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# AUTODESK PRODUCT DESIGN SUITE

## GRAPHICS OPTIMIZATION GUIDE



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# ACCELERATING PRODUCT DEVELOPMENT THROUGH DESIGN VISUALIZATION

Design visualization is at the heart of Morgan Motor Company's development process

Charles Morgan, former director of legendary British car manufacturer Morgan Motor Company, once said his favorite Morgan car was the one that hadn't been built yet. And he saw a lot of these.

With Autodesk software running on HP Z Workstations with NVIDIA Quadro GPUs, Morgan's design department produces stunning visualizations of multiple new car designs before they are even built.

"In the same amount of time it previously would have taken us to create one visual, we're able to make many much higher quality visuals and do several different proposals," says Jon Wells, Head of Design, Morgan Motor Company, who uses NVIDIA® Iray®, the GPU-accelerated renderer in 3ds Max Design, to produce photorealistic renderings.

"When we're doing Iray renderings, we can render some fantastically beautiful outcomes almost in real-time," he explains. "As we turn the model, we can capture a

shot of what that would look like rendered up. We can spin it again and see that again in a different guise."

Wells heads up a team of designers who together with the engineering team present new formal design reviews to Morgan's directors and shareholders. Doing this in an interactive 3D environment inside Autodesk Showcase pays big dividends.

"We're all putting across our ideas and we have to do this concisely and accurately. The best piece of equipment we have in our arsenal to do this is the new Z1 Workstation from HP," he says. "When paired with an NVIDIA Quadro graphics card, we're able to show ideas in great speed and accuracy, spin around 3D models on a very high definition, high-resolution screen. The people can really fully get to understand what it is that we've been working on.

"Everyone gathers around and we pitch and we talk and we present our ideas. And everyone leaves, I believe, with a great understanding of what the final project's

going to look like, even though they've not spent any of their money yet."

[www.morgan-motor.co.uk](http://www.morgan-motor.co.uk)



**WATCH THE MORGAN MOTOR COMPANY VIDEO**

*When we're doing Iray renderings [in 3ds Max Design], we can render some fantastically beautiful outcomes almost in real-time.*

*Jon Wells, Head of Design, Morgan Motor Company*



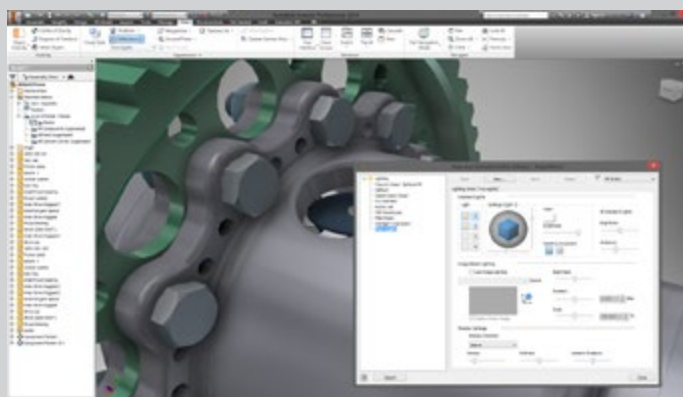
## INSTANT VISUALIZATION INSIDE THE VIEWPORT

Autodesk Inventor, part of the Autodesk Product Design Suite, places a big emphasis on providing high-quality interactive visualization capabilities directly inside the viewport. The software offers full control over shading, lighting and reflections and there are a number of preset visual styles, which can be toggled between instantly to suit different workflows.

'Shaded with edges' helps highlight the topology of the model. It makes it easy to see where fillet blends start and finish and is particularly useful when working with more complex surface-based geometry.

'Shaded with hidden edges' helps expose internal details. For example, when working on a turn component with an internal bore the designer can focus on where the interior surfaces are in relation to the external form.

Increasingly, designers are demanding



higher levels of realism in the viewport. 'Realistic' mode supports reflections, shadows and ambient occlusion, an effect that delivers realistic real world shadows.

Upping the visual quality inside the viewport can offer big workflow benefits. Designers are able to make judgments

on aesthetics throughout the design process. In the past, to visualize a design in such a way would have required a time consuming off line CPU-based render.

With 'realistic' mode the visualization is instant and the model is fully interactive. High-res stills can also be rendered out in

seconds, which can be useful for reports.

Increasing visual quality inside the viewport does place a bigger load on a workstation's GPU. The demands become even higher as the size and complexity of assemblies increase.

Maintaining full interactivity with high-quality models can be a big challenge with older workstations. When rotating, panning and zooming around an assembly, frame rates or visual quality can drop.

**HP Z Workstations** are well equipped to deliver a full interactive experience with large models featuring realistic effects. With high-performance Intel® Xeon® CPUs and **NVIDIA Quadro** GPUs they can help users work in realistic mode all of the time, rather than having to revert back to less demanding visual styles in order to maintain full interactivity with the model. Reliability is also essential in demanding





Autodesk Showcase provides a high-quality real-time environment for client presentations and design / review.

workflows and HP Z Workstations undergo a rigorous testing process before they are tested and certified by Autodesk.

**Autodesk Showcase**, the 3D presentation and visualization tool in Autodesk's Product Design Suite, is able to deliver even higher levels of realism in the viewport. It can be used to present design alternatives but color and finish can also be changed on the fly.

By offering full interactivity in the viewport design options can be viewed from any angle, using real-world materials, lighting, and environments.

Viewport performance in Autodesk Showcase is greatly affected by the complexity of a scene (number of objects, number of materials and polygons).

For complex models with scenes composed of more than 1,000 objects or 1,000,000 polygons, Autodesk recommends a certified hardware-accelerated graphics

card with 2GB graphics memory.

When working with more complex scenes and / or stereo 3D, higher-end cards, such as the NVIDIA Quadro M4000 and M5000, will offer additional benefits.

Autodesk Inventor and Autodesk Showcase are both tightly integrated into the design process. As a result, both place a big emphasis on high-quality visualization in the viewport.

In product development workflows the major focus for **3ds Max Design** from Autodesk's Product Design Suite is on bringing designs to life — producing highly polished, studio quality stills and animations for marketing and sales, which can be quickly rendered using GPUs. That's not to say 3ds Max Design doesn't offer exceptional quality and performance in the viewport. Nitrous, the advanced 3ds Max display engine, supports realistic display of materials, hdr pixel pipelines, and photometric lights.

## AUTODESK INVENTOR BOOSTING PERFORMANCE IN LARGE ASSEMBLIES

With CAD models continually growing in size and complexity Autodesk is always looking at ways to improve 'large assembly' performance inside the viewport.

Autodesk Inventor features a multi-threading component to the graphics layer that interacts with DirectX. This means a HP Z Workstation with a quad core or six core CPU should offer additional benefits over one with two CPU cores.

Autodesk Inventor also features a 'geometry consolidation' technology on which Autodesk's graphics

team collaborated closely with graphics specialist NVIDIA.

With geometry consolidation, similar objects — such as bolts — are automatically grouped together and sent in batches to the GPU. This means there are fewer GPU draw calls, which can boost performance by an order of magnitude.

According to Autodesk, a conservative estimate is 2.5 to 3 times. However, for models with repetitive geometry (e.g. a series of sub-assemblies arrayed in a pattern) the improvement may be bigger.

# 3D GRAPHICS OPTIMIZATION TIPS

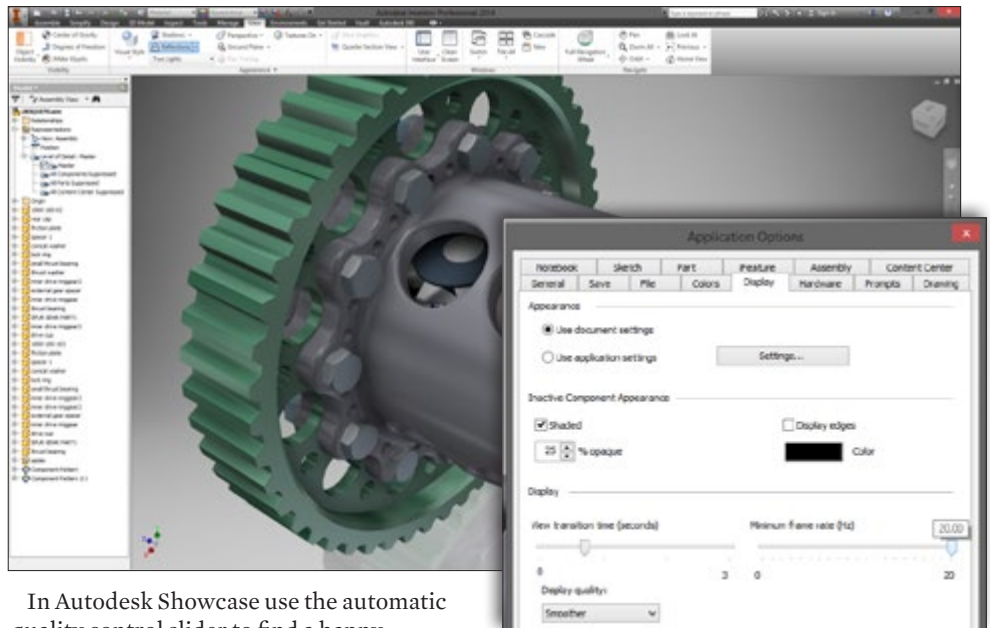
Finding the right balance between visual quality and model interactivity can help boost productivity

**B**y default all products in the Autodesk Product Design Suite are optimized for 3D performance in the viewport. However, there are a number of controls to help users strike a balance between visual quality and interactivity when navigating 3D models.

In Autodesk Inventor there are two main settings to explore. Firstly, set the default display quality to rough, medium, smooth or smoother. Rough will give the best performance, but geometry edges will appear coarse when moving the model. Quality will increase when the model stops.

Users can also set a 'minimum frame rate'. 10 frames per second is the default, but it can be set anywhere between 0 and 20. If hardware can't keep pace with complex models, the graphics engine temporarily drops components from the assembly, starting with the smallest first (e.g. washers and screws) then working its way up the graphics tree. Components will re-appear when the model stops.

With a combination of display quality and minimum frame rate it is possible to ensure that models — even very large assemblies of 40,000 or 50,000 components — will still run smoothly. This could suit the workflow of those working on large industrial machinery, where quick and accurate model orientation is more important than aesthetics. Conversely, an industrial designer may choose to prioritize visual quality and smooth curves over frame rate. It's all about finding the right balance.



In Autodesk Inventor users can adjust display quality and minimum frame rates to find a balance between performance and visual quality

In Autodesk Showcase use the automatic quality control slider to find a happy medium between 3D performance and visual quality. When set to 'high' frame rates may slow down to maintain visual quality. When set to 'low' the level of detail (LOD) will drop, but performance should rise. Select 'Increase level of detail when idle' to improve visual quality to the highest possible LOD when the model is not moving.

In 3ds Max Design turn on adaptive degradation to improve performance in the Nitrous viewport. Adaptive degradation works by temporarily decreasing the visual fidelity of certain objects.

Users can also set a minimum frame rate

that the adaptive display will attempt to maintain. If the frame rate drops below this, the amount of degradation will increase.

Other ways of improving viewport performance in 3ds Max Design include reducing the resolution of texture maps and temporarily turning off all viewport lights, so only default lighting is used.

In 3ds Max Design and Showcase, grouping and combining objects can also increase 3D performance.

## ENHANCE VISUAL COMMUNICATION WITH AUTODESK SHOWCASE



Autodesk Showcase, running on a HP Z Workstation with NVIDIA Quadro professional graphics, can bring designs to life in a dynamic real time environment. Design alternatives with a range of textures, materials and environments can be explored in client presentations and design review sessions.

Storyboards can be created or changes made on the fly. Thanks to an intuitive interface non-experienced

users can also take control.

There are a number of ways to navigate around a scene. Set a center of interest (COI) around which orbit and tumbling occurs. Adjust the navigation speed with the + and - keys to move quickly past large objects or slow down to focus on details.

Models can be sectioned to reveal interior details, presented on a turntable or animated to emphasize

the functional characteristics of a design. For example, how to remove the back cover of a cell-phone or how to unfold a child's scooter.

The constraint behaviors that define these functional characteristics can be exported out of Inventor into Showcase. Shots, alternatives, and materials can also be brought over as part of the tight workflow that exists between Inventor and Showcase.



Morgan car rendered in Autodesk 3ds Max Design.

## NVIDIA IRAY GPU-BASED RAY TRACING

**R**ay tracing creates physically accurate, photorealistic renderings by tracing light. It is a computationally-intensive process, traditionally carried out by multi-core CPUs. However, in recent years, GPU-based ray trace renderers have also come into focus. One of the most notable is NVIDIA Iray, which is available inside 3ds Max Design.

NVIDIA Iray can be accelerated by both CPUs and CUDA-based GPUs, but it thrives on GPUs with lots of cores and on-board memory.

If a single HP Z Workstation has dedicated GPUs for both interactive graphics and rendering it is possible to design and render at the same time without impacting workflow.

It is important to note that the GPU must have enough memory to load in the entire scene (including textures). If not, Iray will fall back to using the system's CPUs. If Error Correcting Code (ECC) memory is supported on the GPU it should be disabled for best performance.

In general, Iray only supports material or shader features relating to physically based ray tracing. In 3ds Max Design these are the general-purpose mental ray materials — Autodesk Materials and Arch & Design.

## PHOTOREALISTIC QUALITY RENDERING

**I**nteractive visualization in the viewport plays an essential role in product development, but highest quality visuals need to be rendered offline.

Autodesk Inventor and Autodesk Showcase have the option of both GPU and CPU-based rendering to create renderings of parts and assemblies. Turntable animations show off a product from all angles and animations can demonstrate the mechanistic movements of models.

3ds Max Design can bring designs to life by delivering high-impact visuals and cinema quality animations. There are a number of rendering options inside 3ds Max Design, including Quicksilver, NVIDIA Iray and mental ray.

Quicksilver is based on the Nitrous graphics engine. It uses both the CPU and

GPU (DirectX), but there is an emphasis on the GPU.

NVIDIA Iray is a physically accurate ray trace renderer which simulates the real world behavior of light. It is used to visualize automotive styling, engineering design, and consumer products.

The big advantage of NVIDIA Iray is it requires little to no experience to setup and is intuitive to operate. It uses both CPUs and GPUs, but thrives on CUDA-based GPUs, such as the NVIDIA Quadro M6000.

mental ray is a CPU-based renderer that supports physically accurate ray tracing as well as cinema quality special effects. It benefits from multiple CPU cores but consequently ties up your processors while rendering.

## CREATE FAST HIGH-QUALITY RENDERS WITH IRAY IN 3DS MAX DESIGN

In Autodesk 3ds Max Design rendering with NVIDIA Iray is incredibly easy. Users specify how long each frame is rendered for, either in terms of time (default 1 minute) or number of iterations (default 500). Early iterations will appear grainy but the rendered image will rapidly refine with more passes. An 'unlimited' option lets the renderer run for an indefinite period of time.

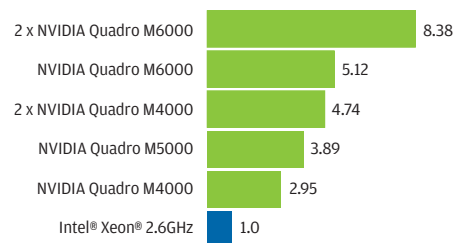
NVIDIA Iray can use both CPUs and NVIDIA CUDA-based GPUs to render scenes. In 3ds Max Design designers are given full control over which processing resources are used, down to specific GPUs and individual CPU cores.

With a HP Z Workstation that includes multiple NVIDIA Quadro professional GPUs it is possible to design in Autodesk Inventor

while rendering a scene with Iray in Autodesk 3ds Max Design with no noticeable slow down in performance.

The results are the same regardless of which type of processor is used, but renders will be delivered faster when using high-performance CUDA-based GPUs, such as the NVIDIA Quadro M5000 or Quadro M6000.

3ds Max 2016 + Iray performance relative to CPU <sup>7</sup>





# WORKSTATION TECHNOLOGY

What to look for when selecting a HP Z Workstation  
to partner the Autodesk Product Design Suite

## HP Z440 WORKSTATION

### GRAPHICS PROCESSING UNIT (GPU)

**T**he trend to deliver more and more realism inside the viewport means the role of the GPU has never been more important.

In order to attain the highest levels of interactivity with models that display realistic reflections, shadows and complex lighting, a modern professional graphics processing unit (GPU), coupled with a high GHz CPU is recommended.

GPU (frame buffer) memory is an important consideration. For Autodesk Inventor, 2GB or more is a good choice, while for workflows that feature Autodesk Showcase or Autodesk 3ds Max Design 4GB or more is recommended for better interactive performance.

NVIDIA Quadro GPUs are designed specifically for professional workstations and have been optimized for performance and reliability when accelerating 3D applications, including those in the Autodesk Product Design Suite.

NVIDIA Quadro is available for all levels of use. For Autodesk Inventor, the Quadro M2000 (4GB) is well suited to mainstream modeling, while the Quadro M4000 (8GB) is better matched to more demanding assemblies.

For workflows that involve Autodesk Showcase and Autodesk 3ds Max Design the Quadro M5000 (8GB) is a great option since both applications rely heavily on the GPU.

If rendering in 3ds Max Design is an important part of your workflow, you may want to consider an HP Z Workstation with NVIDIA multi-GPU technology. For example, combining two NVIDIA Quadro M5000 GPUs delivers over 6x faster rendering than a 2.6 GHz CPU in 3ds Max with NVIDIA Iray.

This multi-GPU configuration also lets you simultaneously render scenes while you continue designing in Inventor.

An HP Z840 Workstation can be fitted with up to three high-end GPUs, such as the NVIDIA Quadro M6000.



Dual NVIDIA Quadro M4000 GPUs are a good choice for those who want to accelerate rendering in 3ds Max with NVIDIA Iray



## PROCESSOR (CPU)

The CPU is one of the most important components in a HP Z Workstation.

For Autodesk Inventor the clock speed of the CPU (GHz) is a top priority as it impacts all core operations and 3D graphics performance.

Multiple CPU cores will boost multi-threaded processes, such as Autodesk Shape Manager,

hidden line calculations, and a multi-threading component in the graphics layer. Four or six cores in a single CPU is a good choice.

To boost performance when rendering with CPU-based ray tracing inside Autodesk Inventor, Autodesk Showcase and Autodesk 3ds Max Design consider dual processors with multiple CPU cores.

For certified performance, Intel® Xeon® processors are recommended.

## MEMORY

16GB of memory is considered to be a good amount for mainstream product development workflows while 32GB is recommended for particularly complex datasets.

With the Autodesk Product Design Suite it is important to consider that multiple applications may be running at the same time, which will also have an impact on memory use.

ECC memory, available in all desktop HP Z Workstations, is recommended for the highest quality results and it is important that memory is properly configured (pairs for two channels, quads for four channels).



The HP Z Turbo Drive is available in all HP Z Workstations.

## STORAGE (DRIVES)

A Solid State Drive (SSD) is recommended for optimal performance. Complex datasets should load and save quicker and, as latency is low, the HP Z Workstation will feel more responsive. Random read / write access is also fast, which is particularly important when multi-tasking and swapping between applications.

SSDs traditionally come as 2.5-inch drives that use the SATA 3.0 interface. However, HP recently released its second generation HP Z Turbo Drive, an add-in PCI Express card that boasts up to 4x the sequential read performance of SATA 3.0.

While SSDs are superior to traditional hard disk drives (HDDs) in terms of performance, their cost per GB is still relatively high. As a result, an SSD is commonly ring fenced for operating system and applications, while a high capacity HDD drive is used to store data. However, with SSDs continuing to fall in price and increase in capacity the need for HDDs is diminishing.

# HP Z WORKSTATIONS OPTIMIZED FOR AUTODESK PRODUCT DESIGN SUITE

**HP Z Workstations deliver the performance, reliability, and application certifications required to accelerate product development workflows**

**H**P offers a complete range of desktop and mobile workstations built for the challenges of product development—from part and assembly modeling with Autodesk Inventor to cinematic quality renderings and animations with 3ds Max Design.

The HP Z Workstation family meets the full range of workstation needs—from

performance-driven computing and design work in space-constrained environments to extreme visualization with complex datasets.

HP ZBook Mobile Workstations offer high performance with exceptional battery life and feature a chassis inspired by aerospace craftsmanship and materials.



	<p><b>HP Z240 SFF</b></p> <p>Workstation performance and reliability at starting prices that rival desktop PCs.</p> <p>Autodesk Product Design Suite usage: Simple 3D assemblies.</p>	<p><b>HP Z240</b></p> <p>High levels of performance and expandability in an accessible tool-free tower form factor.</p> <p>Autodesk Product Design Suite usage: Complex 3D assemblies and visualization.</p>	<p><b>HP Z840</b></p> <p>Dual-socket workstation delivers exceptional performance, industrial design, and tool-free serviceability.</p> <p>Autodesk Product Design Suite usage: Large, complex 3D datasets, simulation, visualization, 1ray rendering</p>
<b>Operating System</b>	Windows 7 Professional 64 (available through downgrade rights from Windows 10 Pro-64) <sup>1</sup>	Windows 7 Professional 64 (available through downgrade rights from Windows 10 Pro-64) <sup>1</sup>	Windows 7 Professional 64 (available through downgrade rights from Windows 10 Pro-64) <sup>1</sup>
<b>Processor</b>	Intel® Core™ i7 6700 (3.4GHz, 4.0GHz Turbo, 4 Core) <sup>2</sup>	Intel® Xeon® E3-1270 v5 (3.6GHz, 4.0GHz Turbo, 4 Core) <sup>2</sup>	2x Intel® Xeon® E5-2687 v3 (3.1GHz, 3.5GHz Turbo, 10 Core) <sup>2</sup>
<b>Memory</b>	16GB DDR4 2133 MHz RAM <sup>3,4</sup>	32GB DDR4 2133MHz RAM <sup>3,4</sup>	64GB DDR4 2133MHz ECC RAM <sup>3,4</sup>
<b>GPU</b>	NVIDIA® Quadro® K1200 (4GB)	NVIDIA® Quadro® M4000 (8GB)	NVIDIA® Quadro® M6000 (24GB)
<b>Storage</b>	Z Turbo Drive 512GB <sup>5</sup>	Z Turbo Drive 512GB and 1TB SATA <sup>5</sup>	Z Turbo Drive 512GB and 1TB SATA <sup>5</sup>



# BRING DESIGNS TO LIFE WITH HP Z DISPLAYS

**HP Z Displays** offer outstanding image accuracy, exceptional adjustability, and mission-critical reliability optimized for professional use. Built with IPS panels, HP Z Displays deliver power savings over first-generation IPS technology and extra-wide viewing angles that foster collaboration.

The HP Z27n Display features a 27-inch 2560 x 1440 resolution while the HP Z24n Display features a 24-inch 1920 x 1080 resolution. For those that

need to see as much design detail as possible the HP Z27s Display offers UltraHD 3840 x 2160 resolution.

Autodesk software can adapt to these different resolutions by changing the size of the toolbar buttons and ribbon icons.

HP Z Displays excel in advanced product development workflows. With complex CAD models the large, high-resolution screens make it easy to see minute details even when “zoomed out” on a design.

For vivid renderings produced with 3ds Max Design, consider the HP DreamColor 27x Studio Display. This true 10-bit display includes an integrated color calibration engine which means design visualizations are as close to real life as possible. Then, moving from the screen to presentation quality prints, HP DreamColor Displays can also be color calibrated to match photorealistic output from HP DesignJet large format printers.



	<b>HP Z1</b>	<b>HP ZBook Studio G3</b>	<b>HP ZBook 15 / HP ZBook 17</b>
	HP Z Workstation performance and reliability expertly designed into the back of a 27-inch diagonal beyond HD touch display. Autodesk Product Design Suite usage: Boardrooms, for Design Review.	Mobile workstation redesigned for productivity on the go. Features 15.6-inch diagonal UHD+ display (3840 x 2160). Autodesk Product Design Suite usage: Mobile design and presentation.	HP's most powerful mobile workstations with incredible expandability. Available with QHD, FHD and optional DreamColor display. Autodesk Product Design Suite usage: Mobile CAD, rendering, and simulation.
<b>Operating System</b>	Windows 7 Professional 64 (available through downgrade rights from Windows 10 Pro-64) <sup>1</sup>	Windows 7 Professional 64 (available through downgrade rights from Windows 10 Pro-64) <sup>1</sup>	Windows 7 Professional 64 (available through downgrade rights from Windows 10 Pro-64) <sup>1</sup>
<b>Processor</b>	Intel® Xeon® E3-1281v3 (3.7GHz, 4.1GHz Turbo, 4 Core) <sup>2</sup>	Intel® Xeon® E3-1505M v5 (2.8GHz, 3.7GHz Turbo, 4 Core) <sup>2</sup>	Intel® Xeon® E3-1505M v5 (2.8GHz, 3.7GHz Turbo, 4 Core) <sup>2</sup>
<b>Memory</b>	32GB DDR3-1866 ECC RAM <sup>3,4</sup>	32GB DDR4 2133MHz ECC RAM <sup>3,4</sup>	32GB DDR4 2133MHz ECC RAM <sup>3,4</sup>
<b>GPU</b>	NVIDIA® Quadro® M2000M (4GB)	NVIDIA® Quadro® M1000M (4GB)	NVIDIA® Quadro® M3000M (4GB)
<b>Storage</b>	256GB SSD and 1TB SATA <sup>5</sup>	Z Turbo Drive 256GB <sup>5</sup>	Z Turbo Drive 512GB and 1TB SATA <sup>5</sup>

# INNOVATION, QUALITY & RELIABILITY

**H**P continually pushes itself in every aspect of workstation design. For serviceability, its trademark tool-less design helps minimize downtime if users need to make upgrades and repairs.

HP Z Workstations feature single latch entry in order to get quick access to key components inside.

Fans, power supplies, optical drives and other components inside desktop HP Z Workstations feature green access points which makes them easy to remove and click back into place. Blind mate connectors on hard drive caddies mean users don't have to worry about power and data cables. Memory modules and graphics cards are located for easy access. Integrated handles and slide rails are built into the chassis to make it easy to move machines around the office.

HP Z Workstations have also been engineered to minimize fan noise produced by cooling fans. The HP Z840, for example, uses ducts to channel airflow over individual CPUs and memory banks to maximize cooling efficiency.

Meanwhile, HP ZBook Mobile Workstations feature the HP Duracase with magnesium-reinforced chassis, HP DuraFinish with brushed and smooth aluminum, latch-less design with precision aluminum-alloy hinges, backlight keyboard, chemically strengthened glass touchpad,



and go through MIL-STD 810G testing for drops, vibration, shock, dust, humidity, altitude, high and low temperature, and temperature shock.<sup>11</sup>

**HP Z Workstations feature green access points to help locate and service internal components**

## ACCESS & SHARE DESIGNS WITH HP REMOTE GRAPHICS SOFTWARE (RGS)

**W**ith HP Remote Graphics Software (RGS) it is possible to access your graphics-intensive workstation applications wherever you have a network connection, or share designs with your extended team. The software offers complete access to the power of a HP Workstation from any Windows or Linux computer, even a HP ElitePad tablet.

There are a number of different use cases for HP RGS. For real time collaboration across multiple sites it is possible to share your workstation screen with multiple users simultaneously for 'view only' or full interactive access.

HP RGS can also be used to support

workstation remote access across multiple offices. A company's workstation resources can be consolidated in a single location and the workforce can connect in from any computer at any location.

The software also provides flexibility for mobile workers while away from their desk — at home, on the shop floor, at client offices, or the boardroom.

With HP RGS 7.0 it is possible to access any CAD application on a HP ElitePad Windows 8 tablet. The desktop optimized user interface presents some challenges but RGS provides the control designers need without complicating the inherent simplicity of a touch screen.

This can be done with a 'virtual mouse'

that helps improve accuracy by using the entire tablet's screen as a trackpad instead of picking geometry directly. It is also possible to assign gestures to keyboard hot keys so controls can be invoked by a multi finger swipe or tap.

With HP RGS no data ever leaves the HP Workstation. Only pixel data is streamed which means huge CAD models or engineering datasets don't have to be moved between sites, which can be slow and can lead to sync issues. Project data also remains secure.

HP RGS is included as standard with HP Workstations. For set up, HP RGS sender and receiver software needs to be installed on workstation and client.

## TUNE YOUR SYSTEM FOR AUTODESK APPLICATIONS

HP Performance Advisor, an HP tool for performance optimization, delivers a simple, effective way to keep your HP Workstation operating at its peak potential.

A software wizard can take you from initial configuration and customization through the optimization of your system for all of the applications within the Autodesk Product Design Suite.

It can help ensure you are using the best certified graphics driver for your installed applications, optimized for performance and stability. It can also offer advice and apply BIOS settings. For example, enabling Intel Hyper-Threading<sup>6</sup> to get maximum performance when rendering with mental ray in 3ds Max Design.

It can also help you gain a quick and accurate understanding of your entire system in one simple, interface, and then help identify bottlenecks by tracking use of memory, CPU and other resources. This can help ensure maximum performance throughout the entire life of your HP Z Workstation.

HP Performance Advisor is included with HP Z Workstations.



HP Performance Advisor features an interactive block diagram to give a crystal clear picture of all the components inside your HP Z Workstation.

## HP & NVIDIA AUTODESK CERTIFICATION

Product development professionals demand performance and reliability from their workstation hardware. HP Z Workstations undergo a rigorous testing process before they are proven and certified by Autodesk and HP.

HP's application certification process is designed to ensure users receive the best possible experience when running the Autodesk Product Design Suite on HP Z Workstations.

A key part of this process is 3D graphics and here HP performs in-depth graphics driver quality testing and performance measurement. If graphics issues are identified then HP works with NVIDIA and Autodesk to resolve them, helping protect users' investment in software and HP hardware.

## HP DESIGNJET PRINTERS

HP DesignJet printers combine ease-of-use with high-quality printing and proven reliability. From individual to enterprise workgroup product development environments, the family of HP large format printers can help streamline design and engineering workflows, offering printing solutions that deliver high-quality applications fast. And with HP Mobile Printing capabilities, it's easier than ever to print on-the-go.

**HP DesignJet T830 Multifunction Printer:** Print, scan, copy, and share with this robust, compact 36-inch Wi-Fi true integrated multifunction printer, ideal for use in offices and manufacturing sites.

At half the size of other 36-inch MFPs (H x W x L),<sup>8</sup> this machine also delivers prints three times faster than previous HP models. Easy operation helps users save time with a front-loading media roll and built-in A3/B+ tray, wireless connectivity,<sup>9</sup> and a full-color 4.3-inch (109-mm) touchscreen. With HP Mobile Printing, you can easily scan, share, and print right straight from your Apple® or Android™<sup>10</sup> smartphone or tablet wherever you are. Use integrated scanning to capture and share feedback, enable archiving and more. The printer creates its own Wi-Fi network for easy connectivity with Wi-Fi Direct.

**HP DesignJet T930 Printer:** For design and engineering professionals, including small product development teams, this 36-inch, 6-ink printer helps boost team productivity and enhance security and is ideal for professional-quality CAD and GIS applications. Six Original HP inks produce a wide color gamut ideal for color graphics—gray and photo black inks produce precise line accuracy and true neutral grays. Productivity can be enhanced with an integrated 50-page output stacking tray, fast processing, management features, and HP Mobile Printing, which allows you to print directly to your printer from a smartphone, tablet, or USB drive.<sup>9</sup> The machine also includes security features to help safeguard information.

**HP DesignJet T1530 Printer & HP DesignJet T2530 Multifunction Printer:** For design and engineering advanced workgroups in enterprise environments, the dual-roll 36-inch, 6-ink printer and MFP are ideal for professional-quality CAD and GIS applications. Produce fine line quality and up to 2400 dpi resolution.

Two rolls help save time with easy front loading and automatic skew correction—work with two media types/sizes and smart switching. Get flat, collated prints with the integrated 50-page output stacking tray. Security protocols like IPSec, 802.1x, SNMPv3, and PIN printing help safeguard your information. Maximize workgroup productivity and enterprise security with the HP DesignJet T1530 Printer. Add print, scan, copy, and share functionality with the HP DesignJet T2530 Multifunction Printer.

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6. Intel® Hyper-Threading - The hyper-threading feature is designed to improve performance of multi-threaded software products; please contact your software provider to determine software compatibility. Not all customers or software applications will benefit from the use of hyperthreading. Go to intel.com/info/hyperthreading for more information, including which processors support HT Technology.
7. Chart compares five different NVIDIA GPU combinations to an Intel Xeon 2.6GHz CPU so users can get an idea of relative performance when rendering with Iray in 3ds Max 2016. Tests run on a workstation with Intel Xeon 2.6 GHz, 32GB RAM, running Win 7 64-bit SPI, using NVIDIA Iray technology in Autodesk 3ds Max and driver version 353.06. Tests were run by NVIDIA.
8. The HP DesignJet T830 Multifunction Printer is the most compact 36-inch device performing large-format print/scan/copy functions and is at least half the size (without the legs) based on H x W x L specifications published as of September 2015.
9. Local printing requires mobile device and printer to be on the same network (usually Wi-Fi access points bridge wireless to wired connections) or have a direct wireless connection. Wireless performance is dependent on physical environment and distance from access point. Wireless operations are compatible with 2.4 GHz operations only. Remote printing requires an Internet connection to an HP web-connected printer. Wireless broadband use requires separately purchased service contract for mobile devices. Check with service provider for coverage and availability in your area. See [www.hp.com/go/designjetmobility](http://www.hp.com/go/designjetmobility) for more details.
10. The HP Print Service Plugin app is available for Android™ mobile devices running Android™ v.4.4 or later. The app is free from Google Play.
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4AA6-4814ENW, April 2016

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