

Preactor 17.0.1 User Guide

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Online Documentation

The latest version of this documentation is available online at <http://help.preactor.com>.

Introduction

About Preactor

Preactor APS is a collection of software offerings comprising Advanced Planning (AP) and Advanced Scheduling (AS) products available in Express, Standard, Professional and Ultimate editions.

Preactor AS allows you to gain greater visibility and understanding of your manufacturing processes, and with it greater control of those processes, allowing better machine utilization, on-time delivery, impact analysis of 'what if' scenarios and identification of bottlenecks to give a few examples. Preactor AS is also suited to non-manufacturing environments, given that the principles of resources constraints are applicable across many industry sectors.

For companies who are in a volatile, make to stock environment and require a more dependable method to plan capacity and stock, Preactor AP offers a planning tool that has the convenience of spreadsheets but with interactive graphs to give the user full control over the results. Unlike spreadsheets and other applications that are relied upon to produce long term MPS data that in turn dictates purchasing decisions, Preactor is suitable for working with large amounts of data, supports both constrained and unconstrained production, and provides a tool to perform 'what if' calculations with alternative scenarios that can deliver true cost reductions where it matters.

Preactor has great flexibility and allows data to be input from existing systems (e.g. BoM and orders) or to be entered within the application. It can support all types of manufacturing processes, either with off-the-shelf capability or, with the Ultimate editions, rules specific to your processes can be added.

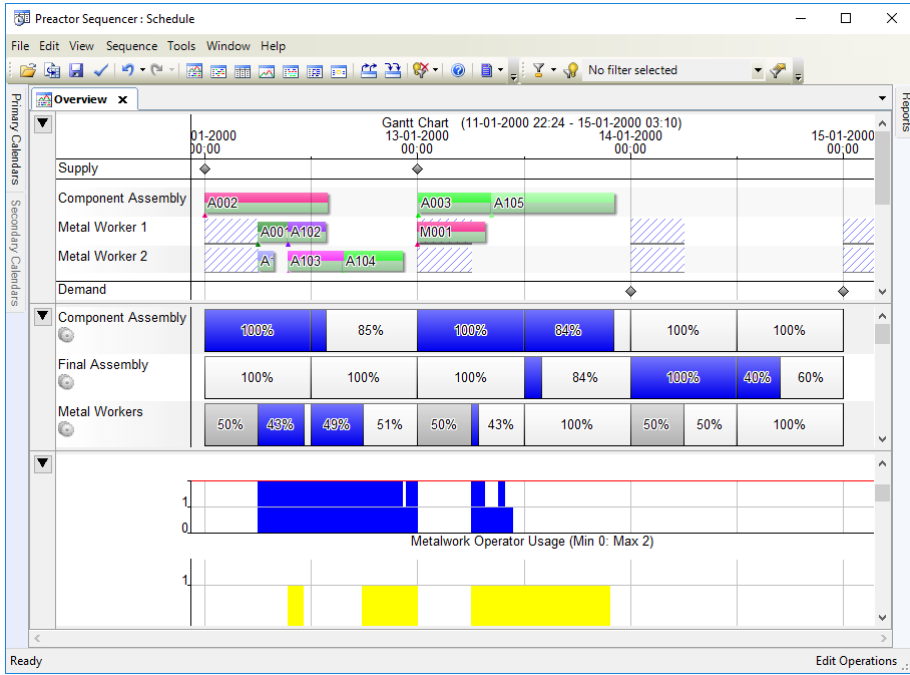
See "Overview" on page 10 for more information on the various editions of Preactor AP and AS.

What's New

This section describes the major new features and enhancements introduced with this release of Preactor. This is not an exhaustive description, but covers the most significant changes. For a more complete list, please refer to the detailed change notes included in the release notes.

Overview Window

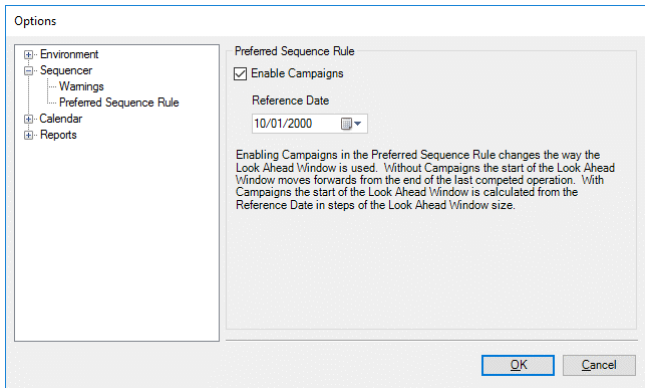
The Preactor AS Overview Window has been renamed to the Gantt Chart. A new, enhanced Overview Window has been created, allowing for a combination of the Gantt Chart, Plots Window and Utilization Window to be shown on a single timeline.



An additional feature to the Overview Window having a single timeline is the ability to have synchronized zooming.

Campaigns Added to the Preferred Sequence Rule

The Preferred Sequence Rule has been improved to allow it to be run in two modes - Campaign Mode, and the traditional Dynamic Timeline mode.



When Campaigns have been enabled, the selection criteria is based on operations that have a Due Date that falls within the given Look Ahead window. The Look Ahead Window is a moving timeline, based on the triggered event time.

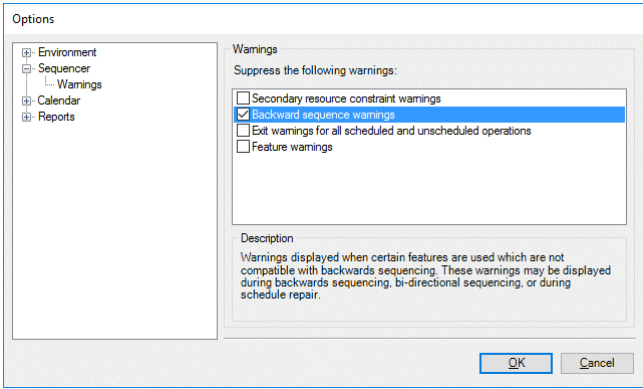
Minimize Overall Setup Rule

The Minimize Overall Setup Rule is similar to the Preferred Sequence Rule, however it focuses on minimizing the setup and changeover times on resources. Improvements have been made to selecting the most suitable resource for the operation.

In order to run this rule in Preactor AS Professional, the Preactor license will require renewal.

Additional Sequencer Options

A number of warning suppression options have been added to the Preactor AS Sequencer.



For example, when the Backwards sequence warnings is suppressed, no warnings will be displayed when there are compatibility issues when using a Backwards Sequencing Rule. It may also impact Bi-Directional Sequencing or Schedule Repair.

Overview

Products

Families and Editions

The Preactor Advanced Planning and Scheduling (APS) solutions offer different features and levels of functionality which take you from Express through to Ultimate.

All editions of Preactor are compatible. This means that you can purchase a lower cost edition of Preactor initially, but then upgrade to another edition as your requirements change. This way you only pay for what you need.

The Preactor products are split into the following product families:

- **Advanced Scheduling (Preactor AS)**
Preactor AS Express, Standard, Professional and Ultimate editions.
- **Advanced Planning (Preactor AP)**
Preactor AP Ultimate edition.
- **Ancillary Products**
Preactor AS Standard, Professional and Ultimate Viewers and Preactor AP Viewer.

Advanced Scheduling

All Advanced Scheduling products offer an algorithmic sequencing method of loading work onto the planning board. This is often referred to as sequential or "order at a time" sequencing. The general philosophy of these rules is to balance the load across resources whilst meeting due dates.

Each operation is selected in turn and all operations are added to the schedule using the constraints that have been defined. All operations for the next order are then processed, and so on, until all orders have been scheduled.

The sequence in which the orders are selected can be due date, priority, or schedule sort order. The direction of loading each operation within an order can be forward from the current time or backward from the due date. In Preactor AS Standard and above you can also define a 'Delivery Buffer', to ensure the order is completed ahead of the due date when backward sequencing. In this case backward sequencing schedules the order from the due date minus the delivery buffer. Work may also be bi-directionally sequenced, whereby up-stream operations for an order are backward sequenced and down-stream operations are forward sequenced, around the selected operation (which must be placed on the planning board).

You may weight orders to generate a preferred sequence of loading, e.g. weight by due date and then by priority. Many schedules can be tried and compared before being released to the shop floor for execution.

The basic features listed for the Preactor AS Express product are available to all the other scheduling products, similarly features listed for the Preactor AS Standard product are also available in all higher level systems, and so on.

Advanced Planning

Available only in Ultimate edition, Preactor AP (Advanced Planning) is a long-term planning tool designed to assist with high level planning decisions based on future demand. AP helps with anticipating seasonal demand variations by utilizing the defined planning resources according to the preferences defined on an item by item basis. Used often in the FMCG (Fast Moving Consumer Goods) sector, Preactor AP considers not only high level capacity constraints, but also order multiples, minimum order sizes and shelf life. Target stock levels are defined in terms of days of cover and an array of charts plots the planned stock level for any given SKU.

Preactor AP Ultimate

The MPS Problem

Master Production Scheduling (MPS) is a key part of the MRP (Master Requirements Planning) process that runs within an ERP (Enterprise Resource Planning) system. The input to MPS will be future customer demand, so it will be typically made up of a mixture of actual sales orders and forecast demand.

There are two main purposes behind the MPS process, which both require MRP to have some visibility of future demand. The first is that MRP can suggest the manufacturing orders that will need to be made. The second is to suggest the purchase orders will need to be raised for bought in items.

The fundamental MPS problem is that the process does not take into account manufacturing capacity. It simply works with the due dates from future demand. This can result in your MRP suggesting orders that cannot be processed in the relevant timescale.

The common solution to this problem is to pre-process future demand through one or more spread sheets before it is loaded into the MPS. This process is often called *Rough Cut Capacity Planning*.

The spread sheets are used to calculate how much of and when each product should be made taking into account some key process parameters such as rough cut capacity, desired stock level limits, shelf life, and so on.

The resulting '*smoothed*' data is then used to create an accurate MPS in the ERP system.

As with any spread sheet based solution, this can work quite well if data volumes are low and there is little variation in demand, but if there is a large numbers of products that share the same production capacity and/or highly variable demand, then the spread sheets become very difficult to manage.

General Features

Planning can be executed in finite or infinite capacity mode and planning time periods can be days, weeks, months or a combination of all three.

Parameters can be set against each item code, which allows different calculations for each item. For example, some products are in *Make to Stock* mode, whilst others are in *Make to Order* mode.

If used together with a Preactor scheduling system, detailed production schedule information can be sent back to the planning system, and this will override planned volume with scheduled volume. MPS can then be recalculated using the production schedule as the base for new results.

Make to Stock

In the food, drink, consumer goods or similar sectors, it is quite likely that production process is in a *Make to Stock* mode. If this is the case, the primary driver in creating the MPS will typically be a forecast of future demand.

Unfortunately, forecast demand can vary over time, due to factors such as seasonality, promotion, weather or special events. This can cause significant variations in forecast demand, which can result in an unrealistic MPS, where there is not enough production capacity to meet the peaks in forecast.

Unfortunately, forecast demand may vary greatly over time because of seasonality, promotions, weather, special events, or similar factors. However, these significant variations in forecast demand can easily result in an unrealistic MPS, where there is not enough production capacity to meet the peaks in forecast.

Preactor AP imports current stock levels, plus actual and forecast demand. It then considers rough cut capacity, pack forward figures, target days of stock cover, manufacturing preferences, minimum/maximum reorder quantities, reorder multiples, product shelf life, and so on, to propose an accurate and achievable MPS.

Production capacity can be specified as a quantity, duration or weight. Using the Preactor calendar system, capacity can be varied over time. The capacity available then limits the production volume created in each period.

Once an initial MPS has been created, the data can be displayed as both stock profile graphs, and capacity usage graphs. The MPS can be changed by simply clicking and dragging a point on the stock or capacity graphs, and the production of a particular item can be moved from one planning period to another. Any changes made will be reflected in all linked plot and grid windows.

The planning BoM (Bill of Materials) can also be exploded by Preactor AP, and then the production plan for lower level items is calculated in the same way. Based on the BoM explosion and the production plan, the proposed material purchase requirements can be exported to an ERP system, for example *Excel*, for action.

Make to Order

In a *Make to Order* environment, the stock levels of finished and/or intermediate items will not be part of the key process parameters, but there will still be the need to evaluate the effects of future demand changes on the manufacturing process.

For example, for complex assemblies in the aerospace sector, each finished item may have a deep BoM (Bill of Materials) and be made up of thousands of individual components. Many of those components are manufactured in-house and they share production capacity, so there is a complex relationship between manufacturing capacity and demand.

When a change in demand occurs, whether that be in terms of quantity or delivery dates, there is a need to be able to quickly assess if it is possible to meet the new requirements.

It is possible to import demand changes into Preactor AP and create a new '*what if*' plan. The planning BoM will be exploded and Preactor AP will show if there are any capacity issues. If there are issues, an acceptable MPS can be created by working interactively.

Ultimate Edition

Preactor AP is available in Ultimate edition only. This means there are no active restrictions on the extent to which AP may be customized. "Ultimate Configuration" on page 300 for more information on how Preactor can be configured to suit all manner of applications.

Preactor AS Express

Preactor AS Express is targeted at users with simple scheduling problems, which is usually found in small, make to order companies. It is for standalone operation only. Database sizes are unlimited. Database tables, fields and menu structure are fixed.

As with all members of the family of scheduling products, the Sequencer has an interactive planning board where you can drag and drop operations from one resource to another, and update the completion times on-screen. It also uses the sequential, or order at a time scheduling method, allowing you to work with rules such as '*priority*' and '*due date*' to decide the ranking of orders.

Features in higher versions of Preactor that are not available in Preactor Express include:

- the Preactor Web Publisher.
- the Preactor Import-Export Script Wizard.
- the Preactor Event Script Processor (PESP).
- the Plots Window.
- Schedule Analysis Reports.
- Customizable data tables and menu interface.

The principal features found in Preactor Express are shared with higher level versions of Preactor.

Additional Information

[Resources and Resource Groups](#)

[Products](#)

[Order and Order Relationships](#)

[File Import](#)

[Table and Field Settings](#)

Preactor AS Standard

Preactor AS Standard edition builds on the features and functionality included in AS Express. The main points of difference are discussed below.

Process Times

Process Times can be defined in terms of time per batch, rate per hour or time per item. They can be either static times defined against an operation, or they can be specific to each of the resources on which that operation is valid.

Setup Times

Setup times can be expressed using one or both of the following techniques:

1. A static setup time against each operation.
2. Attribute based setups.

Unlike to unlike setups are applied when particular attributes are different between operations. These are allowed for table based attributes only. Setup times are defined in the *Changeover Groups* table which must in turn be referenced by the resources on which they are effective.

Operation Relationships

A slack time may be defined between operations.

Subsequent resource constraints can be defined *per operation per resource group*.

Secondary Constraints

While AS Express can be described as a single constraint scheduler, the Standard edition introduces *Secondary Constraints*. These can be used to model all manner of constraints on processes, for example, tooling and manning. There are two ways in which to define secondary constraints:

- By defining a list of individual constraints against each operation and/or resource, and against each of the three attribute tables provided.
- By defining Secondary Constraint Groups that can be applied against an operation and/or resource. You can then select a Secondary Constraint from the group selection. However, in the Sequencer, when generating a schedule Preactor will automatically select a Secondary Constraint when using Secondary Constraint Groups. This can be overridden post schedule generation. You are able to select one Secondary Constraint Group for each operation/resource.

Attribute Tables and Fields

AS Standard allows for up to 12 attributes to be defined per operation. Attributes may be defined in one of three attribute tables, or using one of 9 attribute fields of various types.

Material Constraints

AS Standard allows for modeling of material constraints, using a FIFO linking rule that is biased to link to stock first. In AS Standard, materials always link to a consuming order, such as a Sales Order, or the first operation of a works order. Conversely, materials are always linked from a supply order, such as a purchase order, or from the last operation of a works order. As such, it is only possible to model the linear flow of materials in AS Standard.

Progress Updates

In AS Standard, progress for operations may be fed into the schedule by importing such information from an available data source. Progress will be reported, but will not affect the run-rates of operations.

Order Enquiry

AS Standard supports order enquiries for a single level, meaning one level of process and BoM.

Scripting

AS Standard introduces the Preactor Event Script Processor (PESP) for scripting various aspects of Preactor.

Preactor AS Professional

Preactor AS Professional edition builds on the features and functionality included in AS Standard. The main features and functionality introduced in AS Professional is discussed below.

Full Sequence Dependent Attribute Based Setup Times

Instead of using a fixed setup time, it is possible to define sequence dependent setup/changeover times based on the attributes of one operation to another on a resource.

Set of Standard Advanced Planning Rules

There are a set of Standard Advanced Planning Rules that Preactor can use to scheduling operations. These are:

- APS Forwards
- APS Backwards
- APS Parallel Loading
- APS Preferred Sequence

Preactor Workflow (PESP) Scheduling Actions for Multi-Pass Rules

PESP functionality is increased, allowing for multi-pass rules to be created and used. A multi-pass rule is, for example, one that can locate and sequence specific orders based on specific criteria, and then repeat the process for another criteria.

Operation Level Material Consumption and Production

Supply & demand orders are represented, in the Sequencer, as milestones on the Gantt window. Relationship lines can be drawn between supply orders, works orders and demand orders to show the material relationships. Further analysis of material consumption is allowed in Professional and Ultimate editions of Preactor AS using the Material Explorer.

In addition, in AS Professional and Ultimate editions, user defined pegging rules are allowed. These rules are fully flexible and can be defined as rule sets, which can then be applied on an elective basis. In addition, Professional and Ultimate allow the linking of materials at operation steps other than the first and last operation step. The production of additional materials may be specified in a co-products table.

Material Explorer

The Material Explorer is available in SMC enabled configurations. It provides an interactive graphical representation of links between orders, it accommodates easy access to orders and related orders using its drill down navigational facilities, it can be used to lock or unlock links between orders, highlight shortages and report unused quantities. Material plots relating to the selected order will also be displayed.

Custom Material Linking Rules

Using a PESP script, it is possible to run material control on order enquiry after the order has been expanded but before it schedules on the planning board. The extent to which materials are re-evaluated is driven by the PESP script and limited by the

edition of Preactor. A PESP Action called 'Run SMC on Order Enquiry' exists for light-touch material linking on order enquiry. This action will always filter the producing and consuming queues to the order in question. AS Professional allows you to fully reconsider all materials using the **Run SMC** action. Consideration should be given to the fact that this is a potentially destructive operation.

Advanced Resource Constraints

It is possible to set up complex resource constraints. These take two forms dependent on whether the resource is set up as an infinite resource or a finite resource. For both types of resource the **Match Field** can be used to define rules about the usage of other resources when an operation is placed on this resource. For infinite resources it is also possible to set up match criteria in the **Match Required** field. This allows the limiting of operations that can be placed on the resource at the same time to only those with a matching value in the selected field.

Advanced Operation Constraints

There are additional advanced inter-operation constraints in the scheduling process. These can be defined against the operations in the products table.

Exclude Invalid Resources Based on Attribute

Expanding upon the Attributes functionality available in Preactor AS Standard, for AS Professional and Ultimate editions, it is possible to exclude resources from scheduling processes based on attributes applied to them.

Preactor AS Ultimate

Preactor AS Ultimate edition builds on the features and functionality included in all other editions of Preactor AS. AS Ultimate removes all restrictions on how processes are modeled, which allows for an almost limitless set of scheduling possibilities. The Preactor Package shipped with AS Ultimate is based on the package available with AS Professional, providing a good starting point for your modeling processes.

Below are the main features and functionality that is available in AS Ultimate.

Preactor Object API

Preactor Object API creates an interface, primarily, for data and application manipulations. It exposes methods to read and write data, as well as exposing some application specific behavior. Users can create their own custom actions for use within Preactor in either C# or VB.

Open Planning Board API

Users have full access to the Open Planning Board API, which allows access and manipulate of schedule data directly by using the provided API methods. For example, a user can automate schedule tasks such as inserting operations under defined conditions.

Database Schema and Menu Structure Editing

In Preactor AS Ultimate, users have access to the Preactor Menu and Table Definition Files, which are available for editing. These definition files allow for almost limitless configuration editing, from table building to user interaction (for example). And applicable changes made in this files will be applied to the SQL database

All Preactor Scheduling Features and Classifications

All features and classifications are available in Preactor AS Ultimate, allowing to further configure our Preactor configuration.

For more information on the possibilities with Ultimate editions of Preactor, [see Ultimate Configuration](#).

Preactor Viewers

Preactor Viewers can be used to view all of the same information that is available in an AS or AP system. Viewers have limited functionality that, in general, prevents any form of alteration of the underlying data. However, the Ultimate viewers, with some consideration, can be used to collect information from elsewhere in a business. AS Ultimate viewers have unlimited sequencing capability, so 'what-if' scenarios can be exercised in an AS Ultimate Viewer, though without the ability to commit those scenarios back to the database.

AS Standard and Professional Viewers

AS Standard and Professional viewers are designed to be used with their corresponding AS Master Scheduling System. These products allow read-only access to all Preactor scheduling data tables and to the Sequencer. Access to particular tables may still be restricted using the Security Module.

AS Ultimate Viewers

AS Ultimate Viewers may be used in the same way as AS Standard or AS Professional viewers. These Viewers can also be configured with their own independent database, allowing a subset of information to be shared in an AS Ultimate Viewer session, or for 'what-if' scenarios to be played out. AS Ultimate Viewers permit the commit operations for all tables when using the data editor outside the sequencer. This means that AS Ultimate Viewers may also be used to gather information such as status updates. AS Ultimate viewers also include the Preactor API, so any extensions to Preactor that have been implemented in AS Ultimate may be replicated in the viewer. This means that, for example, a custom scheduling rule can be used to play out a 'what-if' scenario in an AS Ultimate Viewer.

AP Ultimate Viewers

AP Ultimate Viewers are configurable in the same way that AS Ultimate Viewers are, but the planning module does not allow any what-if scenarios to be played out in a viewer.

Classic Products

As of Preactor 17, the products offered are split into two categories; Advanced Scheduling (AS) and Advanced Planning. Within each category are a number of editions ranging from Express through to Ultimate (though at this time only Ultimate editions of Advanced Planning are offered).

Prior to this change, the products offered were:

- Preactor Express
- Preactor 200 FCS
- Preactor 300 FCS
- Preactor 400 APS
- Preactor 500 APS
- Preactor 400 GMPS
- Preactor Enterprise
- Enterprise Runtimes (APS and GMPS)

While these products are all compatible with this version of Preactor, they are no longer generally available. If you are an existing user upgrading to Preactor 17, you will find that your Preactor product continues to work as it always has. If you would like to migrate from your classic product to a generally available product, please talk to your Preactor reseller, or visit the Preactor website at www.preactor.com.

Note: The upgrade path for users of 400 (and above) classic products such as Preactor 400 APS is to an Ultimate edition of Advanced Scheduler or Advanced Planner. The feature set for this transition is equivalent or richer. For 200 and 300 classic products, users should be aware that while an upgrade path exists to either Standard or Professional editions, much of the customization possible in these classic products is now only available with the Ultimate editions, for which an upgrade path also exists.

System Requirements

Your computer should meet the following system requirements for running Preactor.

Operating System	Windows® 7 ¹ Windows® 8.1 ¹ Windows® 10 ¹ Windows Server® 2012 Windows Server® 2012 R2 Windows Server® 2016
Supported Platforms	x86, x64
Microsoft® .NET Framework Version	4.6.2 ²
Microsoft® SQL Server	2008 R2 or later ³ (any edition including Express)
Microsoft® Visual C++ Runtime	Visual C++ Runtime 2017 ⁴
Processor	2 GHz or better
Memory	1 GB RAM (2 GB recommended)
Disk Space	A minimum of 1 GB free disk space is required for Preactor Installation A minimum of 2 GB free disk space is required for .NET Framework version 4 installation on a 64 bit platform.

1. Preactor can be installed on any edition of Windows, but an SQL Server Reporting Services (SSRS) server may only be installed on editions where Internet Information Services (IIS) is supported.
On editions that do not support IIS, only local reporting is possible.
2. Microsoft® .NET Framework Version 4.6.2 will be installed by the Preactor installation program if it is not already installed.
3. SQL Server 2012 is the version supplied on the Preactor distribution media.
4. Microsoft® Visual C++ Runtime will be installed by the Preactor installation program if it is not already installed.

Language Support

Preactor has built-in support for multilingual operation. The default language is English. Siemens have translated Preactor into the following languages:

- French
- German
- Spanish (Mexican, Spanish, Colombian and Argentinian)
- Portuguese (Brazilian and Iberian)
- Russian
- Dutch
- Simplified Chinese
- Japanese
- Polish
- Hungarian
- Italian

- Korean
- Czech

Some additional translations have been provided by 3rd parties, which have been included in the product as a courtesy.

Although Siemens does not certify any other language translations, issues with any translations can be reported and the 3rd party will be informed, so improvements can be made.

The language text is displayed in is dependent on 2 aspects:

- The installation language of the platform.
- The configured language of Preactor.

Some 3rd party applications use the installed language to determine the language to display text, in particular standard settings in dialog boxes (e.g. Yes/No/Cancel).

To get a consistent experience, the installed language and the configured language should be the same. However, it is not necessary to have both installed and configured languages the same (e.g. in locations where more than one language is spoken).

Please note that only the Preactor software is available in multiple languages, and the Help Documentation is only available in English.

Installation

Introduction

This guide provides information on the process for installing and running Preactor.

Whether you are evaluating Preactor, or you have purchased a license, the installation package will be the same. Without activating a license, Preactor will only run in trial mode for 30 days after it is first run. When you purchase a license, that license will have to be activated.

Installing a full version of Preactor for the first time, the following steps are taken:

1. Ensure prerequisite SQL Server instance is available (the version provided on the Preactor distribution media is Microsoft SQL Server 2012 Express (Database Only) Edition.
2. Install Preactor by opening the installation package and following the on-screen instructions.
At this point Preactor can be run in trial mode for up to 30 days.
3. Order and obtain an Activation Code.
This can be for a single user/system, or a multi-user network license.
4. If a Network License has been purchased, download and install the Preactor License Manager software.
5. Use the license utility to enter the activation code. If you are using a trial, you will be prompted by the license utility every time Preactor is run. Alternatively you can enter the activation code by opening the license utility from the start menu. For network license servers, the activation code should be entered on the server using the network license utility.

At this point Preactor can be run in activated mode.

Installation Options

This installation guide will walk you through the simplest deployment scenario where Preactor and Microsoft SQL Server 2012 Express (Database Only) Edition are installed locally. No knowledge of Microsoft SQL Server is required in this scenario.

For deployment scenarios where the SQL Server and/or SQL Server Reporting Services are to be accessed over the network, please contact your IT department.

Installing SQL Express

Preactor requires a connection to a SQL Server instance in order to deploy databases and to use as a persistent store. You may use a pre-existing instance of SQL Server either locally or on the network. If there is no pre-existing instance to use, a copy of SQL Express is included on the installation media.

To install Microsoft SQL Server 2012 Express (Database Only) Edition from the Preactor installation disk.

1. Place the installation media into your drive. If the launcher application does not automatically start, then you will need to browse to the drive using Windows Explorer and double click on the 'setup.hta' file.
2. Follow the on-screen instructions.

If you have downloaded a stand-alone installation of Preactor, or if you prefer to use a later version of SQL Express, you may download it from <http://www.microsoft.com/express/database>.

Tip: Detailed guidance on installing and configuring SQL Express can be found at:
<http://msdn.microsoft.com/en-us/library/ms143219.aspx>

Local Instance

The default deployment case for Preactor is a local instance of SQL Server Express Edition. For this type of deployment, the default server configuration options are suitable.

Remote Instance

Any supported edition of SQL Server may be used and can also be deployed remotely. Remote deployment of SQL Server should be performed according to best practices and should only be done where compliant with network and organization policy.

Note: When deploying SQL Server for use with Preactor on a remote server, in order to ensure integrity of data and deny any possibility of data being compromised or tampered with, due care and consideration should be taken to ensure that all communications between the Preactor application and the SQL server are encrypted.

Installing Preactor

Preactor can be installed from either the Preactor Installation CD or it can be downloaded from the web site. The web install does not include any prerequisite software, which must be downloaded separately if required.

- Installing from the Preactor Installation disk
 1. Place the Preactor Installation disk into your CD-ROM Drive. If the CD launcher application does not automatically load, then you will need to browse to your CD drive using Windows Explorer and double click on the setup.hta file.
 2. Follow the on screen instructions.
- Installing from the Web Installer
 1. In Windows Explorer, double click the .exe file.
 2. Follow the on screen instructions.

If upgrading, the upgrade is recognized when Preactor is run and some additional options are available to the user at that point.

When (re)installing or upgrading, any existing configuration will be maintained. Upgrading the configuration is done by Preactor when it is run. See [Running an Upgraded Version of Preactor](#).

Upgrading

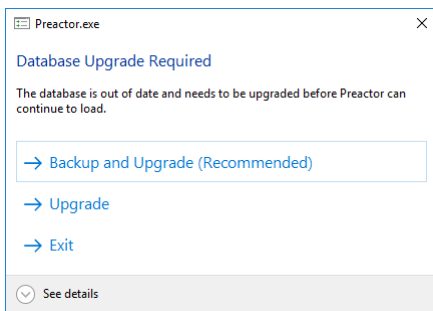
The procedure for upgrading Preactor is the same as for an initial install. "Installing Preactor" on the previous page.

Any Preactor configuration that works with Preactor 10.0 or later can be upgraded to this release.

Note: It is strongly advised that you take a backup of your configuration before upgrading (i.e. create a configuration package).

Once Preactor is installed, any existing Preactor configuration may be opened. To do so, start Preactor in the normal way, selecting the required configuration.

At this point, it is likely that a set of upgrade tasks need to be performed. The greater the difference between the version of Preactor last used with the configuration selected and the version being used now, the greater the number of upgrade steps that will be performed. Before the upgrade steps are executed the following options are offered:



- Backup and Upgrade
Opens the Preactor Configuration Package Manager, allowing a configuration backup to be taken before the upgrade steps are performed.
- Upgrade
Performs the upgrade steps without taking a backup of the configuration.
- Exit
Close Preactor without performing any upgrade steps.

Warning: Once an upgrade step has been performed, it may not be undone. Taking a backup of a configuration prior to performing any upgrade steps is recommended for this reason.

Customization Upgrades

Where additional work may be required due to customization, refer to your Preactor partner for support.

Repairing Preactor

If the files installed with an application have been altered in some way, it is possible that the application will be rendered inoperable or will exhibit unexpected behavior. For this reason many applications, including Preactor, include a repair facility to return the installed application to its expected state.

To repair an existing installation of Preactor, either re-run the installation wizard from the installation media and choose the Repair option or select the repair option presented when selecting Preactor from the list of installed programs in the 'Programs and Features' control panel application.

Repairing an existing installation will replace any missing or corrupt files and re-create any shortcuts.

Uninstalling Preactor

Preactor is uninstalled using the Windows utility, found under Start ► Control Panel ► Program and Features, or by running the Preactor executable downloaded from the Preactor web site, selecting the option to remove the software.

Uninstalling Preactor does not removed any of the configuration files.

No configuration files will be overwritten by the (re)installation of Preactor.

Be sure to take a back-up copy of any configurations you wish to keep.

Preactor Environment

Configuration Folder

When Preactor is installed, a set of configurations are also installed in the folder 'Preactor Configurations', as indicated in the installation script. A number of configurations are provided, each in their own folder.

When expanded (either by double clicking on the file, or from the Configuration Package Manager), a number of files are created. Of particular interest are:

Preactor Command Definition File (.prcdf)

This is a text file reflecting the main configuration items of the system, but Preactor provides an intelligent editor to help with its editing (right click and select 'Modify with Preactor [VERSION]', with the Version being the Preactor version installed). In the distributed configurations, the name given to this file is indicative of the Preactor product selected to be executed – e.g. Preactor AS Ultimate.prcdf and Preactor AS Professional.prcdf.

Preactor Menu Definition File (.prmdf)

This is a text file, normally edited with Notepad. It allows customization of the Preactor menus.

Preactor Table Definition File (.prtfd)

This is a text file, normally edited with Notepad. It allows customization of the Preactor tables and fields.

SQL Database

Preactor holds its working data in an SQL Database.

Licensing

Licenses

Introduction

Preactor uses FlexNet Software Licensing for managing access to its products, and is offered with either:

- **A local license.**
If Preactor is going to be resident on a single machine, then a local license will suffice.
- **A floating multi-user Network License.**
If Preactor is going to be used by a number of users on their machines, even if the users are only running Preactor 1 at a time, a floating network license is required.

A license manager, installed on a server common to a number of systems, can be loaded with one or multiple licenses which enables that number of concurrent users of Preactor.

The Network License Service needs to be installed, licenses added, and Preactor configured to use that network license.

There are two different Run modes that Preactor can be launched in:

- **Trial mode**

This allows Preactor to be tried over a trial period of 30 days. The time period begins as soon as Preactor is opened in this mode. Preactor can be used until the 30 days have expired.

- **Activated mode**

This allows Preactor to run in a fully activated state with no time constraints. An Activation Code must be entered to set Preactor to run in this mode.

Licensing is on a product basis, e.g.

- Preactor 300 FCS
- Preactor 500 APS
- Preactor Viewer

Activation Codes are obtained through your Preactor Partner, and it will generally be provided in an email and can be copied/pasted into Preactor.

Activation can be performed:

- **Online**

Preactor Licensing operations are optimized for systems with internet access,

- **Offline**

For installations that do not have or allow internet access, a manual procedure is offered whereby files are transferred manually between the system and the license activation service.

See [Offline License Management](#) in conjunction with the description for the different Licensing operations to understand how the user accomplishes each operation in an offline installation.

There are a number of operations associated with Licensing Preactor:

- Initialization of the Licensing Area.
- Activating a License.
- Selecting a License.
- Upgrading an existing license.
- Returning an existing license.
- Repairing an existing license.
- Network license manager installation and Setup, and configuring Preactor to use the network license.

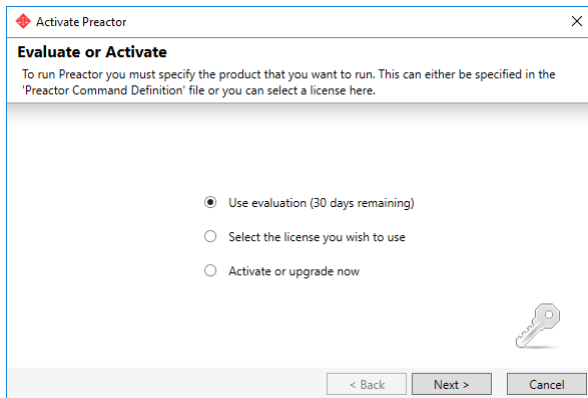
License Checks when Starting Preactor

Whenever Preactor starts, a number of license checks take place. The user will be advised and/or offered options based on those checks.

- If there is no license installed and selected, and no evaluation license has previously been used on the host system, the user is offered the opportunity to Use the Evaluation license.
If selected, this will Initialize the licensing area and activate an evaluation license for a limited period of time.
- If there is no license installed and selected, but an evaluation license is installed, the system will advise the user of the time remaining on the evaluation license before continuing.
- If there is no license installed and selected, the user is offered the opportunity to activate a license, or to select an already activated license.
- If there is a license installed and selected, but it is within 7 days of renewal, the user is prompted with this information before being allowed to continue using Preactor.
- If there is a license installed and selected, and not within 7 days of renewal, Preactor will continue through to the Preactor Desktop.
- A license is automatically selected if present for the configuration being run.

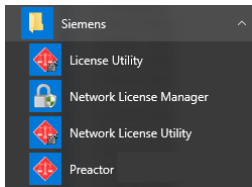
- If a license is not available for the level of configuration selected, but an evaluation license is still available, the evaluation license will be auto selected.

The example below shows an Evaluation license activated:

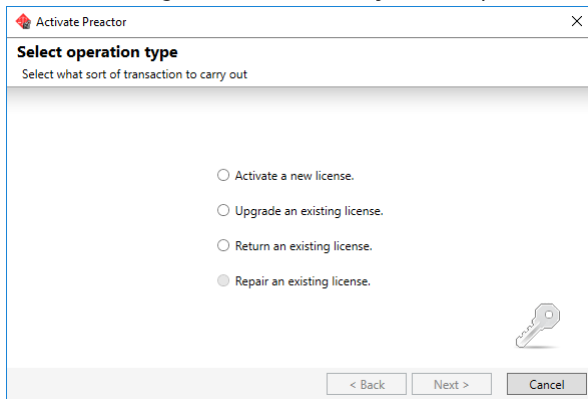


Executing License Operations

All operations (except selecting the license to run Preactor with) can be exercised through the **Licensing Utility** software available from the **Start menu - Siemens** folder, either for the Local License or Network License:



When running the License Utility, valid options are active, invalid options are grayed out.



License Warning

Preactor is licensed using a system that entitles the user to execute the software. While every effort has been made to ensure the continued operation of your Preactor software, it is the case that certain operations may compromise the integrity of the license entitlement and render the system inoperable.

Such operations include, but are not limited to, amending system or installation files, deleting or moving those files or imposing policies that restrict access to those files and / or the system registry.

In order to avoid such issues, you must perform all operations on your license entitlement using the included License Utility, or Server License Utility for network licenses. Under no circumstances should you attempt to duplicate, move or remove a license entitlement by any other means, and any attempt to tamper with license entitlements is strictly prohibited. Any such attempts will render the system inoperable.

In the event that the integrity of the license entitlement is compromised, a manual administrative procedure must be performed. For customers not under current maintenance there is an administrative charge associated with this service.

For instructions on the correct procedures for removing and returning licenses, consult the included documentation.

Activating Preactor

The first time Preactor runs, you will need to specify what license to use.

Activating a Trial

You can activate Preactor for a trial period of 30 days. The time period begins as soon as the trial license is activated.

To activate trial mode, start Preactor and choose the 'Use evaluation.' option presented on the opening screen.

Activating a License

To activate a commercial license select 'Activate Now' and follow the on-screen instructions. An activation code is required in order to complete the activation process. Activation can be performed over the internet or off-line.

Once Preactor is activated, you will no longer be prompted at start-up.

License Initialization

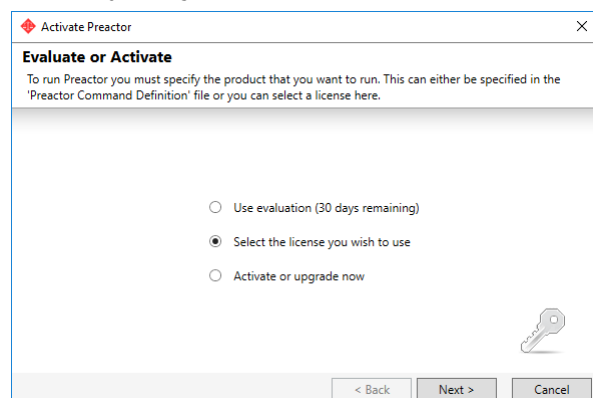
When operating **Online**, Initialization of the Licensing Area is performed as part of the License first Activation - either for a Trial or a normal Activation license - almost invisible to the user. Observing the pop up dialog when activating a license for the first time will see 2 requests being sent and responded to.

When operating **Offline**, since each request and response is performed by manually transferring files to/from Preactor, these separate operations become plainly visible as a request and response file needs to be transferred for each operation.

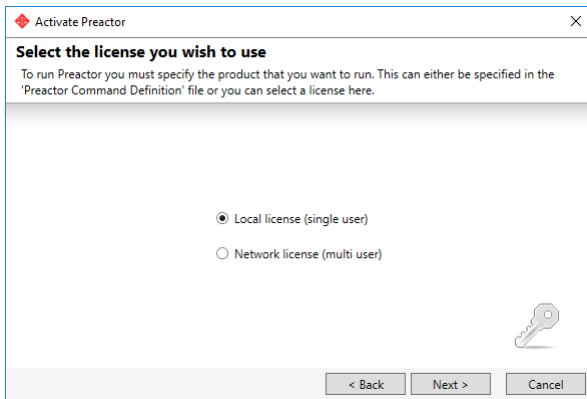
Selecting a License

Selecting a license to use is done from within Preactor.

Whenever starting, where no license is Activated and Selected, the user is offered the opportunity to Select a previously activated license.

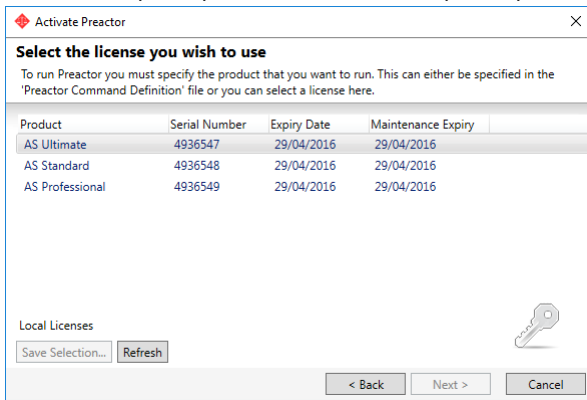


When selecting to Select a license, the user is led through a series of dialogs to select the required license, starting with:

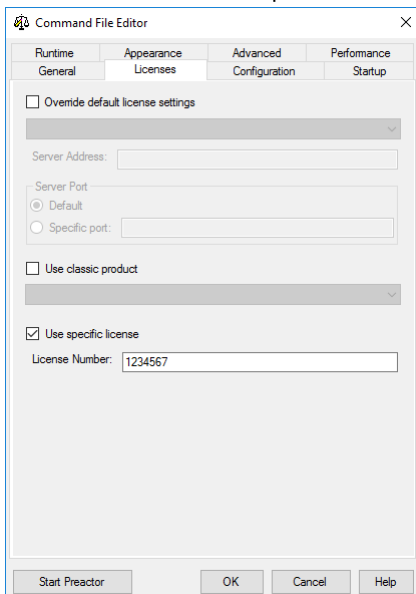


Select the Local license (single user) option.

The user is prompted to select the required product.



At this point, the user can chose to save the selection for later use. Hit Save Selection, and the selection will be saved in the Command File as the specific License Number to use:



If the user does not select to save the selection, the selection will have to be made again the next time Preactor is started.

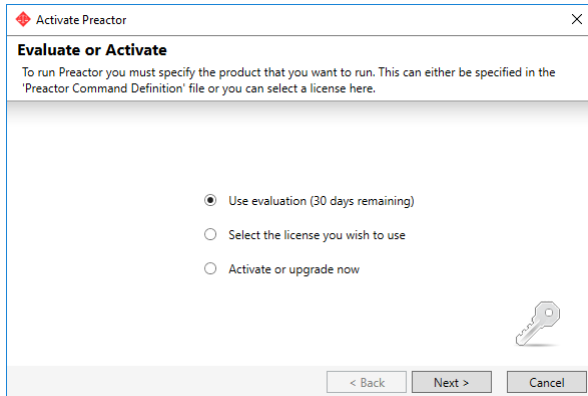
Node Locked Licenses

Node Locked Licenses

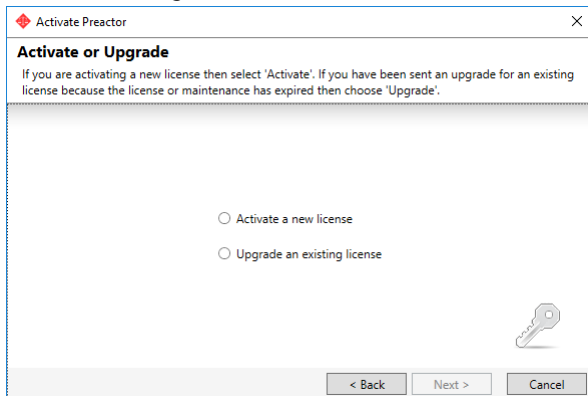
Activating a New License

Activating a license can be done from within Preactor or from the license utility, which utilizes similar screens.

Whenever starting, where no license is Activated and Selected, the user is offered the opportunity to Activate a new license.

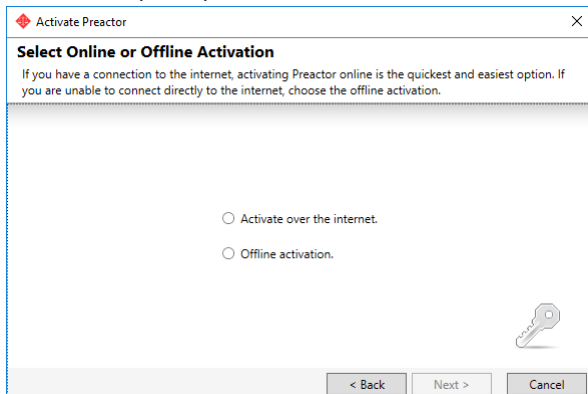


When selecting to Activate now, the user is led through a series of dialogs to configure the Licensing required, starting with:



Select the Local license (single user) option.

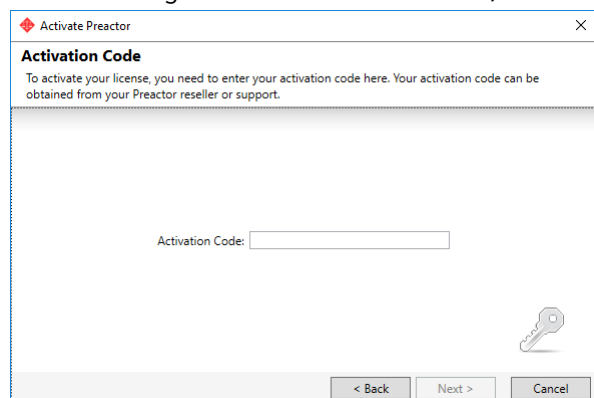
The user is prompted for Internet or Offline activation.



See [Offline License Management](#) for guidance for the offline activation.

Activation Over the Internet

After selecting Activate over the internet, the user is prompted to enter the Activation Code:



Enter the Activation code, and Preactor will perform all actions and checks without further user intervention.

Network Licenses

Network License (Multi-user)

Introduction

The Preactor Network License Manager is used to serve concurrent (floating) licenses for the Preactor application. This document describes how to install and use the Preactor Network License Manager and how to deal with some of the more common issues that occur.

The licenses that Preactor uses are stored in a secure location in an encrypted form. Preactor can either use a 'local' license, in which case the Network License Manager is not required, or the license can reside on a server and be used by multiple computers or users. These server based licenses are called concurrent or floating licenses and are served over a TCP/IP network by the Network License Manager.

The basic components of the Network License Manager are:

- **License server manager**
This application (ladmin.exe) is installed as a service and provides a web management frontend for licenses and allows users to view the status of the server, restart the server, and change the configuration for other services.
- **Vendor daemon**
This application serves licenses for Preactor over the network. This daemon is automatically started by the license server manager and is critical for clients to be able to run Preactor.BoM

Selecting A Server for the Network License Manager

When selecting a machine on which to install a license server select a stable system; do not choose systems that are frequently rebooted or shut down. For this reason, installing the Network License Manager on a user's desktop machine is not recommended and an 'always on' server is preferred. However, there is no technical limitation to installing the Network License Manager on the same machine that will run the Preactor application.

The resources required for the Network License Manager are typically very low:

- **Memory**
The Network License Manager uses roughly 10MB of RAM.
- **CPU**
Very little CPU time is required and, for fewer than 100 concurrent users, the service may only consume a few seconds of CPU time over many days
- **Disk space**
A full install of the Network License Manager will consume around 40MB of disk space. By default the Network License Manager writes out log files to aid with creating usage reports or diagnosing problems. For a small numbers of clients

these log files will grow at a small rate but it is worth checking these files occasionally and rotating and archiving them. Logging can be turned off in the license server manager if space is at a premium. It is recommended that logging is always to a local disk and never to a remote network share.

- Network bandwidth

Relatively little data is sent across the network and typically a check-out or check-in of a license uses about 1KB of bandwidth. It is possible for clients to connect over dial-up or slower connections to a central server. The web based frontend for managing licenses uses HTTP and significantly more bandwidth may be used depending on the frequency with which pages are loaded. For day-to-day use of Preactor this web based frontend is not required so users do not necessarily require access to this if network bandwidth is a bottleneck.

Installing the Preactor Network License Manager

The Preactor Network License Manager can be downloaded from the Preactor website. The software can be downloaded from the [GTAC website](#).

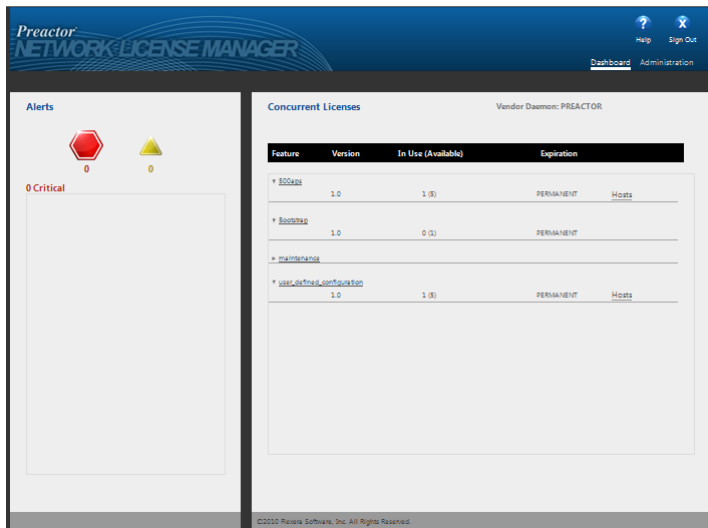
The install is packaged as a self-extracting executable and all that is needed to install it is to double click it to run. Administrator permissions are required to do the install as the installation includes adding a Windows service as well as installing some licensing components to the system. After the Network License Manager has been installed administrator permissions are not required and the service should run at start-up and be available to all users.

The Preactor Network License Manager should be installed to the default location that is suggested by the installer. After installation, the service will automatically be started and, unless specifically told to by the installer, no restart is necessary.

Accessing the Preactor Network License Manager

The Network License Manager can:

- Monitor license counts and who is using licenses.
- Monitor alerts from the license server (out of licenses/errors etc).
- Restart the license service.
- Configure logging on the licensing.



It can be opened from the Help and Support menu option, or from:

Start ▶ All Programs ▶ Siemens ▶ Preactor Network License Manager ▶ Network License Manager

It can also be accessed via a web interface by using a supported web browser. This is useful if the Network License Manager is being opened from a system which does not have Preactor installed.

All versions of Internet Explorer from Internet Explorer 6.0 upwards are currently supported. Most other browsers should work correctly though there may be small layout issues. The web interface can be accessed in two ways:

1. In Standard mode. This is the standard license server management interface, at:
`http://<server>:2188`
 where <server> is the system name where the license server is running.
2. Section 508 mode. This mode provides access to people with disabilities and has the same capabilities as the standard mode, at:
`http://<server>:2188/login508`
 where <server> is the system name where the license server is running.
 The term "Section 508 mode" comes from Section 508, 36 CFR 1194.21, "Requirements for Software Applications and Operating Systems" of the 1998 amendment to the Federal Rehabilitation Act.

Managing the License Operations in Preactor

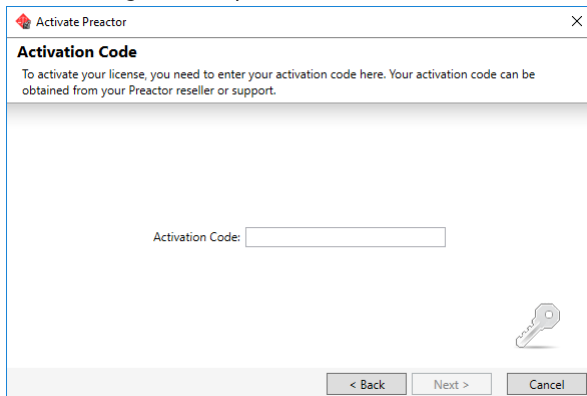
All license operations are managed by the Network License Utility:

Start ► All Programs ► Siemens ► Network License Utility

From here, the following operations are available:

- Activate a new license.
- Upgrade an existing license.
- Return an existing license.
- Repair an existing license.

Performing these operations for a network is exactly the same as for a local single user license.



Managing the Network License Service

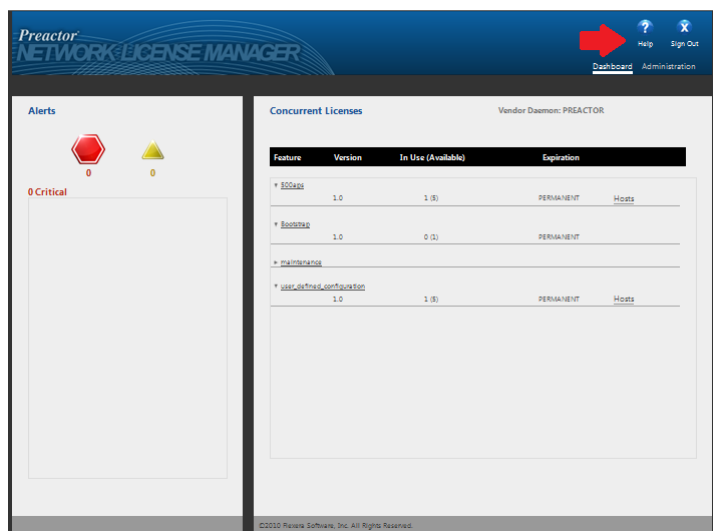
There are two sections to the web interface – the Dashboard and Administration sections.

The dashboard provides information for users about available licenses, who is using licenses, and alerts about the status of the license server.

The administration section allows the server administrator to change parameters for logging and ports used by the vendor daemon.

To log in to the administration section the default username and password are both 'admin'. This should be changed to prevent non-administrative users logging in.

There is full help for the web interface available from within it.



Using a Network License

From the prompt when starting Preactor, select to Activate now, then the Activate a Network license option.

At the next prompt, enter the server address, and the port number if the default is not being used.

This will not succeed unless a License has previously been activated using the Network License Utility.

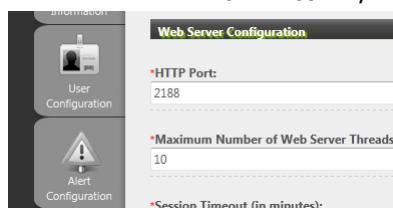
The server address can be:

- an IP address.
- a computer name
- a fully qualified domain

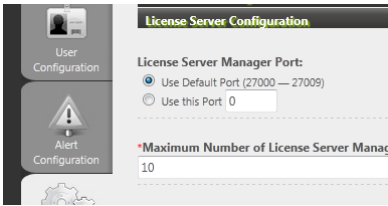
TCP/IP Ports

The Preactor Network License Manager uses three different TCP/IP ports for serving licenses over the network:

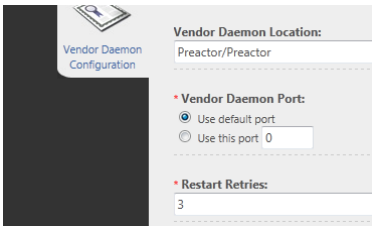
1. The license server manager web interface comes preconfigured to use port 2188. It is recommended that you leave this at its default value but, if it needs to be changed due to a conflict, it can be changed by editing the 'server.xml' file which resides in the 'conf' subdirectory of the installation folder. This file contains a <webserver> element with the port specified as an attribute. Alternatively, the port can be changed by using the web interface itself but this would require that the web interface is accessible, at least for a short period of time.



2. The License Server Manager is a service which provides details about the vendor daemon to connecting clients. This service enables the Preactor application to discover the port number that the vendor daemon uses. This means the user need not specify the port number when activating the Preactor application. By default this service runs on a port in the range 27000-27009. It is recommended that this is not changed unless there is a conflict. It can be changed through the web interface.



3. The vendor daemon, which serves licenses, is the most important part of the Preactor Network License Manager. By default it will choose a port to run on and this port can be any one it finds free (often it will choose one near port 50000). It is recommended that this is changed to be a fixed port which the server administrator knows is free.

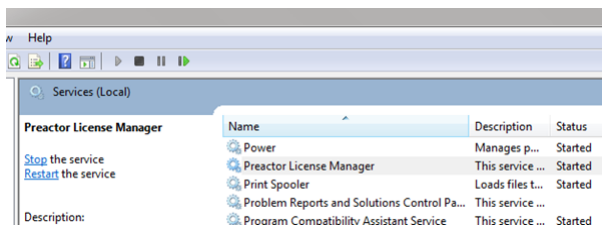


To change the port, enter the 'Administration' section of the web interface, select 'Vendor Daemon Configuration' and then select 'Administer' next to the 'PREACTOR' daemon.

License Troubleshooting

General Troubleshooting

The first thing to check when the Preactor application is unable to find a network license is whether the required services are running on server. This can be found under **Services** in the **Windows Control Panel**. There are two services which need to be running – the **FLEXnet Licensing Service** and the **Preactor License Manager**.



Preactor will not be able to use licenses if either of these services are not running.

To diagnose this issue, open a command prompt and change to the installation directory for the Network License Manager.

Running the command `lmadmin -foreground` will start the Preactor License Manager and should provide information on why the service is not starting correctly.

If the output from running `lmadmin` from the command prompt is similar to the following, the problem is likely to be port conflicts between the Preactor Network License Manager and another program:

```
<OS 10048> Only one usage of each socket address <protocol/network address/port> is normally permitted. : make_sock: could not bind to address 0.0.0.0:8080 no listening sockets available, shutting down. Unable to open logs
```

If there is a port conflict, the ports can be temporarily reconfigured to allow access to the Network License Manager and the administrative options to allow a permanent change:

- Use the *-licPort* argument for the license server port.
- Use the *-webPort* argument for the HTTP port.

The following command reconfigures the HTTP port to 8081:

```
lmadmin -webPort 8081
```

When you have reconfigured the HTTP port, you access the license server management interface using the new port number. So for the example above, connect to the URL, *http://<server>:8081*.

Firewalls

One of the more common issues when deploying the Preactor Network License Manager to a server is that most operating systems ship with an in-built firewall. For network licenses to be served over the network, ports need to be opened up to allow for this communication.

1. The vendor daemon needs to be accessible from the local network. By default the vendor daemon does not run on a fixed port so it is recommended that this is changed through the web interface. Any free port is acceptable and a high one is preferred to help prevent any conflicts with other applications. This is the minimum requirement and at least this port must be open.
2. The license server manager can be opened to the local network which allows users to activate Preactor without having to specify a port. By default, this service runs in a port range between 27000 and 27009 and it is recommended that this port range is opened to TCP traffic.
3. The Preactor Network License Manager web interface can also be opened to the local network. By default this service runs on port 2188 and listens for TCP traffic. This web interface is useful for users to see the status of the license manager but is in no way required for the correct running of the Preactor application.

Some firewalls allow you to specify an application to be allowed through the firewall rather than explicitly specifying ports. There are two applications which do network communications – **lmadmin.exe** which is in the installation folder, and **preactor.exe** which is in the **Preactor** subfolder of the **Network License Manager** installation.

Log Files

There are a number of log files created using the default configuration shipped with the Preactor Network License Manager. These logs files should be sent to your technical support provider in the event of having problems with network licenses. The log files are stored in a directory called 'logs' under the installation folder for the Network License Manager.

- access.log - Contains information recorded about access to the license server management interface.
- lmadmin.log - Contains information recorded by the license server.
- web.log - Contains information recorded by the license server management interface. This file does not contain information about login events. See the access.log file for that information.
- Preactor.log - This file contains information recorded by the corresponding vendor daemons

Move a License

A license may be moved to a new system by Returning the license, then using that license (same activation code) to activate Preactor on the other system.

Return a License

A license may be returned for a number of reasons, most commonly to re-use the license on a different machine.

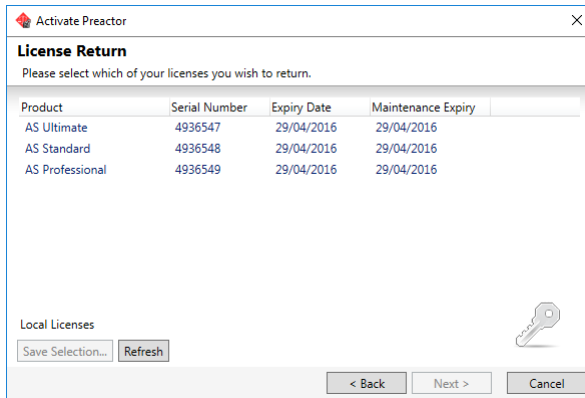
This is done from the Preactor License Utility – by selecting Return an existing license option.

At the next prompt, the user is asked whether the license is being returned over the internet, or is it an offline return.

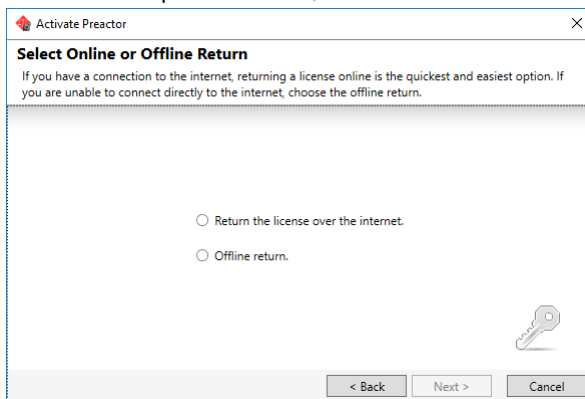
See [Offline License Management](#) for guidance for the offline returning of a license.

Returning a License Over the Internet

At the next prompt, the user is asked to select the license to return:



Select the required license, then Next. The user is then asked why the license is being returned.



Select the appropriate reason and hit Next.

The licensing utility will perform all actions and checks without further user intervention.

Upgrade a License

A license may be Upgraded to:

- Renew the license (timeout or maintenance date changed).
- Extend capability (The product or number of licenses changed).

The new license is obtained from your supplier.

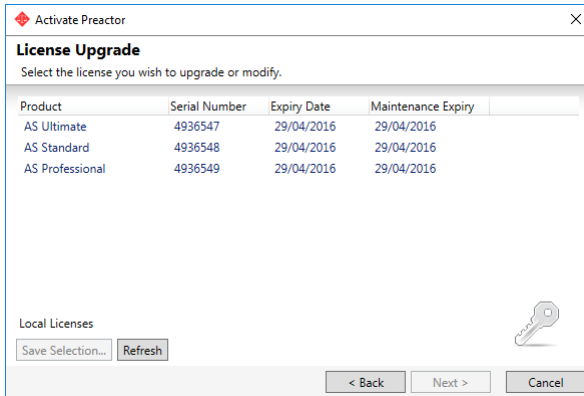
Upgrading the license is done from the Preactor License Utility – by selecting the Upgrade the existing license option.

At the next prompt, the user is asked whether the license is being upgraded over the internet, or is it an offline upgrade.

See [Offline License Management](#) for guidance for the offline upgrading of a license.

Upgrade a License Over the Internet


At the next prompt, the user is asked to select the license to upgrade:



Activate Preactor

License Upgrade
Select the license you wish to upgrade or modify.

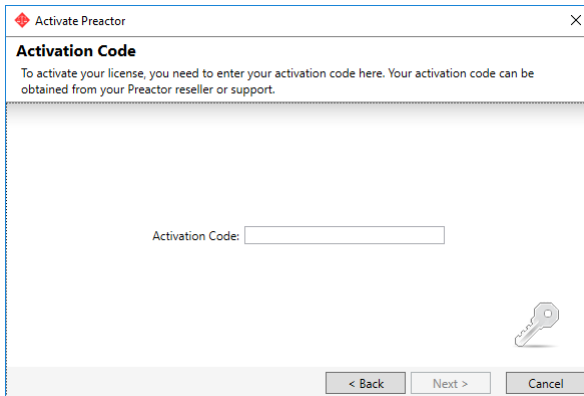
Product	Serial Number	Expiry Date	Maintenance Expiry
AS Ultimate	4936547	29/04/2016	29/04/2016
AS Standard	4936548	29/04/2016	29/04/2016
AS Professional	4936549	29/04/2016	29/04/2016

Local Licenses 

Save Selection... Refresh

< Back Next > Cancel


After selecting the license to upgrade, enter the new Activation Code:



Activate Preactor

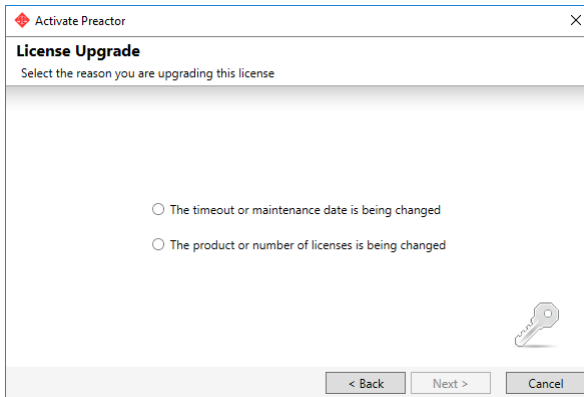
Activation Code
To activate your license, you need to enter your activation code here. Your activation code can be obtained from your Preactor reseller or support.

Activation Code:



< Back Next > Cancel

The user is then prompted to select the reason for Upgrade:




Activate Preactor

License Upgrade
Select the reason you are upgrading this license

The timeout or maintenance date is being changed

The product or number of licenses is being changed



< Back Next > Cancel

Select the appropriate reason and hit Next.

The licensing utility will perform all actions and checks without further user intervention.

The user can upgrade the license to both renew the license and to add capability at the same time. In this case, the user selects to change the product - any change to the maintenance dates will be taken into account at the same time.

Repair a License

A license may need Repairing for a number of reasons, for example forced use of new H/W.

This is done from the Preactor License Utility, and when a repair is necessary the repair option is active (when not, it is grayed out).

Preactor attempts the repair and will report the success or failure of the repair. If it failed, the user should contact Preactor Support.

Offline License Management

Although licensing Preactor is optimized for systems with internet access, a capability is available to support the case where the Preactor system is offline – i.e. not connected to the internet.

Preactor must have a data exchange with the licensing servers for most activities, e.g. for:

- Activation* – When the Activation Code is entered, to ensure it is valid and to record its use.
- Upgrade – When the Activation Code is entered, to ensure it is valid and to record its use.
- Return – to return the Activation Code.

This section can be read in conjunction with the description of each License Operation to see how the procedure is modified in an offline environment.

Offline Data Exchange procedure

There is a common procedure to support the Offline data exchange.

Whenever Preactor has a 'dialog' with the licensing server:

1. A Request file must first be generated and sent to preactorsupport.plm@siemens.com, to obtain a file that is used to enable Preactor to perform the requested operation.
2. A Response file is returned to the user.
3. The Response file is then applied to Preactor to complete the required operation.

It is generally possible to continue operating Preactor with its existing capabilities after sending the request file to support and while awaiting the response (though not for returning a license). When a response file is to be applied, simply restart Preactor or the License Utility, and the option to enter the response file is offered when going through the screen progression shown below.

Activation/Initialization*

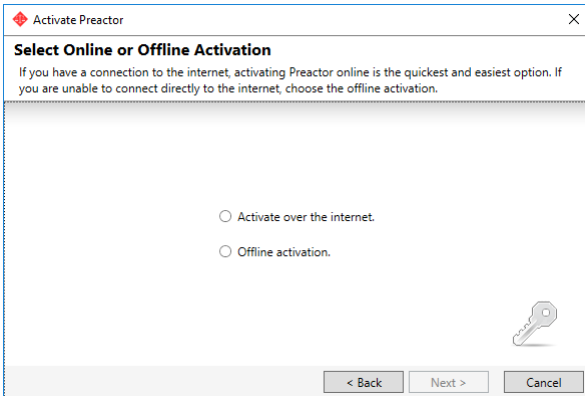
As explained in the Introduction, the step to Initialize the Licensing Area which is part of the first Activation operation performed on Preactor, and which is integral to the Activation request for online activation, involves an additional explicit step for offline activation. This is again done by a data exchange with the licensing servers. So, activating a license for the first time will require 2 data exchange dialogs with the licensing server.

Offline License Activation Example

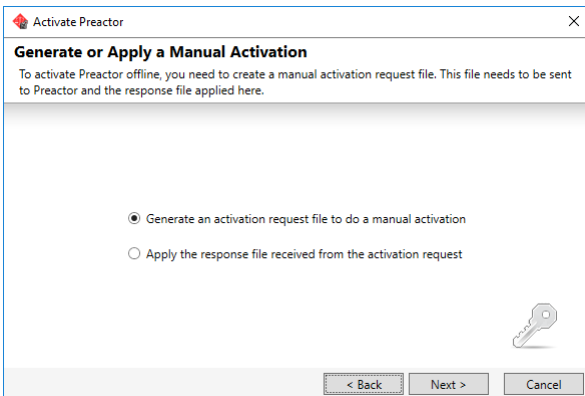
The following example of an offline procedure shows an activation. The upgrade is the same, and the return differs only in that no Activation Code needs to be provided.

This example starts with the Activation already initiated, either when running Preactor in response to the Trial license expiring; or from the License Utility (in the case of a Network License installation, this must be initiated from the Utility).

1. After selecting the operation, the user is prompted to indicate whether this is an offline operation.

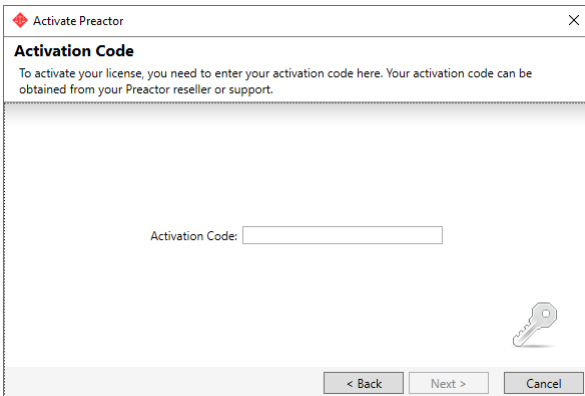


2. Selecting the offline operation, the user is prompted to generate the request file or to apply the response file.

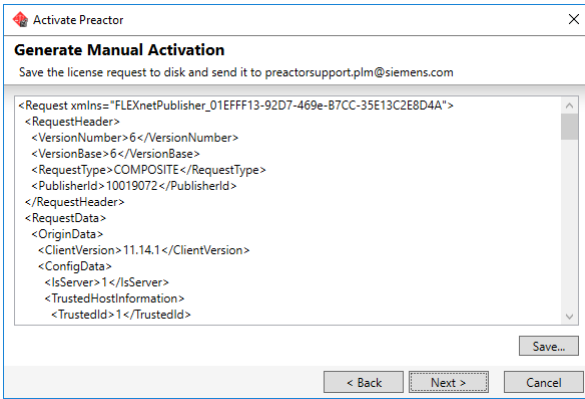


3. First, you must generate the request file.

For the activation and upgrade operations, an Activation Code will be prompted for:



4. A Request file is generated:



5. These contents can be saved into a file, or copied/pasted as required. The file must now be sent to preactorsupport.plm@siemens.com.

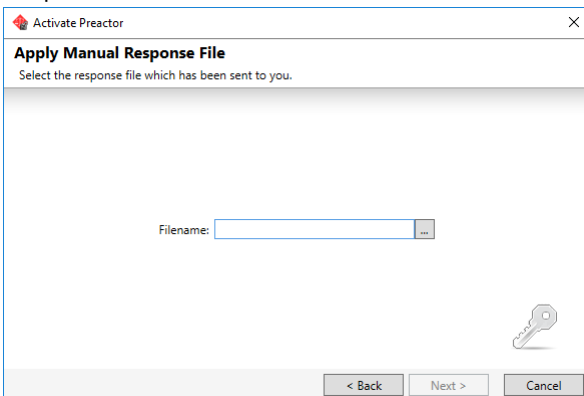
At this point, for activation and upgrade, the licensing activity can be canceled and Preactor can continue to run normally as before while the user is waiting for the response. The product however goes to an unlicensed state if returning a license.

6. When the Response file is returned to the user, it must be placed on the Preactor system.

The licensing activity is restarted again if necessary and returned to the prompt where the Response file can be applied.



Selecting to apply the Response file, or when continuing after generating the Request file, will lead to the prompt to enter the Response file name:



1. Enter or browse to the file.

Selecting next will enable Preactor to complete the operation without further user intervention.

Remember - if Activating for the first time, there will be a second Data Exchange (another request file being generated to be sent to Preactor, another response file to be entered), the first one having been for Initializing the License area, the second for Activating the license.

Configuration Packages

Configuration Package Manager

Overview

Preactor requires a configuration consisting of a database, some configuration files and, optionally, report definitions. Preactor configurations are distributed packaged in a .prpkg file. It is also possible to create these files as a backup for an existing configuration.

The Configuration Package Manager is a tool for managing package files. It takes care of restoring the database to a SQL Server and extracting the configuration files needed to run Preactor.

A set of example package files is distributed with Preactor. Other example Preactor packages can be downloaded from the Preactor web site. The configurations distributed with Preactor are installed into a 'Preactor Configurations' folder by default in the shared documents folder.

Extracting a Preactor Package

The default settings when extracting a package file are appropriate given the following assumptions:

- The database server you are running is using SQL Server Express Edition 2008R2 or later.
- The server has the default instance name of 'SQLExpress'.
- The user has the appropriate permissions for the database server. Using Windows authentication when connecting to the SQL server, the user needs to have 'create' or 'overwrite' permissions. In most cases, a user with Administrator privileges will have appropriate permissions.
- The folder name into which the package is installed will be used to name the database. For example, if your package is placed in a folder called 'My Configuration' then the database will be named 'My Configuration'.

All of these assumptions may be changed by selecting the appropriate options within the Package Manager wizard.

A package file can be opened in one of two ways:

1. Simply browse to the configuration folder and double click on the desired configuration package or right click on the configuration and select Install.

1. Select Start ► All Programs, Select Siemens ► Preactor 17 ► Preactor 17.

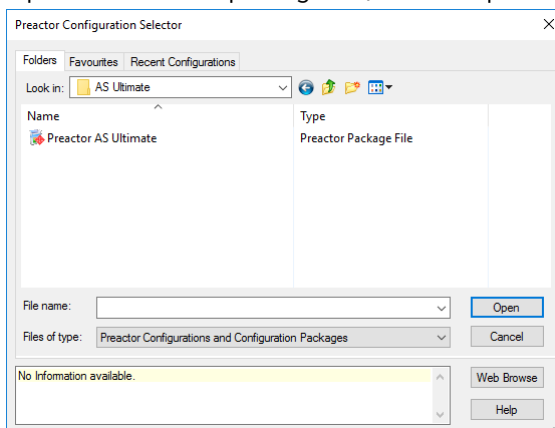
This displays the Preactor Configuration Selector.

1. A list of folders is displayed, containing the various packages available for you to install. All of the packages contain example data.

Additional packages are available for download from the Preactor web site some of which do not contain example data and are ready for you to enter your own data. Click the 'Web Browse' button on the 'Preactor Configuration Selector' dialog to access these packages - you will need to log-in to the Preactor web site to download these packages.

2. Open an example configuration folder.

3. Open the Preactor package file, for example 'Preactor AS Ultimate.prpkg' to install the package.



Once a configuration has been opened, the Package Manager wizard will take you through installing the package.

Wizard

Progress through the wizard in the normal way, selecting from the Options offered in a series of dialogs.

Basic Operation Dialog

Preactor Configuration Package Manager

Basic Options
Select which items are to be installed

Configuration Files and Local Reports

- Install configuration files and local reports
- Overwrite any existing files

Configuration Folder:

Database

- Install database
- Overwrite existing database

Database Name:

Server Reports

- Install server reports to Reporting Services server
- Overwrite existing reports

Report Folder Name:

< Back Next > Finish >>| Close

Normally you should not need to change these options, if you want to install the complete package.

Only select the Overwrite check boxes if you know of a reason why the installation might otherwise fail.

Warning: The Overwrite option will destroy existing data. There is no way to undo this once it is done. Please ensure you have a backup before overwriting any of these items.

Configuration Files and Local Reports

- By default, the unpacked files are deposited in the same folder as the package. This can be overwritten.
- By default, existing files are not overwritten. This protects the user from input error – the unpacking will fail and an error will be reported if unpacking is attempted when files already exist – unless Overwrite any existing files is selected.

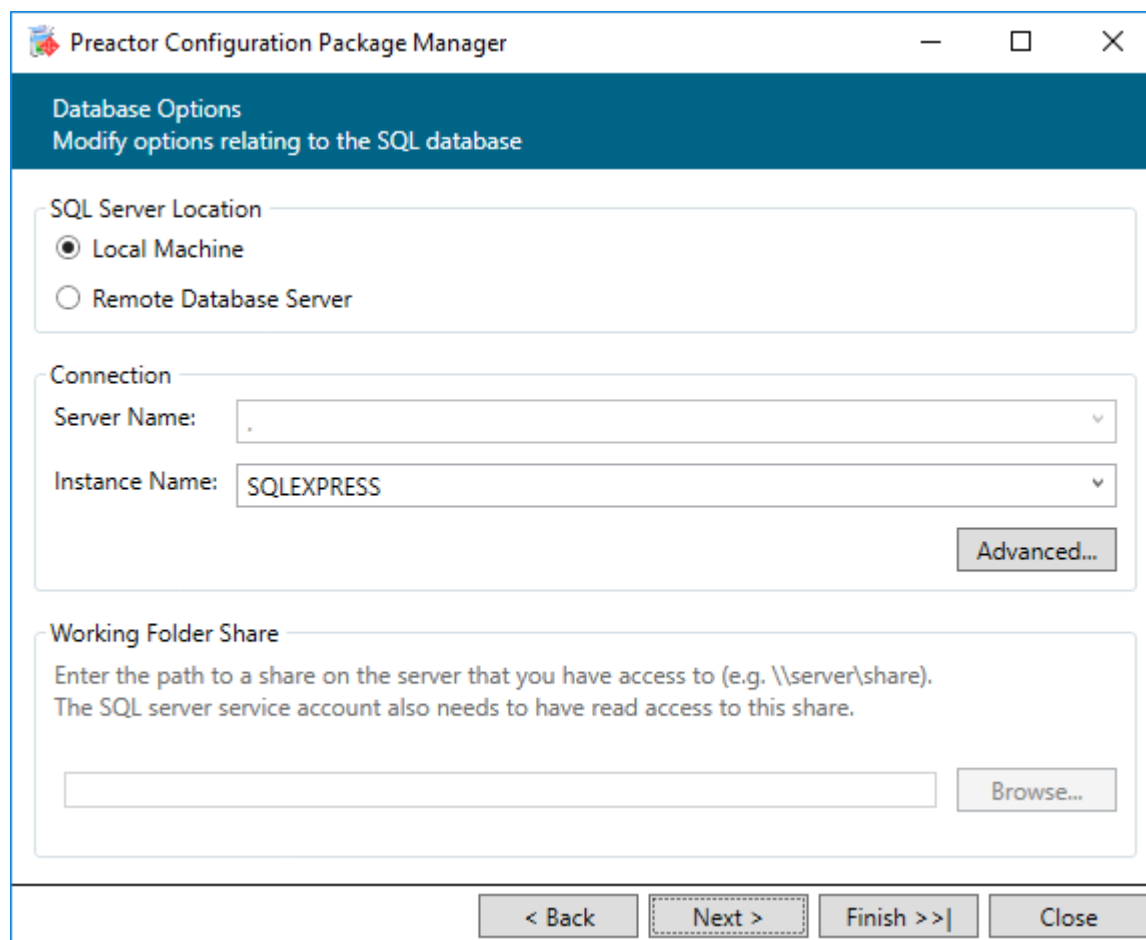
Database

- By default, the DB is named from the name of the folder the package is located in.
This can be overwritten.
- By default, an existing DB will not be overwritten. This protects the user from input error – the unpacking will fail and an error will be reported if unpacking is attempted when a DB already exists – unless Overwrite existing database is selected.

Server Reports

- If the package contains server reports, the 'Server Reports' section must be enabled.
By default Server Reports will not be installed as all example packages contain both local reports and server reports. If you wish to upload the reports in the package to a report server, check the Install server reports to Reporting Services server option.
- Existing reports will cause the installation to fail, unless Overwrite existing reports is selected.
- The name of the Report Folder is taken from the name of the folder in which the package is located.
This can be overwritten.

Database Options Dialog



The screenshot shows a dialog box titled "Preactor Configuration Package Manager" with a subtitle "Database Options" and the instruction "Modify options relating to the SQL database". The dialog is divided into three main sections:

- SQL Server Location:** Contains two radio buttons: "Local Machine" (selected) and "Remote Database Server".
- Connection:** Contains two dropdown menus: "Server Name" (set to ".") and "Instance Name" (set to "SQLEXPRESS"). There is an "Advanced..." button to the right.
- Working Folder Share:** Contains a text input field and a "Browse..." button. The text above the field reads: "Enter the path to a share on the server that you have access to (e.g. \\server\share). The SQL server service account also needs to have read access to this share."

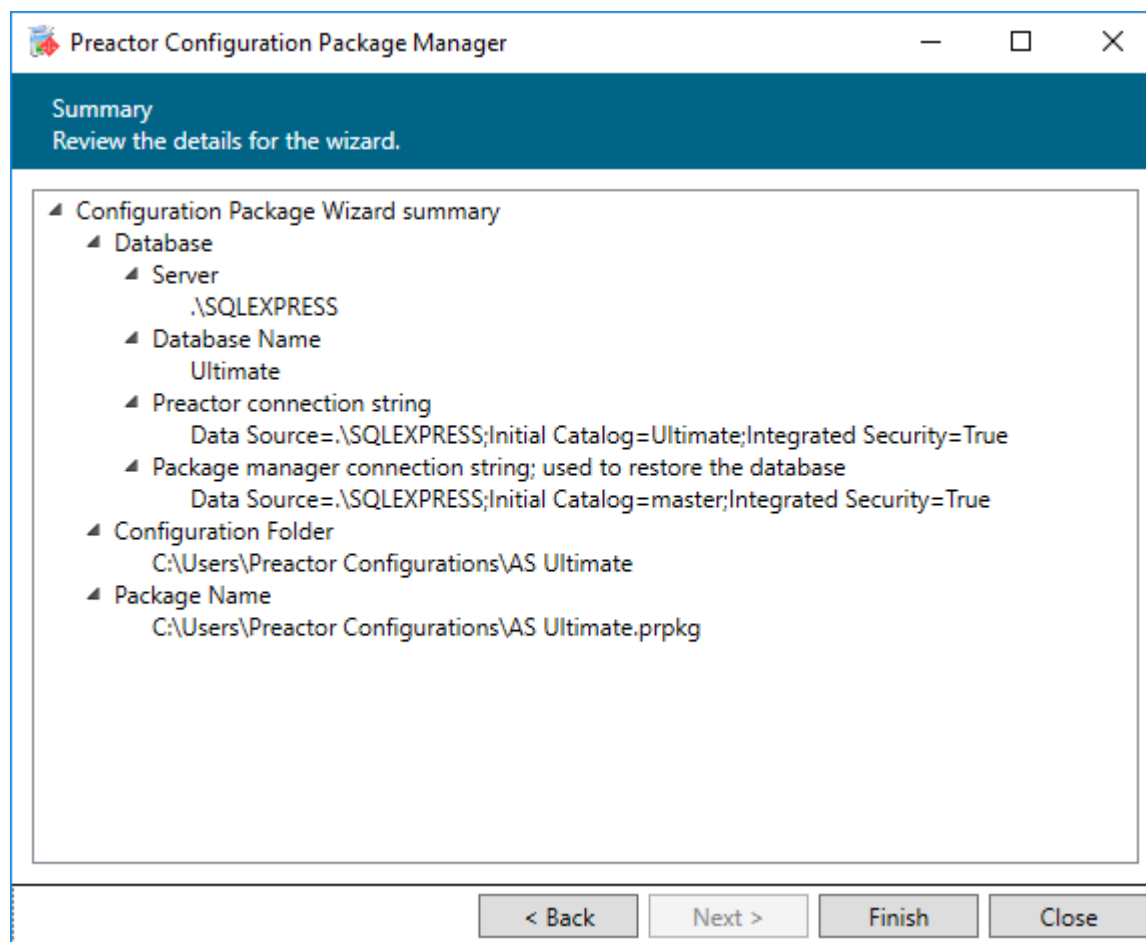
At the bottom of the dialog, there are four buttons: "< Back", "Next >" (highlighted with a dashed border), "Finish >>|", and "Close".

Here you have the choice whether to install the database on the local machine or on a remote server location.

To install the database on the local machine, you must enter the instance name of your local database server in the connection section. By default this is set to 'SQLEXPRESS'. If you selected an alternative instance name when you installed SQL Server, enter it here, select it from the drop down list, or clear the instance name field to use the default instance (no instance name).

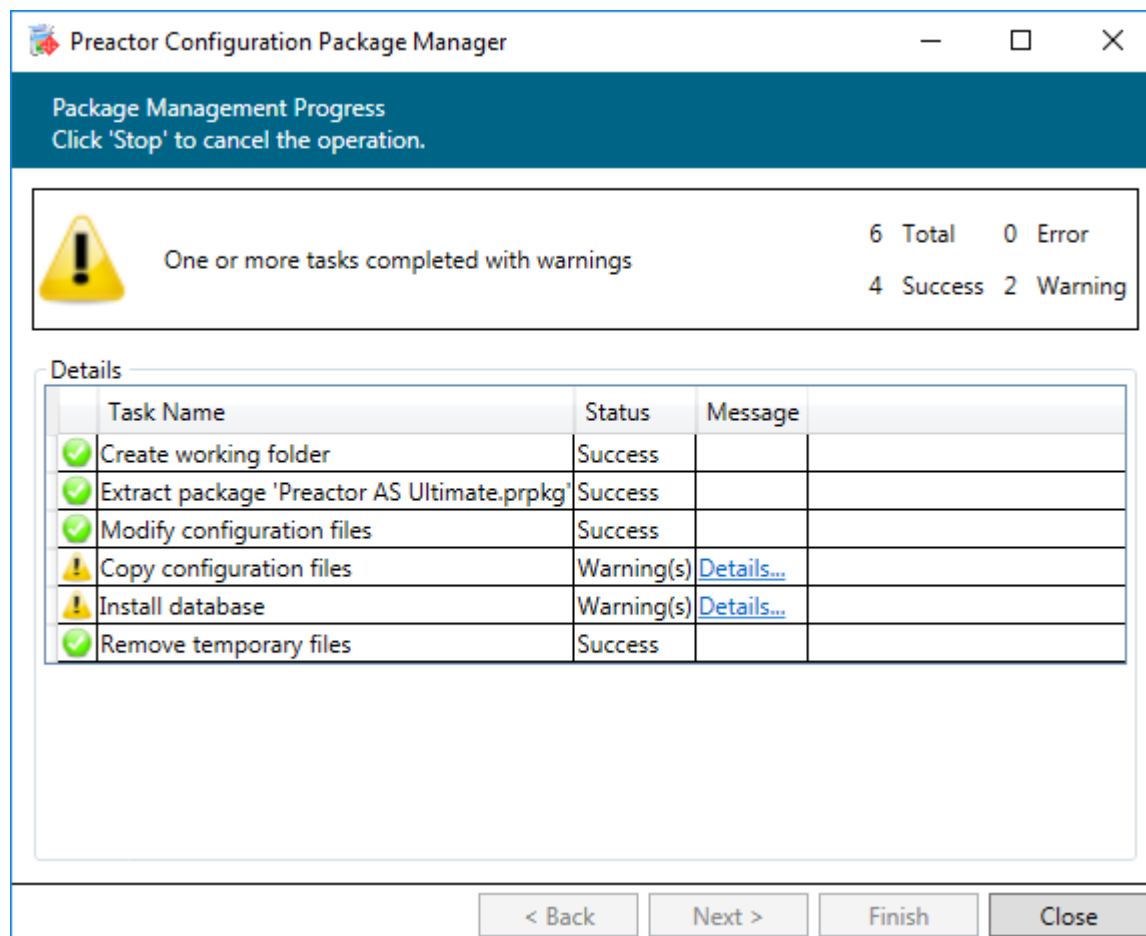
To install the database to a remote server, the name of that server must be specified along with a file share from which the database can be restored. In order for the restore process to succeed, permission to write to the specified file share is required for the user running the package manager and read permission is required for the account under which the SQL Server process is running.

Installation Summary Dialog



This screen shows you the details of what will be installed and where it will be installed.

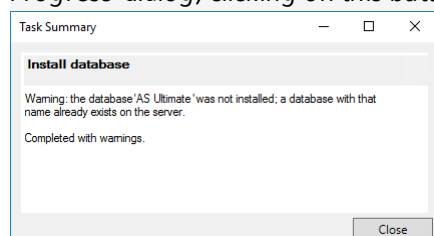
It is important to check that these options are correct and if necessary, click the Back button to amend the options.



The installer will now do all the work of installing the package for you. This involves creating the database, and copying configuration and local report files.

These tasks can sometimes take a significant amount of time but should be left to run to completion. Although there is a 'Stop' button on the form which can be used to abort the installation process, using this may leave the configuration in an unusable state.


Warning: Any warnings or errors that occur during the installation will be listed in the above 'Package Management Progress' dialog (a normal installation will not have any warnings or errors). Clicking on the 'Details...' link in the message column will give more information about what has gone wrong with the installation process. For example, a warning will occur if a database with the same name already exists and the installation process is warning that it has skipped some items because it was not told to overwrite anything. If any warnings have occurred, A 'Report...' button appears on the 'Package Management Progress' dialog, clicking on this button allows you to see a report of all warnings and errors from the installation.



The installer is now finished and, if no errors occurred, you will be able to run the configuration by opening the .prcdf file from the extracted package. The Package Manager automatically modifies any .prcdf files that it installs so that the database connection strings in them are correct.

Configuration Selector

Preactor must be run with an installed configuration. Configurations are defined in a Preactor Command Definition (.prcdf) file.

 Preactor Command Definition File

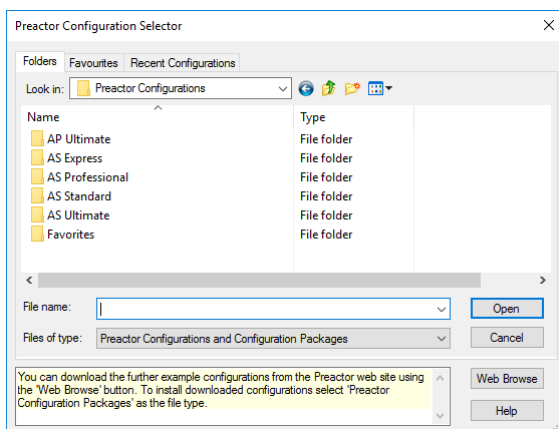
Preactor can be run simply by browsing to the configuration folder and double clicking on the desired configuration, or right clicking on the configuration and selecting Run.

Alternatively the Configuration Selector provides a means of running different examples of the Scheduler from a single location. Each of the configuration folders displayed in the Configuration Selector contains a Configuration File (.prcdf) which points to the appropriate example.

Configuration Selector is started via the start menu:

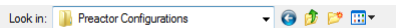
Start ▶ All Programs, Select Siemens ▶ Preactor 17 ▶ Preactor 17.

The Configuration Selector will open:

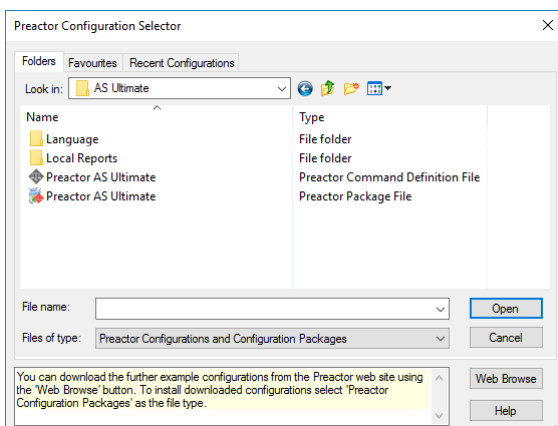


The Configuration Selector offers the following capabilities:

- The normal folder navigation (back, up, new folder, menu).



- Select a configuration folder and run Preactor by selecting the required Preactor Command Definition File and selecting 'Open'.



- Run the Configuration Package Manager by selecting a Preactor Package Manager.
- To browse the Preactor web site for new example configurations:

Web Browse

- And from the other tabs:
 - get a list of Recent Configurations to run.
 - get a list of Favorites to run.

A configuration is added to the favorites by right clicking on the configuration to be added, selecting modify, and in the Advance tab select Add to Favorites.

Running Preactor for the First Time

Preactor must be run with an installed configuration, i.e. a set of provisioned data and system configuration settings applicable to the planning/scheduling activity being managed by Preactor. A configuration is stored in a number of files and the contents of the database.

Preactor is distributed with a number of configurations, with others available from the [Preactor web site](#). Each configuration is contained within a Configuration Package. "Configuration Packages" on page 38.

These configurations are set up so that Preactor runs in the year 2000. This setting can be changed by the user."Preactor Command File Editor" on page 48.

When running Preactor, a configuration must be selected. "Configuration Selector" on the previous page.

In this description of running Preactor for the first time, a simple approach is described for selecting and loading a configuration distributed with Preactor, using a local SQL server.

Preactor can be run in two Configuration modes:

- Preactor Express (Demo)
- Preactor Express (Live)

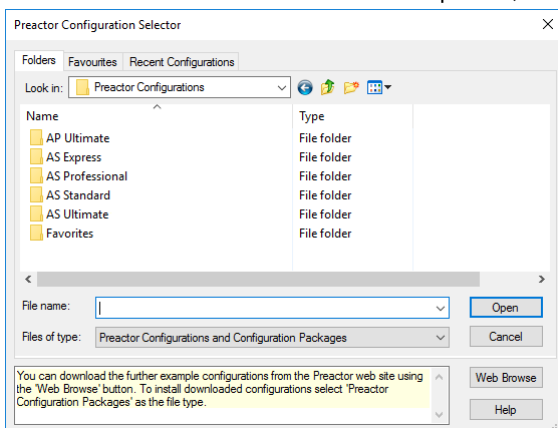
Preactor Express (Demo) is set up with example data. The system is fixed to run in the year 2000.

Preactor Express (Live) is ready to be used in live mode. Tables have been cleared and the system is ready for data entry. Data tables in Preactor can be populated by using the user friendly spreadsheets and importing the data from these sheets or it can be entered manually.

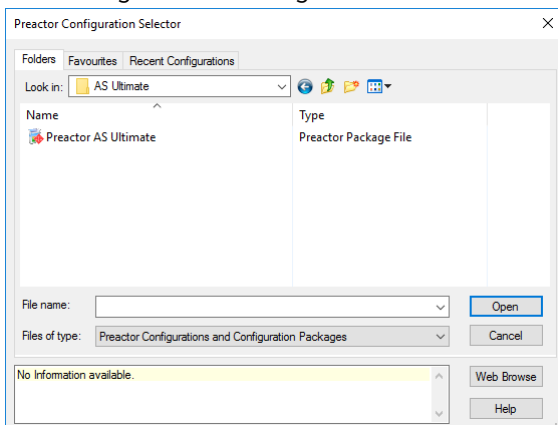
Launching Preactor

1. Select: Start ► All Programs, select Siemens ► Preactor 17 ► Preactor 17. If using Windows Server 2012, navigate to the Start Screen, swipe or click to show the all Apps view and then select Preactor 17. This displays the Preactor Configuration Selector, where a list of folders is displayed, containing the various Preactor packages available for you to

install. Choose either the 'Preactor Express (Demo)' or 'Preactor Express' option.



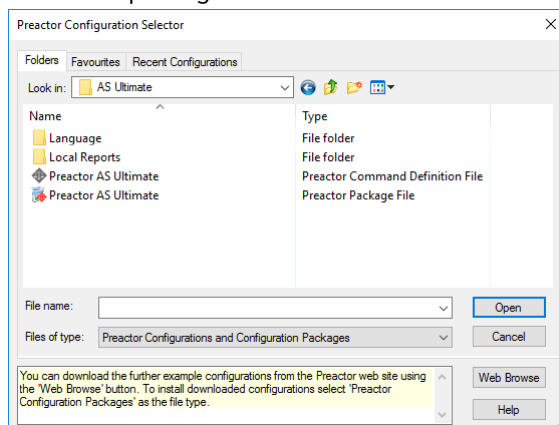
- Open a configuration example, in this case a *Preactor AS Ultimate*. The Configuration Package will be shown for the selected example.



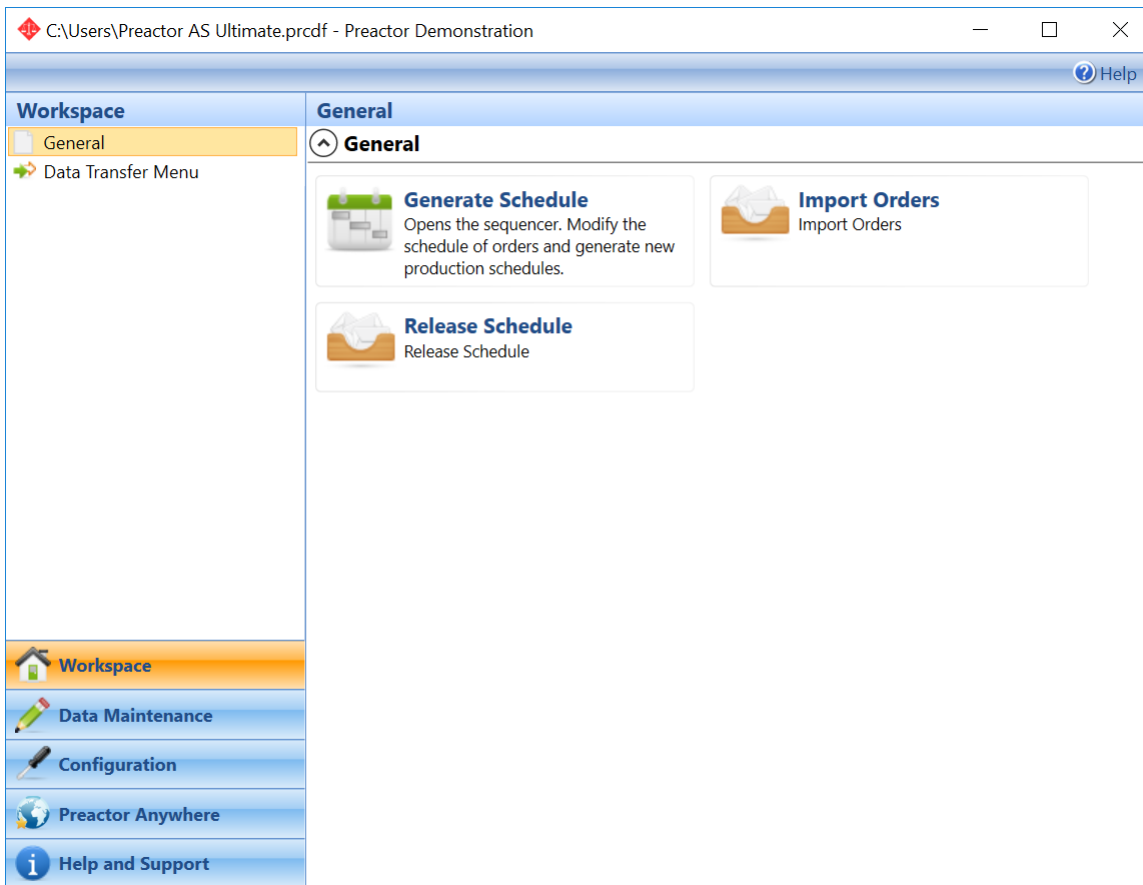
- Select and Open to install the Package. The Package Installation Wizard now runs. Run through the wizard hitting Next/Finish to install the configuration.

- At the first prompt, if the Preactor package is being installed for the first time, the default options can be selected. However, if the Preactor package has previously been installed, certain files and databases may already exist. In this case, only select the option to overwrite existing files and database if you wish the database and files to be overwritten with the contents of the package.
- At the next prompt, the default option is to use the SQL server that has been installed on the local machine.

When the package has been installed successfully, the unpacked configuration can then be seen:



4. Select the Preactor Command Definition File for the Product you wish to run, in this case Preactor AS Ultimate and open it.
After going through some warning and Licensing windows if necessary, Preactor is started and the main window can be seen.



Note: In order to prevent unauthorized access to Preactor's programming interfaces, User Account Control (UAC) should be enabled and Preactor should be run using the least privileges, i.e. a standard user account and not an administrator account.

To install a License, obtain the Activation code from your Preactor Partner or from your normal source, and follow the License Installation dialog when starting Preactor (selecting Activate Now from the dialog).

See [Licenses](#) in the User Guide or Help for details regarding off-line license installation; Network Licenses; or other issues.

See Licenses in the User Guide or Help for details regarding off-line license installation; Network Licenses; or other issues.

Using Preactor

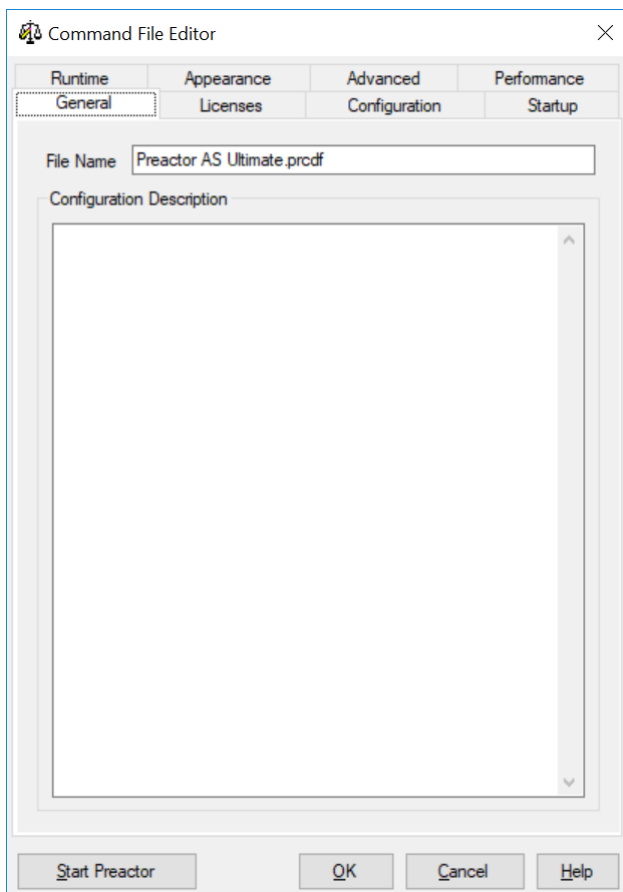
Preactor Command File Editor

Introduction

Every Preactor configuration includes a Preactor Command Definition file. Many of the parameters that define how Preactor should run, from what license to use to how to connect to the database, are stored in this file. The file itself is a text file, and may be edited using a simple text editor. For convenience though the Preactor Command File Editor encapsulates the parameters that may be specified and makes editing a Command Definition File more intuitive and less error-prone.

The default action for a Command Definition File is to open Preactor. To open the file in the Command File Editor instead, click **Modify** from the file context menu in Windows explorer.

When selecting a Command Definition file from the Preactor Configuration Selector, hold down the 'shift' key while opening the file to open it in the Command File Editor.

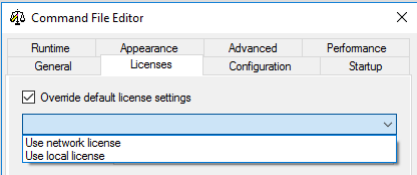


General Tab

Field	Description
File Name	The name of the file currently being edited. This field is read-only.
Configuration Description	A description that is displayed in the Configuration Selector when the

Field	Description
	command file is selected.

Licenses Tab

Field	Description
Override default license settings	<p>Setting this check box will enable the license setting controls. Once checked 'Use network license' or 'Use local license' should be selected from the drop-down list.</p> 
Server Address	When using a network license the address of the server can be specified here. The address may be a fully qualified domain name, local network name or IP-address.
Server Port	If the network license server has been configured to use a port other than the default port, then that port number may be specified here.
Use Classic Product	A classic product may be selected from the drop-down list when this option is checked. Selecting a product is only necessary for classic products such as Preactor 400 APS. Current products are selected according to the license in use.
Use specific license	When checked a seven digit Preactor license number may be entered. Only the license specified will then be used when running this configuration.

Configuration Tab

Field	Description
Preactor Menu Definition File	Here the menu definition file to use for this configuration is specified. Only applicable to Ultimate editions of Preactor.
Preactor Table Definition File	Here the table definition file to use for this configuration is specified. Only applicable to Ultimate editions of Preactor.
Working Directory	An alternative working directory may be specified here. Usually left blank, meaning the directory the configuration file is in will be the working directory.

Startup Tab

Field	Description
Fix Time	When checked, the Fix Time Options panel will become active and an absolute time and date or an expression may be specified to set the date and time for Preactor. Once set, time in Preactor will not progress. Fix Time is useful in scenarios where a repeatable, predictable behavior in Preactor is preferred. For example, when running Preactor with a sample data set. For this reason most Preactor configurations containing sample data have a time set using the Fix Time option. Fix Time can also be useful when trying to repeat a behavior in Preactor as so many of the decision points in Preactor change with the passing of time.

Field	Description
	Fix time expressions can be useful for adjusting the date/time of Preactor relative to the current date/time.
System Time Offset	Similar to Fix Time expressions, but with a simpler +/- offset measured in decimal days.
PCO	When checked the Preactor Communication Object is enabled.

Runtime Tab

Field	Description
SQL Connection String	The connection string used by this configuration to connect to the database. This is usually populated when a Preactor Package is installed using the Configuration Package Manager. Be aware that this parameter, like all other parameters in the Command Definition File, is stored in plain text and therefore any user names or passwords included in the connection string will be visible to anyone with read permissions on the configuration file.
Debug Options	<p>Debug Mode and Debug Plus</p> <p>When debug mode is enabled, Preactor will create a log file called "preactor.log" in the current user's temporary directory. For fully expansive logging, Debug Plus may also be checked. Both debug options will negatively impact the performance of Preactor, "Debug Plus" especially so. Neither option should be routinely enabled.</p> <p>Log</p> <p>When checked a file called Audit.log is created in the working directory when Preactor starts. Any alterations to any value in any table will be recorded in this file, along with the user-name of the user who made the change and the date / time at which the change was made.</p>
Memory Edit Mode	When memory edit mode is enabled, Preactor will inhibit write operations on the database. This is the same mode that Preactor will adopt when a configuration is already in use on start-up.
Compiled Configurations	<p>A compiled file is a fixed configuration file for Preactor containing the same information that can be specified in a Preactor Menu Definition and Preactor Table Definition file. Compiled configurations are used for a number of different reasons. Sometimes they are used as a form of control over the configuration of Preactor, preventing changes to configuration files by end-users. Usually they are used because not all license types allow the configuration features required to have full control over the configuration contents. Such comparability is reserved for the Ultimate editions of Preactor. See "Ultimate Configuration" on page 300 for more information.</p> <p>File</p> <p>Use this option to specify a compiled configuration file. Usually this will be a file compiled using pcompile.exe. For more information, see "Command Line Options" on page 328.</p> <p>Built-In</p> <p>A number of built-in configurations exist for the Express, Standard and</p>

Field	Description
	Professional products. These may be selected by picking from this drop-down list. Only the configuration appropriate to the license being used will be usable.
	<p>Default</p> <p>A compiled file will be selected if appropriate given the license type. For example, if you are using a Classic Preactor Enterprise Run-time license, the Enterprise Run-time compiled configuration will be used.</p>
Language Settings	To override the default language selection, you may specify a language here. For more information, see "Language Support" on page 17.

Appearance Tab

Field	Description
Display Seconds in Time Fields	When checked, all time fields in Preactor will show a seconds element as well as hours and minutes.
Disable Anti-Aliased Fonts	Disabled advanced font rendering in Preactor, such as True Type font rendering. Historically some hardware and driver implementations have exhibited poor performance with respect to Anti-Aliased fonts. This option may be checked in order to circumvent such performance issues.

Advanced Tab

Field	Description
Create Enterprise Run-time	When using the Classic Preactor Enterprise product, this option will generate a new Enterprise run-time file for use with an Enterprise run-time license when Preactor starts.
Add to Favorites	Use this button to create a short-cut to the Command Definition File currently being edited in the Favorites folder in the Preactor Configurations directory. Shortcuts created in this folder appear in the Configuration Selector when the Favorites tab is selected.
Other Text	Additional commands that are not recognized by the Command File Editor may be entered here.

Performance Tab

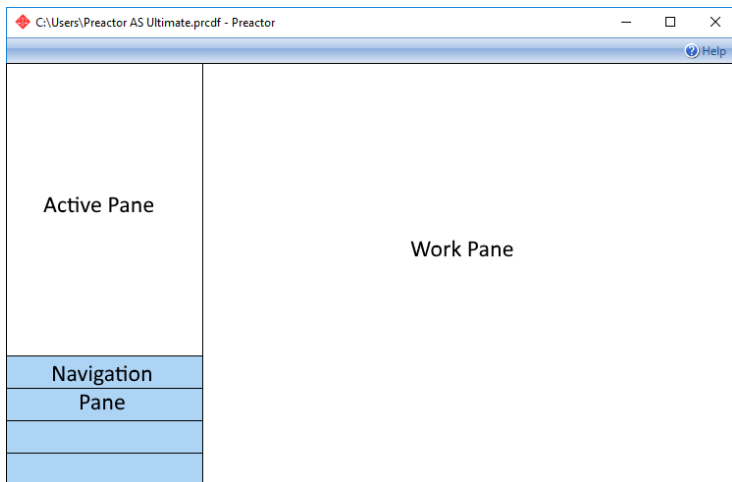
Field	Description
No Costing	When checked, Costing will not be involved in calculations.
No Make Span	When checked, Make Span data will not be involved in calculations.
No Critical Ratio	When checked, Critical Ratio data will not be involved in calculations.

Preactor Desktop

The Preactor desktop is the user interface screen that provides access to all of the Preactor modules such as the sequencer, editor, data transfer options etc. This section describes the organization of the Preactor window and the associated options.

The window is divided into 3 regions:

- The Navigation Pane.
- The Active Pane.
- The Work Pane.



Navigation Panes

The Navigation Pane contains a number of options.

Selecting an item from the Navigation Pane opening up a list of options in the Active pane associated with that item. Typically, the Navigation items include Data Maintenance, Configuration, Help and Support, etc.

Active Panes

The Active pane contains a number of options associated with the Navigation Item associated with it.

Of particular interest is the Workspace pane. This typically offers all the day to day activities expected in Preactor, including:

- A General sub category that provides entry to the Preactor Sequencer and/or Planner.
- A Data Transfer category for Importing/Exporting Orders.

Work Panes

This area typically displays the data selected in the Navigation/Active Pane for editing, or a set of tasks associated with the function selected from the Navigation/Active Pane.

When editing data, the Work Pane has a set of menu options available appropriate to the data being edited.



These include options (where appropriate) to:

- Save the changed data.
- Undo any edits made.
- Redo any edits made.
- Edit (Change, Insert, Delete, and Duplicate a record).
Edit ► Global Assign allows for changes to data covering all the records on display.
- View options (e.g. sort order).
- Hide options (e.g. child records).
- Filter drop down menu, allowing to enable/disable filters applied to the table.
- Maintain advanced filters opens the Manage Expressions windows, where creation and maintenance of user created filters can be managed.
- More Actions (appropriate to the data on display).

Actionable Item

An Actionable Item on the Preactor Desktop can be:

- A task - generally presented in the Work Pane
For example: Launching the Sequencer; Running an Export, Creating a configuration package.
- Running the Editor for provisioning data, e.g. selecting:
 - Data Maintenance from the Navigation pane, and
 - Resources from the Active pane.

It is possible for Tasks to be located in the Active pane, but it is not typical in shipped configurations.

Preactor Data

Preactor holds and maintains different types of data. Data can generally be classed as:

- **Provisioning Data**
This is semi-permanent data which impacts the results of the scheduling or planning.
Examples would be the Resources, Resource Groups and Planning Resource Groups, and the data directly associated with those items (name, cost, type, constraints, etc).
This data is often entered from the GUI, *usually* from the Data Maintenance pane on the Preactor Desktop, but can also be imported.
Modification to this type of data is called '*Provisioning*'.
- **Configuration Data**
This is semi-permanent data which impacts the presentation of the results or data. Things such as colors of items on the GUI.
It also includes 'fixed' provisioning data, for example: Planning Horizon, Default Earliest Start Date Offset, or when defining behavior (Calculate Costs During Sequence).
This data is often entered from the GUI, *usually* from the Configuration pane on the Preactor Desktop, but can also be entered in the same window where provisioning on an item takes place, or from outside Preactor.
Modification to this type of data is called '*Configuring*'.
- **Transaction Data**
This is dynamic or working data, the data that the Planner or Scheduler works on.
It is generally imported, but can be also be '*Edited*' from the GUI.

Editor

The Editor

Introduction

Throughout Preactor data is presented and edited with the use of a common component known as the *Editor*. The following are examples of where the editor is used:

- All data modified through the Preactor Desktop (Resources, Constraints etc.).
- Orders from within the Sequencer in Advanced Scheduling.
- Planning items from within the Planner in Advanced Planning.

Additionally, script list information (event and import/export) is presented using the *Editor*, albeit with some constraints on the capabilities. For example, sorting is not permitted when editing PESP scripts.

If the Sequencer or Planner is open, any editor open on the Preactor Desktop is read-only.

Multiple records can be selected using the standard Windows behavior: hold **Ctrl** to select individual records, **Ctrl-Shift** to select a range or **Ctrl-A** to select all.

Whether using the editor on the Preactor Desktop, in the Sequencer in Advanced Scheduling, or in the Planner in Advanced Planning, the following common features are available:

Edit/Insert/Delete

- To edit a record, double click on the row, or select **Edit** from the context or top menu. This shows a dialog for editing a record. Note that only one record dialog can be open at any one time.
- To delete a selected record, press the **Delete** key, or select **Delete** from the context or top edit menu. If more than one record is selected, all selected records will be deleted. For tables that have a parent / child relationship defined, you can delete a family at a time by selecting **Hide Children** and deleting the parent record. Alternatively simply highlight all records in the family and press delete.
- To insert a record you can either scroll to the bottom of the table and double click the last (blank) row OR select a row and press the **Insert** key, or select **Insert** from the context or top menu. In the latter case the record will be inserted above the selected row.

Field Select and Move

- To select a field, right-click on the header row and select **Field Chooser** from the pop-up menu. The Field Chooser is also available from the View menus.
Any field required can be dragged from the field chooser list onto the editor. To remove a field from the editor you can drag it back into the Field Chooser, or to any area of the screen where the mouse cursor shows an **X**.
- Fields in the editor can be moved to any position by clicking and dragging the field header. It is also possible to stack a number of fields in a single column.

Sorting

- Clicking on the header of a column will sort the entries in the table by the contents of that column. The editor will sort into lexicographic order for string fields, or by value for date, duration and number fields.
- Some fields, such as color fields, have no defined natural sort order. In these cases, when sorted, like values will appear together for these columns.
- To reverse a sort order, simply click on the header again.
- Sorting can also be done by right clicking on the header of a column and selecting **Sort Ascending** or **Sort Descending** from the context menu.
- To perform a composite sort (e.g. sort by Column A then Columns B), **hold down Control while clicking** on the headers.
- Sorting is not possible on Matrix fields.
- Sorting is not possible on the added Status column in the sequencer or planner.
- Sorting is not possible on the PESP event scripts or PIO import scripts tables.
- For tables that have a parent / child relationship defined, sorting on a field can be done within the family, or over the whole table. This choice is selected from the context menu when right clicking on the column header.

Filtering

- The line below the column header is where filters are defined.
- A filter may be defined for any column.
- A filter consists of an operator (as selected from the drop-down list) and a value.
- Filter operands may include:
 - Standard operands like: '<', '=', 'Starts with', 'Contains'.
 - 'IN' - where an item is included if the field value matches one of a set described as a comma separated list in value. e.g. 'IN [Sprocket,Spindle,Gear]'.
- Depending on the column type, different operators are available. For example, a string field will allow 'Contains' whereas a number field will not.
- Multiple filters can be defined at the same time. Where this is the case, each filter will AND with the next. For example: Order Status = 'Complete' AND Quantity > 100.
- The Filter Row can be switched between Show and not Show from the context menu when right clicking on a column header.

Group By

- Clicking the bar above the header row opens or closes the group-by area. Dragging a field from the header row to the group-by area creates a group. The rows in the table are now grouped by that field, with the number of items associated with that group indicated. Dragging a second field after the first in the group area creates sub groups, etc. To remove a grouping, drag the corresponding field out of the group-by area to an area of the screen where the mouse cursor shows an **X**.
- Group By is not possible on Matrix of Status fields.
- The Group By area can be switched between Show and not Show from the context menu when right clicking on a column header.

In-line Editing

- Within the planner it is possible to make in-line edits on all fields that are editable (for example not read-only or evaluated).
- Within the sequencer, in-line edits are possible for check-boxes that are editable.
- Edits are done on a record (row) basis, and are not completed until the row is deselected (another row selected) and all the changes made to the record are committed. The undo stack will have a single entry for all the changes to that record.

Printing

The contents of the current editor window can be printed, by going to the **File** menu in the Sequencer/Planner, and the **More Options** menu from the Preactor Desktop.

Note: Printing while items are grouped will print the collapsed groups only, regardless of whether or not the groups are expanded in the editor.

Copying

The content of an editor window can be copied and pasted, e.g. into an excel spreadsheet. The selected rows will be copied, along with the header row which is always included.

Non Text Based Fields

- Color fields are displayed by a colored icon.
- Browser fields are displayed as hyperlinks.
- Icon fields are displayed as an icon.
- Matrix fields are displayed as 'x' items.

Within the Sequencer and the Planner an additional column showing the status for each row is included within the editor.

Status Column – Sequencer

- The Sequencer Status column indicates the status of an operation or order.
- The left hand side of the icon represents the status for the start of the operation, the right hand side for the completion of the operation.
- The following states can be represented.
 - Green: Scheduled within set time constraints.
 - Orange: Scheduled within the delivery buffer.
 - Red: Scheduled before the earliest start date or after the due date.
- If child records are hidden, a roll-up status is given indicating the worst case status for any given operation within the order.

Status Column - Planner

- The planner status column indicates the Demand Color.
- The status allows expressions to be passed to them for evaluation, and the colors are configurable by the user, from:
Preactor Desktop ▶ Data Maintenance ▶ Planning Parameters ▶ Set Planner Threshold.

Matrix Editor

When adding or modifying most data in Preactor the Editor is used, however data held in matrices is different in that records are added or changed using the **Matrix Editor**.

Sequence Dependent Setup Time fields are an example of this.

When the sequence in which products are manufactured changes the amount of productive time lost to changeovers, this can be reflected in the *To/From* sequence dependent setup time matrix.

Experience has shown that components frequently belong to product families and that setup values relate to changes between product families as easily as product to product. Grouping products into families reduces matrix sizes and enhances processing speed.

The Matrix Editor supports the following features:

- All cells in the table can be edited and set to a common value using the **Edit All** button.
- All cells can be reset to the default value for their type using the **Reset All** button.
- A range of cells can be selected and either reset or edited by using the context menu.
The **F2** key can also be used to edit a range of selected cells.
- It is possible to highlight and mirror opposing cells.

To enter or modify a cell in the matrix:

1. Double click with the left mouse button on the cell to be modified.
An Edit Value dialog is presented.
2. Type in the new value using the format h:mm, e.g. :25.
3. Click **OK**.

The cell value changes to 0 Hours 25 mins.

Setup Persistence

Changing which fields are displayed in the editor and their order, and the sorting preference for each field, persists when the editor is closed and re-opened. Filtering options do not persist, however note that the Orders Editor in the Sequencer is not closed until the Sequencer is closed.

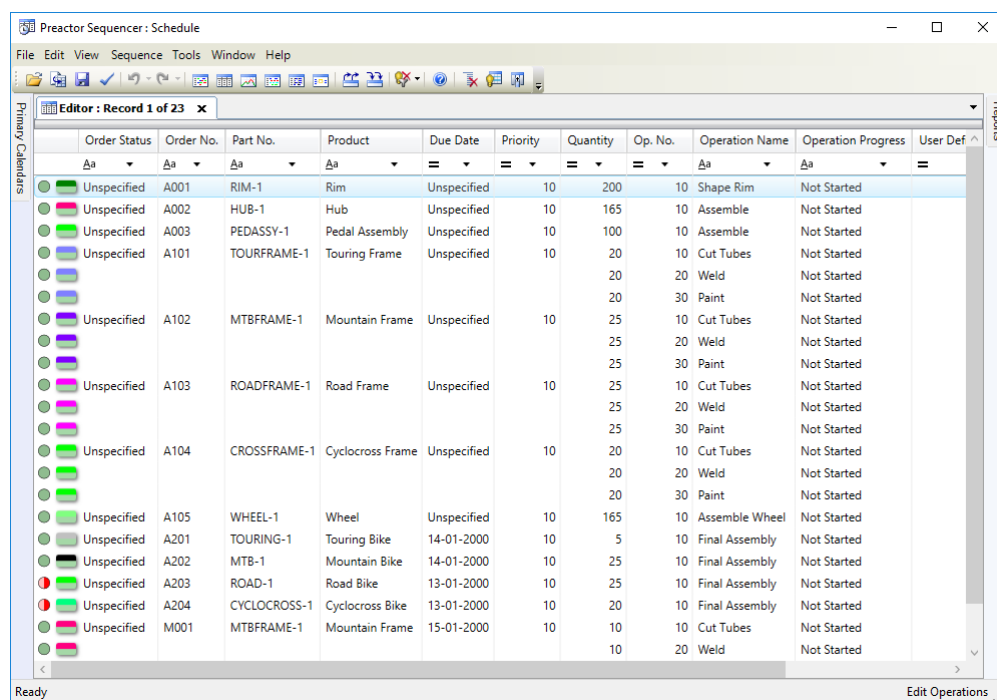
Configuration Classifications

The following classifications control the behavior of the Editor:

- DISPLAY SEQUENCE – Determines whether the sort is just visual, or whether the "memory" is sorted.

Editor Window

Manual data entry/editing, for example, of the Orders can be performed in the Sequencer's Editor window, which can be opened from **View ▶ Editor Window**.



The screenshot shows the 'Preactor Sequencer: Schedule' application window. The 'Editor: Record 1 of 23' window is open, displaying a table of operations. The table has columns for Order Status, Order No., Part No., Product, Due Date, Priority, Quantity, Op. No., Operation Name, Operation Progress, and User Def. The data is as follows:

Order Status	Order No.	Part No.	Product	Due Date	Priority	Quantity	Op. No.	Operation Name	Operation Progress	User Def
Unspecified	A001	RIM-1	Rim	Unspecified	10	200	10	Shape Rim	Not Started	
Unspecified	A002	HUB-1	Hub	Unspecified	10	165	10	Assemble	Not Started	
Unspecified	A003	PEDASSY-1	Pedal Assembly	Unspecified	10	100	10	Assemble	Not Started	
Unspecified	A101	TOURFRAME-1	Touring Frame	Unspecified	10	20	10	Cut Tubes	Not Started	
						20	20	Weld	Not Started	
						20	30	Paint	Not Started	
Unspecified	A102	MTBFRAME-1	Mountain Frame	Unspecified	10	25	10	Cut Tubes	Not Started	
						25	20	Weld	Not Started	
						25	30	Paint	Not Started	
Unspecified	A103	ROADFRAME-1	Road Frame	Unspecified	10	25	10	Cut Tubes	Not Started	
						25	20	Weld	Not Started	
						25	30	Paint	Not Started	
Unspecified	A104	CROSSFRAME-1	Cyclocross Frame	Unspecified	10	20	10	Cut Tubes	Not Started	
						20	20	Weld	Not Started	
						20	30	Paint	Not Started	
Unspecified	A105	WHEEL-1	Wheel	Unspecified	10	165	10	Assemble Wheel	Not Started	
Unspecified	A201	TOURING-1	Touring Bike	14-01-2000	10	5	10	Final Assembly	Not Started	
Unspecified	A202	MTB-1	Mountain Bike	14-01-2000	10	25	10	Final Assembly	Not Started	
Unspecified	A203	ROAD-1	Road Bike	13-01-2000	10	25	10	Final Assembly	Not Started	
Unspecified	A204	CYCLOCROSS-1	Cyclocross Bike	13-01-2000	10	20	10	Final Assembly	Not Started	
Unspecified	M001	MTBFRAME-1	Mountain Frame	15-01-2000	10	10	10	Cut Tubes	Not Started	
						10	20	Weld	Not Started	

For help in using the editor see "Editor" on page 53.

Configuration

Configuration

The 'Configuration' category provides access to all of the tables and settings that are specific to configuring Preactor.

AS Desktop Configuration Menu

The 'Configuration' category provides access to the 'Sequencer Configuration' settings.

The 'Sequencer Configuration' settings control various display and offset options. Specifically, they define where the Sequencer horizon begins and ends, the visual display start and end boundaries of the Sequencer Gantt chart, the presence of the 'Sequencer Operation Thumb' enabling easy drag of operations in the sequencer and offsets for the default earliest start, due date, and terminator position.

The Default Event Scripts that run from push buttons in the Data Transfer menu are also specified here, by selecting options from drop down lists.

These Event Scripts are the:

Order Import Event Script¹

Product Import Event Script²

Order Export Event Script³

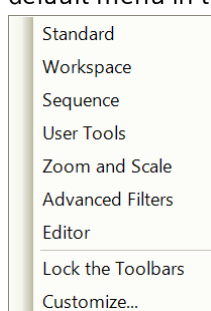
Release Schedule Event Script⁴

APS Event Script⁵

Configuring Menus, Toolbars, and Keyboard Shortcuts

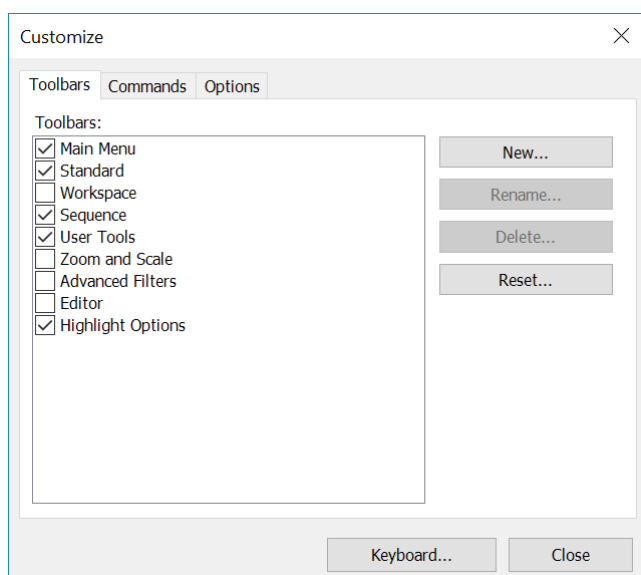
Introduction

Extensive configuration is available for "Menu Configuration" on page 64, "Configuring Toolbars" on the next page, and "Configuring Keyboard Shortcut Settings" on page 63. Right-clicking in the toolbar area of the Sequencer or Planner will display a menu, where it is possible to display/hide toolbars, lock all toolbars, and access the **Customize** dialog. The image below is the default menu in the Sequencer:



In the Sequencer there is one other way to access the Customize dialog, which is by navigating to **Tools ▶ Customize....**

The **Customize** dialog provides option to configure menus, toolbars and keyboard shortcuts.



¹The PESP event script that runs when importing orders using the 'Import Orders' push-button in the Data Transfer Menu.

²The PESP event script that runs when importing products using the 'Import Products' push-button in the Data Transfer Menu.

³The PESP event script that runs when exporting orders using the 'Export Orders' push-button.

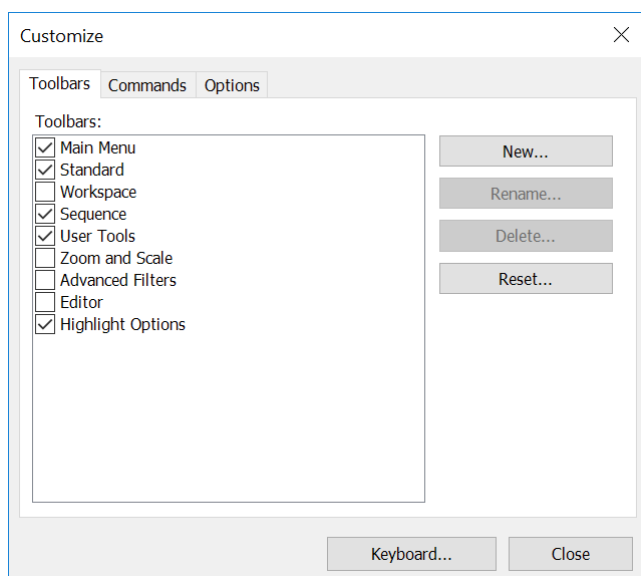
⁴The PESP event script that runs when a schedule is released using the 'Release Schedule' push-button.

⁵Specifies the default PESP event script that should run when allocating operations in the Sequencer with the APS Rules option activated.

Configuring Toolbars

Introduction

Toolbar customization, in both the Planner and the Sequencer, is done via the **Toolbar** tab of the **Customize** dialog.

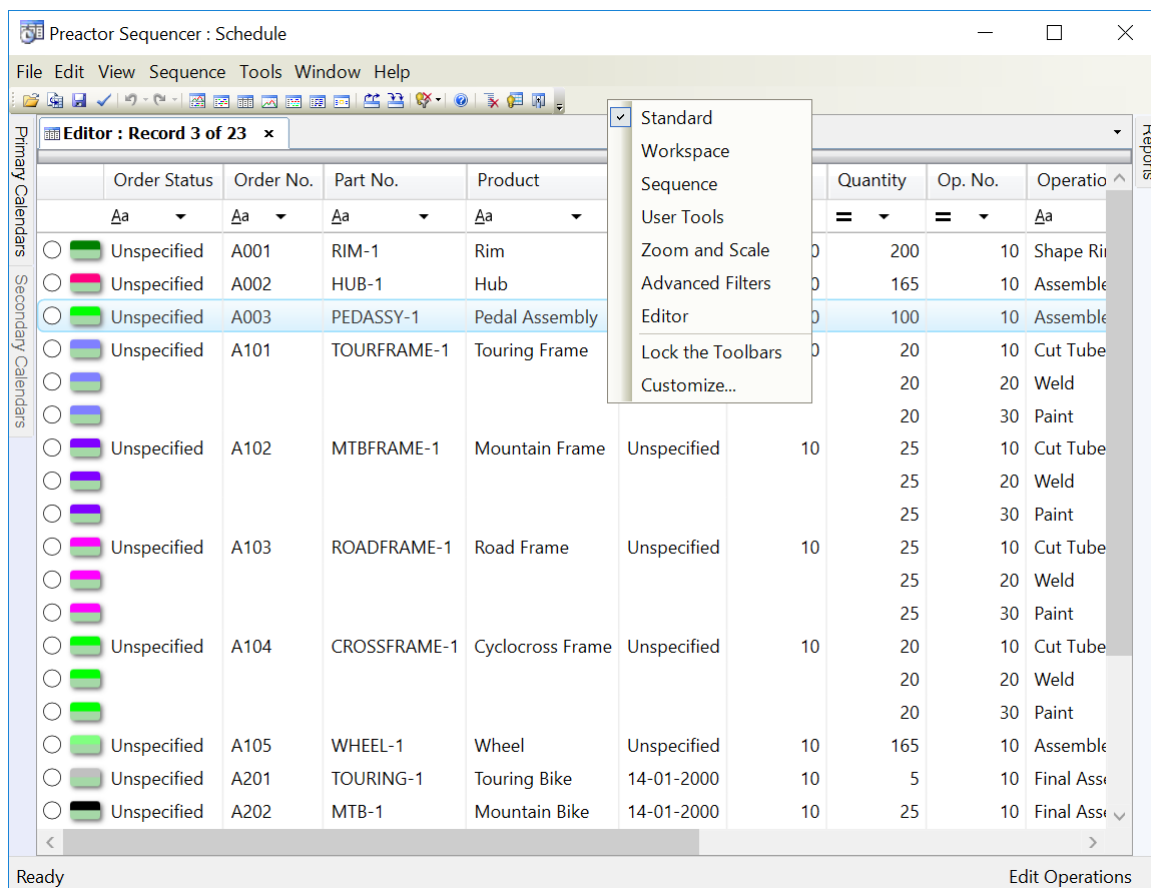


The toolbar list contains all of the default toolbars available in the Planner or Sequencer. It is also possible to create new toolbars in this dialog. Renaming and deleting toolbars is only available to user created toolbars. Resetting toolbars is available to all toolbars in the application.

Configuring Toolbars On/Off, and Locking Toolbars

Some quick configuration can be done by right-clicking in the toolbar area. This results in a pop-up menu, where it is possible to:

- Enable or disable the display of toolbars. Toolbars that are displayed will have a tick next to the toolbar name.
- Lock toolbars in their current location in the toolbar area. This will affect all toolbars displayed.

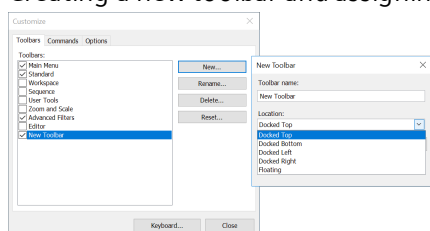


All other configuration is done from the dialog opened when selecting the **Customize** menu option.

Creating, Deleting, Renaming, and Positioning New Toolbars

From the **Toolbar** tab of the **Customize** dialog, the user can:

- Enable or disable the display of toolbars.
- Creating a new toolbar and assigning a position to it.

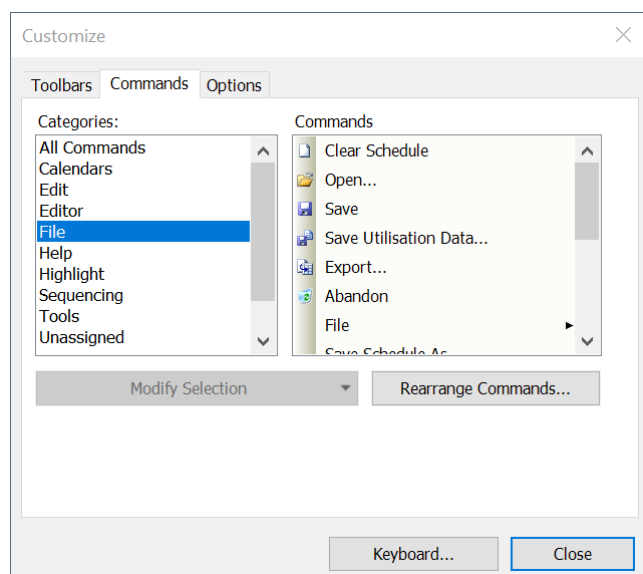


- Delete a user created toolbar.
- Rename a user created toolbar.

It is not possible to delete or rename a default toolbar, e.g. Main Menu, Standard etc.

Modifying Toolbars

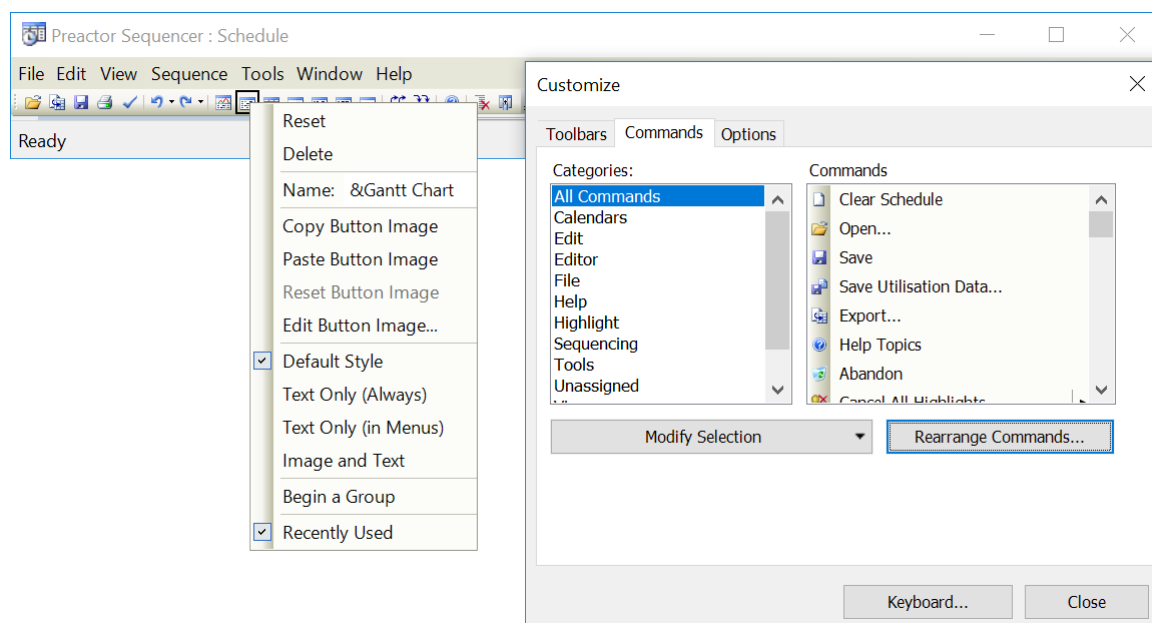
You may place additional buttons on a toolbar or remove existing buttons from the **Commands** tab of the **Customize** dialog.



The **Commands** tab provides categories of actions, based on the menus (e.g. View) or submenus (e.g. Calendars). Dragging the Command icon associated with an action to a displayed toolbar will add that icon to that toolbar. Dragging an icon from a displayed toolbar will remove it.

Modifying Icons

With the **Customize** dialog open, right-click on an icon in a visible toolbar and a drop down menu will appear with a list of available modifications.



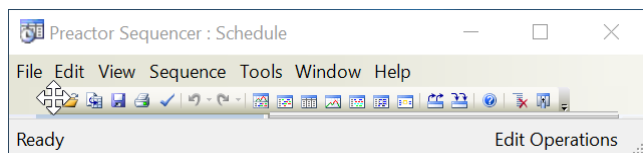
Available modifications include:

- **Edit Button Image**, which opens an *Icon Editor* where the icon image can be modified.
- Display options, such as whether to display the icon image in the toolbar and/or the text of the action.
- Create a group within a toolbar. Each group will have a set of dividers at the beginning and end. Only the start of a group is assigned, using the **Begin a Group** menu option. The end of a group is dictated by which options have the **Begin a Group** option enabled.
- Removing an Icon from the toolbar, by selecting and dragging it out of the toolbar, or by clicking **Delete**.

These options are also be available via the **Customize** dialog ► **Commands** tab ► **Rearrange Commands** ► **Modify Selection** drop down with a toolbar item selected.

Moving Toolbars

A toolbar can be moved by grabbing it at the right hand size and dragging it to the required location on the Sequencer or Planner window.



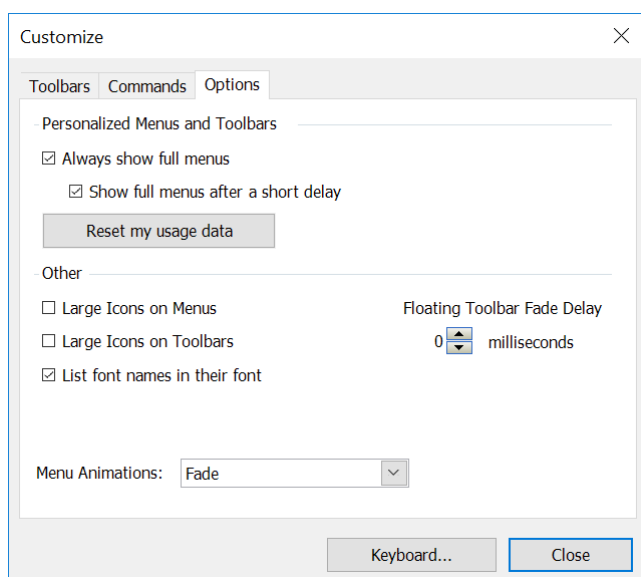
It can be placed on the frame of the window at the top, bottom, left or right hand side. It can also be a floating toolbar, so it is not attached to the Sequencer or Planner window. When floated, the toolbar is subject to fading after a delay, as specified in the **Options** tab of the **Customize** dialog.

Moving toolbars can be prevented by clicking **Lock the Toolbars**.

Other Configurable Items

The Options tab of the Customize dialog has additional features that can be used to customize the toolbar display. These are:

- Displaying full menus for personalized menus and toolbars.
- Whether to use enable the use of large icons in menus and/or toolbars instead of the default size.
- Whether there is a toolbar fade delay for floating toolbars, and a time value expressed in milliseconds.



Creating Toolbars for Predefined Workspaces

When creating a new toolbar for these options, this can be simply done by opening the menu item normally, grabbing the top of the drop down list (the thicker gray bar), and dragging it into the toolbar area.



Then, drag the 'dragged' set of icons somewhere different in the toolbar area, and the toolbar will be created. Additions to the toolbar when a new workspace is created and configured is automatic, though renaming is not.

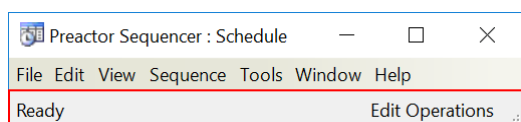
These toolbars can be turned on or off from the toolbar menu, but cannot be deleted from there. They can only be deleted by resetting all the toolbars.

Resetting Toolbars

Resetting toolbars is done either by:

- Clicking the **Reset...** button in the **Customize** dialog, with the toolbar that is to be reset highlighted, or
- With the Customize dialog open, right-clicking on the toolbar that is to be reset, and clicking **Reset** from the right-click menu.

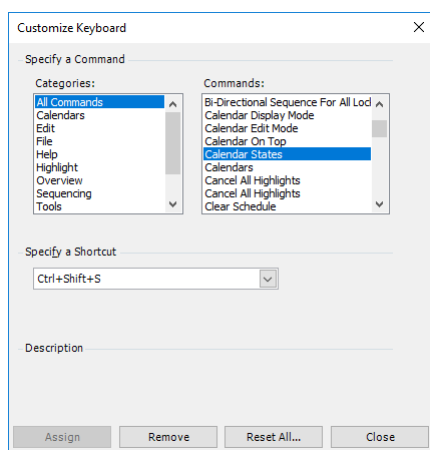
These options will only reset one toolbar. It is possible to globally reset toolbars by double right-clicking in the Status bar at the bottom of the Sequencer.



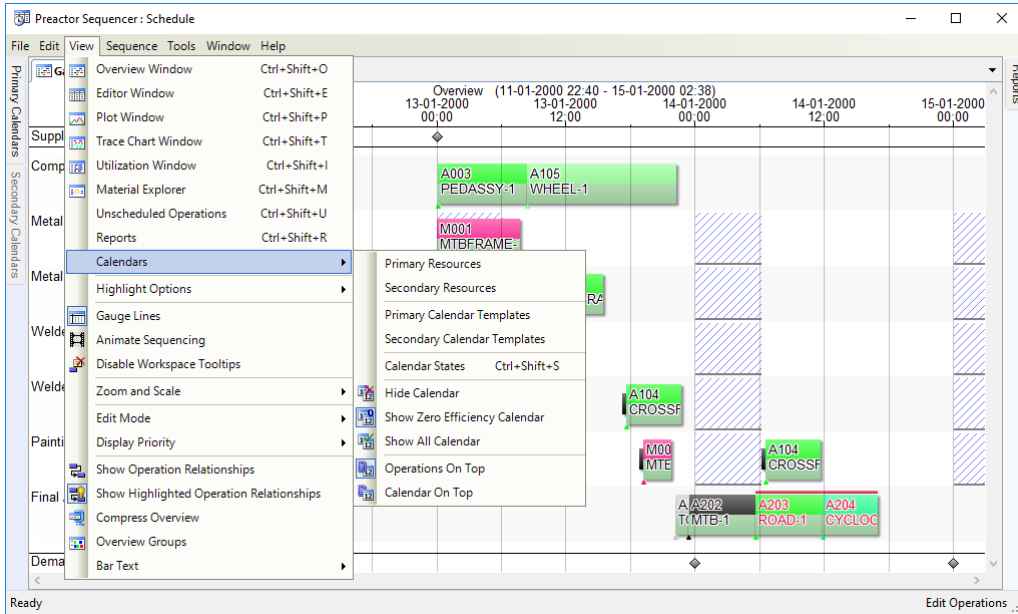
Configuring Keyboard Shortcut Settings

There are two ways to access the **Customize** dialog:

- Navigate to **Tools** ► **Customize...**, and then click on **Keyboard...**
- Click on an empty space in the toolbar area, and click **Customize...** from the drop down menu, and then click on **Keyboard...**



Commands can be assigned to a keyboard shortcut from within the dialog. When a shortcut has been assigned, they will be displayed in the relevant menu, next to the command.

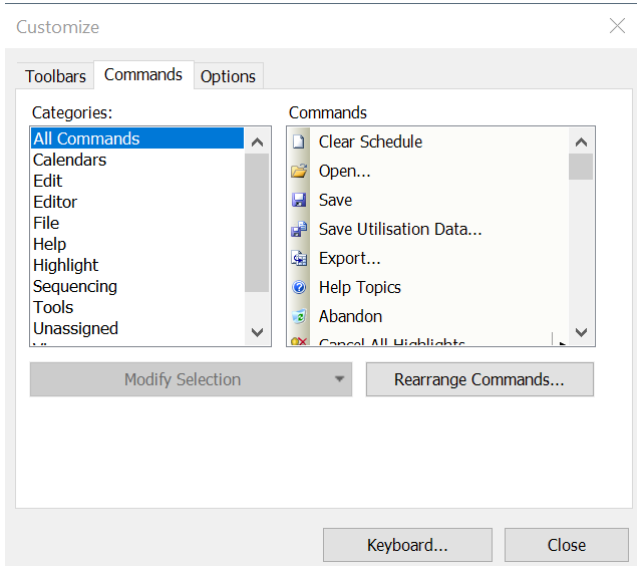


The image above shows that the Plots window can be opened using the **Ctrl + Shift + P** combination shortcut, and the Calendar States using **Ctrl+Shift+S** combination shortcut.

Menu Configuration

Introduction

Menu customization, in both the Planner and Sequencer, is done via the **Commands** tab of the **Customize** dialog.



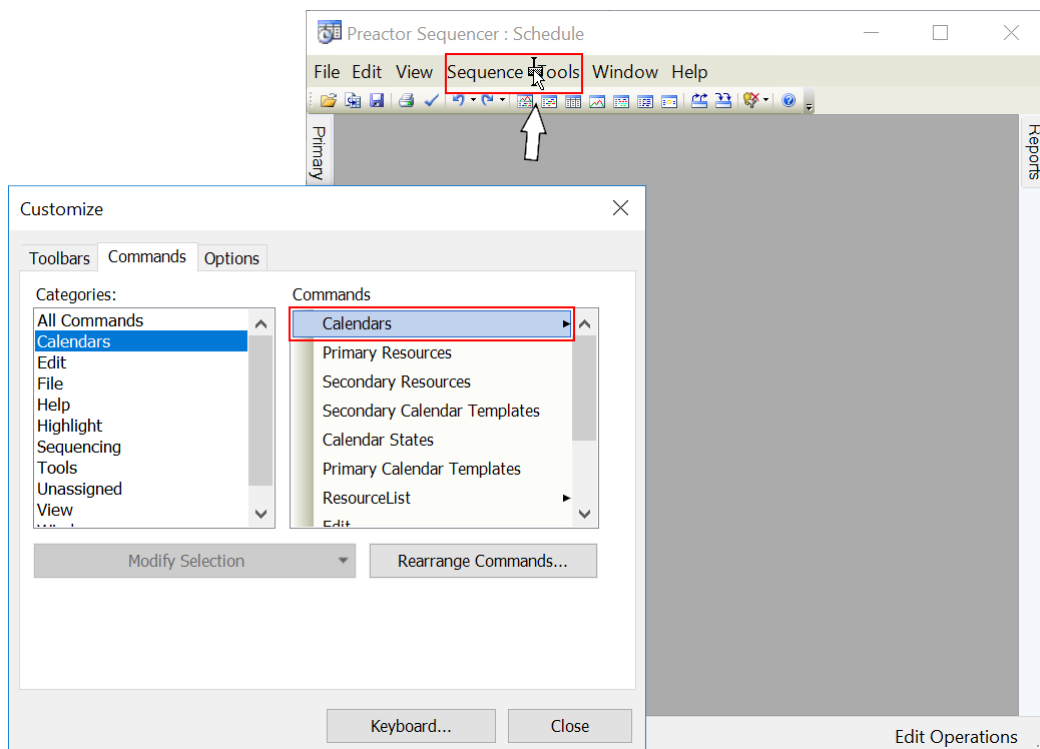
Actions are grouped into *Categories*. These include the main menu options (File, Edit etc.) and larger sub-groups of actions (e.g. Calendars and Highlight). There a number of ways that menus can be modified and configured.

Creating a Menu

*It is **NOT** possible to created a completely new menu item in the Planner or the Sequencer.*

Existing items in a menu can be moved up to the main menu level, if quicker access is required. To move an item to the main menu level, select the top level item from the *Commands* section of the *Commands* tab, and drag it to the desired position in the menu.

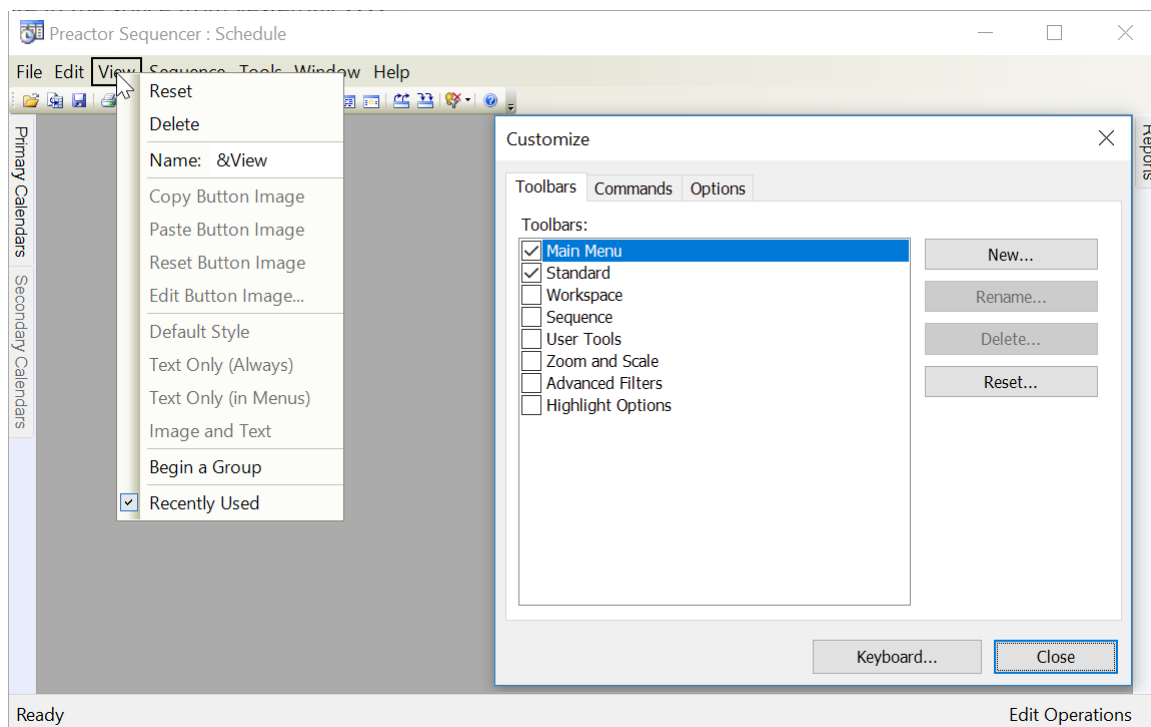
If an item that is dragged is a part of that menu, a menu item will be created instead of a new menu. The identifier between a menu "header" and a menu item is if the following symbol is next to the menu item: ▶



Deleting, Renaming or Resetting a Menu

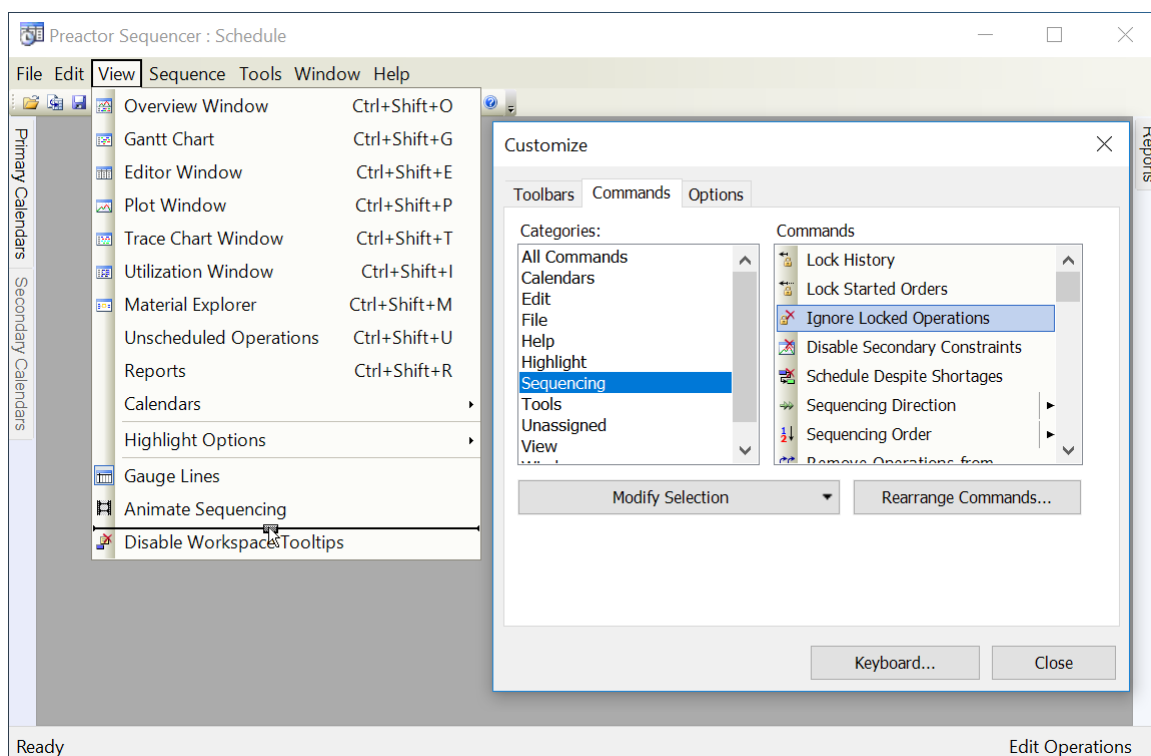
If a menu needs to be renamed or deleted, with the Customize dialog open, right-click on the menu item that is to be edited, and a drop down menu will be displayed. This menu has the options to:

- Reset the menu to it's default set up.
- Delete a menu.
- Rename a menu.



Adding Items to a Menu

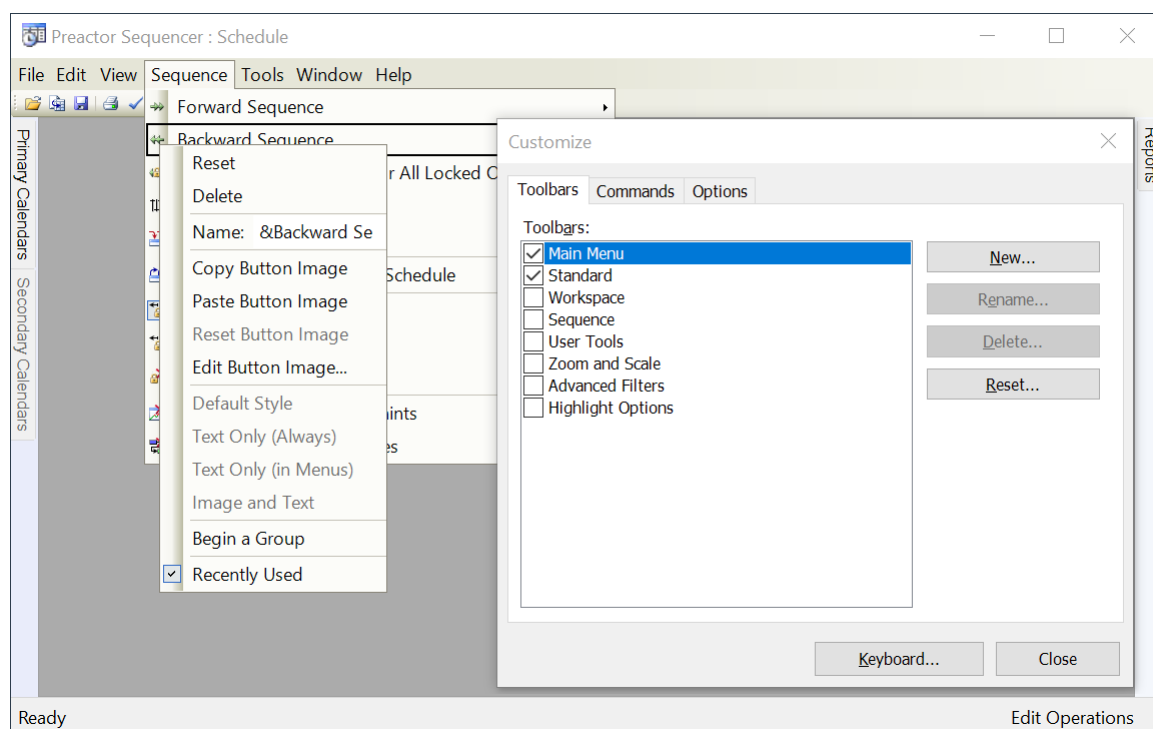
A menu item can be added to an existing menu by dragging the item into the desired menu, with the *Customize* dialog open, displaying the **Commands** tab. It is possible to position the menu item within the menu.



The other method to add an item to a menu is to click **Rearrange Commands....** The pop up window will allow for the addition of a menu item in either a menu or toolbar. This is done by selecting the menu that an item is to be added to, and then clicking **Add**. A list of all of the commands available will be displayed for selection. Only one menu item can be added at a time.

Deleting, Renaming or Modifying a Menu Item

There are two ways in which a menu item can be modified. The first method is to right-click on the menu item that is to be modified, while the **Customize** dialog is open.

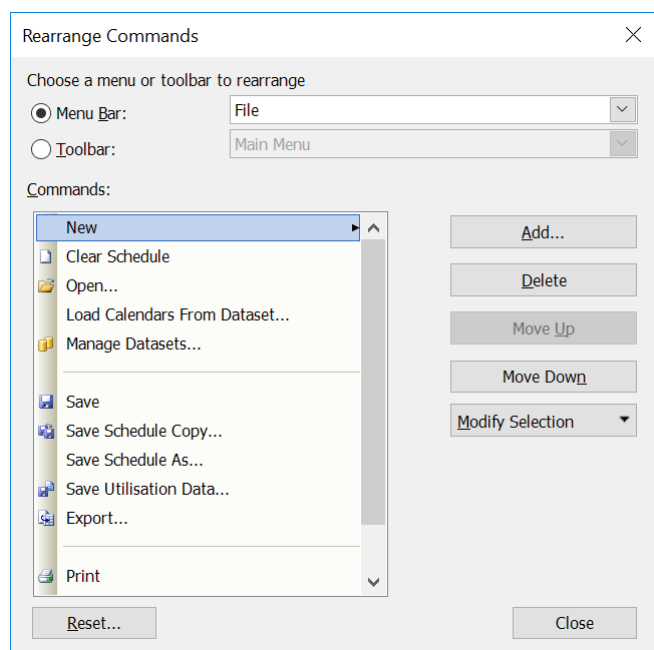


The drop down menu will give all of the available modifications available to that menu item, including:

- Resetting a menu item to its default state.
- Deleting a menu item.
- Renaming a menu item.
- Editing/copying/pasting/resetting the button image.
- Setting the display of a menu item. It is possible to display a menu item as either text only, or text and image. If set to **Text Only (Always)**, then if that menu item is used in a toolbar (for example), it will also be displayed as text instead of an image.

It is also possible to **Begin a Group** within a menu. A group created by clicking **Begin a Group**. A group will then only be ended when **Begin a Group** is enabled for a menu item that is either to start a new group, or show that it is not part of the group.

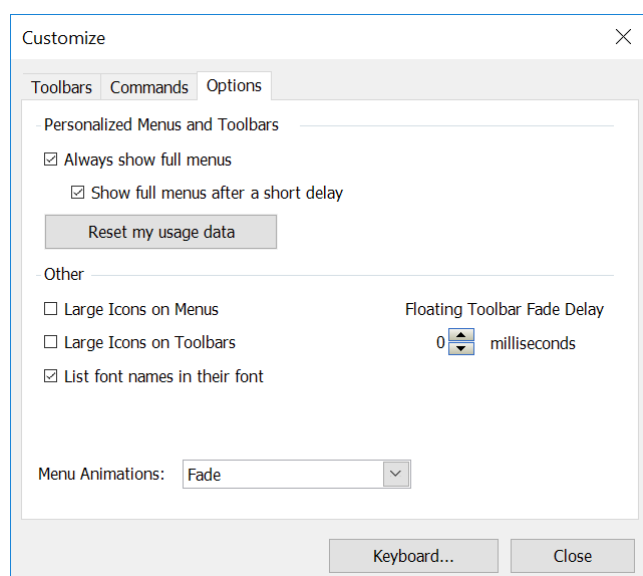
These modifications are also possible to do from the **Modify Selection** drop down of the **Rearrange Commands** dialog, found by clicking **Rearrange Commands...** in the **Command** tab of the **Customize** dialog.



Menu Presentation

The **Options** tab of the **Customize** dialog has a number of additional modifications available for menus, including how menus are to be presented in Preactor. Menu modifications are:

- Always show full menus, along with whether the full menus are displayed after a short delay.
- Resetting usage data, which will delete the record of the commands used in the Sequencer/Planner, and restores the default set of visible commands to the menus and toolbars. This does not undo any explicit customizations. If a reset is performed, this action is undoable.
- Large icons displayed in menu. If this is unchecked, icons will be displayed at it's default size.
- Set menu animations to one of the follow:
 - None
 - Random
 - Unfold
 - Slide
 - Fade



Quick Reference Configuration Guide for Look and Feel

Quick Reference Configuration Guide - Common

What	How
Fonts - Disable Anti Aliased fonts	Command File Editor ▶ Appearance tab
Fonts - Menus (in Sequencer or Planner)	For the Sequencer: Tools ▶ Options For the Planner: Settings ▶ Application Settings
Fonts - Use Small fonts Fonts - Use System fonts	Command File Editor ▶ Appearance
Keyboard Shortcuts - Create/Change	Right click on Toolbar Area: Customize... ▶ Keyboard...
Language Settings	Command File Editor ▶ Runtime
Menus - Change contents and orders of Menus - Menu animation to open drop down list - Show all items, or reduced set for a period or time.	Right click on Toolbar Area: Customize... ▶ Commands tab ▶ Rearrange Commands...
Menus - Show Large/Normal Icons on Menus	Right click on Toolbar Area: Customize... ▶ Options tab
PCO Configuration: Show icon in Taskbar	Preactor Desktop ▶ Configuration ▶ Communications ▶ Configuration
Time - Display seconds in time fields	Command File Editor ▶ Appearance
Toolbars - Enable/Disable	Right click on Toolbar Area. General Toolbars can be enabled/disabled. Select a specific window first (e.g. Gantt Chart) to enable/disable toolbar for that specific window, where available.
Toolbars - Global Lock or Unlock (can be moved)	Right click on Toolbar Area: Check or uncheck Lock the Toolbars
Toolbars - Create, Rename, Delete new Toolbars	Right click on Toolbar Area: Customize... ▶ Select New/Rename/Delete
Toolbars - Modify Toolbar contents and order (of enabled Toolbars)	Right click on Toolbar Area: Customize... ▶ Commands tab ▶ Drag Command to desired toolbar
Toolbars- Show Large/Normal Toolbars	Right click on Toolbar Area: Customize... ▶ Options tab
Toolbars - Floating Toolbar Fade time	Right click on Toolbar Area: Customize... ▶ Options tab ▶ define the Floating Toolbar Fade Delay in milliseconds

Window Management

Dockable Windows

Dockable windows give users more control over the way in which information is presented. It allows them to choose where a window is placed on the screen and to adjust the size of windows to suit their requirements. This can be particularly useful if available screen space is limited or if you are using multiple monitors.

Dockable windows (when 'Dockable' is selected) can also be:

- Docked – fixed to the left, right, top or bottom of the sequencer window.
- Floating – located anywhere in the Sequencer window.

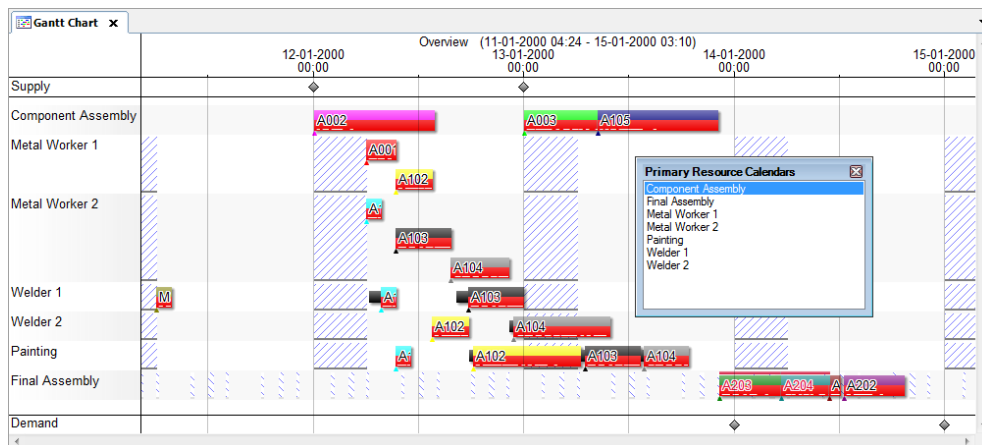
To position the window in a floating position:

- Grab the docked window and pull it to the center of the sequencer - then locate it to the desired position using the [Docking Cues](#).

OR

- Right click on the window head or select the menu option on the head, and select 'Floating'.

e.g. the Primary Resource Calendars window below.

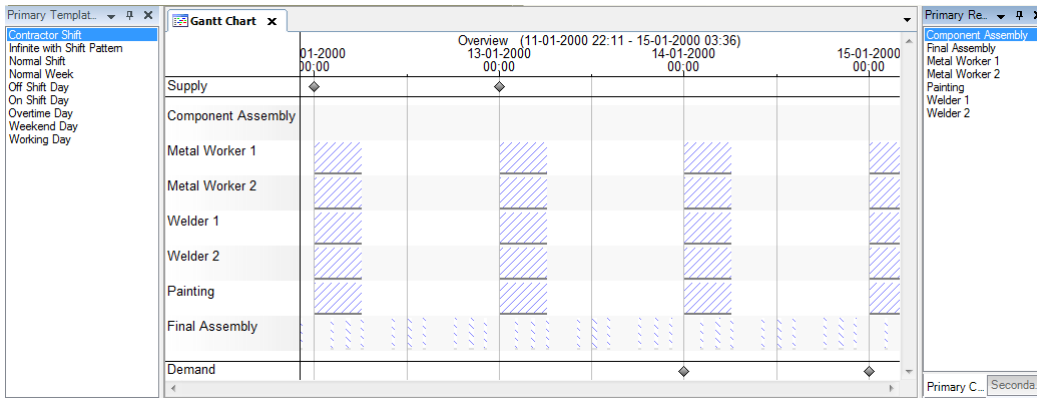


To position a floating window to a docked position:

- Right click on the window head or select the menu option on the head, and deselect 'floating'.

OR

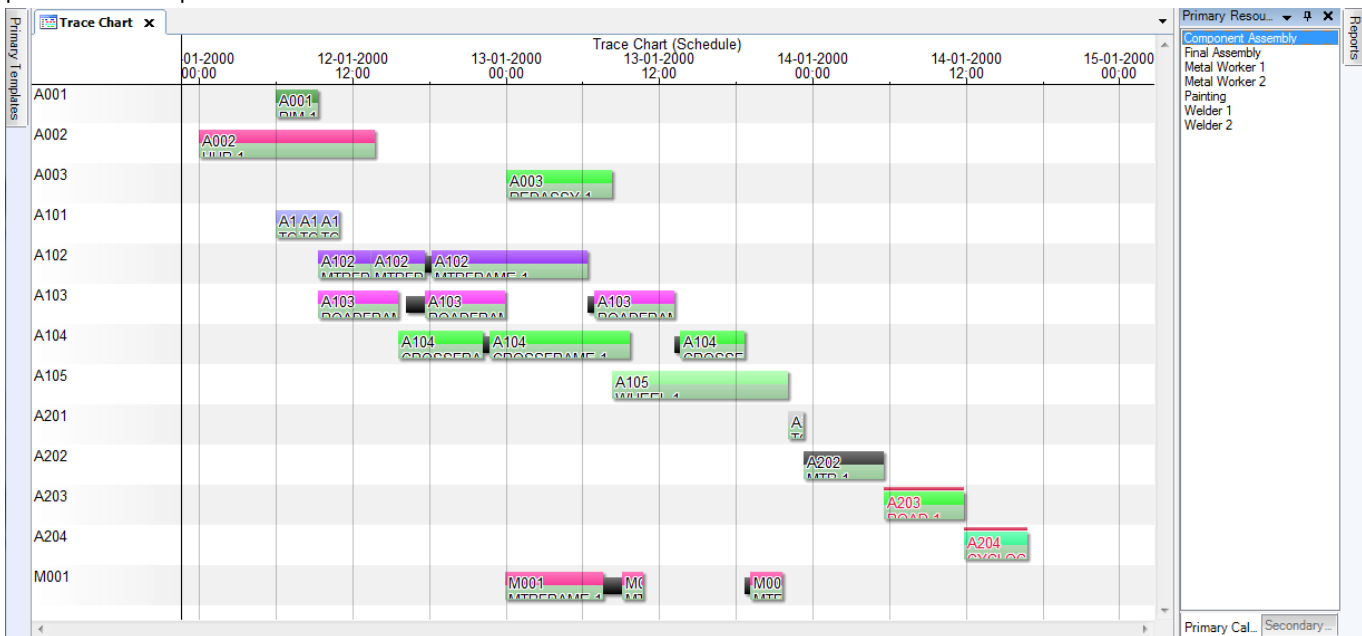
- Grab the window by its head (e.g. the Primary Resources) and drag it to the center of the sequencer - then locate it to the desired position using the [Docking Cues](#).



To PIN or Auto Hide a docked window, right click on the window head or select the menu option on the head and select Auto Hide, or select the Pin icon to its top RHS.



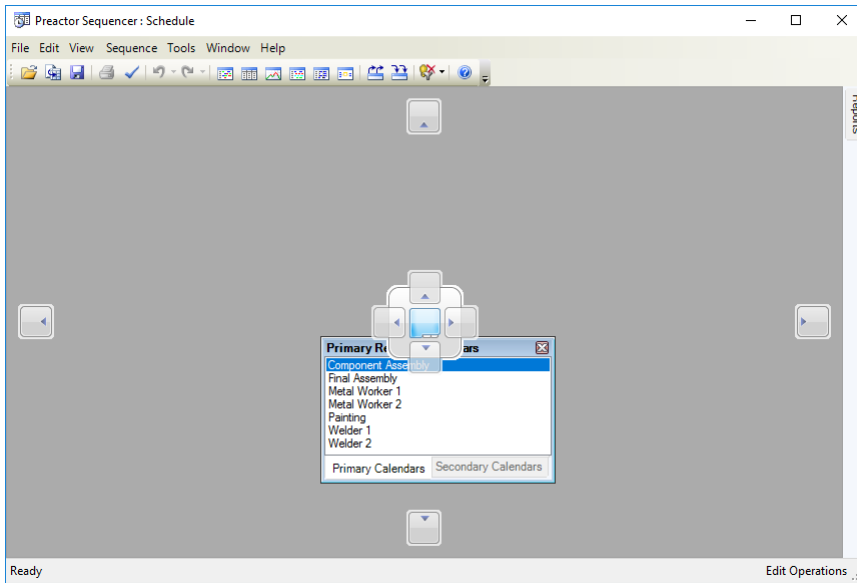
This will cause a tab to be created for the window where that window is docked (Left, Right or Bottom). Clicking on that tab will open the window, clicking outside the window will make it hide. The screen shot below show 2 of the 3 docked windows in the previous example hidden but all with Auto Hide selected.



Dockable windows can be treated as tabbed windows simply by right clicking on the window header and deselecting 'Dockable'.

Docking Cues

These cues or guides appear on screen when you attempt to move a **floating** dockable window, they appear either singly or as clusters. If, when moving a window, you hover the mouse over a particular cue, a shadow appears on screen showing the position that the window will occupy if this cue is selected.



Cues can also be used when you want to arrange several windows in a single group. In any window you can see a cluster of cues and in the center of the cluster is the image of a tab.



Dropping a window in the center of the cluster will add the window as an additional tab to this existing group of windows or single window.

Windows

All windows can be accessed through their 'tab'.

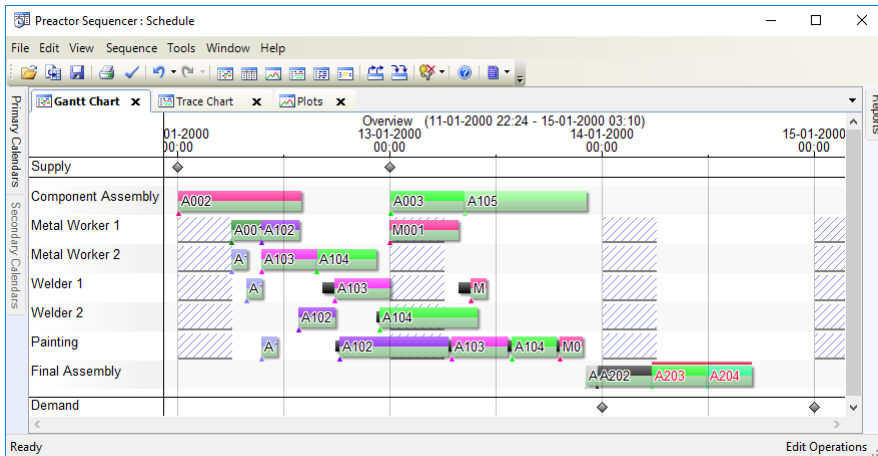
Certain windows are also able to be 'Docked'. These are windows that, when right clicking on their tab include a 'Dockable' option, and which will be by default:

1. Be set to Dockable.
and
2. Open Docked

Window Tabs

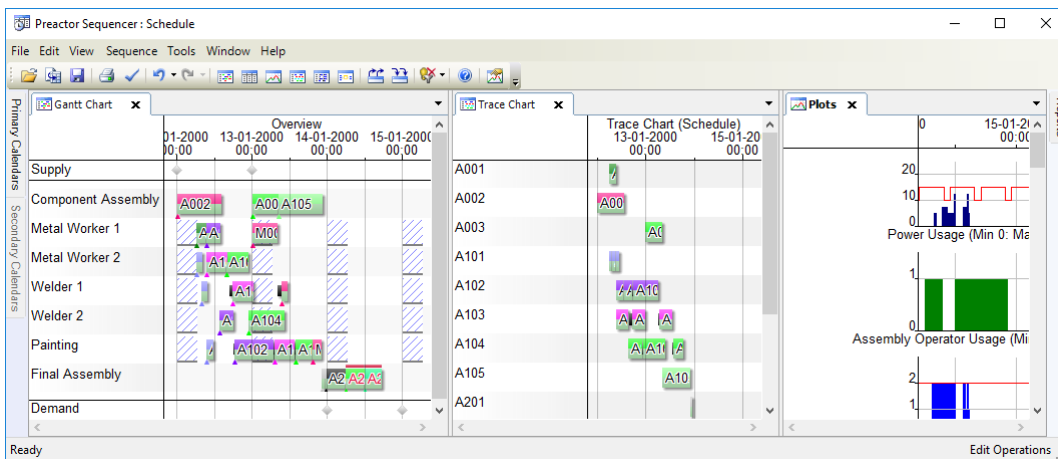
All windows (including Dockable windows with 'Dockable' not selected) can be:

- Accessible through tabs in a single Tab Group at the top of the Sequencer.



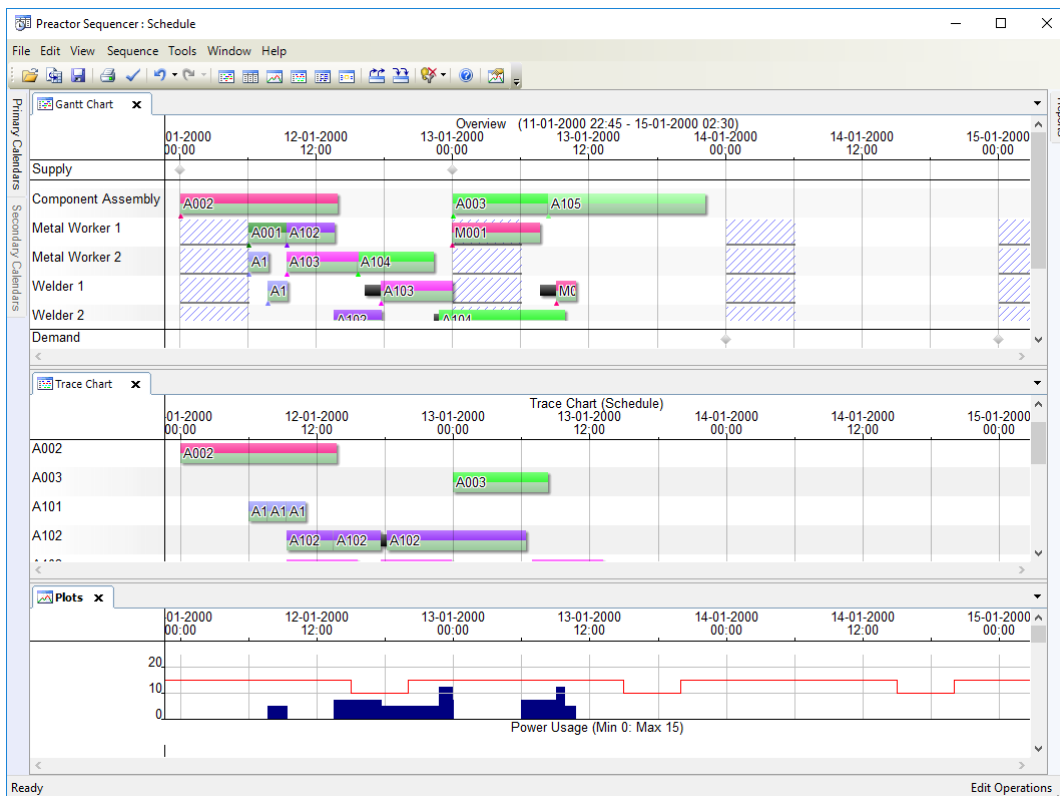
This is how a window is initially displayed by default if it is not 'Dockable'.

- In separate Vertical Tab Groups of the sequencer.



This is achieved by dragging the tab to the left or right hand side of the Sequencer window, or by right clicking on the tab and selecting 'New Vertical Tab Group'.

- In separate Horizontal Tab Group of the sequence:




This is achieved by dragging the tab to the top or bottom of the Sequencer window, or by right clicking on the tab and selecting 'New Horizontal Tab Group'.

Toolbars and Icons

To utilize the screen area efficiently and to provide a quick method of selecting an action: Icons are used to represent action, and a functionally associated set of Icons are grouped into Toolbars, each associated with one or more windows.

By default in shipped configurations, the Sequencer and the Planner each have a number of Toolbars appropriate to that application, some available for all windows, and some associated with specific windows.

The toolbar shown here is the Standard toolbar for the Sequencer: 

Some toolbars are only visible, and only configurable on/off, when the window to which they relate is opened. An example of this is the toolbar associated with Calendar States window in the Sequencer.

The Toolbars can be configured to be turned on (displayed) or off, and new Toolbars can be created.

Workspaces

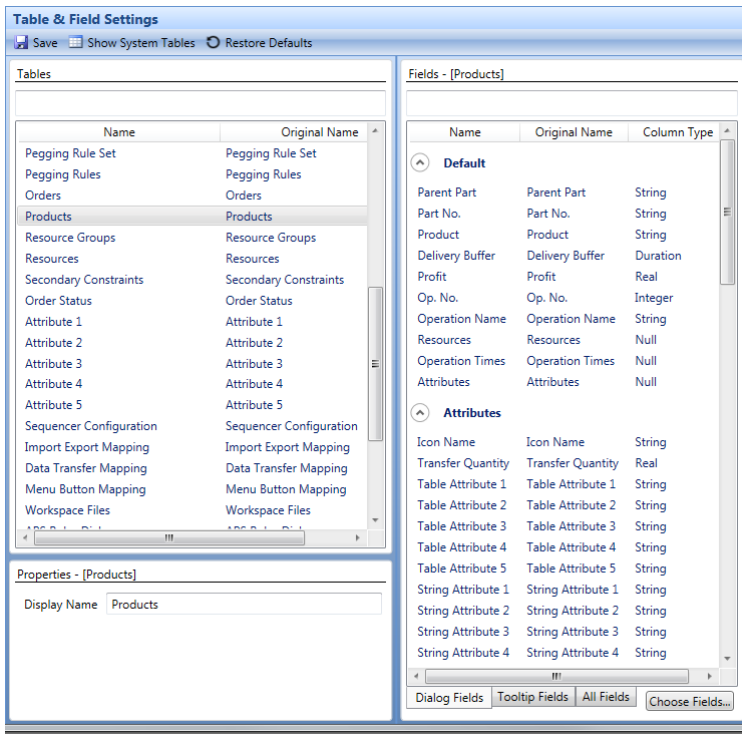
Once you have created a layout of different windows in your workspace it can be saved so that you do not have to rearrange it every time you open the Sequencer (not currently available for the Planner).

Table & Field Settings

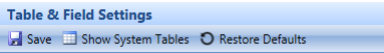
Editor

The 'Table & Field Settings' editor allow users to modify a set of features to change how tables and fields are displayed. This allows a degree of customization of the definition of tables and fields for Standard or Professional editions of Preactor. For Ultimate editions the Table & Field Settings provide a more user friendly option for applying certain types of customization

without having to edit the Preactor Table Definition (.prtdf) file, though this is also an option.



Tools



Save

The save button will save all customizations made in the editor. To abandon changes without saving, the user should navigate away to a different item in the workspace and close the module.

Show System Tables

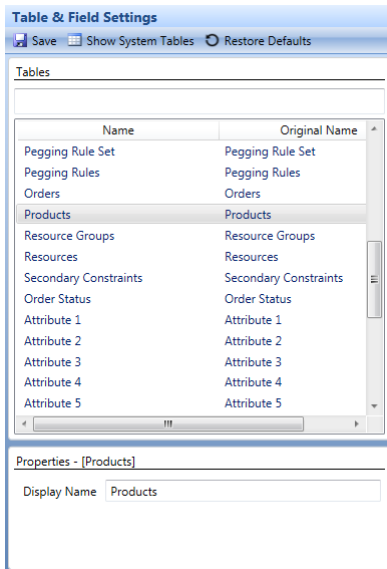
System tables can be shown by clicking the button on the menu bar which says 'Show System Tables' or can be hidden by clicking the 'Hide System Tables' button which becomes visible when system tables are shown.

Restore Defaults

The 'Restore Defaults' button will delete all customizations that have previously been saved. It works at a global level and will remove the customization for every table/field, not just the table or field currently being edited.

Table Properties

The 'Table & Fields Settings' editor is split into 3 panels. The panel of the left hand side shows a list of user defined tables and, optionally, system tables.



To edit any settings a table needs to be selected from the list. A table can be found either by scrolling through the list or by using the filter box above the table list.

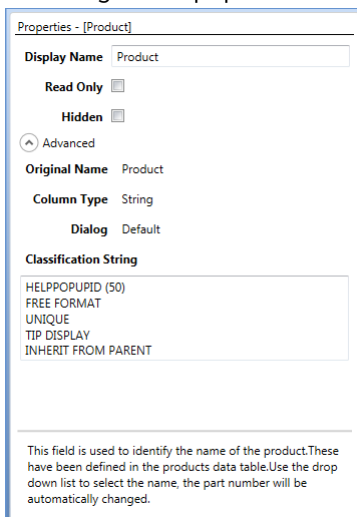
When a table is selected, the properties editor at the bottom of the 'Tables' column becomes enabled. The properties editor allows the user to change the display name of the table. This is the name displayed in the editor and when navigating in the workspace.

Field Properties

The central 'Fields' column allows the user to select a field from selected table. It becomes enabled as soon as a table is picked from the left hand column.

There is a filter box at the top of the column which allows a case insensitive filter. There are also three tabs at the bottom of the column which allow the user to switch between the fields displayed on dialogs, fields displayed on tool tips, and a list of all fields.

Selecting a field populates the final right hand column with the properties for that field.



There are some properties that are common to all fields, and some properties that are displayed depending on the field type. The table below shows which properties are supported for each field type.

	Null	String	Integer	Toggle	Real	Duration
Display Name	X	X	X	X	X	X
Hidden	X	X	X	X	X	X
Read-Only		X	X	X	X	X
Number Format					X	X
Display Seconds						X

Display Name

Setting the display name here overrides the name that is displayed on edit dialogs and on the column headers in the editor.

Read-Only

Read-only fields cannot be edited through the UI, though the underlying field values may still be altered in other ways (using a PESP script, for example).

Hidden

The field is hidden so is not possible to modify or view the data. Selecting this toggle will remove the field from any dialogs it is on, so it will disappear from the list of fields in the 'Dialog Fields' tab.

Number Format

Defines the format in which numbers or durations are displayed. For details, "Number and Duration Formats" on the next page.

Display Seconds

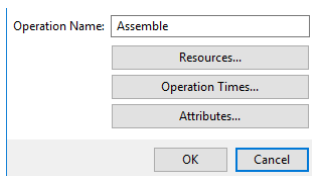
Shows the seconds element of a duration field when selected.

Reordering Fields

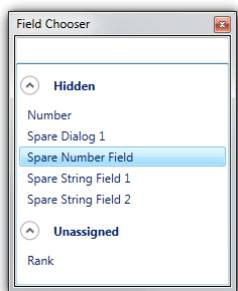
Users can use the 'Dialog Fields' and 'Tooltip Fields' tabs to reorder fields. A field can be 'picked up' by clicking on it with the left mouse button and then, whilst still holding the mouse button down, dragging it into another location. This changes the position of the field within either the dialog or tooltip.

Adding and Removing Dialog Fields

The 'Dialog Fields' tab allows the user to add or remove fields on editor dialogs. Fields can be removed from the 'Default' dialog (the one initially shown when editing a record) or the sub dialogs. For example, the 'Attributes...' button below would show fields listed in the 'Attributes' section of the 'Dialog Fields' list.



To add a field, the user clicks on the 'Dialog Fields' tab at the bottom of the central 'Fields' column and then presses the 'Choose Fields...' button.



This will display a list of 'Hidden' and 'Unassigned' fields. The user can drag a field from either of these two categories into the list of fields. If a field is dragged from the 'Hidden' section of fields then it will automatically become not hidden when added to a dialog.

Similarly, it is possible to remove fields from a dialog either by right clicking on a field in the list and using the 'Remove' option from the context menu, or by dragging a field into the 'Field Chooser'. Dragging a field into the 'Hidden' section of the 'Field Chooser' will remove a field from the dialog and also set it to be hidden.

It is not possible to add or remove fields from matrix fields ('List Fields'), but the fields within them can be reordered just like any other dialog.

Hidden fields are displayed in the 'All Fields' tab as disabled but will not be displayed in either the 'Dialog Fields' or 'Tooltip Fields'.

Number and Duration Formats

Format strings are used to determine how a value is displayed. They are applicable to both REAL fields and DURATION fields, though they are interpreted slightly differently for both.

REAL Fields

A format string for a number field takes the following form:

```
[MAX] length.precision
```

The length element defines the overall length of the value in digits (including the decimal separator). If the length is prefixed with a zero character (e.g. 06), then the formatted number will be padded with zeros, otherwise it is padded with spaces.

The precision element defines the number of digits displayed after the decimal separator (the fractional part).

The optional 'MAX' keyword affects how the precision is interpreted for whole integer values. With the 'MAX' keyword, the precision element defines number of digits used for the fractional part only when the number has a fractional part.

Examples

Value	Format String	Formatted Value
10.55	3.1	'10.6'
10.5	6.2	' 10.50'
10.5	06.2	'010.50'
10	MAX 6.2	' 10'
10.555	MAX 6.2	' 10.56'

DURATION Fields

For DURATION fields, the format determines the number of digits displayed after the decimal point for the minutes part. The default is .2 if the number of minutes is not an integer. The format must be specified as .x. For example, '.4' will cause a duration of 1 hour 5.5 minutes to be displayed as '1 Hours 05.5000 mins'. Integer minutes will always be displayed without any digits after the decimal point.

Import & Export

Import/Export Overview

Much of the information used by Preactor is typically available in other systems and therefore Preactor includes a number of import features for extracting data from other sources, as well as export features for extracting data from Preactor to file.

Import, in particular, is a feature of Preactor with a broad range of functions to accommodate a wide range of integration scenarios. Once defined, import scripts can be invoked from PESP scripts, so more complex integration scenarios can be composed of several import scripts (maybe coming from different sources).

The following sections describe in detail the import and export features in Preactor, how their use is defined by means of an import script, and how those scripts can be easily defined using the in-built Import/Export Wizard.

Data Providers

Preactor supports importing from a predefined Data Provider into any table defined in the *UserData* schema. Executing a query against the Data Provider returns a result set, which becomes the source for the import.

Note: Importing from data providers is a feature that is not available in Express editions of Preactor. If you are using an Express edition, all imports must be from a file source.

Data Providers are a component of the .NET Framework and as such, their availability is dependent upon your operating system. By default, the .NET framework installs four main providers, which allow you to connect to almost any data source. If a requirement exists for a particular 3rd party provider this can sometime be achieved by means of a provider developed by a third-party.

Some Data Providers are only available in either 32-bit or 64-bit versions although most are suitable for any CPU. For example, the OLEDB Jet provider is only available on 32-bit platforms at the time of writing.

Note: Check that your required provider is available for your target platform. You may need to consider whether the 32-bit or 64-bit versions of the required provider are available and select the appropriate installation of Preactor.

.NET Framework Data Providers

A number of data providers are include with the Microsoft .NET Framework. Each is described below:

Data Provider	Description
Data Provider for SQL Server	Provides data access for Microsoft SQL Server version 7.0 or later.
Data Provider for OLE DB	For data sources exposed by using OLE DB.
Data Provider for ODBC	For data sources exposed by using ODBC.
Data Provider for Oracle	For Oracle data sources.

Data Provider for SQL Server

The .NET Data Provider for SQL Server allows you to connect to SQL Server instance running on Microsoft SQL Server 7.0 and later.

Although it is possible to connect to SQL Server databases with both OLE DB and ODBC providers, you should always use the dedicated SQL provider where possible.

Using this provider allows you to create queries over multiple tables and views or even over multiple databases.

Note: Executing a query over multiple databases is only possible if those databases reside on the same instance or on a linked server.

For more information on linking server instances, please visit <http://technet.microsoft.com/en-us/library/ff772782.aspx>

Data Provider for OLE DB

The .NET Data Provider for OLE DB uses a native inter-op layer for data access and provides an extensive selection of providers. OLE DB allows you to connect to Databases and files as well as services such as Network Directory services and much more.

Data Provider for ODBC

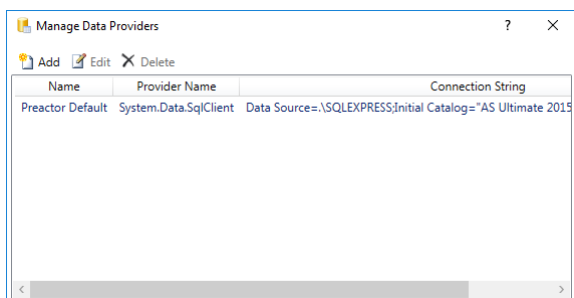
The .NET Data Provider for ODBC enables access to system defined ODBC data sources such as dBase, Paradox, SYBASE and Oracle services as well as Microsoft Office applications such as Visio, MS Project and Excel. Typically, these data sources are defined in the ODBC Data Source Administration control panel in Windows.

Data Provider for Oracle

The .NET Data Provider for Oracle enables access to Oracle Data Sources by using the Oracle Client connectivity software.

Managing Data Providers

Choose **Configuration** ► **Import/Export** ► **Manage Data Providers** to add, edit or delete data providers you wish to define as import sources.

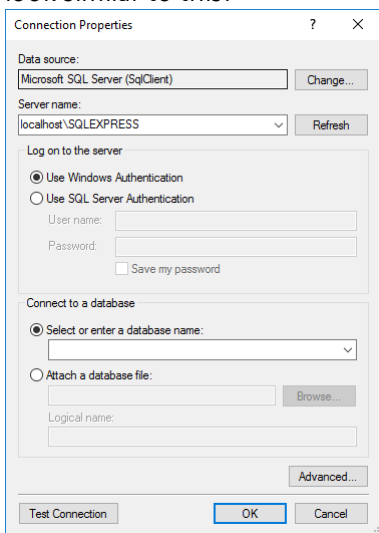


You can create as many providers as required but an import script can only use one data provider.

Note: A data provider named 'Preactor Default' always exists. This provider cannot be deleted or edited and exists as a convenient way to access the database to which Preactor is connected. This is typically used to import sample data.

Creating a New Data Provider

1. In the **Manage Data Providers** dialog, click **Add**.
2. In the **Add Data Provider** dialog, give the provider a name.
3. In the **Choose Data Source** dialog, select a data source from one of the listed available data sources.
4. At this point you will be shown a **Connection Properties** dialog. Complete the connection properties dialog, providing all the details required to connect to your chosen data source. Once complete, the connection properties dialog should look similar to this:



5. If available, it is a good idea at this point to click **Test Connection** to verify that the connection properties provided are working as expected.

Some of the connection properties may affect the validity of queries executed against the data source. For example, in the above dialog it is possible to select a database or you can leave the database blank. If no database is specified, it will need to be specified explicitly within any queries.

Note: For information and guidance on the configuration of Data Providers, please visit <http://msdn.microsoft.com/en-us/library/s7ee2dwt%28v=vs.71%29.aspx>

Edit an Existing Data Provider

An existing data provider can be edited by selecting the data provider and choosing the **Edit** button from the toolbar above.

Delete a Data Provider

To delete a data provider, select the provider and choose **Delete** from the toolbar above.

Connection Strings

When you create a data provider, the connection string is stored in plain text. This means any user names or passwords specified in the connection string are not encrypted.

To avoid any issues it is recommend that you use integrated authentication if possible.

Import/Export Scripts

Both imports and exports are defined as scripts. Each script stores all the information about an import or export process - what the update method is, any queries involved, how the fields are mapped etc. While it is not important to know the detail of what is included in the scripts (this is managed using the Import/Export Wizard), it is useful to understand how these scripts are managed, maintained and ultimately invoked.

Import and export scripts are stored in the Import-Export Scripts (PIO Scripts) table.

Configuration ▶ Integration ▶ Import/Export Scripts.

Script Name	Data Source Type	DataSet	Script Type	Description
Import Resources	Data Provider	Resources	Import	Imports Resources into Resources table.
Import Colors	Data Provider	Attribute 1	Import	Import Colors Data
Import Materials	Data Provider	Attribute 2	Import	Import Material Data
Import Geometries	Data Provider	Attribute 3	Import	Import Geometry Data
Import Resource Groups	Data Provider	Resource Groups	Import	Import the header data of the Resource Groups
Import Resource Group Resources	Data Provider	Resources	Import	Import the Resources in to the Resource Groups table matrix
Import Products	Data Provider	Products	Import	Import Product Data from the Items and Routings Sample Data
Import Constraints	Data Provider	Secondary Constraints	Import	Import additional constraints
Import Supply	Data Provider	Schedule	Import	Import the Supply Data
Import Product Bill of Materials	Data Provider	Product Bill of Materials	Import	Import the Bill of Materials for the products defined in the system
Import Demand	Data Provider	Schedule	Import	Import the Demand Data
Import Bill of Materials	Data Provider	Schedule	Import	Import the Bill of Materials for the orders defined in the system
Import Firm Orders	Data Provider	Schedule	Import	Import Firm Orders with the route already expanded in the source system
Import Suggested Orders	Data Provider	Schedule	Import	Import Suggested Orders which do not have a route associated with them
Import Resources Constraints	Data Provider	Secondary Constraints	Import	Import the additional constraints associated with the resources
Export Schedule	File	Schedule	Export	Export the scheduling data from the Orders table
Export BoM	File	Schedule	Export	Export the current schedules BoM data
Export Shortages	File	Schedule	Export	Export the information about material shortages from the current schedule
Import Sizes	Data Provider	Attribute 4	Import	Import Size Data
Import Customers	Data Provider	Attribute 5	Import	Import Customer Data
Import Co-Products	Data Provider	Co-products	Import	Import Co-Products for the orders defined in the system
Import Product Co-products	Data Provider	Product Co-products	Import	Import Co-Products for the products defined in the system
Import Changeover Groups	Data Provider	Changeover Groups	Import	Import information about Attribute based Changeover times in to the Changeover Groups table

To run an existing script, select the script and choose **Run** from the tool bar.

To create a new script, insert a record into the table as you would for any table in Preactor. On insert the Import/Export Wizard appears. Follow the steps in the wizard to create an import or export script.

Edit a script in the same way as you would edit any data row in Preactor. Again, the Import/Export Wizard will appear to walk you through editing the script.

Scripts can be saved to or loaded from a file. This is useful when transferring scripts between different configurations. To save a script select the script and select **More Actions** ► **Save Script**. To load a script, select **More Actions** ► **Load Script**.

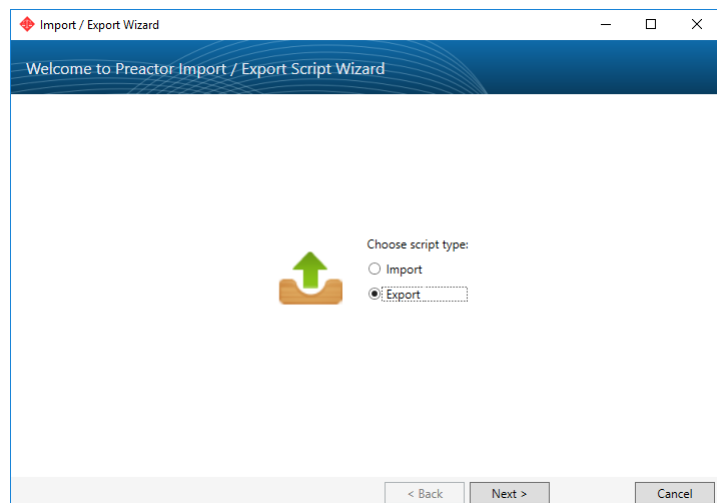
Import/Export Wizard

Import/Export Wizard Overview

The Import/Export Wizard provides a simple interface to define the options for your import or export script. It will allow you to define an import or export script for any table within the "UserData" schema. You can also import directly into any AUTO LIST or AUTO DIMENSION matrix using the matrix import features.

For import scripts, the Import/Export Wizard can connect to a large range of data sources using either a connection through a Data Provider or by using the File connection type. Export scripts target file based outputs only.

When you create a new script, you will first be prompted to select the type of script you wish to create.



Script Information

After selecting either import or export for the type of script you want to define, you are required to enter some basic information about the script. This includes a name and description as well as the table that is the subject of your script. For import scripts, you will need to define some additional information such as the connection type and whether you are importing into the selected table or into one of its associated matrix tables.

Note: Not all tables have matrices defined and the matrix import functions are dependent on what fields are defined in the selected table.

Supported Connection Types

For import scripts Preactor supports two connection types, each of which is detailed below.

File

The *File* connection type allows you to select a locally accessible .csv file as the import source. If you are importing data from a local .csv file then select this connection type.

Data Provider

The *Data Provider* connection type allows you to select a predefined data provider as the import source. The source data is determined by the execution of a query against that source. Select this connection type if you are importing from a database or other data source.

Once you have entered the basic script information, you may progress with the wizard. The options presented to you in the subsequent pages of the wizard will vary depending on the options you have selected.

File Import

Importing from a file is an option across all editions of Preactor. There are fewer steps in importing from a file. So long as the required file is in an accessible location, all that is required is a path to the file.

Import files must be .csv (Comma Separated Value) files. Contrary to the name, a number of delimiters are supported, as well as the standard comma delimiter.

To select a file, click the **Browse...** button and use the **Open File** dialog to select the file you wish to import. The file path will be populated with the full path to the file. If required, this path can be specified as a relative path (relative to the configuration directory). For example:

```
Import-Export Files\Import-Products-Initial.csv
```

In addition to the file path, you can also specify the file encoding using by expanding the **File encoding** section. By default the file encoding is set to Unicode (UTF-8). For Unicode files, several forms of encoding are supported. If the file is ANSI or Windows encoded, selecting **Windows Encoding** with the default code page is typically correct. If you are importing a file that includes characters that are not native to the computer on which you are running Preactor (for example, a file including Chinese characters on a US-English computer) it will be necessary to explicitly select the required code page from the list of those available.

If the first row in the file is a header row, select **File Includes Header**. By default, the expected separator is a comma, but other supported separators can be selected from the list of separators.

Data Provider Import

In all but the Express editions of Preactor, it is possible to import data from a data provider.

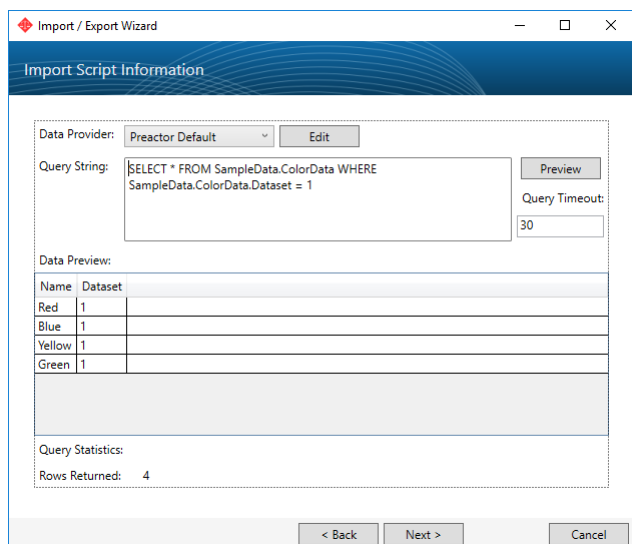
When importing from a data provider, select **Data Provider** from the **Connection Type** drop-down on the script information page of the Import / Export Wizard.

On the following page, you will be asked to select a data provider and enter a query. This query will be executed against the selected data provider and the resulting data set is imported into Preactor when the script is run.

An example of a SQL query:

```
SELECT Name FROM SampleData.ColorData  
WHERE SampleData.ColorData.Dataset = 1
```

On the same page, a preview of the resulting data set is shown. Click **Preview**, or press **F5** to refresh the data preview.



Note: The data Preview pane is populated with a subset of the query result to show you the shape and format of the data you will be importing.

Data Provider Queries

When you use a data provider to import data, you have to define a query that will be executed against your data source.

The syntax of that query may change depending on the data provider that you use, and the performance of your import script can be influenced greatly by the design of your query as well as the source, size and shape of your import data.

In order to design effective and efficient import scripts careful consideration must be given to the design of your query.

The secret to designing an efficient query is to limit its scope. Where possible, only select columns that you need and make use of clauses such as WHERE when available and appropriate to do so.

The topic of query languages, their nuances and best practices is vast and generally outside the scope of this documentation. For more specific information on queries you should refer to the documentation for the query language you are using. However, some general guidance applicable to most Simple Query Language (SQL) derived query languages is given below.

SELECT Statements

The SELECT statement is used to select data from a data source. It returns an object known as a result set. This result set is used as the source for the import.

While the syntax remains similar, arguments can differ between different data sources as can be seen by the following examples:

SQL SELECT

```
SELECT [Column(s)]
FROM [Table]
WHERE [Condition]
```

EXCEL SELECT

```
SELECT [Column(s)]
FROM [SHEET One$]
WHERE [Condition]
```

Text File SELECT

```
SELECT [Column(s)]
FROM [File Path]
WHERE [Condition]
```

JOIN Statements

A JOIN combines records from two or more tables to create a single set of data. There are typically 3 types of join. INNER, LEFT OUTER and RIGHT OUTER but this may vary by provider.

An INNER JOIN returns only those rows from the LEFT table that have a matching row in the RIGHT table, based on the join criteria.

```
SELECT column_name(s)
FROM table1,
INNER JOIN table 2
On table1_column_name = table2.column_name
```

A LEFT OUTER JOIN returns all rows from the LEFT table even if no matching rows were found in the RIGHT table. Any values selected out of the right table will be NULL for those rows returned where no matching row is found in the Right Table.

```
SELECT column_name(s)
FROM table1
LEFT OUTER JOIN table 2
On table1_column_name = table2.column_name
```

A RIGHT OUTER JOIN is the opposite of a LEFT OUTER JOIN in that it returns all values from the RIGHT TABLE regardless of matching rows in the LEFT table.

```
SELECT column_name(s)
FROM table1
RIGHT OUTER JOIN table 2
On table1_column_name = table2.column_name
```

Note: Best practice suggests that you not use a RIGHT OUTER JOIN because these can always be rewritten as a LEFT OUTER JOIN, which is considered more portable and easier to read.

You can execute a join against .csv files and Excel files by applying the same basic syntax.

```
SELECT [Column (s)]
FROM [filePath] as table1
INNER JOIN [filePath] as table2
ON table1.column = table2.column
WHERE condition
```

Open Data Import

In all but Express editions of Preactor, it is possible to import data from an Open Data Protocol (OData) data stream.

Preactor supports OData V3 and V4, both atom and json based streams.

Where data is exposed using OData, all that is required in order to import that data into Preactor is a URL.

Authentication

Some services may require authentication. By default, Preactor will use the current user's credentials to access a service. If other credentials are required, then a user name / password may be provided. Preactor will store any passwords in an encrypted field. See "Encryption " on page 119 for more information.

SIMATIC IT Authorization

When connecting to SIMATIC IT Unified Architecture (UA) service layer, an authorization token must be provided in order to make the request on the server. Preactor supports X509 certificate based authentication for SIMATIC IT UA. An X509 certificate may be stored on disk, or added to the local certificate store. Certificates should be added to Preactor through **Configuration ► Security ► Certificates**.

Entities

Preactor will use the OData meta-data to list the entities exposed by the service. To query for all instances of a particular entity, simply select the entity you require from the list.

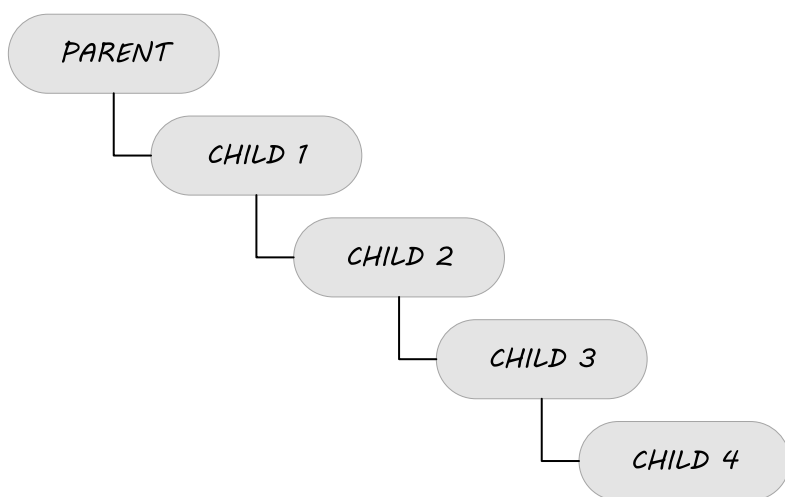
Complex Queries

As well as allowing for simple queries, Preactor allows for more complex queries using OData query syntax. Open the **Advanced** section in order to enter OData syntax. Bear in mind that Preactor will only support queries returning "plain old data", any complex types or collections should be simplified in the query in order to be used by Preactor.

Importing Hierarchical Data

OData Import supports the flattening of hierarchical data to a format that can be consumed by Preactor. This is achieved by writing an *Expand* clause in the **Override Query** field, which is found in the **Advanced** section of the **Query Details** page of the Import Wizard.

A hierarchical data depth of 5 levels is supported by Preactor, and the diagram below illustrates what is meant by levels.



If importing data that contain more than five levels, Preactor will import down to the fifth level, and then will stop looking for data.

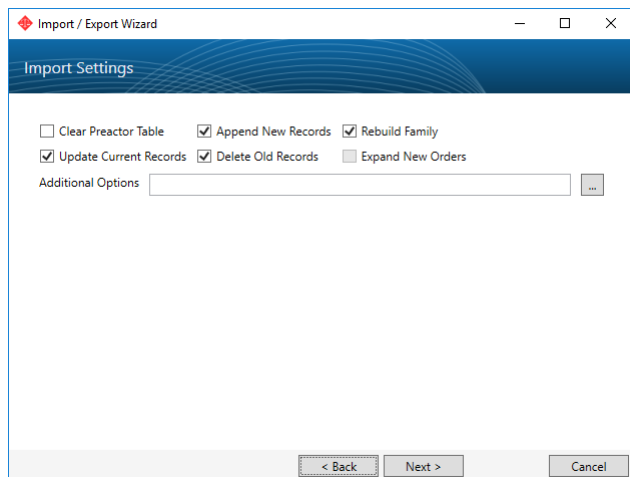
Here is an example of a query that can be used to import data from one table that has a child table associated with it. This query would be used in the Override Query Field:

```
[Parent Table]?$expand=[Child Table1]
```

Where [Parent Table] is the name of the Parent Table, and [ChildTable1] is the name of the table that is the child of the Parent Table.

Import Settings

Once your source data has been defined, whether from file or from a data provider, the remaining pages in the Import/Export wizard from this point on are the same.



There are some general import settings that mandate how the import data will be processed. Each option is explained below.

Clear Preactor Table

The target table will be cleared of all its existing data. Generally, clearing the contents of a table should be avoided as references to items in a table will not be considered when clearing a table and this could compromise the integrity of your data. If a table has no references to it, it is generally safe to use this option.

Update Current Records

When a row in the target table is matched with a row in the import data, its contents will be updated from the import data (according to the mapping defined) if this option is selected.

Append New Record

When a row in the import data does not match with any of the existing rows in the target table, a new row is appended to the target table when this option is selected.

Delete Old Records

With this option selected, any rows that exist in the target table but are not matched with any rows in the import data are deleted.

Rebuild Family

Once all the import data has been imported, any broken family relationships (e.g. parents rows with the same identifier value) are repaired.

Expand New Orders

Specifically for when importing into a table with an expand relationship (such as the expand relationship between an Orders table and a Products table), this option will expand a single row into n rows as specified by the source of the expansion. This is

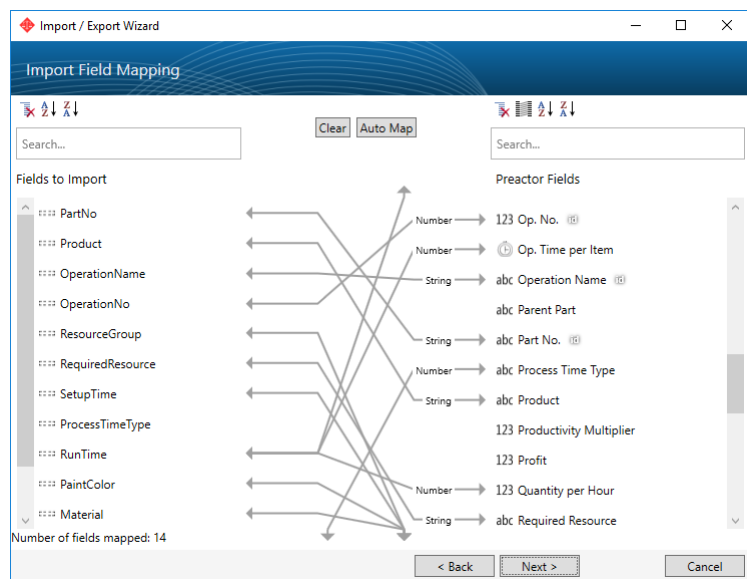
useful when importing order header information and then expanding the routing information from a Products or Routes table. For more information on how expand works, see "Auto Expand" on page 197.

Additional Options

A number of advanced features are enabled using commands that can be defined in the in the Additional Options field.

Mapping Import Fields

Import data and the target fields in a Preactor table need to be mapped from one to the other. The mapping identifies not only the fields for which data should be imported, but also the type of the data being imported, any supported transforms that should be applied and also fields that make up the identifiers for an import.



Mapping Tools

Certain fields can be filtered and sorted using the tool bars at the top of each field list. Each tool is described in the table below:

- Hides unmapped fields
- Sort fields alphabetically
- Sort the fields by mapping. (only available for Import mappings)

The search box can be used to filter the field list based upon a search term.

Clear

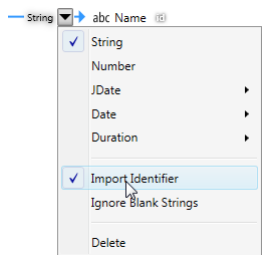
This button will clear all of the existing field mappings.

Auto Map

Based on the names of the columns in the import data and in the target table, Preactor will attempt to map fields automatically when this button is pressed. When a new script is defined, this automatic mapping is invoked when the mapping page is first shown.

Mapping Menu

To show the mapping menu, hover the mouse pointer over the mapping relationship and click on the drop-down menu when the icon appears.



Mapping Properties

Data Type

The first four options are associated with the type of the data that is being imported.

String	The value is a string value.
Number	The value is a numerical value.
JDate	The value is a date represented as the number of days since midnight on the 31/12/1899, otherwise known as an OLE Automation date.
Date	The value is a date. The date format must be specified by selecting from the predefined options or by entering a custom format string.
Duration	The value is a representation of timespan data in various formats including ticks, which are displayed as decimal days.

The normal reference point used for JDate mappings is midnight on 31/12/1899. You can however apply an offset which adds a number of decimal days to the normal reference point.

Note: Preactor supports the full range of Date Time formats within the Microsoft .NET Framework. For more information on Date Time formats and Custom formats, please visit: [http://msdn.microsoft.com/en-us/library/az4se3k1\(v=vs.100\).aspx](http://msdn.microsoft.com/en-us/library/az4se3k1(v=vs.100).aspx)

Import Identifiers

At least one mapping should be marked as an import identifier in order for an import script to be valid. An import identifier is a field or one of a set of fields that can be used to identify a row in a table. For most import scenarios, this set of fields should identify a single, unique row. There are some cases where you may want to match a broader category of records, so the uniqueness of the rows identified is not enforced.

Import identifiers are marked with an "id" symbol to the right of their field name on the right-hand side of the mapping. To set a mapped field as an import identifier select the 'Import Identifier' item from the mapping menu.

Note: Mapped fields should not be marked as import identifiers unnecessarily, as doing so can have a negative impact on import performance.

Ignore Blank Strings

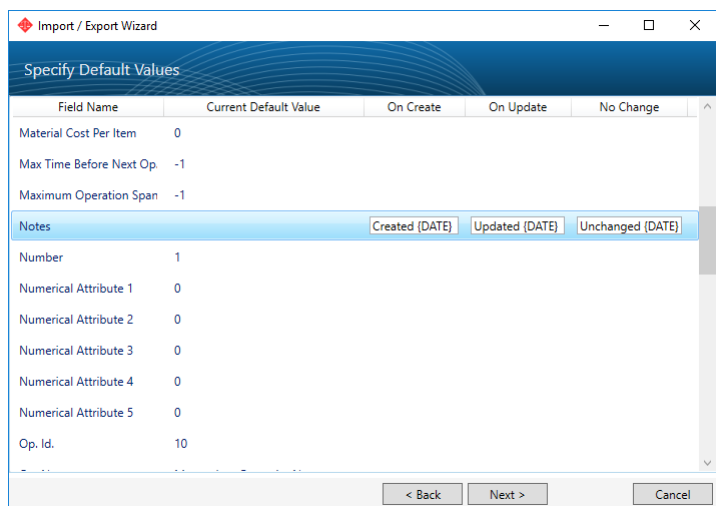
With this option selected, blank strings will not be imported. Any other value will be treated as it would otherwise be treated according to the options specified.

Delete

If you select delete from the mapping menu, the individual mapping relationship will be deleted.

Default Import Values

On occasion fields that are not mapped in an import script may not carry an appropriate default value. Rather than accepting the default value as defined against the field (shown in the first column for reference), we can specify a default value for a field within the import script. The value specified can be different for different scenarios, identified by the **On Create**, **On Update** and **On Delete** column headers on the default values page.



Note: Only fields that have not been mapped are displayed on the default values page.

On Create

This value will be written to the unmapped field whenever a new row is created.

On Update

This value will be written to the unmapped field whenever an existing row is updated.

No Change

This value will be written to the unmapped field when a row exists prior to importing data, but that row is not updated.

Replaced Values

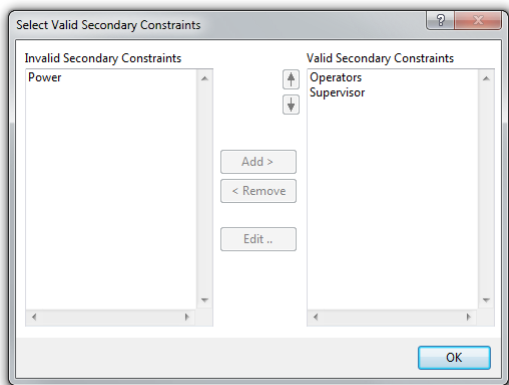
There are some key words that are may be specified within the default values. These key words will be replaced during import. Each is detailed below:

Keyword	Description
{DATE}	A string representing the current date. Only valid for string fields.
{TIME}	A string representing the current time. Only valid for string fields.
{JDATE}	A number representing the current date. Valid for string, number and date fields.
{JTIME}	A number representing the current date/time. Valid for string, number and date fields.

Matrix Imports

Preactor supports two different types of matrices that can be imported.

The first type of matrix is a list of items. These lists appear throughout Preactor and are used when creating groups of items, or assigning multiple items to one record. These lists grow and shrink as you add and remove items. A typical list is shown below:

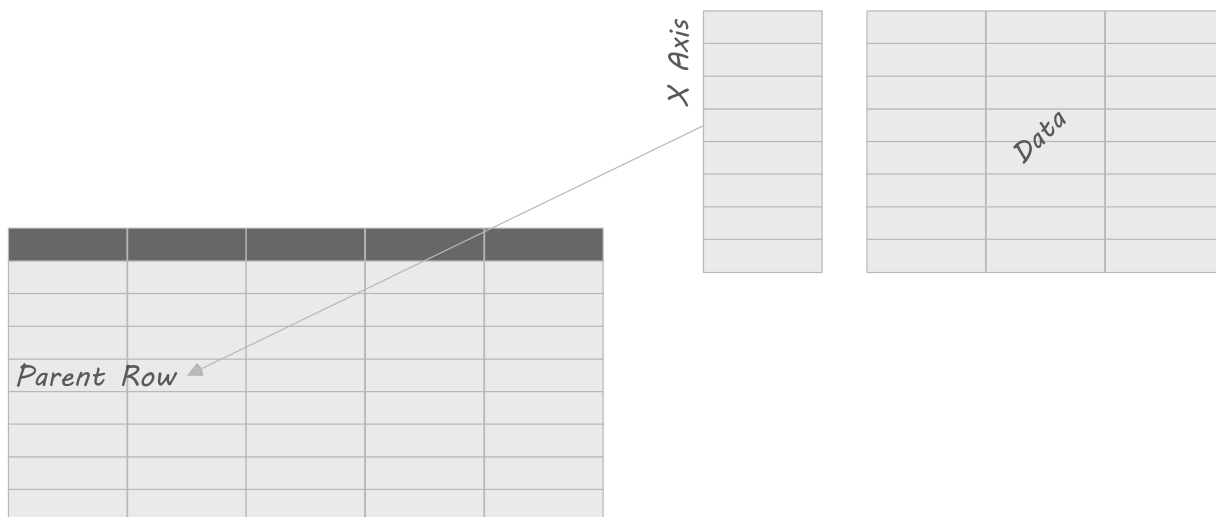


The second type of matrix that Preactor supports is a 2 dimensional matrix. These matrices define a from/to relationship between two tables. A typical 2 dimensional matrix is shown below:

	To: Attribute 1				
	Red	Blue	Yellow	Green	Purple
From: Attribute 1	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00
Red	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00
Blue	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00
Yellow	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00
Green	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00
Purple	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00

Both of these matrices are defined as fields in Preactor, and normally each row in a table will have an instance of a matrix. That is, a table with 10 rows will normally have 10 different matrices. It is therefore important when importing a matrix that you not only have the data for the matrix, but also a way of identifying the correct row in which the list exists.

Importing a List



Importing a list into Preactor uses the same Import/Export Wizard that is used to import into tables. The main difference is that there are multiple "mapping" screens in order to allow the mapping of each piece of information required. For a list, you will be

presented with either 2 or 3 mapping screens depending on how the list is defined (whether you just have a list of items, or whether you have a list of items which have additional data defined against them).

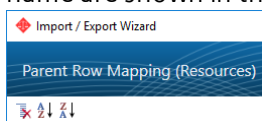
This exercise will take you through importing secondary constraint data for a resources table.

- Step 1: Open the PIO Scripts pane.
 1. From the Preactor Desktop, click **Configuration** and then click **Import/Export**.
 2. In the Import/Export pane, click **Import-Export Scripts**.
- Step 2: Create a new Import Script.
 1. In the PIO Scripts pane, click **Edit** and then click **Insert**.
 2. In the Import/Export wizard, ensure Import is selected and then click **Next**.
 3. In the Enter Script Information window, enter the values from the following table:

Field	Value
Script Name	Import Resources Secondary Constraints
Description	Import secondary constraint information for resources
Preactor Table Name	Resources
Matrix Import	Secondary Constraints
Connection Type	File

Note: To import data from a data provider you can use the Data Provider connection type.

4. Click **Next**.
5. In the Import Script Information window browse and choose either the file above, or use the standard 'Import-Resources-InitialSecondaryConstraintMatrix.csv' file which ships with the configuration in the 'Import-Export Files' folder. Click **Next** once this file is selected.
6. On the Import Settings page select the **Clear All Matrix Records** option and the **Append New Records** option. The other options should be left unchecked.
7. Click **Next** to continue.
8. You are now presented with a mapping screen. It is important to note that the current mapping and table name are shown in the upper left corner of the screen:

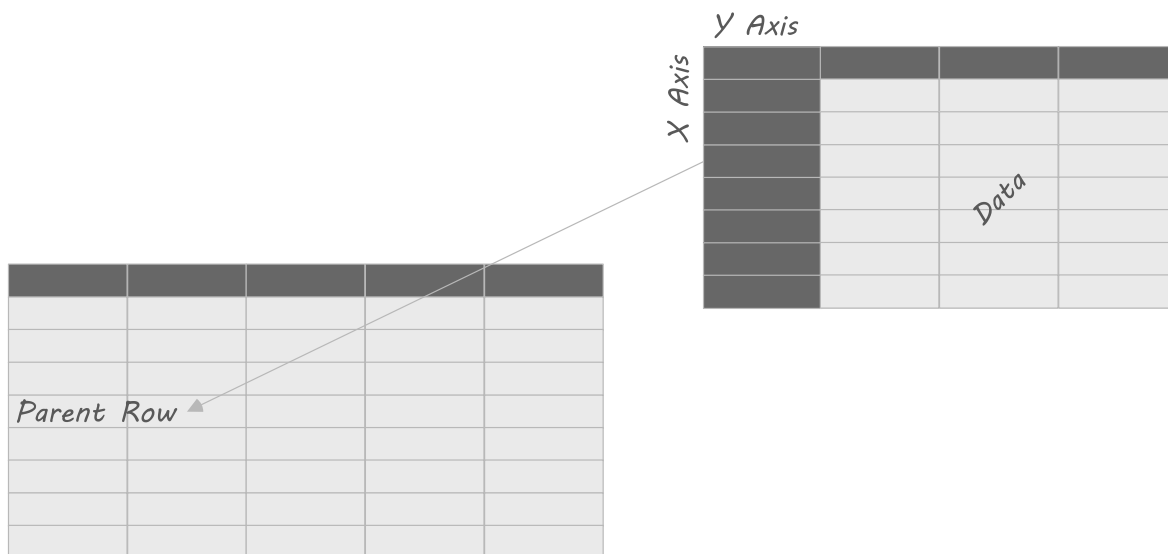


9. This mapping page is to decide how which row the matrix belongs to. The upper left corner shows that you need to map one or more fields to uniquely identify a row in the 'Resources' table. In this the 'Name' row from the 'Fields to Import' column uniquely identifies a "resource" by its **Name** field.
 1. In the Import Field Mappings window, select **Resource** in the Fields to Import list.
 2. Whilst holding the left mouse button, select the **Name** field in the Preactor Fields list.
 3. Click **Next** to continue.
10. This mapping page should show that it is an X Axis mapping page. Refer to the diagram of the list import if you need to understand what this is. The **Secondary Constraints** on the **Fields to Import** column uniquely identifies the item which should be added/updated/deleted from the list.

1. In the Import Field Mappings window, select **Secondary Constraint** in the Fields to Import list.
 2. Whilst holding the left mouse button, select the **Name** field in the Preactor Fields list.
 3. Click **Next** to continue.
11. This mapping page is called the *Data Mapping page*. This is additional data which is attached to the item in the list (usage type and quantity). In cases where there is no additional data, this page will not appear. Similarly, you could continue without mapping any fields if you decided you didn't want the additional data.
1. In the Import Field Mappings window, select **Constraint Usage** in the Fields to Import list.
 2. Whilst holding the left mouse button, select the **Constraint Usage** field in the Preactor Fields list.
 3. Repeat the process for the **Constraint Quantity** field.
 4. Click **Next** to continue.
12. The script has now been created. You can run it here or click **Finish** and run it from within the IO Scripts table. Try changing some data in the import text file (change a constraint quantity from 1 to 5 for example) and verify that, after the script is run again, that the data has changed in the Resources table.

2D Matrix Import

Importing a 2 dimensional matrix into Preactor uses the same Import/Export Wizard that is used to import into tables. There will be 4 mapping screens, where details will be collected about which row the matrix belongs to, what the x axis is, what the y axis is, and what the data is.



The process for creating a script is similar to importing a list. The main difference is that there is an additional *Y-Axis Mapping Page* and that the "Data Mapping" page can only ever have a single field mapping.

Export to File

Preactor supports exporting data to either a .csv file or an Excel spreadsheet. When defining an export script using the Import Export wizard it is possible to export data from any table within the *UserData* schema.

Once the basic script information is defined (name, description, source table), it is then necessary to start defining field mappings. Export field mappings differ from import field mappings in that the fields to export are not defined until the mapping is created. It is also possible to export the same field more than once (for example, with different formatting).

Extract Expression

This is an expression that will be evaluated for every row in the source table. Only rows where the expression evaluates to true will be present in the export file.

Example:

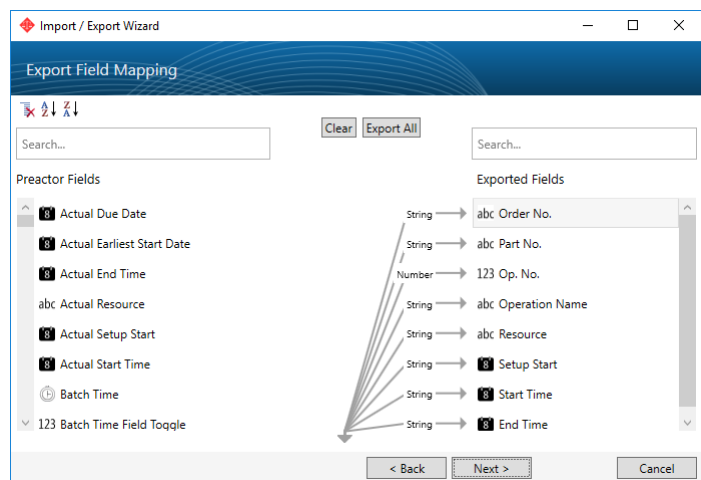
```
Numeric field comparison: {#Resource Group}==2
String field comparison: ~{$Resource Group}~==~Welders~
Date field comparison: {#Order End} > -1 && {#Due Date} > -1 && {#Order End} < {#Due Date}
```

Additional Options

A number of advanced features are enabled using commands that can be defined in the in the Additional Options field.

Mapping Export Fields

Mapping export fields is a case of selecting a field in the 'Preactor Fields' list on the left of the mapping page and including it in the **Exported Fields** on the right. This can be achieved in a number of ways. A field can be dragged from the left list to the right list. If you double-click on a field in the left list, it will appear in the right list. Finally, if you click the **Export All** button, all the fields in the left list will be added to the right list.



The order that fields appear in the **Exported Fields** list dictates the order the fields appear as columns in the exported file. You may reorder the fields in the right hand list by dragging a field up or down the list.

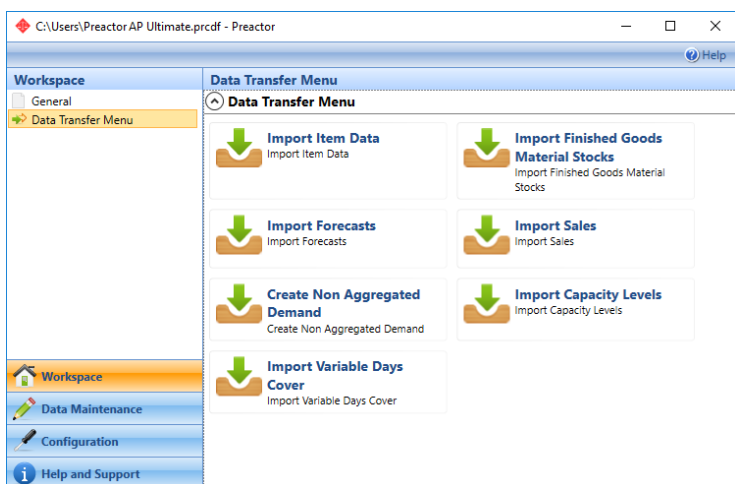
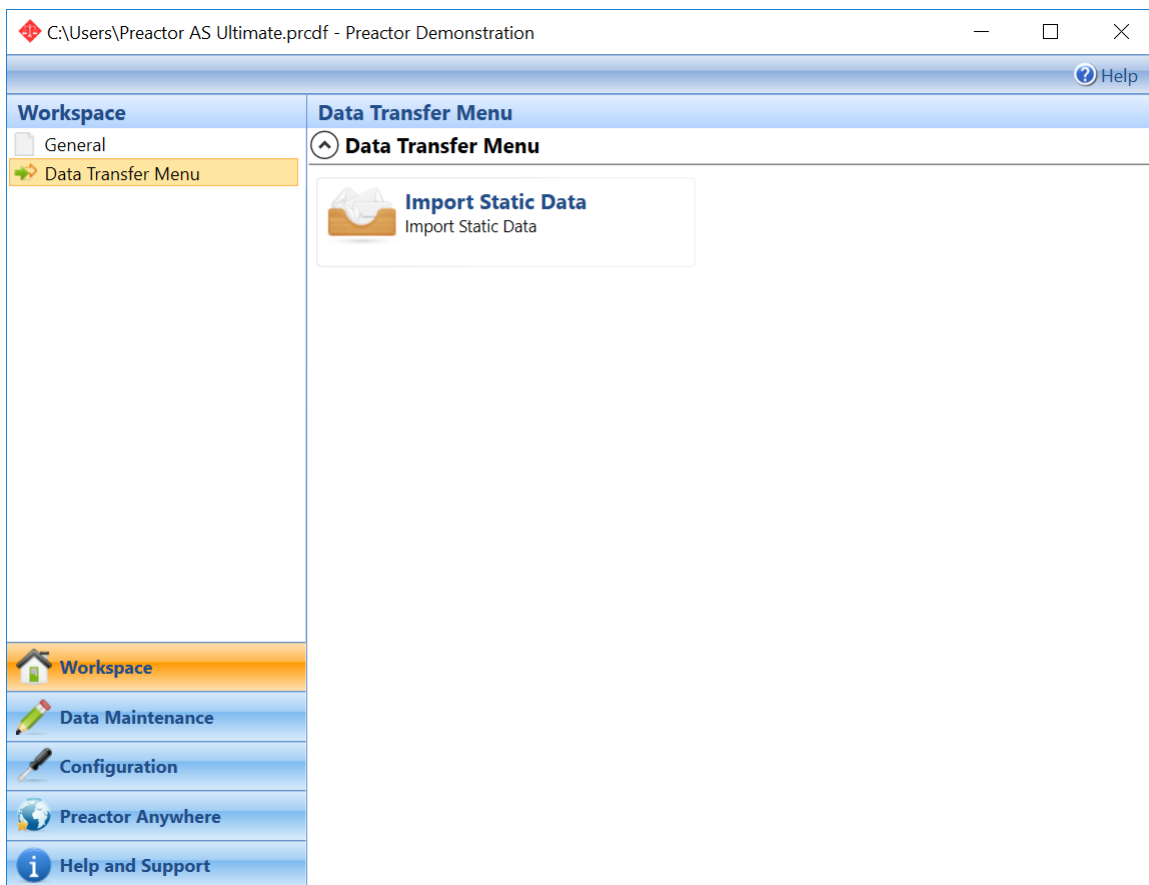
Once a field is listed in the right-list it can be removed by deleting the map from the mapping menu or by clicking the **Clear** button, which will remove all fields from the right list.

Also from the mapping menu are a limited set of formatting options, equivalent to those available for import mapping.

Default Import and Export Scripts

Import/export scripts can be run with a single button hit from the Workspace Data Transfer and General menus, for example to:

- Import Orders, Forecasts, Sales data.
- Export the Release Schedule.



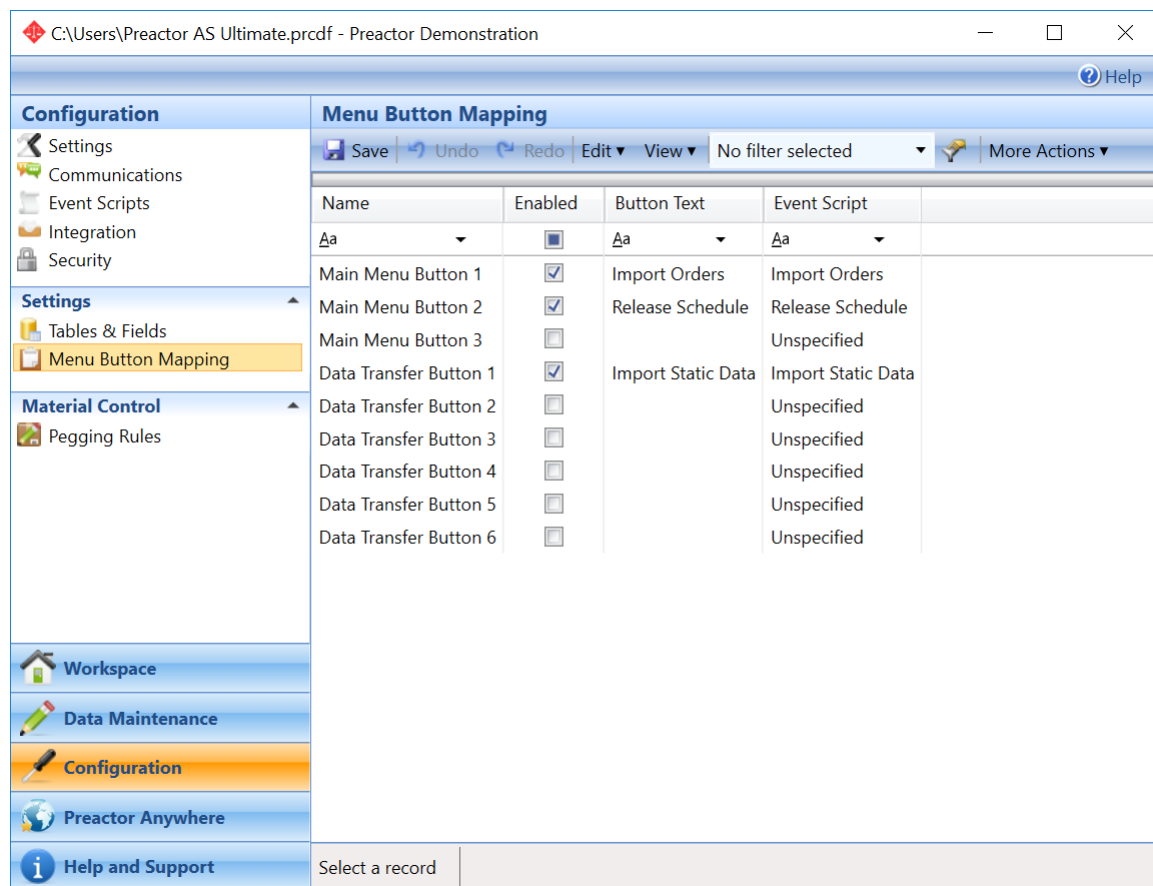
Each of these functions may have a number of scripts available to address different situations.

For example, one Import Order script may populate Preactor with a set of orders, overwriting anything that is already in the database, while another script may add to existing orders.

Which particular script to run is configured via:

- Configuration Pane ▶ Settings ▶ Menu Button Mapping** (Preactor AS)
- Configuration Pane ▶ Settings ▶ Configuration Data** (for Preactor AP)

As can be seen in this Preactor AS example, a drop down menu will offer the scripts available for each of the standard data Transfer buttons.



There would normally be no need to change these for Preactor AP, however alternative scripts could be predefined for different circumstances allowing rapid changes between configurations without needing to manipulate script files.

Importing And Exporting Calendars

Overview

A separate mechanism exists for exporting and importing all Preactor calendar data using SQL stored procedures and XML files. One of the primary reasons for providing this mechanism is to support the transfer of calendar data between a master scheduling system (MSS) and a viewer. This is only necessary when a viewer license is used with an independent database and therefore only applies to Ultimate viewers. When a viewer is connected to the same database as the MSS the transfer of calendar information is not required.

Using Calendar Import/Export

The import or export of calendar data can be achieved using one of two PESP actions. These actions are called **Export Calendars** and **Import Calendars**. Each of these actions takes one parameter called *Filename*. This parameter is where you can specify the name of the file to which the data will be written or from which it will be read. It is usual to give these files a .xml extension. When executed these PESP actions will export or import all calendar data. There is no way to select a subset of the data to export or import. If there is a requirement to do so (for example, only transferring calendar exceptions between configurations) then it is recommended that the system implementer look into the calendar related Preactor API methods (see the API documentation for more details). Generally calendar information should only be imported while the sequencer is not open.

Note: While it is possible to edit .xml files, it is recommended that the calendar related Preactor API methods are used in preference. Certain elements reference other elements using an Id. If these relationships are broken, then the file will fail to import.

External Data Mapping

Overview

External Data Mapping is a feature within Preactor that allows information from an external source to be 'mapped' into the tables defined in Preactor.

This approach differs from conventional import scripts, in that external data is not considered as information that is owned by Preactor. Mapped external data is considered to be owned by the source from which it is mapped. For this reason, it is not possible to perform all of the usual insert, update and delete operations that can be performed on a standard Preactor table.

In addition, when data is mapped in this way, fields into which data has been mapped are removed from the Preactor database. This happens on start-up, in much the same way as would happen were a field deleted from a Preactor Table Definition file in an Ultimate edition of Preactor.

Defining an External Data Map

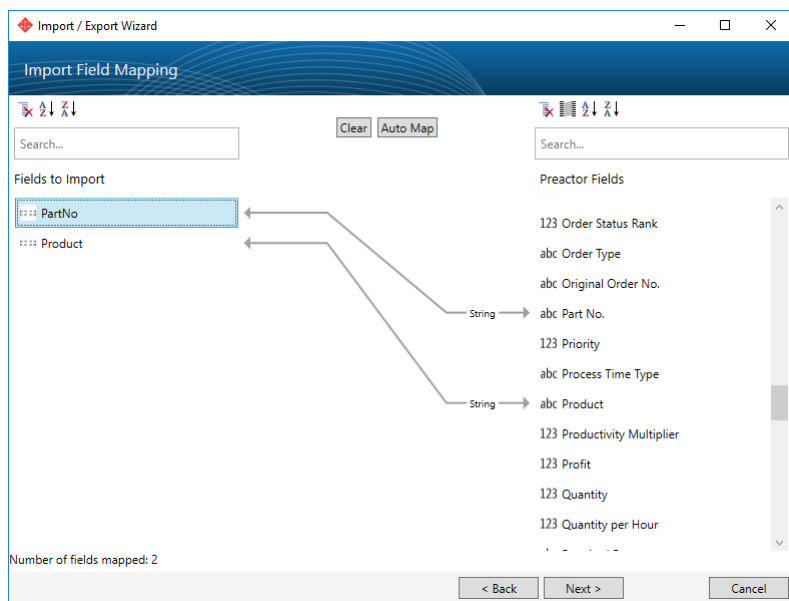
To create a new external data map, from the Configuration category on the Preactor desktop, select **'Integration then External Data Mapping'**. Enter a new row in the table to begin defining the data map.

Data maps are defined in a similar way to import scripts, with the omission of some details that are not required.

In the first step the data map must be named and the target table specified. At this point you must select the type of data source you would like to map data from.

The next part of the process differs depending on the type of data source chose. "File Import" on page 83, "Open Data Import" on page 85 and "Data Providers" on page 79 give more information about the data source types available in Preactor.

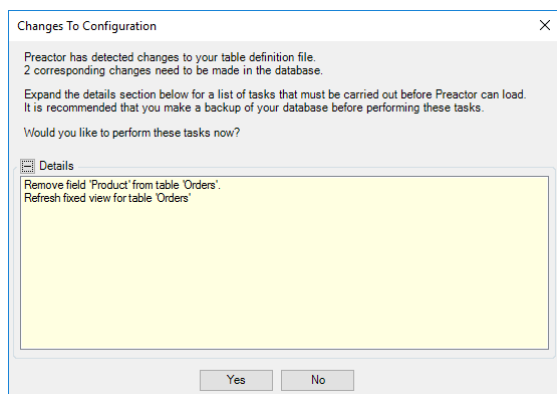
Once the source data has been defined, the final step is to map the fields from the source data into the target table. Each field that is mapped will be removed from the database when Preactor is restarted, unless a mapped field is marked as an ID field. ID fields are used as a key on which to join the external data. More than one ID field may be defined.



Applying Changes on Startup

When Preactor is restarted, fields that are mapped and are not used as IDs will be removed from the Preactor database. In addition, evaluated field that reference a mapped field will also be removed.

The list of changes affecting the database will be displayed on start-up.



Working with Mapped Tables

When external data is mapped into a table, there are a number of behavioral changes that become evident when working with that table in the Preactor Editor.

Firstly, operations such as insert and delete are disabled. Any such activity should be performed in the external data. Another difference is that any field that is mapped becomes read-only. Again, any alteration to this information should be performed in the external source.

Unreachable Sources

When a data source becomes unreachable or the retrieval of external data fails for any reason, Preactor will raise an error. If an error is ignored, Preactor will continue with rows in mapped tables consistent with the ID values stored in the Preactor database. All mapped fields will have their default values. Depending on what data is mapped and the fields it is mapped to, this could have a significant impact on the behavior of Preactor.

Reporting

Reports

Introduction

To be competitive in today's market conditions, organizations require immediate access to relevant up to date information and to extend its use beyond the confines of their own business, to interact with partners, suppliers and customers.

To facilitate this, a collection of standard Microsoft Reporting Services based reports - see [Microsoft Report Services](#).

A selection of reports that ship with Preactor are summarized [here](#). Certain reports are only available based on the Preactor product and configuration that is being used.

The reports are generated from the Reports window in the Sequencer or Planner:

- View ► Reports in the Sequencer
- View ► Reports ► Report List in the Planner

The Reports List will appear down the right hand side of the screen by default.

The report generation is initiated by double clicking on the required report. [Drill Down](#) from one report to initiate another is supported.

Reports are generated on Saved data, not on data 'in memory'.

Reports are often provided as lists, tables, and in graphical form (e.g. graphs and charts). They are generally divided into:

- Reports that show the provisioning of Preactor.
- Reports that show Transaction data
- Reports that show different aspects and consequences of the Sequencing or Planning.
- Reports that show a comparison of different aspects and consequence between two Schedules or Plans – using the current Schedule/Plan and a previously stored one, or two previously stored Schedules/Plans.

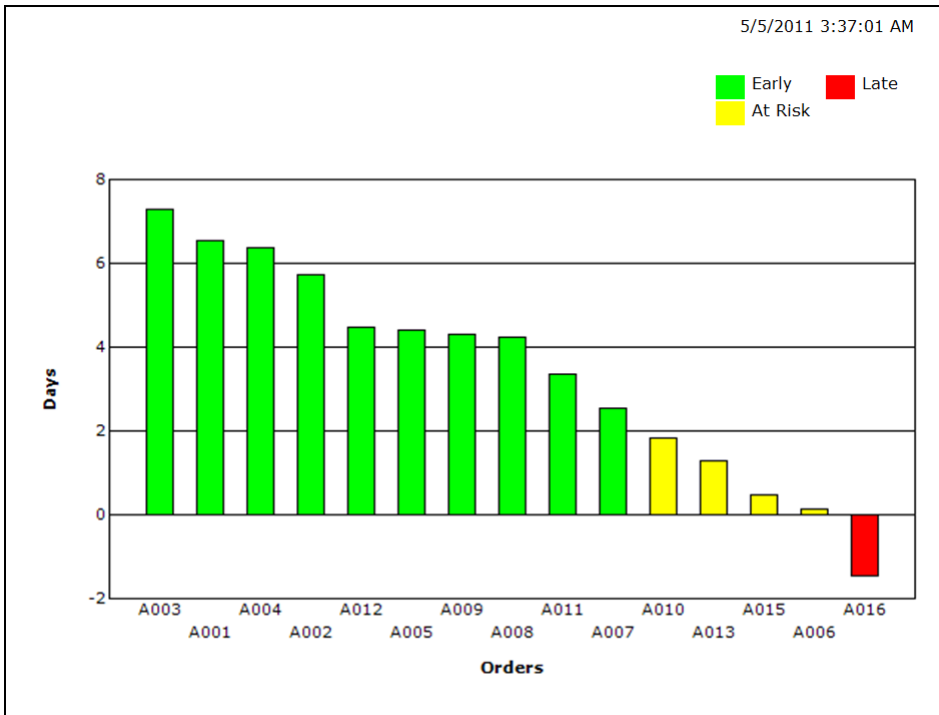
Reports can be seen on screen, and also exported to a PDF, Word or Excel file.

Examples:

1. The Sequencer report Orders By Customers provides a list of all the orders for each customer, one page per customer. This example shows page 1 of a multi-page screen output.

Order No.	Customer	Product	Part No.	Qty.	Due Date	End Time
A001	ABC Cycles	Spindle	1-HFG	10	1/18/2000	1/12/2000 10:40 AM
A005	ABC Cycles	Spindle	1-HFG	16	1/18/2000	1/14/2000 2:23 PM
A009	ABC Cycles	Spindle	1-HFG	10	1/21/2000	1/17/2000 4:53 PM
A013	ABC Cycles	Spindle	1-HFG	16	1/21/2000	1/20/2000 4:35 PM

2. The report Order Late Or Early Bar Chart shows an overview of the scheduled Completion times against due dates. On the screen output, the user can click in one of the bars on the bar chart to Drill Down to get another report detailing the orders which are represented by that bar. This report is taken from the exported Excel output.



3. This report shows a comparison between 2 schedules and their effect on Orders. Note the criteria used for the report can be specified.

Report - [Order Compari... x]

Base Line Sc [Report - [Order Comparison Data]] Comparison Schedule Schedule

Criteria Due Date Performance

View Report

Order Comparison: 7/16/2012 3:31:18 PM

Order Co

Base Line Schedule : BaselineScheduleA
 Comparative Schedule : Schedule
 Criteria : Due Date Performance

Order No	BaselineScheduleA	Schedule	Net Change	Change Effect
A001	132 Hours 43 Mins	157 Hours 20 Mins	24 Hours 37 Mins	+
A002	24 Hours 0 Mins	137 Hours 11 Mins	113 Hours 11 Mins	+
A003	24 Hours 0 Mins	175 Hours 19 Mins	151 Hours 19 Mins	+
A004	24 Hours 0 Mins	152 Hours 50 Mins	128 Hours 50 Mins	+
A005	155 Hours 22 Mins	105 Hours 37 Mins	260 Hours 59 Mins	-
A006	24 Hours 0 Mins	3 Hours 8 Mins	20 Hours 52 Mins	-
A007	48 Hours 0 Mins	61 Hours 7 Mins	13 Hours 7 Mins	+
A008	24 Hours 0 Mins	102 Hours 7 Mins	78 Hours 7 Mins	+
A009	110 Hours 48 Mins	103 Hours 7 Mins	7 Hours 41 Mins	-
A010	24 Hours 0 Mins	43 Hours 48 Mins	19 Hours 48 Mins	+
A011	24 Hours 0 Mins	180 Hours 47 Mins	156 Hours 47 Mins	+
A012	24 Hours 0 Mins	107 Hours 22 Mins	83 Hours 22 Mins	+
A013	34 Hours 45 Mins	31 Hours 25 Mins	3 Hours 20 Mins	-
A014	24 Hours 0 Mins	140 Hours 12 Mins	164 Hours 12 Mins	+
A015	24 Hours 0 Mins	11 Hours 16 Mins	12 Hours 44 Mins	-
A016	24 Hours 0 Mins	12 Hours 55 Mins	11 Hours 5 Mins	-

Preactor Page 1/1

Supported Reports

Sequencer Reports

See also [Report Generation](#) for help in generating the reports, and [Report Reading](#) on how to read and navigate the report output. Note - many reports have Drill Down reports available. [Authoring Reports](#) contains information about how to author reports, if there is a requirement to author them.

Most of the shipped reports are self-described in the title of the report. However, there are a selection of reports that require a more detailed explanation of what the report is showing, or a specific feature available in that report. This selection of reports is detailed below.

Order Reports

- At Risk Orders – Reports on Orders that are at risk of not meeting due dates.
See [At Risk Orders](#) for more information on what orders are deemed 'At Risk'.
- BoM Shortages Summary – Reports on the material shortages expected on a daily or weekly basis.
The user must specify the Scale of the report (Daily or Weekly).
From this report, the user can click a quantity on the report to Drill Down to details on that shortage, opening up the Linked BoM Shortages Report.
- Late Operations by Reference Date – Reports on the Operations that would be late if the Reference time were changed.
The user modifies the Reference Time field in the report and generates a report to see what state the Orders will be at that time.
- Linked BoM Shortages - Provides a detailed view by order of what BoM items that order is short of.
- Operations by Progress – Provides a report of the Operations listed in order of what progress state they are in, as defined by the Operation Progress field against that operation.

Other Reports


- Address Book – Displays the addresses held in the PCO Address Book table.
These will be the addresses of the current system and any system that it communicates with.

Report Reading

There are common structures/formats used for displaying multi-page reports.

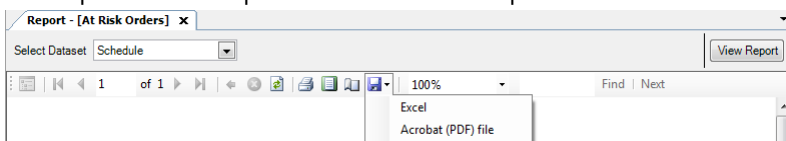
Where a multi-page report has one page per entity (e.g. one page per customer), that report will often have a Document Map on the left hand side of the report. Users can use the map to go to the page for that particular entity, or navigate through normal next/last page toolbar icons.

Order No.	Customer	Product	Part No.	Qty.	Due Date	End Time
A003	Streamline Bikes	Sprocket	AC189-AA	7	1/18/2000	1/11/2000 4:41 PM
A007	Streamline Bikes	Sprocket	AC189-AA	14	1/16/2000	1/14/2000 10:53 AM
A011	Streamline Bikes	Sprocket	AC189-AA	7	1/21/2000	1/18/2000 3:04 PM
A015	Streamline Bikes	Sprocket	AC189-AA	14	1/20/2000	1/20/2000 12:22 PM

The Document Map can be turned On/Off by toggling the Toolbar Icon .

Export Report Data

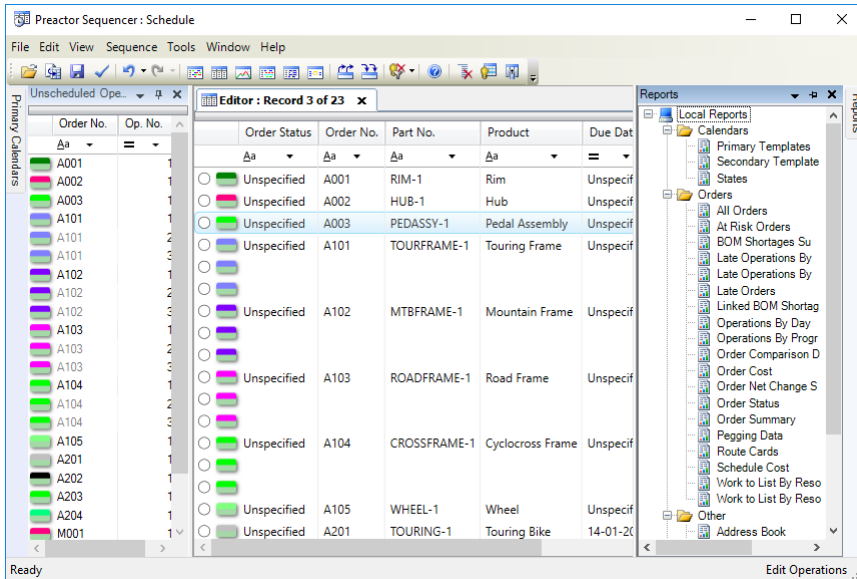
You can export any data displayed on a report to an Excel spreadsheet or PDF file. To do so from a generated report: click on the Export toolbar option and select the export format and continue with selecting the filename and destination.



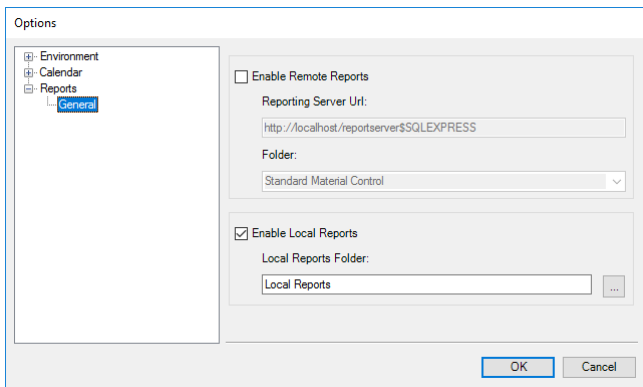
Multi-page outputs will result in multi-worksheet spreadsheets to maintain the report formatting.

Configuring Preactor for Local Reports

If reports have been installed successfully, you should see a list of the reports displayed in the 'Reports' pane in the sequencer. If the Reports pane is not visible, it can be opened by choosing **View ► Reports** from the menu.



You can check the report settings by selecting **Tools** and then **Options...** menu option, click on the **Reports** node in the tree view on the left-hand side. The right-hand side of the dialog displays the settings for both Remote and Local Reports. To display local reports in the Reports pane, make sure that the **Enable Local Reports** check box is checked, the **Local Reports Folder** specifies the location of the folder that contains the report definition files (RDL) files. If you wish to retrieve the local reports from a different location to the current folder that is specified, simply browse to the folder that includes the report files that you wish to be displayed.



Preactor Reports using Microsoft Reporting Services

Reporting facilities are provided by integrating Microsoft Reporting Services within both the sequencer and planner modules. Report RDL files are provided in each shipped configuration package and stored locally on disk. It is also possible to upload reports to a reporting server and view these reports in the sequencer.

Overview

Microsoft SQL Server Reporting Services (SSRS) comprises of a range of tools and services for creating, publishing and managing reports. Preactor renders SSRS reports both locally, or with a connection to an SSRS server. For an overview of

Microsoft Reporting Services, visit:

<http://msdn.microsoft.com/en-us/library/ms159106.aspx>

Configuring Preactor for Reporting Services

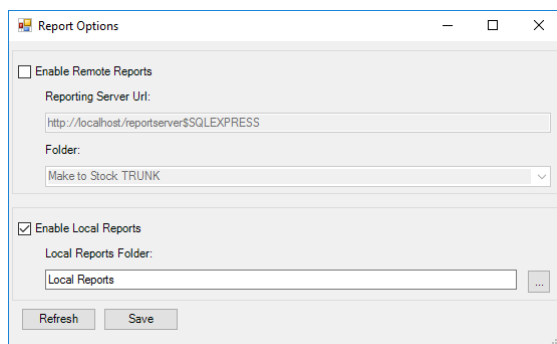
When a configuration is unpackaged using the Package Manager, the report settings specified in the Package Manager wizard are written to Preactor's report setting for you.

If you need to change these settings for any reason, you can do so from within the sequencer or planner. You are able to select Local or Remote reporting services, and define the reporting server URL (for Remote Reports) or the Reports Folder (for Local Reports) from:

Sequencer ▶ Tools ▶ Options ▶ Reports ▶ General.

or

Planner ▶ Settings ▶ Report Options.

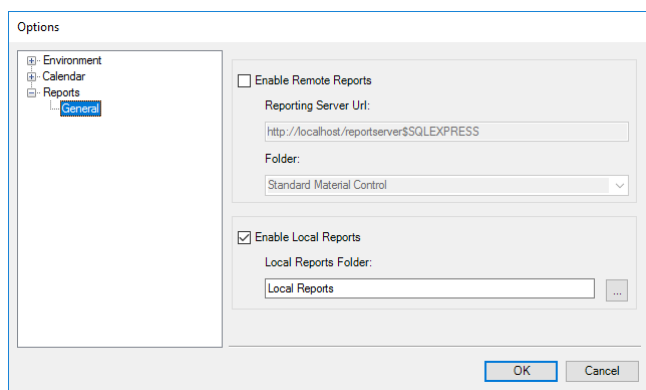


If using Remote Reports, the Server Report options selected when unpackaging the Preactor Configuration become valid.

If the reports that are to be displayed are local reports, then the 'Enable Local Reports' option should be selected and the name of the folder containing the local reports should be specified.

If remote reports stored on a report server are to be displayed then the 'Enable Remote Reports' option should be selected. Specify the URL for your reporting server and a folder name where the reports are held.

By default the URL is: [http://localhost/ReportServer\\$SQLEXPRESS](http://localhost/ReportServer$SQLEXPRESS).



For local reports, if everything is configured correctly, you should see a list of the reports under the 'Local Reports' Node in the 'Reports' panel. For server reports, you should see a list of the reports that have been uploaded to the report server in the 'Reports' pane, under the 'Server Reports' Node. If the Reports pane is not visible, it can be opened by choosing 'View' then 'Reports' from the menu.

Report Generation

When a report generation is initiated, a window will be opened.

- If the report **does not** require any options to be entered by the user, the window will contain the required report. These tend to include those reporting on the current provisioning, e.g. Calendar States.
- If the report **does** require options to be entered by the user (usually selecting which saved Dataset(s) are to be used), the top of the opened window will prompt for that data to be entered, and the 'View Report' button only becomes active when all required information is entered.

This example shows the Total Days Cover report requires the data set to be selected, the Capacity Group to be selected and the From and To Dates to be selected before the View Report button can be used to generate the report.

Some reports require the user to define the type of data to be reported on, and/or the format of the output. The following example requires the Criteria to be selected from a drop down list, and the output format (scale and Bars per Page) to be defined.

Comparison reports require the user to select the Schedules to compare between. The comparison is done between two schedules – one can be the current Schedule or a stored Schedule, one must be a stored Schedule.

Schedules are stored from Sequencer File menu – Save Schedule As...

Drill Down

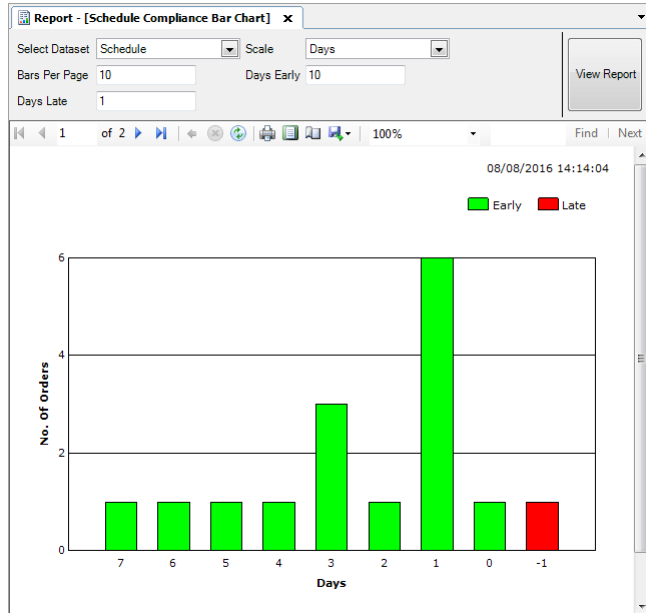
Some reports provide detail information of data presented in another report. These reports can be initiated from that higher level report. This action is called Drill Down.

Typically, and where available, a report indicates that Drill Down information is available by coloring the text as a link, as in this example:

Order No.	Customer	Product	Part No.	Qty.	Op. No.	Operation Name	Lot	Resource
A001	ABC Cycles	Spindle	1-HFG	10	10	Tum Diameter	1	Machining Center
A001	ABC Cycles	Spindle	1-HFG	10	20	Mill End	1	Machining Center
A001	ABC Cycles	Spindle	1-HFG	10	30	Mill Centre	1	Machining Center
A001	ABC Cycles	Spindle	1-HFG	10	40	Harden Spindle	1	Sub Heat Treatment
A001	ABC Cycles	Spindle	1-HFG	10	50	Grind To Size	1	Grinder

Here we see that Drill Down is available for: Order No.; Customer; Product/Part No.; and Resource – each Drilled Down report providing information relevant to that item.

And in this example, the Schedule Comparison Bar Chart results in the following report:



Clicking on the bar representing Orders that are 4 days early opens up the following report detailing those Orders that are 4 days early (actually obtained from the Schedule Comparison Bar Chart Details report):

Order No	Customer	Part No	Product	Quantity	Due Date	End Time
A005	ABC Cycles	1-HFG	Spindle	16	18/01/2000	17/01/2000 08:30
A008	Pennyfarthings	TT-136	Pedal Crank	5	18/01/2000	17/01/2000 12:00
A010	MDN Bike Gear	234-GM	Gear	19	21/01/2000	20/01/2000 01:29
A013	ABC Cycles	1-HFG	Spindle	16	21/01/2000	20/01/2000 16:42
A015	Streamline Bikes	AC189-AA	Sprocket	14	20/01/2000	19/01/2000 18:45
A016	Pennyfarthings	TT-136	Pedal Crank	5	21/01/2000	20/01/2000 10:45

Notice that when in the Drilled Down report, the Back navigation toolbar icon becomes active, so the user can get back to the originating report.

Authoring Reports

Preactor reports are defined using the Report Definition Language (RDL) as used by SQL Server Reporting Services. Reports can be authored using Report Builder.

Microsoft SSRS Report Builder 3.0 can be downloaded from <http://www.microsoft.com/en-us/download>

Reports can be authored locally or remotely from a server. There are a few minor differences to the way reports are defined, depending on which mode the report should work in.

Data Sources

A data source includes the data source type, connection information, and the type of credentials to use. There are two types of data sources; embedded and shared. An embedded data source is defined in the report and used only by that report. A shared data source is defined independently from a report and can be used by multiple reports.

Shared data sources are useful when there are data sources that are used often. It is recommended to use shared data sources for server reports, as they make reports and report access easier to manage, and help to keep reports and the data sources they access more secure.

An embedded data source is a data connection that is saved in the report definition. Embedded data source connection information can be used only by the report in which it is embedded. Embedded data sources are used in local reports so that Preactor can amend the data source at run time to provide the connection information for the database Preactor is connected to. The first data source defined in the report will be given the connection information for Preactor.

Datasets

Not to be confused with datasets for identifying a set of data associated with a loadable table, datasets in the context of reports represent a collection of data used to populate the report. Each dataset has a query associated with it and is linked to a data source. Report Builder will show each defined dataset, allowing controls in the report to be linked to the fields in the dataset.

Parameters

Reports opened from within Preactor may be passed DatasetId parameter. This is a reserved parameter and is provided for convenience so that a report can show results for the currently selected dataset. This parameter is optional for a report, however it is recommended that the parameter is used when viewing Orders in AS or Demand in AP reports. The DatasetId parameter must have the name 'DatasetId', must be an integer and may be hidden.

It is possible to define multiple parameters for a report. Report parameters can be used to alter the behavior of a report. Preactor will allow the end user to specify values for the report parameters. For more information on report parameters see: <https://msdn.microsoft.com/en-us/library/dd220464.aspx>.

Preactor Reports using Microsoft Reporting Services

Reporting facilities are provided by integrating Microsoft Reporting Services within both the sequencer and planner modules. Report RDL files are provided in each shipped configuration package and stored locally on disk. It is also possible to upload reports to a reporting server and view these reports in the sequencer.

Overview

Microsoft SQL Server Reporting Services (SSRS) comprises of a range of tools and services for creating, publishing and managing reports. Preactor renders SSRS reports both locally, or with a connection to an SSRS server. For an overview of Microsoft Reporting Services, visit:

<http://msdn.microsoft.com/en-us/library/ms159106.aspx>

Configuring Preactor for Reporting Services

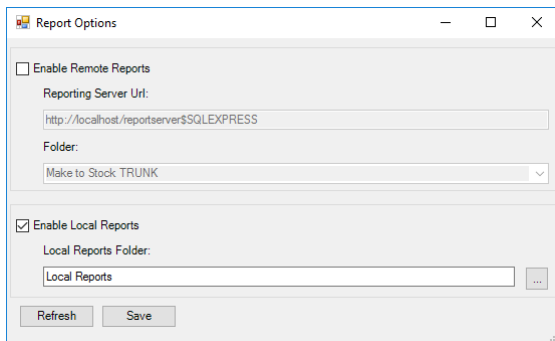
When a configuration is unpackaged using the Package Manager, the report settings specified in the Package Manager wizard are written to Preactor's report setting for you.

If you need to change these settings for any reason, you can do so from within the sequencer or planner. You are able to select Local or Remote reporting services, and define the reporting server URL (for Remote Reports) or the Reports Folder (for Local Reports) from:

Sequencer ▶ Tools ▶ Options ▶ Reports ▶ General.

or

Planner ▶ Settings ▶ Report Options.

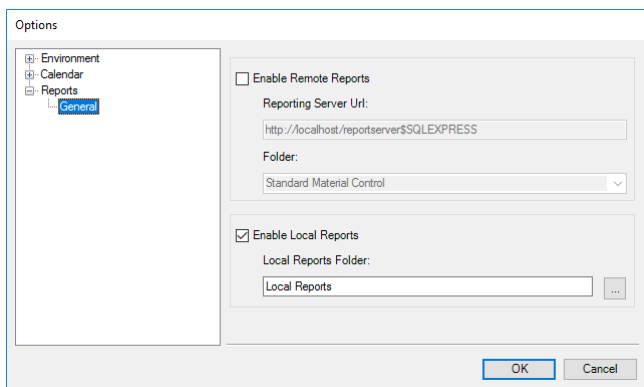


If using Remote Reports, the Server Report options selected when unpackaging the Preactor Configuration become valid.

If the reports that are to be displayed are local reports, then the 'Enable Local Reports' option should be selected and the name of the folder containing the local reports should be specified.

If remote reports stored on a report server are to be displayed then the 'Enable Remote Reports' option should be selected. Specify the URL for your reporting server and a folder name where the reports are held.

By default the URL is: [http://localhost/ReportServer\\$SQLEXPRESS](http://localhost/ReportServer$SQLEXPRESS).



For local reports, if everything is configured correctly, you should see a list of the reports under the 'Local Reports' Node in the 'Reports' panel. For server reports, you should see a list of the reports that have been uploaded to the report server in the 'Reports' pane, under the 'Server Reports' Node. If the Reports pane is not visible, it can be opened by choosing 'View' then 'Reports' from the menu.

Calendars

Calendar Overview

Calendars are used throughout Preactor AS and Preactor AP in a variety of ways. Although some of the specifics around what properties may be set and how the details of a calendar are interpreted may vary depending on the context in which they are used, general concepts such as states and templates and their application are common to all cases. This section describes these concepts and gives some examples of how these concepts might be applied. For more specific information on how calendars are used in Preactor AS, see "Calendars" on page 213.

States

Calendar states are the entity on which all calendars are based. A state may have different properties depending on what it is used for. For example, in Preactor AS a Primary Resource state includes an efficiency which affects the run rate of operations processed on a resource.

A number of states are typically defined in Preactor covering common use cases - on shift, off shift etc. Additional states can be added by the user and may represent all manner of conditions, often purely for information purposes.

Templates

Calendar templates define a repeatable pattern of periods, each period having a duration and other properties depending on the context in which it is used. The template itself also has a duration. The periods within the template may have a cumulative duration as long as but no longer than the duration of the template itself. When applied, templates will repeat in accordance with their duration and any reference date set.

Name

Templates are assigned names in order to easily identify them. They may be given any name.

Color

A color assigned to a template may be used when rendering any view that includes the calendar detail. For example, the Gantt Window in the sequencer in Preactor AS shows the individual calendar states that result when a template is applied to a resource and underneath those states a single colored line shows the color of the template applied at that time.

Duration

When templates are applied, they repeat according to their duration. If a template is not entirely full with periods then still the template duration governs the repeat process. Templates without periods defined for the entire duration will have gaps when applied. How these gaps are treated depends on the template type and how that template is applied.

Reference Date

When a template is applied, its reference date is used as a point from which to repeat the template. For a template that is designed to apply from 8:00 AM on a Monday morning, a reference date should be set on a Monday morning at 08:00 AM. The date chosen is not relevant in this case. Where a template has a non-weekly repeat cycle, it is important to choose a reference date that represents the intended repeat cycle for that template. Reference dates can be overridden when a template is applied.

Calendar Instances

When a calendar is applied to an entity in Preactor it can be referred to as a calendar instance. Calendar instances detail periods for which templates and states are applied.

Default Periods

A calendar instance must have a default period. The default period for a new calendar instance will be based on defaults set in the application. A default template may run indefinitely, or it may change at a given point in time. For example, some equipment may not come online until a given date. In this case that equipment may be defined with a default period using the **Off Shift** calendar state up until the equipment becomes operational, at which point its default period will be set to use the **Normal Working Week** template indefinitely.

Exception Periods

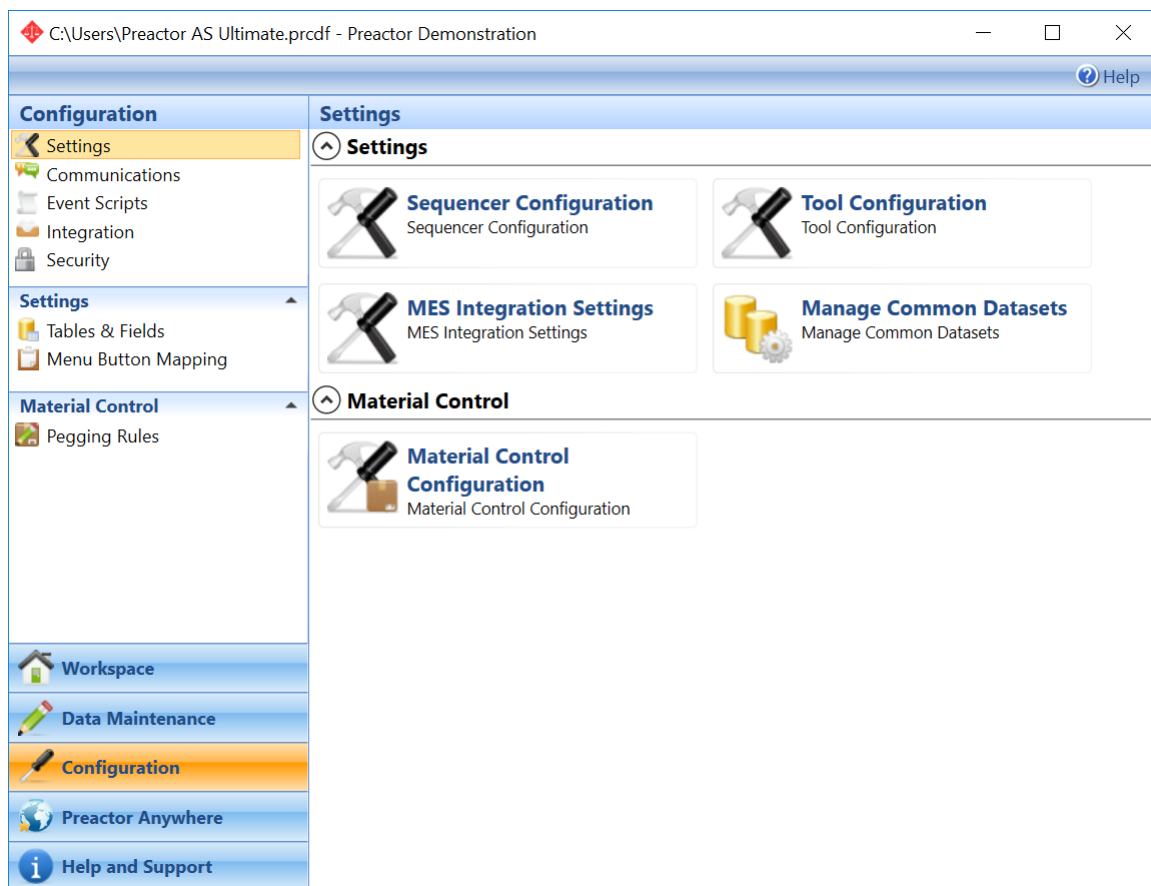
Exception periods are for shorter term deviations from the default template period. As per their name, exceptions should be used for exceptional cases. Examples of this might include running unplanned overtime or simulating the breakdown of a piece of equipment.

Common Datasets

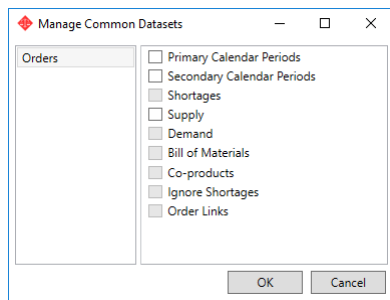
Common Datasets

Common Datasets allows *ASSOCIATE tables* to load from a shared (common) dataset, e.g. allowing Supply tables to be loaded from a common Orders table. This is useful when there is a need to switch between multiple schedules while maintaining a single Supply/Demand/Bill of Materials table. Configuring Common Dataset functionality is done by adding a **COMMON** classification to an ASSOCIATE table, either in the *MaterialControl_prtdf.inc* file for AS Ultimate or the .prtdf file for AP. Once configured, it can be enabled at runtime via the **Manage Common Datasets** window, from the **Configuration** section of the Preactor Desktop.

When a dataset is requested, e.g. the Orders table upon entering the Sequencer, Preactor will check the dataset settings and load the data into the memory based on the settings. A similar process will be followed when saving a dataset, so that a single set of data is kept against a single ASSOCIATE table (when enabled).



The **Manage Common Datasets** dialog displayed all of the tables associated with the Orders table. The associated tables that have had the COMMON classification applied to them will have a check box that can be toggled. When checked, these tables will have data loaded from their common dataset.



Example

The example below shows the Supply table having the COMMON classification applied to it.

```

...
Supply,ASSOCIATE (Orders) COMMON:
Number,-1,INTEGER,
PRIMARY KEY
HIDDEN
SUPPLY TABLE:
Order No., "", STRING,
HELPPOPUPID (25400)
FREE FORMAT
MATERIAL CONTROL ORDER NO:
Order Type,1,STRING,
HELPPOPUPID (25410)
DATABASE (Order Types (Name) )
EXCLUDE " ( ({#Number}==0) || ({#Number}==2) ) "
LOCATE
...

```

Preactor Filtering

Filtering in the Preactor Desktop

Introduction

Preactor's filtering feature within the Desktop is extensive and allows the user to filter items/records within any Desktop editor. Users are able to use filters already existing in Preactor, or by creating custom filters. The filters available in the Desktop are known as *Expression Filters*. See [Creating and Managing Expression Filters](#) for more information.

Creating Expression Filters

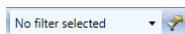
Creating and Applying Filters


Filtering is available in both Preactor AP and AS Desktops and in the Sequencer. Filtering functionality is not available in the Planner.

Any Expressions Filters that you create in the Orders table of the AS Desktop will be available in the Sequencer. Any Expression Filters created in the Sequencer will be available in the Orders table.

In the Preactor Desktop

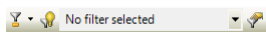
There is a drop down menu and a button that are related to filtering.



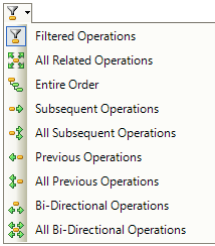
The drop down menu will display any filters that have been created for that editor, and the **Maintain Advanced Filters** button, , opens up the **Manage Filters** Dialog.



In the Sequencer

In the sequencer, the **Advanced Filters** toolbar has all the features required for filtering.

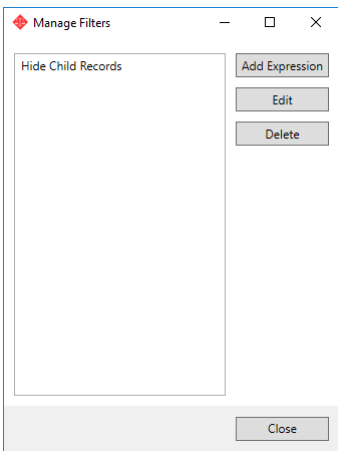


The **Filter Highlight Mode** button opens a drop down menu that gives options available to highlight filtered operations.



The **Highlight Enablement** button, , is a toggle button that will enable or disable highlighting in the Gantt, Trace Chart and/or Editor windows. The **Filter Drop down** will display all the filters available. The **Manage Filters** button, , opens up the **Manage Filters** Dialog.

Manage Filters Dialog



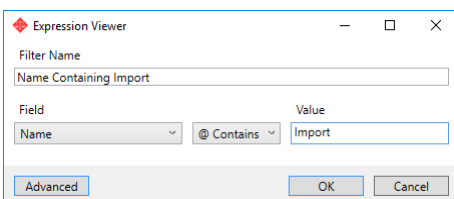
In some Desktop editors, there can be existing filters that are shipped with Preactor. For example, the PESP Event Scripts has one filter packaged with Preactor, **Hide Child Records**. This filter, when selected will hide any child records for a PESP Script. The buttons in the **Manage Filters** window are:

- *Add Expression*
This will open the **Expression Viewer** dialog, where a filter can be created for this editor.
- *Edit*
When a filter is selected, clicking the **Edit** button will open the **Expression Viewer** dialog, and the filter can be edited.
- *Delete*
When a filter is selected, clicking the **Delete** button will prompt the user as to whether the filter should be permanently deleted or not.

In the Sequencer, the Manage Filters dialog has an additional button, Add Composite. For more information on Composite Filters, see [Creating Composite Filters](#).

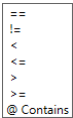
The Expression Viewer

The **Expression Viewer** window is where an expression filter can be created or edited. There are two ways of creating a filter in this dialog; either by using the drop down menus, or by clicking the **Advanced** button and inputting the expression manually.



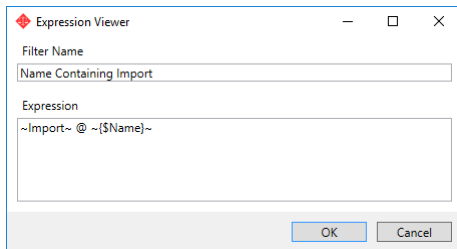
The fields in this dialog are:

- **Filter Name**
This field contains the name of the filter. The name must be unique, if it isn't Preactor will display a warning dialog upon clicking **OK**.
- **Field**
This drop down menu contains all the fields that can be filtered for that table. This drop down menu is table sensitive, so the contents of this drop down will vary depending which table is being filtered.
- **Operator Drop Down Menu**
This drop down displays all the operators available for the expression. If the field selected is a number field, there will be 6 operators available. If it is a string field, there will be 7 operators available, the 6 available for a number field and an additional one, "@ Contains". The image below shows all the operators available, including the additional operator for a string field.



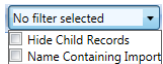
- **Value**
This field will be populated by a value that the filter should evaluate. For example, if a PESP Event Script is to be filtered to those containing the word "Import", import would be in this field.

If the **Advanced** button is clicked, the dialog will be changed, replacing the filter name, Operator drop down menu and value fields with an expression field, where the expression can be manually inputted.



Applying a Filter

With a filter created, it will be available in the toolbar drop down menu.



It is possible to select multiple filters to apply to the table, which is done by clicking on the checkbox. Any filters created and selected in that table editor will be saved automatically when leaving that table. Any filters created are saved to the database and are only removed when clicking the **Delete** button in the **Manage Expressions** dialog.

There is a keyboard shortcut available, which is **Esc**. This will clear any filters applied to a table, and the table reverts to displaying all records.

Security

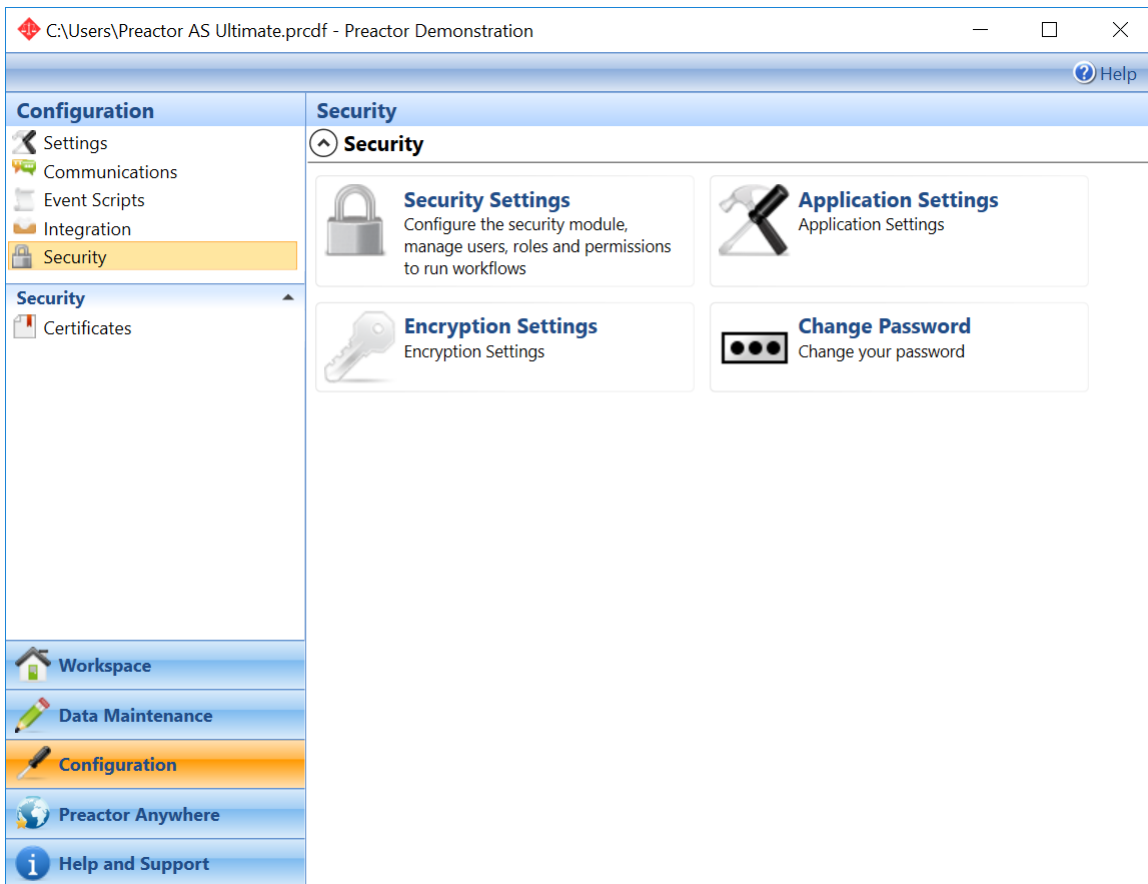
Security

Introduction

Access by a user (Login) to certain navigation options from the Preactor Desktop can be restricted.

This is managed from the Manage Security Settings task:

Preactor Desktop ▶ Configuration ▶ Security



Access to Preactor is managed by the Login

Access to Workflows is controlled by the definition of Roles that are assigned to Logins

- A Workflow is an Actionable Item

Enabling any Workflow results in all the options in the Navigation, Active and Work panes that are required to access that Workflow to become available.

In the diagram below, the workflows for 3 roles are shown: Generate Schedule, Import Orders, and Manage Security Settings.

- A Role is created by the user and associated to one or more workflows.
In the example below, Roles have been created to Administer the System, to Issue Orders, and a Super User role to access a number of Workflows.
- A Login is assigned one or more Roles.
In the example below: Admin can only administer Security; User 1 has access to specific tasks for his job, but the Manager can access the whole system.

Notes:

- Only access to menu items on the Preactor Desktop are managed. Access to menu items within the Sequencer or Planner are not individually managed.
- The configured Security settings are valid for the database a configuration connects to. It will not apply to configurations using a different database.
- Initialization of the Security Settings takes place when starting Preactor. Changes to the Security setting will not be seen until Preactor is restarted.
- When Security is activated, login is necessary, and it is not permitted to log out and to login as a new User. Preactor must be restarted for a different user to login.

- Items added to the menus (by customization) will automatically become Workflows, available for assigning to Roles. Such Workflows will not automatically be assigned to any existing Role however. Items removed from menus will be removed from the Workflow lists and the Roles they were assigned to.
- When configuring Security, there must always be a login configured that can administrate the Security options. Preactor can never get into a state whereby the Security cannot be configured because of lack of access permissions. Of course, loss of password information can result in the inability to manage Security.

Security Guidance

SQL Server

Server Setup

It is recommended that SQL Server is installed and configured by following the latest documentation from the Microsoft, which gives guidance on creating and implementing an effective security plan.

Communications between Preactor and SQL Server

Although securing SQL Server is outside the scope of this documentation, it is recommended that Preactor is configured to use secure communications. SQL Server supports Secure Sockets Layer (SSL) to enable the encryption of data transfers.

Enabling SSL encryption requires modification of the connection string stored in the Preactor Command Definition (.prcdf) file, as well as installing a trusted certificate on the SQL Server host. The .prcdf file can be modified using the 'Command File Editor'. Please refer to the documentation for SQL Server for more information on configuring SSL.

Preactor Configurations

Access to Preactor

Preactor contains an authentication and security module. It is recommended that this mechanism is used to help prevent unauthorized access to Preactor. See "Enable Security Authentication" on the next page for more information on using and configuring this module.

Preactor Configuration Files

Preactor uses a number of configuration files which are stored on disk. These files include the menu and table definition files, workspace information files, and the Preactor Command Definition File. It is recommended that access to these files is restricted to only those users which require access to them. That is, only the users who will run Preactor. Permissions on files can be set using standard Windows file or folder permission sets.

Importing or Exporting of Data

Communications Protocols

The Import/Export Wizard provides a simple interface to define an import or export script for any table within the 'UserData' schema. Preactor can import from both files on disk, and a number of different data providers.

Where Preactor is importing from a disk based file, it is recommended that the permissions are adjusted to prevent unauthorised reading or writing of that file. This can be done using the standard Windows file or folder permission sets.

Where Preactor is importing from a data provider, consideration should be given to securing both the data and the communication mechanism. For example, imports using a SQL data provider should use SSL to encrypt communications. Imports from Open Data sources should consider using HTTPS where possible, and also implement authentication on the data source to prevent unauthorized access. In all cases it is recommended that secure communication protocols are used where possible.

Credential Storage

Preactor supports the encryption of fields. It is recommended that this feature is enabled when storing sensitive information. See "Encryption " on page 119 for more information.

Preactor Communications Object (PCO)

Multiple Preactor systems can communicate using the Preactor Communications Object. PCO allows transport of messages through a variety of mechanisms using "Connectors", such as the FSO (File System Object) connector provided with the Preactor.

Where the FSO connector is used, it is not uncommon to have Preactor read and write to a shared folder on a network. It is recommended that access to any shared folders is restricted to only the users that require permission. Permissions on files can be set using standard Windows file or folder permission sets.

Setting Up Security

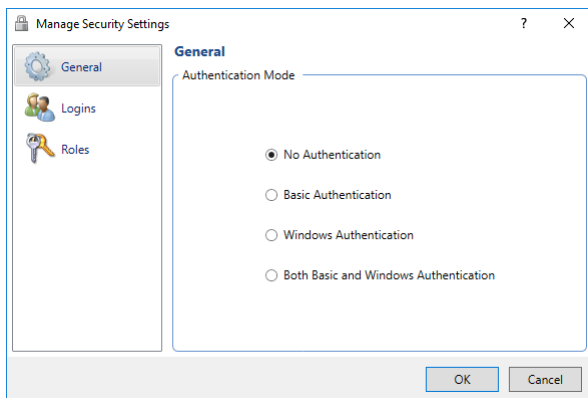
To setup Security, the following must be done:

- Create and/or Identify [Logins](#)
- Create [Roles](#), and assign [Workflows](#) to those Roles
- Assign one or more [Roles](#) to a Login
- Enable [Security Authentication](#)

Enable Security Authentication

Enabling Security Authentication, and choosing which types of Authentication are used, is selected from the General option of the Manage Security Settings window, obtained from:

Preactor Desktop ► Configuration ► Security



There are 2 authentication modes supported; Basic and Windows.

Basic

Enabling Basic Authentication will allow access to Preactor for any Basic Login [created](#) and enabled.

Windows

Enabling Windows Authentication will allow access to Preactor for any Windows Login or Group [specified](#) and enabled.

Either, both, or no authentication mode can be selected.

Logins

A Login provides access to Preactor when [Security](#) Authentication is enabled.

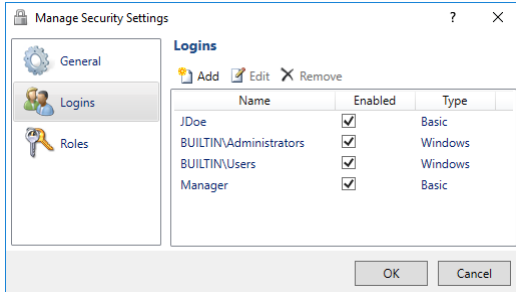
A Login can be:

- A Basic Login ('JDoe' and 'Manager' in the screenshot below).
This type of Login is defined and used only in Preactor.

Login names and passwords are stored securely within Preactor.

- A Windows Login ('PreactorUser' in the screenshot below).
The Login and password is administered by Windows. Only the Windows Identities (SIDs) are stored.
- A Windows Group Login ('ScheduleGroup' in the screenshot below)
Any Windows Login which is part of the group can access Preactor.

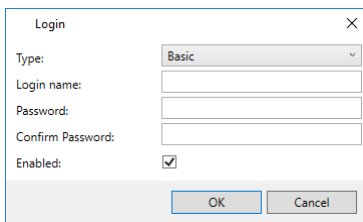
In the Logins windows, the current Logins can be seen, together with their type and whether they are individually enabled:



From the Logins selection, the user can Add, Edit or Remove a Login.

Add and Edit opens a similar dialog, the Logins Editor.

Logins Editor



The user must:

- Select the type of login (Basic or Windows).
- Enter the Login name.
If using a Windows login, that name must be an existing Windows Login or a work group.
- A Password (for Basic types only)
- Select whether to enable the login (this can also be set from the Manage Security Settings/Logins dialog).

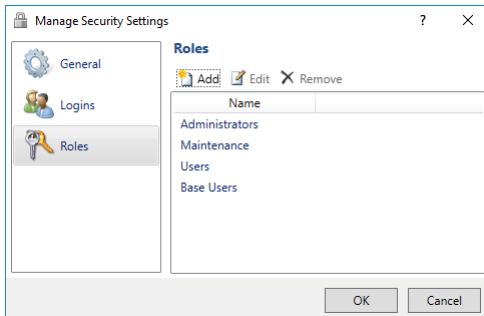
Once created, a Login name and type cannot be changed.

Roles and Workflows

Roles and Workflows controls the access to Preactor navigation when [Security](#) Authentication is enabled.

A Role is created and associated with the workflows necessary to execute that role.

From the Roles selection the user can see existing Roles, and Add, Edit or Remove a Role.



Above we see that 4 Roles have been created, an Admin Role (which can enable Security administration), a Scheduling Role, a Provisioning Role, and a SuperUser Role.

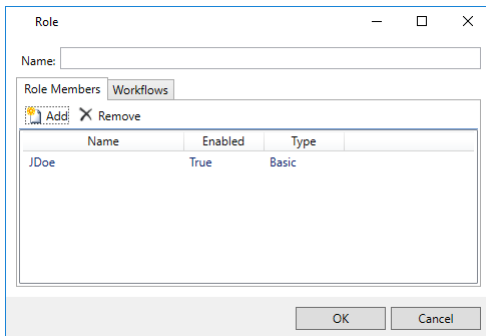
When Adding or Editing a Role, a similar dialog is opened, the Role Editor.

The Role Editor

There are 2 tabs in this dialog,

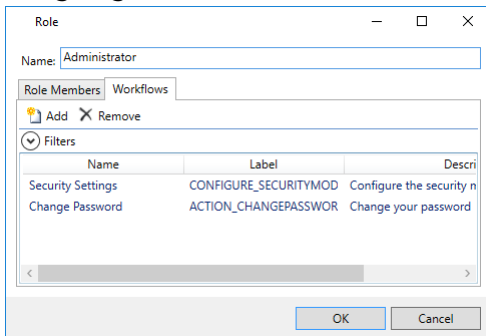
- one for assigning Logins to the Role (Role Members).
- one for assigning Workflows to the Role (Workflows).

Creating a Role, and Adding a Login to the Role Members (assigning a Role to a Login)



- A new Role must be given a name.
- Selecting Add will result in a list being displayed of possible Logins that can be associated with this Role.
- Logins can be Removed from the Role Members.

Assigning Workflows to the Role

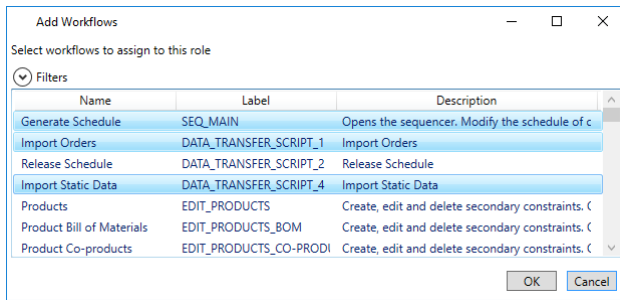


- The list shows which Workflows are currently assigned to this Role.
- Selecting Add will result in a list being displayed of additional possible Workflows that can be associated with this Role.
- Workflows can also be removed from this Role.

The lists can be filtered and/or sorted for ease of reading. To filter:

- Expand the filter
- Enter the desired string in the Name or Label field
- Check the Enable Filter box
- Select Filter

Associating Workflows to a Role is simply a matter of selecting one or more Workflows and selecting OK.

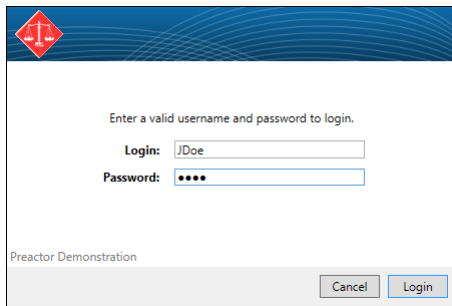


To select items in the lists, it is possible to:

- Add one workflow at a time.
- Use multiple individual selections (Ctrl + Left Mouse click on each item)
- Use group selection (Left mouse click on first item, then Shift + Left Mouse click on last item), or Ctrl A to get all items in the list.
- Use any of the above on the Filtered list.

Logging In

If [Security Authentication](#) is enabled, starting Preactor will result in the Login screen being displayed:



If both Basic and Windows Authentication methods are enabled, the option for which type of Login to be used is offered.

If a Windows method is being used, the current user's login is filled in. No password is needed. Access will be granted if that Login has been enabled, or is part of a Windows group that has been enabled in the Security configuration.

If a Basic method is being used, the user must enter their Login and Password.

Changing Password

A user logged in using Basic Authentication is able to change their password (if that Workflow is allowed). This is done via the 'Change Password' option in:

Configuration ► Security

Encryption

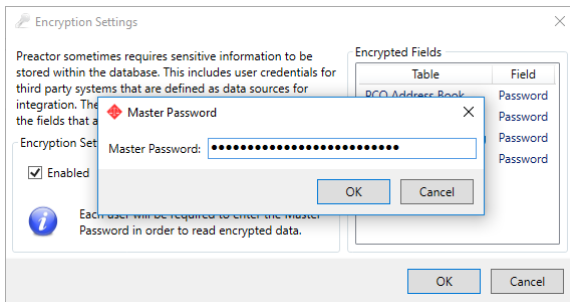
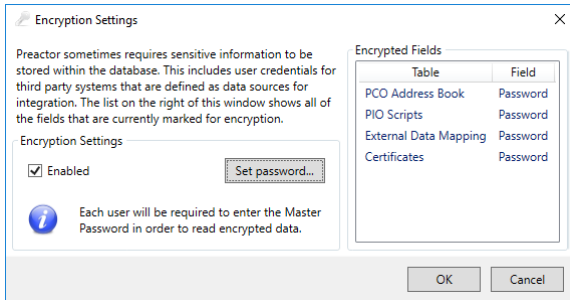
Overview

Some fields in Preactor carry potentially sensitive information. This information needs to be discoverable by authorized users, but should not be discoverable with access to the database only. The encryption feature in Preactor allows for this.

Behavior

Encryption is enabled and disabled on a global basis. If encryption is disabled, encrypted fields will be stored in plain text. When enabled, a master password must be set to read and write the encrypted data. If encryption has been enabled, and then subsequently disabled, all encrypted information will remain in the database until it is overwritten. Encrypted data is kept in memory, and is only decrypted when it is required.

To enable or disable encryption, or to enter the master password, select 'Encryption Settings' from the 'Security' configuration category within Preactor.



Master Password

When encryption is enabled in Preactor, a master password should be set by the enabling user. This master password will be used as the basis for encryption. It is also salted by a cryptographically resilient algorithm, providing greater security.

When a new user (or an existing user on a different computer) tries to access the encrypted data they too will need to provide the master password. Once the master password is verified, the new user will be able to access the encrypted information from then on.

Note: If the master password is forgotten, the encrypted data is only recoverable by those users who already have access. New users cannot be granted access to the encrypted data without the master password.

Evaluate Fields and Encryption

Encryption Strength

Preactor encrypts all information using the AES-256 cipher.

Alternative Methods of Application Delivery

Preactor is a desktop application and typically requires installation on each client machine, client access to the database, and client access to configuration files. Where there are security demands which do not allow this traditional model of application deployment, deployment of the software as a virtual application can be considered. Virtual deployment generally allows the application and its resources to be isolated or sandboxed to some extent.

One of the simpler forms of deploying virtual applications is via presentation virtualization. This allows users to access applications and data on a remote computer using a remote display protocol. The user can view this application via a dedicated

client, or through a web browser. When Preactor is deployed in this manner, only the remote machine requires access to the SQL database or to Preactor's configuration files. All data is therefore retained in a central location, and the user's client is purely communicating mouse, keyboard and display information.

There are alternate forms of deployment of virtual applications, and each should be considered whilst taking into account the security demands of the organization.

Scripting

Preactor Event Script Processor (PESP)

Introduction

Preactor's Event Script Processor allows users to create their own custom functionality as a sequence of Actions, and for that script to be executed in response to an event. It provides a friendly user interface to define the script, and in many cases eliminates the need for the custom feature to be written in code. See the Product Based Feature Lists to determine which products the PESP feature is available in, and note that some specific actions are only available in appropriate products, e.g. APS Rules are not appropriate to the lower functionality products.

An event script is a series of Actions which are processed in sequence until all steps are completed, initiated by an [Event](#).

PESP provides a scripting language, used to define what happens when events occur within Preactor.

The [Events](#) that can result in the execution of a script can be:

- One of a predetermined set of possible discrete events that have occurred in Preactor, e.g. dropping an operation onto the Gantt window (Discrete Event).
- A PCO message is received which indicates a PESP script is to be executed (Message Event).
- A selection on the Preactor Desktop associated with a script has been made (MANIP Event).
- A Timed Event has occurred – an event setup to occur after a predetermined period of time (Timed Event).
- Additionally, a PESP script is available on shipped configurations that manage the presentation and execution of [APS Scheduling Rules](#) in the Scheduler.

A script can be executed by any or all of these events, e.g. a script could be executed as a result of a received PCO message, or when a selection on the Preactor Desktop is made, or when a discrete action in Preactor takes place.

There is a predetermined set of possible actions that can be executed by the event script. In addition to the predefined list of actions, there is also the option to include a 'Custom Action'. The 'Custom Action' can be used to call any custom feature written in code.

An action could be:

- To perform some action in Preactor (e.g. schedule, or display a message).
- To obtain information (e.g. get the current time).
- To jump to another action (identified by the label field) in the script, based on a decision (e.g. IF true, go to this label of the script).

Information can be passed between the actions in the script with the use of variables.

Viewing the Event Scripts

From the Preactor Desktop, select Configuration ► Event Script ► Event Scripts.

A table of the available event scripts will be displayed, from which scripts can be created, deleted, and edited.

Show	Name	Script Type	Script Category	Label	For Event	Action	Description	Action Enabled
<input type="checkbox"/>	After Material Pegging	User Defined	Unspecified		On SMC Finish	No Action		<input type="checkbox"/>
<input type="checkbox"/>	Import Resource Data	Unspecified	Unspecified		Unspecified	Suspend UI	Suspend the user interface before starting the data import	<input checked="" type="checkbox"/>
<input type="checkbox"/>	Import Product Data	User Defined	Unspecified		Unspecified	Suspend UI	Suspend the user interface before starting the data import	<input checked="" type="checkbox"/>
<input type="checkbox"/>	Import Static Data	User Defined	Unspecified		Unspecified	Run Event Script	Import Resource Data	<input checked="" type="checkbox"/>
<input type="checkbox"/>	Import Orders	User Defined	Unspecified		Unspecified	Suspend UI		<input checked="" type="checkbox"/>
<input type="checkbox"/>	Release Schedule	User Defined	Unspecified		Unspecified	Suspend UI		<input checked="" type="checkbox"/>
<input type="checkbox"/>	APS Select Scheduling Rule	Unspecified	Unspecified		Unspecified	Is Module PrSequencer	Select the APS Scheduling Rule	<input checked="" type="checkbox"/>
<input type="checkbox"/>	APS Forwards	APS Rule	Unspecified		Unspecified	APS Forwards	Runs APS Forwards Rule	<input checked="" type="checkbox"/>
<input type="checkbox"/>	APS Backwards	APS Rule	Unspecified		Unspecified	APS Backwards	Runs the APS Backwards rule	<input checked="" type="checkbox"/>
<input type="checkbox"/>	APS Parallel Loading	APS Rule	Unspecified		Unspecified	APS Parallel Loading	Runs the APS Parallel Loading rule	<input checked="" type="checkbox"/>
<input type="checkbox"/>	APS Preferred Sequence	APS Rule	Unspecified		Unspecified	Is Module PrSequencer	Runs the Preferred Sequence rule	<input checked="" type="checkbox"/>
<input type="checkbox"/>	User Tool 1	User Tools	Unspecified		Unspecified	Display Message Box		<input checked="" type="checkbox"/>
<input type="checkbox"/>	User Tool 2	User Tools	Unspecified		Unspecified	Display Message Box		<input checked="" type="checkbox"/>
<input type="checkbox"/>	User Tool 3	User Tools	Unspecified		Unspecified	Display Message Box		<input checked="" type="checkbox"/>
<input type="checkbox"/>	User Tool 4	User Tools	Unspecified		Unspecified	Display Message Box		<input checked="" type="checkbox"/>
<input type="checkbox"/>	Export Button	User Defined	Unspecified		Export Button Press	Test Format		<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	Run SMC on Order Enquiry	User Defined	Unspecified		On Order Enquiry Expanded	Run SMC on Order Enquiry		<input type="checkbox"/>
<input checked="" type="checkbox"/>	Refresh Alerts	User Defined	Unspecified		On Alerts Window Update	Suspend UI		<input type="checkbox"/>

Check the box in the 'Show' column to switch between an expanded or collapsed view of the script. Likewise, check the box in the 'Action Enabled' column to enable and action, uncheck to disable.

Creating and Editing Event Scripts

Event Scripts are created and edited in the PESP Event Scripts data table. From the Preactor Desktop, select:
Customization ► Event Scripts ► Event Scripts

- To create a new script, double click beneath the last entry in the data table.
- To edit the action of an existing script, double click on that action – else right click and edit.
- To add actions to an existing script, click on the row after the location the action is to be added, right click and Insert.

A dialog window opens:

It is possible to delete an action, or the complete script by right clicking and selecting Delete.

The following fields are **mandatory** to have filled in:

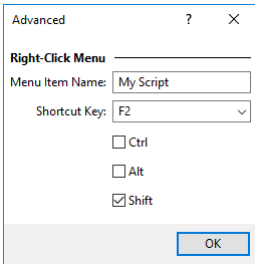
- PARENT
As with all Preactor data tables with family relationships between records, the first action entered in the script is referred to as the PARENT, and that is the option entered in this field. All additional actions in the script are children of the Parent Action and have the name of that parent in this field.
- Name (if a Parent Record)
- Action, or Use Custom Action / Custom Action
An action must be selected, either from the drop down list or by checking the Use Custom Action box and selecting a

custom action. Custom Actions can, for example, be created using the Preactor Software Development Kit (SDK). To add a custom action, you can either choose the NEW PESP Custom Actions option from the drop down list on the Custom Action field in the Event Scripts table and enter the appropriate information identifying the Project, Class, Method and Parameters of the code that you wish to run. Or you can open up the Custom Actions table and add the entry in there first and then select it from the Custom Action field in the Event Scripts table.

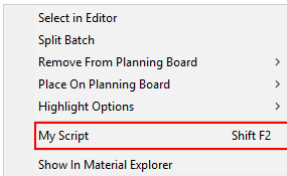
- Parameters
These need to be filled in as appropriate for the selected Action.
Only valid parameters for the selected action are presented to the user to fill in.

The following fields are also available:

- For Event
The For Event is used in the PARENT action of a PESP script to define if the script is to be run in response to a discrete event in Preactor.
If this field is left Unspecified, the event can only be triggered by:
 - a Menu User Interface option (MANIP Event Script).
 - a tool.
 - right clicking on a record in the sequencer to bring up a pop up menu.
 - an APS Rule.
 - a Message (Message Event Script).
- Script Type
There are a number of Script Types that can be associated with the script. They allow you to view in the table only those types that you are interested in by using the drop down filter list box.
Additionally, a Script Type of APS Rule causes that PESP script to be listed in the APS Rules selection dialog in the sequencer. See [APS Scheduling Rules](#)
- Script Category
A Category, as defined in the PESP Script Category table (managed from the desktop) allows scripts to further manage the presentation of the scripts in the PESP Event Script table.
- Label
The Label can be used for jump actions based on a Conditional test within an Event Script (e.g. IF True, jump to this label).
- Description
Allows the user to describe the action. When used for the first action of a script, it typically describes the whole script. This description is visible when the script is displayed in contracted form in the table.
- Action Enabled
A checkbox to individually enable/disable the action in the script.
This can also be set from the table view, using ctrl + shift select in the Action Enabled column.
- Use Custom Action / Custom Action
Checking the Use Custom Action check box alters the Action field name to Custom Action, allowing you to use your own Custom Actions created using the Preactor Software Development Kit (SDK) for example.
To add a custom action, you can either choose the NEW PESP Custom Actions option from the drop down list on the Custom Action field in the Event Scripts table and enter the appropriate information identifying the Project, Class, Method and Parameters of the code that you wish to run. Or you can open up the Custom Actions table and add the entry in there first and then select it from the Custom Action field in the Event Scripts table.
- Advanced
This provides the ability for the script to be executed in the sequencer from the right click menu for the operation in a number of windows in the sequencer, or using a shortcut in combination with a mouse click.



The settings shown in the dialog above add a new menu item to the operation context menu in the sequencer, as shown below.



Custom Actions

Custom actions created by the user can be executed by a PESP script. It should be noted though that:

- The return value of a Custom Action cannot be used by PESP (e.g. to modify the flow of the PESP).
- PESP Script Variables need to be used to return values to PESP by the Custom Action.

Script Variables

Data is transferred between actions in a script using Script Variables.

To create a script variable, just start using it by name (e.g. My Variable) in one action, and it becomes available for use in subsequent actions.

Some predefined script variables are provided:

- **TimedEventActualTime**
The date/time at which the currently running script was started.
- **TimedEventRequestedTime**
The date/time at which the event requested is to be fired. This may be earlier than the actual time, if Preactor had been shut down or if the event calendar had been disabled.
- **TimedEventPrimaryKey**
The Primary Key of the record in the event calendar that fired the currently running PESP script. This value can be used to reference custom data in a configuration specific table. See the section on strategies for a discussion of how to use this mechanism to associate custom information with individual events.

Event Types

Message Events

Messages are passed between systems using the PCO. The message has within it the name of any PESP script to be executed. Typically the message will come from an external source, e.g. from a Shop-floor viewer, with data associated with it (could be a file or XML data within the message).

The data is processed (e.g. by an Import script), a reply sent, and then deleted by the Communications Object (PCO).

See [Example Scripts](#) for further guidance.

Discrete Events

There are many Discrete Events that occur in Preactor and you may want to customize what happens on the occurrence of such with an Event Script.

Typically, actions associated with these PESP Events may:

- Perform data validation or error checking, when the user clicks on 'OK' in a dialog box.
- Force the user to complete all of the dialog boxes in the editor and validate the data they have entered.
- Populate other parts of the database according to values they have just entered.
- Perform an evaluate statement on the figures they have used for operation times.
- Run a script when an operation is dropped on the sequence Gantt window, or when the user attempts to drag an operation in the Sequencer Gantt window.
- Run a custom action.

See also [APS Scheduling Rules](#) for a specific application of Discrete Events.

MANIP Event

A 'MANIP' command can be used to run an Event script, using the switch /RunEventScript.

This is defined in the menu definition file (.prmdf) as shown in the example below for Import Orders:

```
Import_Orders: MANIP.DLL
/RunEventScript {FIND RELATED DB VALUE("Import Export Mapping" "Number" "1" "Order
Import Event Script")},
Import Orders Event Script,
Import Orders,
Foreground, ALWAYS: {RETURN};
;
```

It is an easy way of assigning scripts to Work Pane items on the Preactor Desktop. An Ultimate edition of Preactor is required in order to be able to make changes to the .prmdf file.

Timed Events

The PESP Timed Events module provides Preactor with the concept of executing tasks at some time in the future. An event calendar is used to associate a task with the date and time at which the task is to execute.

Timed Events are useful in a number of scenarios, for example:

To support order promising.

When an order promise is made, an entry can be added to the event calendar to delete the order promise at some time in the future if a firm order has not subsequently been received.

The event calendar is implemented as a standard editable table, managed from:

Preactor Desktop ▶ Configuration ▶ Event Scripts ▶ Timed Event Calendar.

A timed event can be added to the system by creating an entry in the table, and defining the PESP script to run, and when.

PESP actions are also provided that allow timed events to be created in a PESP script.

When the event calendar is enabled, an event calendar processor polls this table at regular intervals and runs any tasks that are overdue. Tasks are deleted from the calendar as soon as they are executed.

The Timed Event module is enabled/disabled and the table scan period is configured, from:

Desktop ▶ Configuration ▶ Event Script ▶ Timed Event Settings.

Changes to the configuration take place when Preactor is next started.

Event Calendar Processor Overview

The event calendar processor runs in the background and is responsible for polling the event calendar, running PESP scripts on demand, and creating/deleting events from the event calendar as needed.

Most of these tasks are designed to run silently in the background so as to disturb Preactor's primary processing as little as possible.

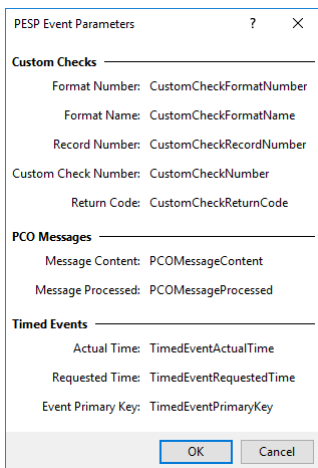
This is achieved by running these processes on separate threads. Although the event calendar performs its polling and script launching logic on a separate thread, the PESP scripts themselves still run on the primary thread.

As shown in the diagram, the PESP action to create a new timed event causes a further thread to be spun up to perform the insert. This temporary thread is destroyed once the insert operation is complete. This approach enables synchronized access to the event calendar table to avoid possible corruption. Thread synchronization is provided through a mutex class which effectively places a software lock over the event calendar table. Writes to the table will only be performed by a thread if it can obtain the mutex. If another thread is currently holding the mutex, the second thread enters a wait state until the mutex becomes available.

Event Parameters and Return Values

The PESP processor is logically located between the part of Preactor that detects an Event, and that which processes that Event. Each event is sent with parameters, and a return status set to 'passed'. That data is stored in as set of variables, identified by the Event Parameters Mapping table, at:

Customization ► Event Scripts ► Event Parameter Mapping



Custom Check Parameters for Discrete Events

There are 2 parameters passed by all events, but they are not always filled with useful information.

- Parameter 1 is usually the Format Number, which maps to the Format Number and Format Name in the table.
- Parameter 2 is usually the Record Number, which maps to the Record Number and the Custom Check number in the table.

Some Events do not use these parameters, so the data is meaningless.

Some Events put other information in these Parameters, appropriate to the Event.

These Parameters are available in the PESP script, but should not be changed.

Return Values

A PESP script can modify that return value which may impact the continued processing of that Event by Preactor. For example, if the event of dropping (but not yet dropped) an Operation on the Gantt window triggers a PESP script, and that script (after some other tests) sets the return value Failed, Preactor would not complete the processing to drop that operation. See actions Return (e.g Return Fail).

Not all processing of events by Preactor is dependent on the return status of the event.

Example Scripts

Message Event Script

An example of a Message Event script, found in the shipped Job Shop configuration, is the Receive Updated Record script.

The flow of this script is:

Action #	Action	Parameters
1:	Is Module PrShell	Returns TRUE if is PrShell. Puts return value in variable
2:	IF FALSE, GOTO End	variable to check, and go to label.
3:	Display Message 'New Schedule received'.	Message to be displayed.
4:	Suspend UI	
5:	Copy attachment to file	File used for Import script
6:	Run Import/Export Script	ID which script to run.
7:	Send PESP Message Schedule Update to Viewer 1	Message type, destination
8:	Send PESP Message Schedule Update to Viewer 2	Message type, destination
9:	Set PESP Message as Processed	
0:	Resume UI	
11:	END	End Script

Simple APS Scheduling Script

All of the shipped configurations contain examples of APS Scheduling scripts such as the APS Forward Rule (the system must run as 400 APS or above for the APS Rule option to be available in the Sequencer). This script simply performs an APS Forward Schedule.

A Multi-Pass Scheduling Rule.

Here is shown a possible flow for a multi-pass scheduling rule facilitated by PESP.

#	Description	Action
1:	Find orders for Customer A	Locate By Expression – e.g. ((~{\$Customer}~===~ABC Engineers~) ({#Priority}==1))
2:	Backward sequence from Due Date.	APS Backwards
3:	Find orders for Customer B.	Locate By Expression – e.g. (~{\$Customer}~===~MDN Gearboxes~)
4:	Forwards Sequence	APS Forwards
5:	Find remaining orders	Locate By Expression This time provide expression, so all remaining jobs are located.
6:	Schedule with preferred rules	APS Preferred Sequence.

Search Records in a Table And Perform Action on Those Matching Criteria.

Here is an example script that loops around all of the records in a table to perform actions on records that match a certain criteria. In this case the PESP script will write 'Complete' to the 'Operation Progress' field for all records that have the 'Use Actual Times' toggle field set.

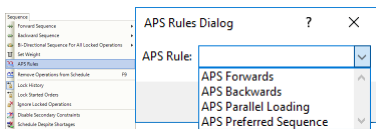
Action Name	Description	Parameters	Parameter Content
Suspend UI	Suspends user interface whilst processing of PESP script is occurring		
Set Script Variable (Number)	Initializes script variable by assigning its value as 0	Script Variable	Script Variable RecordNo
		Number	Use Script Variable No Numeric Value 0.000000
START: (Label)		Format Name	Use Script Variable No String Value Orders
		Expression*	Use Script Variable No String Value ({{Use Actual Times}}==1)
Find Matching Record By Expression	Searches Orders table for all records that have the 'Use Actual Times' toggle field set	Starting Record	Use Script Variable Yes String Value RecordNo
		Direction	Use Script Variable No Constant PrObjSearchForwards
		Result Script Variable	RecordNo
		Expression	Use Script Variable No String Value ({{#PESP_RecordNo}}>0)
Evaluate Shell Expression	Tests to see if a matching record has been found	Script Variable	Script Variable MatchFound
If False	If no matching record has been found, jump to END label name	Condition	Use Script Variable Yes Script Variable MatchFound
		Goto	Use Script Variable No String Value END
Write Field (String)	Write 'Complete' to 'Operation Progress' field in 'Orders' table	Format Name	Use Script Variable No

			String Value	Orders
		Field Name	Use Script Variable	No
			String Value	Operation Progress
		Record Number	Use Script Variable	Yes
			Script Variable	RecordNo
		String	Use Script Variable	No
			String Value	Complete
GoTo	Jump to START label name	Goto	Use Script Variable	No
			String Value	START
END: (Label)				
Resume UI	Restore the user interface			
End Script	Terminates the script			

* If all records need to be included in the subsequent actions, an expression that includes all records such as 1==1 should be entered, rather than an expression that would only include a limited number of records.

APS Scheduling Rules

A PESP script called APS Select Scheduling Rule is provided that facilitates the presentation and execution in the Sequencer of all the APS scheduling rules available. This is executed when the user selects APS Rules from the Sequence menu in the Sequencer, and opens a dialog that allows the user to select the required scheduling rule to run.



This script presents to the user all the scripts of type APS Rule. PESP scripts created to apply a new scheduling rule, given the type APS Rule, will be automatically presented to the user in the APS Rule drop down as shown.

Rule Building

In APS products, customized scheduling rules may be built using the Event Script Processor and/or a custom rule.

Rule building using PESP Actions

1. Highlight all orders with attribute Customer = ABC
2. Backward Schedule
3. Highlight all orders with attribute Customer = XYZ
4. Forward Schedule
5. Highlight all orders that remain unscheduled
6. Schedule Remaining Orders forward by due date

Another example would be to create a campaigning rule, which might contain the following actions:-

1. Highlight orders with Due Date in the next week
2. Schedule using Preferred Sequence
3. Highlight orders with Due Date in the next week +1
4. Schedule using Preferred Sequence
5. Highlight orders with Due Date in the next week +2
6. Schedule using Preferred Sequence

Building Custom Rules

You can use standard actions held in the actions table or create your own Custom Actions using the Software Development Kit (SDK).

You can also create customized parallel loading rules and ASCL rules using the SDK. Preactor 400 APS has a library of rule building functions or macros that can be used for this task but you can also use the SDK if the functions do not do everything that is required.

Communications

Communications

Preactor offers the ability to communicate between other Preactor systems using a feature called PCO (Preactor Communications Object). This feature is used for example, when sending a schedule from the Master Scheduling System to a Shop Floor Viewer.

The capability is enabled from the **Startup** tab of the Command File Editor

There are various options available for configuring PCO, these are discussed below:

- [Address Book](#)
- [Configuration](#)
- [Send Message](#)
- [Read Message](#)

Communications Object

The Communication Object is a stand-alone application that runs side by side with one or more scheduling products and services messages passed to and from these systems as well as other applications, such as ERP.

The object allows transport of messages through a variety of mechanisms using "Connectors", such as the FSO (File System Object) connector provided with the Preactor.

Two communication/integration concepts are supported by Preactor:

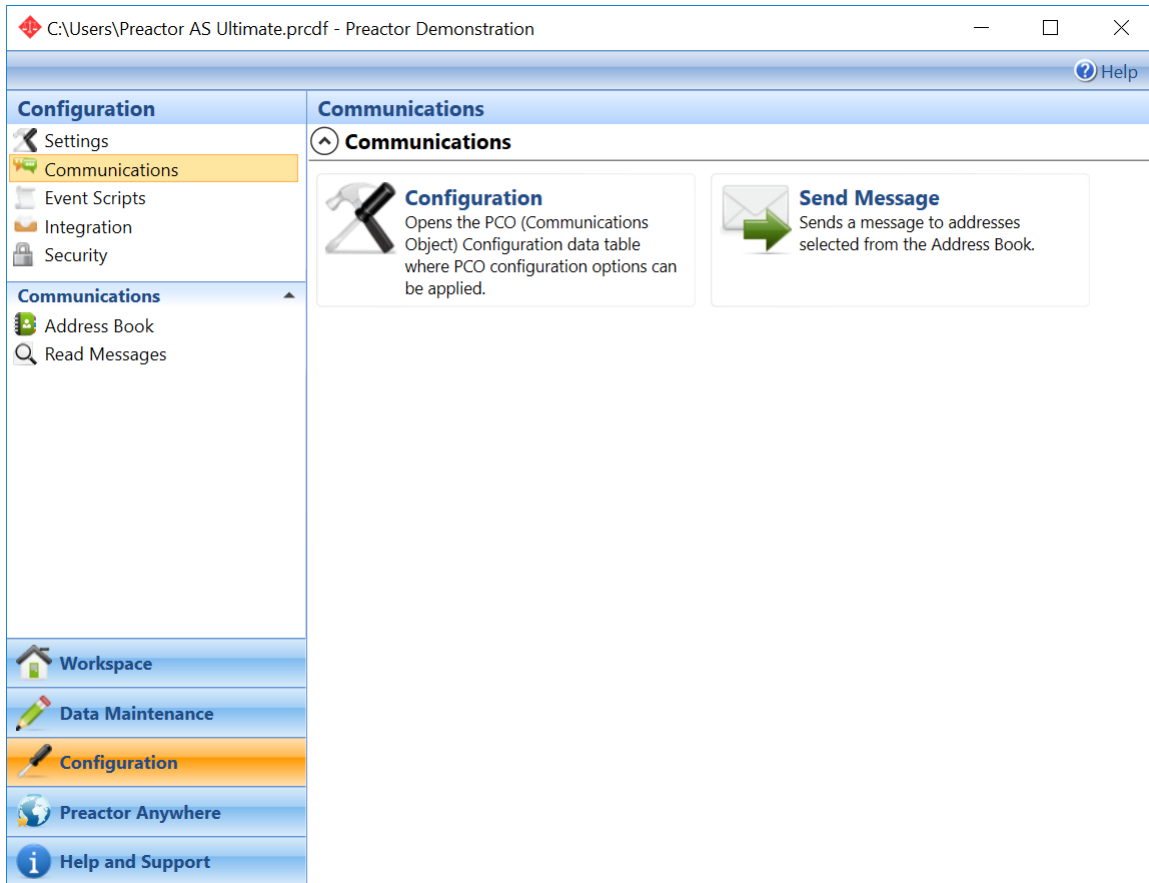
- *Batch file transfer.*
Traditional method of importing and exporting data using ASCII files. It is activated by a manual process of clicking on a button which then imports the data in batches.
Preactor assumes that the data is current and correct.
- *Event-driven messaging.*
Any configuration of Preactor can use either or both.
It is only possible to use event driven messaging between Preactor and an ERP system if the system has the capability to trap messages from the MSS and act upon them, as well as being able to generate messages when certain activities are completed in ERP.

Configuration

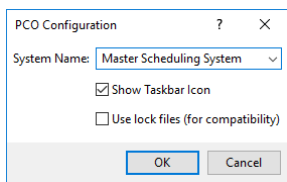
The Edit PCO Configuration dialog is used to specify the default handler for incoming messages to the current system. It should be completed after the Address Book is established.

Access to the Edit PCO Configuration dialog is via:

Configuration Pane ▶ Communications ▶ Configuration



Click **Configuration** in the Work Pane to display the **Edit PCO Configuration** dialog.



- System Name - a unique identifier for the system. It specifies the default handler for incoming messages to the current system. It is associated with the Inbound Address in the [Address Book](#).
- Show Taskbar Icon - A check box which determines whether the PCO icon is displayed in the Windows Task bar.



Click **OK** to save any changes made.

Using PCO with 3rd Party Systems

Preactor's Communication Object (PCO) can be run without Preactor and can be attached directly to another system.

How do I configure PCO in this case?

- A minimal Preactor configuration can be supplied which installs the basic data tables required (Address Book, Connectors etc.).
- PCO can be installed on its own from the Install CD.
- PCO can be setup without this using the Preactor API.
- Example code can be supplied for a program which communicates via PCO.

Address Book

In order for Preactor systems to communicate with one another the address book must specify addresses of the systems involved in communication. The Address Book is used to specify the locations where PCO messages are to be created/processed for the currently loaded system and other Preactor systems involved in communication.

The Address Book contains Inbound and Outbound addresses for the systems that will be communicating with each other. One PCO is available for each Preactor system that runs (even when running multiple Preactor systems on the same computer). The address book should be configured with one inbound address for the current Preactor system, and then an outbound address for each Preactor system that it will be communicating with.

Access to the Address Book is via:

Configuration ▶ Communications ▶ Address Book

Name	Description	Use Connector	Address Type	Message Direction	Address
Master Scheduling System	Master Scheduling Outbound	FSOConnector	UNC Address	Outbound	(TEMP)\PCO
Master Scheduling System	Master Scheduling Inbound	FSOConnector	UNC Address	Inbound	(TEMP)\PCO
Shop Floor Viewer 1	Shop Floor Viewer 1 Outbound	FSOConnector	UNC Address	Outbound	(TEMP)\PCO
Shop Floor Viewer 2	Shop Floor Viewer 2 Outbound	FSOConnector	UNC Address	Outbound	(TEMP)\PCO
Management Viewer 1	Management Viewer 1 Outbound	FSOConnector	UNC Address	Outbound	(TEMP)\PCO
Management Viewer 2	Management Viewer 2 Outbound	FSOConnector	UNC Address	Outbound	(TEMP)\PCO

A new Address can be entered by double clicking on an empty row in the Address Book, or by right clicking an Address and selecting **Insert** or **Duplicate** to enter a new Address above that selected in the list.

An existing address can be viewed and edited by double clicking on that address in the work pane, or by right clicking and clicking **Edit**.

Each Address has a number of characteristics and options, viewed from the **PCO Address Book** window.

PCO Address Book Window

PCO Address Book

Name:

Description:

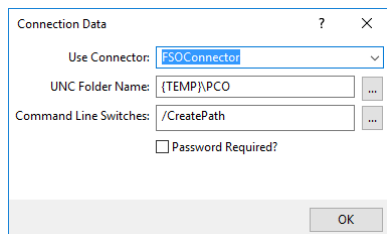
Location:

Message Direction:

Name	Description
Name	A unique identifier for the system.
Description	Message textual description.
Location	Textual description of the location.
Connection Data	Button that opens the Connection Data window.
Message Direction	Specifies whether the message is to be Inbound or Out-

Name	Description
	bound. Inbound is used for the address of the computer that will process messages received. Outbound is used for the address of the computer that will be sent messages generated by this system.

Connection Data Window



Name	Description
Use Connector	Type of connection, though FSO (File System Object) Connector is the only available connection.
UNC Folder Name	Specifies the path to the common folder where messages will be sent or received.
Command Line Switches	Optional parameters that can be passed for each address that may be required. <i>/CreatePath</i> will create the specified folder path as defined in the UNC Folder Name field. Example configurations specify the path in the UNC Folder Name field is <i>{TEMP}\PCO</i> . The {TEMP} keyword represents the local temporary directory.
Password Required?	When checked, the Password field is activated. Allows a password to be entered which may be required by receiving systems. It is NOT required for FSO Connectors.

Establish a common UNC Folder

The system needs to recognize a single common folder through which all messages will pass and a decision has to be made as to where this is to be located.

To establish a common UNC Folder:

1. Decide which networked machine is to hold the 'UNC Folder' and where it is to be located on the machine.

This is the common folder through which all messages will pass.

2. On the appropriate machine use Windows Explorer to create the UNC Folder and identify the path to it.

e.g. C:\PCO

3. Right click on this folder and select **Properties** from the list of options.

This opens the Properties dialog.

4. Share the folder by selecting the **Sharing** tab and clicking on the **Share this folder** radio button.
5. Click **OK** to close the dialog.

Unless installed on the same machine as the UNC Folder, each networked scheduling system must access this folder using a Mapped Network Drive or access it as a [Network Place](#). To add a new network place all machines must be connected to the network.

Add a Network Place

On machines that are remote from the common UNC Folder, the folder may be accessed as a Network Place.

To add a network place:

1. In Windows click **Start**, then **My Computer**. Under **Other Places** click **My Network Places**.
2. In the subsequent dialog select **Add a network place**.

The Add Network Place Wizard opens.

3. Click **Next**.
4. In the following dialog select **Choose another network location**, then click on **Next**.
5. In the subsequent dialog will open, click **Browse** to locate the UNC Folder, previously established one of the networked machines. Click **OK** to close the **Browse for Folder** dialog, then click **Next** in the Network Place dialog.

The Internet or Network Address field will now contain the name of the networked computer and the location of the UNC folder, e.g. \\3001\C\PCO.

6. In the new Network Place dialog provide a name for the new network place.
7. Click **Next** then **Finish** to close the wizard.

Networking Viewers

Used in data sharing mode Viewers require a LAN/WAN connection between them and the Master Scheduling System (MSS). The Communications Object (PCO) distributes any updates to all viewers that have been set up to receive them. Thus Viewers can receive schedules released by the MSS, and return schedule updates to it.

Preactor has a real-time messaging system that is used to communicate between the MSS and Viewers on a PC network. The messaging system has the advantages of providing asynchronous communications that can be used over intermittently available links.

To set up these communications:

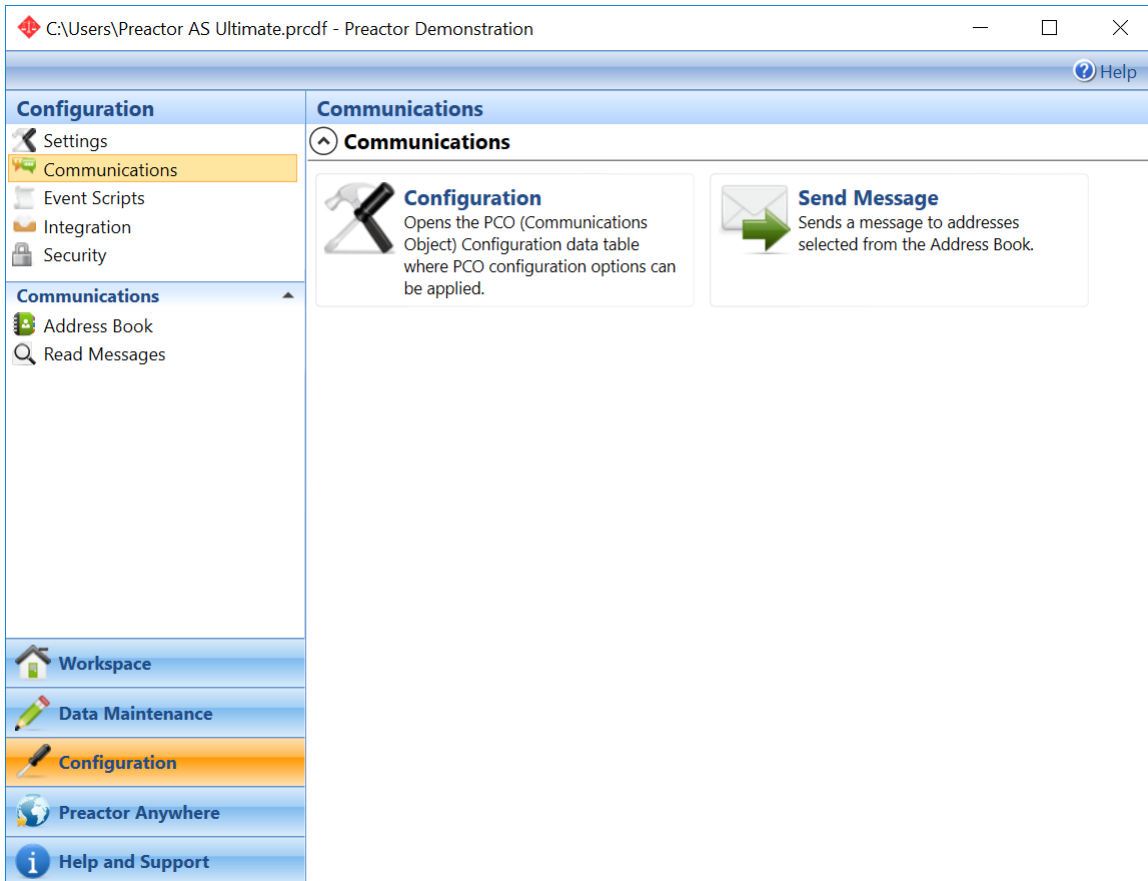
1. Install the Viewers and MSS as a networked licensed version of Preactor.
2. Establish and share a [common UNC Folder](#).
3. Set up the [Address Book](#) for each networked system.
4. [Test](#) the system.

Send Message

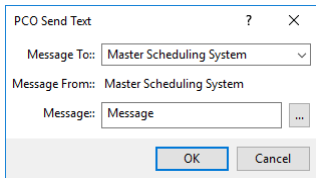
The Send Message feature allows messages to be sent between different Preactor systems. The Communications [Address Book](#) and [Configuration](#) must already be set up in order to send a message:

Access to the Send Message feature is via:

Configuration Pane ▶ Communications ▶ Send Message.



To send a message, click on **Send Message** in the Work Pane. The 'Edit PCO Send Text Message' dialog is displayed.



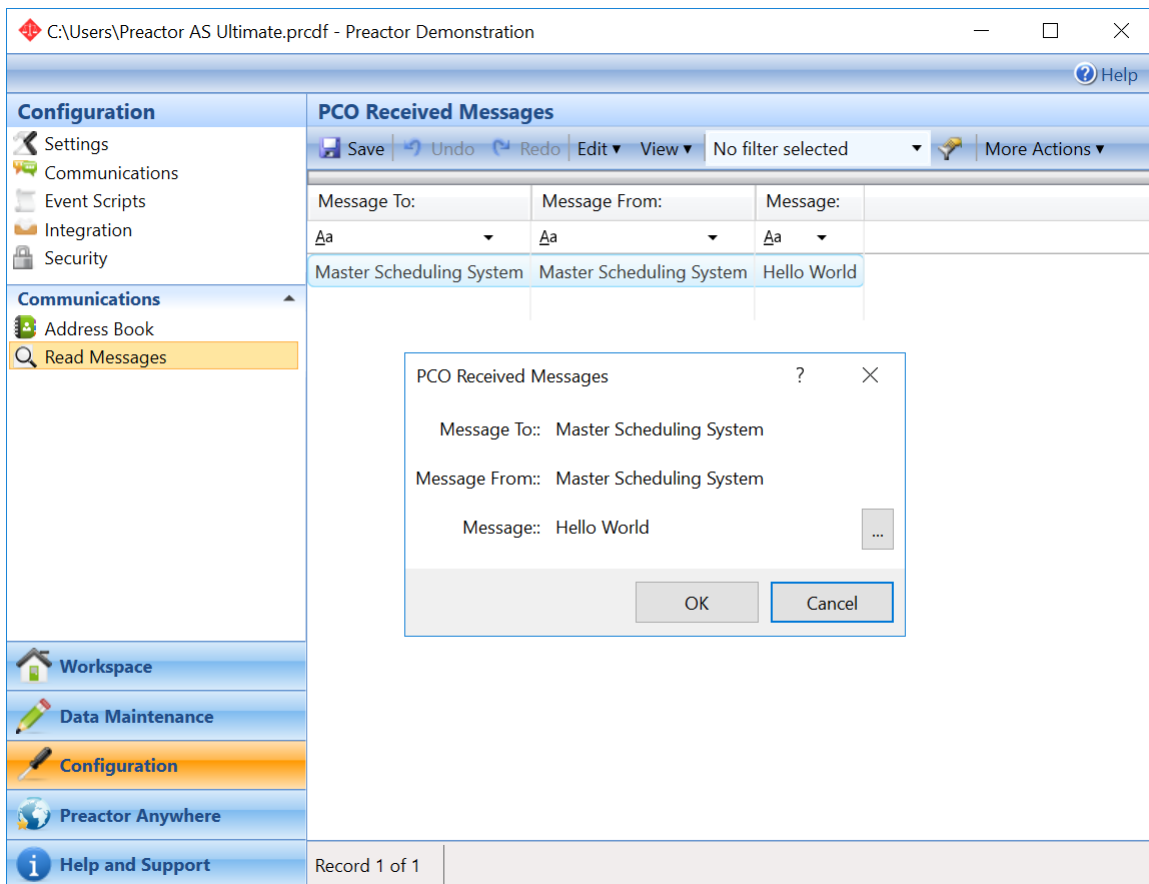
- Message To - Recipient of the message.
- Message From - Automatically populated with the current System Name as specified in the [Communications Configuration](#) topic.
- Message - Text to be included in the message.

Read Messages

Messages can be sent between different Preactor systems, such as a Master Scheduling System sending a Shop Floor Viewer configuration a message. Messages can only be sent and read after the Communications [Address Book](#) and [Configuration](#) have been set up.


Access to the Read Message feature is via:

Configuration Pane ▶ Communications ▶ Read Messages



To read a message, click on the Read Messages option in the Active Pane. The PCO Received Message table is displayed listing all received messages. To view a specific message, double click on the message to be viewed, this will open the **Edit PCO Received Messages Information** dialog.

- Message To - Automatically populated with the current System Name of the system receiving the message as specified in the [Communications Configuration](#) topic.
- Message From - Sender of the message.
- Message - Message text.

Click on the ellipses  to view the entire message if part of it is obscured.

Setting up the Address Book for each networked system

The Communications Object (PCO) allows several scheduling systems to be used on a single machine. Consequently each networked Viewer or MSS must have a unique system name which identifies the particular system to the network.

In order to send and receive messages, each system should have one "Inbound Address" and an "Outbound Address" for each system it will communicate with. See [Address Book](#) for further details in integration.

To set up the Address Books for all systems:

1. Firstly make sure that entries for the current system have been entered into the [Address Book](#).
2. Select:
Configuration ► Communications ► Configuration.

The **Edit PCO Configuration Information** dialog is displayed.

3. Select a System Name for each Preactor system.
4. Click **OK** to save the changes.

Each system on the network now has a unique identity. It now remains to set up the Address Books for each system.

4. Go to the MSS and set up the [Address Book](#) to enable it to communicate with each of the Viewers.
5. When this is complete take the Viewers in turn and complete their Address Book entries.

When selecting the UNC Folder for each address, use the browse button to locate the [Network Place](#) you previously established if this folder is on a remote machine.

Testing the System

Sending messages between Viewers, and between Viewers and the MSS, tests the communications system.

To check the system:

On each machine that is remote from the UNC Folder or License Site check the network.

1. In Windows go to **Start ▶ My Network Places ▶ View Network Connections**.
2. Check that all required connections are connected or enabled.

If any of these are not connected, right click on the icon and select **Connect**.

3. Under 'Other Places', click **My Computer**.
4. Check that the Network Places established for the UNC Folder and License Site are connected.

If these are not connected, right click on the icon and select Open.

5. Select a system, e.g. MSS.
6. Select:
Configuration ▶ Communications ▶ Send Message.

The Edit PCO Sent Text Information dialog is displayed.

7. In the Message To field select an outbound address from the drop down list, enter a message and click **OK**.
8. Go to the system that the message was sent to and select :
Configuration ▶ Communications ▶ Read Messages.

If the message is present then the communication set- up is working.

Database

Database Schemas

The SQL database is partitioned into a number of areas called schemas. Each schema contains tables that can be considered similar in nature.

'UserData' Schema

The tables, fields and constraints in the 'UserData' schema are inferred from the .prtdf file.

These tables contain user maintained data and Preactor makes few assumptions about their structure or content.

'Integration' Schema

These tables are used by the Data Providers module and any associated plug-ins.

'SystemData' Schema

Tables defined in the SystemData schema should not be amended in any way.

Note: The structure and content of these tables may change between releases.

Fixed Schema Views

A number of views have been introduced to the 'SystemData' schemas that map consistently onto fields within the 'UserData' tables. Although the scope for this type of view is limited given the inherent flexibility of Preactor, these views can be very useful, and go some way towards providing a mechanism that will allow common tasks to be performed across a variety of different configurations.

Inferred Database Schema

While some elements of the database schema are fixed (most notable of these is the Calendar schema) for the main part the tables within the database are inferred from the Preactor Table Definition (.prtdf) file. Tables inferred from the .prtdf file are defined in the 'UserData' schema. The configuration file can be amended to add new tables and fields, or to change an existing field.

Referential Integrity

Although **not** currently enabled, foreign key constraints exist in the database for all of the relationships inferred from the Preactor Table Definition File.

These constraints can be used by reporting tools and query generators to show the relationships between tables.

In future versions of Preactor, these constraints may become enabled within the database.

This is currently not practical because of the absence of any referential integrity checks at the core of Preactor. Future versions will probably perform per-row commits, and therefore per-row integrity checks.

System Tables

A collection of tables referred to as "System DB" tables are included into example configurations.

This gives Preactor a place to store the tables used routinely across a number of configurations, and the opportunity to amend and update these tables with new releases of the software. System tables are defined in the database in the 'SystemData' schema.

Planning

Planning Concepts

Introduction

The Preactor AP (Advanced Planner) planner module is the core component in the Preactor AP product.

Preactor AP imports current stocks levels, actual sales and forecast sales. It then considers pack forward figures, target days of stock cover, manufacturing preferences, minimum/maximum re-order quantities, re-order multiples, etc. and accounts for the shelf life of stock to propose a future production plan.

Preactor AP is an interactive capacity constrained MPS generator that can feed its results into the users ERP system and/or their Preactor Ultimate scheduling system. The production plan can be scheduled in Preactor AS (Advanced Scheduler) and then fed back into Preactor AP to show the implication of the actual schedule on the subsequent planning periods. These periods can be re-planned automatically or manually using the grid or via the stock/loading graphs depending on the user's preference.

The planning BoM is also exploded by Preactor AP and the production plan for the lower levels items is calculated in the same way. Based on the BoM explosion and the production plan the proposed material purchase requirements can be exported to e.g. Excel, for action.

Capacity Management

Capacity Management is the function of establishing, measuring, monitoring, and adjusting limits or levels of capacity in order to execute all manufacturing schedules; e.g. the production plan, master production schedule, material requirements plan, and dispatch list. Capacity management is executed at four levels: Resource Requirements Planning, Rough-cut Capacity Planning, Capacity Requirements Planning, and Input/Output Control.

Resource Requirements Planning (RRP) is the most highly aggregated and longest range capacity planning decision. Constraints, changeovers or other fine detail can not be considered at this level.

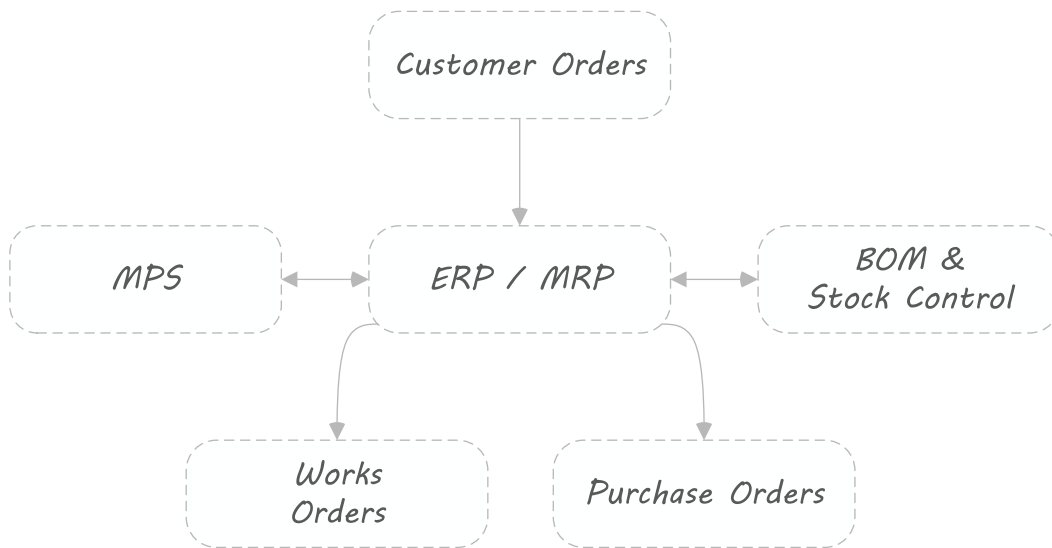
Rough Cut Capacity Planning (RCCP) verifies that sufficient capacity is available to meet the capacity requirements of the Master Production Schedule.

Capacity Requirements Planning (CRP) utilizes time phased material plan information produced by MRP, including information on batch sizes, lead times, receipts and planned orders. It takes into account production capacity in the form of assembly and component inventory and, because Shop Floor Data Collection will typically provide current status for work in progress, work center capacity for current orders needs only to be calculated for the work yet to be completed. CRP links directly into MRP systems and is therefore much more detailed than either RRP or RCCP.

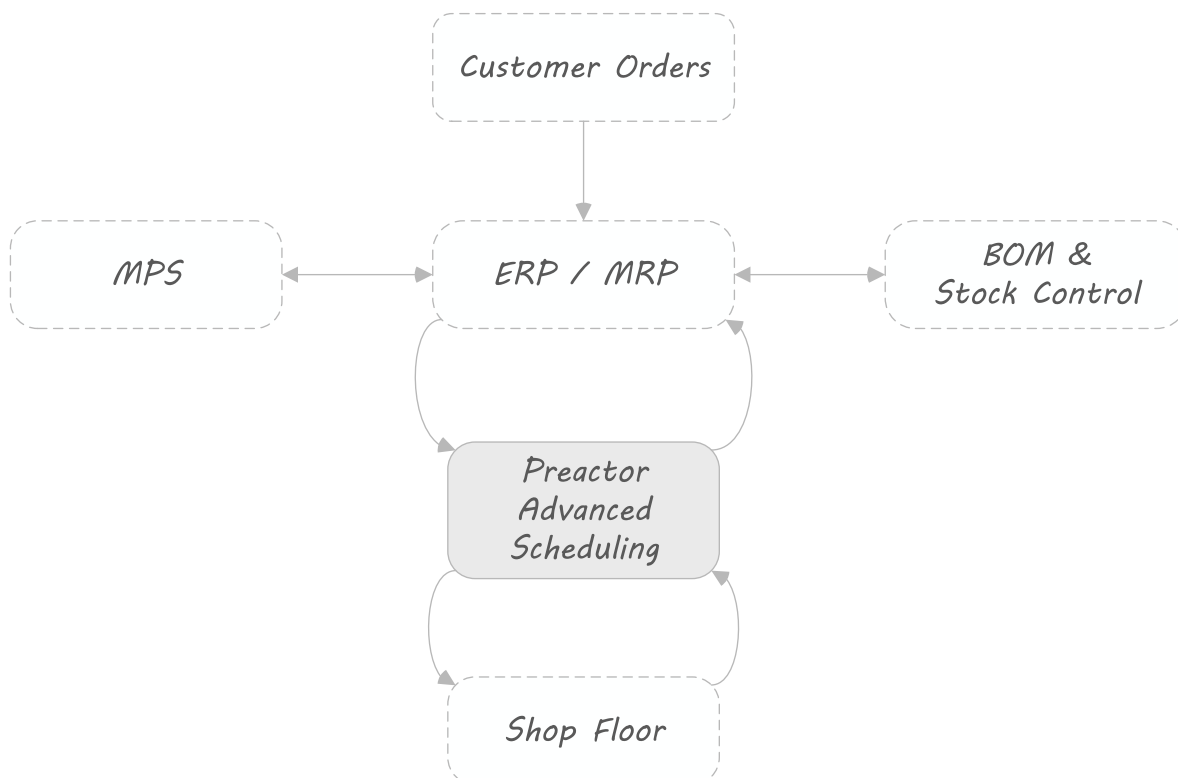
Operating Environment

There follows a typical environment in which Preactor may be located, but Preactor can in fact fit into any manufacturing environment as it is able to take data from existing systems or from the User Interface.

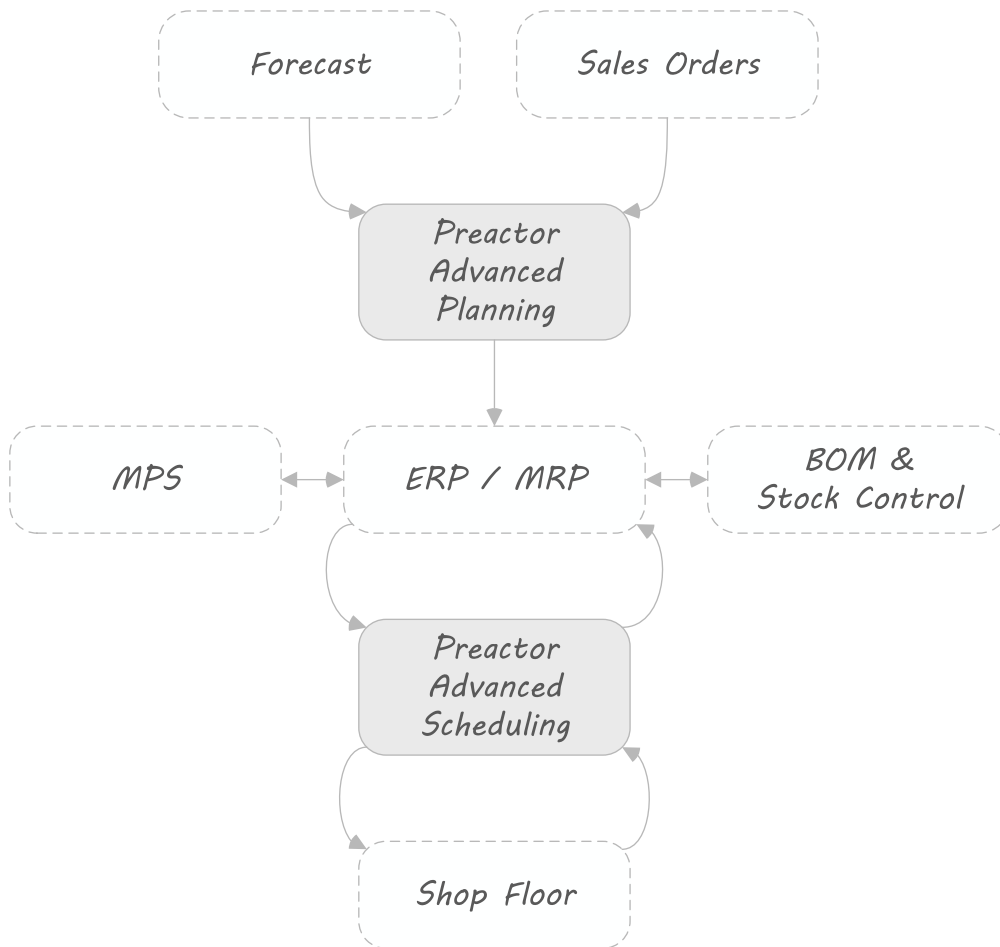
Typical ERP Architecture



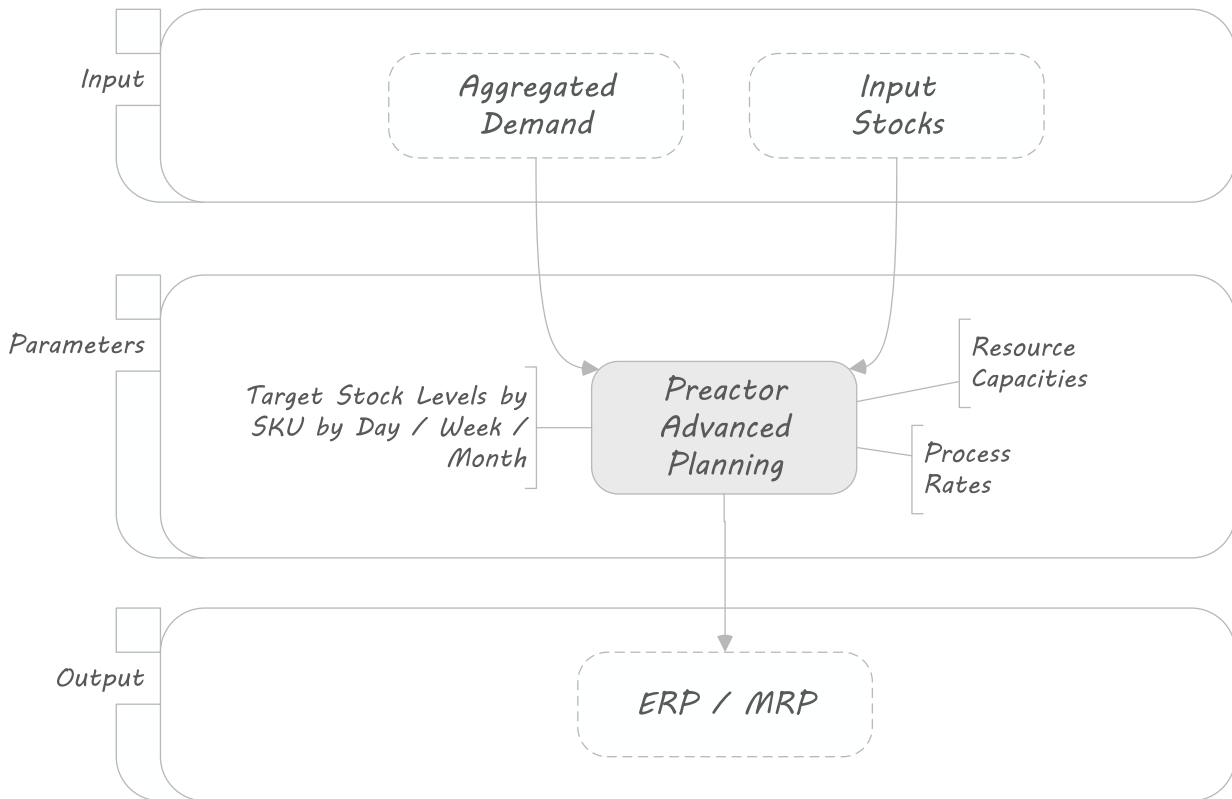
Preactor AS Position



Preactor AP Position



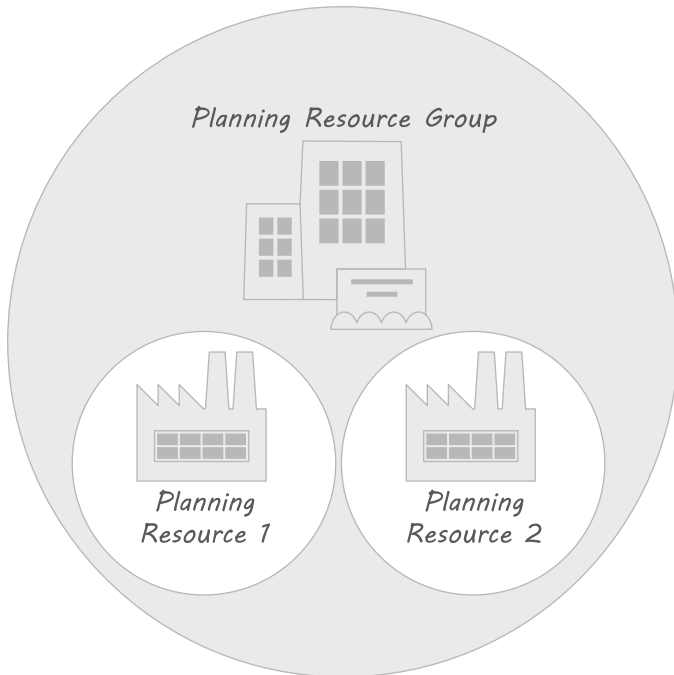
Typical Data Flow



Planning Resource Groups and Planning Resources

Planning Resource Groups are used to group Planning Resources together. For instance a Planning Resource Group may be a whole factory while a Planning Resource will be one area of the factory. Each Planning Resource can have its own capacity level and will contribute to the total capacity of the Planning Resource Group

For Example:



- This Planning Resource Group could be at Company Group Level, but it could simply be a section of the factory.
- This Planning Resource Group contains 2 Planning Resources.
Each one of these could be an individual factory or an individual production line.
- The capacity of a Planning Resource could be made up of the capacity available over a number of production lines in the factory or could be the capacity of an individual production line.
- The total available capacity is the total of the capacity available from each Planning Resource.

If Planning Resource 1 requires additional capacity and Planning Resource 2 has not used the available capacity, Planning Resource 1 can use the remaining available capacity in the Planning Resource Group.

In the below example, consider

- The capacity for each Planning Resource is 6.
- The capacity for the total Planning Resource Group is therefore 12.



MPS Calculation

Make to Stock

Make to stock items are planned forwards. For these items Preactor will calculate an MPS value on the opening date of each planning period from the beginning to the end of the planning horizon.

The trigger for an MPS value to be generated is illustrated with the following pseudo code:

```

If (Opening stock- demand) < Min stock Then
  Volume should be made.
  MPS = Target Stock level - Opening stock + Demand
Else
  No MPS volume is required.
  MPS =0

```

The MPS Value

There are two primary factors that influence the MPS value. These are the minimum and the target stock levels. The basics of the calculation are that if the closing stock for a given item would fall to less than the minimum stock level (assuming no more is produced) then the aim will be to close that bucket with a stock level which is at target.

The target and the minimum stock level are both calculated from the minimum days of cover and the target days of cover fields. These can be either decimal values or whole numbers. The main rule of both of these fields is that neither can be less than zero. However, a value of zero is completely valid for either the minimum or the target days of cover.

There is an option that allows the user to enter absolute values for both the minimum and the target stock level. This is instead of a calculated number.

When the conditions are such that an MPS value is required to maintain an item's stock level, Preactor will generate an MPS value while respecting the minimum order and reorder multiples for the given item. If the trigger happens on a non-make day (as defined in the calendar) then Preactor will test to see if an MPS value of zero will cause the item to go into a negative stock position. The system may be configured to either generate an MPS value that returns the item's stock level to its target stock, or to allow the shortage. See GMPSENABLEMAKEDAYOVERRIDE for further information.

If there are no priorities applied to any stock, then the MPS calculation will not order stock in a specific way, essentially all stock will be sorted in the order in which they appear in the Items table. Essentially, the display of items will appear random.

Make Days

The system is able to use make day and non-make day flags, and so there could be a scenario where there is enough stock to cover the current day but subsequent days which are non-make days will not be covered. There are multiple ways to handle this scenario.

Example 1

Suppose we have day one set as a make day and are making enough stock to stay above the minimum level. This would typically not trigger a make, but if day 2, 3 and 4 are all set as non-make days, and they have sufficient demand on each day to take it into a negative stock position, then the system will automatically search forward and calculate how much additional volume will be required to cover these days. This is only ever going to be enough volume (taking into account order multiples) to cover these days and not enough volume to get you to the target stock level beyond this point (day 4).

Example 2

In this example the make and non-make days are the same as example 1, but we do not have enough stock to cover day 1. This again will search forward add the additional MPS value to the current day but also adding it to the current MPS value required for this period. This will take into account the closing stock position of this period, but again the aim of this is to come out of the other side (when we have another make day) with enough stock to cover that demand. There is no limit to the number of periods forward Preactor will search. It is possible to have four days in a row which are non-make days but the life of the item is only three days. In this scenario the system will not check the item life when generating volume. The make day and non-make days ought to be re-considered to cover this scenario better, as there is a non-make period longer defined that is longer than the item life.

Example 3

Again, the make and non-make days are the same as example 1, but the demand shortages flag is enabled. This means that when the system calculates the MPS value, it will not search forward looking at the subsequent days, and will most probably (due to reorder multiples) close the day with a low stock position. Each subsequent day which is flagged as a non-make day will have an MPS value of zero. The negative closing stock position which results will be reset to 0 each planning period, and the volume missed will be recorded in a column called 'demand shortage'. This is to allow for cases where missed sales cannot be recovered.

Order Multiples

Each time the MPS is calculated the required volume for that period will be validated against the minimum and reorder multiple quantities. Preactor first checks the volume is greater than the minimum, then it will look at the reorder multiples and validate the batch size. There is a relationship between the minimum and the re-order multiple, this means that the minimum re-order quantity has to be a multiple of the re-order multiple value.

Preactor will validate the quantity in these batch sizes and then check to see if by removing a single re-order multiple the closing stock position is still greater than the minimum stock level. This is to prevent constantly rounding up reorder multiples which would take the item over its target level each time. If, by rounding down, the item falls below its minimum stock level, the volume is rounded up.

Decimal places are also taken into consideration when the MPS calculation is made. This is driven from the parameter sets allowing the volume required to be calculated as an integer value for one item and a decimal value for another, in the same plan.

Decimal places are adjusted typically on the lower level items when calculating the MPS. This is due to the finished product level requirement of a lower level item not being a whole value. This is true when, for example, a finished product is made in cases

but the lower level item is made in kilograms. The demand then at this lower level is a decimal value, which is valid because the site would want to know a true number. However, when the calculation is finalized the re-order multiples are still respected to avoid small batches.

Parameter Sets

All the options that are mentioned above specified at item parameter set level.

Make to Order

Make to order items are planned backwards. Preactor will try to keep the lowest stock holding possible while adhering to reorder multiple. The MPS value will be calculated backwards from the end of the planning horizon and will look for demand values. When it finds a value it checks the reorder multiple and works out when it needs to start to produce volume in order to cover the demand. It may be that the reorder multiple is greater than the demand value so Preactor will start to move backwards and check what other demand can be covered by this volume. If Preactor can make the same volume but earlier and cover off additional demand then it will, but will take into account the days of life for that item.

During the process the planning logic will also look at the lead time specified at item level. This means that when adding item life and also lead time, it is important to remember that both will start from the demand date.

Successive MPS Calculation Issue

When the MPS calculation is repeated several times in succession, the set of MPS values that are created from one calculation iteration could sometimes be different from a set produced by previous operations. Despite this rarely occurring, the discrepancies can still happen, for logical reasons, between the first and second iterations of calculating MPS values.

This only occurs when the 'Dynamic BoM' setting is true, and only with any of the following planner modes:

- 'Move',
- 'Move Then Constrain',
- 'Constrain Then Move'.

The main reason for the discrepancy between the first and second calculation iterations is because the second iteration has to take into account the existing MPS, from the first calculation, and how it has been distributed between planning resources. The first iteration calculates the MPS that will generate the MAXIMUM permissible level of closing stock. The second iteration has to take into account that there is existing MPS values, and if there is enough to generate the MINIMUM permissible level of closing stock, no changes to that item will be made. However, if the level falls below the minimum level of closing stock, the calculation will increase the production needed to generate the minimum permissible level of closing stock.

If the 'Infinite Capacity' mode is used, the MPS value is left unchanged between the first and second iterations of MPS calculation, as it will still be the value needed to calculate the maximum closing stock. However, when using a 'Move'/'Move Then Constrain'/'Constrain Then Move' planner mode, some production may be shifted from the primary planning resource to a secondary resource, that can be used to make that item.

With one of the 'Move' planning modes, it can be possible to shift enough production to a secondary resource (or resources) to produce more than the minimum permissible closing stock. If this is the case, in the second iteration the MPS for the main resource is provisionally set to zero, but the MPS for the secondary resource(s) is left unchanged. During the second calculation, the total MPS is checked to see whether it meets the minimum permissible closing stock or not. If this requirement is met, no increase to the MPS is made and the MPS values are left as they are.

Planning Modes

Planning modes alter the way in which capacity is consumed and consequently the make periods for the planned items.

There are five different planning modes:

- Infinite Capacity
- Constrain
- Move
- Move Then Constrain
- Constrain Then Move

The behavior of each planning mode is explained below.

Infinite Capacity

Infinite Capacity planning mode will create plan using only an item's primary planning resource. MPS volumes are not constrained, regardless of available capacity. This can lead to overloading the capacity of a primary resource for any item. Any secondary planning resource will not be considered in this planning mode.

Infinite Capacity is typically used when needing to assess the capacity requirements of the primary planning resource for each item. This mode is the basis for all planning modes in Preactor AP, as all other modes perform subsequent processes based on the data generated from this process.

In Make to Stock (MTS) mode, each item will be planned to meet its target stock level. In Make to Order (MTO), AP will look to make the order as *late* as possible, with *late* being determined as **demand date minus lead time**.

Preactor AP has a trigger that is used for determining whether a production of an item is to be created. This trigger is:

If **(Opening Stock minus demand) < Minimum stock**, then an item should be made.
 Item volume **MPS = Target Stock level - Opening Stock + Demand**
 If **MPS = 0**, no item production is required.

Constrain

Constrain planning mode, like Infinite Capacity, will only plan using an item's primary planning resource and will not utilize any secondary planning resources. It will attempt to "squeeze" down MPS volumes based on the resource's capacity.

Items are ranked by their Days of Cover (DOC), which is calculated for the end of each period or time bucket. Make quantities for items with the longest DOC value will be reduced by **one reorder multiple quantity**. The DOC value for the item will be decreased each time it is reduced. This process is repeated across all items, until the capacity constraint is satisfied. Items that end into a negative stock position based on a reorder multiple will not be reduced any further. This can lead to the capacity being exceeded, even though the plan is constrained.

There are also other reasons why a planning resource could be overloaded:

- The item cannot be made any later (MTS only).
- Making it earlier (MTO mode only) would cause the item to go out of life.
- Item profile is too tight for the demand requirements.
- MTO mode has run out of earlier buckets to plan into.

Move

When using the **Move** planning mode, Preactor will look to spread production over all available resources, based on the capacity constraint. If the total requirement for an item is larger than the capacity of a resource, in a time bucket, then the item will be moved to another planning resource that has available capacity. If required, items can be split over multiple resources to satisfy production.

Similarly to Constrain mode, the items are ranked based on the Days of Cover value calculated for the end of the current period. Preactor will then look at items that have additional resources it can use, and move any overload to the secondary resources. If splitting item production is required, reorder multiple values are considered.

The capacity value of a planning resource is only used to determine if an overload will occur. If there are no other planning resources that an item could move to, due to the fact they are overloaded, then no adjustment will be made to this planning resource.

In summary, no lines will be constrained, but any overload that can be moved for the same bucket will be moved to alternative lines for a 'better' fit in batch order-multiples.

Move Then Constrain

When planning using the **Move Then Constrain** mode, Preactor will look to move production around the available resources (within the same bucket) of the item before it looks to constrain. Production could occur on multiple resources to keep the MPS value as required. If too much production is required across all items and resources then Preactor will look to reduce the MPS value using the constraint logic described earlier.

An item will not be moved to another planning resource if its move is going to cause an overload. This means that when a plan is completed, you may have additional choice planning resources that have a small amount of capacity remaining.

This mode would typically be used when the aim is to spread the MPS value within all the available planning resources, but while trying to make it in the same bucket, e.g. where all the planning choices are within the current factory.

Any overload will be moved over first, and then the line will be constrained so that the capacity consumed fits the available capacity.

Constrain Then Move

When planning using **Constrain The Move** mode, Preactor will look to produce items, mainly on the item's primary resource. If there is not enough capacity to make the required volume after constraining, Preactor will look to use the Move option. If the secondary resource is full it will move to the next resource. If there is no secondary resources that production can move to, because it will become overloaded, then no adjustment will be made.

This is again a combination of the Constrain and Move planning modes. This mode would typically be used when the additional planning resources are at a different location, and therefore the preferred method is to make it in an additional bucket.

The resource will be constrained first and any overload will be moved over to alternative lines.

Flexibility on Dates

Preactor AP can present planning information in such a way to give a long term view while retaining finer 'granularity' for the more immediate dates ([Set Planning Horizon](#)). When a plan is generated, an increasingly courser view can be specified for any future date.

This can be illustrated thus:

Daily							Weekly			Monthly																
M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	Week 2	Week 3	Week 4	Feb	March	April

Alternate Capacity Availability Level and Consumption

Percentage Split

Percentage Split is where the available capacity is specified at the **Capacity Group** level, and then each planning group has to specify (as a percentage) how much of the available capacity it has available as a starting point.

The example below has a capacity group with 4 planning groups associated with it, total capacity 500.

Capacity Group: The capacity available is specified at this level: Capacity available = 500

- Planning Group 1: Capacity available is 20% so therefore the available capacity to this planning group is 20% of 500 = 100
- Planning Group 2: Capacity available is 30% so therefore the available capacity to this planning group is 30% of 500 = 150
- Planning Group 3: Capacity available is 10% so therefore the available capacity to this planning group is 10% of 500 = 50
- Planning Group 4: Capacity available is 40% so therefore the available capacity to this planning group is 40% of 500 = 200

Note: It is important to remember that no test is made to verify that the percentage quantities that are entered do add up to 100%. This is entirely the responsibility of the user entering the data. This would typically be used where the user is happy to define/edit the available capacity at a single point.

Total of Planning Groups

This is where the capacity available is specified at the 'Planning Group' level.

The example below has a capacity group with 4 planning groups associated with it.

Capacity Group: No capacity is specified at this level:

- Planning Group 1 capacity available: 100
- Planning Group 2 capacity available: 150
- Planning Group 3 capacity available: 50
- Planning Group 4 capacity available: 200

The total capacity available to the entire group Capacity Group:

Capacity available: $100 + 150 + 50 + 200 = 500$

How the Capacity is Consumed

Where the Capacity Measure level is specified as 'Percentage Split' or 'Total of Planning Groups' the capacity is used in the following way.

Each planning group has an 'Allocation Sequence' that the user is able to specify a numeric value against. This is then used to rank the planning groups into an order in which the following logic will then be applied. Planning groups must have different numbers or the planning levels logic will apply (see 'How the capacity is consumed – Continued').

In the following example the planning groups allocation sequence fields have the following values:

- Planning Group 1 allocation sequence = 10, Capacity available 100
- Planning Group 2 allocation sequence = 20, Capacity available 150
- Planning Group 3 allocation sequence = 30, Capacity available 50
- Planning Group 4 allocation sequence = 40, Capacity available 400

In these modes the planning groups are processed in the following way. The first planning group is loaded until there are no more requirements for that bucket. If the capacity available is not exceeded then the remaining capacity is made available to all planning groups that follow. But it is important to realize that the next planning group in the sequence has first choice against any available capacity that remained unused from the previous group.

If more capacity than is specified for a planning group is required, then a post process is performed on the items in the planning group.

Planning Groups	Allocation Sequence	Capacity	First Pass – allocated to PG 1	Free for subsequent passes	Second Pass - allocated to PG2	Free for subsequent passes
1	10	100	75	25	25	0
2	20	150	0	150	145	5
3	30	50	0	50	0	50
4	40	200	0	200	0	200

Note: It is important to note that the planning group with the lowest sequence number is processed first. Due to the way spare capacity is re-allocated, it should be the planning group that normally has the most spare capacity to be set to be processed first, i.e. that have the lowest allocation sequence number. The allocation sequence field is classification driven - GMPSPANNINGGROUPELEVEL

The allocation sequence value can also be used to create levels within a capacity group. When used in this way the each level is processed without sharing it’s capacity with another member of the level and any spare is only made available to the next level.

In the following example the planning groups allocation sequence fields have the following values:

- Planning Group 1 allocation sequence = 10 – Level 1
- Planning Group 2 allocation sequence = 10 – Level 1
- Planning Group 3 allocation sequence = 20 – Level 2
- Planning Group 4 allocation sequence = 30 – Level 3

In this mode the planning groups are processed in the following way. The planning groups are sorted into ascending sequence based on allocation sequence number. The first planning group is loaded until there are no more requirements for that bucket. A check is then made to see if the next planning group is the same level. If it is then any available capacity from the previous planning group is saved and not made available to this planning.

If the next planning group is not the same level then any spare capacity is made available to this new level.

There are also flags specified against each planning group to specify if spare capacity can be utilized by another planning group or if spare capacity can be utilized by this planning group. This will allow the planning groups to be setup in more complicated structure.

In the following example the planning groups allocation sequence fields have the following values:

- Planning Group 1 – Level 1,
can share spare production = true,
can use spare production = true
- Planning Group 2 – Level 1,
can share spare production = true,
can use spare production = true

- Planning Group 3 – Level 1,
can share spare production = false,
can use spare production = true
- Planning Group 4 – Level 2,
can share spare production = true,
can use spare production = true
- Planning Group 5 – Level 3,
can share spare production = true,
can use spare production = false
- Planning Group 6 – Level 4,
can share spare production = true,
can use spare production = true

With the data setup in this way, the 3 planning groups on level 1 will all be processed independently. Planning Groups 1 and 2 will then allow any spare capacity to be utilized, but Planning Group 3 will not allow any spare capacity to be utilized.

Planning Group 4 is at level 2. It is allowed to utilize any unused capacity from lower levels. It also allows any unused capacity from either its self or subsidiaries to be utilized.

Planning Group 5 is at level 3. It is not allowed to utilize any spare capacity that is remaining from any lower levels. But any spare capacity that is remaining can be utilized by any further groups.

Planning Group 6 is at level 4. It is allowed to utilize any spare capacity that has been made available. This will include the capacity from Planning Group 4 (level 2) and Planning Group 5 (level 3).

Individually Constrained

This is where the capacity available can be specified at both the 'Capacity Group' level and the 'Planning Group' level. Setup this way, the system will constrain first by each individual planning group and then by the total of all planning groups by the capacity specified at the capacity group level.

The example below has a capacity group with 4 planning groups associated with it.

Capacity Group The capacity available is specified at this level: Capacity available = 400

- Planning Group 1:-Capacity available: 150
- Planning Group 2:-Capacity available: 200
- Planning Group 3:-Capacity available: 250
- Planning Group 4:-Capacity available: 300

Note: When using this method, the capacity available for the planning groups could be more individually, or in total, than the capacity group.

How Individual Capacity is Consumed

Where the Capacity Measure level is specified as 'Individually Constrained' the capacity is used in the following way. Each planning group is first processed as if it were completely independent. Once all the planning groups have been processed (see 'How Planning Groups are Processed') they are then re-processed as a single group.

Note: The allocation sequence value is not used during this process.

First the Planning Groups are processed within their own limits

Then the Capacity Group is processed in the same way.

Group	Capacity	Usage	Spare/ Excess
Planning Group 1	150	120	30
Planning Group 2	200	150	50
Planning Group 3	250	150	100
Planning Group 4	300	210	90
Capacity Group	400	630	-230

Planner Data

Items

The Items table holds information such as Min/Max reorder quantities, Days Life, Rate per Hour and Product Level (e.g. Finished Product, Raw Material etc) for each item. Only items that are marked as 'Include in Planning' are used in the plan.

The Items display in the work pane is like this:

Item Code	Item Desc	Item Attribute 1	Item Attribute 2	Include in Planning	Make to Stock	Planning Resource Group	Capacity UoM
SKU1001	CCB250g	Unspecified	Unspecified	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	UK Plants	Res. Specific Rate
SKU1002	C. C. B. Large	Unspecified	Unspecified	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	UK Plants	Quantity
SKU1003	CCB 700g	Unspecified	Unspecified	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	UK Plants	Quantity
SKU1004	Chefs Carrots 250g	Unspecified	Unspecified	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	UK Plants	Quantity
SKU1005	Carrot Batons	Unspecified	Unspecified	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	UK Plants	Quantity
SKU1006	Green Bean Medley	Unspecified	Unspecified	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	UK Plants	Quantity
SKU1007	Broccoli Florets 225g	Unspecified	Unspecified	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	UK Plants	Quantity
SKU1008	Cauliflower & Broccoli 250g	Unspecified	Unspecified	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	UK Plants	Quantity
SKU1009	Chef's Veg 250g	Unspecified	Unspecified	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	UK Plants	Quantity
SKU1010	Chef's Veg 500g	Unspecified	Unspecified	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Midlands	Quantity
SKU1011	Crunchy Veg Medley 250g	Unspecified	Unspecified	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Midlands	Quantity
SKU1012	Carrot Batons 600g	Unspecified	Unspecified	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Midlands	Quantity
SKU1013	Favourite Five 500g	Unspecified	Unspecified	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Midlands	Quantity
SKU1014	Favourite Five 250g	Unspecified	Unspecified	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Midlands	Quantity
SKU1015	Sweetcorn Wheels	Unspecified	Unspecified	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Midlands	Quantity
SKU1016	Winter Veg'	Unspecified	Unspecified	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Midlands	Quantity
SKU1017	Winter Veg 600g	Unspecified	Unspecified	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Midlands	Quantity
SKU1018	Classic Crudite	Unspecified	Unspecified	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Midlands	Quantity
SKU1019	Casserole Veg'	Unspecified	Unspecified	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Midlands	Quantity
SKU1020	Potato & Asparagus Melt	Unspecified	Unspecified	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Midlands	Quantity
SKU1021	Potato Courgette & Tomato Bake	Unspecified	Unspecified	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Sub Contractor	Quantity
SKU1022	Squash & Potato Bake	Unspecified	Unspecified	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Sub Contractor	Quantity
SKU1023	Trad' Roasting Veg' Medium	Unspecified	Unspecified	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Sub Contractor	Quantity
SKU1024	Beans & Peas with Mint Butter	Unspecified	Unspecified	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Sub Contractor	Quantity
SKU1025	Cauli/Brocc Layer 280g	Unspecified	Unspecified	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Sub Contractor	Quantity
SKU1026	Prepared Sprouts 225g	Unspecified	Unspecified	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Sub Contractor	Quantity

When an item is selected for Edit, the following dialog is opened for provisioning the entry:

Items

Item Code: Planning Resource Group:

Item Desc:

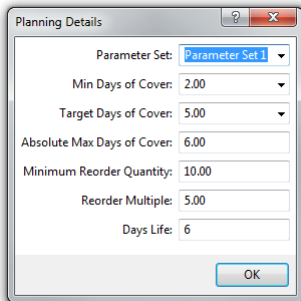
Item Level:

Include in Planning

Make to Stock

Fields of particular note are:

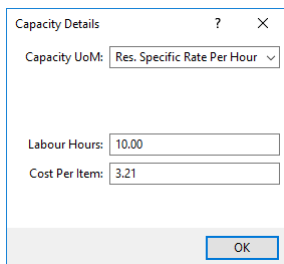
- Item Level - this is set with a custom action Set BoM Levels defined from the BoM structure.
- Item Display Data - plot color and Capacity Sort Order (the order the bars are stacked on the capacity charts).
- Include in Planning - if checked, item will be included in the Planner and all calculations.
- Make to Stock - if checked, Target Days of Cover specifies the capacity constraint process MTS or MTO.
- Planning details, which opens another dialog:



And note here:

- Item Setup Time - time to setup between different products.
- Parameter Set - held against the Parameters Table, associated against the item.

The Capacity Details dialog contains a field of importance, the Labour Hours field. This field is used to calculate the Labour required in the Planner record. Labour Required is Labour Hours multiplied by Rate Per Item.

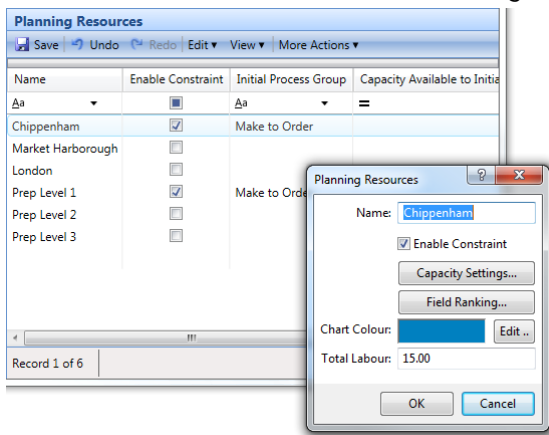


Planning Resources

Planning Resources are assigned to Items so that their capacity can be calculated in smaller areas. Planning Resources need to be set up in the Planning Resources table.

Each Planning Resource is assigned to a Planning Resource Group and will have its own capacity level. To constrain the Planning Resource, check the box 'Enable Constraint'.

The screen shot below is of the Provisioning Planning Resource display in the work pane, with an entry open for edit.



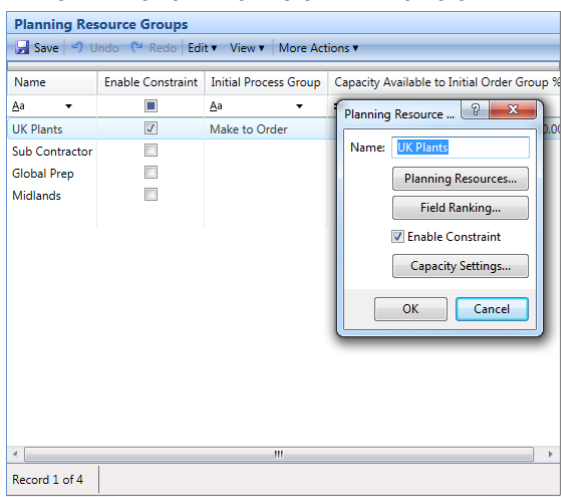
The Planning Resource color can be changed if required. This is the background color that will be used in the Capacity Usage charts.

Total Labour determines the height of the horizontal line in the Labour chart. It isn't affected by Planner calculations.

Planning Resource Groups

As Preactor AP is about capacity planning, some thought needs to be given to how capacity is measured and how it is grouped. "Planning Resource Groups and Planning Resources" on page 142 for guidance.

The screen shot below is of the Provision Planning Resource Group display in the work-pane, with an entry open for edit.



Each Planning Resource Group can be either constrained or unconstrained. To constrain the Planning Resource Group, check the box 'Enable Constraint'. This will also set the Initial Process Group to Make to Order therefore any demand for Make to Order items will be processed within the available capacity first before processing demand for Make to Stock items. The % of capacity available to the Initial Order Group can also be set.

The Field Ranking dialog is available in both the Planning Resources and Planning Resource Groups tables. If there are field rankings enabled for both a Planning Resource and a Planning Resource Group which contains that Planning Resource, then both field ranking are considered when performing Planner calculations. Preactor does not consider the rankings based on priority of them, but instead the order in which the constrain operations are carried out. If, for example, Cost Per Item is set as

the Lowest Value First (LVF) field ranking on a Resource (A), and then as the Highest Value First (HVF) field ranking on a Resource Group that contains Resource (A), Preactor will perform the following:

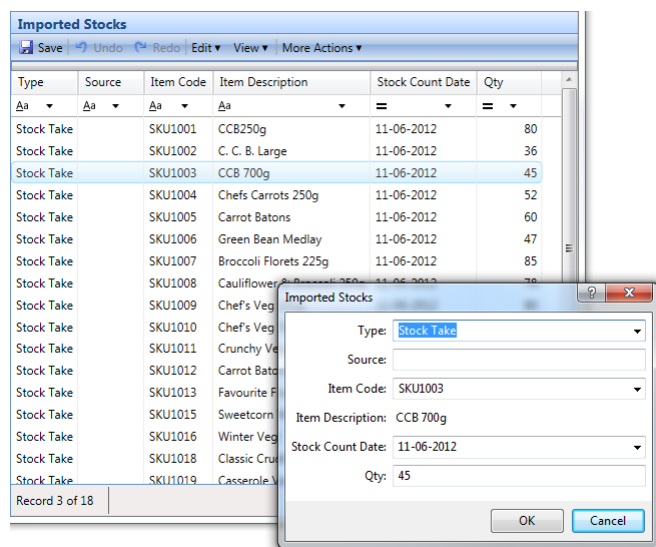
- An operation is performed on each bucket in turn, so two constrain operations are performed for each bucket. One for each field ranking.
- On the first operation, items that are to be processed on Resource (A) will be ranked by Cost Per Item in ascending order (LVF).
- On the second operation, items that are to be processed on any resources within the Resource Group will be ranked by Cost Per Item in descending order (HVF).
- The results of both operations (the new MPS value and capacity usage at Resource and Resource Group level) are then combined and a check is done to ensure that capacity isn't exceeded.

Transaction Data

Preactor AP considers the following as transaction data:

- Stocks
- Sales
- Forecasts
- Capacity Levels
- Variable Days Cover

Below is the Preactor Desktop showing Transaction Data, with Imported Stock information open:



Type	Source	Item Code	Item Description	Stock Count Date	Qty
Stock Take		SKU1001	CCB250g	11-06-2012	80
Stock Take		SKU1002	C. C. B. Large	11-06-2012	36
Stock Take		SKU1003	CCB 700g	11-06-2012	45
Stock Take		SKU1004	Chefs Carrots 250g	11-06-2012	52
Stock Take		SKU1005	Carrot Batons	11-06-2012	60
Stock Take		SKU1006	Green Bean Medlay	11-06-2012	47
Stock Take		SKU1007	Broccoli Florets 225g	11-06-2012	85
Stock Take		SKU1008	Cauliflower	11-06-2012	78
Stock Take		SKU1009	Chef's Veg		
Stock Take		SKU1010	Chef's Veg		
Stock Take		SKU1011	Crunchy Veg		
Stock Take		SKU1012	Carrot Batons		
Stock Take		SKU1013	Favourite F		
Stock Take		SKU1015	Sweetcorn		
Stock Take		SKU1016	Winter Veg		
Stock Take		SKU1018	Classic Cru		
Stock Take		SKU1019	Casserole		

Type	Source	Item Code	Item Description	Stock Count Date	Qty
Stock Take		SKU1003	CCB 700g	11-06-2012	45

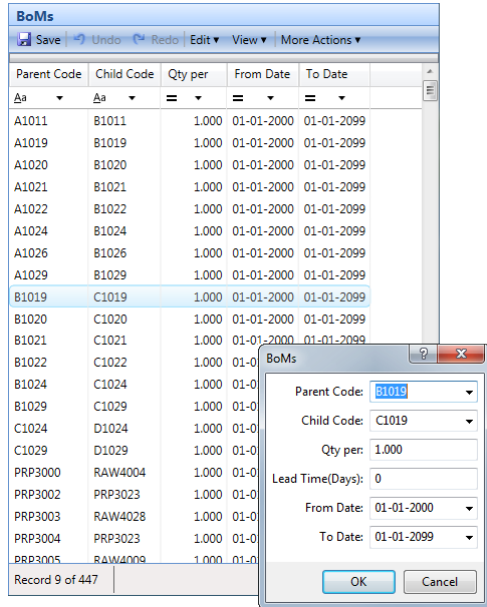
Capacity Levels are set for individual weekdays so that levels can vary throughout the week if required.

The Variable Days of Cover table can be used to override the global settings defined in the Items table for information relating to Minimum Stock, Target Days Cover etc. This is useful in cases where it may be necessary to have different values on a particular date e.g. for promotions etc. This table is used when calculating stock levels. The distinction between Make to Stock and Make to Order items is only significant when production is calculated from these levels.

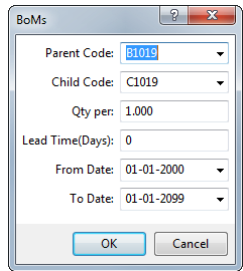
Bill of Materials (BoM)

The Bill of Materials (BoM) tells Preactor AP the different levels of product and quantities of product required for each Finished Product. Using Parent Code and Child Code relationships the material requirement for each order can be calculated and planned by Preactor AP to meet demand dates.

The screen shot below is of the BoM display in the work pane, with an entry open for edit.



Each record shows the Parent Code, Child Code (the next level down), Qty per (how much Child per each Parent) and From and To Dates (when the item is valid for use). There will then be a similar record for the Child Code but the Child Code becomes the Parent Code as in screen shot below.



Products and Routings

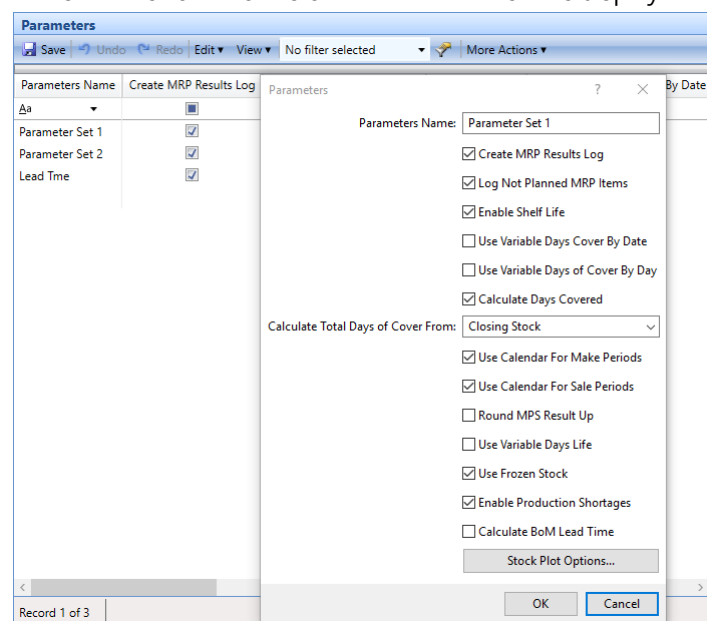
The Products data table includes details of the process route, including each operational step to make the product, the times for each operation, setup times, display information etc.

This information is read when you enter an order for a product in the schedule.

If your system is to be integrated with an MRP/ERP system then it is likely that you will not have this local data table because this information is imported (so called Full Order File Download method).

Parameter Sets

The screen shot below is of the Parameters Sets display in the work-pane, with an entry open for edit.

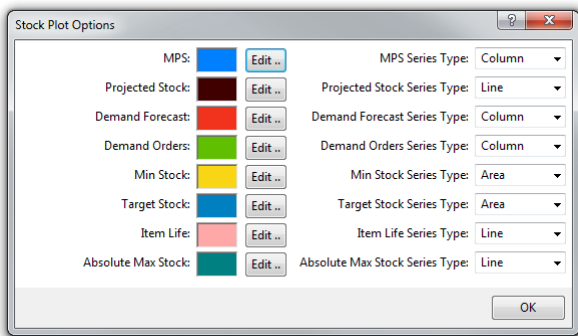


The following options are available:

ENABLE SHELF LIFE	States if the item is to use shelf life to calculate out of life stock and out of life production. If enabled, this field takes the Days Life field into consideration, which unless specified, is considered to be infinite. This affects production calculations and closing stock values.
PARAMETERS TABLE	Identifies if the parameters table exists in the current configuration.
USE VARIABLE DAYS COVER BY DATE/DAY	States if the item is to use variable days of cover with a date or day specified. These determine how Days of Cover records are matched with Planner Records. If DAY is set, the match is between the Planner DAY field and the Variable Days Cover field set in the Variable Days Cover table. If DATE is set, then the match is between the Demand Date specified in the Planner record and the Required Date specified in the Variable Days Cover table.
CALCULATE DAYS COVERED	States if the item is to calculate the total days covered based on the opening or closing stock position.
USE DAY VARIATION	Cover profile specific to day variation.
CREATE MRP RESULTS LOG	Option to create an MRP results log.
LOG NOT PLANNING ITEMS	Option to create the log with non planned items.
USE PRODUCTION MAKE DAY	Use SKU Calendars for production make day planning period.
USE SALES MAKE DAY	Use SKU Calendars for Sales day periods in the planning period.

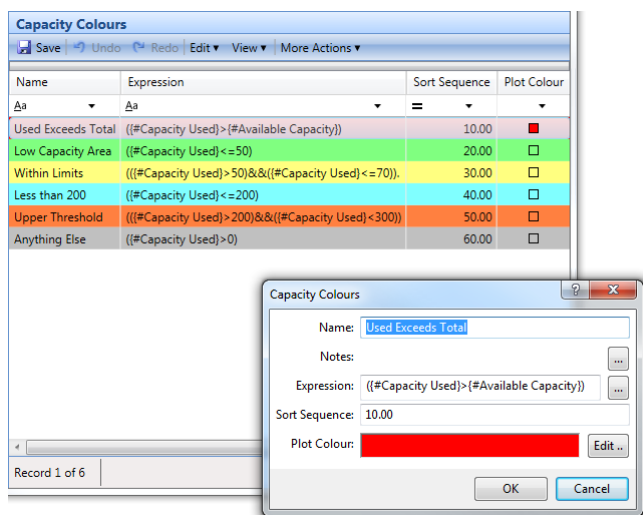
MPS ROUND USE	States if the MPS Result is to be rounded to the nearest re-order multiple.
ADVANCED MAKESTOCK	Use Frozen stock functions in Preactor AP.
VARIABLE DAYS LIFE	Use Variable days of life for the out of life stock calculation.
ENABLE PRODUCTION SHORTAGES	States if production shortages are to be flagged when re-importing scheduled data.
TOTAL DOC REF	States when the total days of cover calculation should start from opening / closing stock.
RESET OPENING FOR FROZEN	Reset opening when adding a frozen stock batch.
USE STATIC STOCK LEVELS	Use static stock levels instead of days of cover.

Selecting Edit against Stock Plot Options produces the plot color selection window:



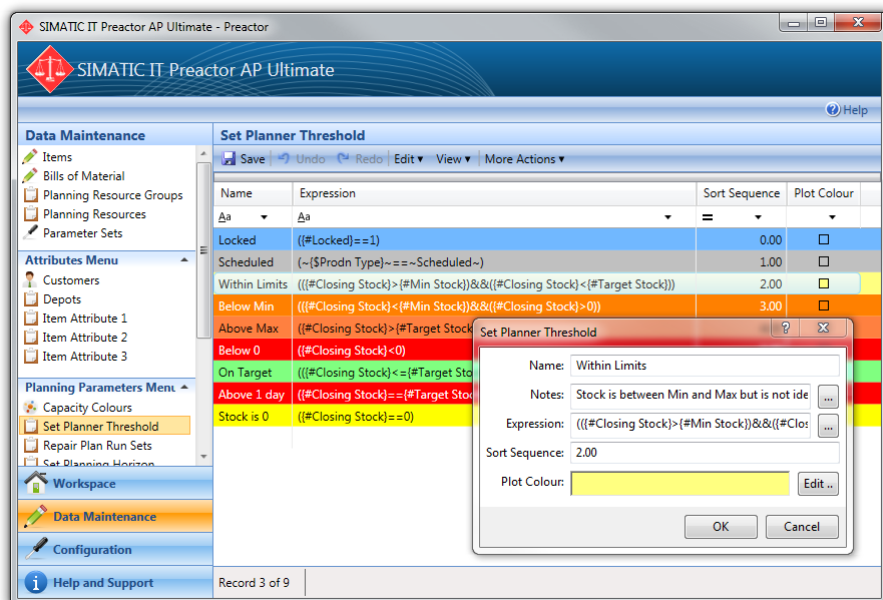
Planning Parameters

Capacity Colors



Planner Thresholds

Colors are used in the Planner to indicate different levels of cover e.g. 'Closing Stock' with a value greater than 'Min Stock' AND less than 'Target Stock' will be colored yellow.



Custom rules can be written in the 'Expression' field. This logic is based on the Demand and Parameters table.

Set Planning Horizon

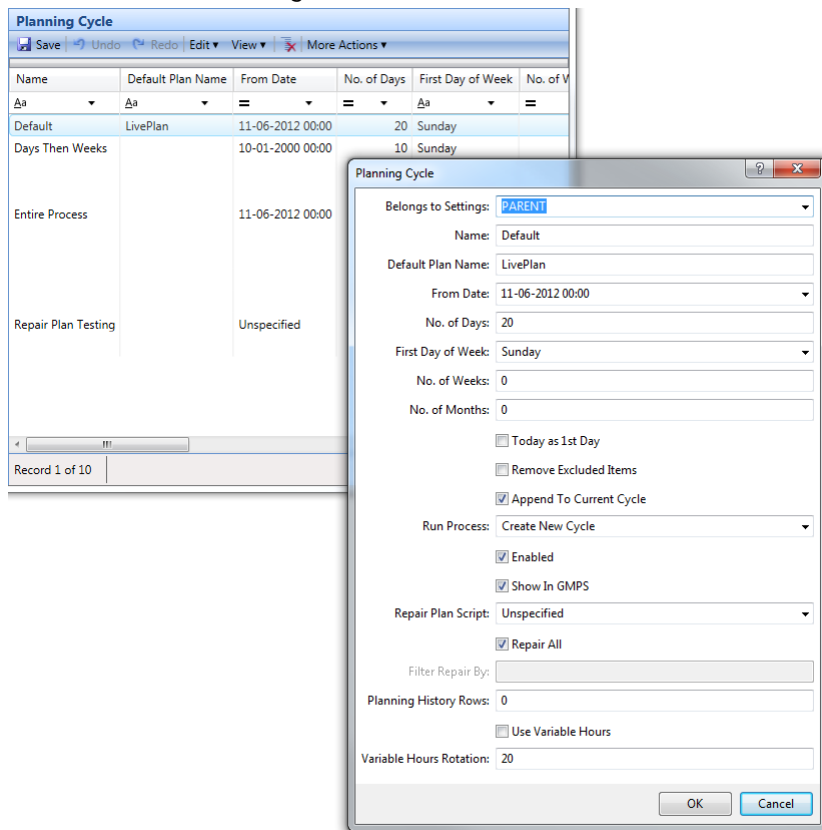
Preactor AP can present planning information in such a way as to give a long term view while retaining finer granularity for the more immediate dates. This is done by provisioning the Planning Horizon.

When a plan is generated, an increasingly courser view can be specified for any future date. A view finer than that for the immediately preceding columns cannot be requested.

If a change in view is required, the whole plan must be re-calculated.

It is of course possible to save different scenarios as different Datasets so as to allow rapid recall of different views.

A number of set Planning Horizons can be created for use within the Planner:



The following fields are of particular note:

- Belongs to Settings - defines the parent Settings, or defines this as a Parent.
- From Date
- No. Of Days
- First Day Of Week
- No. Weeks
- No. Months - These fields define how far in advance to plan.
- Remove Excluded Items - removes items that are unchecked from the planning if amend cycle is selected
- Append to Current Cycle - adds additional records to an existing plan with amend plan option
- Run Process - specifies the function to run controlled from the drop down
- Repair All - repair all rows in planner or select specific row filtering

If NOT SET, Filter Repair By becomes selectable.

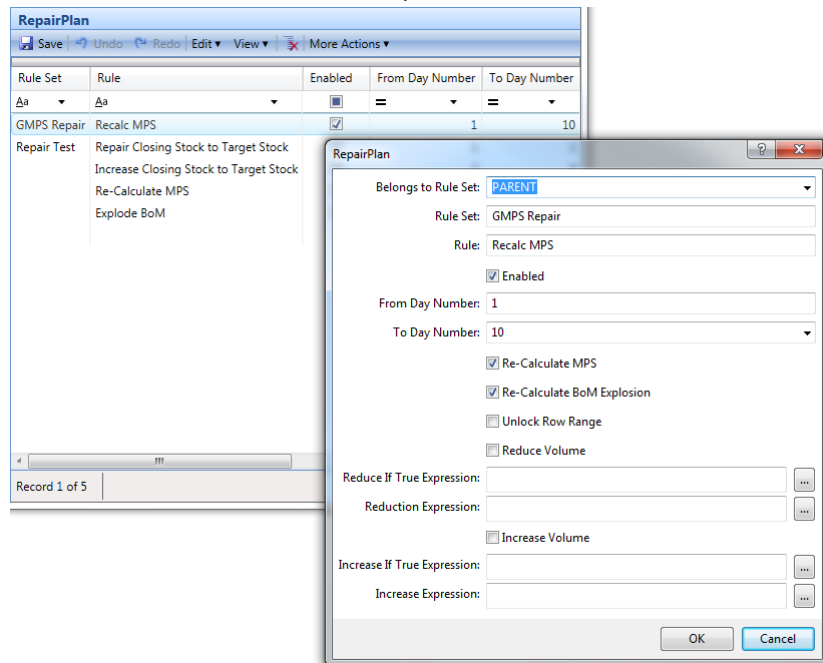
- Planning History Rows - the number of rows from day zero to exclude from the stock calculation

From within the Planner, the particular [Planning Horizon](#) to use can be selected, and can be adjusted as required.

Repair Plan Run Sets

The Repair Plan allows the operator to define repair scripts, which can be manually executed from within the Planner from the Repair toolbar option. A repair may be instigated for example if stocks fall below a certain predefined level.

The screenshot below is of the Repair Plan and its Edit window:



The Repair Plan table contains Rule Sets that can have one or more rules in them. When repairing a plan, Preactor will process the records that fall into the bucket range set against each rule in a Rule Set.

The following fields are of particular note:

- Belongs to Rule Set - name of the Parent Rule Set, or indicates this is a Parent Rule Set.
- From Day Number - day zero is the first day of the plan.
- Re-Calculate MPS - allows the user to make changes without recalculating.
- Re-Calculate BoM Explosion - permits changes in quantity produced based on closing stock levels.
If not set, then Reduce Volume and Increase Volume options become available.

A brief example of how rules in a Rule Set would interact with each other would be:

- If the demand date for a record lies within the date range of a rule, the recalculate flags are consulted, and if either has been checked in the **Repair Plan** dialog, then MPS is recalculated and/or the BoM is exploded.
- If these two options are not checked, then a more refined correction is applied instead, which may result in a small adjustment to the MPD.
- If the **Increase Volume** checkbox is checked, then an **Increase If True Expression** is required to be evaluated for the Planner record. If this expression returns true, then an **Increase** expression is evaluated to obtain a new MPS value.
- The same is said for the **Reduce Volume** checkbox and **Reduce If True** and **Reduction** Expressions.

Preactor Planner

Introduction

This chapter assumes that all data has already been imported into the interim tables.

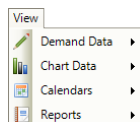
The Planner is the main grid that all data such as Sales, Stocks and Forecasts will be imported into. When Preactor has calculated what product is required to meet demand, the MPS values will also be shown. MPS values can be changed manually, if necessary, in the Planner.

From the Preactor Desktop Workspace Menu, select Generate Plan. When the plan is first opened it will be empty. Either open an existing Dataset (plan) or create a new one.

Planner Main Windows

Introduction

The View menu option provides the following screen:



From this menu option:

- Demand Data provides access to results of the planning, and some associated configuration data.
- Chart Data provides useful information in chart form, the charts being able to be manipulated.
- Calendar Data can be viewed and edited.

Calendars can be setup for:

- Planning Resources
- Planning Resource Groups
- Items

Calendar templates can be built and can be assigned to Planning Resource Groups and/or Planning Resources to define capacity levels.

- Reports can be generated.
The reports list is displayed on the right-hand side of the planner window.
The report settings, e.g. file path, can be set in Settings – Report Options from within the Planner.

Tool Bars

For general Toolbar management and usage, see the section in the [Preactor Tour](#).
















The following tool bars can be enabled/disabled:

- Standard Toolbar
- Global Filter Toolbar
- Repair Plan Toolbar









The Standard Toolbar

The Standard toolbar will have different options depending upon which window is active.




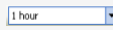
The following are the common set offered on all windows (prior to any user modification of the toolbar customization):

Button	Name	Description
	New	Create a new Dataset
	Open...	Opens an existing Dataset.
	Save	Saves a Dataset
	Amend Plan	Re-runs the Planner, to take into account changes to plan data (e.g. planning horizon)
	Print	Print
	Undo	Undo the last change
	Redo	Redo the last Undo
	Auto Update MPS	Enables automatic value refresh for subsequent records following a manual change
	Calculate Stock	Populates the opening stock column
	Calculate MPS	Populates the MPS results column with the proposed value for the plan.
	Enable Capacity Constraints	Switches on or off the Capacity Constraint if Planning Resource Groups have been setup.
	BoM Exploder	Explodes the records for each SKU to show lower level items as long as they are marked as 'include in planning'.
	Static/Dynamic	When set to Dynamic , the BoM expansion step is executed when Calculate All is performed. When set to Static , no BoM expansion will occur.
	Repair	Provides access to the Repair Plan scripts.
	Hide Child Records	Hide all child records present in the plan.

In addition to the common set, when the **Stock Profile Viewer** (graph) window (prior to any user modification of the toolbar customization) is open, the following is available:




Button	Name	Description
	Code	Select from the drop down list which Item to view in the graph.
	Series	Select from the drop down which sets of data to include in the graph.
	Zoom In	Allows the user to zoom In on graph
	Zoom Out	Allows the user to zoom Out on graph
	Reset Zoom	Resets the view to default after Zoom In or Zoom Out has been used.
	Disable Demand Interaction	Enable/Disable the ability to dynamically change stock or orders by dragging the columns of the graph
	Disable All Interactions	Allows/prevents user from using mouse to drag/drop MPS results thus changing the overall calculations.
	Select Features	Select from the drop down list which features to enable in the graph, e.g. Port Labels, Alert Colors, User Zoom and Disable Interactions.

The following is offered, in addition to the common set, when the **Calendar Templates** window (graph) is open:

Button	Name	Description
	Undo	Undo Calendar Template changes
	Redo	Redo Calendar Template undo actions.
	Add Period	Opens the dialog to add a period to the Calendar Template
	Snap Period To	Allows the user to define the Snap value.





Global Filters

When the **Global Filters** toolbar (prior to any user modification of the toolbar customization) is enabled, the following is available:

Button	Name	Description
	Sync Views	Syncs any filters applied in the Editor window with any other opened window. It has no impact on the Stock Profile Viewer and the Capacity Alerts.
	Bulk Lock Rows	Lock multiple rows prior to recalculating
	Bulk Unlock Rows	Unlock multiple rows

Repair Plan

The following is offered when enabling the **Repair Plan** toolbar (prior to any user modification of the toolbar customization):

Button	Name	Description
	Repair Drop Down	Select from the drop down list which Repair Script to run a repair with.
	Run Repair Script	Runs the Repair Script.
	Repair Rule Set	Select from the drop down list a Rule Set available to run a repair with.
	Repair Plan from Rule	Runs the Repair Plan according to rule selected.

Configuration

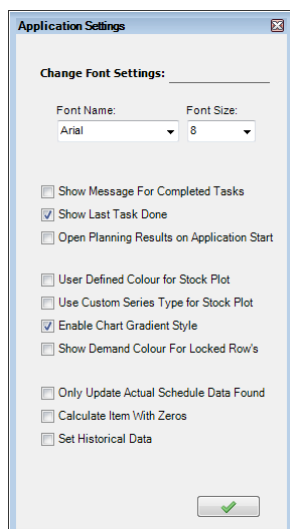
Planner Specific Configuration

Application Settings

The Application Settings window allows various settings can changed or enabled, including:

- Fonts
- Message Displays
- Colors

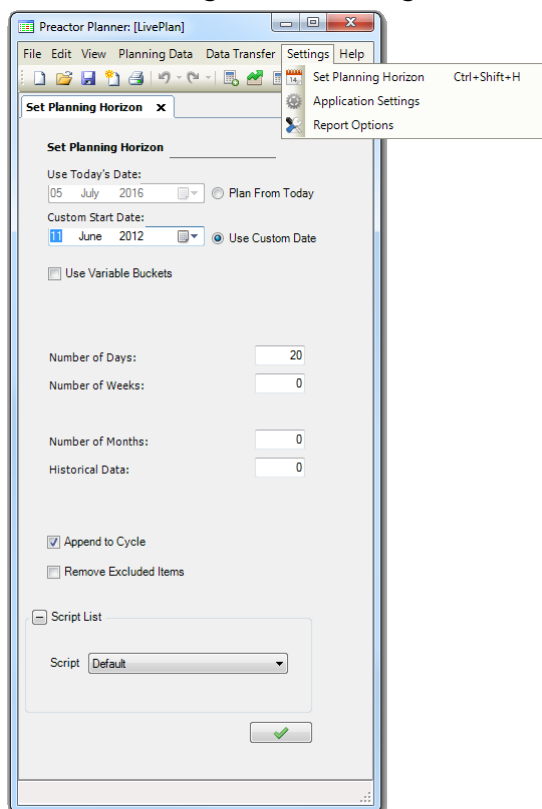
Planner ▶ Settings ▶ Application Settings



Planning Horizon

The Planning Horizons to use for charts is selected from:

Planner ► Settings ► Set Planning Horizons

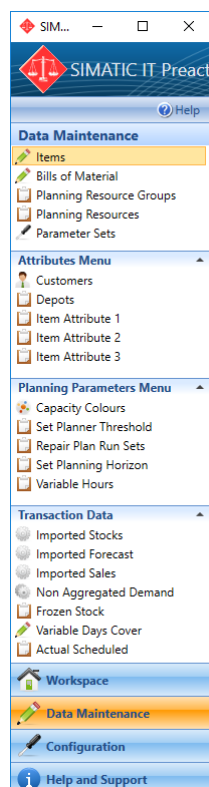


From here, a predefined set of values can be selected under the Script List, and individual values adjusted.

The predefined sets of values are [provisioned](#) from the Preactor Desktop.

Planning Data

Introduction



Most Provisioning and Transaction data can be viewed and edited from within the Preactor AP Desktop Data Maintenance Pane, or imported. Data is in a read-only format if the Planner is open, and can only be edited when the Planner is closed.

Managing the Plan

Amend Plan

Amend Plan performs an update or refresh of the plan after changes are made to provisioning or configuration data within the Planner. It is the same effect as closing and re-opening the planner.

Amend Plan is initiated from either the [toolbar icon](#), or from the menu item:

Planner ▶ File ▶ Amend Plan

Lock Rows

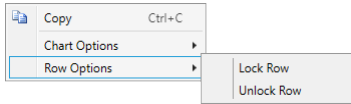
Within the Planner, it is possible to lock records (rows) prior to running any recalculations, allowing for records to retain any MPS value set. Locking rows can be done in one of two ways.

The first is by using the Global Filter toolbar. This toolbar is enabled by navigating to **Edit ► Global Filter**. "Tool Bars" on page 162 provides information about the toolbar.



The lock and unlock buttons, when used, will lock all the records in the plan, or if editor filtering has been applied, the records that are displayed as a result of the filtering will be affected.

In order to lock/unlock individual records, the row that is to be locked must be right-clicked on, and then navigating to **Row Options** will display these options.



If the option **Sync Window with Planner Window** is enabled from the **Sync Views** drop down in the **Global Filter** toolbar, then the Planner Alerts window will be updated to show which records have been locked.

Repair Plan

Description

Repair plan scripts can be used to adjust production figures. The rules can be setup to adjust production figures on specified planning buckets with specified filter criteria. Repair results should always round to the nearest re-order multiple for the item repaired.

Repair Plan Options (**Data Maintenance ► Repair Plan Run Sets**).

Field Descriptions

Field Name	Description
Belongs to Rule set	Specifies if the record is a parent or child record.
Rule Set	The name of the rule set.
Rule	The name of the individual rule for this record.
Enabled	Specifies if the record is enabled as part of the repair rule script.
From Day Number	From bucket that the rule should start to make the repair from.
To Day Number	To bucket that the rule should repair to.
Re-Calculate MPS	Specifies if the production figure should be recalculated for the bucket(s) specified.
Re-Calculate BoM Explosion	Specifies if the bill of material needs to be re-calculated.
Unlock Row Range	Specifies if a records that fall between To and From bucket range need to be unlocked.
Reduce Volume	Specifies if the record should reduce production volumes if the reduce if true expression is met.
Reduce If True Expression	Specifies a preactor evaluate expression that should return true or false in order to reduce production.
Reduction Expression	Uses a preactor evaluate expression to calculate how much the production needs to be reduced by.
Increase Volume	Specifies if the record should increase production figures if the increase if true expression is met.
Increase If True Expression	Specifies a preactor evaluate expression that should return true or false in order to increase production.
Increase Expression	Uses a preactor evaluate expression to calculate how much the production needs to be increased

Field Name	Description
	by.

All examples will use the make to stock example configuration that is shipped with Preactor.

The repair definition called 'Repair Test' will be used in this example.

Reduction Expressions

A reduction expression can be used to reduce the production figure based on the Reduce If True Expression field. The following example highlights how the logic could be applied.

Navigate to the repair plan format (Data Maintenance ► Repair Plan Run Sets):

Rule Set	Rule	Enabled	From Day Number	To Day Number	Re-Calculate MPS	Re-Calculate BoM Explosion	Unlock Row Range	Reduce Volume	Increase Volume
GMPS Repair	Recalc MPS	<input checked="" type="checkbox"/>	1	10	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Repair Test	Repair Closing Stock to Target Stock	<input checked="" type="checkbox"/>	1	1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Increase Closing Stock to Target Stock	<input checked="" type="checkbox"/>	2	3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Re-Calculate MPS	<input checked="" type="checkbox"/>	3	100	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Explode BoM	<input checked="" type="checkbox"/>	0	20	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Double click the first record 'Repair Closing Stock to Target Stock' to display the reduction logic.

The dialog will display the repair reduction rules and in this example if the closing stock is greater than the target stock then the production figure will be reduced for the first planning bucket.

RepairPlan

Belongs to Rule Set: []

Rule Set: Repair Test

Rule: Repair Closing Stock to Target Stock

Enabled

From Day Number: 1

To Day Number: 1

Re-Calculate MPS

Re-Calculate BoM Explosion

Unlock Row Range

Reduce Volume

Reduce If True Expression: ...

Reduction Expression: ...

Increase Volume

Increase If True Expression: ...

Increase Expression: ...

OK Cancel

Testing the result

Open the live plan dataset and manually change the production for SKU1001 11/06/2012 to be 5000.

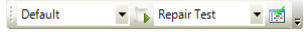
This will increase the closing stock to be over the target stock of 143.

Code	Product	Day	Demand Date	Item Level	Opening Stock	Demand	MPS	Out of Life Total	Closing Stock	Min Stock	Target Stock	Total Days of Cover	Production Make Day	Planning Resource
SKU1001	CCB250g	Monday	11-06-2012	Finished Product	80.00	44.00	5000.00	0.00	5036.00	76.00	143.00	19.00	<input checked="" type="checkbox"/>	Chippenham
SKU1001	CCB250g	Tuesday	12-06-2012	Finished Product	5036.00	44.00	0.00	0.00	4992.00	52.00	99.00	18.00	<input checked="" type="checkbox"/>	Market Harborough
SKU1001	CCB250g	Wednesday	13-06-2012	Finished Product	4992.00	32.00	0.00	0.00	4960.00	50.00	101.00	17.00	<input checked="" type="checkbox"/>	Chippenham
							0.00							Market Harborough

Use the repair plan option to reduce the volume to be equal to or under the target stock.

Repair ▶ Repair Script ListC:\Users\wf0fun\Desktop\Captured_Images\Repair Plan 4.png

Select the Repair Test rule from the drop down list:



Click 'Repair Plan from Rule'.

The following result will highlight how the reduction process has repaired the first bucket for SKU1001.

Code	Product	Day	Demand Date	Item Level	Opening Stock	Demand	MPS	Out of Life Total	Closing Stock	Min Stock	Target Stock	Total Days of Cover	Production Make Day	Planning Resource
SKU1001	CCB250g	Monday	11-06-2012	Finished Product	80.00	44.00	110.00	0.00	146.00	76.00	143.00	6.09	<input checked="" type="checkbox"/>	Chippenham
							0.00							Market Harborough
SKU1001	CCB250g	Tuesday	12-06-2012	Finished Product	146.00	44.00	0.00	0.00	102.00	52.00	99.00	5.09	<input checked="" type="checkbox"/>	Chippenham
							0.00							Market Harborough
SKU1001	CCB250g	Wednesday	13-06-2012	Finished Product	102.00	32.00	35.00	0.00	105.00	50.00	101.00	5.16	<input checked="" type="checkbox"/>	Chippenham
							0.00							Market Harborough

The production figure has been adjusted to 110 and the closing stock recalculated. In this example the closing stock of 146 has exceeded the target stock of 143 this is down to re-order multiple for this item being made in batches of 5 cases.

Increase Expressions

An increase expression can be used to increase the production figure based on the Increase If True Expression field. The following example highlights how the logic could be applied.

Using the Repair Test rule, double click the 'Increase Closing Stock to Target Stock' record:

RepairPlan ? X

Belongs to Rule Set: Repair Test

Rule Set: Repair Test

Rule: Increase Closing Stock to Target Stock

Enabled

From Day Number: 2

To Day Number: 3

Re-Calculate MPS

Re-Calculate BoM Explosion

Unlock Row Range

Reduce Volume

Reduce If True Expression:

Reduction Expression:

Increase Volume

Increase If True Expression:

Increase Expression:

OK Cancel

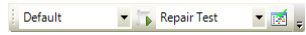
Buckets 2 to 3 should be re-calculated if the closing stock value is less than the target stock for the bucket based on the Increase If True Expression field.

To test this logic open the LivePlan dataset and change the production figure on 11/06/2012 to zero. This will cause 12/06/2012 closing stock to fall negative as no production is made to cover those orders.

Code	Product	Day	Demand Date	Item Level	Opening Stock	Demand	MPS	Out of Life Total	Closing Stock	Min Stock	Target Stock	Total Days of Cover	Production Make Day	Planning Resource
SKU1001	CCB250g	Monday	11-06-2012	Finished Product	80.00	44.00	0.00	0.00	36.00	76.00	143.00	0.82	<input checked="" type="checkbox"/>	Chippenham
SKU1001	CCB250g	Tuesday	12-06-2012	Finished Product	36.00	44.00	0.00	0.00	-8.00	52.00	99.00	0.00	<input checked="" type="checkbox"/>	Market Harborough
SKU1001	CCB250g	Wednesday	13-06-2012	Finished Product	-8.00	32.00	35.00	0.00	-5.00	50.00	101.00	0.00	<input checked="" type="checkbox"/>	Chippenham

Use the repair plan option to increase the volume to be on target stock (Repair ► Repair Script List).

Select the Repair Test rule from the drop down list:



The production figure on the 12/06/2012 will now be increased to meet the target stock. Closing stock is now 102 again exceeding the target stock by 3 cases due to the re-order multiple of 5 for this item.

Code	Product	Day	Demand Date	Item Level	Opening Stock	Demand	MPS	Out of Life Total	Closing Stock	Min Stock	Target Stock	Total Days of Cover	Production Make Day	Planning Resource
SKU1001	CCB250g	Monday	11-06-2012	Finished Product	80.00	44.00	0.00	0.00	36.00	76.00	143.00	0.82	<input checked="" type="checkbox"/>	Chippenham
SKU1001	CCB250g	Tuesday	12-06-2012	Finished Product	36.00	44.00	110.00	0.00	102.00	52.00	99.00	5.09	<input checked="" type="checkbox"/>	Chippenham
SKU1001	CCB250g	Wednesday	13-06-2012	Finished Product	102.00	32.00	35.00	0.00	105.00	50.00	101.00	5.16	<input checked="" type="checkbox"/>	Chippenham

These examples highlight how to use the reduction and increase expression logic independently on separate planning buckets. It is possible to have a combination of a reduction and increase expression on the same bucket to adjust the production figures.

Re-calculate MPS and Re-calculate BoM Explosion Options

The repair rule can also specify MPS and Bill of Material calculations. For example the user could specify that the MPS calculation will only need to run from planning bucket 5 onwards and buckets 1 to 5 shouldn't be re-calculated. If production figures should not be re-calculated those records should be locked using either the right click lock record option or the global filter lock tool (Edit ► Global Filter ► Lock Records in View).

Creating Planning Horizon Repair Script

It is possible to run more than one process using the planning horizon. The following instructions will explain the Entire Process script defined against the planning cycle format. The script runs the following processes:

1. Create a new plan.
2. Calculate Stocks.
3. Calculate Production.
4. Repair the plan using the Repair Test script.
5. Explode Bill of material requirements.

Navigate to Data Maintenance ► Set Planning Horizon:

Name	Default Plan Name	From Date	No. of Days	First Day of Week	No. of Weeks	No. of Months	Today as 1st Day	Remove Excluded Items	Append To Current Cycle	Run Process	Enabled	Show In GMPS	Repair Plan Script
Default	LivePlan	11-06-2012 00:00	20	Sunday	0	0	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Create New Cycle	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Unspecified
Days Then Weeks		10-01-2000 00:00	10	Sunday	2	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Create New Cycle	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Unspecified
										Calculate Stock Levels	<input type="checkbox"/>		Unspecified
										Calculate MPS	<input type="checkbox"/>		Unspecified
Entire Process		11-06-2012 00:00	20	Sunday	0	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Create New Cycle	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Unspecified
										Calculate Stock Levels	<input checked="" type="checkbox"/>		Unspecified
										Calculate MPS	<input type="checkbox"/>		Unspecified
										Repair Plan	<input checked="" type="checkbox"/>		Repair Test
										Explode BoM	<input checked="" type="checkbox"/>		Unspecified
Repair Plan Testing	Unspecified		0	Sunday	0	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Repair Plan	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	GMPS Repair

In the view of information the 'Run Process' field specifies which process to run as part of the script.

If Repair Plan is selected for the Run Process then a Repair Plan Script will need to be selected:

In this example the Repair Test rule will run after production figures have been calculated.

Using these scripts it is possible to run several repair plan scripts in succession. For example the user might have an AM Planning horizon of rules that need to be completed in the morning and a PM Planning script for actions that need to be completed in the evening.

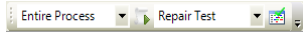
It is also possible to use a Preactor evaluate expression to filter the planner format so that only the filtered records will be repaired.

It is then possible to set which script needs to run in the planner (Settings ► Set Planning Horizon).

Using the script option:

Clicking the New Plan button will then run all associated processes for the 'Entire Process' script.

The planning horizon script 'Entire Process' can also run using Run Repair Script button.



Summary

If a single repair script needs to run for the entire planning board then the 'Repair Plan from Rule' button should be used – highlighted as 'Repair Test' above.

A single or several repair plan scripts need to run in succession with or without filtering then the 'Run Repair Script' button should be used to run the rule.

Datasets

Introduction

The set of data being managed by Preactor AP are stored in Datasets.

Datasets can be stored and opened, and Preactor AP can be configured to open the last worked on Dataset when entering the Planner.

Open Existing Dataset

To Open a Dataset, select:

File ► Open

Select a Dataset from the drop down list and select Open to load the plan.

Create a New Dataset

When a new plan is generated, Preactor will adhere to the date range and bucket size defined in the Set Planning Horizon window. This can be seen in:

Settings ► Set Planning Horizon

In the example shown above the selection begins with Plan From Today. Preactor will create a plan for a period of 14 days, with daily records, starting with today's date.

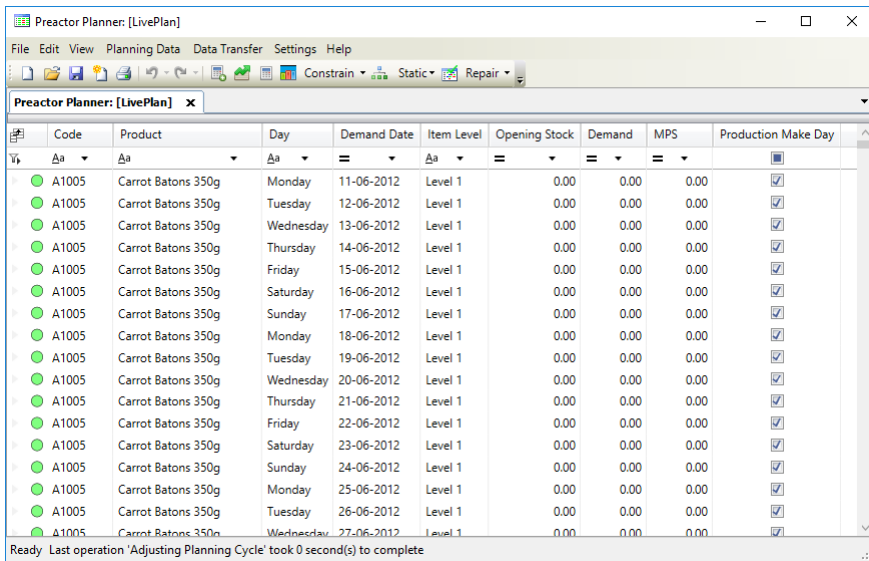
A [predefined](#) set of Planning Horizons can be accessed from the Script drop-down.

Set the Custom Start Date as required. If 'Append to Cycle' is checked the dates will be added to any existing dates (use when updating existing plan). State the Number of Days to be included in the period. If the date range is to include weekly dates, select the First Day of Week from the drop down list and state the Number of Weeks to be created. Select the Green Check Mark to continue.

To generate the structure of the Dataset, go to:

File ► New

A record will be created for each item marked as 'Include in Planning', for each of the dates in the range selected.



Click on Calculate Stock (- Planning Data ▶ Calculate Stock - or default shortcut F2).

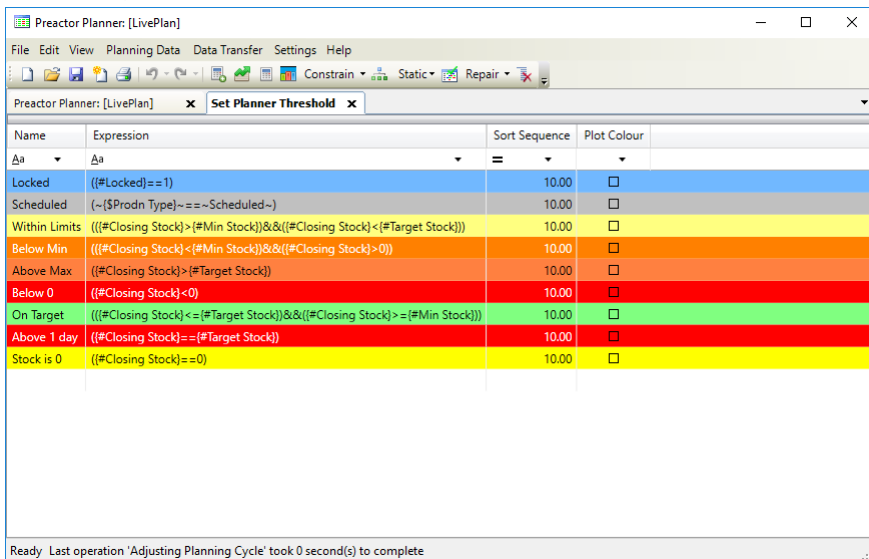
This will bring in all imported stock data into the planner and will show values in the Opening Stocks column.

Before calculating the MPS values decide whether to constrain the plan or not.

If a Constrained plan is required then click on Enable Constraint before clicking on Calculate MPS .

Preactor AP takes into account the planning cycle, the opening stock, the pack forward %, the target days cover, the forecast and the make day for each item and will propose production volume. Calculated values will be displayed in the MPS Results column.

The plan will now display colors depending upon the settings in Set Planner Threshold (View ▶ Demand Data ▶ Set Planner Threshold).



It is possible to manually edit values in the plan. Click in a cell and type the new value. If the 'Auto Update MPS' icon is selected prior to making any manual changes, Preactor AP will automatically refresh values on screen following each change.

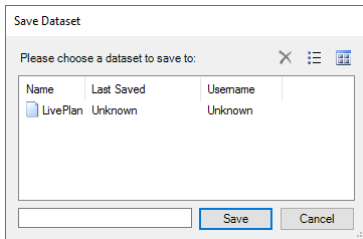
Click on BoM Exploder if lower levels items are also needed to be displayed in the plan.

Any values shown in the Out of Life column indicate that stock of that item will be not be included in calculations from that date. This is based on Days Life values held in the Items table or Out of Life Date as held in the Imported Stocks table.

Save the Dataset ( - File ▶ New - or default shortcut Ctrl+S)

Saving Datasets

Demand results can be saved to the Preactor Database by clicking on the Save icon on the top menu. A pop-up form will display, enter a name for the dataset and click on Save to commit the results to the database. It is possible to save over an existing result set. Select the result set name from the list displayed and click on Save.



Open Last Dataset on Start Up

If the planner should always open up the last plan worked on it is possible to set this up in the Application Settings.

Go to Settings ▶ Application Settings and select Open Planning Results on Application Start by checking the box.

Save the changes and the next time the planner is started the last plan saved will open automatically.

Demand Data

Introduction

The Planner offers a number of outputs to assist in monitoring production, from:

View ▶ Demand Data ▶ ...

This includes:

- View Plan
- View Alerts
- Set Planner Threshold
- MRP Results

Advance options allow Advance Pivot Grid and Day Offset Grid to be selected.

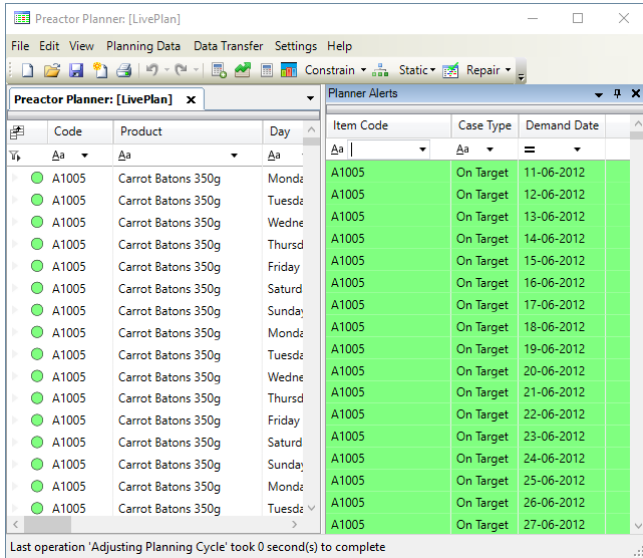
Alerts

Preactor AP has an Alerts window (View ▶ Demand Data ▶ View Alerts) that opens by default on the right-hand side of the planner window and allows the user to filter results. The Alerts window can be docked elsewhere if required.

Data can be filtered by Item Code, Demand Date, and Case Type e.g. Above Max stock, Within Limits etc.

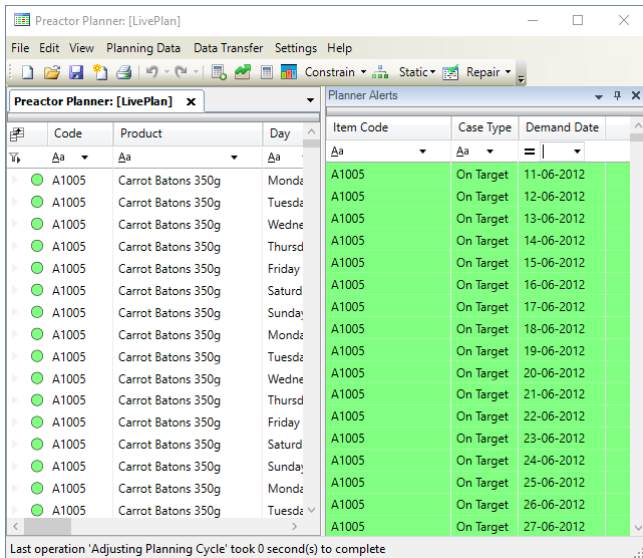
Alerts Filtering - Capacity and Demand

To start filtering, click on the text box below the column name. Type in a value required to match on. Click on Tick:

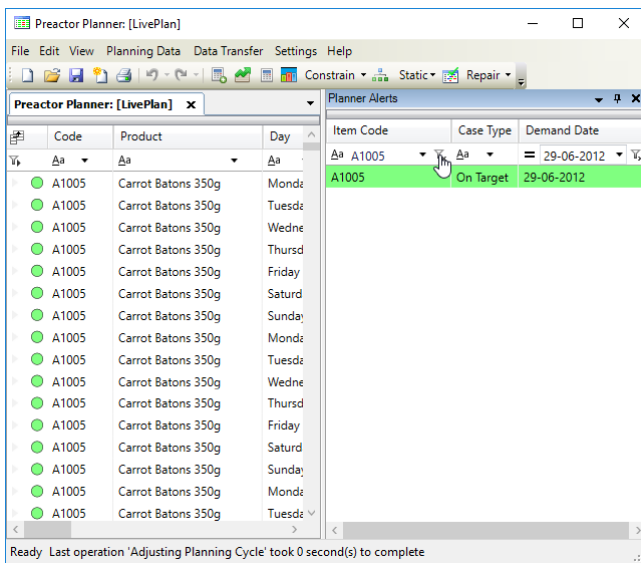


Records in the Alerts window will be filtered to match the criteria.

The Alerts can be filtered further, by e.g. Date. Click on the filter box below the Date column header and either type in a value or select a value from the drop down menu to match on.



To deselect filters, click on the filter-remove button. Do this for all filters. The Alerts window will display all records once again.



Please see Filtering Data / Column Filters for full explanation of filter conditions.

Total Stock Holding

Total stock can be listed in terms of value, pallets, cases etc. These can be used to assess storage volume and value.

Right clicking on an item, chart data, or View Stock profile in the Planner allows the user to see the stock chart for that item. MRP results can be adjusted from here.

Use of Calendars

Introduction

Calendars are used by the Planner and the Sequencer in different ways. This information related specifically to how they are used in the Planner.

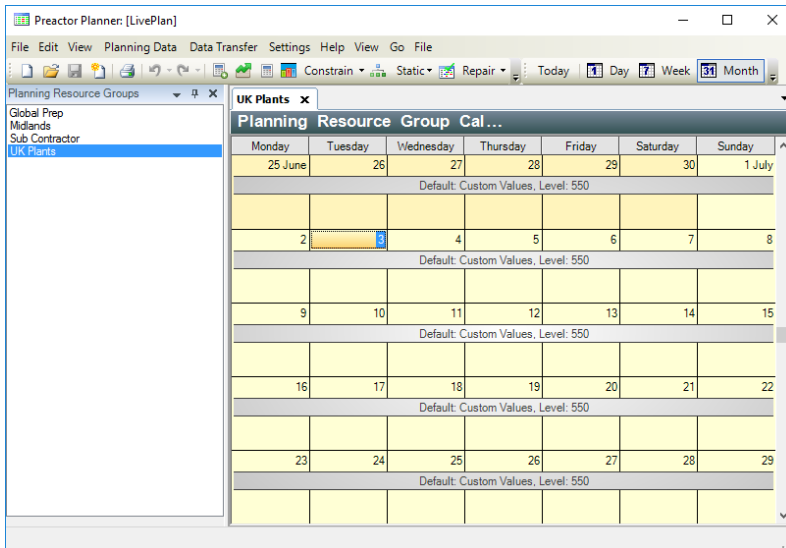
Calendars in the Planner define:

- Capacity level of Planning Resource Groups and Planning Resources.
- Sales and Production Periods for Items.

Planning Resource Groups

The list of Planning Resource Groups is opened by:

Planner ▶ View ▶ Calendars ▶ Planning Resource Groups ▶ Planning Resource Group

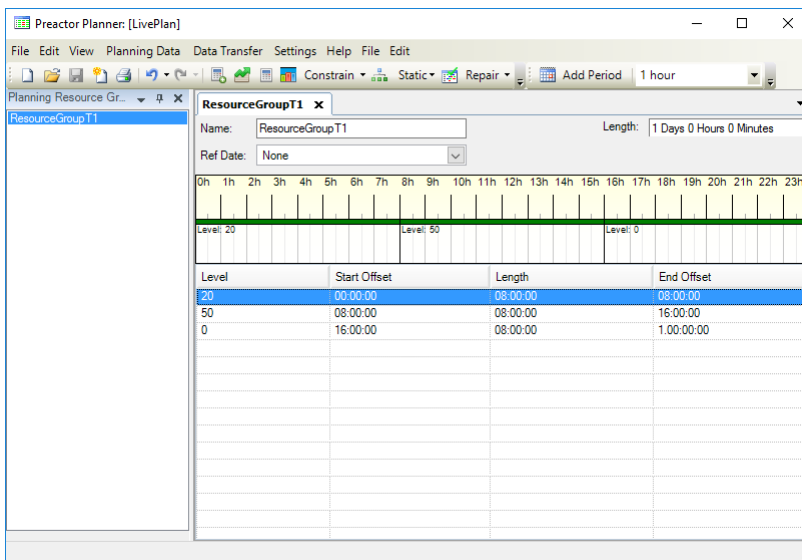


The example above shows the planning resource group UK Plants. The calendar window shows that the template 'Market Harbourough 7 day' is assigned to this planning resource group.

Planning Resource Groups - Templates

Planning Resource Groups Templates can be viewed and edited from:

Planner ► View ► Calendars ► Planning Resource Groups ► Planning Resource Group Templates



Planning Resource Groups templates are assigned to Planning Resource Groups to define capacity levels.

Planning Resource Groups - New Templates

A new Planning Resource Groups template can be created from:

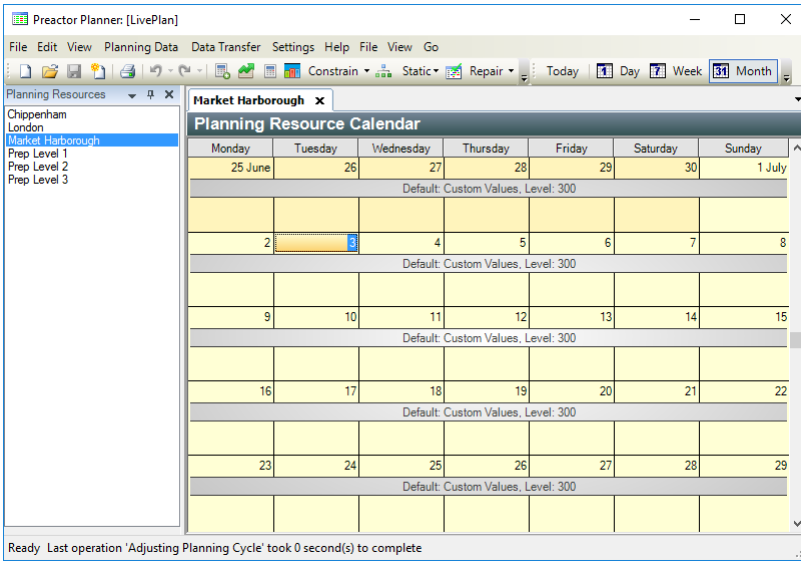
Planner ► View ► Calendars ► Planning Resource Groups ► New Planning Resource Group Template

Planning Resource Groups templates are assigned to Planning Resource Groups to define capacity levels.

Planning Resources

The list of Planning Resource Groups is opened by:

Planner ▶ View ▶ Calendars ▶ Planning Resource Groups ▶ Planning Resource Group

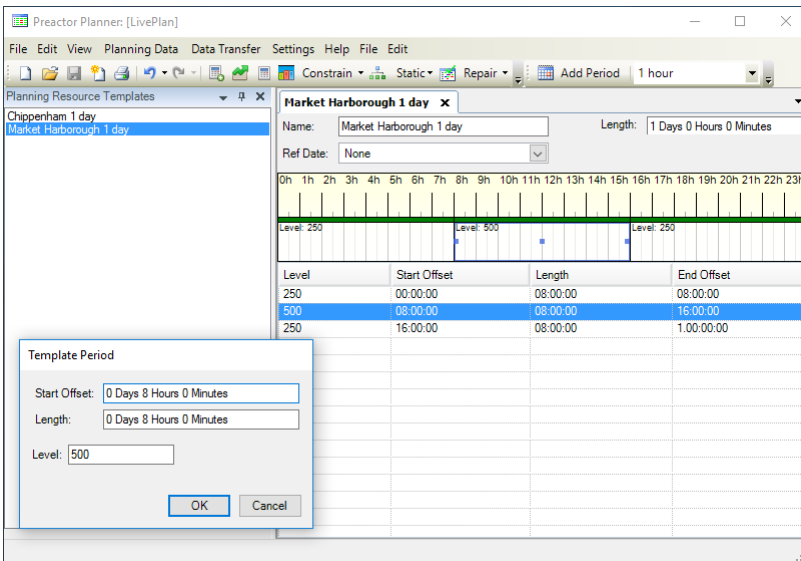


Double clicking on one of the Planning Resources will open a window for that resource's calendar.

Planning Resource - Templates

Planning Resource Templates can be viewed and edited from:

Planner ▶ View ▶ Calendars ▶ Planning Resource ▶ Planning Resource Templates



Changes made to existing templates will affect all Planning Resources that have the template assigned to them.

Planning Resource templates are assigned to Planning Resource to define capacity levels.

Planning Resource - New Templates

A new Planning Resource Groups template can be created from:

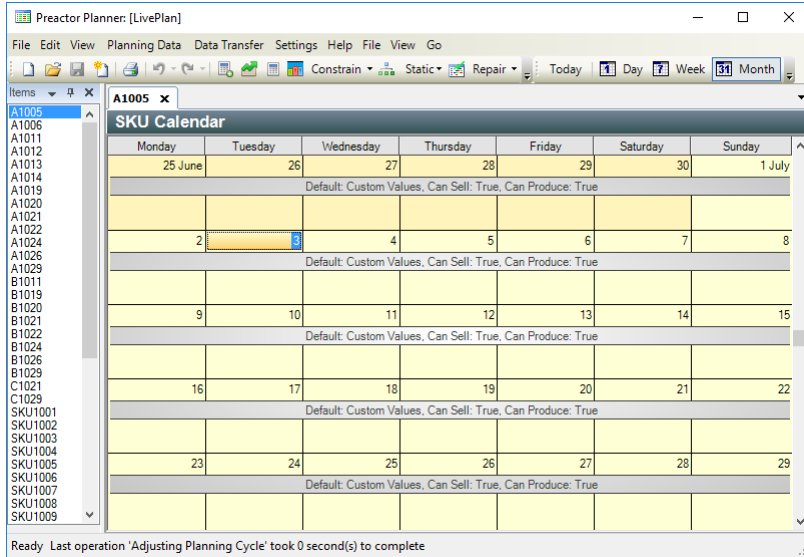
Planner ▶ View ▶ Calendars ▶ Planning Resource ▶ New Planning Resource Template

Planning Resource templates are assigned to Planning Resource Groups to define capacity levels.

Item Resources

The list of Planning Resource Groups is opened by:

Planner ► View ► Calendars ► Items ► Item Resources

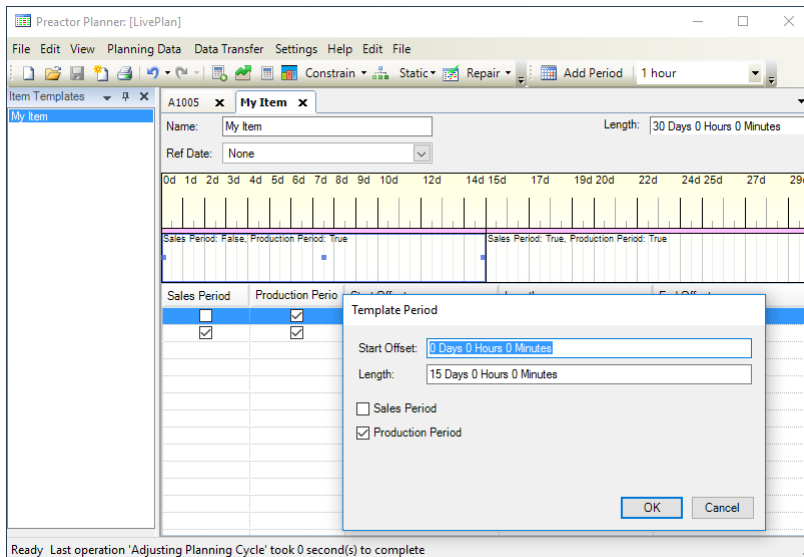


Double clicking on one of the Item Resources will open a window for that resource's calendar.

Item Resource Templates

Item Resource Templates can be viewed and edited from:

Planner ► View ► Calendars ► Items ► Item Templates



Changes made to existing templates will affect all Items that have the template assigned to them.

Item Resource templates are assigned to items to define their sales and production periods.

Item Resource - New Templates

A new Item Resource template can be created from:

Planner ▶ View ▶ Calendars ▶ Items ▶ New Item Templates

Item Resource templates are assigned to Items to define their sales and production periods.

Charts

Capacity Usage

Capacity Usage can be shown by:

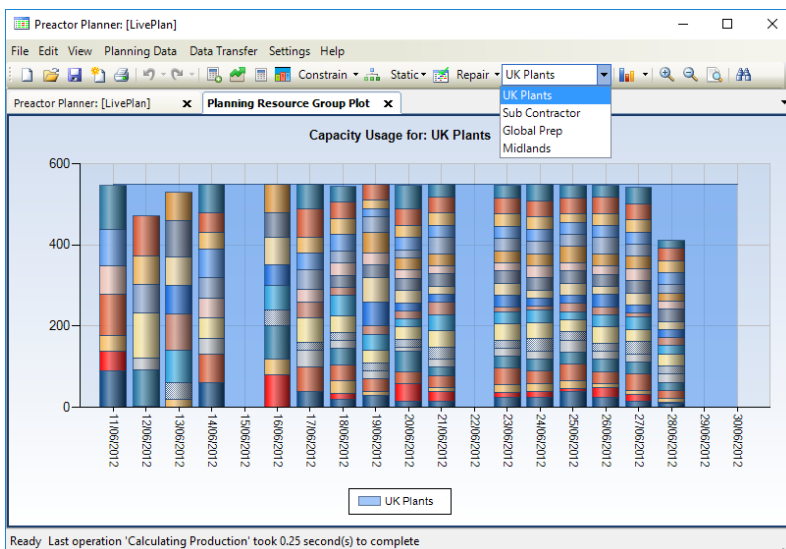
- Planning Resources Plot
- Planning Resource Group Plot
- Planning Resource Multi Plot.

To open the window, select:

View ▶ Chart Data ▶ Capacity Usage ▶ [selected display type].

The capacity chart illustrates the production volumes, over available capacity.

Capacity is represented by the colored background area and the production volumes are represented by the colored blocks in the upright columns.



Production values can be modified by left clicking on a colored block and dragging that block up or down. The actual value will be displayed during the process. Production can also be dragged from one date to another by left clicking on a colored block and dragging the block to another date. Any changes made to production date or value in the chart will automatically update the Planner.

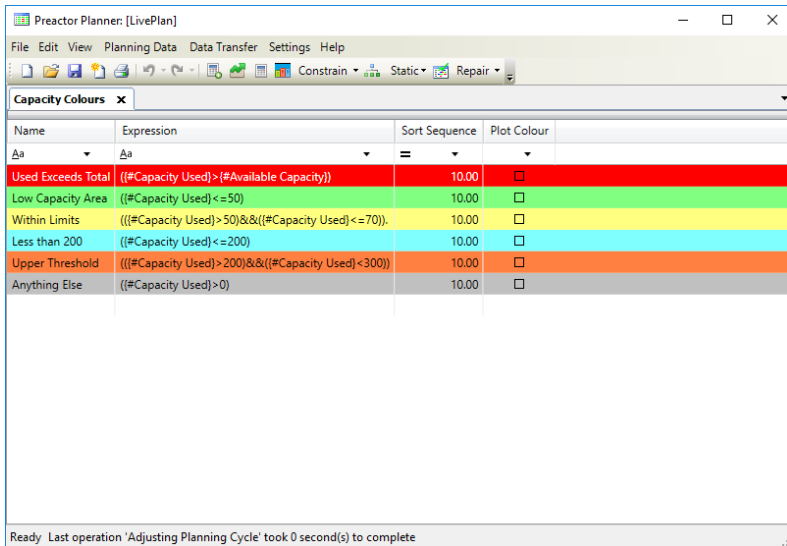
To view a different Capacity Group, select it from the drop down menu.

Capacity Colors

To open the Capacity Colors window, select:

View ▶ Chart Data ▶ Capacity Usage ▶ Capacity Colors

This displays the Capacity Colors table as described in Provisioning Data – Planner Data – Planning Parameters – Capacity Colors. Only the colors selection can be edited from here. Double click a record to open the color edit window.

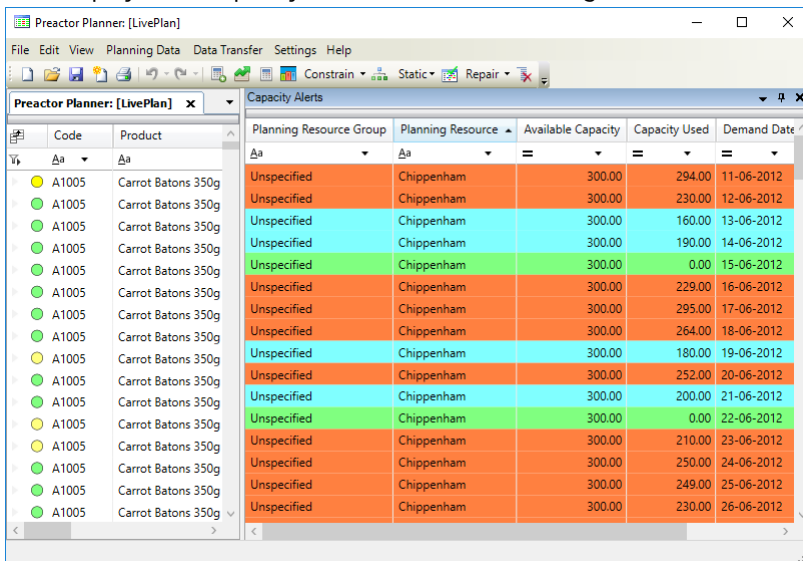


Capacity Alerts

To open the Capacity Colors window, select:

View ► Chart Data ► Capacity Usage ► Capacity Alerts

This displays the Capacity Alerts Window on the right-hand side of the planner.



Use the column filters to filter the records in the Capacity Alerts Window that match the criteria.

BoM Pie Chart

This shows items in the top level BoM.

Charts - Analyzing the Plan

Introduction

The Planner offers a number of outputs for analyzing the plan, from:

View ► Chart Data ► ...

This includes:

- [Capacity Usage](#)
- [Stock Profile Viewer](#)
- [Total Stock Holding](#)
- [BoM Pie Chart](#)

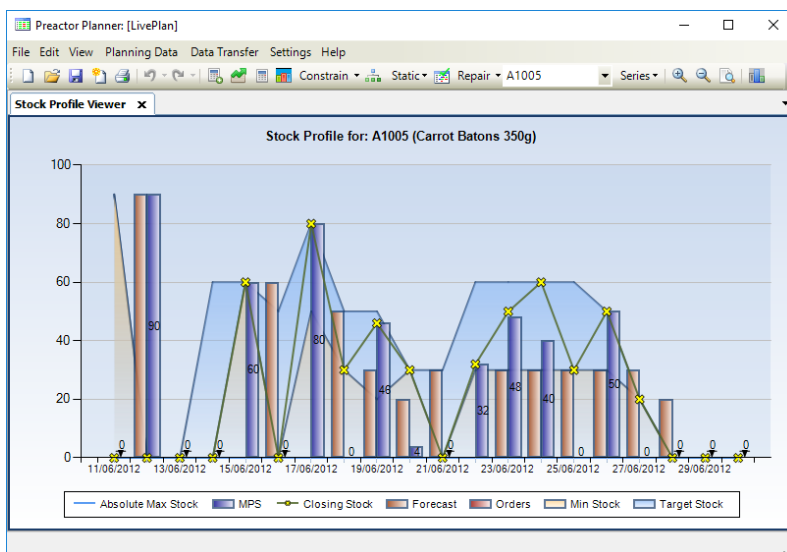
Stock Profile Viewer

All Demand Results are represented on the Stock Profile Viewer. This can be accessed by:

- View ▶ Chart Data ▶ Stock Profile Viewer
- select an Item from the Drop Down box in the Toolbar

or

From the Demand window, right-click on a record and select Chart Data ▶ View Stock Profile.



The Stock Profile can display a number of possible series, selectable from the Toolbar):

- **MPS Result**
The proposed production required for the specific day. A zero MPS Value is represented by an upward arrow.
- **Projected Stock**
The Projected Stock Level of the item for each day.
- **Forecast**
The total quantity for forecasts for the date
- **Orders**
The total quantity for orders for the date.
- **Min Stock**
The Minimum Stock Holding required for the item for each day
- **Target Stock**
The ideal stock holding required for the item for each day

The plan can be modified by dragging the MPS Result columns in the chart to a different value. Right click on one of the purple columns and hold and drag the column up or down to the new value. Switch on Point Labels to see the actual value. Any changes made in the Stock Profile chart will automatically modify the corresponding value in the Planner.

The MPS Result value can be adjusted from a zero value by left clicking on the Point Label (0) and dragging upwards.

It is possible to switch to a chart for another item by using the Stock Profile drop down list. As soon as another item is selected the graph will change to display relevant data for that item.

Once there is valid data for a graph of stock profile (calculate stock, then calculate MPS, then look at stock profile), the ability to dynamically change stock or orders by dragging the columns of the graph can be disabled.

Reports

Planner Reports

See also [Report Generation](#) for help in generating the reports, and [Report Reading](#) on how to read and navigate the report output. Note - many reports have Drill Down reports available.

Planner Reports generally include the following:

- Below Minimum Stock
For each item, shows description, demand date; closing and minimum stocks.
- Greater than Maximum Stock
For each item and demand date, shows: closing and maximum stocks.
- All Capacity
For each capacity group, gives capacity used and % by date.
- Capacity by Planning Group by Date
For each date, lists capacity used and % for each PG.
- Demand
- Items
For each Item -
 - Unit of measure,
 - Item level,
 - Include in planning?,
 - Maximum and target days of cover,
 - Minimum and maximum reorder quantity,
 - Reorder multiple,
 - Capacity and planning group names,
- Out of Life
For each item, demand date, out of life stock, product and total.
- Plan Comparison
Side-by-side comparison of production and total days cover by date for two selectable saved Datasets.
- Imported Sales
For each item, shows order date and quantity.
- Imported Stocks
For each item, shows; quantity, production and out of life dates.
- All Orders
- Days Cover by Item

- total days Cover Outside Limits
- Total Days Cover

Quick Reference

What	How
Item Plot Color in Planner Capacity Plot	From the Preactor Desktop: Data Maintenance ▶ Items ▶ Double click Item ▶ Item Display Data
Item Sort Order in Planner Capacity Plot	Preactor Desktop: ▶ Data Maintenance ▶ Items (Double click Item) ▶ Item Display Data
Columns Within the Planner it is possible to hide/unhide columns to achieve a different view of the data.	Toolbar icon 
Demand Color Enable/Disable	Toolbar icon 
Planner Threshold Provisioning - Which colors to/are used to indicate different stock levels	To provision/view: Preactor Desktop: Data Maintenance ▶ Set Planner Threshold To View: from within the Planner: View ▶ Demand Data ▶ Set Planner Threshold.
Messages - Completed Tasks, Enable/Disable	Settings ▶ Application Settings - Show Messages for Completed Tasks.
Messages - Show Last Task Enable/Disable It puts a message on bottom left hand side of planner window after updates etc and gives time to run that action.	Settings ▶ Application Settings ▶ Show Last Task Done
Planning Group Colors	Preactor Desktop: ▶ Data Maintenance ▶ Items (Double click Item) ▶ Item Display Data
Stock Profile Chart - Enable/Disable Data Selection	Toolbar Icon  and select the required data to be displayed.
Stock Profile Chart Colors The colors have to be defined, then the colors have to be enabled	To Define the Colors: From the Preactor Desktop: Data Maintenance ▶ Parameters - Edit the Stock Plot Options for that Parameter. To Enable The colors Within the Planner: Settings ▶ Application Settings - Check 'Use Custom Color For Stock Plot
Toolbar - Toolbar ScreenTips Enable/Disable	Right click on Toolbar Area, select Customize. ▶ Select Options

Scheduling

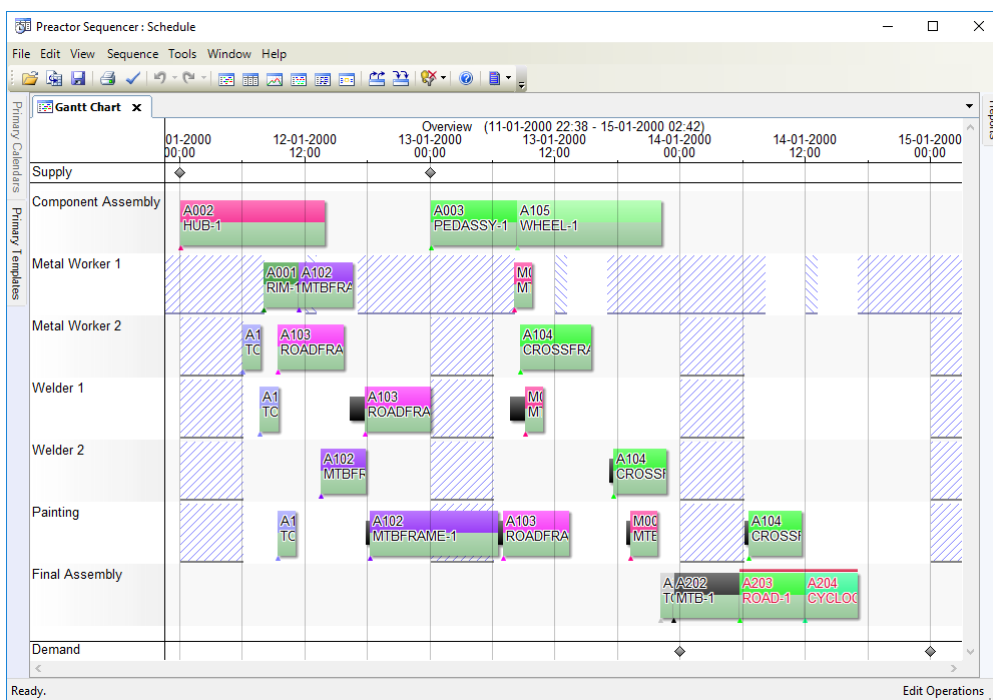
Preactor Sequencer

Introduction

The Sequencer is the heart of the scheduling system and contains the Calendar Editor, Schedule Gantt Chart, Editor, Plots, Trace Chart, and Utilization windows. It establishes the shift calendar patterns for both primary and secondary resources, provides automatic and manual scheduling functions and carries out all finite capacity calculations.

To enter the Sequencer

- From the Workspace Navigation pane in the Preactor Desktop, select General (in the Active Pane) and select the Generate Schedule button. The Sequencer opens displaying its Gantt Chart window:



To open additional tabbed windows in the Sequencer

- Select a window from the View menu option (Gantt Chart, Overview, Plot, Trace Chart, Utilization, or Material Explorer windows)
- Select the window from the toolbar

Menu Bars and Toolbars

Selecting any Menu Bar commands displays a sub menu showing the options available under each one. The options available under each menu are context sensitive, based on which of the sequencer windows is focused.

Toolbars too are context sensitive, depending on the view that has focus. Here the Standard toolbar is displayed but you can right click on the bar to activate other toolbars.

Window Display

The Sequencer uses two types of window display, "Docking" windows and "Tabbed" windows.

Calendars and Reports are presented at the edges of the screen as hidden docking windows that are displayed when the appropriate tab is clicked. Unscheduled Operations appear in a docked panel on the left of the screen.



To provide more screen area for the sequencer display the Unscheduled Operations panel can also be presented as a hidden window, by clicking on the Auto Hide pin in the top right of the panel.

Tabbed windows are only presented if the "Tabbed" option is selected in Window menu bar command.

Window Layout

- The Sequencer's window display (workspace) can be rearranged to suit your own requirements, and is normally lost when exiting the Sequencer.
- The workspace can be saved (as a named workspace) and loaded for future use, or set to be saved on exit of the sequencer and re-used when entering the sequencer in future - using the Window ▶ Workspaces menu options.

Window Fonts

- The fonts for the text in a number of windows (Gantt Chart, Plots, Trace Chart) can be modified from the menu item: Tools ▶ Options ▶ Environment.

Concepts

Scheduling Algorithms

Production Scheduling Algorithms

All Preactor scheduling products can use the sequential or order at a time scheduling method, found in FCS systems. Here, each order, is loaded in sequence, dependent on due date, priority etc and operations are loaded forward, backward or bi-directionally.

Additionally, APS allows you to use the parallel loading method, where, as each resource becomes free, operations are selected from the queues of work waiting to be processed, using industry standard [dispatching rules](#).

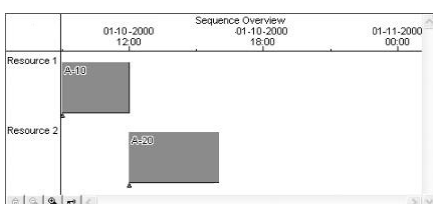
For example, you may want to minimize setup times by selecting operations in a particular color sequence. A look-ahead period can be defined to decide which operations should be pulled forward in order to minimize setups when generating the schedule.

An example of sequence dependant changeovers can be seen on the Preactor web site.

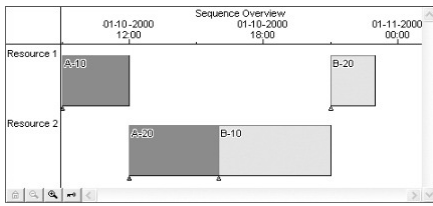
Algorithmic Sequencing

The sequencer uses an algorithm to select an order and places each operation for that order on the planning board. It repeats this process until all orders (and therefore, all operations) have been loaded.

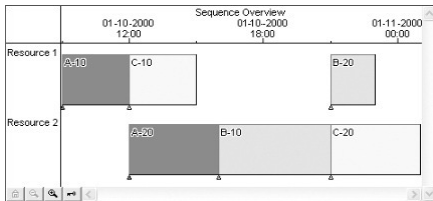
Each operation is loaded on its specified resource at the first available time slot that satisfies the constraints for that operation. The order-at-a-time construction process, sometimes called Order Based Method or Sequential Loading, is shown in the following diagrams. In this example, we first load Order A, then Order B, and finally, Order C.



Step 1: Load Order A



Step 2: Load Order B



Step 3: Load Order C

In an order-at-a-time sequencer, selecting the sequence in which the orders are loaded onto the planning board controls the schedule. Once an order is selected, all of its operations are loaded in a straightforward, unalterable way.

Hence, the key to the quality of the schedule that is generated by the algorithmic sequencer is the dispatching rule - i.e. rule that is used for selecting the order-loading order.

There are a number of very simple heuristic rules that can be used to select the sequence for loading the orders on the planning board. One rule that can be used for selecting the order sequence is to sort the orders by a priority value that has been assigned to each order. Other possible sorting criteria are earliest due date, earliest release date, and smallest remaining slack time. None of these rules are optimal in a mathematical sense. Each rule represents a different strategy and focus in planning the orders. For example, the due date-related rules (earliest due date, least remaining slack) focus on reducing the number of late orders, whereas the priority-based rule strives to complete the most important orders as soon as possible.

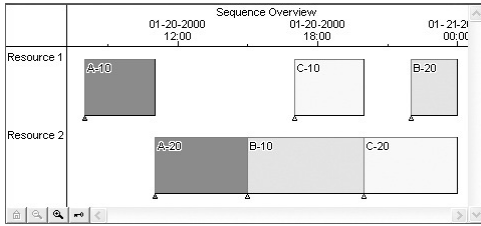
In some applications, a given operation can be performed on two or more different resources. In such cases, the schedule in an algorithmic sequencer is first determined by the sequence of orders, then by the rule that is used to determine to which resource a given operation is assigned during the loading process. Again, simple heuristic rules (e.g., assign the operation to the resource that will complete the operation first) can be used to determine the schedule.

Backward Sequencing

Although an order-at-a-time sequencer typically loads each order working forward in time by starting with the first operation and continuing through to the last operation, (forward sequencing), it is also possible to use this same sequencing scheme but reverse the procedure to work backward in time (backward sequencing).

In this case, the sequencer begins by loading the last operation for the order to finish at its due date. It then continues by loading the order's preceding operation to finish at the start time of the last operation. This process is continued, working backward in time, until the first operation for the order is loaded. At this point, the sequencer then selects a new order to load and repeats the entire process, again starting with the last operation and working backward in time. It continues in this fashion until all orders are loaded.

The following diagram shows a schedule generated by backward sequencing Orders A, B, and C, where the vertical line on the right denotes the due date for all three orders.



Backward Sequencing Chart for Orders A, B, and C

The advantage of a backward algorithmic sequencer is that it always generates a schedule that has no late orders. However, the schedule may require start times that are infeasible; that is, the orders must start before the current time.

In essence, a forward order-at-a-time sequencer fixes the start times for an order and determines the end times (which may violate the due dates), whereas a backward order-at-a-time sequencer fixes the end times and determines the start times. Although the idea of constructing a schedule that has no late orders is appealing, backward sequencing has some practical limitations, even in cases where a feasible solution is generated.

Backward scheduling shifts all orders to the right on the planning board so that they start as late as possible while still meeting the due date. This means that there is no time buffer in the system and any disruptions that occur; (machine breakdowns, late material arrivals, etc.) will typically create late orders. In addition, by postponing the use of our available capacity and waiting until the last minute to start each order, we give up the opportunity to consider additional orders that may arrive later and need to be added to the schedule. For these reasons, many schedulers prefer a forward sequencing. There is also a tendency for backward sequencing to produce lower resource utilization. If you consider the Backward Sequencing Chart, a gap has been left between operations A-10 and B-20 on Resource 1. It is likely that the gap is too small to be filled by operations loaded later in the sequencing process, resulting in lower utilization. If the work had been forward sequenced the gap would have been at the end of B-20 (i.e. added to the as yet unused pool of capacity), making it available to other operations of any duration. It is also possible to use an algorithmic sequencer in a bidirectional mode. In this case, we select an operation somewhere in the middle of the order and schedule the remaining operations using forward sequencing and the preceding operations using backward sequencing. This is useful in cases where we have an available time slot on a critical, highly utilized resource and we want to assign an operation to this critical resource and then load its upstream and downstream operations around this operation. We can accomplish this by fixing the operation on the critical resource and bidirectional sequencing the remaining operations for this order. In summary, an algorithmic sequencer is a simple and fast method for loading a set of orders on the planning board. The schedule is completely determined by specifying the sequence of orders and a rule for selecting between resources.

Simulation-Based Sequencing

Simulation-based sequencing provides an attractive alternative to algorithmic sequencing by providing a simple, yet very flexible method for constructing a schedule. In general, a simulation-based sequencer can also produce any schedule that is produced by an algorithmic sequencer. However, a simulation-based sequencer can also consider many schedules that cannot be considered by an algorithmic sequencer. Hence, the simulation-based sequencing approach, sometimes referred to as a Resource Based Method or Parallel Loading, can create better schedules than an algorithmic sequencer, but this would depend very much on what you consider to be a 'better' schedule.

In contrast to the algorithmic sequencer, the simulation-based sequencer selects and loads an operation at a time. By loading individual operations rather than entire orders, the simulation-based sequencer has finer control over the way the operations are loaded onto the planning board. This operation-at-a-time loading is the key to the added flexibility in schedule generation using the simulation-based sequencer.

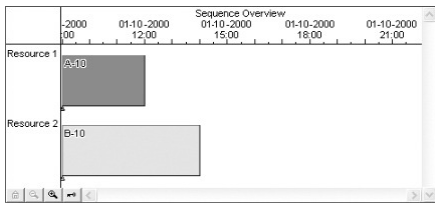
A second fundamental difference between the algorithmic and simulation-based sequencer is that the simulation-based sequencer constructs the schedule in a single time pass by moving forward from one event time to the next. The simulation-based sequencer begins at the current time and loads all operations that can start now. Note that these operations do not come from a single order as in the case of the order-at-a-time sequencer, but can be taken from the entire set of orders. Once all operations that can start at this event time have been loaded, the simulation-based sequencer advances time to the next

event e.g., the first completion time for any operation on the planning board. In this case, a busy resource has just changed to idle; hence, the simulation-based sequencer attempts to load additional operations at this new event time. The simulation-based sequencer continues in this fashion, advancing time forward to the next event time and loading additional operations as resources become idle until all operations have been loaded.

The following set of figures illustrates steps in the simulation-based construction process. In each of the figures, the vertical line denotes the current value of simulated time. The first step in the simulation-based sequencer is to load all operations that can begin at the current time.

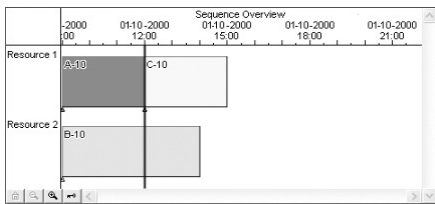
In this example:

- Step 1: Operation 10 for Order A (A-10) can be loaded on Resource 1 and Operation 10 for Order B (B-10) can be loaded on Resource 2.



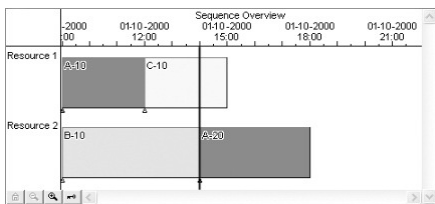
Step 1: Load Operation A-10 and B-10

- Step 2: The simulated time is advanced to the ending time of Operation A-10, and Operation C-10 is then loaded on Resource 1.



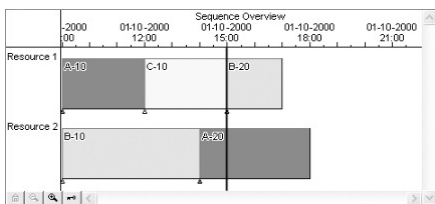
Step 2: Load Operation C-10

- Step 3: Simulated time is advanced to the end of Operation B-10, and Operation A-20 is loaded on Resource 2.



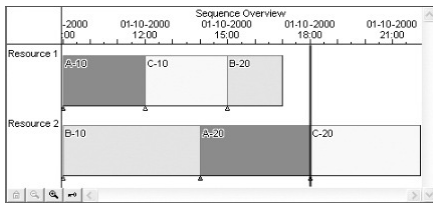
Step 3: Load Operation A-20

- Step 4: Simulated time is advanced to the end of Operation C-10, and Operation B-20 is loaded on Resource 1.



Step 4: Load Operation B-20

- Step 5: Simulated time is advanced to the end of Operation B-20. Since no further operations remain to be loaded on Resource 1, simulated time is advanced to the end of Operation A-20 where the final operation, C-20, is loaded on Resource 2.



Step 5: Load Operation C-20

In contrast to the algorithmic sequencer, the simulation-based sequencer only moves time forward. It only advances time forward once all operations that are to be loaded at that time have been loaded. Hence, the simulation-based sequencer temporarily stops time and examines the entire order set, advancing to the next event time once all operations have been loaded. The algorithmic sequencer, on the other hand, is constantly moving back and forth in time as it loads all operations for each order. It starts at the current time and goes forward in time loading all operations for this first order. It then goes back again to the current time and again moves forward in time loading all operations for the second order. It continues in this fashion, moving forward and backward in time, until all orders are fully loaded on the planning board. Hence, the algorithmic sequencer fixes an order and works across time, advancing to the next order once all operations have been loaded.

In the Preactor 400 APS simulation-based sequencer, we control the schedule using dispatching rules that select the next operation to load.

Typical rules select the next operation

- with the shortest setup time
- with the shortest processing time
- with the earliest due date
- with the lowest value of critical ratio
- in a preferred sequence etc

Although the loading concepts employed by the Simulation Based Sequencer provide great flexibility in schedule generation, the effective use of this flexibility is influenced by the dispatching rules chosen to select the next operation for the resource from the queue of work waiting to be processed. Preactor 400 APS employs both standard and customized dispatching rules and this is discussed further in the section dedicated to Preactor 400 APS.

There are disadvantages in using a simulation-based sequencer too. An example would be use a dispatching rule which minimizes lateness, such as 'critical ratio', where selection of operations would be based on the remaining operation time compared to the delivery time. In this situation, if capacity is a problem, a simulation-based sequencer would tend to minimize total lateness of all the orders but you would have a higher number of late orders (i.e. a large number of slightly late orders). An algorithmic sequencer using the due date priority option would produce fewer late orders (i.e. a small number of very late orders). In this situation the user could focus attention more easily on those orders that are predicted to be late.

An algorithmic sequencer can also control some process parameters more effectively than a simulation based sequencer. For example in many food and process industries it is often a requirement to control the amount of time that work waits between process steps (food can spoil). Because an algorithmic sequencer loads a complete order at a time it can easily check if the intervals between the operations are correct, and adjust them if required.

The simulation-based sequencer has less control because when it loads the first operation it does not know when the next operation will be loaded. Later, when the next operation is loaded, it may not be possible to move the first operation because other work has been loaded in between.

In general, a simulation based sequencer using First In First Out (FIFO) as the dispatching rule, will generate a schedule with higher resource utilization and a shorter overall schedule span than an algorithmic sequencer, but at the expense of higher work in progress.

In-built Scheduling Rules

APS scheduling systems are equipped with in-built scheduling rules.

Examples of these are:

- Preferred Sequence (by order attribute, setup time, process time, critical ratio)
- Minimize Work In Process (WIP) Forwards
- Minimize WIP Backwards
- Selective Bottleneck (TOC)
- Dynamic Bottleneck
- Minimize Overall Setup
- Campaigning
- Parallel Loading

The **Preferred Sequence** rule is data driven. You can select the criteria by which the preferred sequence is created. Critical ratio is used, for example, to minimize late orders by dynamically changing the priority of orders based on a comparison of remaining process time with time to due date.

The **Minimize WIP** rules are sequential rules that endeavor to minimize the make-span for each order. Min WIP forward loads each order forward from the current time, locks the last operation and backward sequences from there. Min WIP backward loads each order from its due date, locks the first operation and forward sequences from there.

The **Selective Bottleneck** rule is based on the Theory of Constraints (TOC) philosophy. It works by the user selecting the 'Bottleneck Resource' or 'Bottleneck Resource Group'. Each order is then backward scheduled from the Due Date (less Delivery Buffer). Any operations loaded onto a bottleneck resource are offset by the Bottleneck Buffer time (defined in the Resource data table for each resource) which is designed to give some 'slack' such that any delays to operations before the bottleneck resource will not result in it being 'starved' of work. Preactor then detects whether any operations in that order must start before current time. If so then these operations are re-scheduled forwards using up some or the entire bottleneck buffer. If this is consumed then some or the entire delivery buffer may also be used up and the 'At Risk' or 'Late' flag is set.

The **Dynamic Bottleneck** rule is an improvement over the classical selective bottleneck scheduling where the bottleneck will 'wander' depending on the current product mix that is scheduled. Rather than pre-processing your orders to determine a single bottleneck, the Dynamic Bottleneck Rule calculates the bottleneck individually for each order. Operations 'upstream' of the bottleneck are then backward sequenced inserting a resource buffer like the Selective Bottleneck rule.

The **Minimize Overall Setup** rule is similar in some respects to the Preferred Sequence rule. However it is focused purely on minimizing the setup or changeover time on resources. In the Preferred Sequence rule, as each resource becomes idle it selects the next operation to load based on the preferred sequence criteria in the resource database without any consideration of other resources that could also be used. Thus, provided one or more operations can be run on the resource and they lay within the 'Look Ahead Window' one of them will be scheduled based on the preferred sequence. In the Minimize Overall Setup rule, consideration is made across all resources able to run the operation even if they are still busy. The rule does not use the preferred sequence criteria in the Resource table. It does however use the 'Look Ahead Window' to decide whether an operation should be available to be scheduled in the same way as the Preferred Sequence rule.

The **Campaigning** rule is used when a production schedule is to be created in waves and uses a PESP script. When the rule runs, a dialog box asking the user to enter a Reference Date, Campaign Period and Number of Campaigns appears. The first pass of the rule locates all orders where the reference time entered is greater or equal to the due date of the order, these orders are then forward scheduled. The Reference Date is then incremented by the Campaign Period, the Number of Campaigns decremented. The second pass of the rule will again locate all orders where the reference time entered is greater or equal to the due date of the order. The number of passes of the rule will be the same as the number entered into the Number of Campaigns field.

The **Parallel Loading** rule is resource specific. Operations that are ready to load are put in one or more queues which can be ranked according to the rule assigned to the resource. As a resource becomes free, it looks at the queue of waiting operations and selects the best operation to process next.

Version Availability

Below is a table listing which scheduling rules are available in the Standard, Professional and Ultimate versions of Preactor AS.

Scheduling Rule	AS Standard	AS Professional	AS Ultimate	AS Ultimate Viewer
Preferred Sequence	N	Y	Y	Y
Minimize WIP Forwards	N	N	Y	Y
Minimize WIP Backwards	N	N	Y	Y
Selective Bottleneck	N	N	Y	Y
Dynamic Bottleneck	N	N	Y	Y
Minimize Overall Setup	N	N	Y	Y
Campaigning	N	Y	Y	Y
Parallel Loading	N	Y	Y	Y

Sequential and Parallel Loading of Operations

There is an alternative scheduling engine to FCS (Finite Capacity Scheduling) available in Preactor Professional and Ultimate.

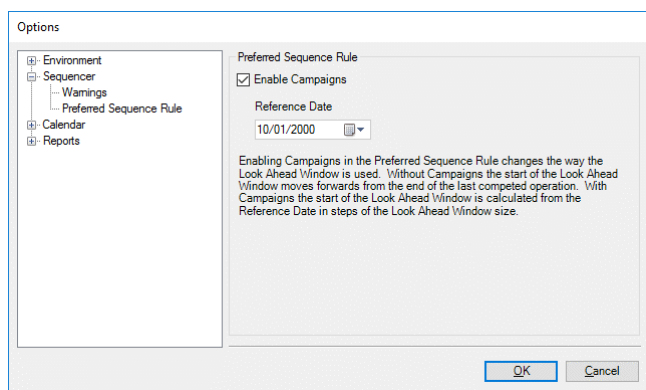
With the FCS scheduling engine all operations for an order are loaded onto the schedule before another order is considered.

In APS you can also elect to load one operation at a time and use so called dispatching rules to select which operation to load next.

Parallel Loading rules are resource specific. Operations that are ready to load are put in one or more queues which can be ranked according to the rule assigned to the resource. As a resource becomes free it looks at the queue of waiting operations and selects the best one to process next.

The standard Preferred Sequence Rule uses this logic. It also has a *Look Ahead Window*, which defines a time period that is used to determine whether an operation should be allowed into a queue for a specific resource. When a resource becomes free the rule determines what its look ahead window is from the current time. If an operation from an order has a due date within that window then it is allowed into the dispatching rule queue.

There is also the ability to enable Campaigns when using the Preferred Sequence Rule. This is done via the **Options** in the window **Tools** menu. Enabling Campaigns within the Preferred Sequence Rule will change the way that the Look Ahead Window is used. When not using Campaigns, the start of the Look Ahead Window will move to the end of the last completed operation. When Campaigns are enabled, the start of the Look Ahead Window is calculated from the Reference Date in steps of the Look Ahead Window size.



Order & Operation Relationships

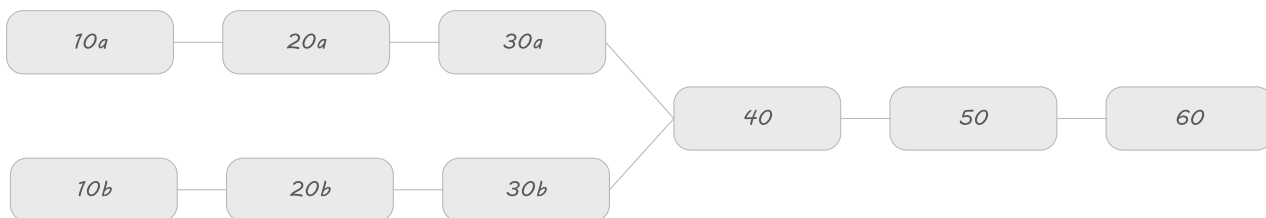
Sequencing Orders using Operation Numbers

When operation numbers are used to define the sequence of operations within an order the Preactor Sequencer assumes that lower operation numbers must be performed before higher operation numbers and that operations with the same operation number may be performed in parallel.

Defining operation relationships in this way is quite easy and has the advantage that you can easily insert or remove operations without the need to redefine the parameters of previous or subsequent operations. All operations of the Order are considered as a whole and sequenced in one action.

However, there are significant limitations in the way that operation numbers can be used to model assembly and dis-assembly within the order.

For example, consider the assembly in the following order:



Using operation number relationships only, the two operation 10s would have to be performed before either of the operations 20s and both operation 20s would have to be performed before either of the operation 30s.

Often, with assembly of this type, operations 10a, 20a and 30a could be performed independently of operations 10b, 20b and 30b. The only point at which dependency is required is at operation 40.

Sequencing Orders Using MADE FROM

Defining operation sequences using MADE FROM overcomes the limitations of implying the relationship using operation numbers. However setting up the relationship is more complex.

In the above example the MADE FROM table would look like this:

```

Op 10a - No Dependencies
Op 20a - Depends on Op 10a
Op 30a - Depends on Op 20a
Op 10b - No Dependencies
Op 20b - Depends on Op 10a
Op 30b - Depends on Op 20b
Op 40 - Depends on Op 30a and Op 30b
Op 50 - Depends on Op 40
Op 60 - Depends on Op 50
  
```

When sequencing the operations of the order, Preactor creates internal virtual orders for sequencing. The virtual order is made up of the previous and subsequent operations plus, iteratively, any operations that have no more than one previous operation and no more than one subsequent operation.

Looking at the order above, this would result in the following virtual orders:

```
Virtual Order 1: 10a, 20a, 30a.  
Virtual Order 2: 10b, 20b, 30b.  
Virtual Order 3: 30a, 30b, 40, 50, 60.
```

Preactor then treats these virtual orders in the same way as orders defined using operation numbers. The virtual orders become available for sequencing when there are no unallocated dependents of the first operation. So in this example, Virtual Orders 1 and 2 are considered immediately, Virtual Order 3 is only considered once both Virtual Orders 1 and 2 have been sequenced.

It can be seen that Virtual Order 3 contains both operations 30a and 30b; these operations will have been already sequenced before Virtual Order 3 is considered, so there will be no relationship between them, other than operation 40 requiring that they have both been processed.

When using the operation relationships can include operations that are not part of the same actual Order, however, internally the same Virtual Order concept is used.

Operations With Complex Relationships

Certain features of Preactor can create more complex relationships between operations than just there previous and subsequent operations. These features are:

- Maximum time between operations – INTER OPERATION INTERVAL
- Subsequent resource constraints – SUBSEQUENT RESOURCE CONSTRAINT and RESET SUBSEQUENT RESOURCE
- Secondary constraint usage types that can affect secondary constraints outside of the span of the operation, for example "Increment From Start", "Decrement To End" etc.

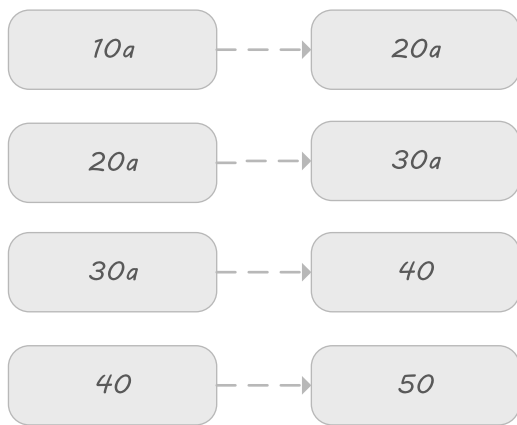
Use of these features must be carefully considered when using MADE FROM and assembly or dis-assembly. The above features are only considered within each order, when using MADE FROM this means the Virtual orders created internally. If any of these features are used within an order constructed using MADE FROM where multiple Virtual orders are then created, unexpected results may be obtained.

Outlined below are scenarios where problems may arise.

INTER OPERATION INTERVAL

If only one pair of operations in an order have and INTER OPERATION INTERVAL it will not cause a problem, however if there is a chain of INTER OPERATION INTERVAL values between contiguous operations, this creates a complex operation relationship.

In the above example, say the following INTER OPERATION INTERVAL relationships were specified, the actual duration of the intervals is not a determining factor:



First, Virtual Order 1 will be sequenced, Op 10a, 20a and 30a. If Op 30a cannot be sequenced within the required time, Op 20a will be moved forwards. Moving Op 20a may then violate the interval between Op 10a and 20a, this will cause Op 10a to be moved. Eventually operations 10a, 20a, and 30a will be scheduled so that the intervals will be respected, assuming there is available capacity.

Virtual Order 2 will now be sequenced independently.

Finally Virtual Order 3 can be sequenced which includes Operations 30a and 40, these two operations have an INTER OPERATION INTERVAL constraint. If this interval is violated, Op 30a will be moved, however, as Op 20a is not part of Virtual Order 3 it will not be considered and will not be moved even if the INTER OPERATION INTERVAL between it and Op 30a is violated. It will thus be possible for the final schedule to violate the INTER OPERATION INTERVAL specified between Op 20a and Op 30a.

SUBSEQUENT RESOURCE CONSTRAINT

In the order above, say Op 50 can be performed on either the Lathe or Mill. Op 10a sets the SUBSEQUENT RESOURCE CONSTRAINT to Lathe. The Lathe will be set as a required resource, for all subsequent operations in Virtual Order 1, Op20a and Op 30a. However, for Virtual Oder 3 which contains Op 50, no SUBSEQUENT RESOURCE CONSTRAINT will have been set and the operation will be free to be placed on the Lathe or Mill.

Secondary Constraints

When operations require secondary constraints, the sequencing engine checks that the usage of the constraint is within the required limits for the duration of the use of the constraint, Setup time, Operation time or the entire process time. If the constraint is affected outside of the operation duration then an additional check is performed after the entire order (Virtual order) is scheduled. If the constraint is, say, incremented by one operation and decremented by another in equal quantities, the constraint will be verified between the two operations. If the constraint is not incremented and decremented by equal quantities then the constraint is checked out into the future indefinitely.

If in our example, Op 10a increments a constraint and Op 50 decrements the constraint by the same amount unexpected results may be given as Op 10a and Op 50 are not within the same Virtual Order. Virtual Order 1 will be scheduled, but as no operation in the Virtual order decrements the constraint, it will be checked indefinitely into the future. If there is no other usage of the constraint and there are no capacity changes caused by calendars that would cause the constraint to be violated, then the order will be sequenced. However, if at any point in the future the constraint is violated, the Op 10a will be either scheduled after the violation or left unallocated if it is not possible to place the operation without violating the constraint. If Op 10a is not sequenced, Virtual Order 3 will never be a candidate for sequencing as Op 30a will never be sequenced.

Auto Expand

Preactor will build the details of an order from a routing (typically described in a Products table), BoM & Co-Products table. This is called 'Auto Expand' and is a function of Preactor that can be performed on import or while manually entering data. In fact, the auto expand functionality is flexible and can expand from n source tables into n target tables. The process and the relationships through which this is achieved are described below. For Standard and Professional editions of Preactor AS these relationships are fixed, but for Ultimate editions the relationship may be defined in any valid way for any number of tables.

Auto Expand in AS Standard & Professional

Standard & Professional editions of Preactor AS have a fixed auto expand relationship which can be described as follows.

The Orders table is expanded from the Products table using the 'Part No.' field as an identifier to link the order and the product information. In addition, the Order BOM table is expanded from the Products BOM table and in Professional the Order Co-Products table is expanded from the Co-Products table.

Auto Expand Configuration (Ultimate Only)

The Ultimate configuration that ships with Preactor is configured to work as described above for the Standard & Professional editions. However, configurations migrated from earlier versions of Preactor, or customized configurations, may have auto expand configured in a number of different ways, as described below.

In order to automatically expand a parent operation for an order into all its individual operations a link to a source table that contains the operation data is required. This link is created with the AUTO EXPAND classification, which defines the field that is used as a reference into the table that is to be used for creating a complete set of operations for a given order type, the order type is most commonly defined by the Product.

Expand from Parent / Child relationship

In this case individual operations are specified as children of the referenced parent record via a DATABASE reference. EXPAND UPDATE fields are populated using this relationship.

The creation of individual operation records can be controlled using the CONTROL AUTO EXPAND classification on a TOGGLE type field.

After expand AUTO INCREMENT and UNIQUE fields are updated, default values are set and EXPAND UPDATE, ALWAYS UPDATE and UPDATE REFERENCE fields are set.

Expand from Matrix

Individual operations may be specified in an AUTO LIST of data, used is operations are common to multiple products. One record is created in the target table for each entry in the source AUTO LIST.

After expand AUTO INCREMENT and UNIQUE fields are updated. Default values are set. EXPAND UPDATE and UPDATE REFERENCE fields are set.

Note: This method of expansion is rarely used and, while still possible, expansion from a parent / child relationship is the preferred technique. Standard and Professional editions of Preactor AS use parent / child relationships.

Disconnected Expand

In the situation where a product may or may not exist in a referenced table, a 'disconnected' expand is required. A disconnected expand is one where it is possible to either select a product from an existing list or to create ad hoc orders by specifying each operation step. This means that when importing orders, those orders can include a full description of the process, order header information only, or a mix of both. The auto expand relationships in Standard & Professional are disconnected in this way.

Individual field relationships are specified using the LOOKUP SOURCE classification on the AUTO EXPAND field and LOOKUP UPDATE rather than DATABASE references, further LOOKUP SOURCE fields may be specified to aid manual product selection in a similar way to an ADDITIONAL REFERENCE field.

LOOKUP SOURCE fields are FREE FORMAT String fields that can contain either matching strings that define a unique reference into the source table or ad hoc data not present in the source table. EXPAND UPDATE fields are also updated when a matching reference is found.

When importing header only records that need to be expanded, the LOOKUP SOURCE field that is a reference to the field specified as the FAMILY in the source table must be populated for the expand to succeed. For example, if both 'Part No.' and 'Product' are specified as LOOKUP SOURCE fields in the 'Products' table and the FAMILY field in the 'Products' table is defined as FAMILY(Part No.), then the 'Part No.' field must be populated in the import data.

Expand of associated tables

Operations in associated tables are also updated using the EXPAND REFERENCE, ORDER MATCH and EXPAND MATCH classifications via a LOOKUP SOURCE table reference. LOOKUP UPDATE fields are also updated.

A typical use would be creation of BOM data for Orders expanded using a Products table from a Product BOM table. A minimum of 4 tables are involved in this expansion type, but more table pairs can be used if required.

For example:

Orders table expanded from a Products table.

Order BOM table expanded from a Products BOM table.

Order Co-Products table expanded from a Co-Products table.

Only the tables that are to be expanded need to be associated to the main target table, Order BOM and Order Co-Products tables are associated to the Orders table in the above example. Tables containing the expansion data do not need to be associated, they are linked indirectly by the use of the LOOKUP SOURCE classification.

When the records have been created in the main target table, all associate tables are searched for an EXPAND REFERENCE field. The expand reference is used to create a unique FREE FORMAT string reference to the main target table, if an EXPAND REFERENCE field is present then an attempt is made to expand the associated table, any records created in the associated table will have the EXPAND REFERENCE field assigned to the related records field value.

When expanding associated tables, a search is made in the associate table for any records where all ORDER MATCH fields are equal. If they exist then expansion is assumed to have been performed already and no further action is taken.

If no records match in the associated table, then the EXPAND MATCH fields are used to create records in the associated table from the table defined by LOOKUP SOURCE.

Sequence Dependant Setup Times

Instead of using a fixed setup time you can define sequence dependent setup or changeover times based on the attributes of one operation to another operation on a resource.

For example the sequence of product A to product B on a resource could incur a 30 minute changeover time but product B to product A would incur a 3 hour changeover time.

Where limited data is available this can be achieved by using the Like to Like Setup Time and Like to Like Match fields in the Products table.

Where more comprehensive data is available, go to the Resources table and use the Sequence Dependant Setup Time pushbutton in the Edit Resources Information dialog to establish a matrix of setup times. Refer to these values in the Products table using the Setup Group field.

Infinite Capacity Resources

In most cases the user will want to define resources as having 'finite' capacity, however in some circumstances 'infinite' capacity resources may be chosen to model certain processes. For example a sub-contract operation may always have a 2 day lead time no matter how many batches are sent and in this case an infinite resource called Sub-Contract might be used to model the delay.

An alternative status to Infinite capacity is Infinite with Shift Patterns. This may be used, for example, if our sub-contractor did not work at weekends so that the 2 day lead time would be extended if sent on a Friday.

Note: If you wish to be able to break down or change the calendar state of an infinite capacity resource you must use the 'Infinite with Shift patterns' option.

To establish an infinite capacity resource:

1. From the Data Maintenance category, click on the Resources data table.

The Resources Data Table is displayed.

2. Double click on the record you wish to have infinite capacity.
3. Click on the 'drop down' arrow against the Finite or Infinite field and select Infinite or Infinite with Shift Patterns.

Order Enquiry

Preactor AS allows order enquiries within the sequencer. This can be used to give estimated delivery dates and facilitate various 'what-if' scenarios. An order generated using the order enquiry feature can later be discarded.

Scheduling an order enquiry requires availability not only of the resources and other constraints on the process steps, but also availability of materials. Fulfilling the material requirement can be as simple or as complex as is required, though accommodating more complex scenarios does requires a PESP script.

To perform an order enquiry, select **Tools ▶ Order Enquiry** from the sequencer menus. You will be presented with a blank order dialog. As a minimum it is necessary to assign an order number, select a product and enter the quantity required.

Order enquiry can only be used to expand a predefined product and its materials. Ad-hoc routings should be entered manually as order enquiry does not support entering this type of information.

Materials & Order Enquiry

No Materials

Where a process has no bill of materials, order enquiry will sequence the operations regardless of how material control is configured.

Schedule Despite Shortages

The simplest approach to materials for order enquiry is to ignore the material requirement all together. This is achieved using the 'Schedule Despite Shortages' feature in the sequencer. This can either be enabled prior to performing an order enquiry or order enquiry can be used to expand the order after which 'Schedule Despite Shortages' can be enabled and the order sequenced using whatever rules are required.

Capable-To-Promise Order Enquiry

By using a PESP script on the 'On Order Enquiry Expanded', it is possible to run material control on order enquiry after the order has been expanded but before it schedules on the planning board. The extent to which materials are re-evaluated is driven by the PESP script and limited by the edition of Preactor. A PESP Action called 'Run SMC on Order Enquiry' exists for light-touch material linking on order enquiry. This action will always filter the producing and consuming queues to the order in question. For AS standard the rule set parameter is ignored.

AS Professional and AS Ultimate allow the selection of a ruleset with the 'Run SMC on Order Enquiry' action, or you can fully re-consider all materials using the 'Run SMC' action. Consideration should be given to the fact that this is a potentially destructive operation.

If the defined SMC Rule Set leaves the enquiry order with material shortages then Preactor will attempt to satisfy these by creating Work Orders or Supply Orders. Where an Item is represented both in the Products table and the Purchased Items table the system will default to using the produced part. The specified Pegging Rule is then re-run to assess the Works Orders created with respect to the Parts they require and the process repeats.

This continues until no shortages exist or no further shortages can be resolved. The set of Orders is then Sequenced to determine whether the Enquiry Order can be met and when by.

Pegging Rules

The Pegging Rule set for use by the Order Enquiry impacts how the Order Enquiry process is performed.

If 'Retain Partial and Complete Allocations' and 'Retain Complete Allocations' are both unselected the Order Links are only created if all the shortages can be satisfied; i.e. if any of the shortages cannot be resolved then none of the shortages shall be resolved. Where any shortage cannot be resolved this will result in the process being unable to ever satisfy the Order and as such the expansion halts at this point.

This is the case in earlier versions of the Preactor configurations (Professional and Ultimate). To fully enable the Order Enquiry BOM expansion a Purchased Items table is required detailing how to process the creation of the supply records.

This can be constructed using the entry in the currently shipping MaterialControl_prtf.inc file as a template. The table can be exposed in the application for editing through adding to the Preactor.prmdf file (the entry can be copied from the v16.4 version of this file).

Extending Order Enquiry

In Preactor AS Ultimate it is possible to extend the way that the Order Enquiry system satisfies material shortages identified during the pegging. The "On Order Enquiry Shortages Calculated" event gives system implementers the opportunity to interact with the shortage data and override the default behaviour when creating Work Orders and Purchase Orders. "Scripting" on page 121 for more information.

Managing Order Enquiries

When entering an order enquiry Preactor will mark the order using the 'Order Enquiry' toggle field. While useful to be able to perform such actions within Preactor, it is likely that any firming of those enquiries will be completed in an upstream order management system and therefore these order enquiries should be easily identified so that they can be removed from the schedule or otherwise handled appropriately.

Materials

Material Control

Overview

Preactor AS allows the modeling of materials using a feature called Material Control. Given a Bill of Materials for an order, material control will link the required materials for each of the operation steps within that order by applying pegging rules. For more information on building pegging rules "Building Pegging Rules" on the next page.

Materials usage is tracked across three tables:

- The supply table, in which items that supply material are defined.
- The orders table, in which items that both consume and supply materials are defined.
- The demand table, in which items that demand material are defined.

Supplies are usually stock records, purchase orders or purchase recommendations. When we refer to the orders table, we are usually referring to works orders. Demand orders are usually sales orders. A given material may be linked from any source. For example, a sales order that demands a quantity of a material may be linked to a stock record or a works order, depending on the material pegging rule defined and the availability of materials.

Supply & demand orders are represented in the sequencer on the Gantt Chart as milestones. Relationship lines can be drawn between supply orders, works orders and demand orders to show the material relationships. Further analysis of material consumption is allowed in Professional and Ultimate editions of Preactor AS using the Material Explorer included in the Sequencer "Material Explorer" on page 268. A number of material centric reports are included in the Standard edition.

Material Control in AS Standard

AS Standard allows the pegging of materials using a single built-in material control rule. This rule has the following behavior:

- All unlocked links are cleared from all demand orders and unscheduled works orders.
- Consuming queue contains all demand orders and unallocated works orders that have BoM data.
- Producing queue contains all supply orders and all works orders that produce material.
- Both queues are ranked by date then priority.
- Materials are allocated on a FIFO (First In First Out) basis.
- Materials will be allocated as found in the appropriate Queue. Quantities will not be compared.
- Linking to materials with future availability is allowed (backward links)

Note: Demand and supply orders cannot be multi-line orders in the Standard edition of Preactor AS. For cases where multi-line sales orders or purchase orders are required, it is necessary to suffix the order identifier with a line item number or similar. This is best achieved at import time.

Material Control in AS Professional & Ultimate

In AS Professional and Ultimate editions, user defined pegging rules are allowed. These rules are fully flexible and can be defined as rule sets, which can then be applied on an elective basis. In addition, Professional and Ultimate allow the linking of materials at operation steps other than the first and last operation step. The production of additional materials may be specified in a co-products table.

Building Pegging Rules

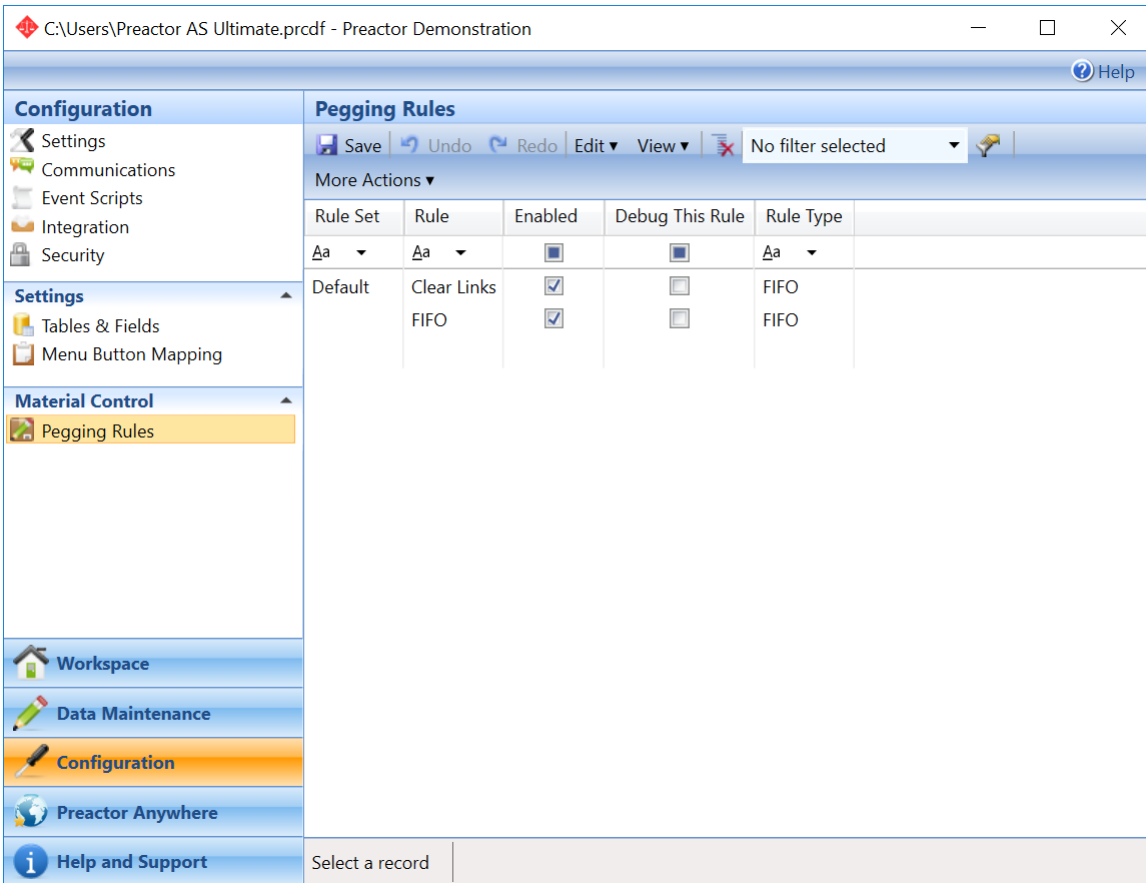
The Pegging Rules table is used to define rules for how material links should be created between demand and supply orders. It can be accessed by going to:

Configuration ► Pegging Rules

These rules are fully customizable and can have several passes to them. There are built in standard rules such as *Production Qty=Consuming Qty*, *Production Qty>=Consuming Qty* and *FIFO*. If the standard rules are not explicit enough, then a *User Defined* rule, or a rule which runs via a PESP (Preactor Event Script Processor) script can be used.

Rule Creation

A Standard Material Control (SMC) Rule will typically consist of several passes, each pass of the rule is represented by a separate record entry for that rule set. The Pegging Rules table in the Material Control example configuration includes a Default rule set which has two rule passes. The first rule pass is always the parent record and is where the name of the Rule Set is entered. Child records of that rule set are subsequent rule passes that will run after the first pass of the rule is completed.



Double-clicking on a rule will open the Pegging Rules dialog. Field names can be right-clicked on to provide additional information about that field.

In the case of the Default rule set included in the Material Control example:

- The first rule pass will clear any links that currently exist between orders. The Internal and External Queue Filter fields are available for use. These queues can be used if there are certain links to demand orders that do not need to be cleared.
- The second rule pass will then allocate materials on a FIFO basis. It will **Retain Partial and Complete Allocations**. This option allows for linked to be created on BoM lines where the BoM line quantity doesn't need to be completely satisfied for the link to be made. In turn, any items that are short will then be highlighted as a shortage. It will allow **Allow Backwards Links**, meaning that the default behavior for material control is overridden, by allowing for backwards links to be created when production occurs after consumption.

Filtering and Ranking Queues

Filter expressions can be entered in the supply and demand filter fields to restrict the orders that are to be included in that particular rule pass. The Internal Supply Queue Filter field refers to supply records present in the Orders table. The External Supply Queue Filter field refers to records present in the Supply table.

The Internal Demand Queue Filter field refers to demand records present in the Orders table. The External Demand Queue Filter refers to records in the Demand table.

Expression syntax for these fields should follow the regular EVALUATE expression syntax. An example of where a filter may be needed could be where links need to be made to initial stock records first before other records are considered. In this case the expression might be:

```
(~{$Order Type}~==~Stock~)
```

which would be entered in the External Supply Queue Filter field on a rule pass that precedes other rule passes.

If all supply records are present in the Orders table only, then the Internal Supply Only toggle can be checked which will enable the Supply Queue Ranking field. In this setup, queues can be ranked by certain criteria such as Due Date, Earliest Start Date and Priority with either lowest value first or highest value first. The same applies if all demand records are present in the Orders table only, the Internal Demand Only toggle can be checked, enabling the Demand Queue Ranking field. An example of how you may use ranking may be if you wanted your rule to link to orders with a lower due date first, you would select **Due Date** and press the **Add L.V.F** button for the Demand Queue Ranking field.

If Supply records are present in both the Supply as well as the Orders table the queue ranking will be lowest value first on Due Date and then Priority. The same applies to the Demand records, if they are held in both the Demand and Orders table, then the ranking will be lowest value first on Due Date and then Priority.

Include Scheduled Orders in Demand Queue

When the Include Scheduled Orders in Demand Queue toggle is checked, demand orders that are already scheduled can be re-linked. If the Include Scheduled Orders in Demand Queue toggle is checked on the first pass of the rule and the Clear Current Links toggle is checked, all links will be cleared.

Inheriting Values

Values of certain fields can be passed down to orders with a lower BoM level that are related to that order, this can be applied to both supply and demand orders. An example might be where the value of an attribute of a sales order is inherited by the orders which are consumed by the sales order, in this case the Inherit From Demand field should be checked on the relevant passes of the pegging rule where it is desired for this value to be applied. The field that is to be inherited should be defined in the Orders data table in the Preactor.prtdf file.

Rules

Production Qty=Consuming Qty, *Production Qty >=Consuming Qty* or *FIFO* are standard pegging rules which can be selected as the standard rule that is to run on a particular pass of a rule.

The *Production Qty=Consuming Qty* rule will only allow orders to be linked together where the producing quantity is equal to the consuming quantity.

The *Production Qty>=Consuming Qty* rule will only allow orders to be linked together where the producing quantity is greater than or equal to the consuming quantity.

The *FIFO* rule imposes no restrictions on what orders can be linked together, orders will be linked together in the order that they are positioned in the consuming and producing order queues.

If these rules do not meet the necessary linking criteria, a User Defined or PESP Script value can be selected in the Rule Type field.

If a rule is user defined, an expression needs to be entered in the Selection Rule field. The expression should follow the regular syntax rules that apply to the EVALUATE field classification, apart from using + and - to identify producing and consuming records respectively.

If production records are present in both the Supply and Orders tables, the field name used in the expression must be a field that is present in both tables. The same applies to consumption records, if they are present in both the Orders and Demand tables the field name used in the expression must be a field that is present in both tables.

An example expression might look like this:

```
(~{+:$Product Attribute 1}~==~{-:$Product Attribute 1}~)
```

This expression ensures that this rule pass will only allow producing and consuming orders to be linked if they have the same value.

There is one special keyword that can be used in this user defined selection expression:

```
{SMCQTY} or {SMCQUANTITY}
```

This represents the unused quantity in a producing record or the required quantity in a consuming record. These values are not available in any one field with a record during SMC processing. The unused quantity is not written to the record until SMC finishes and the required quantity is quantity multiplied by the BoM quantity. e.g. if you wanted to create an expression equivalent to the standard 'Production Qty=Consuming Qty' it would be

```
`{+ : SMCQTY} == { - : SMCQTY} '`
```

If the PESP Script option is selected in the Rule Type field, then the name of the PESP script should be entered in the PESP Script field which should become visible.

Allocation

If the **Retain Partial and Complete Allocations** and **Retain Complete Allocations** options are both unchecked, one single rule pass has to allocate all materials to the order, if all materials cannot be allocated, nothing will get linked.

If the **Retain Complete Allocations** option is checked, each BoM line is treated individually. The full quantity of the BoM Line must still be satisfied, but if one of the BoM Lines cannot be satisfied, it doesn't prevent the other BoM Lines of the order from being allocated if their requirements have been met. For example, if the requirement of an order was for 5 frames, 10 wheels and 5 saddles but only the 5 frames and 10 wheels were available, then these would be allocated. But a shortage would exist for the saddles.

If the **Retain Partial and Complete Allocations** option is checked, anything that can be allocated will be, regardless of whether the exact quantity of a BoM Line is available. For example, if the requirement was for 5 frames, 10 wheels and 5 saddles but only 1 frame, 2 wheels and 1 saddle were available, these materials would be allocated, but the order would have shortages.

The **Allocate Multiples Only** field when checked will allow the quantity of a link created to be allocated in specific multiples. This multiple is specified in the BoM Data.

If the **Allow Backward Links** option is checked the default behavior of SMC is overridden by allowing backward links to be created when production occurs after consumption.

SIMATIC IT MES Integration

Available only for Ultimate editions of AS, Preactor integrates with SIMATIC IT (SIT) MES using a combination of standard import techniques and web services accessed through PESP Actions as well as an *Alerts* window available from within the Sequencer module.

Overview

Preactor AS can generate viable, realistic schedules of work while meeting over-arching objectives (e.g. minimized WIP) to be consumed by production. Manufacturing Execution Systems do not necessarily adhere to such a schedule. By combining Preactor with SIT MES, you can leverage the power of Preactor AS, while ensuring that all your execution objectives are met.

While adherence to a schedule is something that ought to be a primary concern, often, real-world issues mean that at execution time it is necessary to deviate from the published schedule. For this reason, integration with SIT MES means not only publishing a schedule from Preactor, but also maintaining an on-going dialog between Preactor and SIT MES, such that the planners and production supervisors are better informed of the impact of their actions.

In the case of Preactor, this means ensuring an up-to-date view of the execution status of operations. This is achieved in a number of ways. Firstly, using Preactor's standard import facilities, to always capture the latest execution state from SIT MES before generating any plan. At this point, SIT MES is made aware that the operations imported into Preactor are under consideration and marked as 'In Planning'. This means that production staff are immediately aware that the plan is under revision. While in this state, any alterations to the properties of those operations are recorded, and presented by Preactor in the Sequencer **Alerts** Window, keeping the planner informed of execution events. This means that the planner can respond quickly to these alerts, taking appropriate action. Depending on the nature of the alert, this may mean abandoning the current planning session and starting again. In less severe cases, it may only be necessary to alter the availability of a resource to represent a breakdown or similar.

PESP Actions

A number of PESP actions exist to facilitate this integration. Refer to the reference material for PESP Actions for full details and the actions and their function. The actions specific to SIMATIC IT MES are:

- SetExitState
- GetExitState
- SetInScheduled
- SetInScheduling

The 'SetInScheduling' action plays a role in the batch process for retrieving the latest execution state from MES. This typically happens prior to opening the sequencer module. 'SetInScheduled' is used when a schedule is published in order to push suggested resources, start and end times to MES.

A custom action using the SetInScheduled action can be created using the Preactor Software Development Kit (SDK).

Alerts

Within the Sequencer module, an Alerts Window is available that shows any alteration to the properties of all items under consideration by the Planner. This gives immediate visibility of any disruptive operational issues, as well as keeping the Planner informed of current status. The Alerts Window is linked to the Alerts Table, which is a memory-only table. Upon closing Preactor, the table will be cleared of all data within it. When viewing the Alerts Window in the Sequencer module, there is the functionality to save and print the data held in the table.

A PESP action is available, called *Refresh Alerts*, where the user is able to define a event that can be used to refresh the data populated in the Alerts Window. If this PESP action is not enabled, a custom integration method between Preactor and UAF services must be specified.

With Alerts enabled, the **Refresh Frequency** can be set, in seconds, to determine when the table is to be refreshed.

Settings

The SIMATIC IT MES integration settings are administered from **Configuration ▶ Settings ▶ SIMATIC IT Settings**.

- **Alerts Enabled** - When checked, the Alerts Window is enabled in the Sequencer. A valid service URI must be entered. If unchecked, the Alerts Window is unavailable.
- **Refresh Frequency** - The time between each refresh of the Alerts Window, specified in seconds.
- **Target Platform** - Selects the service to be used. In the shipped configuration, if *UAF* is selected, then the **Certificate** and **OData Command/Query Timeout** fields are available for use.
- **Publish Dataset** - When configured as part of a PESP script, this field is used to control whether schedule information should be communicated with another system. For example, a user may want to send changes to an upstream MES, but only when adjusting their live or confirmed orders. The name of that live dataset can be specified here. If the value in this field does not match the currently edited dataset, then changes to data can be ignored.
- **Service URI** - The Web Service URI is used for communicating between Preactor and SIMATIC IT MES, primarily for the purpose of populating the Alerts Table.

Note: To ensure integrity between the client Preactor application and the MES Web service, HTTPS should be used as the transport mechanism when configuring the MES service address.

- **Certificate** - Specifies the X.509 Certificate to use to confirm the client identity when communicating with the service URI. Typically this certificate will be issued by the MES system implementer, and must be imported into the Preactor certificates table, which can be found in **Configuration ▶ Security ▶ Certificates**.
- **OData Command/Query Timeout** - The time, in seconds, that can elapse before a request for new data will timeout. This field is used when querying for order changes that will be displayed in the Alerts Window. If the request times out, then an error message is displayed.

Resources and Resource Groups

Critical to any Preactor scheduling system is the resource data. The items entered in to the resources table will form the entries on the vertical axis of the Gantt chart within Preactor's sequencer and are the primary constraint on the processing of the orders and operations in the system. Which constraints are defined as primary resources will depend on the environment and should be discussed with the system implementer. In the majority of cases machines are modeled as the primary resources but in different environments it may be more appropriate to model other constraints, such as labor.

A resource can be configured in one of two main modes:

Finite

This means that the resource can only process one operation at any time. Additional work for that resource will be queued and placed on the resource when it becomes available.

Infinite

This means that the resource can process multiple operations at the same time. In most cases this mode is combined with an additional constraint on the resource which determines how many operations can be processed concurrently. Infinite mode resources can be configured to either consider shift patterns or ignore them.

By default the Preactor sequencer runs in Finite Mode so these are the settings that should be configured for day to day usage. There is also an Infinite Mode that allows the planner to identify areas of over-utilization and bottlenecks.

As well as containing the resources themselves their scheduling attributes are defined in the resources table. These include:

1. Any additional constraints associated with the resources. Details of how these are set up can be found in the Secondary Constraints documentation.
2. Which setup and changeover time settings are associated with that resource and whether they are to be applied concurrently or cumulatively.
3. The cost of utilization and whether this cost should take in to account efficiency information from the resource calendars

The way that the resources are represented in the Sequencer is also controlled from the resources table. The Gantt Separator field specifies whether a line is drawn underneath the resource on the Gantt chart to help distinguish between individual resources or groups. The Preactor Display Order defines the order that the resources are shown in, this field is used by setting relative values and then sorting the records in the editor grid by it. The Resource Display Option field determines when the resource is shown in the Gantt chart and the Resource Display Style field allows the user to determine whether the operations on the resource are shown in a stacked or cascaded mode. The Usage Plot Display Settings determine how the resource usage is represented in the Multi Plot window.

Resource Groups are a way of assigning primary resources in to groups. There are two main purposes within Preactor for these Groups

1. If these groups are set against an operation the limit the valid resources for that operation to the times contained within the group. These groups are usually defined in an upstream system and imported in to Preactor.
2. Groups can also be set up that are not assigned to any operations directly but are used for display purposes. For instance a group may be set up that relates to a particular area of the factor but contains resource of different types. This would enable quick filtering of the of the Gantt chart down to just that area.

The Resource Groups table also contains the Display Options for the Resource Groups plots.

Preactor AS Professional

In Preactor AS Professional it is possible to set up complex resource constraints. These take two forms dependent on whether the resource is set up as an infinite resource or a finite resource. For both types of resource the Match Field can be used to define rules about the usage of other resources when an operation is placed on this resource. Details about how to construct Match Field expressions can be found in the MATCH FIELD help. For infinite resources it is also possible to set up match criteria in the 'Match Required' field. This allows the limiting of operations that can be placed on the resource at the same time to only those with a matching value in the selected field

The criteria for ranking the queued operations in the Preferred Sequence rule can also be defined against each resource. One or several criteria can be used for the ranking.

Secondary Constraints and Secondary Constraint Groups

Secondary Constraints

Secondary Constraints are used to model any other constraints there are on the scheduling process which are not modeled by the primary resources. In a common setup, where the Primary Resources are machines, this would include items such as labor and tooling. When used in conjunction with infinite capacity resources they can also be used to model resource capacity.

The two criteria which control the behavior of any constraints are set using the Use as a Constraint and Calendar Effect fields.

Use as a Constraint determines whether the constraint has any effect on the scheduling process. If this field is not selected the constraint can be used for information purposes, for example to give an indication of required labor levels.

The Calendar effect field specifies how the constraint interacts with primary resource calendar. Details of the options and the effect they have are contained with the tool tip that is available for each one.

These values can be set for constraints when Preactor's sequencer is running in both finite mode and infinite mode. The default setting for infinite mode is for the resource to be not set as a constraint.

In addition to the fields which set the scheduling behavior of the constraints there is also the opportunity to set the display option of the constraint plots, how they affect the cost of the operation and any additional attributes that may be associated with them.

Once constraints have been created in the secondary constraints table there is some additional setup needed to configure the usage of them. Constraints can be assigned to:

1. Resources
2. Operations
3. Attributes of Operations
4. Specific Resource/operation combinations

In all of these cases the same three pieces of information are needed. These are the constraint name, its usage and the Quantity that is used. The Constraint usage defines how the constraint is used during the operation, for example there may be have a skilled operator type which is only used during the setup portion of an operation or a tool which is used from the start of the operation but is not released again until several operations later. The constraint Quantity can be a straight numerical value or can be tied to the value within several other fields in the operation in question. An example of this would be linking the constraint usage to the quantity field or a dimension value of the constraint in question is modeling resource capacity.

Secondary Constraint Groups

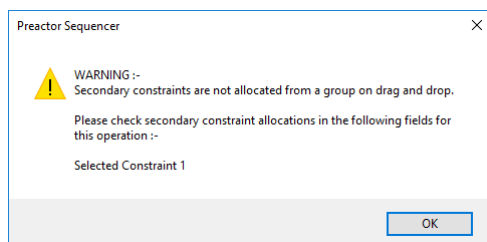
In addition to using Secondary Constraints, it is possible to create groups of constraints that can be applied to either a Resource or an Operation. Creating Secondary Constraint Groups allows for Preactor to make selections from a list of Secondary Constraints, in a similar way to how Primary Resource selection is made.

There is also the ability to model scenarios where individual operators, for example, have multiple skills, and therefore the use of single Secondary Constraints could lead to over utilization, if modeled incorrectly.

In Secondary Constraint Groups, any constraint within that group can be ranked. This is beneficial when it comes to ensuring that there is no shortages in resource.

When a schedule is generated, any record that has been assigned a Secondary Constraint Group, Preactor will auto-populate the assigned Secondary Constraint that has been chosen from the group. If this constraint needs to be changed, it can be done so manually. If the schedule is cleared, Preactor will clear the selected Secondary Constraint field. This does not occur if manually dragging and dropping operations onto the Planning Board.

If trying to manually drag and drop operations onto the Planning Board, a warning message will be shown. An example is shown below.



In AS Standard, there is only one Secondary Constraint Group field. In AS Professional and Ultimate, there are two fields.

Products, BoM, Co-Products and Purchased Items

Preactor can be used to store templates of item routing and bill of material data. These are held in the Product and Products Bill of Materials tables. There is also functionality to store information about Purchased Items in the Purchased Items table. Often when used in conjunction with other business system there is no requirement to store this data in Preactor so usage of these tables is optional. In instances where Preactor AS is not linked to a business system where scheduling specific data is available or order enquiry facilities are needed then these tables can be used to expand details of manually entered data or order header information which has been imported.

Products

The data in the Products table can be set up to represent multi-operation routings using a parent child relationship. This means that the first operation of any routing is set as a parent and all subsequent operations have the parent part set to match the Part No of the parent. The Op. No. assigned to the operations determines the order that they are processed in and the Operation Name must be a unique value within the product routing.

Once the basic operation details have been assigned then the scheduling attributes of that operation can be set up.

Operation Times

This includes setting the standard setup time and process time of the operation. The process time can either be set as an operation time per item, a rate per hour or a batch time. Alternatively a resource specific version of these types can be set to enable the consideration of the times set against each individual resource in the Resource Data list. It is also possible to set a slack time to be applied between this and the previous operation. There is also the possibility to set a delivery buffer against each operation which when backwards forward will give information about when the operations are falling within the delivery buffer. When scheduling backwards the delivery buffer will prevent the operation being scheduled within the specified amount of time before the due date.

Professional & Ultimate

Professional and Ultimate editions can consider some additional advanced inter-operation constraints in the scheduling process. These can be defined against the operations in the products table

Slack Time Before Next Operation – is a slack time between the end of this operation and the next which must be adhered to.

Max Time Before Next Op + Interval Type – The combination of these fields define the time in which the subsequent operation must be processed. The Max Time Before Next Op field contains the time and the Interval type defines whether the time specified is a relationship between the start or the ends of the operations. This feature is useful in situations where the state of material alters over time such as something that becomes less workable as it cools or warms

Maximum Operation Span Increase % - defines the percentage that it is acceptable for the operation length to increase by. Setting this to a low value could prevent the operation from being extended over off shift and low efficiency calendar periods.

Productivity Multiplier – is a value that can be set to alter the speed of processing for a specific operation. Changing the value of this field from the default value of 1 to 2 will half the operation time, enabling the modeling of concepts such as variable manning levels.

Resource Information

The value in the Resource Group field determines which resources are valid for this operation; therefore it determines the list of resources to choose a required resource from and the list of resources in the Resource Data dialog.

Editing the records in the resource data list allows the input of resource specific information for the operation including costing, setup time, process time and resource specific constraint usage. It is also possible to determine, using the Automatic Sequencing toggle, whether Preactor's automatic sequencing rules will include this resource for consideration. The set subsequent resource group field allows the setting of the resources that are valid for all subsequent operations. This is useful in a situation where there are assembly lines set up and orders should not switch between them during processing.

The Secondary Constraints list allows the definition of constraints which are specific to this operation, regardless of which resource it is processed on.

The Secondary Constraint Group fields allows for the definition of Secondary Constraint Groups which are specific to this operation, and can be used as an alternative to applying an individual list of constraints.

In AS Standard, there is only one Secondary Constraint Group field. In AS Professional and Ultimate, there are two fields.

Attributes

The Attributes dialog allows the setting of any additional attributes that are associated with the product or operation. As well as a set of spare attribute fields of varying data types, the functionality of which is described in the attributes section, this dialog enables the setting of:

Transfer quantity, which determines how many pieces need to be processed before an order can move on to the next operation.

The Operation Icon

Costing information – The material cost and user defined operation cost can be set.

Notes and a related Document can be assigned to the operation.

Independent Lots, which determines whether the operation can be linked to a single previous step to retrieve its material or needs to be linked to all previous operations. This means that when this option is selected one lot of an order for this product can continue to be processed before the other lots have begun.

Products BoM

The products BoM holds information about the BoM requirements of the products which are held in the products table. It is a part to part BoM which is used when an order is expanded from a product routing to generate an order specific instance of the BoM.

The Product Bill of Materials table has a family relationship in the same way as the Products table. The Part No. field relates to the product that is consuming the material. In the case of Preactor AS Standard the operation name and op. no. fields must always relate to the first operation of the product routing. The Required Part No and Required Quantity related to the material that is required. Unlike the Part No field the value held in the Required Part No field does not have to be an item that is also represented in the Products table, enabling the modeling of materials that are not manufactured items.

Multiply by order quantity determines whether the required quantity defined is an absolute value unrelated to the order quantity or should be

Ignore shortages determines whether any shortages of this material should affect the ability to schedule orders for the product that requires it. This may be useful in instances when the user wishes to be notified of potential material issues by the scheduling system but the material has a short lead time so should not influence the scheduling results.

The Multiple Quantity allows the modeling of situations where the material should always be consumed in set quantities.

Professional & Ultimate

Preactor AS Professional and Ultimate sees the introduction of the ability to consume and produce materials at any operation of the product. This means that the Operation Name and number defined in the Products Bill of materials can be for any valid operation in the routing and the Product Co-Products table is introduced. This table is set up in the same way as the Product Bill of Materials table except the material produced instead of consumed at an operation step is detailed.

Purchased Items Table

The Purchased Items table is used to support and enhance the Order Enquiry functionality, for when purchased goods need to be considered. Users are able to input lead times, minimum reorder quantities and reorder multiples against a purchased item. The lead time information for an item will be added to the terminator time.

*If an item exists in both the Purchased Items and Products table, by default, Preactor will prefer the Products data before the Purchased Items data. This functionality can be changed by using the **On Order Enquiry Shortages Calculated** PESP event, and by manipulating the Order Enquiry Shortages data.*

Attributes

The Preactor AS Standard configuration has been set up so that much of the scheduling related functionality is applied to operations using attributes. There are a set of attribute fields assigned to each operation of a variety of different data types to enable the addition of different attribute types. The data type of the attribute also has an effect on the scheduling functions that can be controlled from that attribute.

Table Attributes

The table attributes have data sourced from a set of tables within Preactor which must be populated, manually or via import, before they can be used. Having the data held in this way means that these attributes can be used to assign a variety of scheduling functions including:

1. Bar Color, which will determine the color assigned on the Gantt chart to operations with a matching attribute value
2. Secondary Constraints, can be assigned to the attributes which will then be used by every operation that has that attribute set
3. A ranking which is used in the weighting rule to allow the attributes of the operation to affect the prioritization of works orders and operations
4. Setup times, details of which can be found in the [Changeover Groups section](#).

String, Numerical, Date and Duration Attributes fields can be used for information purposes and related tasks such as coloring and locating the bars on the Gantt chart. Additionally Numerical, Duration and Date Attributes have the role of use in the Weighting rule. Numerical Attributes can also set the quantity of secondary constraint that is used by an operation, as described in the Secondary Constraints section.

Professional and Ultimate

1. Preferred Sequence; the ranking associated with the attribute can be used by the resource based advanced scheduling rule to group like operations and schedule them in a preferred order. This is useful in scenarios such as printing operations where moving from a light to a dark color is preferable. This is available for table based, numerical, date and duration attributes
2. Resource Validity; Resources can be marked as invalid for operations of a particular table based attribute. This can be used to model a scenario where there are several orders based on the same base routing, using the same

resource group, but with varying attributes which have an effect on which of those resources in the group is valid. If these rules are not represented in the data sent from upstream business systems they can be easily represented against the attributes.

Setups and Changeovers

There are three locations within the configuration where setup and changeover times can be modeled. These are:

1. Against an operation in the products and orders tables.
2. In the operation specific resource data in the products and orders tables.
3. In the Changeover Groups table.

The Changeover groups table gives the opportunity to use operation attributes to apply sequence dependent setup times. When creating a record in the table it is possible to record a changeover time that only occurs when there is a change in value for each of the table based attributes against the operation. The group that is created can then be applied to as many or as few resources as is required within the resources table. Using this setup it is possible to model compound changeover times which can be applied differently to different resources or groups of resources.

Preactor AS Professional

In Preactor AS Professional it is possible to also model more complex setup changeover times against each of the table based attributes. This is represented by a matrix of 'to' and 'from' values for each attribute which allows different changeovers dependent on which specific values the operations in question have for that attribute.

Calendars

Calendars

Preactor Calendars provide the user with an intuitive approach to the development of both primary and secondary resource shift patterns. It simplifies the definition of standard shifts and allows for the use of arbitrary repeating shift patterns. Default shift patterns can easily be assigned to either resources or groups of resources. Resources, both primary and secondary, may operate under different shift patterns. Complex working practices built up in this manner may be saved for future use. It is simple to switch resources from one shift pattern to an alternative for a short period of time, e.g. overtime working.

There is a hierarchy in how resource calendars are made up. Each resource has a calendar. This calendar defines what calendar template(s) are assigned to a resource. A calendar template is made up of a number of periods. Each period has a calendar state. The creating or editing of calendar states, calendar templates and the assignment of templates to resources is done within the Sequencer.

Use of Calendars

Preactor Calendars provide the user with an intuitive approach to the development of both Primary and Secondary Resource shift patterns. It simplifies the definition of standard shifts and allows for the use of non seven day repeating shift patterns. Default shift patterns can easily be assigned to either Resources or groups of Resources.

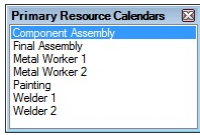
Resources, both Primary and Secondary, may operate under different shift patterns.

Complex working practices built up in this manner may be saved for future use. It is a simple matter to switch Resources from one shift pattern to an alternative for a short period of time, e.g. overtime working.

Primary Resource Calendars Panel

By default Primary Resource Calendars are contained in a hidden docked window.

When you click on the Primary Calendars tab a window appears in the top left of the Sequencer's main window. It lists all the primary resources.



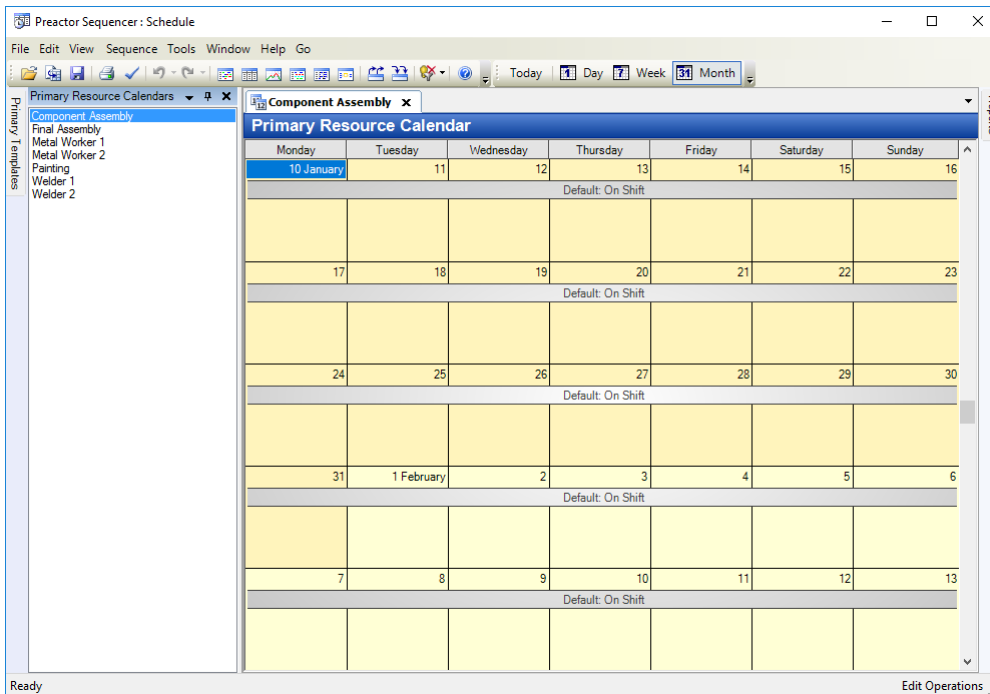
Double-clicking on a resource in the list opens the primary resource's calendar in the main window.

Resource Calendars

Primary and Secondary Resource Calendars are generated by applying one or more Calendar Templates to a resource.

Initially they are generated automatically, as soon as a resource is created, by the application of the Default Template.

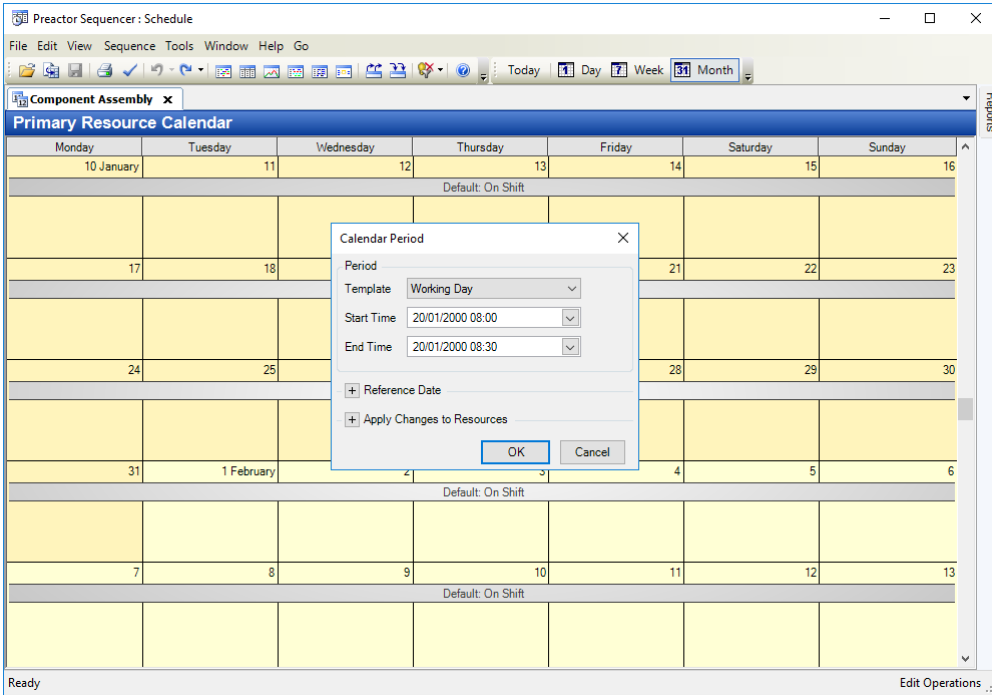
The Default Template is established in Calendar Settings and can be changed using the Calendar Period dialog,(see Default Template).



Resource Calendars are displayed in the Sequencer's main screen by double clicking on a resource in either the Primary Resource Calendar or Secondary Resource Calendar panels.

Calendar Exceptions

Amendments to the default calendar can be made by adding exceptions in the Resource Calendar.



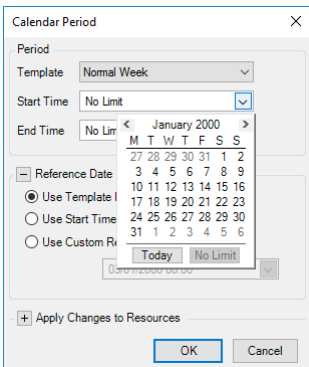
To add a new exception to the Calendar:

1. Double click in a blank space in the calendar.

The Calendar Period dialog is presented.

2. Select the template to be used for the exception.
3. Enter a start and an end date and time for the exception.
4. By default when creating a new exception the start time will be set to 8:00 am on the day you double clicked on.

If you are editing a default period you have the option to set these dates to "No Limit".



This can be done clicking the "No Limit" button on the date dialog. The amendment will then appear below the default calendar on the days you defined. You can edit an amendment by double clicking on it in the calendar.

5. Set the appropriate Reference Date

The date time within the template in which to start the cycle. i.e. if you have a week long template (Monday – Friday) and you wanted to use this template but you where already half way through the week you could set the reference date to reflect this, and your period will start the cycle as if it had been running since Monday.

[Template Reference Date¹](#)

¹This will use the reference date set in the template, the default for the "Default" period.

Start Time Reference Date¹

Custom Reference Date²

6. Select the resources to which the changes will apply. To select all resources, simply right click on the first resource and choose the 'Select All' option from the pop up menu. Multiple resources can also be selected by highlighting the first resource that is to be included (left click on the resource name) and hold down the shift key and left click on the last resource name that is to be included, right click on the highlighted resources and choose the 'Check' option.
7. [Apply Changes to Resources³](#)
8. Click OK.



9. Save the changes to the calendar.

You can edit an existing exception by double clicking on it in the calendar.

Viewing/Editing Multiple Resource Calendars

Although individual Resource calendars can be opened under a tab in the Sequencer's Main Window, it is also possible to open several resources under a single tab.

To view multiple resource calendars under a single tab:

1. Use shift click or control click to select multiple resources in the resource Calendars panel.
2. Right click on the selected resources and choose the "Edit" option.

The resource calendars are displayed in the main window.

¹Uses the current start time as reference date. This is the default for exceptions.

²Allows you to specify a reference date in which the exception will use.

³Displays the resources which the exception applies to. In the multiple resource view this will display the list of resources in which to apply the period to. The resource selection also allows you to select and deselect resources in which to apply the current amendment.

In this case two default resource calendars are shown as the default for one resource differs from the others.

In addition, there are two calendar exceptions, the one shown as a solid color applies to all resources in the group, while the one displayed with a transparent bar only applies to some of the resources. The names of the relevant resources are displayed on the bars of the calendar.

Editing

Resource calendars can be edited in the multiple view just as easily as they can when viewing a single resource.

Editing common exceptions or a common default template will result in the changes being applied to all selected resources. Any non common exceptions will result in the changes only being applied to the resources it applies to.

Adding new exceptions

All exceptions added in the multi-resource view will be applied to all the displayed resources.

Deleting Exceptions

Right clicking on a period in the Resource calendar view will display a context menu which will give you the option to delete.

Amending Primary Resource Calendars in the Gantt Chart

Primary Resource calendars may be modified directly from within the Gantt Chart, facilitating short term changes to working patterns.

To modify a Primary Resource Calendar:



1. Select 'Calendar Edit Mode' from 'View' ► 'Edit Mode', or using the 'Edit Mode' toggle on the 'Standard' tool bar.
2. Double-click on a primary resource calendar at the point where you would like to alter the calendar state.

The Calendar Period dialog is opened:

3. Select the revised template, set the start and end times, change the details if necessary and set any other resources to which this change is to be applied.

Note: When editing calendars in this way, the list of resources that appears under 'Apply Changes to Resources' is limited to resources with the same calendar period at the same time prior to opening the edit dialog.

Amending Secondary Resource Calendars in the Plots window

If secondary resources are defined, it is possible to alter the resource calendar from the Plots window.

To accommodate short term changes, Secondary Resource Calendars can be modified from the Plots window.

To modify Secondary Resource Calendars:

1. With the Sequencer open, select the Plots Window from the View menu bar command.
2. Right click with the mouse on the secondary plot you wish to modify.

The Calendar Period dialog is displayed.

4. Select the required template.
5. Enter a Start Time and End time for the period being modified.
6. Complete the remaining details.
7. If necessary select the secondary resources to which the changes are to be applied.
8. Click OK.

Drag and Drop Templates into Calendars

Resource Calendar Editor

Templates can be dragged and dropped into individual and groups of resources calendars.

On drop, if the selected template can successfully be added, it will be inserted into the calendar.

In "Day" view the template will be added with a start time set to the start of the time slot it was dropped and set for a duration of 15 minutes.

In all other views the template will be added on the day it was dropped starting at midnight and running for 24 hours.

Similar to the Resource Templates a Ø (no entry) will be displayed if a period already exists in the location you are trying to drop and the status text "A period already exists at this location, Periods cannot overlap" will be displayed in the parent window.

Resource Calendar Printing

Several different views of the primary and secondary resource calendars may be previewed and printed.

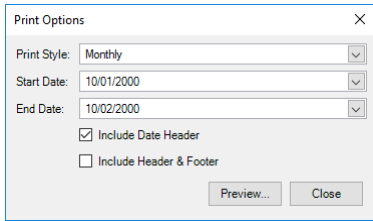
To print resource calendars:

1. In the Sequencer open the docked Primary or Secondary Calendar windows by selecting the appropriate tab to the left of the main window.
2. Select the required resource or resources (using Click with the Shift or CTRL keys).
3. Right click on a selected resource and select the "Edit" button that is presented.

The calendars are opened in the main window.

- From the File menu bar command, select Print Resource Calendar.

The Print Options dialog is displayed.



Print Style

Print Style options provide a Monthly, Weekly or Daily view of the Resource calendars and allow you to select the date range involved.

A further option 'Calendar Details' prints a detailed breakdown of templates and exceptions on a daily basis.

Include Header and Footer

If the "Include Header & Footer" check box is checked the Resource Calendar name(s) and current date are printed.

Include Date Header

If the "Include Date Header" check box is checked, date and calendar information is added to the printed output.

June 2000							July 2000						
M	T	W	T	F	S	S	M	T	W	T	F	S	S
			1	2	3	4					1	2	
5	6	7	8	9	10	11	3	4	5	6	7	8	9
12	13	14	15	16	17	18	10	11	12	13	14	15	16
19	20	21	22	23	24	25	17	18	19	20	21	22	23
26	27	28	29	30			24	25	26	27	28	29	30
							31						

Monday	Tuesday	Wednesday	Thursday	Friday	Sat/Sun
29 May	30	31	1 June	2	3
Default: Custom Values(Min:0, Max:1)					
					4
Default: Custom Values(Mi					

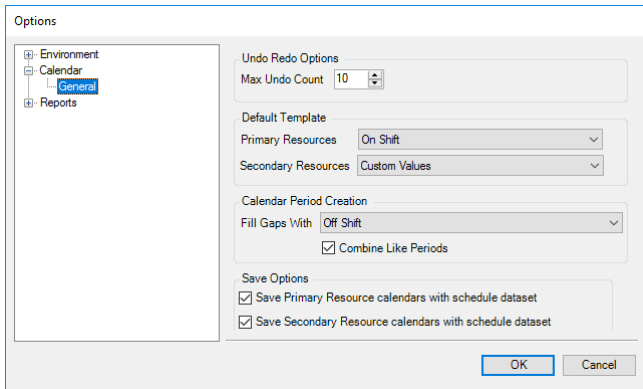
- Click the "Preview" button.

The Print Preview dialog is displayed. Here options allow you to control the page set up and the way in which calendars are viewed

- Once you are satisfied with the options chosen select the print option from the File menu bar command.

Calendar Options Calendar

Default settings for Calendars are established in the Sequencer. These settings are accessed from the menu **Tools ▶ Options**.



The **Undo Redo Options** section allows the specification of a **Max Undo Count**. This is the maximum number of times the **Undo** or **Redo** toolbar buttons may be consecutively clicked.

The **Default Template** section has drop down lists where selection of which default template will be used when creating Primary or Secondary Resources. The template can then be changed during editing of the created resource.

The **Calendar Period Creation** section has a drop down list where a period can be selected, which will be used to fill gaps within a calendar. The **Combine Like Periods** check box, when enabled, will combine any calendar periods into one period when they are the same. For example, a 3 hour On Shift period followed by a 2.5 hour On Shift will be combined into a singular 5.5 hour On Shift.

The **Save Options** section allows for the enablement of resource calendars, both Primary and Secondary, to be saved when the schedule dataset is saved. If these check boxes are not ticked, then any changes made to the resource calendars will not be saved and loaded when the schedule is saved/loaded.

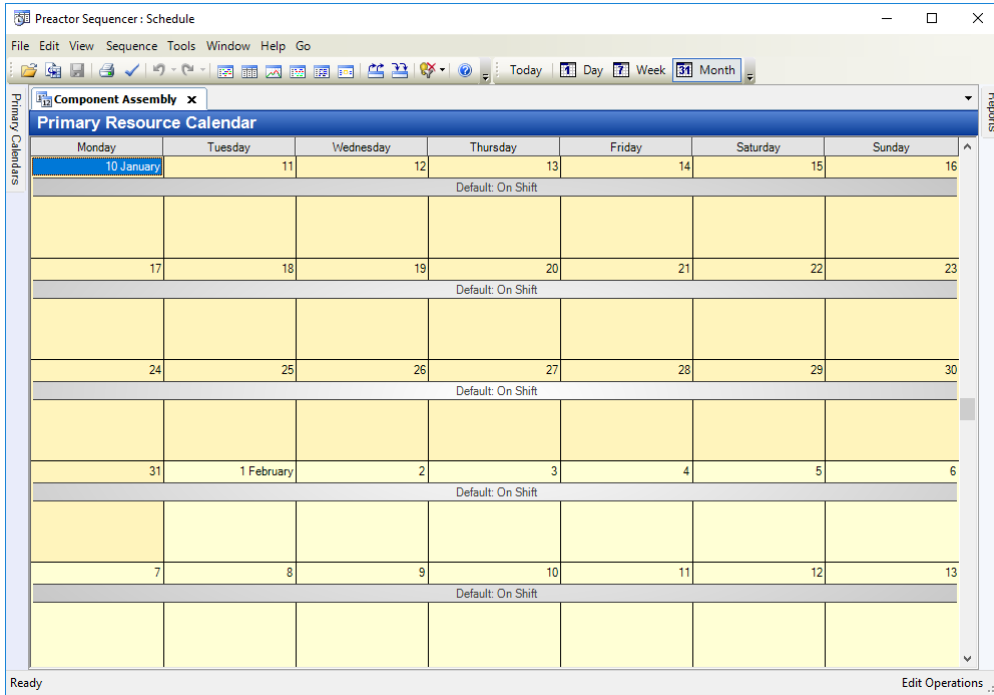
Default Template

Whenever a new Primary or Secondary resource is created, a default template is assigned to it using the values established in the **Calendar Editor Settings** dialog.

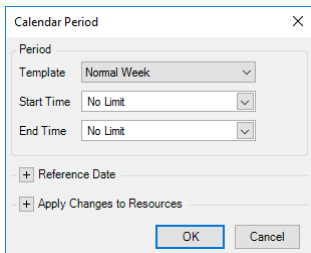
To replace the existing default template:

1. Double click on a Primary or secondary Resource in either of the **Resource Calendar** panels.

This displays the resource calendar in the Sequencer's main screen.



2. Double click on the **Default:** template in the gray bar, which in the image is **On Shift**.



The Calendar Period dialog is opened.

- 3. Select the required template from the options available.
- 4. If you wish to change the default template for a specific period of time enter a start and end time.

This would allow you to introduce a different work pattern during the summer months for example.

- 5. Click **OK**.
- 6. Save the changes to the Resource Calendar.

Calendar States

Calendar states allow you to define the properties applicable to resources for a given condition. Typical states used are: Off Shift, On Shift, Breakdown and Overtime. Each state is identified within the sequencer Gantt Chart by the color and pattern assigned to it.

To access the Calendar States data table select 'Calendar States' from 'Calendars' in the 'View' menu.

Add/Edit Calendar States

Existing calendar states can be modified by opening the existing record, and new states added by double-clicking on a blank row or selecting 'New Calendar State' (📅) from the calendar states toolbar.

The Calendar State dialog has a number of fields to be completed.

Name

This serves only as an identifier and is used to identify a state when used in a calendar template or any other case where states may be referenced within the Preactor sequencer. It is typical to use names such as 'On Shift' to convey a meaning. It is possible to define states that only differ by name, which can be useful if identification of calendar states is important (e.g. 'Early Shift' / 'Late Shift').

Color

The color assigned to a shift state is then used to identify period of that state in the sequencer Gantt Chart.

Hatch Style

The hatch style may be selected from a list of available styles. This then forms the repeated pattern that is used to fill calendar periods of this state. It is a good idea to use styles that differentiate calendars from operations in order that one cannot be confused with another when looking at a busy Gantt Chart.

Note: The visibility of a calendar state is not only affected by the color and hatch style selections, but also the calendar view option selected. By default Preactor will show off shift (i.e. 0% efficiency) calendar periods only.

Efficiency

The efficiency of a resource affects the rate at which operations are processed while a resource has this state applied. Often this value will be set to either 100% or 0% to indicate an active or inactive state. There are times though where other efficiencies may be appropriate. Any positive efficiency value may be used. For example, if a resource with two operators can run twice as fast, you may want to define a '2 Operator' state for that resource, with an efficiency of 200%. Another common case is where optimistic or pessimistic operation times have been defined. A way to globally affect these operation times would be to set your resource efficiency to say 90% or 110% to compensate.

Cost Factor

The cost factor is applied to a resource's 'Cost per Hour'. This can be used to indicate elevated costs when processing operations against a resource in a particular state. For example additional overhead, overtime costs etc.

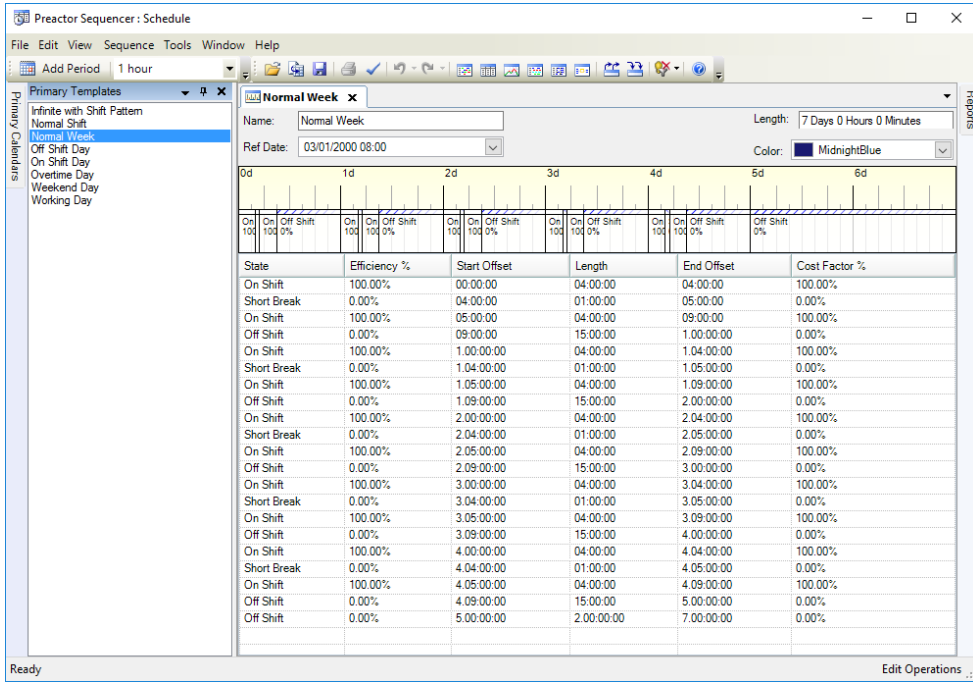
Setup Allowed

Setup allowed defines whether setup can proceed while a resource is in this state. A calendar state where setup is not allowed will never allow the setup portion of an operation to commence. Although an operation may have zero setup time, Preactor considers that all operations have a setup portion. This means that even operations with zero setup cannot start on a resource where there is no calendar period that allows setup. Once an operation has been allowed to start, calendar periods that do not allow setup are treated as 0% efficiency with respect to the setup portion of an operation. Generally calendar states allow setup times and the commencement of setup is controlled through operation relationships, but disallowing setups on a calendar state may be appropriate in some cases. For example, you have a class of unattended resource where setup operations can occur only during a manned shift period, but once set up, the resource can continue processing the operation through unmanned shift periods.

Primary Resource Templates

Primary Resource Templates are accessed by selecting a Primary Template in the templates panel and double clicking on it.

This opens the Primary Resource Template in the Sequencer's main screen.



A Template is simply a named set of calendar periods and each period has an associated Calendar State.

The length of the template defines the repeating cycle. For example, if the template length is seven days then a resource with this template will repeat this cycle every seven days.

To create a new template:

1. In the Sequencer, select Primary Calendar Template from the File command's 'New' option.
2. Enter a name for the template.
3. In the Length field enter the template length, the time period over which the shift cycle is completed.

The Reference Date, the date on which the template is applied and the identifying Color, displayed in the Gantt Chart, are only required for Higher Level Templates.

4. Enter the Template Periods required in the new template (see Modifying Templates).

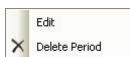


5. Save the Template.

Saving the template adds it to the primary template panel.

To Edit or Delete an existing Primary Calendar Template:

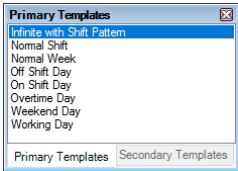
1. Right click on a name in the Primary Template Panel.



2. Select Edit or Delete Period from the options presented.

Primary Templates Panel

By default the Primary Templates panel is located to the lower left of the Sequencer's main window. It lists all the calendar templates that you have created for primary resources.



Double clicking on an item in the list opens its Primary Calendar Template in the main window.

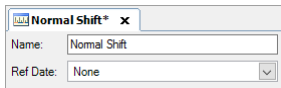
Modifying Templates

We can amend all aspects of existing Primary and Secondary Resource Templates by performing any or all of the following operations.

- Add period
- Delete period
- Edit period
- Move period (drag with mouse)
- Change template length
- Change start offset / end offset (drag with mouse)



Once modifications have taken place, templates must be saved to retain the changes.



If the Template's Tab contains a star (*) next to the tab name, it has changes that have yet to be saved.

Add Period

The Calendar Editor allows you to add periods to existing primary or secondary resource templates.

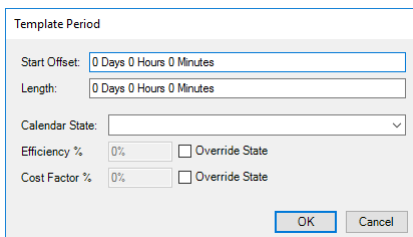
To "add" a Resource Period to an existing template:

1. Open the required template in the Sequencer's main window.



2. From the Edit toolbar select the " Add Period" option or right click on a blank line beneath any existing entries.

The Template Period dialog is displayed.



By default the calendar period edit dialog will appear with the end offset of the latest period and the same length as the latest period.

Periods may be added anywhere in the template as long as there is no conflict with an existing period.

3. Insert values for "Start Offset" and period "Length".
4. Select the "Calendar State" to be applied.

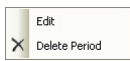
When a Calendar State is selected, the 'Efficiency %' and 'Cost Factor %' fields display default values established in the Calendar States data table. These may be overwritten by checking the adjacent check boxes and entering a new value in these fields. This will effectively lock these values whatever happens to the underlying default values of the Calendar State.

Delete Period

The Calendar Editor allows you to delete periods from existing primary and secondary resource templates.

To delete a period:

1. Open the template to be modified.
2. Right click on the period record you wish to delete.



A pop up selection menu is presented.

3. Select Delete Period.

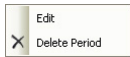
Edit Period

In the Calendar Editor you can edit periods from existing primary and secondary resource templates.

To edit a period:

1. Open the resource template to be modified in the Calendar Editor's main window.

Right click on the period record you wish to modify.



A pop up selection menu is presented.

2. Select "Edit".

A Template Period dialog is displayed.

 A screenshot of the 'Template Period' dialog box. It contains the following fields and controls:

- 'Start Offset': 0 Days 0 Hours 0 Minutes
- 'Length': 0 Days 0 Hours 0 Minutes
- 'Calendar State': A dropdown menu.
- 'Efficiency %': 0% with an 'Override State' checkbox.
- 'Cost Factor %': 0% with an 'Override State' checkbox.
- 'OK' and 'Cancel' buttons at the bottom.

3. Modify the details as required and select OK

Move Period

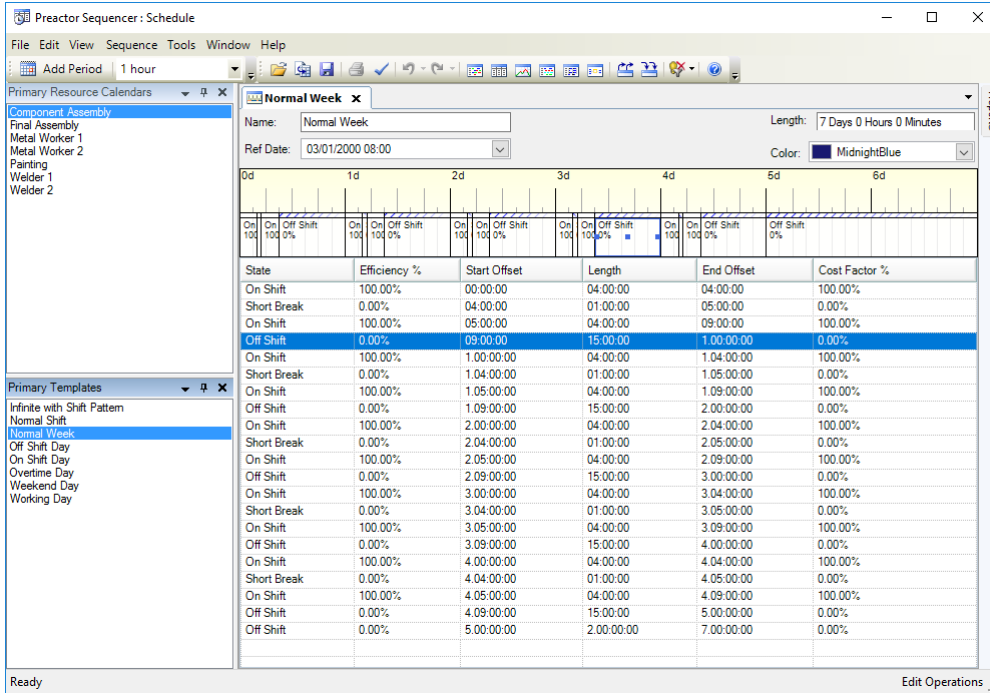
Periods can be moved within an existing template.

Note: Only if collisions with other existing periods are avoided.

To move a period:

1. Hover the mouse pointer over the center of the period in the template's calendar view.

A central node appears, accompanied by direction arrows.



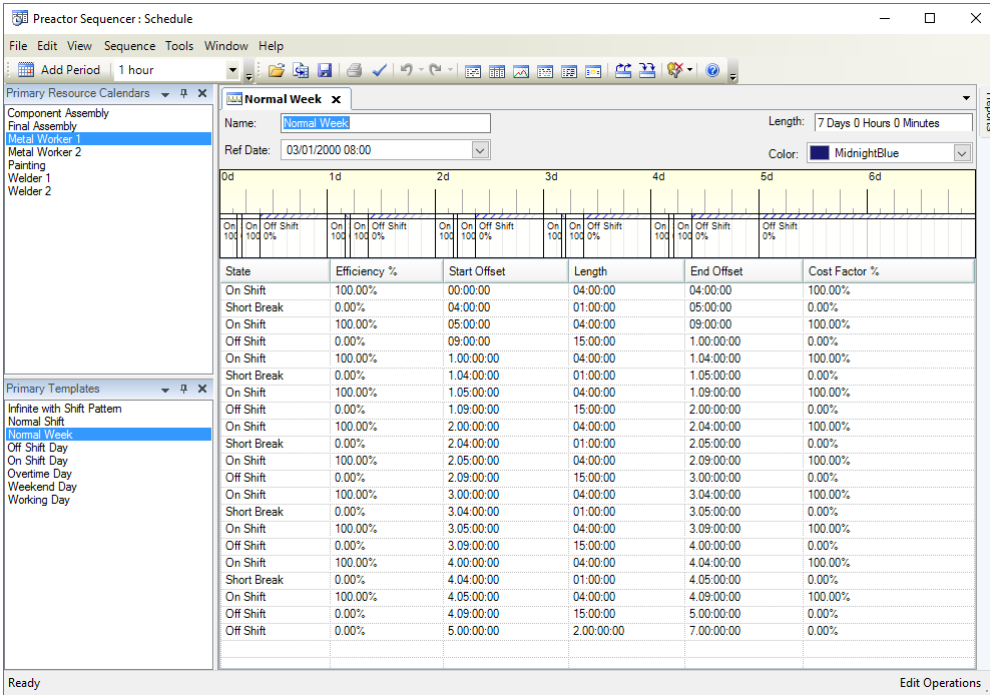
2. Click and drag the node to left or right.
3. Release in the required position.

Change Template Length

All time periods assigned to a resource template occur within its overall template length.

To change the template length of an existing resource template:

1. Open the existing template.



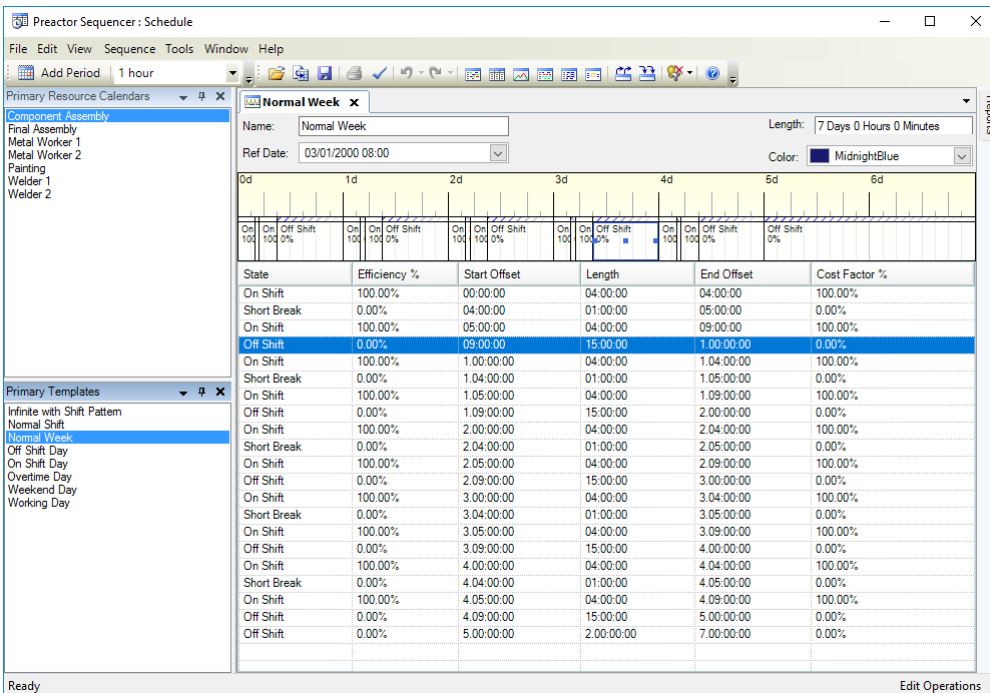
2. In the "Length" field at the top-right of the form, modify the overall length of the template.

Change start offset / end offset

In the Calendar Editor, Start and End Offset values specify the relationship of a period to the Resource Template in which it is allocated.

To change the start offset or end offset of a period:

1. Open the Resource Template to be modified.
2. Hover the mouse over either of the select nodes at each end of the period to be modified. Click and drag the node to move the start offset or end offset to a new time.



Snap Periods To

When moving calendar periods, or amending the start offset / end offset in the calendar template view, the "Snap Periods To" option is obeyed.

Opened from the View command, you can select from a number of predefined values what you would like your snap value to be.

Editing calendar periods manually still allows any other values to be entered.

Building Higher Level Templates

Higher level templates, representing a working day, week or month, for example can be constructed using existing lower level templates.

To build a higher level template:

1. Open the Calendar Editor.
2. Select the "New" option from the File menu bar command, and select Primary Calendar Template.

You could also select Secondary Template at this point.

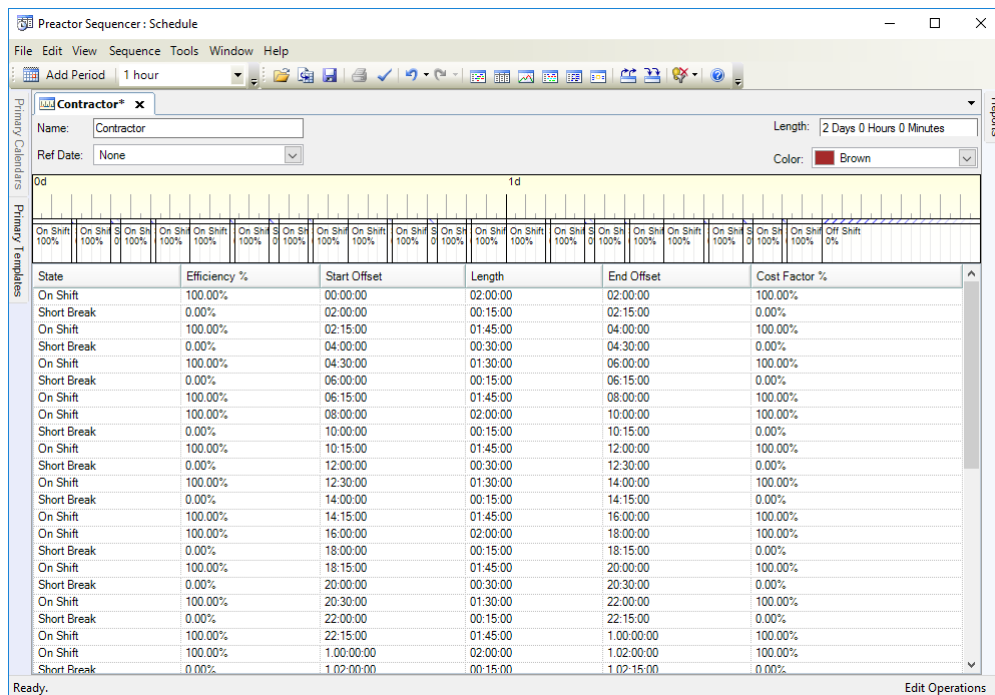
3. Enter a name and overall length for the template.
4. If this is a top level template, i.e. which will be used directly by a Resource Calendar, enter a Reference Date and Color.

The reference date fixes the starting point for the template's application.

We can now enter work periods by double clicking on the first blank line and completing the Template Period dialog or we can drag and drop existing lower level templates from the list of Primary Templates into this new one.

5. Click and drag the Working Day template from the primary Templates panel and drop it anywhere in the lower half of the new template.
6. Select this template again (or any other) and add that to the new one, and so on.

As they are added, the time periods are represented graphically against a timescale in the new template.



If for example an "Off Shift" period that has been added was not long enough to fill a particular time period, this could be extended by clicking on its graphical representation and dragging its finishing time to a new position.

This position can be influenced by the setting of the "Snap Periods To" tool bar command.

It is advisable not to leave any time gaps in your template, ensuring that the whole of the template length is filled with either "On Shift" or "Off Shift" periods.



7. Once the template is complete, save the file.

Saving the template adds it to the Primary Templates panel.

Secondary Calendar Templates

Secondary calendar templates are, in most regards, the same as primary calendar templates. The difference is that rather than setting the calendar state, efficiency and cost factor of a primary resource over the duration of the template, instead you control the minimum and maximum values for a secondary constraint.

Orders

Much of the data in the orders table can be populated from the products table where Preactor is using this as the source of the routing information. Otherwise this data can be imported directly. The details of the usage of the fields on the Resources, Operation Times and Attributes dialogs can be found in the documentation for the Products table. "Products, BoM, Co-Products and Purchased Items" on page 210.

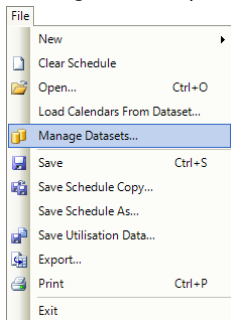
Order Datasets

A data set is a collection of operations that make a schedule and (optionally) the calendars that are valid in producing that schedule.

Data sets are stored with unique names. The data set named 'Schedule' is the one that is typically opened when entering the Sequencer.

For more information on storing calendars and datasets, "Calendar Options" on page 219.

Management options for datasets are available from File menu:

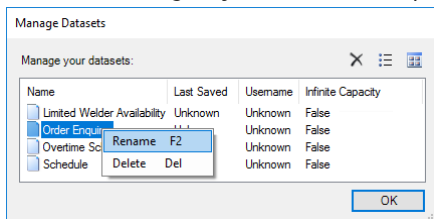


The options are:

- **Open** allows a saved Dataset to be opened and used, restoring both the Schedule and Calendars.
- **Save** allows the Dataset to be saved in the standard location (Schedule).

- **Save Schedule Copy** creates a new Dataset with the name provided.
The working Dataset continues to be used and updated with future changes to the schedule.
Some admin housekeeping of the stored Datasets is also possible from this window.
- **Save Schedule As** creates a new Dataset with the name provided.
The new Dataset becomes the working copy, the previous working Dataset now becoming unchanged.
Some admin housekeeping of the stored Datasets is also possible from this window.
- **Load Calendars From Dataset:** If the configuration option Save Calendars with Schedule Dataset checked, this allows the Calendars but not the Schedule to be loaded.
Some admin housekeeping of the stored Datasets is also possible from this window.
- **Manage Datasets** allows some admin housekeeping of the Datasets.

When selecting any of the above options which allow admin housekeeping , a window similar to the following is opened:



From this window, the user can:

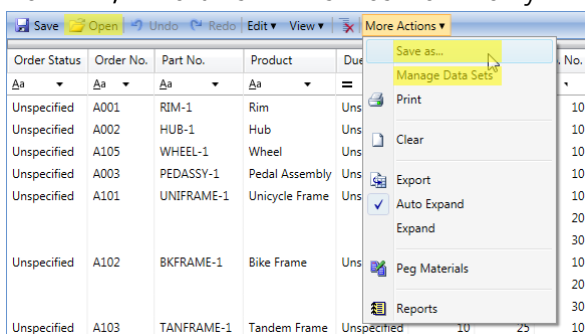
- Identify existing saved Datasets with associated information.
- Use the icons at the top of the window to select a Schedule to be deleted, or for the saved schedules to be shown in list or icon format.
- Right click on a Dataset to Rename or Delete it
- For Save Schedule Copy... and Save Schedule As... options, enter a name to save the current schedule as.
- For Open and Load Calendars From Dataset options, select a saved Dataset to open from..

When exiting the sequencer, the user is prompted to save changes to the schedule in the current Active Dataset, i.e. the last Dataset opened, or the Dataset last saved to.

When entering the Sequencer, the Dataset named Schedule is always set as the Active Dataset.

If it is required to make a Saved Dataset the one opened automatically when entering the Sequencer, that Dataset should be opened, then Saved As the Schedule Dataset.

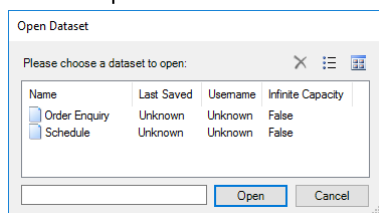
Datasets for tables can also be managed outside the Sequencer, if Preactor has been so customized.
However, the orders table is most commonly the table managed.



Above we see the ability to edit Orders added to the Workspace,

With Dataset Management enabled, the user is offered the options to Save as... and Manage Datasets under More Actions,

and to Open Datasets. Windows similar to those described above for the sequencer are opened.



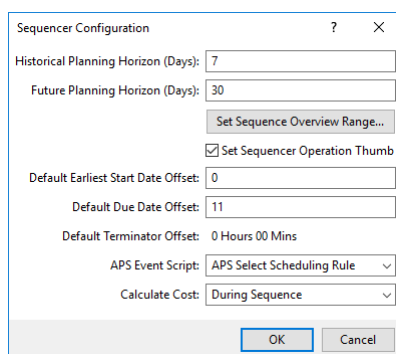
Configuration

Sequencer Configuration Settings

The Sequencer has a number of date offsets, periods, and other settings whose defaults need to be defined.

These defaults can be configured via:

Configuration ► Sequencer Configuration



The configurable items are:

For the Gantt Chart Window:

- Historical Planning Horizon.

This determines how far back from the current date (or Fixed date) the sequencer will show calendars for, and how far back in history the Terminator line can be taken.

- Future Planning Horizon.

This determines how far forward the Sequencer is allowed to plan for. Operations that would fall outside this horizon will not be placed onto the planning board.

- Set Sequence Overview Range.

What the range of the Gantt Chart will be, in the Sequencer.

The Sequence Overview Range can be set to:

- Fit to Items – The range will show all objects currently on the planning board.
- Full Range – The Gantt Chart range will show from the current date minus the Historic Planning Horizon, to the current date plus the Future Planning Horizon.
- Custom – The user can define the number of days offset from the current date to start and end the Gantt Chart range (-ve numbers for dates before the current date).
- Progress Control Color – See the Product Based Feature Lists for [Mid-batch Update](#) and [Operation Progress Indicator](#).

- Default Terminator Offset.

When opening the Gantt Chart, the Terminator line is shown at this offset past the current time.

- Set Sequencer Operation Thumb

This enables a small icon to appear on the Planning Board just at the start of the operation, to enable the user to hover the mouse over and get details about the operation and to easily drag and drop the operation. This is useful when the operation is so short it is difficult to see on the Gantt Chart – the thumbnail is never reduced in size.



For the Order Editor

- Default Earliest Start Date Offset.
- Default Due Date Offset.
- Default Terminator Offset.

Sequencer Configuration

The 'Sequencer Configuration' option is accessed by selecting the 'Configuration' category and then clicking on the 'Sequencer Configuration' option in the 'Settings' work flow area. This displays the 'Edit Sequencer Configuration Information' dialog.

Historical Planning Horizon (Days) - defines how far you can scroll backwards in time in the Sequence Gantt Chart.

Future Planning Horizon (Days) - The time period that Preactor will allow jobs to be sequenced into the future, the Schedule Horizon. When the sequencer initializes, it creates all the shift patterns for all resources up to the end of the schedule horizon. If the horizon is very long then it will take longer to initialize the sequencer.

Set Sequence Overview Range - opens a dialog which customizes the period displayed in the Sequence Gantt Chart.

Set Sequence Operation Thumb - toggles a small black triangle displayed against each operation in the Sequencer, making it easier to drag operations displayed on the planning board.

Set Progress Control Color - sets the color that displays an operation's progress in the Sequence Gantt Chart when mid-batch quantities and times have been recorded.

Default Earliest Start Date Offset - When new orders are entered in the Editor, they will automatically be assigned an 'Earliest Start Date', that is the time before which the first operation of the order cannot be scheduled. The 'Default Earliest Start Date Offset' uses the time of entry of the order and the offset time to assign the value. Set to 0 will mean that the first operation will be loaded as soon as possible. An offset of 1 (1 Day) will mean that the first operation will be loaded as soon as possible after the current time + 1 day.

Default Due Date Offset - similar to the Default Earliest Start Date Offset except that this defines the offset that will be used to set the delivery date for the order. For example, if set to 11, the due date will be set to current time + 11 days.

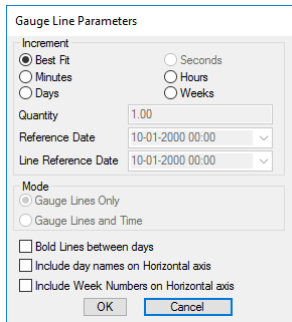
Default Terminator Offset - The terminator is the current time and is used in the sequencer when removing operations from the planning board. Any operations that cross the terminator are not usually removed. By default the terminator is at the current time. Specifying an offset here allows you to move the terminator relative to the current time.

Calculate Cost - establishes options defining when cost calculations take place - During Sequence, After Sequence or Never.

Choose Default Event Scripts - displays a dialog which allows default PESP Event Scripts to be assigned to various actions.

Gauge Lines

Gauge lines are used in any window with a time line. This includes the Gantt Chart, Trace Chart and Plots window. Gauge lines can be toggled on or off by choosing **View ▶ Gauge Lines**. To configure gauge lines, double click on the time line of the Gantt Chart. This will show the following dialog:



All windows with a time line follow the same settings.

Gauge Line Parameters

Increment

Choose from the available options. You can specify an increment along with a unit type. Using 'Best Fit', Preactor will decide the appropriate interval at which to display a gauge line.

Mode

When using any 'Increment' option other than 'Best Fit', determines the frequency with which labels in the horizontal axis are drawn. When 'Gauge Lines Only' is selected, the increment pertains to the gauge lines and not to the horizontal axis labels. When 'Gauge Lines and Time' is selected, Preactor will attempt to display labels in the horizontal axis at the increment specified. Where it is not possible to display a label, 'Best Fit' will prevail.

Options

The final set of options are as described below:

- **Bold Lines between days** - Any gauge line that falls between one day and the next will be made bold.
- **Include day names on Horizontal axis** - Display the day of the week alongside the date/time in the horizontal axis.
- **Include Week Numbers on Horizontal axis** - Displays the week number along with the date/time in the horizontal axis.

Menus And Toolbars

Menu Bar Commands

The Sequencer's Menu Bar Command options and associated Toolbar Buttons are described in the following section:

[File](#) - The available command options vary with the view currently displayed in the Sequencer's main window.

[Edit](#) - Most options are applicable only to the Editor window.

[View](#) - Used to select the Windows displayed in the Sequencer and to control the way in which information is displayed.

[Sequence](#) - Provides the Sequencer's principal scheduling functions.

[Tools](#) - Provides tools to be used in conjunction with the schedule.

[Window](#) - Provides options to change the Sequencer's workspace layout.

Help - lists the available user help facilities.

Toolbars in the Sequencer

For general Toolbar management and usage, see the section in the [Preactor Tour](#).













The Sequencer has a number of toolbars:

- Standard - available at any time.
- Workspace - available at any time.
- Sequence - available at any time.
- User Tools - available at any time.
- Zoom and Scale - available at any time.
- Overview - available when the Gantt Chart window is focused.
- Editor - available when the Editor window is focused.
- Trace- available when the Trace window is focused.
- Calendar States- available when the Calendar States window is focused.

See [Menu Bar Commands](#) for details of toolbar button functions.

File Menu Bar Command













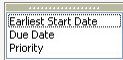
The File Menu Bar Command options and associated toolbar buttons are listed here.

Button Name	Description
New	Allows new Calendar Templates to be generated.
 Clear Schedule	Deletes all operations (orders) from the current schedule, and clears the schedule.
 Open...	Opens previously stored Dataset.
 Open Comparative Schedule	Opens a second file for comparison with the first.
 Close Comparative Schedule	Closes the comparison file.
 Import from Disk...	Imports data from an external source.
 Save	Saves the current Dataset.
 Save Schedule Copy...	Saves a snapshot of the working Dataset to a different name. This differs from 'Save Schedule As' in that the schedule you originally loaded remains the current schedule; any subsequent saves will still be performed against the originally loaded schedule rather than the copy. See also the Manage Sequencer Datasets .
Save Schedule As...	Saves the current Dataset under a user defined name. The newly named Dataset becomes the current Dataset. See also Manage Sequencer Datasets .
 Save Utilization Data...	Configures and saves the utilization report.
 Export...	Export the schedule to a file/location as defined by the PESP script For Event Export Button Press.
Load Calendars From Dataset	Loads just the Calendars from the named Dataset to overwrite the current working copy of the Calendars. The Schedule and Transaction data are not restored.
 Manage Datasets.	Opens the Manage Datasets dialog where Datasets can be renamed or deleted. See also Manage Sequencer Datasets .
 Print...	Prints the contents of the current window. e.g. Print Gantt Chart, Plots etc.
 Print Preview	Provides a preview of the printed output.

Button Name	Description
Exit	Exits from the sequencer saving the current schedule and calendar. (This can also be achieved by clicking on the cross at the top right hand corner off the screen.)








Edit Menu Bar Command



















The Edit Menu Bar Command options and associated toolbar buttons are listed below:



Button	Name	Description
	Undo	Undo previous listed actions.
	Redo	Redo previous listed actions.
	Edit...	Edit the selected record or add a new record, if you select the row beneath the last record in the Schedule.
	Insert...	Insert a new record before the selected record.
	Delete...	Delete the selected record.
	Duplicate	Copy the selected record.
	Repeat Order...	Allows you to repeat an existing order or split an order into a number of production batches.
	Auto Expand	Enables automatic record expansion.
	Expand Orders	Expands all orders in the Schedule.
	Set Earliest Start Date for all records	Sets the Earliest Start Date, using the offset established in the Configuration Data menu.
	Set Due Date for all records	Sets the Due Date using the offset established in the Configuration Data menu.
		Allows you to set the Earliest Start Date, Due Date or Priority for all records. (Editor Window only.)
	Global Assign	The Global Assign option of the Sequencer Edit menu bar command displays the following fields for modification:
		

View Menu Bar Command

View commands are context sensitive and are dependent on the Sequencer window that is in focus.












Button Name	Description
	Overview Window Displays the Overview Window.
	Gantt Chart Displays the Gantt Chart Window.
	Editor Window Displays the Editor Window.
	Plot Window Displays the Plot Window. This feature is not available in Preactor Express.
	Trace Chart Window Displays the Trace Chart Window.
	Utilization Window Displays the Utilization Window.
	Material Explorer Displays the Material Explorer Window.
	Unscheduled Operations Displays the Unscheduled Operations window.

Button Name	Description
Calendars	Displays Primary and Secondary, Resource Calendars, Templates and Calendar States. This will not operate if the required display is already open as a hidden window.
Reports	Opens the Reports window if this is not already open as a hidden window.
Highlight Options	Displays the operation Highlight Options options.
 Gauge Lines	Enables the gauge lines for all windows, except the Editor and Material Explorer windows.
 Animate Sequencing	Enables animation of Automatic Sequencing.
 Disable Workspace Tooltips	Disables the tooltips which appear when you hover the mouse over an operation.
 Hide Children	Hides child records in the Editor window. (Editor window only.)
 Highlight Selected Records	Highlights the currently selected record(s). (Editor window only.)
Show Inherited Items	Shows more information for child records. (Editor window only.)
 Field Chooser	Opens the Field Chooser dialog, allowing for more columns to be displayed in the Editor. (Editor window only.)
 Reset Layout	Resets all layout modifications, including size and positions of columns. (Editor window only.)
Save Customization on Exit	If enabled, will save any customization made to the layout. (Editor window only.)
Zoom and Scale	Provides options to control how Plots and Charts are displayed . (Gantt Chart, Trace Chart and Plots Windows only.)
Edit Mode	Allows you to use the Gantt Chart to modify operations or calendars using:  Operation Edit mode or  Calendar Edit mode.
Display Priority	Allows the Gantt Chart display to show:  Operations On Top or  Calendar On Top.
 Show Operation Relationships	Displays flow lines between related operations in an order. (Gantt Chart and Trace Chart Windows only.)
 Show Highlighted Operation Relationships	Displays flow lines between related operations when orders are highlighted. (Gantt Chart and Trace Chart Windows only.)
 Compress Gantt	Hides Resources with no highlighted operations in the Gantt Chart. (Gantt Chart window only.)
 Overview Groups	Allows you to select a group of resources to view in the Gantt Chart. (Gantt Chart window only.)
Bar Text	Allows you to enable three different options for the text in an operational bar: outline description text, small description text, rotate description text. (Gantt Chart and Trace Chart Windows only.)
 Normalize Trace Chart	Displays the Trace Chart normalized relative to the Due Date of the operation. (Trace Chart window only.)
 Show Demarcation Between Rows	Enables more visible lines between operation lines. (Trace Chart window only.)
Vertical Axis	Enables the subject of the X (vertical) axis of the Order Trace Chart to be selected. (Trace Chart window only.)
 Configure Plots	Opens the Select User plot dialog allowing the plots displayed in the plots window to be chosen. (Plots window only.)

Button Name	Description
 Configure Utilization	Opens the Utilization dialog, allowing for enabling and disabling of items shown. (Utilization window only.)
 Bucket Settings	Opens the Bucket Setting dialog for configuration of utilization buckets. (Utilization window only.)
Set Utilization Mode	Enables the Utilization window to be set in either percent or hours. (Utilization window only.)







Sequence Menu Bar Command

The Sequence Menu Bar Command options and associated toolbar buttons are listed below:

Button Name	Description
 Forward Sequence	Sets the sequencing mode to forward and presents the available forward sequencing options .
 Backward Sequence	Sets the sequencing mode to backward and presents the available backward sequencing options .
 Bi-Directional Sequence For All Locked Operations	Sets the sequencing mode to bi-directional around locked operations and presents the available bi-directional sequencing options .
 Set Weight	Displays the Set Weight Window.
 APS Rules	Sets the sequencing mode to use "APS rules" and presents a dialog from where an APS rule can be selected from the available options.
 Remove Operations from Schedule	Removes all operations from the planning board that are not locked.
 Lock History	Locks all operations that have already started.
 Lock Started Orders	Locks all operations in an order that has already started.
 Ignore Locked Operations	When selected operation locking is ignored.
 Disable Secondary Constraints	Disables checking of secondary constraints.
 Schedule Despite Shortages	Enables the sequencing of operations when constraining materials are unavailable.

Tools Menu Bar Command



The Tools Menu Bar Command options and associated toolbar buttons are listed below:

Button Name	Description
 Peg Materials	Runs Standard Material Control (SMC) using the 'Pegging Rule' that has been set as the default to use, to create links between orders.
 Infinite Capacity Sequence	Sets the Sequencer into Infinite Capacity mode.
<input checked="" type="checkbox"/> Validate Schedule	Validates the current schedule.
 Repair Schedule	Repairs the schedule keeping operations on the same primary resource where possible.
 Schedule Statistics...	Displays the Schedule Statistics.
 Order Enquiry...	Opens the Order Enquiry dialog, allowing a promise date against an order enquiry to be calculated without reorganizing other operations that have already been scheduled.
 Operation	Opens the "Operation Properties Window" on page 256.

Button Name	Description
Properties	

Window Menu Bar Command

The Window Menu Bar Command options and associated toolbar buttons are listed below:









Button	Name	Description
	Save Workspace	Saves the current workspace as a .prwpi file.
	Restore Workspace	Prompts user to select a previously saved Workspace to open
	Predefined Workspace	Allows the user to edit the Predefined workspace buttons. See: Predefined Workspace Toolbar
	Workspace Options	Provides two options - " Save Workspace on Exit " and " Save Toolbars with Workspace ".
	Close All windows	Closes all visible windows.
	Minimize All windows	Minimizes all visible windows.
	<u>1</u> Overview	Name of a window that is currently open in the Sequencer.
<input checked="" type="checkbox"/>	<u>2</u> Plots	Name of a window that is currently open in the Sequencer and which has focus.







Highlight Options Menu Bar Commands

Operations and Orders can be located and highlighted based on common criteria (late, early, etc), and highlighted operations locked or unlocked. Multiple criteria can be used, e.g. highlighting Actual (complete) operations and those within the Delivery Buffer. Each highlight criteria selection is a toggle switch, so can be enabled or disabled, with a Cancel All Highlights capability present also.

The Highlight Options Menu Bar Command options and associated toolbar buttons are listed below, and can also be accessed from the dropdown from the Highlight Options on the standard toolbar:



Button	Name	Description
	Cancel All Highlights	Cancels all highlighting. Returns all operations to their normal state.
	Show Outline	Continues to show unhighlighted operations as an outline on the Gantt Chart, Editor and Trace Chart windows. This applies when the highlighting is done by options outside the Locate capabilities (e.g. toolbar).
	Highlight Locked Operations	Highlights locked operations in the Gantt Chart, Editor and Trace Chart windows.
	Highlight Actual Operations	Highlights actual and partly completed operations in the Gantt Chart, Editor and Trace Chart windows (those operations using Actual Times rather than Preactor Generated times).
	Highlight Early Operations	Highlights operations sequenced before the earliest start time in the Gantt Chart, Editor and Trace chart windows.
	Highlight Operations Within Delivery Buffer	Highlights operations that are Scheduled to finish within the delivery buffer period.
	Highlight Orders Within Delivery Buffer	Highlights all operations of orders that have operations scheduled to finish within the delivery buffer.
	Highlight Late Operations	Highlights operations scheduled after their Due Date.

Button Name	Description
 Highlight Late Orders	Highlights all operations of orders that have operations due to finish after the Due Date.
 Highlight Delayed Operations	Highlights all operations that are delayed due to resource availability.
 Highlight Bottleneck Operations	Highlights the operation that is delayed most due to resource availability in each order.
 Lock Highlighted Operations	Locks all highlighted operations.
 Unlock Highlighted Operations	Unlocks all highlighted operations.
 Highlight Sequence Errors	Highlights operations failing the sequence check in the Gantt Chart, Editor and Trace chart windows.














Calendar States Menu Bar Commands

The Calendar States Menu Bar Command options and associated toolbar buttons are listed below:

Button Name	Description
 New Calendar State	Opens the Calendar State dialog allowing a new state to be created.
 Delete Calendar State	Deletes an existing Calendar State, unless this is currently used by an existing Resource.

Zoom and Scale

These options allow you to control the way in which charts are displayed in the Sequencer.

Button Name	Description
 Zoom Timeline In	Decreases the scale of the X (horizontal) axis.
 Zoom Timeline Out	Increases the scale of the X (vertical) axis.
 Reset Timeline	Reset to the default value.
 Increase Bar Height	Increases the scale of the Y axis.
 Reduce Bar Height	Decreases the scale of the Y axis
 Increase Plot Height	Increases the scale of the Y axis.
 Reduce Plot Height	Decreases the scale of the Y axis
 Reset Bar Height	Reset to the default value.
 Reset All	Resets both the X and Y axis to the default values.
 Scroll Lock	<p>When selected this performs two functions :</p> <p>Prevents arrow keys from causing scrolling¹, you can still scroll by clicking on the scroll bars with the mouse.</p> <p>Prevents the Gantt Chart from scrolling while dragging an operation outside of the Gantt Chart window.</p>
 Set Range	Opens the "Set Overview Range" dialog to allow the horizontal range of the chart to be set.
 Gauge Lines	Toggles the display of Gauge Lines on and off in Gantt Chart, Plots and Trace Charts.
 Configure Gauge	Opens the "Gauge line Parameters" dialog allowing you to configure chart Gauge Lines .

¹The main use of this is to prevent scrolling of the Overview when it is zoomed in and you are using the Mouse Click and arrow keys to highlight operations.

Button Name	Description
Lines	

Global Assign

The Global Assign option of the Sequencer Edit menu bar command displays the following fields for modification:

.....
Earliest Start Date
Due Date
Priority

Undo/Redo



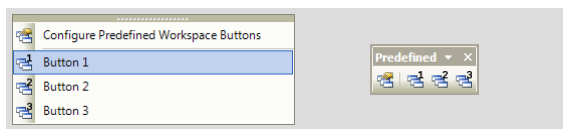
Undo Redo

Preactor remembers your activities in the Gantt Chart. The user can undo or redo these activities using the buttons provided. So, for example, if you drag and drop an operation then decide to return it, the Undo button can be used.

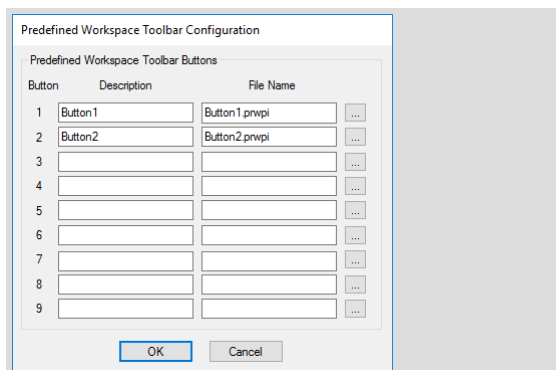
Workspaces

Predefined Windows Workspaces

From here, a user can configure which saved Workspaces to assign to a button, and also to 'tear off' the buttons to place on the toolbar to make switching between Workspaces quicker.



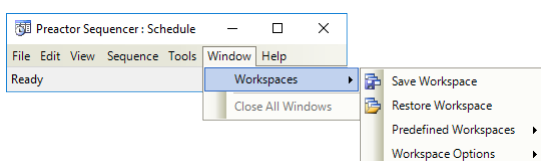
Predefined Workspaces menu Tear off buttons



Predefined Windows Workspace Configuration

Window Workspace Management

Management of the Window Workspace in the Sequencer is from the Window Workspace menu item:



From here a user can:

- Save the Windows Workspace.
- Restore a previously saved Windows Workspace.
- Configure the Workspace options to:
 - Store the toolbars as part of the Windows workspace.
 - To Save the Windows Workspace (as the Default) when exiting Preactor.
- Define, and Switch between Predefined Workspaces.

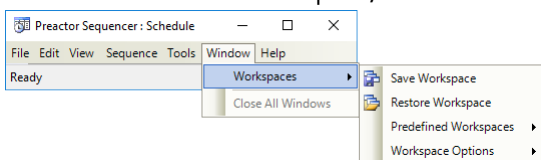
Saving the Configuration - Sequencer

Changes to the Workspace and Toolbar settings can be saved for re-use between sessions in a number of ways.

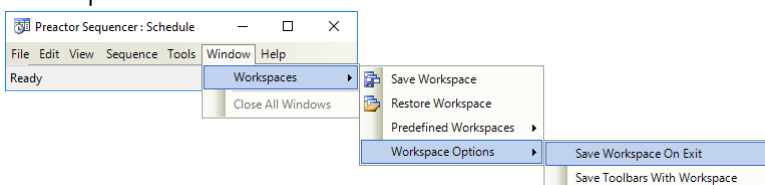
Workspace

The workspace is, by default in the shipped configurations, not saved for re-use between Sequencing sessions. The user has a number of options:

- The user can save a Workspace, and restore it during a later Sequencing session:



- The user can elect to have the Workspace saved automatically when exiting, and restored automatically when entering the Sequencer:



Toolbars

Toolbar settings are maintained across Sequencer sessions.

Toolbars settings can be stored with saved Workspaces.

Toolbar setting configuration is **language dependent**. That is, the Toolbar Setting is associated with the Language that configuration was done in. Change the running language from say English to German, and any Toolbar configuration will be lost until the Language they were created is again set as the run-time language.

Orders Editor

Highlight Selected Records

When using the editor in the sequencer any selected operation records can be highlighted in the Gantt Chart by selecting **Selected Records** from the **Highlight Options** menu on the editor context menu. The same function may be accessed from the **View** menu by selecting **Highlight Selected Records** or by pressing the shortcut key **F7**.

Insert an Operation in a Started Order

You may need to insert a temporary operation into an order's production process, e.g. a rectification task may be required after operation 10 has been completed but before operation 20 starts.

Note: This facility is not enabled in systems that are integrated with an ERP system, as amendments to the process route should be undertaken within the ERP system.

To insert a temporary operation into a process route:

1. With the Editor window open in the Sequencer, click on the second operation (Op. 20) of the scheduled order that is to be modified.



2. From the 'Edit' menu bar command select the 'Insert' option.

A record is inserted between operations 10 and 20 and the Edit Orders Information dialog is displayed.

3. Against 'Operation Name' select 'Extra Operation' from the drop down list.

The operation number changes to 2000.

4. Change the 'Op. No.' to 15.
5. Click on the 'Resources' Edit pushbutton and select the 'Required Resource'.
6. Set the operation time etc. and close the dialog.

An icon is placed in the Unscheduled Operations window

You can also change the quantity and add additional constraints to the inserted operation in Preactor 300 FCS products and above.

7. Right click on the record and from the 'Remove from Planning Board' options choose 'All Subsequent Operations'.

The unscheduled operations appear as icons in the Unscheduled Operations window.

8. Right click on the record again and from the 'Place on Planning Board' options select 'Forward, All Operations'.

The unscheduled operations are rescheduled and the impact of the change seen in the Gantt Chart.

Changing Order Due Dates, Priorities etc.

You may interactively change the due date, earliest start date or priority of an order. You can then reschedule to see the impact on the overall schedule and the effect on delivery compliance across all orders.

To see the impact of changing an order's priority:

1. Double click on the first operation of the selected order.



This can be carried out in the Sequence's Gantt Chart or Editor windows.

The Edit Order Information dialog is displayed.

2. Enter the new value in the 'Priority' field.

A lower value increases priority.

3. Close the dialog.
4. Remove all orders from the Schedule.
5. Forward sequence all orders by priority.

Use the  and  toolbar buttons.

6. Examine the effect of the changes.

At Risk Orders

Any order where the last operation will finish within the period of the delivery buffer is considered to be potentially 'At Risk'.

At Risk orders are indicated:

- On the Gantt Chart and Trace windows, by an yellow bar over the operation.



- In the Order Editor, by coloring the status indicator yellow.



Highlighting

At Risk orders can also be highlighted by use of the [Highlight Options Toolbar or menu](#) options:

- Highlight Operations within the Delivery Buffer.
- Highlight Orders within the Delivery Buffer.

Similar capability is available for [Late Orders and other operation statuses](#).

Order Call off

You can enter an order and then arrange to call off sub-orders in defined quantities and time interval.

For example you could enter an order for 100 of product 'A', then use the call off order tool to create 5 sub orders of 20 at 1 week intervals. Each sub-order would then have the Earliest Start Date and Due Date set, taking into account the call off quantity and time interval.

To create a Call off sequence:

1. With the Editor window displayed in the Sequencer, either create a new order or select the parent of an existing order from which you wish to call off sub-orders.
2. From the Edit menu bar command, select the 'Repeat Order' option.

A Repeat Orders dialog is displayed.

3. Under 'Repeat Mode' select 'Call off'.
4. Under 'Creation Mode' select 'Create standard operations for this order'.

If the selected order uses a modified routing you may choose to use this rather than the standard operations.

5. Enter the interval at which you wish the sub-orders to be repeated in 'Repeat Interval'.
6. Enter the call off quantity for each sub-order in 'Repeat Quantity'.

Repeat Orders

You may enter an order and then define a repeat interval.

For example you could enter an order for 100 of product 'A' then use the repeat order tool to create 5 sub-orders of 100 offset by 1 week. The Earliest Start Date and Due Date of each sub-order would then be set taking into account the repeat interval.

To create a repeat order:

1. With the Editor window displayed in the Sequencer, either create a new order or select the parent of an existing order from which you wish to repeat.
2. From the Edit menu bar command, select the 'Repeat Order' option.

Repeat Orders for : A003

Order Quantity

Repeat Mode
 Duplicate Call off

Creation Mode
 Duplicate this orders operations
 Create standard operations for this order

Repeat Interval

Repeat Count

A Repeat Orders dialog is displayed.

3. Under 'Repeat Mode' select 'Duplicate'.
4. Under 'Creation Mode' select 'Create standard operations for this order'.

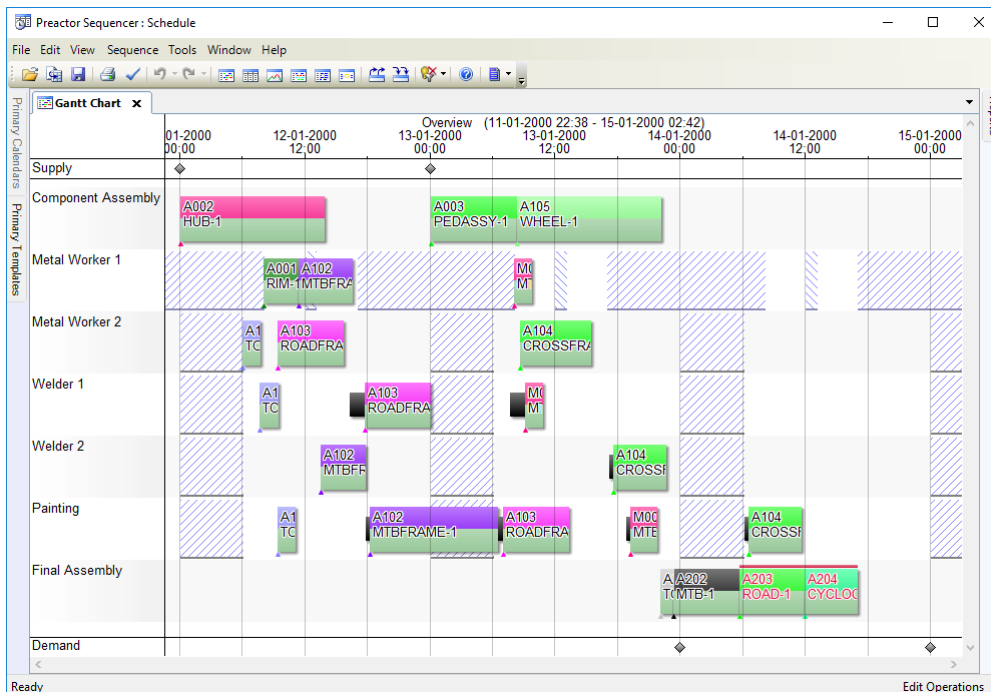
If the selected order uses a modified routing you may choose to use this rather than the standard operations.

5. Enter the interval at which you wish the order to be repeated in 'Repeat Interval'.
6. Enter the number of times the order is to be repeated in 'Repeat Count'.

Please note; a 'Repeat Count' of 2 provides 1 additional order, a 'Repeat Count' of 3 provides 2 additional orders etc.

Gantt and Trace Chart

Gantt Window



The Gantt chart displays the planning board.

- The vertical axis depicts the available primary resources on which operations are loaded.
- The horizontal axis shows the time range over which they are scheduled.

The duration of scheduled operations are represented by the length of the colored Gantt bars. You can click and drag these bars to a new position on the planning board (via the operation preview icons in the Editor window). If a new position violates existing scheduling constraints, a warning message is displayed.

Resting the mouse pointer over a Gantt bar activates a tool tip display providing information about the operation. Further information can be obtained by double clicking on the Gantt bar to display the *Edit Order Information* dialog, which allows data to be updated or modified.

The relationship between operations can be shown using by choosing **View ▶ Show Operation Relationships**, which displays arrows linking related operations. These relationships can also be displayed by holding down the ALT key and clicking on an operation. Unrelated operations are grayed out.

Shift patterns can be displayed in the Gantt chart. The operator can switch between different Calendar Display Modes using a toolbar option. Calendars may be modified from the Gantt chart, through the introduction of overtime working or machine breakdown periods etc.

[Late](#), [Early](#) and [At Risk](#) orders can be highlighted.

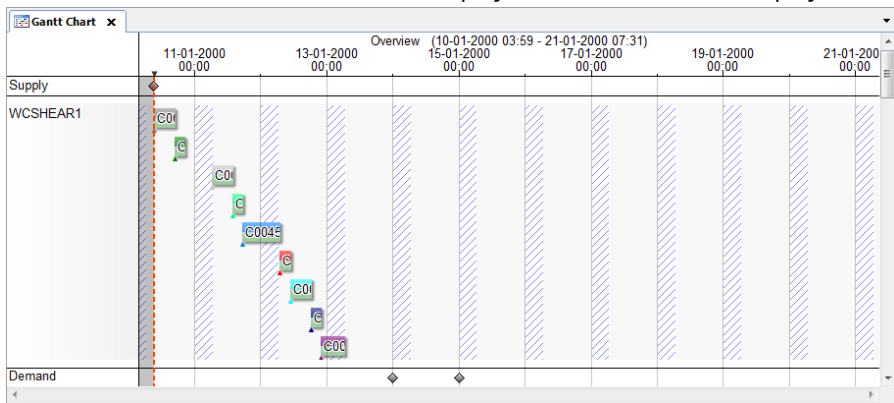
Display Option - Zoom and Navigation

You can zoom in on both axis using the Zoom and Scale option from the View command and the toolbar. Quick zoom and navigation is possible using :

- Mouse Wheel to scroll up/down
- Shift + Mouse Wheel to scroll left/right
- Ctrl + Mouse Wheel to zoom in/out on the horizontal axis
- Ctrl + Shift + Mouse Wheel to zoom in/out on the vertical axis
- Ctrl + Left Mouse Button to Pan (drag by moving the cursor).

Display Option - Stacked or Cascaded Display

The Sequencer's Gantt chart window can be changed to display Resources in a Stacked (default) or Cascaded format, as illustrated here (Lathe with Stacked display, Mill with Cascaded display):



Right click on the resource name in the Gantt chart and select Stack Operations or Cascade Operations to change the format for that resource from the pop up menu.

The settings for this display format do not persist across sequencer sessions, however the default display format for each resource can be configured in a field in the Resources table.

Drag and Drop Operations

Operations can be dragged and dropped onto the Sequencer's Gantt Chart window from the Unscheduled Operations window, and from the Editor window using the Traffic Light. Operations already on the planning board may also be dragged and dropped onto alternate resources or on the same resource in a different sequence.

To Drag and Drop an Operation:

1. Left click on an operation icon in the Unscheduled Operations window or a Bar in the Gantt Chart, or on the status icon of an operation in the Editor; hold the mouse button down; drag it to the required position in the Sequence Gantt Chart; and release the button.

While dragging an operation, the length of the bar will change if shift patterns or efficiency vary across the process and/or setup times.

The Sequencer will not allow the user to drop it onto a resource that is not in the resource group for the operation.

Operation Progress Indicator

This feature provides a convenient and visual way of tracking the progress of an operation.

As a mid-batch quantity and time is entered for an operation, a bar will be displayed in the operation on the Gantt Chart, equivalent to the percentage progress made.

The default progress control color is 'silver' but this can be modified in the 'Progress Control Color' field located in the 'Edit Configuration Set Up Information' dialog, accessed via the 'Configuration Data' pushbutton in the Configuration Menu.

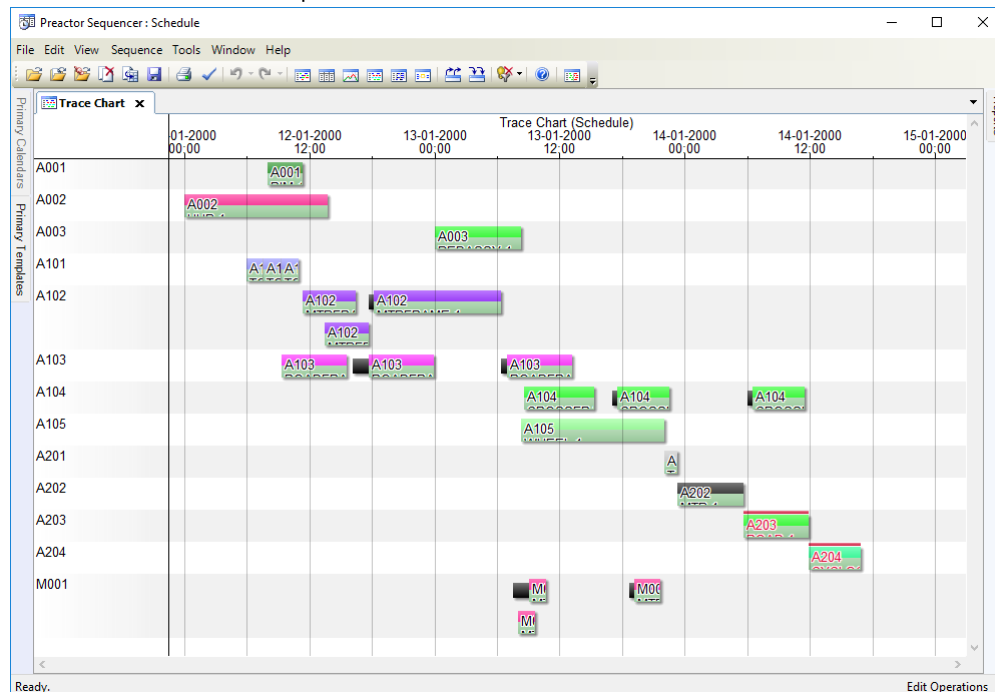
Please note, there is no link between the 'Operation Progress Indicator' and the 'Operation Completion' routine, completing an operation will not set the progress indicator bar to 100%.

This can only be accomplished by the Mid-Batch update routine.

Trace Chart Window

This window provides a convenient way of viewing schedule data in different ways to the Gantt Chart.

The Trace Chart can be opened from the View menu, or from the toolbar icon: 



1. The Trace Chart for the current schedule is displayed and is similar to that seen in the Gantt Chart, but now it allows you to compare previous schedules you have saved, one with another.
2. Use the File/Open... option, or the equivalent toolbar button, to display the selected reference file as a Gantt chart.

3. Select File/Open Comparative File option from the menu bar or equivalent toolbar button, to display the selected comparative file as a second Gantt chart. Each order now displays two loading patterns, one above the other.

This feature is particularly useful if you wish to check the consequences, for example, of increasing the priority of one order on all the other orders.

Once the Trace chart has been opened, the view menu bar command contains a context sensitive Normalize Trace Chart option. When selected this displays the Trace Chart normalized to the Due Date of each order, which is useful when checking for late/early orders.

Using the drop down selection against the Vertical Axis toolbar option, the subject of the vertical axis can be changed.

You can also zoom in on the vertical and horizontal axis of the chart, using the Zoom and Scale option from the View command.

[Late](#), [Early](#) and [At Risk](#) orders can be highlighted.

Display Option - General

The chart uses a number of display enhancements, selected from the View menu bar command:

- Set Range - controls the start and extent of the Gantt chart.
- Configure Gauge Lines - sets the interval between Gauge Lines and controls their appearance.
- Gauge Lines - toggles the Gauge Lines on and off.
- Disable Workspace Tool tips - toggles the tool tip display on and off.

Display Option - Zoom and Navigation

You can zoom in on both axis using the Zoom and Scale option from the View command and the toolbar.

Quick zoom and navigation is possible using :

- Mouse Wheel to scroll up/down
- Shift + Mouse Wheel to scroll left/right
- Ctrl + Mouse Wheel to zoom in/out on the horizontal axis
- Ctrl + Shift + Mouse Wheel to zoom in/out on the vertical axis
- Ctrl + Left Mouse Button to Pan


Comparing Actual Operation Times with Scheduled Times

The Trace Chart can be used to compare the original scheduled start and finish times for operations and the actual times, once the data is available.

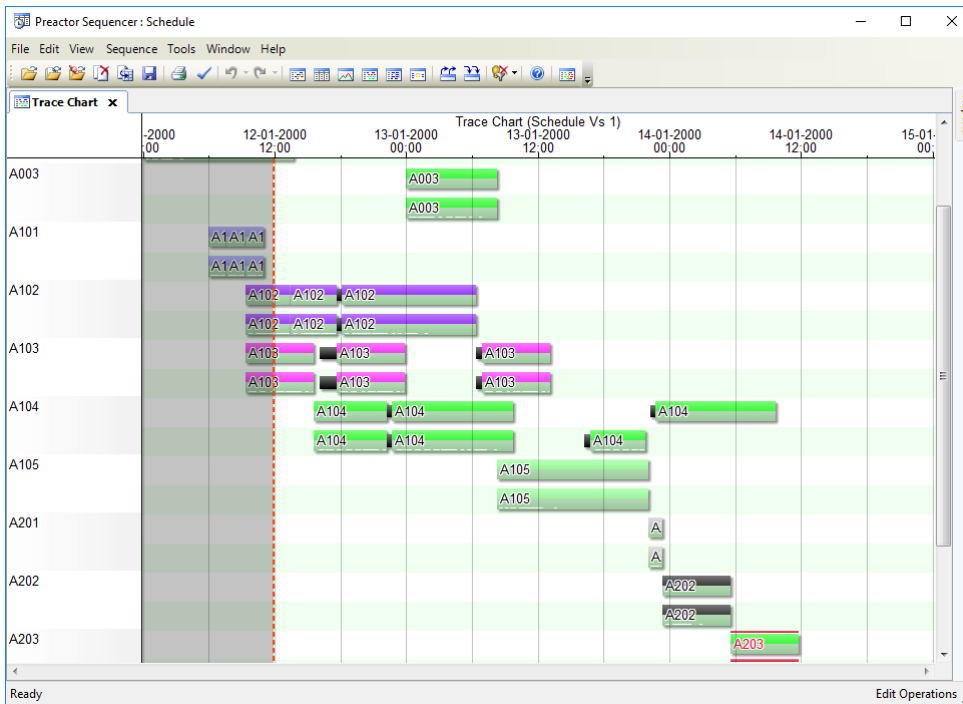
To do this the user should save a 'reference schedule' say at the start of a scheduling period.

Once there are some operation completions (the Use Actual Times checkbox has been checked and start and finish times entered) the Schedule can be saved and compared to the reference schedule saved before.

To make this comparison:

1. Access the Sequencer and open the Trace Chart window.
2. Click on the Open button to open a Dataset and select the reference schedule .

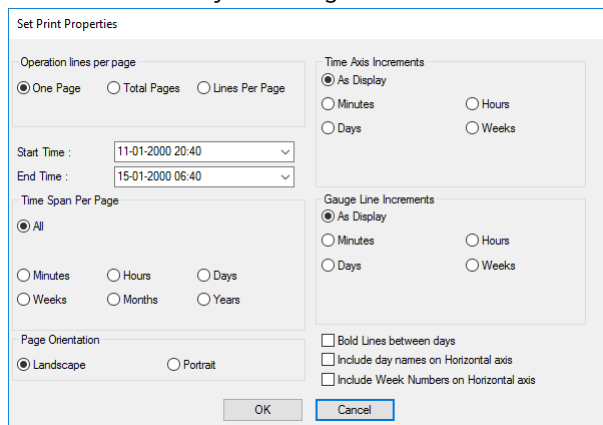
- Click on the Open Actual Comparative Schedule button and select the current schedule (with completed operations)



Only operations that have been completed will be displayed in the green area below the reference schedule so comparisons can be made.

Printing the Gantt Chart or Order Trace Chart

Various settings exist to customize how the Gantt Chart or Order Trace Chart can be printed. The **Set Print Properties** dialog can be accessed by selecting **Print** from the **File** menu (within the Sequencer) when the **Gantt Chart** tab is the focus.



Operation Lines Per Page

Name	Description
One Page	Prints all of the Gantt Chart lines on one page.
Total Pages	Spreads the Gantt Chart lines across the number of pages specified in the 'Total Pages:' field, which becomes visible when this option is selected.
Lines Per Page	Specifies the number of Gantt Chart lines that are to be included per page.

Time Span

Name	Description
Start Time	Allows a start time to be entered to specify the beginning of a time span to be printed.
End Time	Specifies the last time that is to be included in the printout. The actual end time may be later, based on the time span that has been selected. For example, if a start time of January 1st 2000 and an end time of February 10th 2000 has been entered, and the time span is one month per page, then the end time of the printout will be March 1st 2000, the last page will include the specified end time.

Time Span Per Page

Name	Description
All	Displays the whole time span on one page.
Minutes	Enables the <i>Page Span</i> field, allowing the number of minutes to be specified per page.
Hours	Enables the <i>Page Span</i> field, allowing the number of hours to be specified per page.
Days	Enables the <i>Page Span</i> field, allowing the number of days to be specified per page.
Weeks	Enables the <i>Page Span</i> field, allowing the number of weeks to be specified per page.
Months	Enables the <i>Page Span</i> field, allowing the number of months to be specified per page.
Years	Enables the <i>Page Span</i> field, allowing the number of years to be specified per page.

Page Orientation

Name	Description
Landscape	Specifies that the schedule should be printed as landscape.
Portrait	Specifies that the schedule should be printed as portrait.

Time Axis Increments

Name	Description
As Display	Prints the time axis lines as currently displayed in the Gantt Chart.
Seconds	This option is only available if the <i>Include Seconds</i> feature has been switched on in the Command File Editor. It specifies the interval at which a time axis line should appear in the printed output. A <i>Quantity</i> field becomes visible allowing the number of seconds to be specified.
Minutes	Specifies the interval at which a time axis line should appear in the printed output. A <i>Quantity</i> field becomes visible allowing the number of minutes to be specified.
Hours	Specifies the interval at which a time axis line should appear in the printed output. A <i>Quantity</i> field becomes visible allowing the number of hours to be specified.
Days	Specifies the interval at which a time axis line should appear in the

Name	Description
	printed output. A <i>Quantity</i> field becomes visible allowing the number of days to be specified.
Weeks	Specifies the interval at which a time axis line should appear in the printed output. A <i>Quantity</i> field becomes visible allowing the number of weeks to be specified.
Reference Date	This option is available when either seconds, minutes, hours, days or weeks options have been selected. The reference date allows a starting point at which the time axis lines can be applied.

Gauge Line Increments

Name	Description
As Display	Prints gauge lines as currently displayed in the Gantt Chart.
Seconds	This option is only available if the <i>Include Seconds</i> feature has been switched on in the Command File Editor. It specifies the interval at which a gauge line should appear in the printed output. A <i>Quantity</i> field becomes visible allowing the number of seconds to be specified.
Minutes	Specifies the interval at which a gauge line should appear in the printed output. A <i>Quantity</i> field becomes visible allowing the number of minutes to be specified.
Hours	Specifies the interval at which a gauge line should appear in the printed output. A <i>Quantity</i> field becomes visible allowing the number of hours to be specified.
Days	Specifies the interval at which a gauge line should appear in the printed output. A <i>Quantity</i> field becomes visible allowing the number of days to be specified.
Weeks	Specifies the interval at which a gauge line should appear in the printed output. A <i>Quantity</i> field becomes visible allowing the number of weeks to be specified.
Reference Date	This option is available when either minutes, hours, days or weeks options have been selected. The reference date allows a starting point at which the gauge lines can be applied.

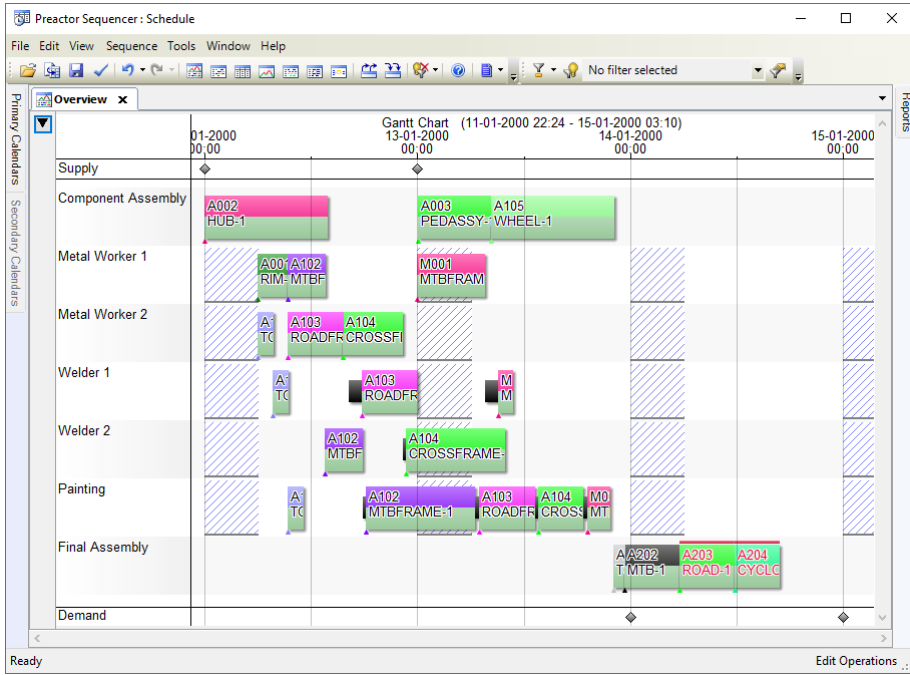
Other Appearance Settings


Name	Description
Bold Lines between days	Prints a bold line to divide the days.
Include day names on Horizontal axis	Prints the day names on the time axis.
Include Week Numbers on Horizontal axis	Prints the week numbers on the time axis.

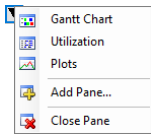
Overview Window

The Overview Window is a window that enables the user to view a combination of the Gantt Chart, Plots Window and Utilization Window together. It is possible to have numerous panes open, and these will work in unison with each other.

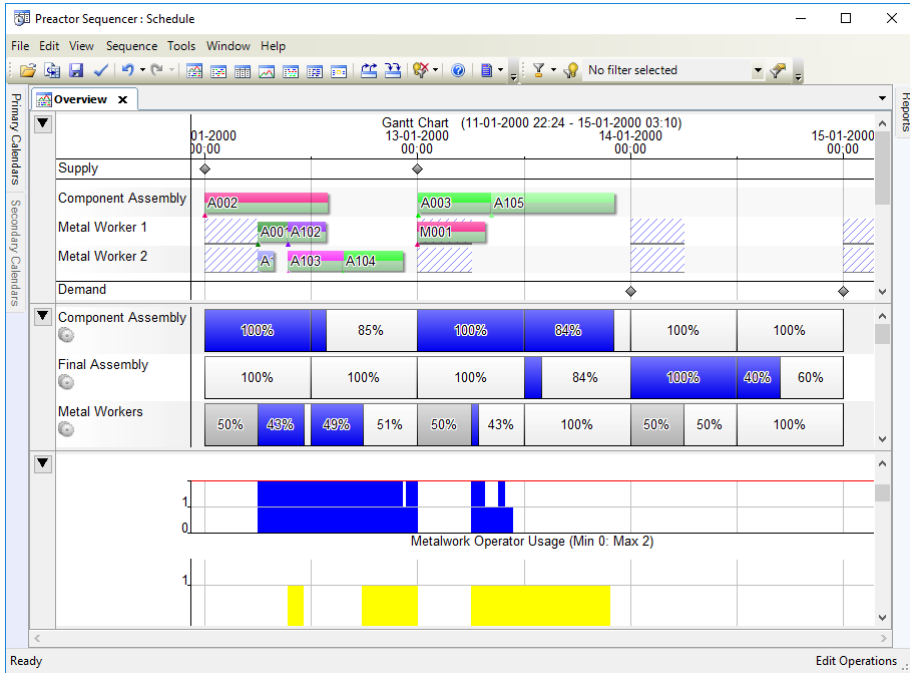
Opening the Overview Window is done by navigating to **View ► Overview Window**.



Upon opening, the default view of the Overview Window is to display the Gantt Chart. The Overview menu button, , (which is available, separately, for each pane open in the Overview) can be used to change the view of the current Overview pane, add another pane to the Overview Window, or close a pane. Clicking **Add Pane...** will add a new pane at the bottom of the Overview Window. Closing panes can be done to any pane in the window, except the one at the very top. This is to ensure that the Overview Window is populated with a form of information.



Clicking **Gantt Chart**, **Utilization** or **Plots** will then be displayed within that pane. It is possible to have multiple panes displaying the same information.

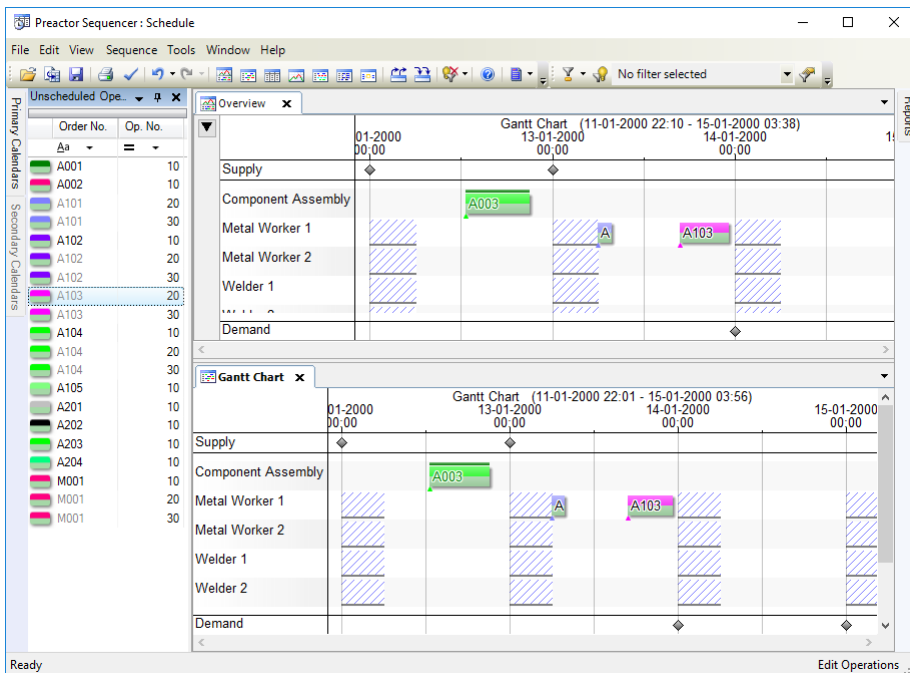


Panes within the window can be resized, and resizing one pane will impact all panes. There is a single timeline used across all panes within the Overview Window. Zooming in or out (horizontally or vertically) within a pane will affect all panes within the window, allowing for finer detail viewing when needed.

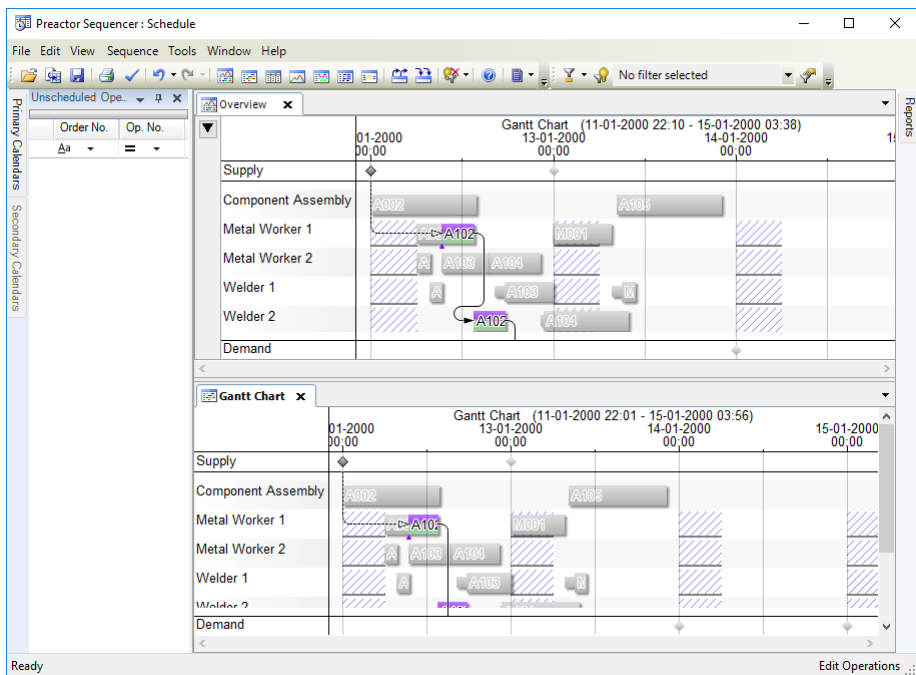
*Using the shortcut key for vertical zooming, **Ctrl+Shift+Scrolling of Mouse**, will allow for vertical zooming of a single pane.*

The Overview Window is a dockable window, though the panes within the Overview can only be displayed in a horizontal manner. This is due to the use of a single timeline.

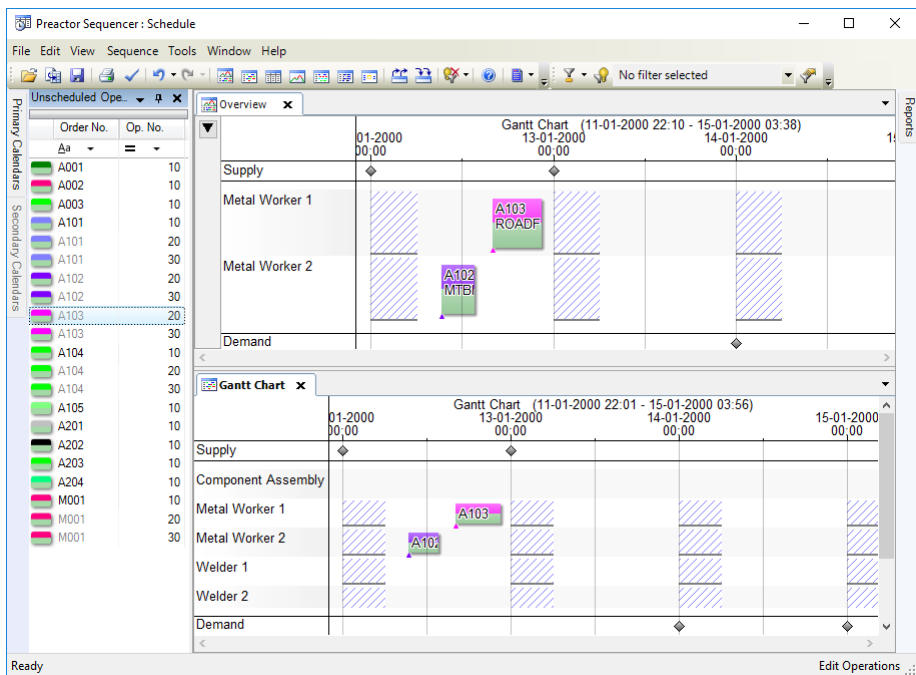
If there is a need to drag and drop operations into a Gantt Chart pane within the Overview, then the Sequencer will auto refresh to display the data in any other windows that are open, like the Gantt Chart itself. The same is true for scheduling and unscheduling operations.



Highlighting operations within a Gantt Chart pane in the Overview Window will have a global effect, and if a stand alone Gantt Chart Window is open, any highlighting functionality chosen will be displayed in both the Overview Window and Gantt Chart.



Using the **Compress Gantt Chart** option from the View menu will only affect the Gantt chart that is in focus. In the image below, the Overview Window was the focused window, so the Gantt Chart pane was compressed, leaving the Gantt Chart Window to display the entire planning board.



While there is no limit to the amount of panes available for displaying within the Overview Window, it's recommended to limit the amount to less than 5, otherwise the display can appear cluttered.

The Overview Window will be saved "as is" when using the **Save Workspace** function. Upon opening a saved workspace, all of the options, pane sizing and zooming will be restored.

Highlighting and Filtering

Highlight an Order's Process Flow

The sequence in which an order's operations are performed, the time span and the resources on which they are carried out can be seen by highlighting the process flow.

To highlight an order's process flow:

1. In the Gantt Chart click on one of the order's operations, while holding down the **ALT** key.

All related orders and operations and flow lines are added to the display. Solid lines link operations within an order and dotted lines link related orders.

2. Where the whole process cannot be seen, use the Compress Gantt toolbar button to shrink the Gantt Chart to include only those resources with highlighted operations.



3. Click anywhere in the Gantt Chart to return to the normal (or compressed) display.

Late and Early Order Highlighting

The operations and orders that are late or early are indicated and highlighted on the Gantt Chart, Trace, and Order Editor windows.

Late orders are indicated:

- On the Gantt Chart and Trace windows, by a red bar over the operation



- In the Order Editor, by setting the status indicator red, with an emphasis on the right side.

		Unspecified	A203	ROAD-1	Road Bike	13-01-2000	10	25	Final Assembly	Not Started
		Unspecified	A204	CYCLOCROSS-1	Cyclocross Bike	13-01-2000	10	20	Final Assembly	Not Started

Early orders (those whose start date is before the Earliest Start Date specified) are indicated:

- On the Gantt Chart and Trace windows, by a green bar over the operation



- In the Order Editor, by setting the status indicator red, with an emphasis on the left side.

		Unspecified	A001	RIM-1	Rim	Unspecified	10	200	10	Shape Rim	Not Started
		Unspecified	A002	HUB-1	Hub	Unspecified	10	165	10	Assemble	Not Started

Highlighting

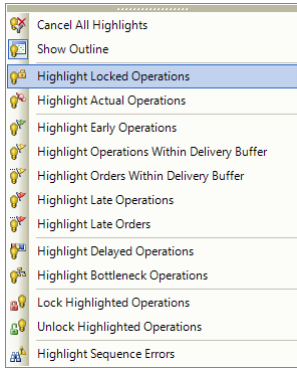
Late and early orders can be highlighted by use of the [Highlight Options Toolbar or menu](#) option.

Other conditions can also be highlighted from this toolbar, e.g. Locked Operations, Bottleneck Operations, etc.

Similar capability is available for [At Risk Orders](#).

Highlighting Options

From **View ▶ Highlight Options**, a number of highlighting options are available:



Below is a table explaining all the buttons.

Button Name	Description
Cancel All Highlights	Cancel All Highlights Cancels all highlighting. Returns all operations to their normal state.
Show Outline	Continues to show unhighlighted operations as an outline on the Gantt Chart, Editor and Trace Chart windows. This applies when the highlighting is done by options outside the Locate capabilities (e.g. toolbar).
Highlight Locked Operations	Highlights locked operations in the Gantt Chart, Editor and Trace Chart windows.
Highlight Actual Operations	Highlights actual and partly completed operations in the Gantt Chart, Editor and Trace Chart windows (those operations using Actual Times rather than Preactor Generated times).
Highlight Early Operations	Highlights operations sequenced before the earliest start time in the Gantt Chart, Editor and Trace chart windows.
Highlight Operations Within Delivery Buffer	Highlights operations that are Scheduled to finish within the delivery buffer period.
Highlight Orders Within Delivery Buffer	Highlights all operations of orders that have operations scheduled to finish within the delivery buffer.
Highlight Late Operations	Highlights operations scheduled after their Due Date.
Highlight Late Orders	Highlights all operations of orders that have operations due to finish after the Due Date.
Highlight Delayed Operations	Highlights all operations that are delayed due to resource availability.
Highlight Bottleneck Operations	Highlights the operation that is delayed most due to resource availability in each order.
Lock Highlighted Operations	Locks all highlighted operations.
Unlock Highlighted Operations	Unlocks all highlighted operations.
Highlight Sequence Errors	Highlights operations failing the sequence check in the Gantt Chart, Editor and Trace chart windows.

When operations are highlighted, only those operations will be placed or removed from the planning board when sequencing or unallocating operations using the toolbar or menu options, or Preactor OPB API methods.

Clearing Highlighting in the Sequencer

There are numerous ways to clear any highlighting:

- The **Cancel All Highlights** button exists three times within the Sequencer.
 1. Once in the **Highlight Options** toolbar.
 2. Once in the **Standard** toolbar.
 3. Once in the **View** menu.
- Clearing any highlighting in the Trace Chart and Gantt Chart Windows can be done by clicking on empty space within the respective window.
- Use of the **ESC** key, which will remove any highlighting in the Trace, Gantt Chart and/or Editor windows, along with any selected filters. However, using this shortcut will not reset the highlight mode selected.

Highlighting Sequence Errors

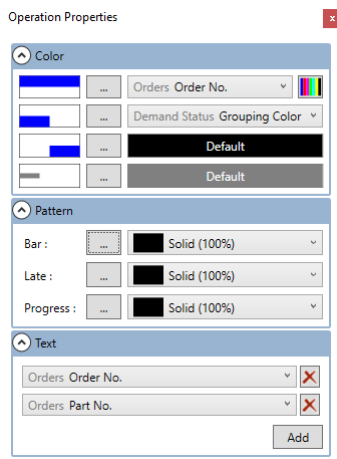
When editing an already generated schedule, it is possible that sequence errors will occur. If the **Highlight Sequence Errors** button is toggled on, errors in the sequence will be displayed. However, due to Preactor not continuously refreshing, if operations are moved in the Gantt Chart window while this button is toggled on, Preactor will not display any changes in sequence errors. To refresh the highlighting of errors, after all changes have been made, the **Highlight Sequence Errors** button must be deselected, then reselected to view any changes made.

Operation Properties Window

The Operations Properties Window allows the user to design the operation bars that are shown in the Gantt Chart, Trace Chart, Editor and Unscheduled Operations windows. This is only available in AS. The window allows for three aspects of the bar to be edited:

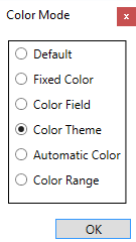
- Color
- Pattern
- Text

This window is accessed from the Tools Menu, the Operation Properties Window.



Color

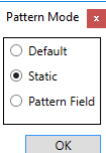
There are a number of modes available for the color of the operation bar. The ellipses button is used to change these.



- **Default** is the default coloring mode for that section of the operation bar:
 - For the main bar, this will be black.
 - For the low bar, this will be the same as the main bar.
 - For the low right bar, this will be the same as the low bar.
 - For the progress color, this will be gray.
- **Fixed Color** allows the user to set a fixed color for that section of the operation bar.
- **Color Field** allows the user to select a color field that will be used as the color for the section of the operation bar. Selecting this mode will provide the user with a drop down list of all the available themes for the operations bar.
- **Color Theme** allows the user to select a field and a theme for that section of the operation bar. The bar will be consistently colored, based on the value of the field and the selected theme. Selecting this mode will provide the user with an additional dialog box which contains all of the colors available for the theme.
- **Auto Mode** will cause the bar to be consistently colored, based on the value of the field. The color of the bar can be selected from the entire spectrum of colors available in the software.
- **Color Range** will cause the color of the bar to be based on where the value of the selected field fits within the start and end colors. When 'Apply Color to Default Values' is ticked, the values from the selected field would be considered in the range, otherwise the operation bars will be colored white when the record value matches the default value.

Pattern

There are three modes available to apply a pattern to an operation bar.



- **Default** will apply the default pattern to the operation bar.
 - The bar pattern will be solid.
 - Late patterns will be 60% fill, unless the bar pattern has a Static or Pattern field.
 - Progress will be solid.
- **Static** will set the operation part to use the selected pattern.
- **Pattern Field** will set the operation part to use the pattern value from the selected field.

Text

The user is able to add up to four lines of text to an operation bar. The text line will be fetched from the value of the selected field.

Filtering Within the Sequencer

Filtering is available in the Viewers, though no filters will be saved upon closing the Viewers.

Filtering is not available in the Planner.

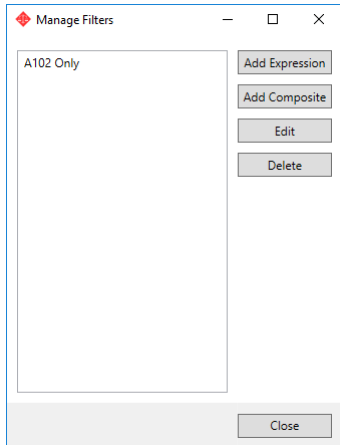
Preactor's filtering feature within the Sequencer is extensive and allows the user to filter items/records. Users are able to use filters already existing in Preactor, or by creating custom filters. There are two types of filters available for creation in the Sequencer, *Expression Filters* and *Composite Filters*. See [Creating and Managing Expression Filters](#) and [Creating and Managing Composite Filters](#) for information on how to create and manage filters.

Creating Composite Filters

Composite Filters are only available within the Preactor Sequencer.

Creating Composite Filters

Composite Filters are made from two or more filters, Expression and/or Composite Filters, and uses AND/OR logic to create a composite filter. Adding a Composite Filter is done by clicking the **Add Composite** button in the **Manage Filters** dialog.



This will open the **Composite Filter Builder** dialog. A Composite Filter requires a minimum of two child filters, which can be a combination of child Composite Filters and [Expression Filters](#). If the requirement(s) are not met, there will be a red outline around the section that is not fulfilling it.



The buttons in the Composite Filter Builder are:

- AND ▾
This drop down menu can be set as AND or OR for that composite tree.
- These two buttons are used for editing or deleting a child filter. However, only Expression Filters can be edited.
- These three buttons are used for choosing what the child filter should be, either by using an existing filter, creating a new filter, or adding a Composite Filter.

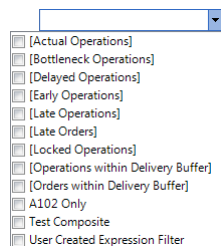
There is no limit to how many filters, Composite and Expression, can be used to create a Composite Filter. Though it is preferable to keep a composite as limited as possible, because if the filters are to be used with large configurations, a system's memory can be impacted on.

Composite Filter Logic

Preactor calculates the outcome of a Composite Filter by analyzing the first child filter it can find. In an instance where there may be numerous children composite filters, Preactor may take some time to compute the filtering results. When creating a Composite filter, it is recommend to try and put any filters that will remove the most items first. For example, Due Date or Customer. Building a Composite Filter in this way will help to minimize the amount of time Preactor spends calculating the filter results.

Applying Composite Filters

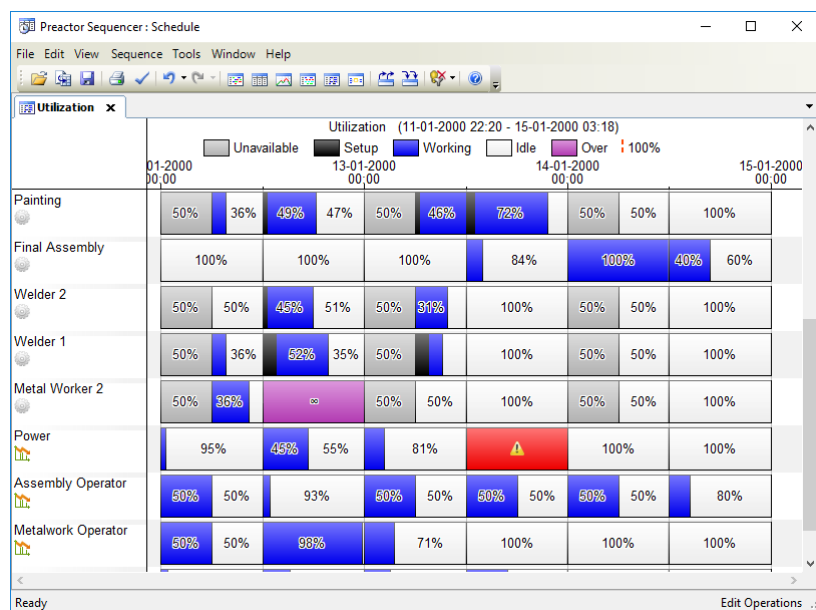
With a filter created, it will be available in the toolbar drop down menu.



It is possible to select multiple filters to apply, which is done by clicking on the checkbox. To remove the selection of filter(s), either uncheck the checkboxes, or use the **Esc** Key. Any filters created are saved to the database and are only removed when clicking the **Delete** button in the **Manage Expressions** dialog.

Utilization View

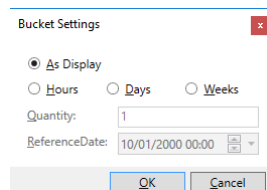
The Utilization View provides a bucketed summary view of resource group, primary and secondary resource utilization. The utilization view can be opened by selecting 'Utilization Window' from the 'View' menu, or using the toolbar icon:



By default, utilization data is shown for all resource groups, primary resources and secondary resources. This selection can be changed by choosing 'Configure Utilization' from the 'View' menu.

Time Buckets

The utilization view is divided into buckets of time, as specified in the 'Bucket Settings' dialog. To open this dialog, with the Utilization view selected, choose 'Bucket Settings' from the 'View' menu.



Buckets can be a number of hours, days or weeks long or, when 'As Display' is selected, they can follow the gauge line increment. "Gauge Lines" on page 232 for more information.

Utilization Values

Utilization can be expressed either as a percentage of the available time in a bucket (by default), or as a number of hours and minutes. To switch between the two options choose either 'Percent' or 'Hours' from 'View', 'Set Utilization Mode' while the Utilization window is selected.

Unavailable

Unavailable time is characterized by calendar periods of 0% efficiency on primary resources. For example, when a primary resource is off-shift over a weekend.

Setup

Setup shows the time spent on the setup portion of an operation. Where setups are performed in parallel, setup time can cause a period to go beyond 100% utilization, even on finite capacity resources.

Working

Working time considers only the process portion of operations. For infinite capacity resources this can, of course, be greater than 100%.

Idle

Idle time is identified as time when a resource could be utilized but it is not. For infinite capacity resources this is difficult to express in a consistent manner, so the nominal capacity of the infinite resource is used (see below).

Over

Over is used to display when there is no time available on the resource to process the operation, but it has work forced upon it. In percentage mode, if the Over value covers a whole time bucket, the infinity symbol is displayed.

100% Marker

It is possible to 'overload' resources. For example - when sequencing operations on an infinite capacity resource (or using infinite capacity mode) or against a secondary resource which is unconstrained. For this reason, when a resource is loaded above its nominal capacity, the 100% point in the bucket is marked with a dashed red line. For infinite capacity resources this line represents where the resource would be fully utilized were it a finite resource, and for overloaded secondary resources the point at which the resource would be fully utilized were the constraint in effect. Resource groups can also be overloaded in this way, where the sum of the nominal capacity available within that group is considered.

Note: When a period of time is defined as having zero availability on a resource, that time bucket will be shown as 100% unavailable. This is displayed with the warning symbol on a red background.

Utilization Data

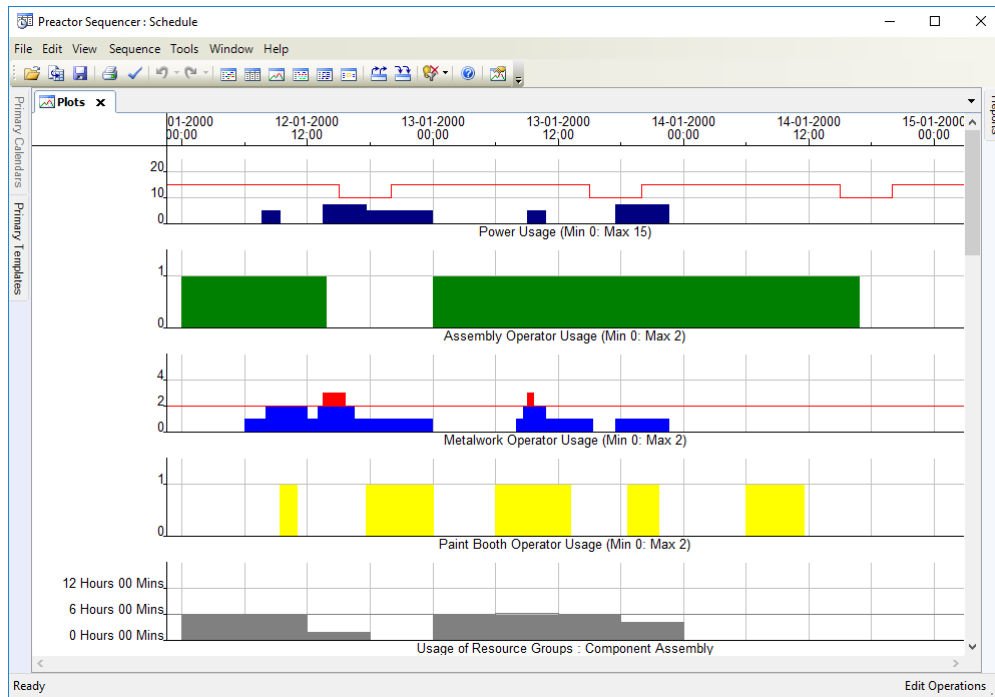
It is possible to extract the underlying utilization data that is the basis for the utilization view. This can be achieved in a few different ways. To extract the data for a single row (i.e. a primary resource, secondary resource or resource group), select 'Copy' from the context menu for that row. To extract all data for all rows in the view, select 'Copy all' from the same menu. When you copy data for all rows, the name of the row is included. When you copy data for a single row, it is not.

The copied utilization data is formatted such that it will paste easily into a spread sheet where further analysis can be done.

Plots

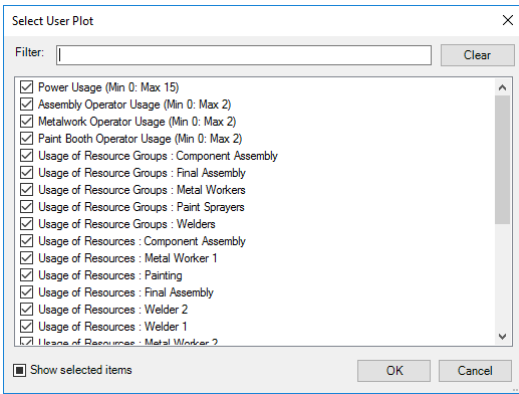
Plot Window

Not available in Preactor Express.



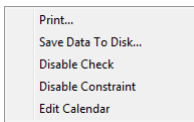
The window is displayed by selecting the Plot Window option from the View menu bar command. It displays Secondary Constraint, Resource Group and Primary Resource usage. It allows you to view plots of capacity utilization or to examine the work in progress waiting to be processed at a resource at any point in time, i.e. 'Resource Workload Queues'.

You can zoom in on both the vertical and horizontal axis of these plots, using the Zoom and Scale option from the View command



The plots viewed can be chosen using the 'Configure plots...' option from the View menu or by right clicking in a primary resource plot.

If you right click in a secondary resource plot the following options are presented:



Option	Description
Print	Provides a print out of the plot selected.
Save Data to Disk	Saves details of the selected plot as a .csv file.
Enable/Disable Check	When disabled, it prevents a warning message appearing if the usage of the secondary resource exceeds its maximum value, while operations are being dragged and dropped in the Gantt Chart.
Enable/Disable Constraint	When disabled, the secondary constraints maximum value may be exceeded while sequencing.
Edit Calendar	Presents the Calendar Period dialog, allowing the calendar values to be modified.

Using the Zoom option from the View menu, you can zoom in/out on both the vertical and horizontal axes of the plots.

If a workspace is saved, with the Save Workspace option from the Window menu bar command, the current configuration and zoom settings will be retained.

Data Stored in the .csv File

Below is an example of what data is stored in the .csv file:

Metalwork Operator Usage (Min 0: Max 2)

```
02-01-2000 00:00,3.6527000000000000e+004,0.0000000000,0.0000000000,2.0000000000
03-01-2000 00:00,3.6528000000000000e+004,0.0000000000,0.0000000000,2.0000000000
12-01-2000 06:00,3.6537250000000000e+004,2.0000000000,0.0000000000,2.0000000000
12-01-2000 22:15,3.65379270833680640e+004,1.0000000000,0.0000000000,2.0000000000
12-01-2000 22:45,3.65379479167129760e+004,2.0000000000,0.0000000000,2.0000000000
13-01-2000 00:00,3.6538000000000000e+004,0.0000000000,0.0000000000,2.0000000000
13-01-2000 06:00,3.6538250000000000e+004,2.0000000000,0.0000000000,2.0000000000
13-01-2000 07:35,3.65383159722916750e+004,1.0000000000,0.0000000000,2.0000000000
13-01-2000 09:05,3.65383784723032510e+004,2.0000000000,0.0000000000,2.0000000000
13-01-2000 09:45,3.65384062500463110e+004,1.0000000000,0.0000000000,2.0000000000
13-01-2000 10:45,3.65384479167476970e+004,0.0000000000,0.0000000000,2.0000000000
09-02-2000 02:00,3.65650833333333360e+004,0.0000000000,0.0000000000,2.0000000000
09-01-2001 09:00,3.6900375000000000e+004,0.0000000000,0.0000000000,0.0000000000
```

No headers will be included, and in total there are 5 columns per line of data.

Column	Description
Column 1	Time at which the data point occurs, except for start and end lines, which are extra points used internally by Preactor. The data point will occur whenever the min or max usage values change. Will be displayed as a DD-MM-YYYY HH:MM:SS value.
Column 2	Numeric representation of the time, as it can be necessary to show small difference in time that would not be shown by the Column 1 value.
Column 3	Numerical value of the Constraint Usage.
Column 4	Numerical value of the Constraint Minimum Value.
Column 5	Numerical value of the Constraint Maximum Value.

Secondary Constraint Usage

You may define a number of secondary constraints (resources) to be used by a primary resource and/or product. For example a machine may require an operator or a tool to carry out an operation.

In the Sequencer's Plots window a plot for each secondary resource is available. You can define the color of the plot and a color change when the usage exceeds a defined level. In Preactor 200 FCS secondary constraints have infinite capacity and therefore plots are used to show excessive demand for the constraint.

It is also possible to define different secondary constraint usages for each resource that can perform an operation within a work center or resource group. For example two resources A & B may do the same process. Resource A may require an operator but resource B does not.

In addition to using Secondary Constraints, it is possible to create groups of constraints that can be applied to either a Resource or an Operation. Creating Secondary Constraint Groups allows for Preactor to make selections from a list of Secondary Constraints, in a similar way to how Primary Resource selection is made. Using Groups is beneficial when there is a requirement to model a system where operators, for example, are multi-skilled.

Usage Plot Display Settings

Are applied to plots in the Sequencer's Multi Plot window:

Plot Color - the color of the Usage Plot displayed in the Sequencer's Multi Plot window.

Plot Fill Pattern - sets the Usage Plot's fill pattern.

Usage Max. Hours - a value entered in this field defines the level at which the plot color changes to that specified in the 'Plot Color Above Max. Hours' field. If left as 'Unspecified' a line will be drawn to display the maximum number of hours available.

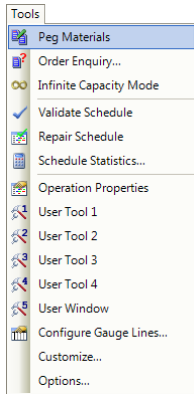
Plot Color Above Max. Hours - this color is used to define those areas of a Usage Plot, displayed in the Sequencer's Multi Plot window, that exceed the value specified in the 'Usage Max. Hours' field.

Set Up Time Line Color - this color is used to define line in a Usage Plot, displayed in the Sequencer's Multi Plot window, that represents set up time.

Materials

Pegging Materials

Links between orders need to be established first before operations in the 'Unscheduled Operations' window can be scheduled. Select the 'Peg Materials' option from the 'Tools' menu in the Preactor Sequencer, this will run the Standard Material Control module (SMC) and create the links between the orders.



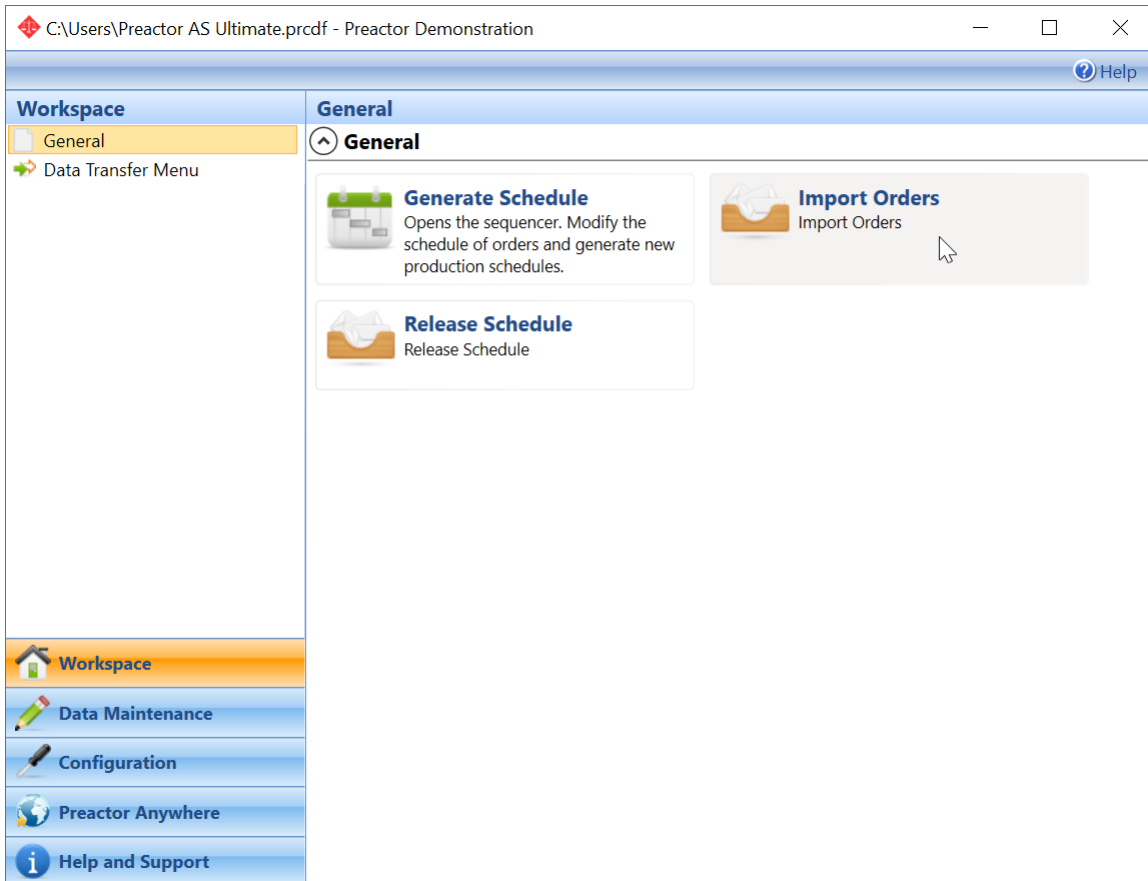
SMC will run using whatever 'Pegging Rule' has been set as the default in the 'Material Control Configuration' table. Please read the ['Building Pegging Rules'](#) section for more information on how to create material control rules.

The orders can be scheduled, once the order links have been created. Orders that have shortages will not be scheduled unless the shortage has been ignored.

Supply, Demand and Works Orders

Importing Orders into Preactor

Order data can be imported by choosing the **Import Orders** from ERP option:



When this option is selected, a PESP script is run that will import the data from some import files into Preactor, populating the Supply, Demand, Works Orders and Bill of Materials tables.

The Supply, Demand and Works Orders tables can be accessed by going to **Maintain Database**.

The tables are listed under the **Orders** sub category. The Bill of Materials table is listed under the **Material Control** sub category.

Supply Orders Table

The Supply table holds orders for current or future production that do not utilize resources. These will be orders such as purchase orders where parts have been ordered from a different factory, or stock orders using parts that have already been made. A field called Supply Date is used to define when the materials become available for consumption. Records in this table are referred to as 'supply orders' and are shown in the Supply area of the Preactor Sequencer Gantt Chart positioned at the point specified in the supply date field.

Demand Orders Table

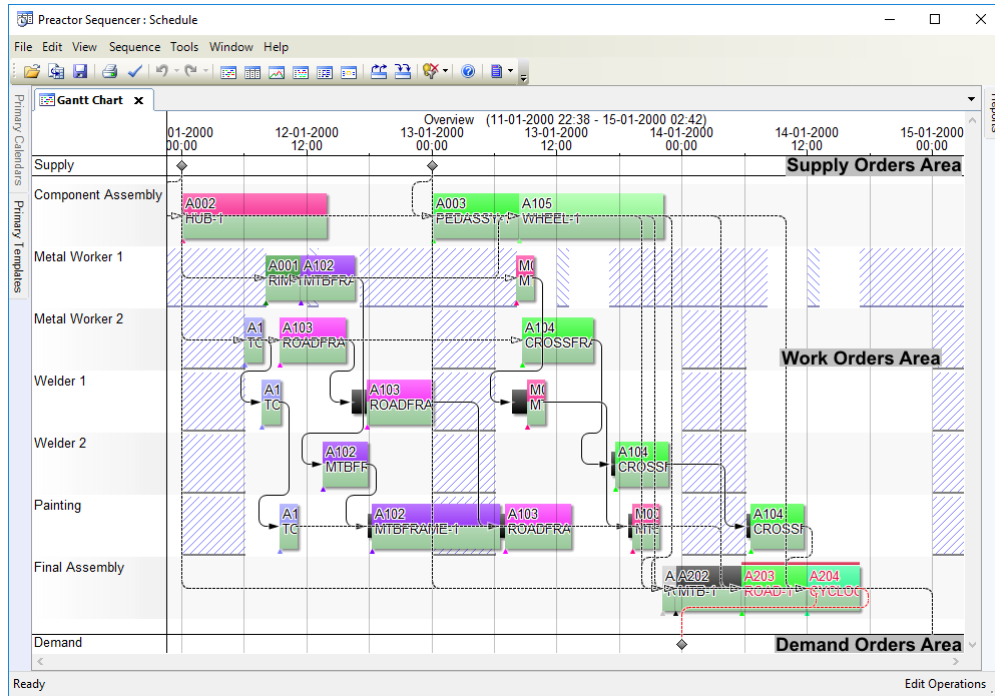
The Demand Orders table holds the orders for final consumption. These will be orders such as sales or make to stock orders; again these orders do not utilize resources, they are the orders for finished products. A field called Demand Date is used to define when the materials are required by. Records in this table are referred to as 'demand orders' and are shown in the Demand area of the Preactor Sequencer Gantt Chart.

Works Orders Table

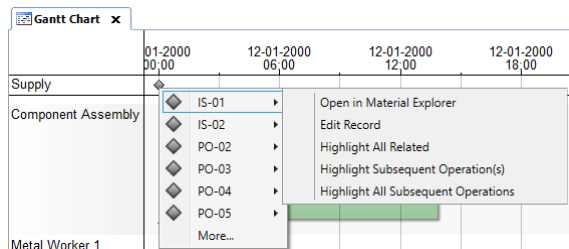
The Works Orders table contains the orders that are to be scheduled on the resources area on the Sequencer Gantt Chart. Typically these will be orders for parts that when combined together produce the final product to be consumed by orders in the demand orders table.

Supply, Demand and Works Orders in the Preactor Sequencer.

In the Preactor sequencer, the Gantt Chart is divided up into three different areas, the first area is for supply orders, the second is for works orders and third is for demand orders.



The Supply Orders area is used to visually show when the supply order is available to be consumed. The Demand orders area is used to visually show when the demand orders require the material to satisfy the Demand Date. The milestones on the Gantt Chart provide an access point to these supply or demand orders in their respective areas.



To access supply or demand orders, right click on a milestone on the sequence Gantt Chart. A list of orders applicable at that point in time will be displayed. Hover the mouse pointer over an order of interest, the following options will be displayed: Open in Material Explorer, Edit Record, Highlight All Related, Highlight Subsequent Operation(s) and Highlight All Subsequent Operations.

Open in Material Explorer

This will open the 'Material Explorer' window and display the selected order and any orders it is linked to.

Edit Record

This will load up an 'Edit' dialog allowing details of that order to be modified.

Supply ? X

Order No.: PO-02

Order Type: Purchase Order

Part No.: TIRE-1

Description: 18 Tire

Supply Date: 12-01-2000 00:00

Priority: 10

Quantity: 0.00

Attributes...

OK Cancel

Highlight All Related

This option will highlight all orders related to the selected order.

Highlight Subsequent Operation(s)

This option will highlight all immediate subsequent operations related to this order.

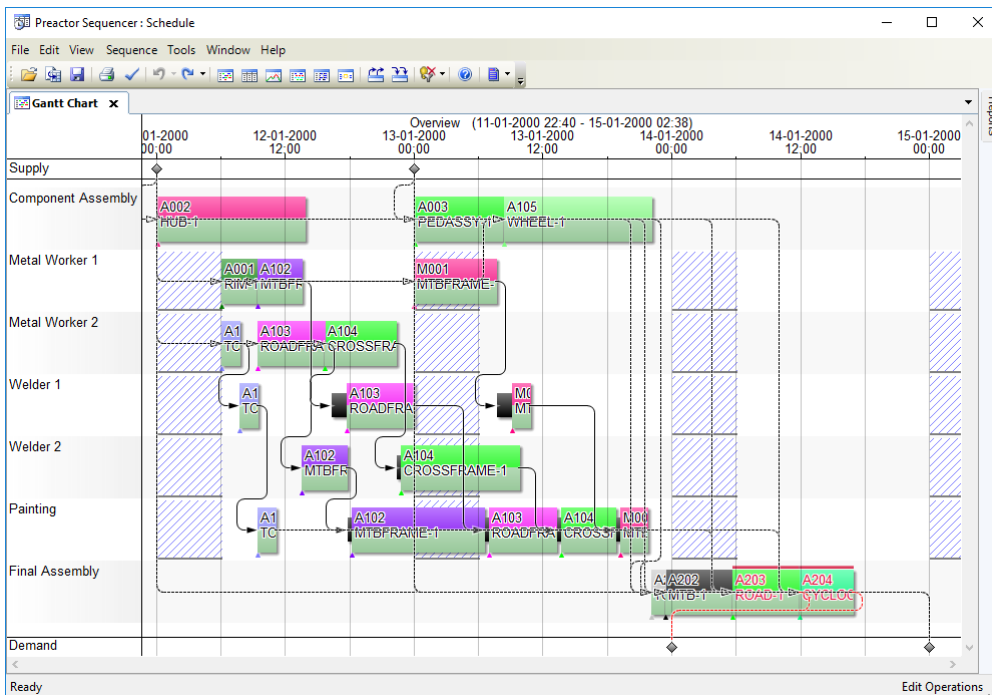
Highlight All Subsequent Operations

This option will highlight all subsequent operations related to this order.

Works orders can be edited by either double clicking on an operation on the Gantt Chart or opening the Editor Window from the View menu. The Editor Window displays works orders only.

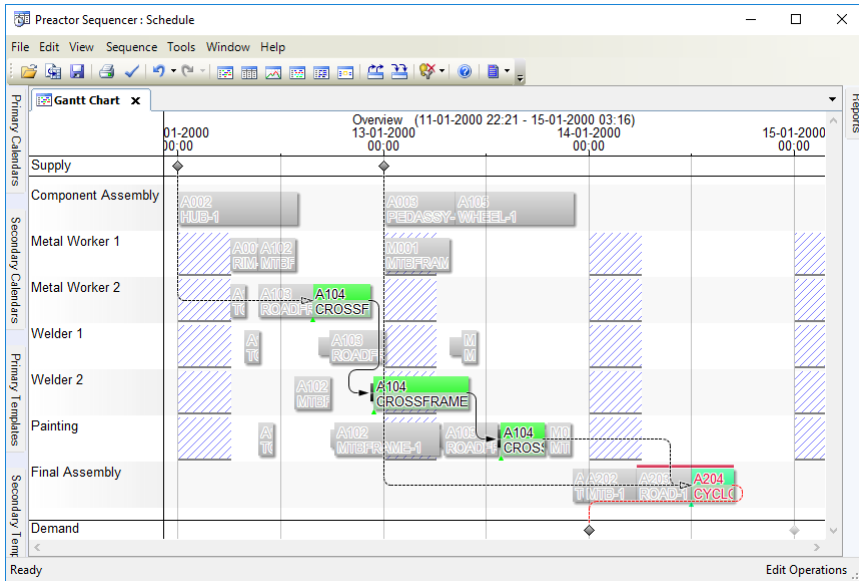
Operation Relationship Lines in the Preactor Sequencer Gantt Chart

Relationship lines can be displayed in the Preactor Sequencer Gantt Chart after orders have been pegged and scheduled, by selecting the **Show Operation Relationships** option from the **View** menu. Lines will be drawn to show relationships between all orders and operations, including demand and supply orders. The solid lines show links between operations of the same order, dotted lines show links between different orders and red dotted lines show that a demand order is receiving its materials past the Demand Date.



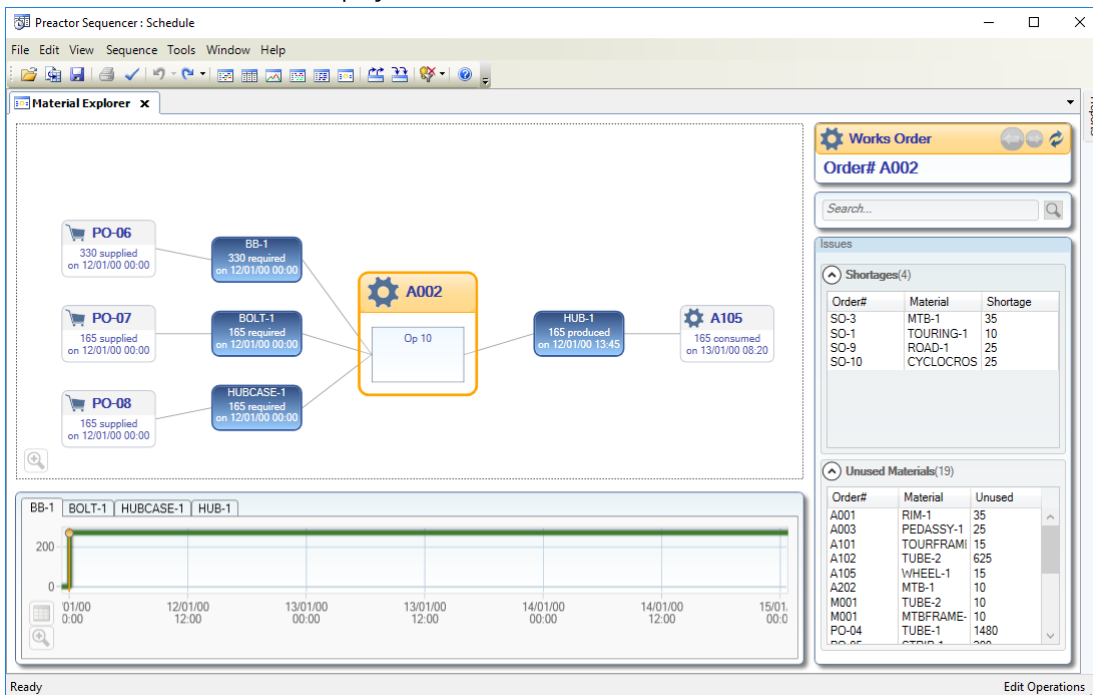
The highlighting features can be used to improve the visibility of the lines drawn in the Gantt Chart. If the Show Operations Relationships is toggled on in the **View** menu, only lines pertaining to a (set of) record(s) will be shown.

The image below shows all the subsequent orders for A104. This was done by right clicking on the first A104 operation, going to **Highlight Options** and selecting **All Subsequent Orders**.




Material Explorer

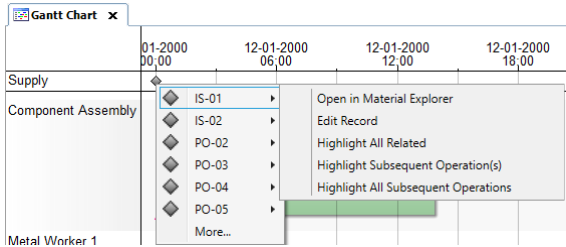
The material explorer is available in SMC enabled configurations. It provides an interactive graphical representation of links between orders, it accommodates easy access to orders and related orders using its drill down navigational facilities, it can be used to lock or unlock links between orders, highlight shortages and report unused quantities. Material plots relating to the selected order will also be displayed.



Accessing the Material Explorer

The material explorer can be accessed in a variety of ways:

- From the 'View' menu in the Preactor Sequencer select the 'Material Explorer' option.
- Select the  toolbar button on the 'Standard' toolbar.
- Right click on an operation and select the 'Show in Material Explorer' option that appears on the popup menu.
- Right click on any diamond image on the Sequencer Gantt Chart, hover the mouse over any of the listed orders and select the 'Open in Material Explorer' option from the pop up menu.



Material Explorer Features

The main portion of the 'Material Explorer' window provides an interactive graphical diagram of the order that is being viewed and the operations that the order comprises of. It also displays any immediate supply or demand orders that relate to that order. It shows the amount of each item required to fulfill the order, and the amount that the order itself produces, if the operations have been scheduled the times that materials become available is also displayed. The supply orders are displayed on the left hand side of the order being viewed and the demand orders are displayed on the right hand side. It is possible to double click on any of the 'supply' or 'demand' orders to drill down to the orders that relate immediately to them.

Any shortages of an item are shown as a red triangle with a white exclamation mark:



Short of 25

Any unused items are displayed as a stock pile:



35 unused

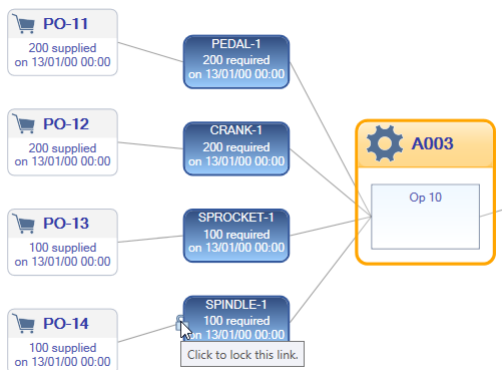
The magnifying glass in the bottom left hand corner of the graphical order display screen can be used to zoom in or zoom out.

Locking/Unlocking of Pegged Materials

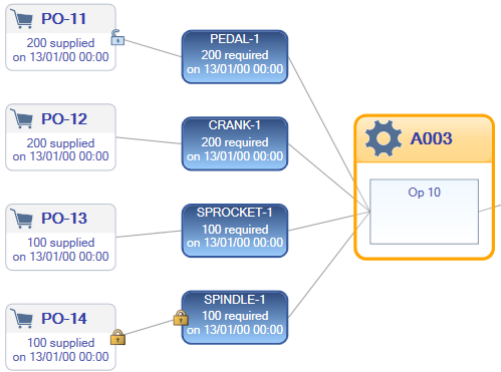
Links can be locked after running the 'Peg Materials' option from the 'View' menu. When a link has been locked, it will not be deleted when the 'Peg Materials' option is selected again. To lock a link, follow these steps:

In order to lock a link, orders must already be pegged together (to peg orders select the 'Peg Materials' option from the 'Tools' menu).

1. Open the 'Material Explorer' window by selecting 'Material Explorer' from the 'View' menu in the Preactor Sequencer or using any of the other methods described previously for accessing the 'Material Explorer'.
2. Rest the mouse pointer over the beginning or end of a link to a specific item. A padlock icon will be displayed.



- Click the mouse button once to lock the link; a padlock will appear on the link that is locked.



To unlock the link, again follow the same steps and click once on the padlock to unlock the link, the padlock image will disappear.

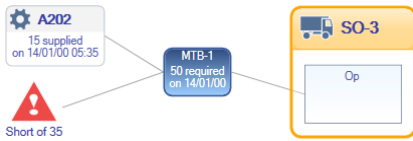
Scheduling Despite Shortages

Preactor by default will not allow orders with shortages to be scheduled. See also [Schedule Despite Shortages feature description](#). This behavior can be overridden by ignoring the shortage. To ignore a shortage, follow these steps:

- Open the 'Material Explorer' window by selecting 'Material Explorer' from the 'View' menu in the Preactor Sequencer or using any of the other methods described previously for accessing the 'Material Explorer'.
- On the 'Issues' panel, expand the shortages area by clicking on the arrow next to the 'Shortages' text to display all shortages.

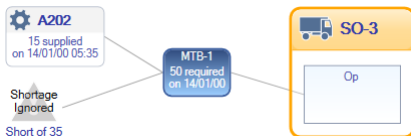
Order#	Material	Shortage
SO-3	MTB-1	35
SO-1	TOURING-1	10
SO-9	ROAD-1	25
SO-10	CYCLOCROSS-1	25

- Double click on one of the orders listed that has shortages. The graphical view of the order will be displayed.



- In the graphical view of the order, double click on the red triangle that represents the shortage that you wish to ignore.

The red triangle will turn gray, and the shortage will now be ignored when scheduling the operations.

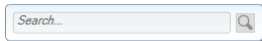


Order Description



The first panel on the right hand side of the Material Explorer provides information about the order currently being viewed. This panel includes back and next buttons for easy navigation when exploring different orders and a refresh button to redraw the screen when changes have been made to any orders.

Search Facility



A search facility is available in the second panel displayed on the right hand side of the Material Explorer. This search feature will locate order numbers that match the search text. The search option is case sensitive and will perform sub string searches if the entire text has not been entered. Double clicking on the located order will alter the order displayed in the main window of the 'Material Explorer' so that the order displayed is the located one.

Issues Panel

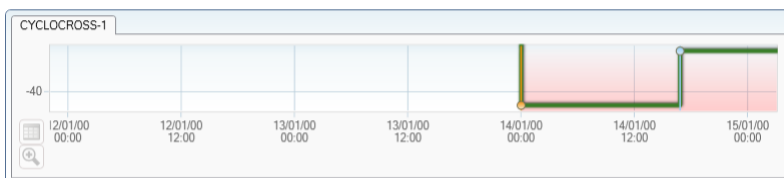
 A screenshot of the 'Issues' panel in the software. It contains two expandable sections: 'Shortages(4)' and 'Unused Materials(19)'. The 'Shortages' section is expanded and shows a table with columns 'Order#', 'Material', and 'Shortage'. The 'Unused Materials' section is also expanded and shows a table with columns 'Order#', 'Material', and 'Unused'.

Order#	Material	Shortage
SO-3	MTB-1	35
SO-1	TOURING-1	10
SO-9	ROAD-1	25
SO-10	CYCLOCROSS	25

Order#	Material	Unused
A001	RIM-1	35
A003	PEDASSY-1	25
A101	TOURFRAM1	15
A102	TUBE-2	625
A105	WHEEL-1	15
A202	MTB-1	10
M001	TUBE-2	10
M001	MTBFRAME-	10
PO-04	TUBE-1	1480

The 'Issues' panel can be used to display orders that have shortages or unused material. Clicking on the arrow next to either the 'Shortages' or 'Unused Materials' sections expands the dialog to display any items that are short or unused. You can double click on any order shown in the 'Shortages' or 'Unused Materials' area to display it in the main 'Material Explorer' window.

Material Plots



The material plot in the lower left portion of the 'Material Explorer' displays a graph showing the quantities of an item over time, and how the quantity varies as the item is produced and consumed.

If the order currently being viewed in the graphical area relates to several other materials, a plot for each material will be drawn and tabs to switch between each plot will be visible in the plot window.

The plot will show both positive and negative quantities. A circular icon is displayed at a point on the graph where a change has occurred in the quantity. If the mouse is hovered over the circle, a tip display pops up detailing the exact time that the change

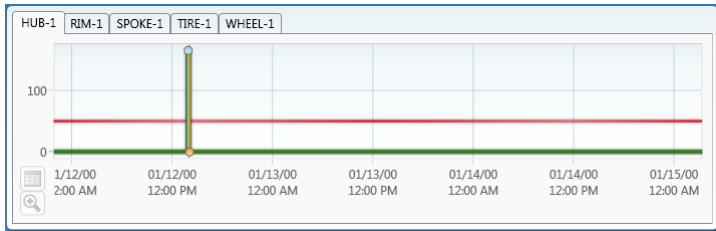
in quantity occurred, the current stock level, the order(s) that caused the change and the quantity produced or used by that order. It is possible to navigate to the order(s) displayed on the tip display by resting the mouse pointer over the order and clicking on the hyperlink when it appears.

The pale blue and amber vertical lines drawn on the plot represent stock movements (operations must be scheduled to see the amber line). The amber line is the currently selected item in the graphical diagram of the order, and is drawn at the time when the selected order consumes the material it is linked to. The pale blue vertical line is drawn at the time when the supply order feeds the currently selected order.

A zoom facility in the lower left corner of the material plot is available to enhance visibility.

Static Stock Line

Preactor can be customized to enable the indication on the Material Explorer stock plot of a line representing a stock level for each part, at a value supplied by the user.



The line is labeled using a tooltip with the name of the field in which the value is specified, and its provisioned value. The indicator is visible at all zoom levels.

The use of this field would typically be used to show the minimum stock level.

The Customization Help (Index: Static Stock Level Indicators) provides details of the activation of this field.

Sequencing

Unscheduled Operations Window

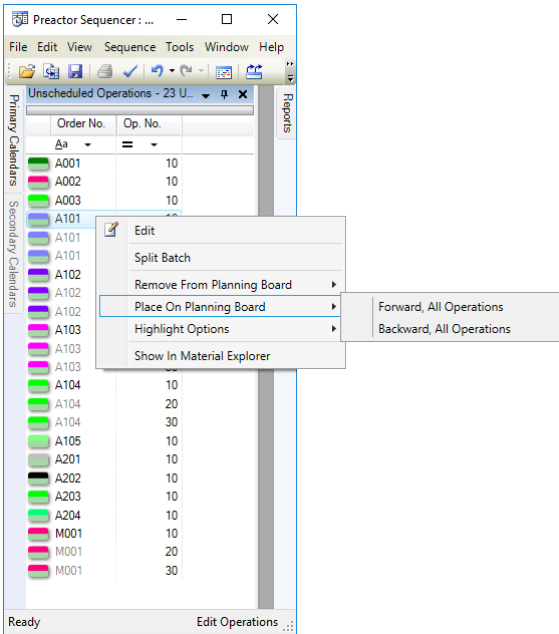
A view of the currently unscheduled operations can be obtained from the Sequencer menu option:

View ▶ Unscheduled Operations

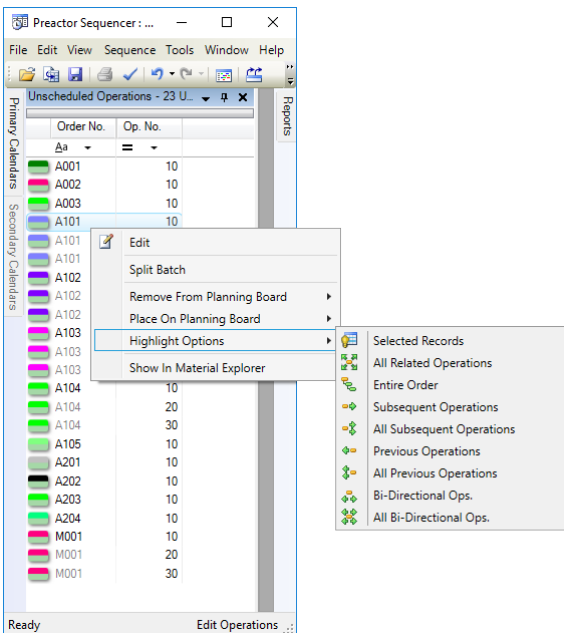
Order No.	Op. No.
A001	10
A002	10
A003	10
A101	10
A101	20
A101	30
A102	10
A102	20
A102	30
A103	10
A103	20
A103	30
A104	10
A104	20
A104	30
A105	10
A201	10
A202	10
A203	10
A204	10
M001	10
M001	20
M001	30

From here:

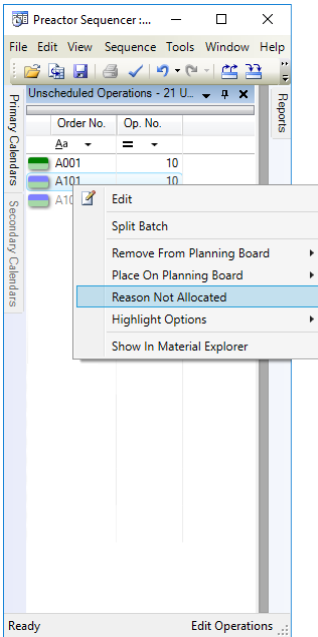
- All operations can be sequenced (using the Sequence menu option or the appropriate toolbar icon).
- The operations for a single order can be sequenced. Right click on an operation for that order and select Place on Planning Board:



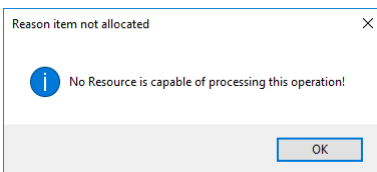
- Change an order to split the batch – See [Manual Batch Splitting](#) for details.
- Highlight the order in a number of different ways.



- Find out why an operation has not been scheduled. Right click on an operation that was left in the Unscheduled Operations Window after a scheduling run and choose the Reason Not Allocated option.



A message will be displayed explaining why the operation was not scheduled on the planning board.



Orders that are already on the Planning Board can be removed from it and placed in the Unscheduled Operations window by:

- For all operations, use the Sequence menu option to Remove Operations from the Schedule or the appropriate toolbar icon.
- From the Gantt Chart window, select an operation and right click to remove the whole order, or subsets thereof.

Automatic Sequencing

Preactor Express uses sequential or order at a time scheduling method, which allows you to work with rules such as 'priority', 'due date', etc to decide the ranking of orders. Many production schedules can be tried and compared before being released to the shop floor for execution.

Automatic sequencing of the schedule file is accomplished in the Sequencer using options under the Sequence menu bar command, or the equivalent toolbar buttons.

When sequencing orders the user must consider the manner in which orders are loaded to the Planning Board, e.g. Forward, Backward etc. and how the sequence of loading will be organized, e.g. by priority, due date or schedule sort order.

To sequence all orders lying in the Unscheduled Operations Window:

1. Determine the scheduling criteria you wish to use.

You may wish to forward sequence in due date order.



2. Under the 'Sequence' menu bar command select 'Forward Sequence'.

A sub menu displays the options: 'Forward By Priority', 'Forward By Reverse Priority', 'Forward By Due Date' and 'Forward By Schedule Sort Order'.

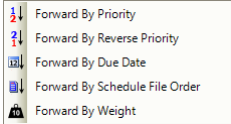


3. Select the 'Forward By Due Date' option.

All orders are forward sequenced by Due Date in the Gantt Chart window.

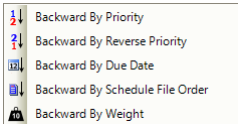
Forward Sequencing

Forward Sequencing is accessed from the Sequencer's Sequence command and provides the following sequencing options:



Backward Sequencing

Backward Sequence is accessed from the Sequencer's Sequence command and provides the following sequencing options:







Bi-Directional Sequencing




In bi-directional sequencing one operation is locked, e.g. a bottleneck operation or one that is performed on a critical resource. Operations upstream of the locked operation are sequenced backwards from its start time, while downstream operations are forward sequenced from the locked operation's end time.

One example of its use is shown here.


To sequence bi-directionally:

1. Starting with a blank schedule, click the **Generate Schedule** button . This places the orders on the Planning Board.
2. Click the **Highlight Bottleneck Operations** button , either by going to **View, Highlight Options**, or by enabling the **Highlight Options Toolbar**.

*If more operations than the bottleneck one are highlighted, click the **Highlight Filter Mode** button , on the **Advanced Filters Toolbar**, and from the subsequent menu, select **Filtered Operations**, .*

3. Click the **Lock Highlighted Operations** button, , from the **Highlight Options Toolbar**.
4. Remove all the highlighting and filtering by clicking the **Cancel All Highlights** button, , from the **Highlight Options Toolbar**.
5. Unschedule the unlocked operations using the **Remove Operations from Schedule** button, .

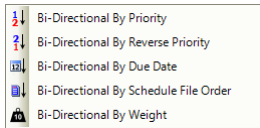
This will leave the operations that were not highlighted on the schedule.

6. With the **Sequence Toolbar** enabled, click the **Sequencing Direction** button and select **Sequence Bi-directionally**, .
7. Forward sequence any operations remaining in the unscheduled operations window.

This approach would give orders using bottleneck facilities priority on resources upstream of the bottleneck.

Bi-Directional Sequencing

Bi-Directional Sequencing For All Locked Operations, is accessed from the Sequencer's Sequence command and provides the following sequencing options:



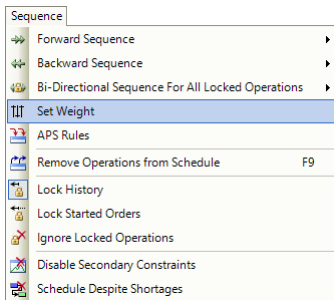
Sequencing by Weight

Deciding which operation to sequence can be dependent on normal rules (e.g. forward sequencing, backward sequencing, bi-directional sequencing) as dictated by the common attributes of Priority, Reverse Priority, Due Date or File Order.

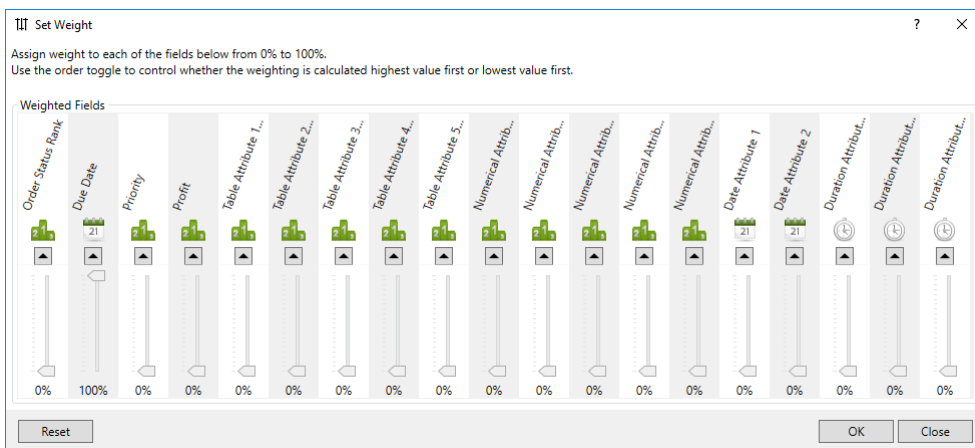
It is also possible to sequence operations based on the consideration of a list of attributes, with the relative weighting given to each attribute controlled by the user.

Modifying the Weighting

When enabled, the Set Weight option is available in the 'Sequence' menu:







Selecting Set Weight opens the window allowing the relative weighting to be provisioned.



The user simply selects Highest Value First or Lowest Value First and adjusts the sliders for each attribute, then hits OK to apply the desired weighting to the scheduling.

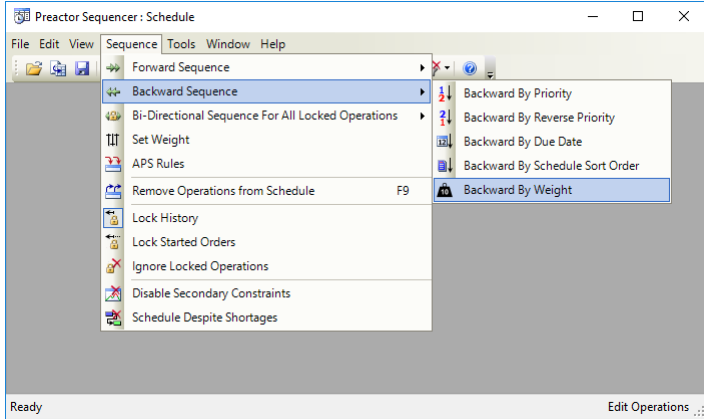
The icon at the top of each attribute indicates the type of value that attribute is:

-  is for a Duration
-  is for Date/Time
-  is for a toggle or Boolean

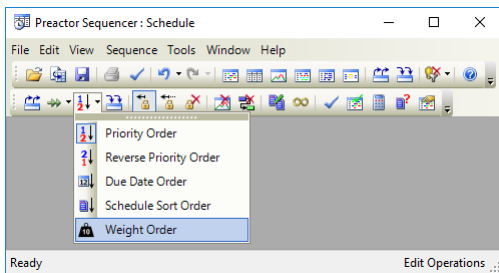
 is for a Number.

Sequence by Weight

To sequence using the provisioned weights for the attributes, the Sequence Menu has a '... By Weight' option for the Forward , Backward and Bi-Directional sequencing options:



Sequence by weight at the next sequence can be set from the Sequencing Order toolbar:



The Weighting Rule

Preactor applies a calculation to the values of the weighted attributes to effect the order the operations are sequenced.

Consider the following:

	Attribute A Range of values for all operations	Attribute B Range of values for all operations	Attribute C Range of values for all operations	Weighting with Highest Value First setting
Min Value	0	12	Jan 1st 2012	0
				1
	20	14		2
				3
				4
Mid Value	50	17	Jan 6th 2012	5
				6
				7
		20	Jan 9th 2012	8
				9
Max Value	100	22	Jan 11th 2012	10

Here we see how the weighting of the values of an attribute is normalized across the range of values that attribute has with the operations being scheduled. Note:

- A value of 20 for Attribute A will not have the same weighting as the same value for Attribute B.
- A value of 20 for Attribute A has the same weighting as a value of 14 for Attribute B.
- A value of 20 for Attribute B has the same weighting as a value of Jan 9th 2012 for Attribute C.

The overall weighting of an operation is a product of all that operation's weighted attributes.

Customization Classifications:

- WEIGHTED
- SEQ WEIGHT

Manual Sequencing

In the Sequencer's Gantt Chart, icons in the **Unscheduled Operations** window represent operation of any unscheduled orders. Icons can be treated as the electronic equivalent of the cards that you would place in slots on a manual planning board.

The data associated with each operation can be viewed and edited by double-clicking on the icon itself, or on its associated Gantt bar in the **Sequence Gantt Chart**.

Preactor allows you to drag and drop operations onto resources in the Gantt Chart window from the **Unscheduled Operations** window.

To load the icons/operations onto the resources:

1. Under the **Schedule** sub category select the **Generate Schedule** action.

The Sequencer is displayed.

2. Select the required icon in the **Unscheduled Operations** window by clicking on it with the mouse and holding down the left mouse button.
3. Drag the icon with the mouse to a suitable resource on the planning board.

When you move the icon over a suitable resource a Gantt bar is displayed.

4. Release the mouse button to drop the operation onto the resource, at a selected point in time.



Similarly, the schedule can be edited by picking up and dropping the Gantt bars in the Gantt Chart. Notice that the size of the bar changes as you move over the chart. This is because the Preactor continually re-calculates the process time and takes into account the shift patterns of a resource over which the bar or icon is placed.

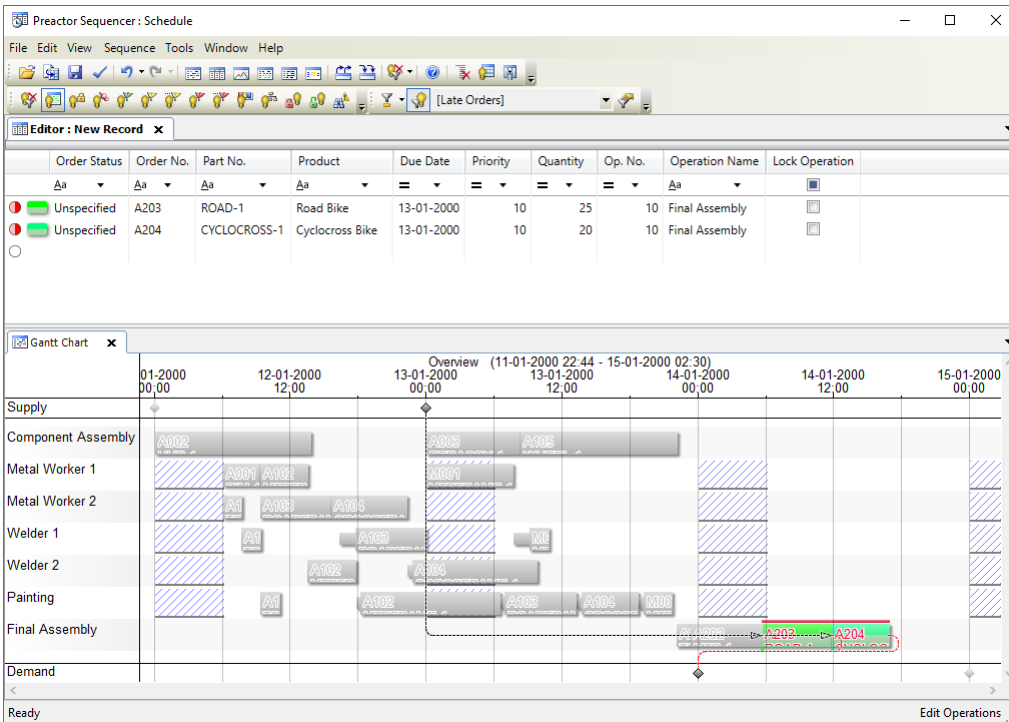
Loading/Unloading Operations Using Filtering and Highlighting



The **Highlight Options Toolbar** and **Advanced Filters Toolbar** can be used together to load/unload operations with specific attributes in the following windows:

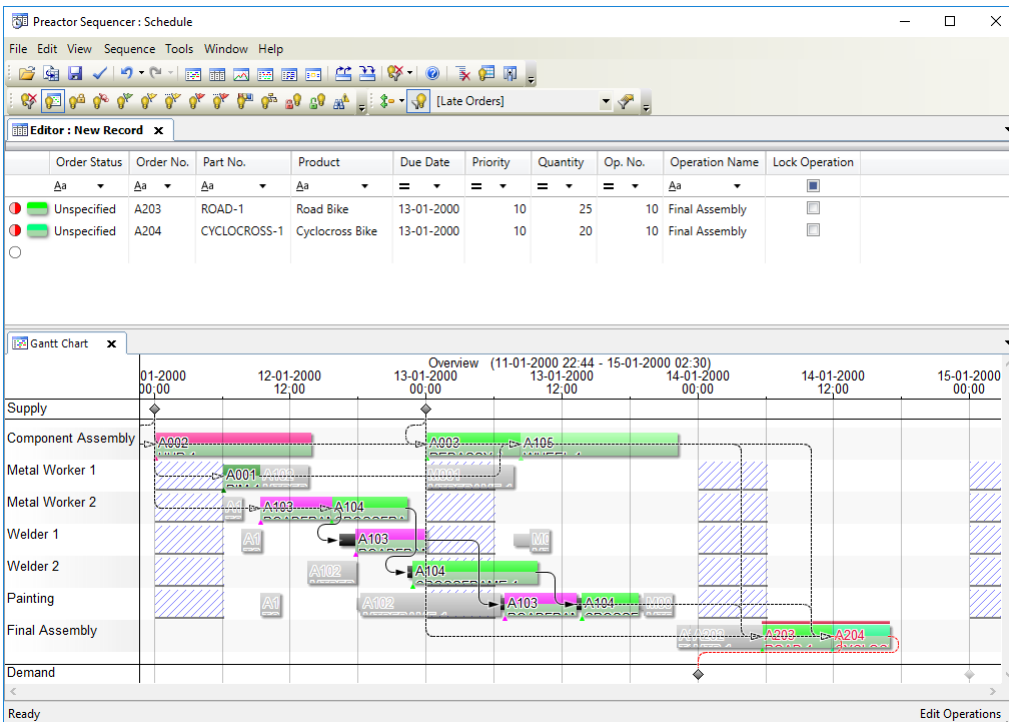
- **Unscheduled Operations**.
- **Gantt Chart**.
- **Editor Window**.
- **Trace Chart Window**.


The following will provide an example of how to sequence operations (using APS rules) around bottleneck operations.

1. Starting with a blank schedule, click the **Generate Schedule** button .
2. Click the **Highlight Late Orders** button , either by going to **View, Highlight Options**, or by enabling the **Highlight Options Toolbar**.

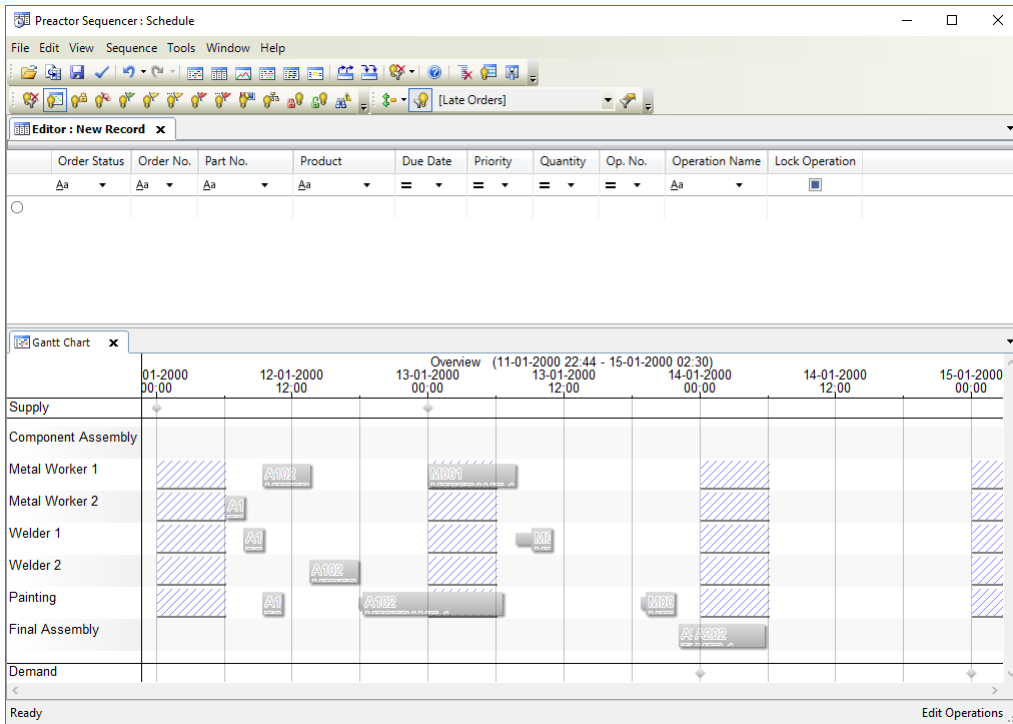




3. Click the **Highlight Filter Mode** button , on the **Advanced Filters Toolbar**, and from the subsequent menu, select **All Previous Operations**, .

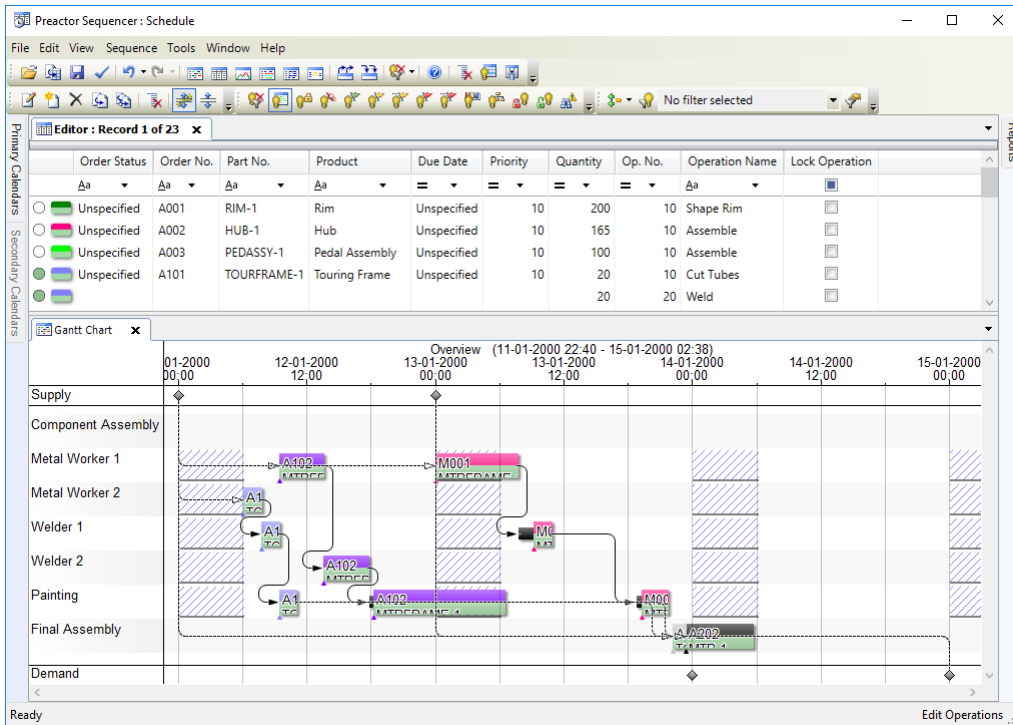



4. With the operations highlighted, unschedule them, using the **Remove Operations from Schedule** button, .

This will leave the operations that were not highlighted on the schedule.



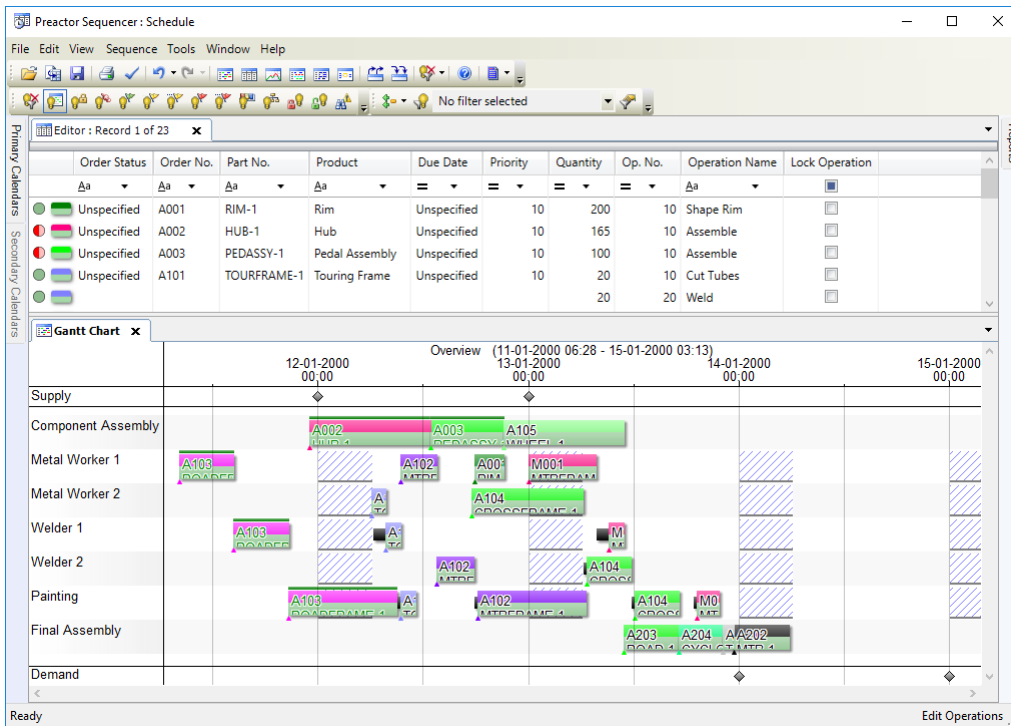
- Remove all the highlighting and filtering by clicking the **Cancel All Highlights** button, , from the **Highlight Options Toolbar**.
- Click the **Highlight Enablement** button, , on the **Advanced Filters Toolbar**.



- Click the **Lock Highlighted Operations** button, , from the **Highlight Options Toolbar**.

The operations currently on the schedule are now locked and cannot be unscheduled until they are unlocked.

8. From the **Sequence** menu, select **Backwards Sequence**, then **Backwards By Due Date**.



The outcome of performing the above is that there are no late orders, and only one early operation. Further highlighting, filtering and sequencing manipulation can be carried out until the schedule fits with a manufacturing requirement.

Operation Locking

Once scheduled, individual operations can be locked onto the planning board (they will not be removed when a reschedule occurs) in a number of ways.

Individual Operations

Single operations may be locked, one at a time in the Gantt Chart, by double clicking on an operation to open the **Edit Orders Information** dialog and checking the **Lock Operation** check box. Similarly operations can be unlocked one at a time.

By Order

All of an order's operations can be locked together. To highlight and lock the required order, use the **Highlight Options** from the **View** menu. In the **Highlight Options** menu, select the order to be locked.



Select the **Lock Highlighted Operations** button to lock all the order's operations. Similarly an order's operations can all be unlocked this way.

By Attribute

An alternate method of locking or unlocking multiple operations uses attributes.



Use the **View** menu to select an appropriate attribute and use the **Lock Highlighted Operations** button to lock or unlock all operations with the same attribute value.

By Resource

Another method of locking and unlocking multiple operations at a time is to right click on a resource name in the Sequencer and use the lock/unlock options to lock all operations that are currently assigned to that resource.

By Time

A further method of locking multiple operations at a time is, in Calendar Edit mode, to drag the terminator time to some time in the future. Operations that lie within or across the terminator will not be removed from the schedule.

Shortcuts

There are a number of shortcuts to facilitate locking. These include:

- Keyboard Shortcuts can be setup to Lock (and unlock) operations.
- When in **Locate ▶ Highlight** Locked Operations, using **shift + left mouse button** on an operation will toggle the lock operation parameter for that operation.

In the Editor Window, a field can be placed from the **Field Chooser** dialog called **Lock Operation**, which displays whether an operation is locked or not. This field can be filtered on to display only locked or unlocked operations, or both.

Schedule Despite Shortages

By default Preactor will not schedule orders that are affected due to the shortages of materials. This default behavior can be overridden by the Schedule Despite Shortages feature. There are two different ways that shortages can be ignored.

- Globally by choosing the Sequence ▶ Schedule Despite Shortages option.
- Individually by marking items as short in Material Explorer.

Globally Applying Schedule Despite Shortages

Follow these steps to globally schedule despite shortages:


1. Run SMC by choosing the Tools ▶ Peg Materials option.
2. Schedule the operations.
3. Select the Sequence ▶ Schedule Despite Shortages option.
4. Schedule the operations again. Any operations that were unscheduled due to shortages will be placed on the planning board.

Individually Ignoring Shortages

Shortages can be ignored on an individual basis using Material Explorer. Please view the Material Explorer section for more information on this feature.

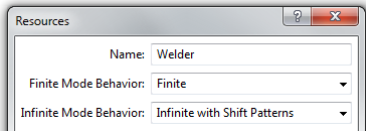
Infinite Capacity Sequencer Mode

Sequencing can be performed with resources constrained as provisioned, or in Infinite Capacity mode where Primary and Secondary resources/constraints are removed or adjusted. Infinite Capacity sequencing may be used to help determine where additional resources can be placed to meet demand.

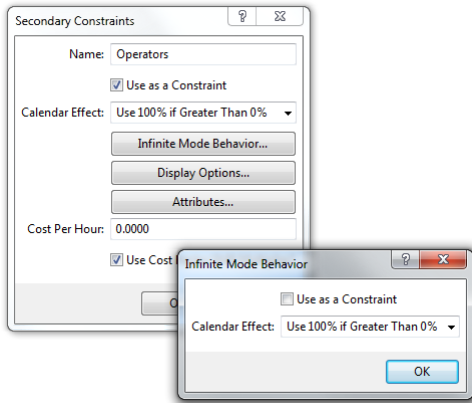
Infinite Capacity Sequencer mode is enabled/disabled by toggling the  toolbar icon or on the Tools menu.

Datasets include the state of the Infinite Capacity Sequence mode when saved and opened, to allow any over-utilization of resources to be maintained.

The scope of which resources are set to Infinite Capacity when this mode is enabled can be modified. Here you see the fields where this Alternate Behavior is defined for a Resource:



Here you see the settings for the Secondary Constraint:



By default (or when Alternate values are not configured to be part of the configuration), the following behavior is exhibited when enabling this mode:

- All primary resources become 'Infinite with shift pattern'.
- All secondary constraints become 'unconstrained'.
- All secondary constraints are no longer checked as part of the sequence validation.

Turning off this mode, after creating a schedule when in Infinite Capacity Sequencer mode that produces a schedule that over-utilizes a resource, will result in the schedule being changed to remove the over utilization.

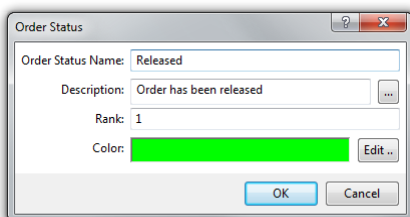
An example use of this capability could be as follows:

- Sequence normally to identify orders not meeting their due dates.
- Un-sequence orders not being met.
- Enable Infinite Capacity
- Sequence Backwards by Due Date.
- The Utilization Window shows resource over-utilization, providing an insight into where additional resources can be placed to meet targets. "Utilization View" on page 259 for more information.

Order Status

An order can be given a status such as Suggested, Released or Confirmed etc.

The Order Status option accesses the Order States table where criteria can be defined for a given Order Status Category, e.g. a name, operation bar pattern and a description of the status category.




The Operation Bar Pattern is displayed in the Gantt bar on the Planning Board when the operation is set to a specific order status in the Sequencer.

Order Enquiry Process

Where there is an inbuilt table of routing information, a (possible) multi-level BoM and sub-assemblies, the user can use the Order Enquiry button to find the earliest delivery date for a batch of product. Where a multi-level BoM and sub-assemblies exist, Preactor will leverage the routing and BoM explosion features, allowing for orders to be created for all of the required items which are currently in a shortage state.

To make an Order Enquiry:

1. Click the **Order Enquiry** button  from the Sequence toolbar, or by going to **Tools > Order Enquiry**. This will open the Order Enquiry dialog.

2. Enter the enquiry details in the dialog, and then click **OK** to start the enquiry.
3. Once the enquiry is complete, the following dialog will be displayed.

Yes will confirm, sequence and highlight on the planning board the proposed sequence of operations. **No** will revert the sequencer back to its "pre-enquiry" state. **Change** will allow the user to edit the enquiry details.

*In order for an Order Enquiry to work as intended, the **Run SMC on Order Enquiry** event script must be enabled.*


Schedule Repair

The user has access to a schedule repair button.

Schedule repair can be used to correct a schedule where small alterations to actual start and finish times for an operation have caused operations within an order to overlap (assuming transfer batching has not been defined as allowed). Schedule repair will keep operations on the same resource (where possible) but adjust the start and finish times for un-started operations to maintain the correct operation sequence within an order.

The Schedule repair facility is intended for use in simple scheduling environments. If you have a more complex scheduling environment using, for example, secondary constraints, material control (pegging), inter-operation constraints, APS scheduling rules, etc. you may find that you have to unschedule and reschedule instead.

To use the schedule repair facility:

1. In the Sequencer's Tool command, click on the Schedule Repair button. 

A Schedule Repair Parameters dialog is opened.
2. Check the check box if you are prepared to allow operations to be scheduled earlier.

The options are:

 - Allow Sequence Change

This allows the operations for an Order being worked on a resource to be sequenced in a different order - e.g. Order 2 may be processed before Order 1.
 - Maintain Sequence when Possible

This option allows the sequence of operations scheduled on a resource to differ from the sequence in which they were originally placed. The operation sequence within an order will be maintained but operations may be placed in a different sequence relative to operations from a different order. The Resource on which an operation is placed will be maintained unless this is impossible due to sequence violations, in which case the operation will be unallocated.
 - Prevent any Sequence Change.

No sequence change is allowed. If a single operation cannot be placed in the same sequence then EVERYTHING that was sequenced after that operation will be unallocated – because the sequence could not be maintained..
3. Choose a preferred sequencing option by highlighting the appropriate radio button.

A message is received when the repair has been complete.

Parallel Operations

Each operation in a process route has a number, say 10, 20, 30 and so on. If two operations are defined as number 10, both of these operations must be scheduled to finish before sequencing operation 20. In effect the two operations 10 will be processed in parallel providing, of course, that the required resources are available for use.

Transfer Batching

You can define transfer batching between operations. For example a batch of 100 could have a transfer quantity of 20. Then as soon as the first 20 parts have been completed the next operation can be scheduled for the subsequent operation.

To define transfer batching between operations:

1. In the Products table, open the record where you wish to split the batch.

The 'Edit Products Information' dialog is displayed.

2. Click 'Operation Attributes'.
3. In the Attributes dialog, input a value into the Transfer Type dialog.
4. Click 'OK' to close the dialog.

Manual Batch Splitting

The quantity scheduled for production or batches in production may be broken down into smaller lots.

To split a batch manually:

1. In the Sequencer's Unscheduled Operations or the Gantt Chart window, right click with mouse on an operation where the batch quantity is to be split.
2. From the pop-up menu, select the Split Batch option.

A dialog headed Total Quantity is... is displayed.

3. Edit the 'Quantity' field to the smaller batch quantity and click 'OK'

The original quantity is written down and a new smaller batch created. This is represented by an icon in the Unscheduled Operations window or a bar in the Gantt Chart.

4. Either, load this batch manually in the Gantt Chart or place it in the Unscheduled Operations window.

To sequence the split batch from the Unscheduled Operations window, right click on the record and select 'Place on Planning Board' and then the forward or backward sequencing options.

Lot Splitting

You can specify at an operation that a batch is split into smaller lots. For example a batch of 20 may be split into lots of 10.

To define lot splitting at an operation:

1. In the Products Data Table open the record where you wish to split the batch.

The 'Edit Products Information' dialog is displayed.

2. Click on the 'Operation Attributes' pushbutton.
3. In the subsequent dialog, set the 'Batching Method' field to 'Split'.

A 'Lot Size' fields is displayed in the dialog.

4. Define the lot size you require the batch to be split into in this field.
5. In a Preactor 300 FCS you can check the 'Independent Lots' check box to allow the split lots to proceed independently¹.
6. Click on the 'Previous' pushbutton and then click 'OK' to close the dialogs.

Cost Calculation

Cost calculation by operation and schedule.

A User can define a number of data fields associated with costs. For example you can define the cost per hour for resources, whether these are multiplied depending on calendar state (e.g. on-shift and overtime variations), and material cost for each operation. The cost for each operation may be displayed in a tool tip in the sequencer Gantt Chart. As an operation is dragged and dropped to an alternative resource or is rescheduled or overtime added, so the operation cost is recalculated.

Additional order cost report.

Where cost information has been added then a standard report is available which displays the cost for each operation for an order and a total cost for the order.

¹This is used for example to allow the batch to be processed across more than one resource in a resource group or work center.

It is also used where a resource can only process a smaller lot at a time e.g. an oven can only take 10 parts at a time.

Mid-batch Update

Available in Preactor 300 FCS systems and above, this feature enables you to apply a mid-batch update for a batch at an operation, e.g. you may wish to enter the quantity complete and time for part of a batch.

Preactor uses this information to calculate the 'Effective Operation Time'.

To apply a mid-batch update:

1. Open the record you wish to amend in the Sequencer's Gantt Chart or Editor windows.

The 'Edit Orders Information' dialog is displayed.

2. Select the 'Operation Status' pushbutton.

The 'Edit Orders Operation Status Information' dialog is opened.

3. Complete the 'Mid Batch Time' and 'Mid Batch Quantity' fields.
4. Click on the 'Previous' pushbutton and then the 'OK' button to close all dialogs.

When these dialogs are closed Preactor calculates the 'Effective Operation Time' to date. The operation bar is adjusted in the Sequencer and the portion of the operation bar representing the progress of the operations is now shaded on the operation (the default color is Silver, this can be changed in the Preactor Desktop under Configuration ► Sequencer Configuration ► Set Progress Control Color)

If the 'Edit Orders Operation Status Information' dialog is reopened, it will be seen that the 'Effective Op Time' field now shows the calculated value.

Operation Completion

When an operation is finished it can be set as 'Complete' in the Sequencer's Gantt Chart. Setting an operation as 'Complete' sets the current start and end times as 'actual' values, unless these are overwritten. In addition the operation can no longer be removed from the schedule, it is locked to the planning board.

To set an operation as 'Complete':

1. In the Sequencer, double click on the particular operation, in either the Editor or the Gantt Chart.

The Edit Orders Information dialog is displayed.

2. Left click on the 'Complete' check box to lock the operation.
3. Click 'OK' to close the dialog.

Bear in mind that the Start and End Times may not be the original times, these values may be changed if the operation's Gantt bar is moved, or in a Preactor 300 FCS system, or greater, if a 'Mid Batch' time and quantity have been entered.

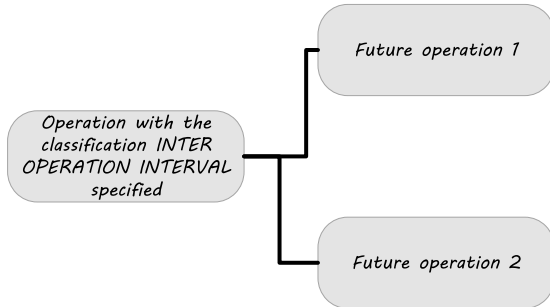
Inter-Operation Relationships

In the Sequencer, during scheduling, an error message can appear when using inter-operation constraints with operations that have multiple previous or subsequent relationships. The following classifications define the inter-operation constraints:

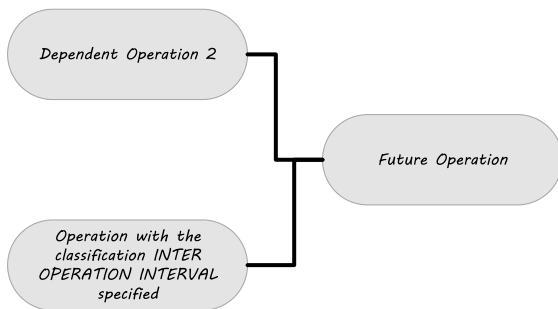
- INTER OPERATION INTERVAL
- START OFFSET
- END OFFSET

A multiple relationship is defined as either:

- A single operation that is the dependency for multiple subsequent operations.



- An operation that is linked to a future operation, that itself has multiple operations.



If any of the three classifications are used in the configuration, and have a value set in the data for one (or more) operations, then an error message will be displayed. There are two main types of error messages that can be displayed, one for multiple subsequent operations and one for multiple previous operations. The error message for multiple subsequent operations will specify where the issue is arising from (e.g. the INTER OPERATION INTERVAL classification having a value that is not "No Limit") and stating that the operation has more than one subsequent operations linked to it. The error message for the multiple previous will specify which operation is causing the issue and that the operation has more than one previous operation linked to it.


There are three options available to close the error dialog, which are:

Yes	Continues to schedule operations displaying the errors.
No	Continues to schedule operations without displaying errors.
Cancel	Stops sequencing operations, and "rolls back" the schedule to it's previous state.

There are a number of preventative measures that can be taken in order to avoid the inter-operations issue from arising. The first would be to not use the INTER OPERATION INTERVAL classification in the configuration. The second would be to set values for the data so that the classification is not used for specific operation(s), if the classification needs to be used. Then this would be to ensure that operation(s) that use the classification do not have any multiple operation dependencies.

Export Schedule Data to Excel

You can export user defined schedule data to an Excel spreadsheet, with either of the following options:

- Selecting File ► Export
- Selection the Export icon in the Standard toolbar .

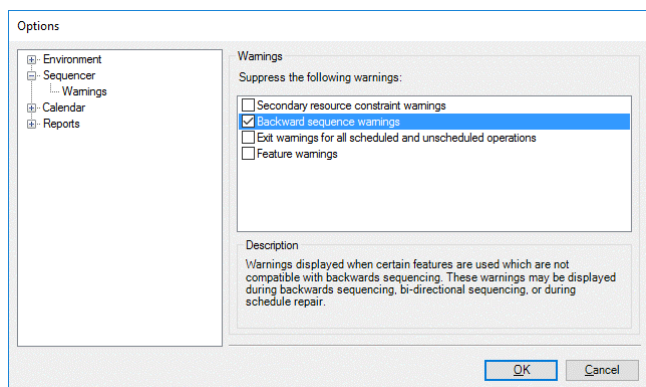
The current schedule data is exported to file/location defined by the PESP script For Event Export Button Press.

Suppressing Warnings in the Sequencer

Within Preactor, there are a number of command line switches that can be used to turn warnings on and off in the Sequencer. If using these switches, Preactor needs to be restarted in order for the changes to the PRMDF to take place. If any of the following command line switches have been defined in the PRMDF, they will be used to define the default state of whether the warnings will be displayed:

- /NoManualMovementConstraintCheck
- /DisableFeatureWarning
- /NoExitSequenceWarning
- /SkipDataConsistencyCheck

In conjunction with the command line switches, within the Sequencer, the **Options** window (accessible from the **Tools** menu) contains a **Warnings** section where warning suppression is available.



In a scenario where none of the above command line switches are listed in the PRMDF, then the warnings will be displayed by default in the Sequencer. When any of the check boxes have been ticked in the Options window, then warnings will then be suppressed.

In a scenario where at least one of the command line switches has been listed in the PRMDF, the switch will define the default state for whether the warning is displayed. The Warnings section can then be used to override any of the command line switches.

The selections made in the **Warnings** section of the **Options** dialog are database specific, as is the use of the command line switches in the PRMDF. The selections made in the Options dialog will be saved upon clicking OK, and will be retained upon closing and restarting Preactor.

Reports

Displaying Reports

The Sequencer is equipped with a selection of standard reports.

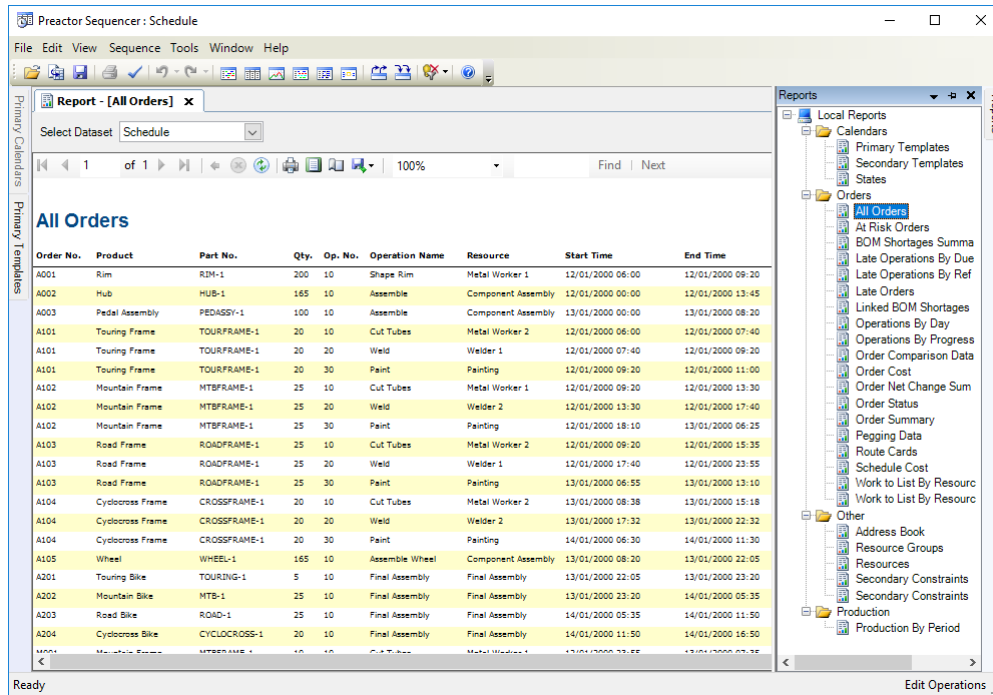
To access the available reports:

1. Select the Reports option from the View menu bar command.

By default the Reports Panel is displayed to the right of the main window, displaying a list of available reports. Local reports will be listed under the 'Local Reports' node.

2. Select the required report by double clicking on it with the left mouse button.

The report opens in the Sequencer's main window.



You can generate reports on different schedules that have been saved using the 'Select Dataset' facility to identify the data to be used and 'View Report' to generate the new report on the dataset.

Shortages Report

Preactor 400 APS provides a shortage report that allows you to check whether sufficient orders have been raised to satisfy the demands generated by the current production schedule.

To view the Shortages Report:

1. In the Sequencer click on the 'Reports' tab.

The 'Reports' panel is displayed.

2. Select 'BoM Shortages' report from the options available.

The BoM Shortages report is generated, listing orders with shortages, the shortage reference and the quantity outstanding.

Schedule Statistics

For any schedule the user may look at a standard set of statistics.

To display these statistics, with the Sequencer open select the 'Schedule Statistics...' option from the Tools menu bar command.

OR

Select icon:

The Schedule Statistics dialog is displayed, showing data for the currently loaded schedule:

Schedule Statistics				
Order Count Data				
	Early	Late	Incomplete	Started
Absolute	11	2	0	0
Percentage	84.62	15.38	0.00	0.00
Order Completion Data				
	Total	Minimum	Average	Maximum
Early Time	3 Days 21:25	0 Hours 00 Mins	8 Hours 30 Mins	2 Days 2:20
Late Time	1 Day 4:40	11 Hours 50 Mins	14 Hours 20 Mins	16 Hours 50 Mins
Setup Time	5 Hours 30 Mins	0 Hours 00 Mins	0 Hours 25 Mins	2 Hours 00 Mins
Lead Time	6 Days 16:40	1 Hours 15 Mins	12 Hours 22 Mins	1 Day 3:50
Added Value Percentage	26.67%	66.81%	100.00%	
Resource Data				
	Minimum	Average	Maximum	
Working Percentage	14.14	26.17	55.27	
Setup Percentage	0.00	1.21	4.63	
Unavailable Percentage	0.00	19.83	27.76	
Idle Percentage	35.73	52.79	71.08	
Utilisation Percentage	19.57	31.60	55.27	
Schedule Span	12-01-2000 00:00 - 14-01-2000 16:50			2 Days 16:50
Close				

Order Count Data

- Early** The number or percentage of orders for which the last operation ends before its due date.
- Late** The number or percentage of the total number of orders in the schedule file for which the last operation ends before its due date.
- Incomplete** The total number or percentage of incomplete orders; i.e., the number of orders for which there is one or more operation that is not scheduled.
- Started** The total number or percentage of orders that have already started, i.e., the number of orders that have operations that start before the terminator.

Order Completion Data

Early Time

- Total** The total early time for all fully scheduled orders; i.e., the sum, for all orders, of time between the end of the last operation and the due date for that order. The calculation does NOT include data for orders for which this value is negative as these orders are deemed to be late.
- Minimum** The minimum early time; i.e., the smallest time between the end of the last operation and the due date for that order. The calculation does NOT include data for orders for which this value is negative as these orders are deemed to be late.
- Average** The average early time; i.e., the average time between the end of the last operation and the due date for that order. The calculation does NOT include data for orders for which this value is negative as these orders are deemed to be late.
- Maximum** The maximum early time; i.e., the maximum time between the end of the last operation and the due date for that order. The calculation does NOT include data for orders for which this value is negative as these orders are deemed to be late.

Late Time

Total	The total late time for all fully scheduled orders; i.e., the sum, for all orders, of time between the due date and the end time of the last operation of the order. The calculation does NOT include data for orders for which this value is negative as these orders are deemed to be early.
Minimum	The minimum late time; i.e., the minimum time between the due date and the end of the last operation for that order. The calculation does NOT include data for orders for which this value is negative as these orders are deemed to be early.
Average	The average late time; i.e., the average time between the due date and the end of the last operation for that order. The calculation does NOT include data for orders for which this value is negative as these orders are deemed to be early.
Maximum	The maximum late time; i.e., the maximum time between the due date and the end of the last operation for that order. The calculation does NOT include data for orders for which this value is negative as these orders are deemed to be early.

Setup Time

Total	The total amount of setup time for all fully scheduled orders.
Minimum	The minimum amount of setup time for an order.
Average	The average amount of setup time for an order.
Maximum	The maximum amount of setup time for an order.

Lead Time

Total	The total lead time of all fully scheduled orders. i.e., the sum, for all orders, of the times between the setup start of the first operation of the order to the end time of the last operation of the order.
Minimum	The shortest lead time of all fully scheduled orders.
Average	The average lead time of all fully scheduled orders.
Maximum	The maximum lead time of all fully scheduled orders.

Added Value Percentage

Minimum	The minimum value of the added value for all fully scheduled orders. Added value for an order is the sum of the process times for all operations divided by the lead time. Both process time and lead time are adjusted by resource efficiency and capacity. Hence, if all operations in an order do not have to wait for the resource at all and there is no setup time, the result will be 100%.
Average	The average value for the added value calculation for all fully scheduled orders.
Maximum	The maximum value for the added value calculation for all fully scheduled orders.

Resource Data

Working Percentage

Minimum	The minimum value, over all resources, of the working percentage calculation. The working percentage calculation is the amount of resource capacity spent in processing jobs (not setups) expressed as a percentage of the total time span.
Average	The average value, over all resources, of the working percentage calculation.

Maximum The maximum value, over all resources, of the working percentage.

Setup Percentage

Minimum The minimum value, over all resources, of the setup percentage calculation. The setup percentage calculation is the amount of capacity that the resource has which is used for setup expressed as a percentage of the total time span.

Average The average value, over all resources, of the setup percentage calculation.

Maximum The maximum value, over all resources, of the setup percentage calculation.

Unavailable Percentage

Minimum The minimum value, over all resources, of the unavailable percentage calculation. The unavailable percentage calculation is the amount of capacity that the resource has which is unavailable due to reduced or zero efficiency expressed as a percentage of the total time span.

Average The average value, over all resources, of the unavailable percentage calculation.

Maximum The maximum value, over all resources, of the unavailable percentage calculation.

Idle Percentage

Minimum The minimum value, over all resources, of the idle percentage calculation. The idle percentage calculation is the amount of capacity that the resource has which is available but not used expressed as a percentage of the total time span.

Average The average value, over all resources, of the idle percentage calculation.

Maximum The maximum value, over all resources, of the idle percentage calculation.

Utilization Percentage

Minimum The minimum value, over all resources, of the utilization percentage calculation. The utilization percentage calculation is the amount of resource capacity spent in processing jobs (not setups) expressed as a percentage of the total time span minus the unavailable time.

Average The average value, over all resources, of the utilization percentage calculation.

Maximum The maximum value, over all resources, of the utilization percentage calculation.

Schedule Span

The time span and duration from the start of the performance data calculation to the end of the performance data calculation. The start time will be the start of setup of the earliest starting fully scheduled order for which no operations are scheduled before the terminator. The end time will be the end time of the latest ending order.

Web Publishing

Web Publishing

Introduction

The web publishing facility runs with Microsoft's Internet Explorer 6.0 or higher. It allows Gantt charts or Order Trace charts to be saved as HTML files that can be placed in a local directory or a remote directory in a shared computer.

A web server can be used to expose this location, enabling a browser to view the files over an intranet or the Internet. In this mode Preactor becomes "browser enabled". Gantt charts that are placed on a web site are not just pictures or bitmaps, each individual bar is an object. Resting the mouse pointer on a bar reveals Tool Tips, clicking on a bar displays its dialog box. The chart has pan, zoom and scroll capabilities and uses gauge lines, dates and times.

There are three ways of using the Preactor to release charts to be published on the web:

- Option 1 - The 'Release Schedule' option from the Workspace General or Data Transfer menus on the Preactor Desktop. The default setting for the Release Schedule option does not generate HTML files, but this can be achieved by simply checking the 'Action Enabled' toggle on the 'Web Publish' action in the 'Release Schedule' event script located in the PESP Event Scripts Data Table. (Not available with Preactor Express).
- Option 2 - From inside the Sequencer, using the Using the [Tools ► Web Publish](#) menu selection.
- Option 3 - Using the [Web Publisher \(PWP\)](#)

Viewing HTML Files

To view the HTML files through Internet Explorer:

1. Select the Configuration option from the Navigation Pane.
2. Click on the Web Publisher option from the Active Pane.
3. Click on the View Gantt Chart option in the Work Pane.

Microsoft Internet Explorer is opened showing the Gantt Chart.

Note that the path to the Gantt chart (gantt.html) is shown in the 'Address' field.

4. Rest the mouse over one of the Gantt bars.

Tool tips giving details of the order pop up.

5. Click on one of the Gantt bars.

Dialogs display more comprehensive information, allowing the schedule to be examined in detail.

6. Click on the icons in the bottom left hand corner of the chart to zoom in, zoom out and reset the display.

The View Custom Chart can be used in a similar manner.

Note: If Internet Explorer displays an Information Bar, (just below the Address Bar), and blocks the active content of the file you are viewing, right click in the Information Bar and select 'Allow Blocked Content'.

Web Publisher (PWP)

Before using this facility you should ensure that the Web Publisher is configured to meet your requirements.

To use the Web Publisher:

1. Select the Configuration option from the Navigation Pane.
2. Click on the Web Publisher option from the Active Pane.

Various options applicable to the Web Publisher are displayed.

3. Select either the Publish Gantt Chart or Publish Custom Chart to publish information for the Web.

Information will only be published if a schedule has already been generated.

The information to be published can be observed using the equivalent View options.

Web Publisher Configuration

The Web Publisher allows standard and customized Gantt Charts (HTML Charts) to be published. Some of the configuration settings can be altered to meet your requirements. Changes made in the Web Publisher only apply when using the Publish Gantt Chart and Publish Custom Chart options available from Configuration ► Web Publisher. They do not apply when publishing from the Sequencer or any user defined work flow (such as a 'Release Schedule' work flow).

To Configure a Gantt Chart publication:

1. Select the Configuration option from the Navigation Pane.
2. Click on the Web Publisher option from the Active Pane.
3. Choose the Configuration option listed on the Work Pane.

This displays the Edit PWP Configuration Information Web dialog.

4. Set the source file, output path and the dimensions for the display.

The 'Gantt Exclude Expression' field can be used to control the data displayed.

Right click on the individual field names for more information.

5. Click OK to save any changes.

To Configure a Custom Chart publication:

The lower portion of the dialog allows a custom chart to be defined.

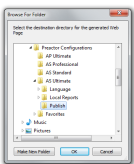
1. Set the source file, output path and the dimensions for the display as you did for the Gantt chart but also define the fields to be used as the axes of the chart.
2. Click OK to save the changes.

Web Publishing from Within the Sequencer

Using this method the only option available to the user is the selection of the folder to which the data will be exported.

To use this option:

1. Selecting this option is from the Sequencer ► Tools ► Web Publish.
Selecting this option opens the Browse dialog enabling the destination folder to be selected.



2. Select the required destination folder.
In this example the default Gantt folder has been used but this could be any folder on a shared networked computer.

- Once the OK button is selected a Web Publishing dialog depicts a progress bar showing files being copied to their destination.
When the Web Publish icon is used only the current chart is transferred as an HTML file and no sizing options etc. are available to the user

Web Publishing

In Ultimate editions of Preactor the user can automatically create reports and Gantt charts, to be viewed with Microsoft Internet Explorer.

To publish a Gantt chart:



- In the 'Preactor Sequencer' select the Web publish toolbar button.

A 'Browse For Folder' dialog is displayed.

- Select a destination folder for the Web Page you will create.
- Click the 'OK' button.

You can now open the Web Page in the destination folder using Internet Explorer.

Web Publisher in Sequencer

To pass specific command line parameters to the Web Publisher from the sequencer, any command line parameter beginning with /PWP will be passed over when the web publisher is run.

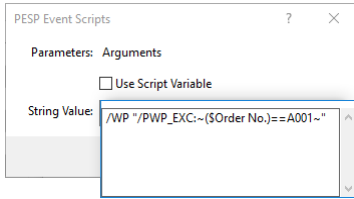
```
; -----
; Edit Production Sequence
; -----
;
S_SEQ : PRS.EXE,
"/FMT:Orders" /AS "SCHEDULE" /GF
/GL /GZC /FO
"/HideExp:Hide Route:1:({#Belongs to Order No.}!=-1)&&({Show}==0) "
"/HideExp:Hide Alternate Routes:1:({Disable Op}==1) "
"/PWP_GANTTHEIGHT:300"
"/PWP_GANTTWIDTH:700",
Sequence Jobs,
Preactor Sequencer,
Maximize,
ALWAYS:MainMenu;
;
```

Web Publish with PESP

The web publisher may be run from a PESP script using the 'Web Publish' action.

A list of the different command line parameters that can be entered in the 'Parameters' section of the 'Web Publish' action, can be found in the reference section.

Here is an example:



The PESP script could run from a shell menu button, (defined in the .prmdf file) for example:

```
MENU_Web_Publish : {DIALOG},
  Select Option from Menu,
  Publish Menu:
  PUSHBUTTON | HELPPOPUPID (59100),Publish to Web,Web_Publish:
  DEFPUSHBUTTON | HELPPOPUPID (53170),Return to Previous Menu,{RETURN};
;
Web_Publish: MANIP.EXE,
  /RunEventScript Web Publish Event Script,
  Run Event Script,
  Web Publish,
  Foreground,
  ALWAYS:{RETURN};
```

Or perhaps from a toolbar button (this can be added to a PRS.dll or PREDIT.dll call in .prmdf file):

```
"/ActiveX:Publish:PESP.EventHandler:RunScriptByName:Web Publish Event Script"
```

Quick Reference

Quick Reference Configuration Guide - Sequencer

What	How
Attribute Display - Color	Preactor Desktop ► Data Maintenance ► Attribute (Select Attribute) ► Select parameter
Bar Text style - for Gantt Chart and Trace - Outline - Small - Rotated	View ► Bar Text
Calendars - Display Mode: - Hidden; - Show All - Show Zero Efficiency. - Display Priority: Calendar on Top / Operations on Top.	View ► Calendars
Calendars - Save Calendars with Datasets	Tools ► Options ► Calendar ► General
Calendars - State Hatch Style	View ► Calendars ► Calendar States Default shortcut: Ctrl + Shift + S

What	How
Due Date Offset	Preactor Desktop: ▶ Configuration ▶ Settings ▶ Sequencer Settings
Earliest Start Date Offset	Preactor Desktop: ▶ Configuration ▶ Settings ▶ Sequencer Settings
Future Planning Horizon	Preactor Desktop: ▶ Configuration ▶ Settings ▶ Sequencer Settings
Gauge Lines in Gantt Chart, Trace and Plot - Period Increment (Days, Hours etc) - Display times, days, dates - Weight of line between days (normal/bold)	 in Zoom and Scale toolbar
Gauge Lines Show/Hide in Gantt Chart, Trace and Plot	View ▶ Gauge Lines (toggle) Also  in Zoom and Scale toolbar
Historical Planning Horizon	Preactor Desktop: ▶ Configuration ▶ Settings ▶ Sequencer Settings
Operation Thumb	Preactor Desktop: ▶ Configuration ▶ Settings ▶ Sequencer Settings
Gantt Chart - Resource Display Style (Stacked or Cascaded)	For a Resource: Temporary change - in the Sequencer: Right click over the resource Change Default: - from the Preactor Desktop For 1 Resource Data Maintenance ▶ Resources ▶ Display Options. For all Resources: Data Maintenance ▶ Resources ▶ Edit (Top of Workpane) ▶ Global Assign ▶ Resource Display Style
Gantt Chart Range	Preactor Desktop: ▶ Configuration ▶ Settings ▶ Sequencer Settings
Product Display - Icon - Display Color - Plot setup time line color	Preactor Desktop: ▶ Data Maintenance ▶ Product ▶ Double click on Product ▶ Product Display Data
Progress Control Color	Preactor Desktop: ▶ Configuration ▶ Settings ▶ SequencerSettings
Resource Display - Display Options - Gantt Separator	Preactor Desktop: ▶ Data Maintenance ▶ Resources ▶ Double click on resource ▶ Display Options

What	How
<ul style="list-style-type: none"> - Order - Plot color - Plot fill pattern - Plot setup time line color - Style 	
Resource Group Display <ul style="list-style-type: none"> - Plot color - Plot fill pattern - Plot setup time line color 	Preactor Desktop: ▶ Data Maintenance <ul style="list-style-type: none"> ▶ Resource Groups <ul style="list-style-type: none"> ▶ Double click on resource group ▶ Display Options
Scaling and Zoom <ul style="list-style-type: none"> - Set Range for Timeline - Zoom In Timeline - Zoom Out Timeline - Zoom in Bar Height - Zoom out Bar Height 	View ▶ Zoom and Scale Zoom In Timeline - Ctrl + scroll up Zoom Out Timeline - Ctrl + scroll down Zoom in Bar Height - Ctrl + shift + scroll up Zoom out Bar Height - Ctrl + shift + scroll down
Secondary Constraint Display <ul style="list-style-type: none"> - Display Usage Plot - Effect in Infinite Capacity Mode - Effect - Use 100% if greater than 0% - Effect - Start of job efficiency - Effect - Follow efficiency changes - Max Value Color - Min Value Color - Plot color - Plot fill pattern - Plot setup time line color 	Preactor Desktop: ▶ Data Maintenance <ul style="list-style-type: none"> ▶ Secondary Constraints <ul style="list-style-type: none"> ▶ Double click on constraint
Start Date Offset	Preactor Desktop: ▶ Configuration <ul style="list-style-type: none"> ▶ Settings <ul style="list-style-type: none"> ▶ Sequencer Settings
Terminator Offset	Preactor Desktop: ▶ Configuration <ul style="list-style-type: none"> ▶ Settings <ul style="list-style-type: none"> ▶ Sequencer Settings
Trace - Vertical Axis <ul style="list-style-type: none"> - Customer - Order Number - Part Number - Product - Resource - Resource Group 	View ▶ Vertical Axis
Workspace Tooltips, Expands info on bars in Gantt Chart, Trace and Unscheduled operations	View ▶ Disable Tooltips
Zoom and Scaling in Gantt Chart, Trace, and Plots <ul style="list-style-type: none"> - Set Range for Timeline - Zoom In Timeline - Zoom Out Timeline - Zoom in Bar Height - Zoom out Bar Height 	View ▶ Zoom and Scale Zoom In Timeline - Ctrl + scroll up Zoom Out Timeline - Ctrl + scroll down Zoom in Bar Height - Ctrl + shift + scroll up Zoom out Bar Height - Ctrl + shift + scroll down

Ultimate Configurability

Ultimate Configuration

Whether you are using an Advanced Planner or an Advanced Scheduler product, the Ultimate editions of both allow extensive configuration options and extensibility through the Preactor configuration files and APIs.

The following topics will talk you through getting the most out of the Ultimate editions of Preactor.

Some knowledge of computer programming paradigms is assumed for the majority of this content. For support or assistance in configuring Preactor, a number of accredited Preactor Resellers are listed on the Preactor website at www.preactor.com.

Configuration File Access Control

Editing Preactor configuration files may alter the behavior of the application such that controls put in place to prevent access or limit functionality for a user may be circumvented, or malicious or unverified extensions may be included in the application without the user's knowledge. For this reason, only authorized users should be granted permission to edit these files.

Configuration files implicated include, but are not limited to:

- Preactor Configuration Definition Files (.prcdf)
(Express, Standard, Professional and Ultimate editions)
- Preactor Menu Definition Files (.prmdf)
- Preactor Table Definition Files (.prtdf)
(Ultimate editions only)

Other files may be included in a configuration file (using the #include directive). These files typically have a .inc extension.

Further controls preventing modification of configuration files may be employed, for example by compiling a configuration. "Compiling Preactor Configurations" on page 328 for more information on compiling configurations.

The Table and Menu Definition Files

Preactor's menus and dialogs can be modified to reflect the process being modeled, your organization, and your working practices for example. Fields or features not used can be removed, new fields added, and many other items can be customized.

Preactor Command Definition File

Most users start Preactor by double clicking on the relevant icon or by using the Windows program menu system. Under these circumstances Preactor will use the .prmdf and .prtdf files that are contained in the working directory, and if you wish to invoke any of the Preactor.exe command parameters you will have to modify the properties of the Windows shortcut (icon). The Preactor Command Definition File (.prcdf) gives you an alternative way of invoking the command parameters and it allows you to start a Preactor system directly from Windows Explorer.

The .prcdf file simply contains a set of Preactor command parameters that can specify the working directory, the .prmdf and .prtdf files to use, the Preactor mode, etc. Preactor will automatically register the .prcdf extension with Windows so simply double clicking on the .prcdf file in Windows Explorer will run the required Preactor configuration. If you have several different versions of Preactor installed. Double clicking on the .prcdf file will result in running the last version of Preactor that was

installed on your computer. If you need to run using a different version, right click on the .prcdf file and choose the appropriate 'Open With' option.

Here is an example of a .prcdf file opened in a text editor

```
"/DbConnect:Data Source=.\SQLEXPRESS;Initial Catalog=\"Preactor AS Ultimate\";Integrated
Security=True;"
"/MDF:Preactor.prmdf"
"/TDF:Preactor.prtcdf"
"/PCO"
```

The Preactor Command File Editor program provides a user interface allowing the most common options to be set against the .prcdf file. To run the Command File Editor program, right click on the .prcdf file and select the 'Modify' option from the Pop Up Menu, this will load up the Preactor Command File Editor program. "Preactor Command File Editor" on page 48 for a full description on the different features that the Preactor Command File Editor program provides.

See the reference documentation for a full explanation of the available Preactor Desktop command parameters that can be applied.

Menu Definition File

The Preactor Menu Definition File

Overview

The Preactor menu definition file (Preactor.prmdf) is a human-readable ASCII command file, it controls the way that the user interacts with the system and the order in which Preactor modules are executed. It can be likened to an operating system batch command file, but it allows the user to configure navigational menus and work flows to manipulate complex command parameters to personalize the Preactor configuration.

The Preactor Desktop module reads the Preactor.prmdf file and creates categories, sub categories, category and sub category content items, action groups and work flow items to organize the Preactor Desktop. The layout of these items will be seen when Preactor is loaded, based on the definitions present in this file.

The flow of execution through the Preactor.prmdf file is controlled by labels (for example, when a workflow item is selected, go to a given label) and by the return codes generated by the programs that are run. In this way, the flow of execution can be set by special exit conditions or allowed to continue as normal.

Any executable program supported by the underlying operating system can be run from the Preactor.prmdf file. This allows you to use Preactor to integrate a number of different applications to provide an integrated solution to your problem.

In order to configure Preactor, it is necessary to understand all of the syntax and parameter definitions. This section starts with a top-level description and ultimately defines all items.

The Preactor.prmdf file has the following sections:

1. Directives

[SHELL] indicates the section of the file to be used by the Preactor Desktop program

/RunEventScript Runs specified event script defined in the 'Event Scripts' table.

#include allows other definition files to be included.

#define allows variables to be defined and conditions to be applied based on the existence of the variable.

#label image allows an image to be joined to a program.

{MESSAGEBOX}

2. [Constructs](#)

PROGRAMS launches any of the Preactor executable modules

or any other DOS or Windows-based program

MESSAGES defines customized messages for display to the user

DIALOGS defines menu options

CONDITIONAL BRANCHING controls program flow

Note: The Preactor tags, user variables, key words, labels, etc., in the Preactor.prmdf file are all case-sensitive.

Comments may be placed in the Preactor.prmdf by use of a semicolon character (;) at the beginning of the line. It should be noted, however, that comments may NOT be placed in the middle of the definitions for program execution unless specifically stated in the syntax for the particular construct.

Constructs

The menu definition file has four constructs: Programs, Dialogs, Conditional Branching and Application Information. All of the structures can be called from any other structure since Preactor uses a label mechanism for determining which item is next and all are defined between the PROGRAMS and PROGRAMS_END directives.

Strict Parsing

With strict parsing on (#define PARSE_STRICT placed in the .prmdf file) Preactor will not accept any invalid syntax in the menu structure. Without it Preactor will try to omit invalid syntax or mark invalid workflow items as broken in the Preactor Desktop.

The rules that apply are as follows:

- Only one instance of each workflow label definition.
- Menus must be called when defined.
- Workflow definitions should include a calling label.
- All target labels defined in the menu definition should exist elsewhere in the .prmdf file.

The table below describes the error messages that will appear when any of the above rules are broken.

Message	Reason
The label <label name> is called but not defined.	A dialog contains a button that calls a label that does not exist.
The message box '<label name>' at label '<label name>' contains a syntax error.	The message box contains something other than TEXT or BUTTON.
The dialog '<label name>' at label '<label name>' contains an ENTRYFIELD. This is no longer supported.	Dialogs with ENTRYFIELD on them are no longer supported.
The message box '<label name>' at label '<label name>' contains invalid buttons.	The buttons defined on a {MESSAGEBOX} are not a valid combination; refer to the documentation.
The message box '<label name>' at label '<label name>' contains an unknown icon type.	The icon defined on a {MESSAGEBOX} is not a valid icon; refer to the documentation for a valid icon type.
The Uri at label '<label name>' is invalid.	The form of the URI for the specified label is not valid. Refer to Microsoft Pack URI documentation for more information.
The menu '<label name>' at label '<label name>' does not form part of the navigation structure. Menus of this type are no	Preactor does not allow menus to be defined without being called from another menu.

longer supported.

The workflow label '<label name>' is defined multiple times.

Duplicate labels are not permitted.

System Include Error: More than one default system category was found. This is not supported.

More than one default system category was found. Check that the system includes is included correctly and you are not defining your own.

System Include Error: The default system category was not found.

The default system category was not found, ensure you have included the system includes.

Could not find label '<label name>' as defined using #set MAIN_MENU.

The label specified on the main menu syntax was not found.

Commands and Return Codes (Operand Parameters)

When you run the Preactor modules from the Preactor.prmdf file, the calling conventions assume that the module is a separate executable file, although in later versions of Preactor they are in fact Dynamic Link Libraries (dll's). The Preactor.prmdf calling procedures allow commands to be passed to the Preactor modules or to any other actual executable program. The commands obey normal DOS command line conventions, and the switches are space delimited. This means that if you require a space within your command (e.g., you are using a field name that contains spaces as part of the command), then you must enclose the complete command in double quotes (").

For example:

```
"/EXC:{Start Time}<0"
```

See Also:

[Passing Time Expressions with a Command](#)

Conditional Branching

FUNCTION

Although it is possible to control program execution flow by using the combination of program return codes and the optional offset user variable, there are many cases where this method cannot provide sufficient control. The Preactor conditional branching construct allows a much more comprehensive mechanism for controlling program flow.

SYNTAX

```
[Label]:{CONDITIONAL},
Expression: Target Label[, Assignment User Variable = Value]:
repeats...;
```

PARAMETERS

Label (optional)

Label is an optional alphanumeric string that is terminated with a colon (:) character and is used to jump to the conditional from another program or menu option.

{CONDITIONAL}

case-sensitive key word

Expression

Expression is the logical condition that is to be evaluated. This may contain any Preactor tags or variables that have previously been defined in the Preactor.prmdf file.

A condition may also be the reserved word "ELSE," in which case the program flow will be directed to the associated target label. If there is no "ELSE" option and none of the defined conditions are true, then the program flow will proceed to the first defined item (i.e., the {START} label).

Target Label

If the condition is true (i.e., non-zero), then the target label associated with the condition is selected.

A condition may also be the reserved word "ELSE," in which case the program flow will be directed to the associated target label. If there is no "ELSE" option and none of the defined conditions are true, then the program flow will proceed to the first defined item (i.e., the {START} label).

Assignment User Variable = Value (optional)

An optional user variable assignment statement.

EXAMPLE

```
Test: {CONDITIONAL} ,
{From_Date} <= {To_Date}: More_Files:
ELSE: Finished;
```

The above example will test the two variables From_Date and To_Date and proceed to the label More_Files if From_Date is less than or equal to To_Date. Otherwise, program flow will proceed to the label Finished.

Dialogs

FUNCTION

The dialog construct defines Preactor push-button menus.

SYNTAX

```
[Label:] {DIALOG},
Description,
Dialog Title,
Item Type, Parameters:
repeats...;
```

PARAMETERS

Label (optional)

Label is the optional alphanumeric string that is terminated with a colon (:) character and is used to jump to a dialog from another program or menu option.

{DIALOG}

The {DIALOG} key word is used to indicate that this section is a dialog definition.

Description

Description text to guide the user.

Dialog Title

Dialog Title is the title given to the dialog.

Can be set to the special value {HIDDEN}

Item Type

PUSHBUTTON	A push button.
PUSHBUTTON	The default push button.

REMARKS

The item type syntax is in the next sections.

EXAMPLE

```
MENU_Maintenance : {DIALOG},
,
Data Maintenance:
PUSHBUTTON | HELPPOPUPID (53040),Resources,EDIT_Resources:
PUSHBUTTON | HELPPOPUPID (53030),Resource Groups,EDIT_Groups:
PUSHBUTTON | HELPPOPUPID (53050),Secondary Constraints,EDIT_Const:
PUSHBUTTON | HELPPOPUPID (53010),Products,EDIT_Products:
PUSHBUTTON | HELPPOPUPID (53150),Product Attributes,MENU_Product_Attributes:
PUSHBUTTON | HELPPOPUPID (53150),Operation Attributes,MENU_Operation_Attributes:
PUSHBUTTON | HELPPOPUPID (53110),Customers,EDIT_Customers;
```

The label "MENU_Maintenance" marks the start of the dialog box structure, there is no description text in this example. The dialog title is "Data Maintenance"

Seven push buttons are also defined. The HELPPOPUPID text provides a reference to the language include popup_prmdf.inc file which contains a description of the action the item performs. The HELPPOPUPID text will be displayed as a tool tip when hovering the mouse over elements such as categories, sub categories and content items in the Preactor Desktop. For work-flow items the pop up text is displayed directly underneath the name of the work-flow item. The target label defines the name of the label that the Preactor Desktop will jump to when the item is selected, for example in the above the 'Resources' table will be displayed when the category content item 'Resource' is selected as defined by the 'EDIT_Resources' target label.

PUSHBUTTON

FUNCTION

Defines an item that can be selected in the Preactor Desktop.

SYNTAX

```
PUSHBUTTON [Help Popup Reference] [Position], Item Text, [User Variable = Value], Target
Label, [Assignment User Variable = Value]:
```

PARAMETERS

Name	Description
PUSHBUTTON	Defines the Item Type.
Help Popup	The HELPPOPUPID(x) reference that determines what help pop up text is associated with the item. The pop

Name	Description
Reference (optional)	up text itself is defined in popup include files in the working directory's Language folder.
Positioning of Sub Categories (optional)	By default subcategories on the Preactor Desktop are placed above content (Editors or Feeds) to improve loading speed. To override this behavior the POSITION(x) classification can be added, where x is a number defining the positioning. All subcategories and menus are given a default order of 100.
Item Text	The text that will be displayed for the item
User Variable = Value (optional)	An optional conditional test. If the condition is true, i.e., the User variable is equal to the value, then the item is displayed. Otherwise, it is not.
Target Label	The label to which Preactor will go when this item is selected.
Assignment User Variable = Value (optional)	Assigns a value to a user variable.

EXAMPLE 1

```
PUSHBUTTON | HELPPOPUPID (50100),Data Transfer,MENU_ImpExp:
PUSHBUTTON | HELPPOPUPID (50030),Generate Schedule,SEQ_Main:
PUSHBUTTON | HELPPOPUPID (50100) | POSITION(0),Start Page,FEED_StartPage:
```

The above example demonstrates the POSITION feature, in the case of the above the Start Page category content item will appear above the sub categories General and Data Transfer on the Preactor Desktop. *without* the POSITION defined, the Start Page option would appear below the General and Data Transfer sub categories because it loads an RSS feed which by default is placed below sub categories since it is a content item.

EXAMPLE 2

```
{CONDITIONAL},
{MODE} == 100, {NEXT}, PMODE=100:
{MODE} == 200, {NEXT}, PMODE=200:
{MODE} == 300, {NEXT}, PMODE=300:
{MODE} == 400, {NEXT}, PMODE=400:
{MODE} == 500, {NEXT}, PMODE=400:
ELSE, {NEXT}, PMODE=0;
...
PUSHBUTTON | HELPPOPUPID (53060),Routes, PMODE = 300, EDIT_Routes:
PUSHBUTTON | HELPPOPUPID (53060),Routes, PMODE = 400, EDIT_Routes:
```

The conditional ({CONDITIONAL}) statements have assigned values to the PMODE user variable based on what mode of Preactor is running (such as 200 FCS, 300 FCS etc). On the PUSHBUTTON definition, the value of PMODE is tested to determine if the Routes option is to be displayed on the Preactor Desktop. In the above case, the option is only displayed if the value of PMODE is either 300 or 400 (Preactor is running as either 300 FCS or 400 APS).

EXAMPLE 3

```
PUSHBUTTON | HELPPOPUPID (50030),Generate Schedule,SEQ_Main,VARIABLEX=1:
```

The User Variable VARIABLEX is assigned the value of 1.

TEXT

FUNCTION

Defines a text string to be displayed in the dialog, TEXT defines left justified text.

SYNTAX

TEXT, Alpha-numeric text

PARAMETERS

Alpha-numeric text

The text string is used as the prompt for the data entry field.

Programs

The programs construct causes a Preactor module or external program to be executed. The program name (or Preactor module) is defined together with commands for that program. In addition, fields can be defined to prompt the user and inform of the action of the program.

Preactor will execute only one program or process at a time. The Preactor Desktop will then become inactive until that process terminates. When the process does terminate, it will set a return code to a numeric value (usually between 0 and 255) to indicate how the process ended. This allows the user to select a different branch of execution depending upon the return code of the process.

It should be noted that if an exit code is returned for which there is no label defined, an error would occur.

FUNCTION

Used to launch any of the Preactor executable modules, any other DOS or Windows-based program or to call an entry point in your ActiveX server.

SYNTAX

```
[Label:]Program Executable Name,
  Operands,
; With Comments within the Operand if Desired
  Screen Prompt,
  Program Title,
  Run Mode,
  Return Code [- User Variable],Target Label,
  [Assignment User Variable = Expression]:
Return Code repeats...;
```

PARAMETERS

- Label (optional)
Label is an optional alphanumeric string that is terminated with a colon (:) character and is used to jump to the program from another program or menu option.
- Program Executable Name
Program Executable Name is the name of the program that you want to run; for example, NOTEPAD.exe. The Preactor modules use a .exe extension even though they are in fact dynamic link libraries (dll's)., i.e. PRS.exe.

If the first character is "@", Preactor will try to find the Windows program that is associated with the file given as the executable. For example, if you want to load the program that can edit README.wri (WORDPAD.exe under Windows 95), you could use

@README.wri as the Program name. Note that you must still specify any command line parameters that will probably include the file name again. It should also be noted that the file must exist.

The keyword ActiveX is used to tell Preactor that you want to call an ActiveX Server, and this is followed by the entry point of your method. You cannot pass any parameters to your method, but Preactor will automatically pass the 'handle' to the Preactor database object. You cannot use the Open Planning Board object in this way, because the Preactor sequencer will not be running.

The return code for your method can simply be assigned in your code and then tested in Preactor.

For example this .prmdf file construct: -

```
Your_Label: ActiveX MyProject.MyServer MyFunc,
,
Running Your Method,
Method,
Foreground,
0:{START}:
1:Error_Message
```

Will call this method: -

```
Public Function MyFunc(db As PreactorObj)
'Your code for the method goes here.
'It will use the db variable as the
'prefix to the Preactor methods, e.g
- db.ReadField("Orders", "Priority", 5)
'You can assign the function name 0 or 1
'to set the return code, e.g.
MyFunc = 0
End Function
```

Refer to the Preactor SDK documentation for more information.

- **Operands**

A list of operands that will be passed to the program that is run. Operands that can be passed to Preactor modules are explained in the Preactor Reference Guide section.

- **Comments within the Operand**

After the Program Executable Name, you must specify the operands that are passed to the program.

Most of the Preactor modules are controlled extensively by the use of command switches to determine the way in which they work. The parameters may be entered on as many lines as you like; the Preactor Desktop program will remove spaces that are not required. Comment lines may be placed between operands. Operands that require spaces within them must be enclosed in double quotes to prevent them from being interpreted as multiple operands. The final operand is terminated with a comma (,).

For example, to pass the following operands to PReedit:

```
/FMT:Orders /AS /PS
```

The following construct including the comments could be used instead:

```
; Specify format to use.  
;  
/FMT:Orders  
;  
; Auto Save on exit.  
;  
/AS  
;  
; Sort the records so that all children of a parent are  
; displayed underneath the parent.  
;  
/PS,
```

- **Screen Prompt**
Screen Prompt is the string of text that is displayed in yellow at the bottom of the Preactor Desktop while the command is executing.
- **Program Title**
Program Title is the string of text that is used to describe the application by Windows; this string will appear in both the task manager and in the title bar of any window that is created unless the program that is run specifically changes that title.
- **Run Mode**
The Run Mode facility has been included for future use to determine the mode of execution for a program. This may be specified using the following key words:
 - **Foreground** - The program is run in the foreground.
 - **Background** - The program is run in the background.
 - **Iconized** - The program is run in the iconized (minimized) state.
 - **Maximized** - The program is run in the maximized state.
 - **Clock** - The program is run in the background with a clock display to indicate that the program is running.
 - **Detached** - Preactor will not wait for the program to end.

Due to limitations in the display functions in the current versions of Microsoft® Windows®, it is not possible to set the Foreground/ Background mode for a spawned program. The running mode will be determined by the program itself. In future versions of Windows, this feature may be enabled.

The run mode may also specify the key word "Minimize Shell", this causes the main Preactor window to minimize while the program is running.

- **Return Code**
The Return Code is the numeric return value from the program. It can be used to determine the next action that is taken.
For example, a return code of 0 typically means that the program execution ended successfully and the next logical step should be taken. Another return code of 5 could indicate an error that requires a message to be displayed.

There is no limit on the number of return code values. Preactor will select the label that corresponds to the actual return code.

If a program returns a value that is not specified, then Preactor will give an error message indicating the command line and return code that caused the error.

The reserved word ALWAYS can be used to select a default label, this must be the last Return Code specified.

- User Variable

The User Variable is optional, and it allows the next action to be determined by a combination of the program return codes and the value of user variables. If, for example, you wish the next action to be the one identified by Label A only if the program executed successfully and a previous menu option had been selected, then when the previous menu option was selected, we assigned the user variable a value of 10. When the program exits with a return code of 2 (all OK), we actually test for a return code of 12 (two plus the user variable value).

User variables are defined when they are used and may be set to a value or used in an expression. If used in an expression, the name of the user variable should be enclosed in curly brackets ({}).

The end of this section contains an example of the use of a user variable to control the exit branch that is taken.

- Target Label

Target Label is the label to which Preactor goes when the specified return value is passed back from the running program. Target label has three reserved names:

- {NEXT} goes to the next item in the Preactor.prmdf file
- {START} goes to the first item defined in the Preactor.prmdf file
- {END} exits from the Preactor Desktop
- {RETURN} valid from programs and conditionals only. It will return to the last menu that was displayed. This enables the ShellExecute routine to return to whatever menu was displayed when the method was called

- Assignment User Variable

Assignment User Variable is optional and is the name of the user variable that is to be assigned if this return value is the selected exit branch.

- Expression

Expression is only required if an Assignment User Variable has been specified and is an expression that is to be evaluated with the result assigned to the user variable specified.

- DELIMITERS

: (colon) - used after [Label] or between repeated parameters

;(semicolon) - defines a comment line if in column 1 or is the last character of a construct

, (comma) - separates operands

@ (at) - defines a call to a program associated with a specified file type

{ } (braces) - defines a variable, label, or directive

" " (double quotes) - defines strings with spaces in them

NOTES

This section is closely coupled with items in the Preactor.prtfd file, and there is no automatic cross checking. This must be done administratively.

Passing Time Expressions with a Command

TimeExp is a word that is used to indicate that the command takes a time and date parameter. These times and dates can either be hard coded or, more typically, calculated by Preactor tags.

TimeExp may be specified in MM-DD-YY HH:MM or DD-MM-YY HH:MM depending on the date format settings in your Microsoft Windows® configuration. Alternatively, you could enter Julian dates/times directly (e.g., 34700.5 = 1 Jan 1995 12:00 noon). The Preactor tags will typically evaluate directly to Julian dates/times (e.g., {JDATE} returns today's Julian date).

Menu Structure Logic

The following steps describe the parsing logic that is used to create the layout of the Preactor Desktop navigational structure:

- [Stage 1: Build simple menu structure from MDF](#)
- [Stage 2: Restructure and flatten categories and child items](#)
- [Stage 3: Introduce content groups and create navigation structure](#)

Menu Structure Logic - Stage 1

Stage 1: Build simple menu structure from MDF

This stage involves reading the MDF contents, creating a simple menu structure and validating the results.

1. Parse all of the MDF contents

Preactor will parse all of the menus.

2. Find the first menu

```
[SHELL]
#define PARSE_STRICT
#set MAIN_MENU TheLabel
.
.
.
TheLabel : {DIALOG},
,
PUSHBUTTON | HELPPOPUPID (50100),Data Transfer,MENU_ImpExp:
...
```

3. Create hierarchical menu structure

From the first menu, Preactor will create a hierarchical menu structure following links to other menus

The result is attached to the Workspace category

The process is repeated from other system categories

4. Mark up special items in the structure

A further pass is made to find special content items and identify them as content.

Currently this is expressed as:

Must be an editor

All labels return

Does not have the Edit Record command line switch

Does not have the Auto Exit command line switch

5. Check for orphaned menus

These are menus that are not called from another menu.

Menu Structure Logic - Stage 2

Stage 2: Restructure and flatten categories and child items

At this stage the menus are turned into categories and the whole hierarchical structure is flattened to four levels deep.

1. Promote any eligible sub categories of the default Workspace category

An eligible sub category is one that contains content actions such as editors.

These categories are moved up to the top level.

2. Restructure top level categories

If the category contains actions, these are moved into a default sub category called General.

3. Restructure sub categories and flatten the hierarchy

Move any nested categories up until the structure is only three levels deep.

4. Remove empty categories

Remove any empty categories from the structure

Menu Structure Logic - Stage 3

Stage 3: Introduce content groups and create navigation structure

This last stage introduces content groups and creates the final navigation structure.

1. Take each top level category

a. Add a group to the category and add content workflow items to it.

b. For action workflow items, create a default sub category and add the action workflow items to a group in the default sub category.

2. Take each second level category

a. Take content workflow items and add them to embedded item groups and add these groups to the sub category.

b. Take action workflow items, and add them to action item groups and add these to the sub category.

Table Definition File

Field Types

Field Types

The Field Type defines the type of data that is in the field. The field types supported by the Preactor database are listed below.

DURATION

INTEGER

MATRIX
STRING
REAL
TIME
TOGGLE
DIALOG

Database

Data Integrity

All the Preactor modules expect the SQL database tables to match their respective formats in the Preactor.prtf file, and if a mismatch is found, the file will not be read past that point. If it is necessary to add or delete fields in a particular format, the relevant data table must also be changed to maintain the database integrity.

Adding a field to a table definition will also cause tasks to be created on start-up. In the simplest case this will be a FREE FORMAT string field, and a single task will be created to add the field to the relevant SQL data table. Other field additions will cause incidental foreign key additions or alterations. Adding a field of the MATRIX type will cause slightly different behavior, "Adding Auto List and Matrix Fields" on page 327.

If records are simply added to a table that contains MATRIX or AUTO LIST fields, then these fields should also be updated. If they are not updated, PREdit will report that the MATRIX field is the wrong size when it is accessed for editing and will automatically correct the size, if requested, using default values.

Calendars Schema

Calendar data is stored in its own fixed schema. The calendar table structure and fields are not defined in the Preactor.prtf file this includes all calendar data (including vacations and other exceptions), calendar states and minimum and maximum secondary resource values.

SQL Database File

Preactor data is held in an SQL Database. The SQL database is partitioned into four schemas:

- User Data
- System Data
- Calendars
- Schedule Analysis

The data in the [User Data schema](#) are the tables and fields that are defined in the Preactor.prtf file. A Preactor 'format' is transformed into one or more tables in the SQL database. AUTO LIST and MATRIX data are held in separate tables with relationship links to the table that the AUTO LIST or MATRIX classifications are defined in.

For information about the other schemas please view this page: [SQL Database Schema](#)

Schedule Analysis Schema

The data in this schema is formatted in such a way as to allow you to create your own reports. A set of views are provided that simplifies reports based on simple roll ups (such as daily or weekly, single resource or resource group, etc.). User driven

analysis can be performed using pivot tables. The schema is optimized for use with pivot tables allowing you to analyze your schedule metrics in chart or table form, controlling how the data is sliced and summarized.

SQL Database Schema

The database is partitioned into four schemas:

- Calendars Schema
- Schedule Analysis Schema
- System Data Schema
- SQL User Data Schema

Referential Integrity

Although not enforced, foreign key constraints exist in the database for all of the relationships inferred from the Table Definition file. These constraints can be used by reporting tools and query generators to show the relationships between tables. In future versions, these constraints may be enforced.

"Changes to the Inferred Database Schema" on page 325 for specific information about adding and removing tables etc.

System Data Schema

System data tables are defined in their own schema called 'SystemData'.

Changes should not be made to the data and structure of these tables, any changes made are not supported.

The data held in these system data tables are supplied in all supported languages.

A number of fixed schema views have been introduced to the 'SystemData' schema that will map consistently onto fields within the 'UserData' tables. Although the scope for this type of view is limited given the inherent flexibility of Preactor, these views can be very useful, and go some way towards providing a mechanism that will allow common tasks to be performed across a variety of different configurations.

SQL User Data Schema

The tables and fields in the user data schema vary by configuration and are defined in the Preactor.prtfd file.

A Preactor 'format' is transformed into one or more tables in the SQL database; one SQL table will contain the majority of the format's data. A further table will be created for each auto-list field; this table will also contain columns for each field associated with the auto-list. An additional table will also be created for each matrix field in the format. A parent-child relationship is formed between the main table and its auto-list and matrix tables.

Data held in the SQL database can easily be accessed by third party applications such as Crystal Reports®, Microsoft® Access and Microsoft® Excel.

Classification Overview

Classifications (Locating Data)

Preactor must have access to certain data that is relevant to the finite-capacity calculations. To maintain complete flexibility in the structure and use of the database, Preactor makes no assumptions about the names of fields or the formats (tables) in which particular data are contained. For example, naming a field Quantity is not sufficient to indicate its function; use of the classification flag QUANTITY is required.

Classifications are used to define the use of particular fields and how they should be displayed for editing. The classifications are simply added to each field definition, which allows a particular piece of data to be contained in any format. For example, Setup Time could be contained in the Product Format, the Operations Format, the Resource Groups Format or the Resources Format. Multiple classifications can be added to the same field to produce the desired effect in the overall database structure. There are seven basic groups of classifications.

Data Source	Classifications that indicate the source of the data. For example, is the data to be retrieved from another table, or is it a free-format string?
Display Control	Classifications that indicate how the field is to be used by Preactor to control the display of items like the Gantt chart or the Sequencer windows.
Field Display Control	Classifications that indicate how the individual field is displayed when a user is prompted to edit or view a data record.
Job and Operation Parameters	Classifications that determine how Preactor will control and manipulate a job or operation of a job.
Resource Parameters	Classifications that determine how Preactor will control and manipulate a resource.
Miscellaneous	Classifications that do not fall into any other category; for example, those that control data record location and sorting.
Preactor 400 APS Specific Classifications	Classifications specific to the sequencer in Preactor 400 APS systems.

Classification Definition

FUNCTION

Classifications are used to tell Preactor where to find and how to use particular pieces of data, how to display the data, and how to control data entry, etc., as part of the format RECORD_FORMAT.

SYNTAX

Classification | Classification

The classification is selected from a list in the Preactor Reference section (alphabetized list) or Tables 2 through 7 (functional lists) and follows the rules stated in the Preactor Reference manual and in the "Required Classifications" section.

DELIMITERS

| (optional)

The "|" can be used to delimit classifications when more than 1 is used. The "|" is only used to improve the readability of the text and is not used by Preactor. Further, if the classification list requires a second line, there is no delimiter needed for the end of line.

REMARKS

All values, except FREE FORMAT and STRING IN FILE string entries, are stored as double-precision real values in any data files produced. If they contain fractional data they are written in exponential format with 15 digits of precision, or as integers if there is no fractional data. FREE FORMAT string entries or STRING IN FILE entries will be stored as strings delimited with quotes; e.g., "string".

Classifications are an integral part of the configuration definition and must be well understood. In addition to defining the details of fields, there are also couplings where certain classifications must be used for a certain Preactor module or where one classification must be used with another classification. Again, classifications are an important feature for the configuring of Preactor.

EXAMPLE

```
; Format Operations
;
Operations, "OPS.prtbl", 0, 200:
  Number, 0, INTEGER,
  PRIMARY KEY | HIDDEN:
  Op Name, 0, STRING,
  FREE FORMAT (20) | UNIQUE:
  Resource Group, 1, STRING,
  DATABASE (Resource Group (Name)) :
  Resources, -1, MATRIX,
  AUTO LIST (Resource Group (Resources)) :
  Pattern, 1, STRING,
  DATABASE (Patterns) | PATTERN:
  Set-up time, 0.006945, DURATION,
  SEQ CHANGEOVER:
  Operation Time, 0.006945, DURATION,
  CONDITIONAL "ENTRY>0";
```

Classification Use in Operations Format.

Above is an example of a table format. Each field is defined as follows:

Number:	
INTEGER:	Data stored as an integer.
PRIMARY KEY:	Makes this field unique and is used for numeric references.
HIDDEN:	Means the field is not displayed in the Preactor Editor.
Op Name:	
STRING:	Display data as a String.
FREE FORMAT (20):	Defines a free format string of 20 characters.
UNIQUE:	Forces the operation names to be unique.
Resource Group:	
STRING:	Display data as a String.
DATABASE (Resource Group (Name)):	Defines the source of the Resource Group data.
Resources:	
MATRIX:	Data are stored as a single dimension matrix.
AUTO LIST (Resource Group (Resources)):	Defines which resources from the above group are valid.
Pattern:	

STRING:	Display data as a String.
TABLE(Patterns):	Refers to string table of patterns.
PATTERN:	Defines field as display pattern type.
Set-Up Time	
DURATION:	Display data as a duration (hh:mm form).
SEQ CHANGEOVER:	Tells PRS to use this value for setup/changeover times.
Operation Time:	
DURATION:	Display data as a duration (hh:mm form).
CONDITIONAL "ENTRY>0":	Prevents zero and negative entries.

Classification Tracking

Tracking is the mechanism by which classifications (conditions) can be searched for in tables, via relationships to the source table. The result is a path which data will follow when requested. Preactor will only track through ten tables along a path, meaning that if the classification required is in a column within the eleventh table, Preactor will not locate it.

The process starts with a tables, and ends with another table or a column. One instance of the tracking process can produce wither a single path or multiple paths to follow for data. Tracking is used on demand upon loading Preactor, though if there are any modifications to be made to the .prtdf files, it cannot be done during runtime.

There are four different types tracking behavior:

- Local
- Reference
- Special, and
- Secondary Constraints.

Classifications have specific tracking behavior assigned to them, meaning that they can only be tracked in a specific manner. For example, a classification such as MATCH PREFERRED is assigned with the Reference tracking behavior. Meaning that Preactor will be able to locate the condition within the limitations of the Reference tracking behavior.

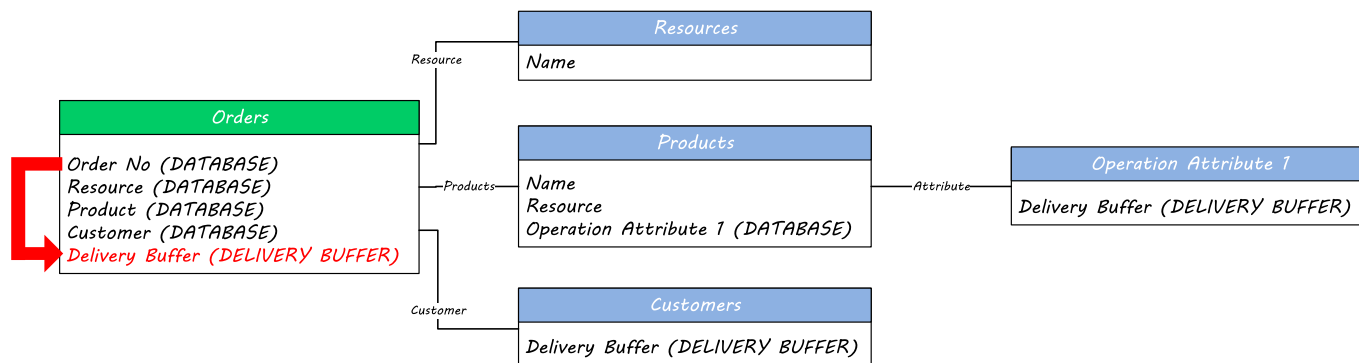
Tracking is used:

- In the Sequencer, for scheduling and for assigning colors and patterns to operations.
- In the Editor, for assigning a background color and for measuring the quantity of an item.
- In the API, to copy a record, to create APS Rules and User code uses. For API, tracking does not behave as expected, as it takes the source (table and record), classification string and occurrence (which is the occurrence of the classification across the entire configuration) for creating a path. It will return a number which is a value, or an error code if nothing is found.

While it is possible to have a classification present numerous times throughout a configuration, Preactor will only track to and use one, with any other occurrences remaining unused.

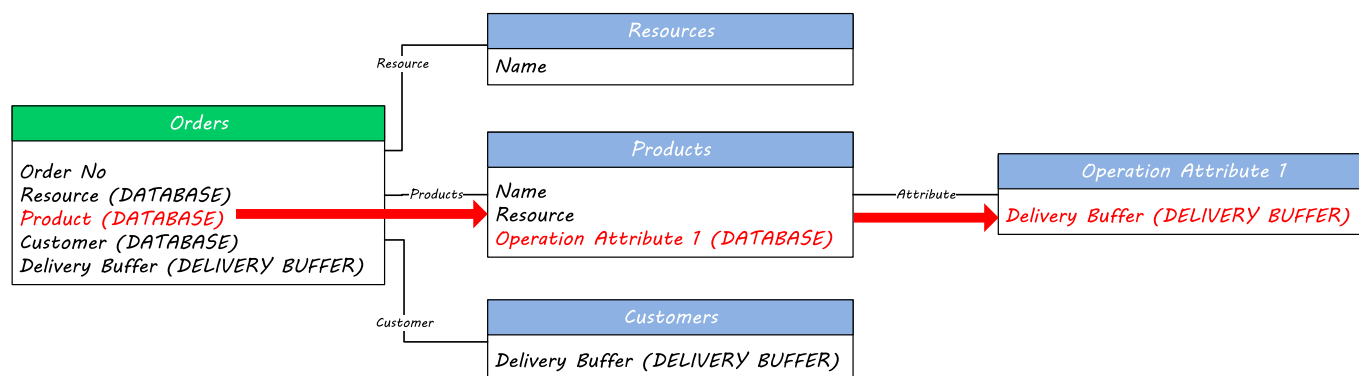
Local Tracking

Local tracking behavior stops in the source table that has been called upon. The path produced is one with a single node. Using the diagram below, and taking that the DELIVERY BUFFER classification has been assigned with Local tracking behavior, Preactor will only look for the condition within the source table. The source table in this example would be the Orders table. Preactor will not track through and Database references to other tables.



Reference Tracking

Reference tracking behavior will follow database references through tables until an instance of the classification is found. A tracking path is constructed is the table contains matrix columns with a reference back to the source table. The diagram below shows the path that Preactor will create upon following the Product and Operation Attribute 1 database references.



Preactor will stop at the first instance of the classification being found, as long as it is located within the limitations of Preactor on tracking tables up to 10 times along a path. Meaning that if the classification is located at the 11th stop along the path, Preactor will not create a path to it. If this is the case, Preactor will continue searching through tables until a classification is found that meets the path requirements. If a classification cannot be found within the Reference tracking requirements, Preactor will react by modifying what will be displayed in the Planner or Sequencer.

Classifications

There are two classifications that can impact how reference tracking occurs:

The use of NO TRACK on a column, within a table, will cause Preactor to not track through it. Using the diagram above, if there was NO TRACK on the Operations Attribute 1 column, Preactor would move on to tracking through the Customer database reference to find the DELIVERY BUFFER classification.

The use of ALLOW BACK TRACK allows Preactor to back track through a table for one instance. Using this classification means that Preactor can scan through other tables, that are not the source table, to find the classification required. If the column the required classification is in also contains ALLOW BACK TRACK, Preactor will track back once, to see if it links to the source table. If this requirement is met, a tracking path will be created, and if not, Preactor will ignore it.

Special Cases

Special tracking behavior refers to instances where the tracking process is only applicable to certain things. For example, the Sequence uses a special behavior to write the resource and operation is scheduled on by extending the reference behavior. It will take the first node in the Orders table (that being the reference to the Resource table) and then will pull the information required from the Resource table, specifically names.

Another case is the SEQ GRAPH classification, for example, which will track through AUTO LIST, ASSOCIATE or AUTO DIMENSION classifications, if SEQ GRAPH is not initially found.

Another classification that exhibits special behavior is the FORCE WINDOW classification. It will track all database columns that reference the Resources table that have the FORCE WINDOW classification.

Secondary Constraints

Secondary constraints tracking behavior is unique, in that it will create a group of tracking paths. It is usually used for classifications such as USE CAPACITY, CAPACITY TYPE, and CALENDAR EFFECT etc. The TO TRACK classification is usually respected. If one constraint reference is found, the behavior will attempt to create and use a reference track from the Orders table. Otherwise, the path will attempt to track from the Secondary Constraints table. If more than one constraint reference is found, this behavior will track from the Orders table, and every subsequent track must end in the same table, for example, Secondary Constraints.

String Tables

String Tables

FUNCTION

Defines fixed data in the file that can be viewed by the user but not changed by the user.

Most data in the database is held in tables that have been defined in the table definition (.prtdf) file. This allows the data to be edited at will by the user. There are some classes of data that do not need to be changed by the user but would be undesirable to hard code into the system. As an example, the time bucket units specified for each resource in the Resources Format must be picked from Seconds, Mins, Hours, Days or Weeks.

The numeric values are actually stored in the database, but whenever the field is displayed or the pick list used, it is the text strings that are seen by the user. The list can be changed at any time by editing the table definition (.prtdf) file.

The typical tables defined in the Preactor.prtdef file are:

CAPACITY USE	Defines when to change capacity data
TIME	Defines time units
COLORS (or COLOURS)	Defines available colors
PATTERNS	Defines cross hatch and other fill patterns
WINDOW STATE	Defines allowable PRS resource window states

Any item that can be stored in a string table could also use a Preactor database table to do the same job; however, string tables have the advantage that the amount of memory required to store the string table is significantly less than that required to store the equivalent database table.

SYNTAX

```
STRING_TABLES
Name:
  Number , String:
  repeats;
STRING_TABLES_END
```

PARAMETERS

STRING_TABLES all uppercase key word

Name the name of the table

Number user-assigned number associated with the "String" this is used internally in the file, but not displayed to the user

String text displayed to the user for this entry

DELIMITERS

, (comma) separates Number from String
 : (colon) separates strings in the same table
 ; (semicolon) ends the table

EXAMPLE

```
Time Units:
 0, Seconds:
 1, Mins:
 2, Hours:
 3, Days:
 4, Weeks;
```

The string table is named "Time Units." The first item is number 0 with "Seconds" as text. The last item is number 4 with "Weeks" as text.

Database Design

The Preactor database is highly configurable, allowing you to add or delete Formats (tables) and to move particular data items (fields) between the tables. This flexibility allows you to change the database structure to allow simple integration with other systems by matching their database structure and to change the meaning of the data by moving it between Formats (tables).

If you intend to add or delete Formats (tables), you should first develop a database structure diagram for your proposed database. Designing hierarchical tables that can contain matrices and selection lists is not a simple task and you may wish to contact your supplier for assistance.

The database structure diagram will enable you to identify the Formats (tables) and the fields that you require and the relationship between them. You should also consider whether your structure will allow Preactor to reference all the required data uniquely. Unfortunately, it is quite simple to design database structures that do not have unique references into particular tables, and with matrix data you have to ensure that Preactor has a unique key to each axis available in the Orders table.

When developing Preactor tables, some basic rules must be adhered to:

1. The relationship flow must be in one direction (left to right); i.e., the references cannot form loops. When using two-dimensional matrices, however, loops can be formed by using the AUTO LIST facility to constrain the elements in the matrix that are displayed (see note 7). This is only a display constraint; all the matrix elements exist even if they are not used.
2. For the automatic sequencing functions to work correctly, the Orders format must contain a PARENT field. Even if there is only one operation per order (as often happens in Capacity Planning configurations), the PARENT field must exist.
3. Pick lists are only constrained when you have a direct pointer to the table containing the constrained list and the list itself. A good example is the selection of resources within a Resource Group in the Products table. The Products table has a reference to both the Resource Group and the Resources within that group.
4. There must always be a unique reference from a higher-level table to a lower-level one. In most cases, this is achieved by default. In each example, the Part Number field in the Schedule File has a direct relationship with the unique Part Number field in the Products table. The database will cope with references that skip levels, but you must ensure that one field in the higher-level table has a unique reference to a record in the lower-level table. An error message will be given if this is not the case.
5. When a two-dimensional matrix is declared and one axis is a field in the current table, that field must form the first axis of the matrix. For example, if you have a Product/Resource matrix for Operation time in the Resources table, then the Resource Name field must be the first axis to be declared.

6. With a two-dimensional matrix, if the table that is providing one of the axes also has a field that is an AUTO LIST of records in the table containing the matrix, then the AUTO LIST will constrain the display of the matrix. For example, if you created a setup matrix from operation to operation in the Resources table, then the matrix would be constrained by the AUTO LIST of resources in the Products table; i.e., you would only see the data for operations that can be carried out on that resource.

Table Hierarchy

The Preactor database uses a simple definition system to describe the database tables, etc., but applies intelligence to deduce relationships that are not explicitly specified. The data are held in tables in an SQL database.

When the Preactor data server PRSERVER reads the Preactor.prtdf table definition file, it establishes the obvious forward relationships between the tables. For example, in the standard Preactor example, the following table hierarchy is used:

- Products Table,
- Resource Groups Table,
- Resources Table.

The Products Table lists the Operations required and specifies which Resource Group is used, and the Resource Group Table defines which Resources are in the Group. Such a top-down hierarchy is typical of the way data are viewed when configuring a finite-capacity scheduling system. It is not, however, the way in which the data are often used by the system.

In the standard Preactor example, the setup time is held in the Products Table, but the setup times are required when Preactor is processing each Resource. There is no direct method defined in the Preactor.prtdf file by which a Resource can tell which Operations can use it, since that is a backward relationship through the tables. To avoid the need to define explicitly all the required backward relationships, PRSERVER automatically deduces the backward relationships when it processes the Preactor.prtdf file, thus allowing Preactor to also view the database as though it were structured:

- Resources Table,
- Resource Groups Table,
- Products Table.

The database also automatically constrains pick lists. For example, if an operation uses the resource group "Lathes" and subsequently a list of resources valid for that operation is requested, only the resources in the "Lathes" group are shown. The constrained lists also extend to matrix fields if a changeover time matrix was set up in the resource groups table and subsequently "Lathes" changeovers are picked for editing, only the changeovers for products processed on the "Lathes" will be displayed.

Family Relationships

Preactor supports the concept of families of records within a table. The concept is primarily to form the association between parent records and a group of child records. It is necessary to have a field with the FAMILY classification specified that will be set to -1 for the parent records and the primary key of the parent record for all child records.

FAMILY Classification

If a Family relationship has been established, it is possible (using Classifications) to define some fields as being INHERIT FROM PARENT, in which case changes can occur only in the Parent record. These changes will be inherited by the child records. The Part Number field in a Products table is often defined this way, since it makes little sense to be able to change the product in later operation records.

An example of a section of the products table is shown below.

```

; Products Table definition
;
;
Products:
  Parent Part,-1,STRING,
  HELPPPOPUPID (10)
  FAMILY(Part No.)
  DIALOG ONLY:
Number,0,INTEGER,
  PRIMARY KEY
  HIDDEN:
  Part No., "",STRING,
  HELPPPOPUPID (45)
  FREE FORMAT
  UNIQUE
  INHERIT FROM PARENT
  NO CHILD UPDATE:
Product, "",STRING,
  HELPPPOPUPID (55)
  FREE FORMAT
  UNIQUE
  TIP DISPLAY
  INHERIT FROM PARENT:
Profit,0,REAL,
  HELPPPOPUPID (270)
  FORMAT(.2)
  DIALOG ONLY
  INHERIT FROM PARENT:

```

Tracking

The Preactor database allows fields to be moved between the tables. This flexibility allows for structuring the database in a way that is suitable for each application and their processes. Moving the data can also change its meaning, and the overall effect should be considered before moving a field.

Taking Setup Time as a simple example, the effect of placing it in each of the three standard process tables can be seen in the table below.

Database	Effect
Products	One setup time for each operation; e.g., a widget requires 10 min. setup on the lathe, but 15 on the mill
Resource Groups	A single setup time for each resource group, that is independent of the operation and product; e.g., it will always take 10 min. to setup the lathes, 20 min. to setup the mills, etc.
Resources	Each resource will have a single setup time that again is independent of the operation and product; e.g., Lathe A always takes 10 min. to setup, but Lathe B always takes 15 minutes.

Table Definitions (RECORD_FORMAT)

Overview

The user can modify the database by modifying fields and classifications or adding new ones to the Preactor Table Definition (.prtdf) file.

When Preactor starts, it finds any changes that have been made to the .prtdf file and applies changes to the SQL database.

Note: This file should only be modified after attendance at a suitable Preactor Configuration Course.

Syntax

```
RECORD_FORMAT
; [Comment]
Name, [Table Type]:
  [FieldName], [DefaultValue], [ FieldType],
  [Classifications]:
  [. . . additional field definitions];
;
[... additional format definitions]
RECORD_END
```

RECORD_FORMAT is the keyword that starts the record format section.

Name

The Name field is the alphanumeric name given to the table. This name is used in many places to access data stored in the records within the table. All names must be unique. The name may contain spaces etc.

Table Type

The table type field specifies one of the following:

1. Normal table.

For a normal table the table type field is left blank. Normal tables are loaded from the database on start up and saved upon request or on exit from the editor or sequencer. For compatibility with configurations migrated from earlier versions of Preactor, specifying a file name in quotes has the same effect.

2. DATASET table.

Data set tables are specified using the keyword 'DATASET'. A data set table is able to load / save data from / to data sets in the database. Data sets are loaded on demand, usually when opening a sequencer or editor. For compatibility with configurations migrated from earlier versions of Preactor, specifying a file name or a file extension only with no quotes will have the same effect.

3. ASSOCIATE table.

An ASSOCIATE table is defined with the keyword 'ASSOCIATE' followed by the name of a DATASET table in parentheses. For example ASSOCIATE (Orders). Many ASSOCIATE tables can be defined using the same DATASET table. All of the ASSOCIATE tables and the table with which they are associated will be treated as a group of tables. This means that whenever a table within this group is saved or loaded, all the other tables in the groups will also be saved or loaded.

An ASSOCIATE table can also be defined with 'ASSOCIATE' followed by a classification string in squared brackets. For example, ASSOCIATE [LAUNCH TIME]. With the use of this, Preactor will locate the first table and field that contains this classification

string. If the classification string cannot be referenced, it will be excluded, and the table associated with the classification string will remain a non-loadable table.

4. COMMON

The COMMON classification can be added to an ASSOCIATE table within the MaterialControl_prtfd.inc file. Enabling this will allow the ASSOCIATE tables to load from a single, shared (common) dataset. This functionality is useful for when there is the need to switch between multiple schedules, yet there is a desire to maintain a single Supply, Demand or Bill of Materials table, for example.

Field Name

Field Name is an alphanumeric string used to describe the field. The Field Name is used in many places, in both the data structures and displaying the data to the user. Field Names must be unique within the table.

Each table must have a field defined with the PRIMARY KEY classification.

Default Value

The Default Value is used as an initial value for a field in a new record. For example, most Preactor systems use default values of 10 for the Priority field and 1 for the Batch Size field when adding a new order to the production schedule. These values can then be edited.

Some actions cause the default value to be overridden. For example, the Due Date can be set by the Preactor Editor by specifying an offset from the current date.

The following rules apply to the Default Value:

- If the field is a REAL, INTEGER, or TOGGLE data type, simply supply the required default value.
- If the field is a STRING, TIME, or DURATION data type, a value of -1 will cause the word "Unspecified" to be shown as the field value. To allow a value of -1, a field must have the ALLOW UNSPECIFIED classification defined.
- For STRING data types with a FREE FORMAT classification, the default value can be specified by enclosing the text in double quotes; e.g., "string".

Field Type

The field type defines the type of data that is in the field. "Table Definition File" on page 312.

Classifications

The classification field is where any classifications are defined against a field. Classifications are used to define the presentation, behavior and purpose of a field. For more information on classifications and their meanings, please refer to the reference section.

Comments

Comments are allowed in the Table Definition file anywhere outside of a field definition. Comments should be prefixed with a semi-colon (;) at the start of a line.

Remarks

1. The FieldType and Classifications parameters are defined in separate sections of this chapter.
2. To add or delete a field simply add or delete field definitions when initially configuring Preactor. If the run-time database already contains data from the user when this file is edited, data integrity must be ensured.
3. Each table requires a field with a PRIMARY KEY classification as shown in the example.

Example

Example of a typical RECORD_FORMAT definition.

```

RECORD_FORMAT
;Resource Groups Table Definition
;
Resource Group:
Number,0,INTEGER,
PRIMARY KEY:
Name,0,STRING,
FREE FORMAT (40)
UNIQUE
SEQ GROUP:
Resources,-1,MATRIX,
AUTO LIST (Resources (Name) );
;
RECORD_END

```

The table is named "Resource Group,".

The first field name is "Number" and is classified as the PRIMARY KEY for this tablet. Note that all table definitions must have a field that defines the PRIMARY KEY.

The second field, "Name," is a Field Type of FREE FORMAT string 40 characters in length that is classified as UNIQUE. It is also defined as the field used to name groups of resources in the sequencer using the SEQ GROUP classification.

The third field, "Resources," is classified as an AUTO LIST of resources, picked from the "Name" field in the "Resources" table.

Changes to the Inferred Database Schema

Preactor allows ad-hoc changes to the structure of its data storage by amending the table definition (.prtdf) file.

```

;
#include {PREACTOR PATH}\Include\pr_prtdf.inc #VERSION 3
#include MaterialControl_prtdf.inc
;
;*****
;
;   Preactor AS Table Definition
;
;*****
;
ACTIVEX_CUSTOM_CHECK_SERVER
;
GANTT_BUCKET_WIDTH 1
;
#ifdef VIEWER
VIEWER_MODE
#endif
;
#include Language\{COUNTRY}\{COUNTRY}_popup_prtdf.inc #OPTIONAL
;
RECORD_FORMAT
;
;*****
;   User Process Data Formats(Tables)
;*****
;
; Main schedule file definition.
;
Orders_DATASET:
  Belongs to Order No.,-1,STRING,

```

In order to support this, changes have to be made to the database when a change is made to the table definition file. The detection of these changes takes place on start up.

Listed below are the types of changes that can be made to the Preactor Table Definition file (.prtdf) that have an effect on the inferred database schema. Any number of these changes may be applied at start-up.

Always ensure that a backup of your database is taken before applying these types of changes since many of these operations can cause data loss and are irreversible.

Adding Fields

Adding a field to a table definition will also cause tasks to be created on start-up. In the simplest case this will be a FREE FORMAT string field, and a single task will be created to add the field. Other field additions will cause incidental foreign key additions or alterations. Adding a field of the MATRIX type will cause slightly different behavior, please see the [Adding Auto Lists and Matrix Field](#) topic.

The length of table and field names is limited to 50 characters. In the case of AUTO LIST and MATRIX type fields this maximum applies to the combined table name and field name.

Removing Fields

Removing a field will cause the inverse effect of adding a field, see the [Adding Fields](#) topic.

Renaming Fields

Fields can be renamed using the PREVIOUS NAME classification. This may cause alterations to foreign keys relevant to that field.

The length of table and field names is limited to 50 characters. In the case of AUTO LIST and MATRIX type fields this maximum applies to the combined table name and field name.

Field rename tasks can occur even where the name of the column in the database table does not need to change. In these cases, the name of the field has been changed, but the net result is that the name of the column in the database is the same. This happens because in deciding the name of a column in the table, certain characters are ignored. An example of this would be renaming a field from 'Name' to 'Name.'. Both of these field names resolve to the column name 'name'. When these tasks occur, all that happens is that the field definition in the database is updated to reflect the new field name.

Resizing Fields

FREE FORMAT, fields can have their length altered by the MAX LENGTH classification. Changes to the length will alter the field definition in the database. Field lengths greater than 4000 will cause the type of the column to change to varchar(max). This type has no limit on its length.

Altering the Length of a Field

FREE FORMAT STRING fields can have their length altered by the MAX LENGTH classification.

Changes to the length will alter the field definition in the database.

Field lengths greater than 4000 will cause the type of the column to change to varchar(max).

This type has no limit on its length.

Altering the Default Value of a Field

Changing the default value in the field definition in the table definition file will cause a corresponding task to alter the default constraint against the corresponding column in the database.

Altering the Nullable state of a Field

The ALLOW UNSPECIFIED classification determines whether a column in the database will allow null values.

Adding or removing this classification from a field causes a task on start up to alter the column accordingly.

Changing Null Field State

The ALLOW UNSPECIFIED classification determines whether a column in the database will allow null values. Adding or removing this classification from a field causes a task on start up to alter the column accordingly.

Adding Auto List and Matrix Fields

Adding AUTO LIST or MATRIX fields to a table definition will cause a new table to be created in the database. This is because the AUTO LIST or MATRIX data has been normalized. Foreign keys will be added to link the new table to its parent.

Removing Auto List and Matrix Fields

Removing an AUTO LIST or MATRIX field will cause the AUTO LIST or MATRIX table in the database to be removed, along with all of its foreign keys.

Adding Tables

You can define a new table in your Preactor Table Definition File (.prtdf) when ever you like. When Preactor detects a change of this type on start-up, it will create tasks to perform corresponding changes in the database. In its simplest form, this will be a single task to add the table, but in many cases, changes to foreign keys will also take place.

Removing Tables

You can remove a table definition from your Preactor Table Definition (.prtdf) File. Preactor will create a task to remove the table on start-up, and again this may involve changes to foreign keys.

Renaming Tables

Renaming tables requires the use of the PREVIOUS TABLE NAME classification, which must be placed on the PRIMARY KEY field for that table. A table without a PRIMARY KEY field cannot be renamed. The name of a PRIMARY KEY column in the database is inferred from the table name where the name of the PRIMARY KEY field in the table definition file is "Number". This means that in most cases, a table rename will also cause the primary key column in the database to be renamed.

The name of a PRIMARY KEY column in the database is inferred from the table name where the name of the PRIMARY KEY field in the table definition file is "Number". This means that in most cases, a table rename will also cause the primary key column in the database to be renamed.

The name of any child tables that exist to support AUTO LIST or MATRIX fields on the renamed table will also change, as the name of this child table is also inferred from the parent table name.

The length of table and field names is limited to 50 characters. In the case of AUTO LIST and MATRIX type fields this maximum applies to the combined table name and field name.

Table rename tasks can occur even where the name of the table in the database does not need to change. In these cases, the name of the table has been changed, but the net result is that the name of the table in the database is the same. This happens because in deciding the name of a table, certain characters are ignored. An example of this would be renaming a table from 'Table' to 'Table.'. Both of these table names resolve to the column Table 'table'. When these tasks occur, all that happens is that the table definition in the database is updated to reflect the table name in Preactor.

SYNTAX

```

RECORD_FORMAT
; [Comment]
Name,
Extension or FileName,
[MinimumRecords,]
[MaximumRecords,]
[FileMode]:
  FileName,
  DefaultValue,
  FieldType,
[Classifications]:
[. . . additional field definitions];
;
[... additional format definitions]
RECORD_END

```

User Configurable Database

The user can modify the database by modifying fields and classifications or adding new ones to the Preactor Table Definition (.prtdf) file.

When Preactor starts, it finds any changes that have been made to the .prtdf file and applies changes to the SQL database.

Note: This file should only be modified after attendance at a suitable Preactor Configuration Course.

Compiling Preactor Configurations

Running the Configuration Compiler

The configuration compiler can be run from the command line, a batch script or through a build system such as MSBuild.

When running the compiler, a command definition file (.prcdf) must be specified which must contain:

- The license to compile the configuration.
- Any #define directives.
- The Menu and Table definition files (.prmdf and .prtdf)

As the compiler will not load any data, it will ignore the database connection string. The compiler is an executable installed alongside Preactor called pcompile.exe.

Command Line Options

Running the compiler from the command line will provide help on each of the available switches:

Usage:

pcompile.exe <options>

Options:

Option	Description
--------	-------------

-h or -?	Provides help on the list of available options.
-c <filename>	Name of the Command Definition File to run.
-oem	Compile for an OEM configuration.
-l <license number>	Compile for the given license number.
-r	Compile for a run-time configuration.
-o <filename> or -out <filename>	Override the default compiled filename.

Examples:

Compile configuration for current license:

```
pcompile.exe -c ..\Folder\FileName.prcdf
```

Compile a run-time configuration:

```
pcompile.exe -c "C:\Folder\File Name.prcdf" -r
```

Compile an OEM configuration with a target output filename:

```
pcompile.exe -c "File Name.prcdf" -out "filename.oem" -oem
```

API

The Preactor API

The API may be used to manipulate Preactor.

Custom actions can be created which allow you to execute custom code during specified events. For example the OK button on an edit dialog could execute your custom code to validate data entry in required fields.

Open Planning Board Object

A user has full access to the Open Planning Board Object, which allows access and manipulation of schedule data directly using the API methods provided.

For example a user can automate schedule tasks such as inserting operations under defined conditions, e.g. a clean in process (CIP) operation in a process industry application, using a PESP Event incorporating a custom action.

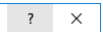
Help & Support

Field and Button Functions

Pop-Up Help is available for fields or push buttons.

To determine the function of a menu button or a dialog field:

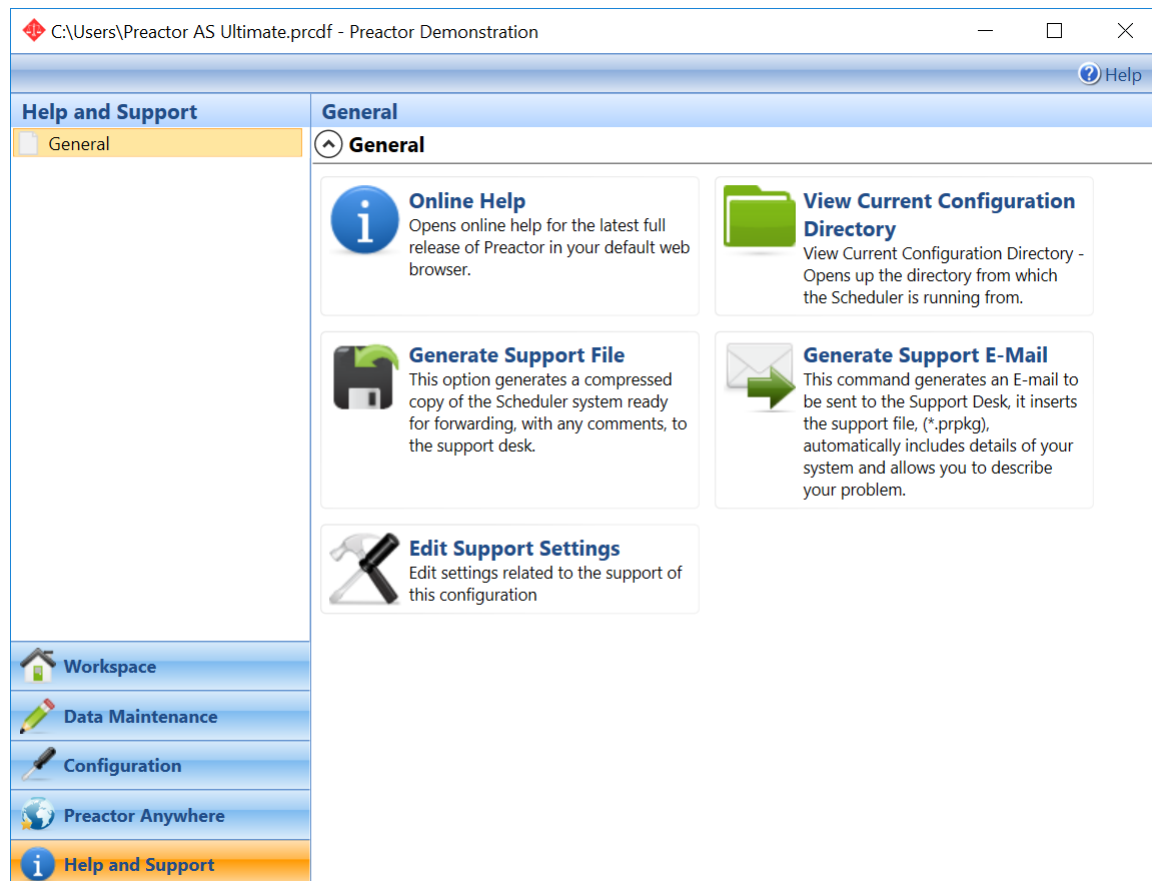
1. Click on the field name with the right mouse button or left click on the 'What's this' tool bar button and then click on the field or button.



A pop up help window appears providing a description of the selected item.

Preactor Help and Support

The Help and Support options can be obtained from the Help and Support Pane:



Support

It is often necessary to provide a backup of a Preactor configuration in the form of a Preactor package file in order to diagnose issues. This can be achieved using the **Generate Support File** or **Generate Support Email** options.

When requesting support, the following information is required:

- A valid license number.
- Operating system and version.
- The full version of Preactor in use, in the form WW.XX.YY.ZZZZ.

Generate Support File

This option will create a Configuration Package (a file with the .prpkg extension) in the directory that your Preactor configuration is running from, which includes configuration, report and database files.

Generate Support E-mail

This option is similar to the Generate Support File option, except that there is an option on the Package Management Progress dialog to send an e-mail.

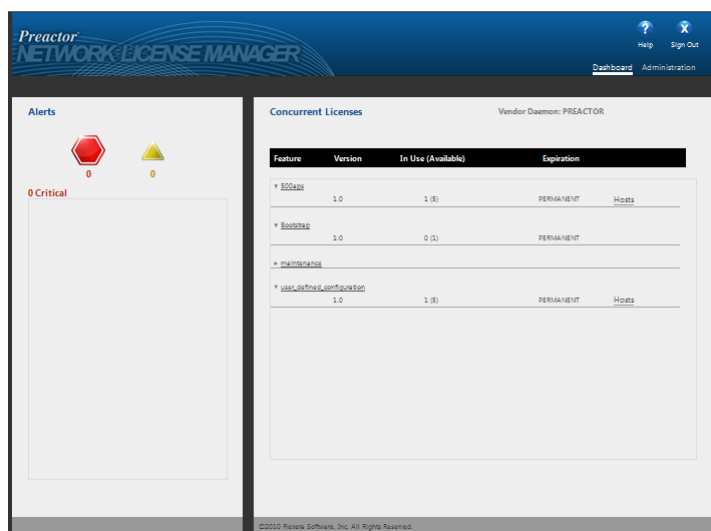
The default email address can be altered from the **Edit Support Settings** option.

Backup

A backup of a Preactor Configuration can be carried out from the Help and Support Pane, using Generate Support File. This will generate a Configuration Package. See "Configuration Packages" on page 38 for more information.

View Network License Manager

When employing a Network License service, the Network License Manager shows how many licenses are in use, who is using them, and how many are free.



The screenshot displays the Preactor Network License Manager interface. The top navigation bar includes 'Preactor NETWORK LICENSE MANAGER', 'Dashboard', and 'Administration'. The main content area is divided into two sections:

- Alerts:** Shows 0 Critical alerts and 0 warnings.
- Concurrent Licenses:** A table showing the status of licenses for various features. The table is titled 'Vendor Daemon: PREACTOR'.

Feature	Version	In Use (Available)	Expiration
* ESDMS	1.0	1 (3)	PERMANENT Hosts
* Bootstrap	1.0	0 (1)	PERMANENT
* maintenance			
* user_defined_configuration	1.0	1 (3)	PERMANENT Hosts

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From here, the log can be inspected to see when more requests for licenses were requested than could be supported. The Help function of the License Server Manager provides guidance of the management capabilities.

Troubleshooting

Troubleshooting

Introduction

This section will provide details of a number features that will help you debug your configuration, and also details steps that may be taken to resolve some common user queries.

FAQs

The following section details steps that may be taken to resolve some common user queries.

- [How do I get Preactor out of Trial mode?;](#)
- [Why is Preactor running in year 2000, and how do I stop it?](#)
- [How do I get Preactor to run the version I purchased?](#)
- [How do I find what version or build of Preactor I am using?](#)
- [How do I obtain e-mail support from my supplier?](#)
- [How do I Create Copies of a Configuration for Training or Testing Purposes?](#)

How do I get Preactor out of Trial mode?

Why is Preactor running in year 2000, and how do I stop it?

There are two different Run modes that Preactor can be launched in:

- Trial mode.

This allows Preactor to be tried over a trial period of 30 days. The time period begins as soon as Preactor is opened in this mode. Preactor can be used until the 30 days have expired.

In this mode, Preactor is fully functional.

- Activated mode.

This allows Preactor to run in a fully activated state with no time constraints. An Activation Code must be entered to set Preactor to run in this mode.

Preactor is distributed with a number of example configurations that facilitate the Trial of the product, and to provide you something you can base your configuration on. These configurations are set to run in a Fixed Time (e.g. the year 2000). The Fixed Time can be changed or removed, see Fix Time – Fixing the Current Time.

How do I get Preactor to run the version I purchased?

The product to be run (e.g. 200 FCS) is configured in the Preactor Command Definition File (.prcdf). See Specify Which Product to Run / License.

How do I find what version or build of Preactor I am using?

Click on the Help icon in the menu bar and choose the 'About' option. The build and version will be displayed on the dialog that loads.

How do I obtain e-mail support from my supplier?

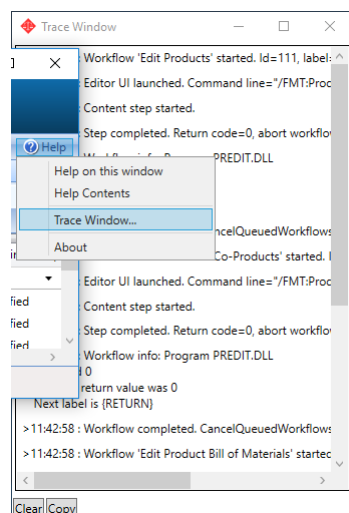
Support email requests can be created from the Support menu option.

How do I Create Copies of a Configuration for Training or Testing Purposes?

Backups can be done from the Help and Support menu options.

Tracing Activity

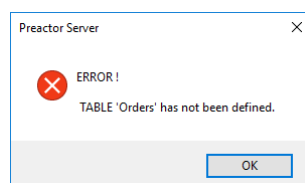
Preactor can provide a trace of all activity. This is activated from the Help button on the workspace menu bar.



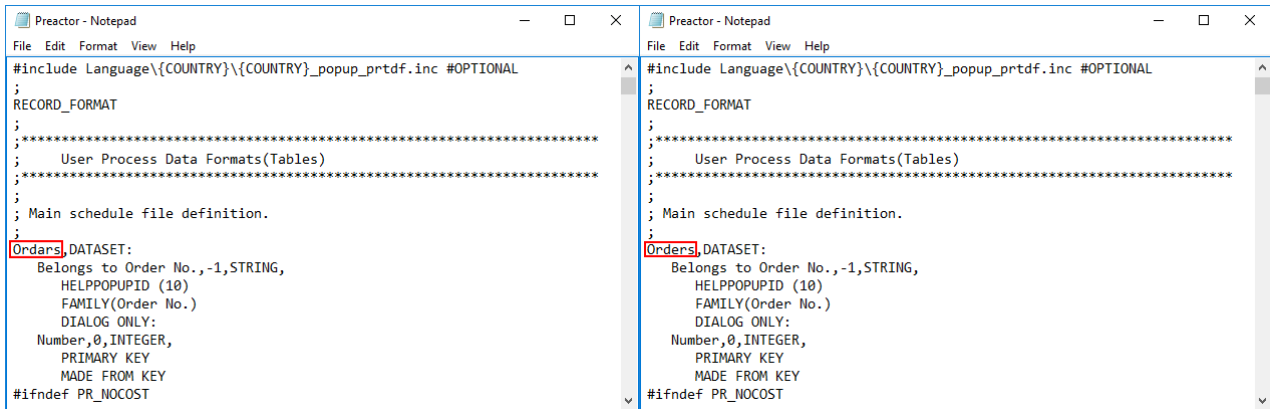
Troubleshooting the Preactor Table Definition File

It is important that when the Preactor.prtdf file is edited that the syntax is preserved and that all field names in references, etc., are spelled correctly. If PRSERVER finds that it cannot understand any part of the Preactor.prtdf file, it will abort loading. It is recommended that modifications to the Preactor.prtdf file are made in small increments and that the system is tested between each set of modifications.

If there is an error in the .prtdf file, a warning dialog will be displayed on start up of Preactor and then Preactor will close. In this case, a spelling mistake was applied to the orders table.



From here, the Preactor.prtdf file can be opened in a text editor, in order to find where the error is and correct it.



The error dialog box will always display information that can be used to correct an error in the Preactor.prtdf file.

Debugging Preactor Menu Definition Files

To enable the Preactor menu definition files to be checked and especially to allow validation of the calculated tags, a Workflow Log debug facility is provided in the Preactor Desktop. The 'Debug Window' is displayed by selecting 'Help ► Debug Window...' on the Preactor Desktop. When a Preactor workflow action is activated, such as entering the sequencer, text will be printed in the debug window providing information on the contents of various tags and command line parameters that are used on entry to the sequencer.

Security Information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions only form one element of such a concept.

The customer is responsible to prevent unauthorized access to its plants, systems, machines and networks. Systems, machines and components should only be connected to the enterprise network or the internet if and to the extent necessary and with appropriate security measures (e.g. use of firewalls and network segmentation) in place.

Additionally, Siemens' guidance on appropriate security measures should be taken into account. For more information about industrial security, please visit <http://www.siemens.com/industrialsecurity>.

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends to apply product updates as soon as available and to always use the latest product versions. Use of product versions that are no longer supported, and failure to apply latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under <http://www.siemens.com/industrialsecurity>.

Version 4.1 – 01.06.2016- Siemens AG, I I A L C G, Nuremberg

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