



# ***DIJET CARBIDE TOOLS***

**Indexable Tools A1.1**

**Finishing**

# DIJET CARBIDE TOOLS

## Meeting the Trust of Customers

The industrial world poses various difficult problems toward tooling. Dijet has been meeting the trust of customers with continuous development of new tools and materials using our experience of more than 50 years as a total carbide tool manufacturer.



**Mirror Ball**

A1



**Mirror Radius**

A21



**Finish-One**

A61



**Backdraft**

A55



**Back & Forth**

A65



**Finish Jet Mill**

A69

## HOW TO USE THE CATALOG

Please note that products in this catalog are continuously under study and are improved.

The products therefore may be changed in the future and thus become different from the catalog.

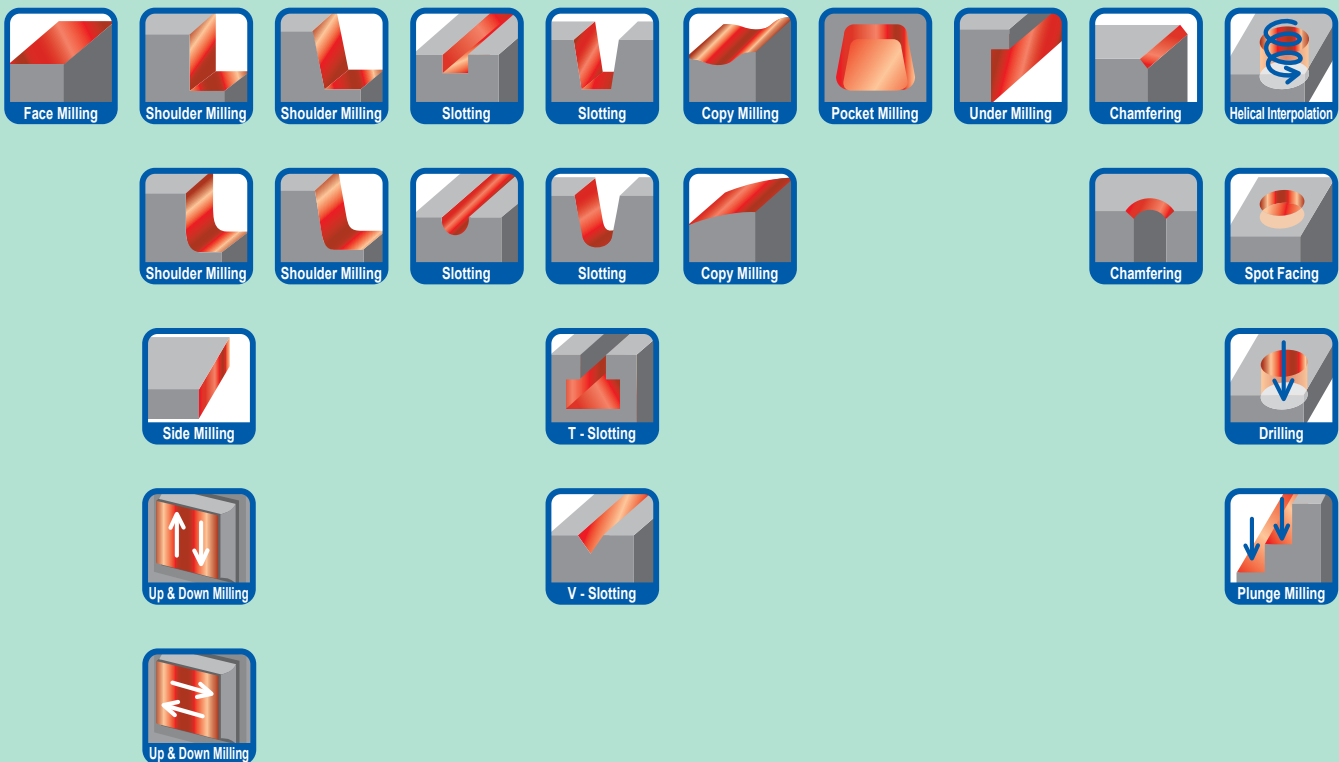
Stock status is mentioned for the products in this catalog. However, please note that the products here may be replaced by the new grades and products in the future.


Regarding stock status:

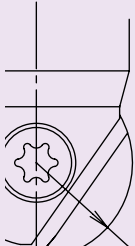
- Stock standard items (NOTE: Some items may be stocked in Japan - delivery approximately 2 weeks.)
- Non stock standard items (Production after order received)

See Technical Catalog for grade information and spare part information.

## CUTTING STYLES











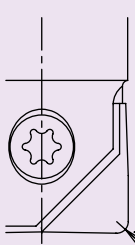
R.125"~R.625"  
R3mm~R16mm

### Mirror Ball - BNM Page

Steel Shank Inch (Ø .250" - Ø 1.25")	A-3
Steel Shank Metric (Ø 6mm - Ø 32mm)	A-5
Carbide Shank Inch (Ø .250" - Ø 1.00")	A-7
Carbide Shank Metric (Ø 6mm - Ø 32mm)	A-9
Modular Head type - Inch (Ø .500" - Ø 1.25")	A-2
Modular Head type - Metric (Ø 10mm - Ø 32mm)	A-2
Modular Head Holders - Inch & Metric	A-77
Inserts	A-11
Running Information	A-17











1° (RNM) (RME)  
3° (HRM/FRM) (HRE/FRE)

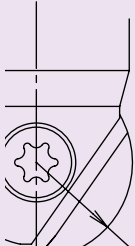
R.015"~R.125"  
R.3mm~R3mm

### Mirror Radius - RNM Page

Steel Shank Inch (Ø .312" - Ø 1.25")	A-23
Steel Shank Metric (Ø 8mm - Ø 32mm)	A-24
Carbide Shank Inch (Ø .312" - Ø 1.25")	A-23
Carbide Shank Metric (Ø 8mm - Ø 32mm)	A-25
Modular Head type - Inch (Ø .500" - Ø 1.25")	A-22
Modular Head type - Metric (Ø 10mm - Ø 32mm)	A-22
Modular Head Holders - Inch & Metric	A-77
Inserts	A-28
Running Information	A-36









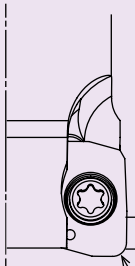
R.250"~R.500"  
R4mm~R15mm

### Econo Ball - EBEM Page

Steel Shank Inch (Ø .500" - Ø 1.00")	A-40
Inserts	A-40
Running Information	A-41








1.9mm


R0.2~0.8mm

### QM Mini for Finishing Page

PME End Mill type - Inch (Ø 1/2")*	A-44
MPM Modular Head type - Inch (Ø 1/2" - Ø 1-1/4")	A-44
MPM Modular Head type - Metric (Ø 10mm - Ø 32mm)	A-44
Inserts	A-45
Running Information	A-46

\*Note: End mill style not G-body



### QM Max for Finishing Page

QXPS End Mill type - Inch ( $\varnothing$ 3/4" - $\varnothing$ 1-1/2")*	A-48
QXP Face Mill type - Inch ( $\varnothing$ 2")	A-49
QXP Face Mill type - Metric ( $\varnothing$ 40mm - $\varnothing$ 66mm)	A-49
MQX Modular Head type - Inch ( $\varnothing$ 3/4" - $\varnothing$ 1-1/4")	A-48
MQX Modular Head type - Metric ( $\varnothing$ 16mm - $\varnothing$ 42mm)	A-48
Inserts	A-50
Running Information	A-51

\*Note: End mill style not G-body

### BackDraft - DBD Page

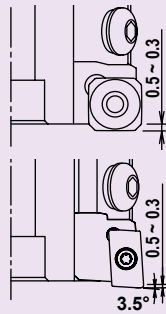
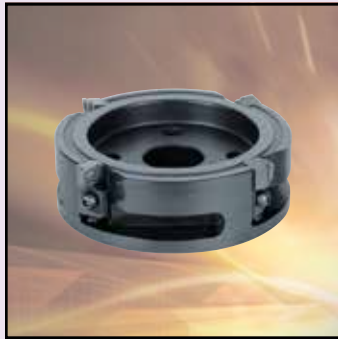
End Mill type - Inch ( $\varnothing$ 1.00" - $\varnothing$ 1.25")	A-56
End Mill type - Metric ( $\varnothing$ 40mm)	A-57
Face Mill & End Cap type - Inch ( $\varnothing$ 2.00" - $\varnothing$ 2.50")	A-56
Face Mill type - Metric ( $\varnothing$ 50mm - $\varnothing$ 80mm)	A-57
Modular Head Type - Inch ( $\varnothing$ 1.00")	A-56
Modular Head type - Metric ( $\varnothing$ 20mm - $\varnothing$ 40mm)	A-57
Modular Head Holders - Inch & Metric	A-77
Inserts	A-58
Running Information	A-59

### Finish-One - T-FON Page

End Mill type - Metric ( $\varnothing$ 16mm - $\varnothing$ 20mm)	A-62
Modular Head type - Metric ( $\varnothing$ 10mm - $\varnothing$ 21mm)	A-62
Inserts	A-63
Running Information	A-63

### Back & Forth Cutters - PFC, MPF Page

Modular type - Metric ( $\varnothing$ 30mm - $\varnothing$ 40mm)	A-66
Face Mill type - Metric ( $\varnothing$ 50mm - $\varnothing$ 80mm)	A-66
Inserts	A-66
Running Information	A-68



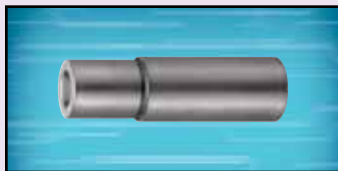
### Finish Jet Mill - FJM, FJM-DB Page

FJM Face Mill type - Metric (Ø 80mm - Ø 250mm) . . . .	A-70
FJM-BD Face Mill type - Metric (Ø 80mm - Ø 250mm) . .	A-74
FJM Inserts . . . . .	A-72
FJM-BD Inserts . . . . .	A-75
FJM Running Information . . . . .	A-73
FJM-DB Running Information . . . . .	A-76



### Carbide Shank Holder - MSN Page

Inch - relieved . . . . .	A-77
Metric - relieved and tapered . . . . .	A-78
Metric - straight . . . . .	A-80



### G-Body Steel Shank Holder - MGN Page

Inch . . . . .	A-81
Metric . . . . .	A-81





# Mirror Ball

## High Precision Indexable Ball Nose End Mill

### High Precision:

Insert radius form accuracy is below  $\pm .0004$ " when fixed to the holder (accuracy below  $\pm .00024$ " on insert alone), increasing the possibility of equal or higher precision machining when comparing solid ball nose end mill machining.

### Cost Performance:

Finishing with Mirror Ball can replace the conventional solid carbide ball nose end mill. By adopting economical indexable insert, tool costs of finishing process can be reduced greatly.

#### • Styles of Inserts

- The Mirror Ball (neutral geometry) leaves a mirror finish.
- The Mirror-S (helical geometry) great for high temp alloys and stainless steels.
- The Mirror-TG (negative helix) finishes materials up to 60 HRC with a strong edge.
- The new Mirror-SSR has full radius geometry for machining more than 180 degrees.

#### • Precision clamp screw mounting

The ground screw precisely locates insert in body, giving high accuracy and repeatability from insert to insert.

#### • DH coating

The new DH coating designed to perform in high hard materials due to its ultra-micro grain substrate of carbide, allowing higher surface footage due to its higher resistance of oxidation and wear.

#### • GRM insert

- New bull nose insert with large radius.
- Bigger step over when finishing wide concave applications.
- Leaves smoother surface finish than a standard ball nose cutting on the tip.

#### • Carbide shank

Using the carbide shank or carbide holder with modular head achieves maximum tool life and highest precision machining for finishing operation in high speed cutting.





Copy Milling



Pocket Milling



Slotting

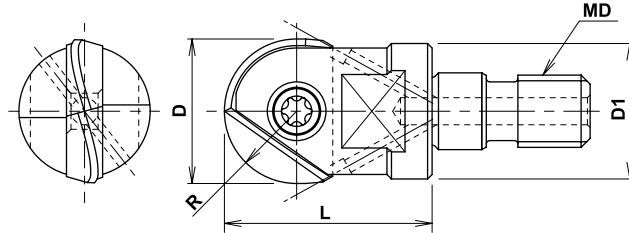
# Mirror Ball

INCH

METRIC

## MODULAR HEAD

MBX Type - Coolant Thru



### Specifications

CATALOG NUMBER	STK	DIMENSIONS					HEAD TORQUE		INSERT		PARTS	
		D	R	L	D1	MD	lbs/ft	Nm	Inch	Metric	Screw	Wrench
MBX-100-M6	•	10mm	5mm	18mm	9.7mm	M6	5.90	8	-	BNM-100 BNM-110	FSW-3007H	T-08
MBX-120-M6	•	.500"/12mm	.250"	.787"	.452"	M6	5.90	8	BME-0500	BNM-120	FSW-3509H	T-10
MBX-160-M8	•	.625"/16mm	.312"	.903"	.591"	M8	11.8	16	BME-0625	BNM-160	FSW-4013H	T-15
MBX-200-M10	•	.750"/20mm	.375"	1.16"	.728"	M10	11.8	16	BME-0750	BNM-200	FSW-5016H	A-20W
MBX-250-M12	•	1.0"/25mm	.500"	1.38"	.945"	M12	14.7	20	BME-1000	BNM-250	FSW-6020	T-30
MBX-300-M16	•	1.25"/30mm or 32mm	.625"	1.69"	1.14"	M16	18.4	25	BME-1250	BNM-300 BNM-320	FSW-8025	A-40

See page A-77 for Modular Head Shanks

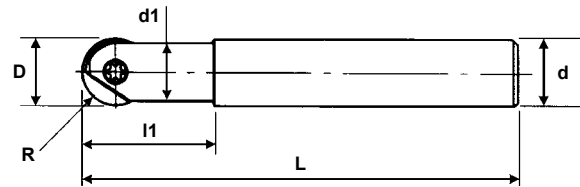
Note: All cutters are supplied without inserts or wrenches.



**INCH**

# Mirror Ball

## STEEL SHANK

**BNM Type - Straight Style**

### Specifications

CATALOG NUMBER	STK	DIMENSIONS							INSERT INCH (METRIC)	PARTS	
		D	R	L	d1	l1	d	$\alpha$		Screw	Wrench
BNMS-120026S-S050	•	.500	.250	3.26	.393	1.02	.500	-	BME-0500 (BNM-120)	FSW-3509H	T-10
BNMM-120032S-S050	•	.500	.250	5.13	.393	1.26	.500	-			
BNMM-120053S-S050	•	.500	.250	4.33	.393	2.08	.500	-			
BNML-120046S-S050	•	.500	.250	5.88	.393	1.81	.500	-			
BNMS-160032S-S062	•	.625	.312	3.62	.551	1.26	.625	-	BME-0625 (BNM-160)	FSW-4013H	T-15
BNMM-160063S-S062	•	.625	.312	4.84	.551	2.48	.625	-			
BNMS-200038S-S075	•	.750	.375	4.09	.669	1.49	.750	-	BME-0750 (BNM-200)	FSW-5016H	A-20
BNMM-200044S-S075	•	.750	.375	6.28	.669	1.73	.750	-			
BNMM-200075S-S075	•	.750	.375	5.55	.669	2.95	.750	-			
BNML-200060S-S075	•	.750	.375	6.88	.669	2.36	.750	-			
BNMS-250045S-S100	•	1.00	.500	4.76	.826	1.77	1.00	-	BME-1000 (BNM-250)	FSW-6020	T-30
BNMM-250070S-S100	•	1.00	.500	7.50	.826	2.76	1.00	-			
BNMM-250090S-S100	•	1.00	.500	6.53	.826	3.54	1.00	-			
BNML-250080S-S100	•	1.00	.500	9.06	.826	3.15	1.00	-			
BNMS-300053S-S125	•	1.25	.625	5.23	1.02	2.08	1.25	-	BME-1250 (BNM-300 or BNM-320)	FSW-8025	A-40
BNMM-300106S-S125	•	1.25	.625	7.32	1.02	4.17	1.25	-			

**Note: All cutters are supplied without inserts or wrenches.**

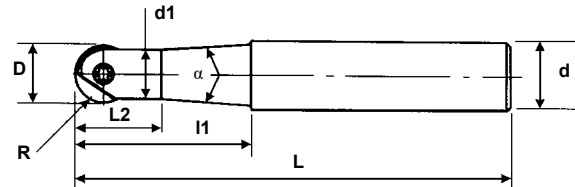


# Mirror Ball

**INCH**

## STEEL SHANK

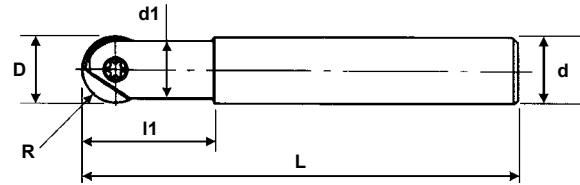
### BNM Type - Taper Style



### Specifications

CATALOG NUMBER	STK	DIMENSIONS								INSERT INCH (METRIC)	PARTS	
		D	R	L	d1	l1	L2	d	$\alpha$		Screw	Wrench
BNMS-060035T-S037	•	.250	.125	3.62	.212	1.37	.590	.375	12°	BME-0250 (BNM-060) (BNM-070)	FSW-2005H	T-06
BNMS-080035T-S050	•	.312	.156	3.62	.283	1.37	.728	.500	21°17'	BME-0312 (BNM-080)	FSW-2506H	T-07
BNMM-080053T-S050	•	.312	.156	4.33	.283	2.08	.728	.500	8°			
BNML-080075T-S050	•	.312	.156	5.19	.283	2.95	.728	.500	3°40'			
BNMS-100035T-S050	•	.375	.187	3.62	.355	1.37	.827	.500	19°3'	BME-0375 (BNM-100) (BNM-110)	FSW-3007H	T-08
BNMM-100053T-S050	•	.375	.187	4.33	.355	2.08	.827	.500	7°			
BNML-100075T-S050	•	.375	.187	5.19	.355	2.95	.827	.500	3°40'			
BNMM-120053T-S050	•	.500	.250	4.33	.393	2.08	.866	.500	3°	BME-0500 (BNM-120)	FSW-3509H	T-10
BNML-120085T-S062	•	.500	.250	5.70	.393	3.34	.866	.625	3°			
BNMM-160063T-S062	•	.625	.312	4.84	.551	2.48	1.10	.625	2°48'	BME-0625 (BNM-160)	FSW-4013H	T-15
BNML-160100T-S075	•	.625	.312	6.53	.551	3.93	1.10	.750	3°			
BNMM-200075T-S075	•	.750	.375	5.55	.669	2.95	1.34	.750	2°	BME-0750 (BNM-200)	FSW-5016H	A-20
BNML-200115T-S100	•	.750	.375	7.51	.669	4.52	1.34	1.00	4°			
BNMM-250090T-S100	•	1.00	.500	6.53	.826	3.54	1.61	1.00	4°40'	BME-1000 (BNM-250)	FSW-6020	T-30
BNML-250135T-S125	•	1.00	.500	8.46	.826	5.31	1.61	1.25	3°			
BNMM-300106T-S125	•	1.25	.625	7.32	1.02	4.17	1.93	1.25	5°30'	BME-1250 (BNM-300) (BNM-320)	FSW-8025	A-40
BNML-300160T-S125	•	1.25	.625	9.44	1.02	6.29	1.93	1.25	2°20'			

Note: All cutters are supplied without inserts or wrenches.

**METRIC****Mirror Ball****STEEL SHANK****BNM Type - Straight Style****Specifications**

CATALOG NUMBER	STK	DIMENSIONS								INSERT METRIC (INCH)	PARTS	
		D	R	L	d1	l1	L2	d	a		Screw	Wrench
BNMS-120026S-S12	•	12	6	83	10	26	-	12	-	BNM-120 (BME-0500)	FSW-3509H	T-10
BNMM-120053S-S12	•	12	6	110	10	53	-	12	-			
BNMS-160032S-S16	•	16	8	92	14	32	-	16	-	BNM-160 (BME-0625)	FSW-4013H	T-15
BNMM-160063S-S16	•	16	8	123	14	63	-	16	-			
BNMS-200038S-S20	•	20	10	104	17	38	-	20	-	BNM-200 (BME-0750)	FSW-5016H	A-20
BNMM-200075S-S20	•	20	10	141	17	75	-	20	-			
BNMS-250045S-S25	•	25	12.5	121	21	45	-	25	-	BNM-250 (BME-1000)	FSW-6020	T-30
BNMM-250090S-S25	•	25	12.5	166	21	90	-	25	-			
BNMS-300053S-S32	•	30	15	133	26	53	-	32	-	BNM-300 or BNM-320 (BME-1250)	FSW-8025	A-40
BNMM-300106S-S32	•	30	15	186	26	106	-	32	-			

**Note: All cutters are supplied without inserts or wrenches.**

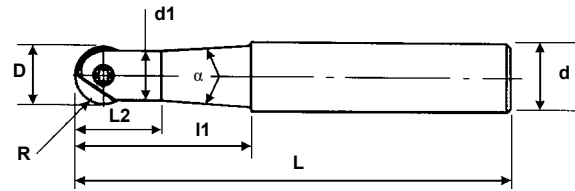


# Mirror Ball

**METRIC**

## STEEL SHANK

### BNM Type - Taper Style



## Specifications

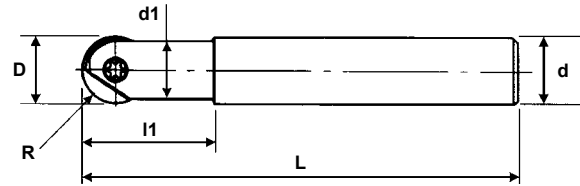
CATALOG NUMBER	STK	DIMENSIONS								INSERT METRIC (INCH)	PARTS	
		D	R	L	d1	L1	L2	d	$\alpha$		Screw	Wrench
BNMS-060030T-S10	•	6	3	80	5.4	30	15	10	8°15'	BNM-060 BNM-070 (BME-0250)	FSW-2005H	T-06
BNMS-080035T-S12	•	8	4	92	7.2	35	19	12	7°45'	BNM-080 (BME-0312)	FSW-2506H	T-07
BNMM-080053T-S12	•	8	4	110	7.2	53	19	12	3°30'			
BNML-080075T-S12	•	8	4	132	7.2	75	19	12	1°30'			
BNMS-100035T-S12	•	10	5	92	9	35	21	12	5°45'	BNM-100 BNM-110 (BME-0375)	FSW-3007H	T-08
BNMM-100053T-S12	•	10	5	110	9	53	21	12	2°30'			
BNML-100075T-S12	•	10	5	132	9	75	21	12	1°			
BNMM-120053T-S12	•	12	6	110	10	53	22	12	1°30'	BNM-120 (BME-0500)	FSW-3509H	T-10
BNML-120085T-S16	•	12	6	145	10	85	22	16	1°30'			
BNMM-160063T-S16	•	16	8	123	14	63	28	16	1°30'	BNM-160 (BME-0625)	FSW-4013H	T-15
BNML-160100T-S20	•	16	8	166	14	100	28	20	1°30'			
BNM-200050T-S25LS	•	20	10	170	17	50	34	25	12°	BNM-200 (BME-0750)	FSW-5016H	A-20
BNMM-200075T-S20	•	20	10	141	17	75	34	20	2°			
BNML-200115T-S25	•	20	10	191	17	115	34	25	1°50'			
BNM-250060T-S32LS	•	25	12.5	200	21	60	41	32	14°	BNM-250 (BME-1000)	FSW-6020	T-30
BNMM-250090T-S25	•	25	12.5	166	21	90	41	25	2°20'			
BNML-250135T-S32	•	25	12.5	215	21	135	41	32	1°30'			
BNM-300080T-S32LS	•	30	15	220	26	80	49	32	4°	BNM-300 or BNM-320 (BME-1250)	FSW-8025	A-40
BNMM-300106T-S32	•	30	15	186	26	106	49	32	3°			
BNML-300160T-S32	•	30	15	240	26	160	49	32	1°10'			

Note: All cutters are supplied without inserts or wrenches.

**INCH**

# Mirror Ball

## CARBIDE SHANK

**BNM-C Type - Straight Style**

### Specifications

CATALOG NUMBER	STK	DIMENSIONS							INSERT INCH (METRIC)	PARTS	
		D	R	L	d1	l1	d	$\alpha$		Screw	Wrench
BNMS-060016S-S025C	•	.250	.125	3.00	.212	.625	.250	-	BME-0250 (BNM-060) (BNM-070)	FSW-2005H	T-06
BNMS-060038S-S025C	•	.250	.125	3.75	.212	1.50	.250	-			
BNMM-060050S-S025C	•	.250	.125	4.25	.212	2.00	.250	-			
BNML-060076S-S025C	•	.250	.125	5.25	.212	3.00	.250	-			
BNMS-080038S-S031C	•	.312	.156	3.75	.283	1.50	.312	-	BME-0312 (BNM-080)	FSW-2506H	T-07
BNMM-080057S-S031C	•	.312	.156	4.50	.283	2.25	.312	-			
BNML-080089S-S031C	•	.312	.156	5.75	.283	3.50	.312	-			
BNMS-100038S-S037C	•	.375	.187	3.75	.354	1.50	.375	-	BME-0375 (BNM-100) (BNM-110)	FSW-3007H	T-08
BNMM-100057S-S037C	•	.375	.187	4.50	.354	2.25	.375	-			
BNML-100089S-S037C	•	.375	.187	5.75	.354	3.50	.375	-			
BNMS-120029S-S050C	•	.500	.250	3.38	.393	1.14	.500	-	BME-0500 (BNM-120)	FSW-3509H	T-10
BNMM-120063S-S050C	•	.500	.250	4.75	.393	2.50	.500	-			
BNML-120101S-S050C	•	.500	.250	6.35	.393	4.00	.500	-			
BNMS-160034S-S062C	•	.625	.312	3.70	.551	1.33	.625	-	BME-0625 (BNM-160)	FSW-4013H	T-15
BNMM-160063S-S062C	•	.625	.312	4.84	.551	2.48	.625	-			
BNML-160114S-S062C	•	.625	.312	7.10	.551	4.50	.625	-			
BNMS-200038S-S075C	•	.750	.375	4.09	.669	1.49	.750	-	BME-0750 (BNM-200)	FSW-5016H	A-20
BNMM-200075S-S075C	•	.750	.375	5.55	.669	2.95	.750	-			
BNML-200127S-S075C	•	.750	.375	8.00	.669	5.00	.750	-			
BNMM-250090S-100C	•	1.00	.500	6.53	.826	3.54	1.00	-	BME-1000 (BNM-250)	FSW-6020	T-30
BNMM-250114S-S100C	•	1.00	.500	7.50	.826	4.50	1.00	-			
BNML-250152S-S100C	•	1.00	.500	10.00	.826	6.00	1.00	-			

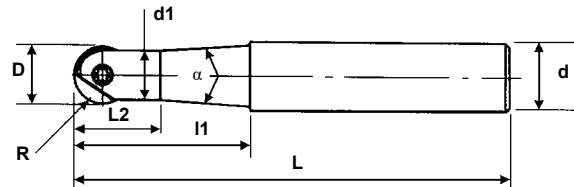
**Note: All cutters are supplied without inserts or wrenches.**



# Mirror Ball

**INCH**

## CARBIDE SHANK BNM-C Type - Taper Style



### Specifications

CATALOG NUMBER	STK	DIMENSIONS								INSERT INCH (METRIC)	PARTS	
		D	R	L	d1	L1	L2	d	$\alpha$		Screw	Wrench
BNMS-060032T-S037C	•	.250	.125	3.50	.212	1.26	.492	.375	10°	BME-0250 (BNM-060) (BNM-070)	FSW-2005H	T-06
BNMM-060050T-S037C	•	.250	.125	4.21	.212	1.96	.492	.375	5°			
BNML-060072T-S037C	•	.250	.125	5.07	.212	2.83	.88	.375	3°			
BNMS-080035T-S050C	•	.312	.156	3.62	.283	1.37	.787	.500	10°	BME-0312 (BNM-080)	FSW-2506H	T-07
BNMM-080053T-S050C	•	.312	.156	4.33	.283	2.08	.787	.500	8°			
BNML-080075T-S050C	•	.312	.156	5.19	.283	2.95	.787	.500	5°			
BNMS-100035T-S050C	•	.375	.187	3.62	.355	1.37	.886	.500	10°	BME-0375 (BNM-100) (BNM-110)	FSW-3007H	T-08
BNMM-100053T-S050C	•	.375	.187	4.33	.355	2.08	.886	.500	6°			
BNML-100075T-S050C	•	.375	.187	5.19	.355	2.95	.886	.500	3°			
BNMM-120053T-S050C	•	.500	.250	4.33	.393	2.08	1.02	.500	3°	BME-0500 (BNM-120)	FSW-3509H	T-10
BNML-120085T-S062C	•	.500	.250	5.70	.393	3.34	1.02	.625	4°			
BNML-160100T-S075C	•	.625	.312	6.53	.551	3.93	1.22	.750	2°	BME-0625 (BNM-160)	FSW-4013H	T-15
BNML-200115T-S100C	•	.750	.375	7.52	.669	4.52	1.41	1.00	5°	BME-0750 (BNM-200)	FSW-5016H	A-20

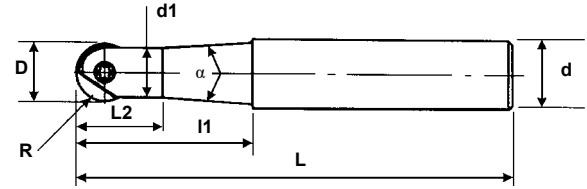
Note: All cutters are supplied without inserts or wrenches.

**METRIC**

# Mirror Ball

## CARBIDE SHANK

### BNM-C Type - Taper Style



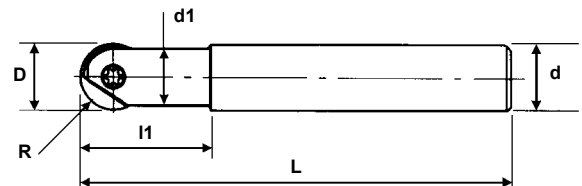
### Specifications

CATALOG NUMBER	STK	DIMENSIONS								INSERT METRIC (INCH)	PARTS	
		D	R	L	d1	L1	L2	d	$\alpha$		Screw	Wrench
BNMS-060030T-S10C	•	6	3	80	5.4	30	15	10	6°	BNM-060 BNM-070 (BME-0250)	FSW-2005H	T-06
BNML-080075T-S12C	•	8	4	132	7.2	75	20	12	2°	BNM-080 (BME-0312)	FSW-2506H	T-07
BNML-100075T-S12C	•	10	5	132	9	75	23	12	1°30'	BNM-100 BNM-110 (BME-0375)	FSW-3007H	T-08
BNML-120085T-S16C	•	12	6	145	10	85	27	16	2°30'	BNM-120 (BME-0500)	FSW-3509H	T-10
BNMM-160063T-S20C	•	16	8	123	14	63	30.5	20	4°	BNM-160 (BME-0625)	FSW-4013H	T-15
BNML-160100T-S20C	•	16	8	166	14	100	30.5	20	1°15'	BNM-160 (BME-0625)	FSW-4013H	T-15
BNML-200115T-S25C	•	20	10	191	17	115	36	25	2°	BNM-200 (BME-0750)	FSW-5016H	A-20
BNML-300160T-S32C	•	30	15	240	26	160	48	32	1°	BNM-300 or BNM-320 (BME-1250)	FSW-8025	A-40

Note: All cutters are supplied without inserts or wrenches.

## CARBIDE SHANK

### BNM-C Type - Straight Style



### Specifications

CATALOG NUMBER	STK	DIMENSIONS								INSERT METRIC (INCH)	PARTS	
		D	R	L	d1	L1	L2	d	$\alpha$		Screw	Wrench
BNMS-060017S-S06C	•	6	3	60	5.4	17	-	6	-	BNM-060 BNM-070 (BME-0250)	FSW-2005H	T-06
BNMM-060035S-S06C	•	6	3	92	5.4	35	-	6	-			
BNML-060017S-S06C	•	6	3	120	5.4	17	-	6	-			
BNMS-080025S-S08C	•	8	4	90	7.2	25	-	8	-	BNM-080 (BME-0312)	FSW-2506H	T-07
BNMM-080035S-S08C	•	8	4	92	7.2	35	-	8	-			
BNML-080075S-S08C	•	8	4	140	7.2	75	-	8	-			
BNML-080095S-S08C	•	8	4	160	7.2	95	-	8	-	BNM-100 BNM-110 (BME-0375)	FSW-3007H	T-08
BNMS-100030S-S10C	•	10	5	100	9	30	-	10	-			
BNMM-100043S-S10C	•	10	5	100	9	43	-	10	-			
BNML-100075S-S10C	•	10	5	140	9	75	-	10	-			
BNML-100080S-S10C	•	10	5	220	9	80	-	10	-			
BNML-100095S-S10C	•	10	5	160	9	95	-	10	-			
BNML-100140S-S10C	•	10	5	220	9	140	-	10	-			

Note: All cutters are supplied without inserts or wrenches.



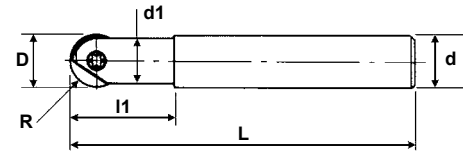
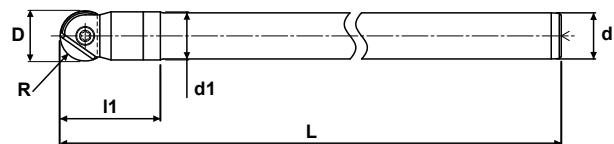


# Mirror Ball

**METRIC**

## CARBIDE SHANK

### BNM-C Type - Straight Style


**Fig. 1**

**Fig. 2**


### Specifications

CATALOG NUMBER	STK	DIMENSIONS						FIG.	INSERT METRIC (INCH)	PARTS	
		D	R	L	d1	l1	d			Screw	Wrench
BNMS-120028S-S12C	•	12	6	83	11	28	12	1	BNM-120 (BME-0500)	FSW-3509H	T-10
BNMM-120053S-S12C	•	12	6	110	11	53	12	1			
BNML-120095S-S12C	•	12	6	160	11	95	12	1			
BNML-120100S-S12C	•	12	6	220	11	100	12	1			
BNML-120130S-S12C	•	12	6	200	11	130	12	1			
BNML-120150S-S12C	•	12	6	220	11	150	12	1	BNM-160 (BME-0625)	FSW-4013H	T-15
BNMS-160033S-S16C	•	16	8	92	15	33	16	1			
BNML-160070S-S16C	•	16	8	140	15	70	16	1			
BNML-160090S-S16C	•	16	8	160	15	90	16	1			
BNML-160100S-S16C	•	16	8	220	15	100	16	1			
BNML-160110S-S16C	•	16	8	180	15	110	16	1	BNM-200 (BME-0750)	FSW-5016H	A-20
BNML-160150S-S16C	•	16	8	220	15	150	16	1			
BNMU-160220-S15C	•	16	8	220	15	-	15	2			
BNMS-200039S-S20C	•	20	10	104	19	39	20	1			
BNMM-200075S-S20C	•	20	10	141	19	75	20	1			
BNML-200100S-S20C	•	20	10	220	19	100	20	1	BNM-250 (BME-1000)	FSW-6020	T-30
BNML-200105S-S20C	•	20	10	180	19	105	20	1			
BNML-200125S-S20C	•	20	10	200	19	125	20	1			
BNML-200170S-S20C	•	20	10	250	19	170	20	1			
BNML-200220S-S20C	•	20	10	300	19	220	20	1			
BNMU-200270-S18C	•	20	10	270	19	40	18	2	BNM-300 or BNM-320 (BME-1250)	FSW-8025	A-40
BNMM-250090S-S25C	•	25	12.5	166	24	90	25	1			
BNML-250100S-S25C	•	25	12.5	220	24	100	25	1			
BNML-250140S-S25C	•	25	12.5	220	24	140	25	1			
BNML-250170S-S25C	•	25	12.5	250	24	170	25	1			
BNMM-300120S-S32C	•	30	15	200	29	120	32	1	BNM-300 or BNM-320 (BME-1250)	FSW-8025	A-40
BNML-300100S-S32C	•	30	15	220	29	100	32	1			
BNML-300140S-S32C	•	30	15	220	29	140	32	1			
BNML-300170S-S32C	•	30	15	250	29	170	32	1			
BNML-300220S-S32C	•	30	15	300	29	220	32	1			

Note: All cutters are supplied without inserts or wrenches.



## Mirror Ball Insert Recommendation

Material	Mirror (neutral)	Mirror S	Mirror SS (SSR)	Mirror TG	Mirror TS
	Neutral Geometry Semi-Finish Finish	Helical Geometry Semi-Finish Finish	Helical Geometry Semi-Finish Finish	Helical Geometry Hard Milling Flat Finishing	Helical Geometry Hard Milling Semi-Finish Contour Finishing
	DH103 JC5015 (metric)	JC8008 FZ05/FZ08	DH108	DH102	DH202
Gray Cast Iron (200-250 HB)	DH103	JC8008	DH108	DH102	DH202
Nodular Cast Iron (180-250 HB)	DH103	JC8008	DH108	DH102	DH202
Carbon Steel	JC5015	JC8008	DH108	*	*
Low Alloy Steel	JC5015	JC8008	DH108	*	*
Mold Steel (30-40 HRC)	DH103	JC8008	DH108	DH102	DH202
Tool & Die Steel (40-50 HRC)	DH103	JC8008	DH108	DH102	DH202
Hardened Die Steel (50-60 HRC)	DH103	*	DH108	DH102	DH202
Stainless Steel (45 HRC)	JC5015	JC8008	DH108	*	*
Titanium	JC5015	JC8008	DH108	*	*
Copper Alloys	JC5015	JC8008	DH108	*	*
Aluminum	*	FZ05/FZ08	*	*	*

First Choice
Second Choice
Third Choice



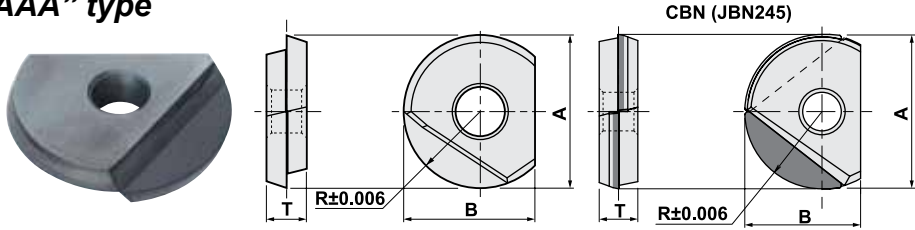
# Mirror Ball

**INCH**

**METRIC**

## MIRROR BALL INSERTS

Mirror "A" & "AAA" type



### Specifications - (radius tolerance +/- .006mm)

CATALOG NUMBER	DIMENSIONS					RECOMMENDED TORQUE (lbs x ft)		STOCK					
								COATED		DIAMOND COATING	UNCOATED	CBN	
	A	R	B	C	T	lbs/ft	Nm	DH103	JC5015	JC10000	KT9	JBN245	
INCH SIZES	BME-0250A	.250	.125	.196	-	.078	.37	.5	•				
	BME-0312A	.312	.156	.275	-	.094	.66	.9	•				
	BME-0375A	.375	.187	.326	-	.102	.89	1.2	•				
	BME-0500A	.500	.250	.409	-	.118	1.48	2.0	•				
	BME-0625A	.625	.312	.472	-	.157	2.21	3.0	•				
	BME-0750A	.750	.375	.570	-	.196	2.95	4.0	•				
	BME-1000A	1.00	.500	.736	-	.236	3.69	5.0	•				
	BME-1250A	1.25	.625	.925	-	.275	4.43	6.0	•				
METRIC SIZES	BNM-060	6	3	5	-	2	.37	.5	•	•	•	•	
	BNM-070	7	3.5	5.5	-	2	.37	.5		•	•		
	BNM-080	8	4	7	-	2.4	.66	.9	•	•	•	•	
	BNM-100	10	5	8.5	-	2.6	.89	1.2	•	•	•	•	
	BNM-110	11	5.5	9	-	2.6	.89	1.2			•		
	BNM-120	12	6	10	-	3	1.48	2.0	•	•	•	•	
	BNM-160	16	8	12	-	4	2.21	3.0	•	•	•	•	•
	BNM-200	20	10	15	1	5	2.95	4.0	•	•	•	•	•
	BNM-250	25	12.5	18.5	1	6	3.69	5.0	•	•		•	•
	BNM-300	30	15	22.5	1	7	4.43	6.0	•	•		•	•
BNM-320	32	16	23.5	-	7	4.43	6.0	•	•		•		

### Specifications - (radius tolerance +/- .002mm)

CATALOG NUMBER	DIMENSIONS					RECOMMENDED TORQUE (lbs x ft)		STOCK					
								COATED					
	A	R	B	C	T	lbs/ft	Nm	JC5015					
METRIC SIZES	BNM-060-AAA	6	3	5	-	2	.37	.5	•				
	BNM-080-AAA	8	4	7	-	2.4	.66	.9	•				
	BNM-100-AAA	10	5	8.5	-	2.6	.89	1.2	•				
	BNM-120-AAA	12	6	10	-	3	1.48	2.0	•				
	BNM-160-AAA	16	8	12	-	4	2.21	3.0	•				
	BNM-200-AAA	20	10	15	-	5	2.95	4.0	•				
	BNM-250-AAA	25	12.5	18.5	-	6	3.69	5.0	•				
	BNM-300-AAA	30	15	22.5	-	7	4.43	6.0	•				
	BNM-320-AAA	32	16	23.5	-	7	4.43	6.0	•				



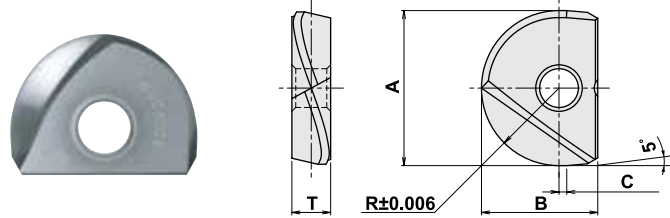
**INCH**

**METRIC**

# Mirror Ball

## MIRROR BALL INSERTS

Mirror "S" & "SS" type



### Specifications - (radius tolerance +/- .006mm)

CATALOG NUMBER	DIMENSIONS					RECOMMENDED TORQUE (lbs x ft)		STOCK			
	A	R	B	C	T	lbs/ft	Nm	COATED	DLC	UNCOATED	
								JC8008	JC20003	FZ05/FZ08	
<b>INCH SIZES</b>	BME-0250-S	.250	.125	.196	-	.078	.37	.5	•		•
	BME-0312-S	.312	.156	.275	.020	.094	.66	.9	•		
	BME-0375-S	.375	.187	.326	.039	.102	.89	1.2	•		•
	BME-0500-S	.500	.250	.409	.039	.118	1.48	2.0	•		•
	BME-0625-S	.625	.312	.472	.039	.157	2.21	3.0	•		•
	BME-0750-S	.750	.375	.570	.039	.196	2.95	4.0	•		•
	BME-1000-S	1.00	.500	.736	.039	.236	3.69	5.0	•		•
	BME-1250-S	1.25	.625	.925	.039	.275	4.43	6.0	•		
<b>METRIC SIZES</b>	BNM-060-S	6	3	5	-	2	.37	.5	•	•	•
	BNM-080-S	8	4	7	0.5	2.4	.66	.9	•	•	•
	BNM-100-S	10	5	8.5	1	2.6	.89	1.2	•	•	•
	BNM-120-S	12	6	10	1	3	1.48	2.0	•	•	•
	BNM-160-S	16	8	12	1	4	2.21	3.0		•	•
	BNM-200-S	20	10	15	1	5	2.95	4.0		•	•
	BNM-250-S	25	12.5	18.5	1	6	3.69	5.0		•	•
	BNM-300-S	30	15	22.5	1	7	4.43	6.0		•	•
	BNM-320-S	32	16	23.5	1	7	4.43	6.0	•		

Fig. 1

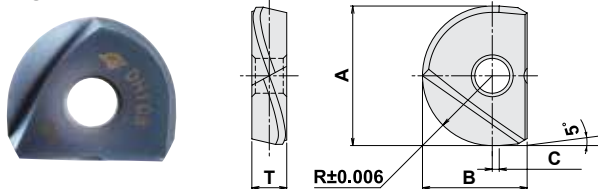
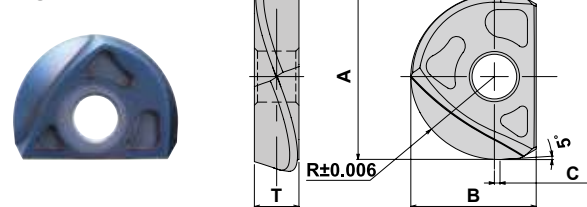


Fig. 2



### Specifications - (radius tolerance +/- .006mm)

CATALOG NUMBER	DIMENSIONS					RECOMMENDED TORQUE (lbs x ft)		FIG.	STOCK		
	A	R	B	C	T	lbs/ft	Nm		COATED		
									DH108		
<b>METRIC SIZES</b>	BNM-060-SS	6	3	5	-	2	.37	.5	1	•	
	BNM-080-SS	8	4	7	0.5	2.4	.66	.9	1	•	
	BNM-100-SS	10	5	8.5	1	2.6	.89	1.2	1	•	
	BNM-120-SS	12	6	10	1	3	1.48	2.0	1	•	
	BNM-160-SS	16	8	12	1	4	2.21	3.0	1	•	
	BNM-200-SS	20	10	15	1	5	2.95	4.0	2	•	
	BNM-250-SS	25	12.5	18.5	1	6	3.69	5.0	2	•	
	BNM-300-SS	30	15	22.5	1	7	4.43	6.0	2	•	



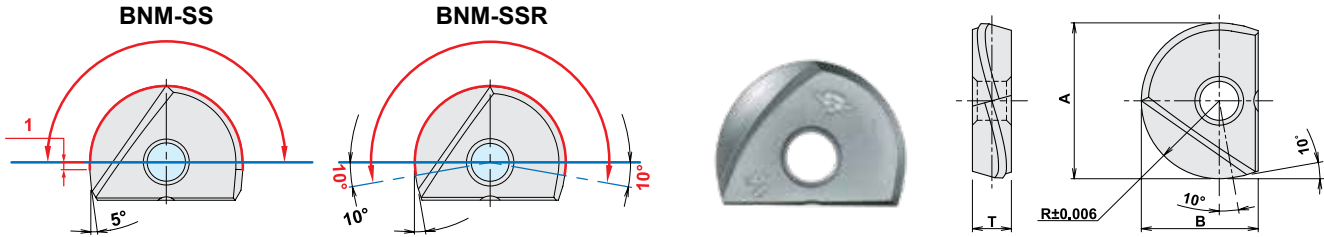
# Mirror Ball

**INCH**

**METRIC**

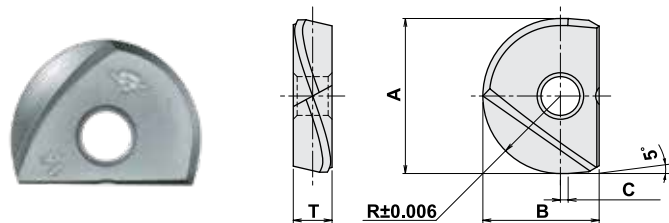
## MIRROR BALL INSERTS

Mirror "SSR" & "TG" type



Specifications - (radius tolerance +/- .006mm)

CATALOG NUMBER	DIMENSIONS					RECOMMENDED TORQUE (lbs x ft)		STOCK		
	A	R	B	C	T	lbs/ft	Nm	DH108	COATED	
METRIC SIZES	BNM-080-SSR	8	4	7	-	2.4	.66	.9	•	
	BNM-100-SSR	10	5	8.5	-	2.6	.89	1.2	•	
	BNM-120-SSR	12	6	10	-	3	1.48	2.0	•	
	BNM-160-SSR	16	8	12	-	4	2.21	3.0	•	
	BNM-200-SSR	20	10	15	-	5	2.95	4.0	•	
	BNM-250-SSR	25	12.5	18.5	-	6	3.69	5.0	•	
BNM-300-SSR	30	15	22.5	-	7	4.43	6.0	•		



Specifications - (radius tolerance +/- .006mm)

CATALOG NUMBER	DIMENSIONS					RECOMMENDED TORQUE (lbs x ft)		STOCK		
	A	R	B	C	T	lbs/ft	Nm	COATED	DH102	
INCH SIZES	BME-0375-TG	.375	.187	.326	.039	.102	.89	1.2	•	
	BME-0500-TG	.500	.250	.409	.039	.118	1.48	2.0	•	
	BME-0750-TG	.750	.375	.570	.039	.196	2.95	4.0	•	
	BME-1000-TG	1.00	.500	.736	.039	.236	3.69	5.0	•	
METRIC SIZES	BNM-060-TG	6	3	5	-	2	.37	.5	•	
	BNM-080-TG	8	4	7	0.5	2.4	.66	.9	•	
	BNM-100-TG	10	5	8.5	1	2.6	.89	1.2	•	
	BNM-120-TG	12	6	10	1.5	3	1.48	2.0	•	
	BNM-160-TG	16	8	12	1.5	4	2.21	3.0	•	
	BNM-200-TG	20	10	15	2	5	2.95	4.0	•	
	BNM-250-TG	25	12.5	18.5	2	6	3.69	5.0	•	
	BNM-300-TG	30	15	22.5	2	7	4.43	6.0	•	
BNM-320-TG	32	16	23.5	2	7	4.43	6.0	•		

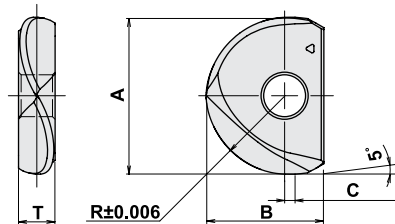
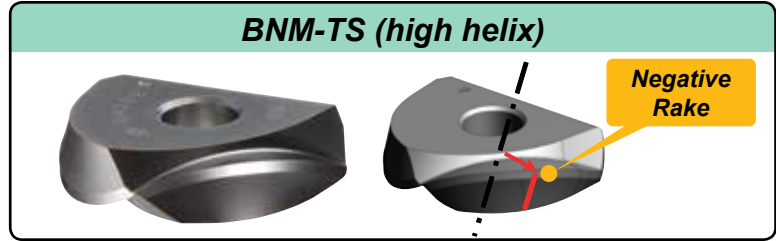
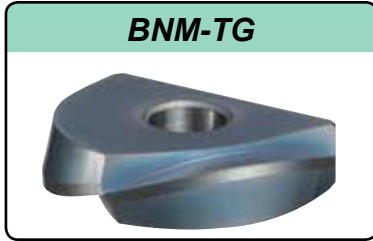


**METRIC**

# Mirror Ball

## MIRROR BALL INSERTS

Mirror "TS" & "GRM" type

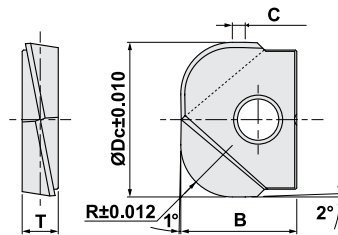
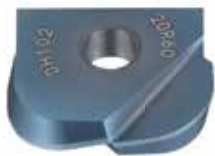


### Specifications - (radius tolerance +/- .006mm)

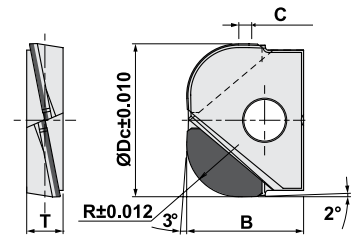
CATALOG NUMBER	DIMENSIONS					RECOMMENDED TORQUE (lbs x ft)		COATED
	A	R	B	C	T	lbs/ft	Nm	PVD DH202
BNM-160-TS	16	8	12	1.5	4	2.21	3.0	•
BNM-200-TS	20	10	15	2	5	2.95	4.0	•
BNM-250-TS	25	12.5	18.5	2	6	3.69	5.0	•
BNM-300-TS	30	15	22.5	2	7	4.43	6.0	•

### Mirror "GRM" type

PVD (JC8015 / DH102)



CBN (JBN245)



### Specifications - (radius tolerance +/- .006mm)

CATALOG NUMBER	DIMENSIONS					RECOMMENDED TORQUE (lbs x ft)		STOCK		
	A	R	B	C	T	lbs/ft	Nm	COATED		CBN
								PVD		
DH102	JC8015	JBN245								
GRM-160-R50	16	5	12	1.1	4	2.21	3.0	•	•	•
GRM-200-R60	20	6	15	1.7	5	2.95	4.0	•	•	•
GRM-250-R80	25	8	18.5	2.0	6	3.69	5.0	•	•	•
GRM-300-R10	30	10	22.5	2.5	7	4.43	6.0	•	•	•


**METRIC**

# Mirror Ball

## Controlled Torque Wrenches

Wrenches are pre-set to protect screws and bodies against damage during both the tightening and loosening process.



### Controlled Torque Wrenches (with replaceable blades)

CATALOG NUMBER	TORQUE #	SCREW TORQUE		REPLACEMENT BLADE	APPLICABLE INSERT
		lbs./ft	Nm		
TQC-06	T6	.37	0.5	B-06	BME-0250, BNM-060, BNM-070, HRM-060, RNM-060
TQC-07	T7	.66	0.9	B-07	BME-0312, RME-0312, HRE-0312
					BNM-080, RNM-080, HRM-080, HRM-090, FRM-080
TQC-08	T8	.89	1.2	B-08	BME-0375, RME-0375, HRE-0375
					BNM-100, BNM-110, RNM-100, HRM-100, HRM-110, FRM-100
TQC-10	T10	1.48	2.0	B-10	BME-0500, RME-0500, HRE-0500, FRE-0500
					BNM-120, RNM-120, RNM-130, HRM-120, HRM-130, FRM-120

## Insert Mounting Information

1. Make sure the insert seat on body is carefully cleaned.
2. Make sure insert itself is clean, especially the hole and face location.
3. Change insert screw when threads start to wear.  
(approximately every 10-15 inserts)
4. Do not over tighten screw, see table for torque specifications.

SCREW	RECOMMENDED TORQUE	
	lbs./ft	Nm
FSW-2005H	.37	0.5
FSW-2506H	.66	0.9
FSW-3007H	.89	1.2
FSW-3509H	1.48	2.0
FSW-4013H	2.21	3.0
FSW-5016H	2.95	4.0
FSW-6020	3.69	5.0
FSW-8025	4.43	6.0

## Modular Head Mounting Information

1. Make sure the mounting surface of the modular head and the carbide holder are clean.
2. Make sure after tightening there is no gap between the head and the carbide holder.
3. Do not over tighten head, see table for torque specification.

MODULAR HEAD THREAD SIZE	RECOMMENDED TORQUE	
	lbs./ft	Nm
M6	5.90	8
M8	11.8	16
M10	11.8	16
M12	14.7	20
M16	18.4	25





INCH

METRIC

# Mirror Ball

## Recommended Cutting Data for Mirror Ball

Material	Insert Style	Grade	SFM		6mm 1/4"	8mm 5/16"	10mm 3/8"	12mm 1/2"	16mm 5/8"	20mm 3/4"	25mm 1"	30mm 32mm 1-1/4"
Gray Cast Iron (200-250 HB)	BNM/BME BNM/BME-TG BNM/BME-TS	DH103 DH102 DH202	1200	RPM	18,000	15,000	12,000	9,000	7,400	6,000	4,500	3,600
				IPM	360	300	280	220	220	180	180	140
				DOC	.006"	.008"	.010"	.010"	.012"	.012"	.015"	.015"
				WOC	.006"	.008"	.010"	.010"	.012"	.012"	.015"	.015"
Nodular Cast Iron (180-250 HB)	BNM/BME BNM/BME-TG BNM/BME-TS	DH103 DH102 DH202	1100	RPM	16,500	13,500	11,000	8,500	6,500	5,500	4,200	3,300
				IPM	330	270	260	200	200	165	170	130
				DOC	.006"	.008"	.010"	.010"	.012"	.012"	.015"	.015"
				WOC	.006"	.008"	.010"	.010"	.012"	.012"	.015"	.015"
Carbon Steel (up to 50 HRC)	BNM/BME BME-S BNM-SS	DH103 JC8008 DH108	1000	RPM	15,000	12,000	10,000	7,600	6,000	5,000	3,800	3,000
				IPM	300	240	240	180	180	150	150	120
				DOC	.006"	.006"	.008"	.008"	.010"	.010"	.012"	.012"
				WOC	.006"	.006"	.008"	.008"	.010"	.010"	.012"	.012"
Low Alloy Steel (up to 50 HRC)	BNM/BME BME-S BNM-SS	DH103 JC8008 DH108	800	RPM	12,500	9,800	8,000	6,000	5,000	4,000	3,000	2,500
				IPM	250	200	190	150	150	120	120	100
				DOC	.006"	.006"	.008"	.008"	.010"	.010"	.010"	.010"
				WOC	.006"	.006"	.008"	.008"	.010"	.010"	.012"	.012"
Mold Steel (30-40 HRC)	BNM/BME BME-S BNM-SS	DH103 JC8008 DH108	900	RPM	14,000	11,000	9,000	7,000	5,500	4,500	3,500	2,750
				IPM	170	175	150	140	130	135	100	100
				DOC	.006"	.006"	.008"	.008"	.010"	.010"	.012"	.012"
				WOC	.006"	.008"	.008"	.010"	.010"	.012"	.012"	.015"
Tool & Die Steel (40-50 HRC)	BNM/BME BME-S BNM-SS	DH103 JC8008 DH108	750	RPM	11,500	9,000	7,600	5,700	4,600	3,800	2,800	2,300
				IPM	140	125	120	115	100	100	90	70
				DOC	.005"	.006"	.008"	.008"	.010"	.010"	.012"	.012"
				WOC	.005"	.006"	.008"	.008"	.010"	.010"	.012"	.012"
Hardened Die Steel (50-60 HRC)	BNM/BME-TG BME-S BNM-SS BNM-TS	DH102 JC8008 DH108 DH202	600	RPM	9,000	7,300	6,000	4,600	3,700	3,000	2,300	1,800
				IPM	90	80	75	70	65	60	50	45
				DOC	.005"	.006"	.007"	.008"	.009"	.010"	.010"	.010"
				WOC	.005"	.006"	.007"	.008"	.009"	.010"	.010"	.010"
Stainless Steel (45 HRC)	BME-S BNM-SS	JC8008 DH108	650	RPM	10,000	8,000	6,600	5,000	4,000	3,300	2,500	2,000
				IPM	100	100	90	100	80	80	75	60
				DOC	.006"	.006"	.008"	.008"	.010"	.010"	.012"	.012"
				WOC	.006"	.006"	.008"	.008"	.010"	.010"	.012"	.012"
Titanium	BME-S BNM-SS	JC8008 DH108	300	RPM	4,600	3,700	3,000	2,300	1,800	1,500	1,150	900
				IPM	18	15	18	14	14	12	12	9
				DOC	.004"	.004"	.006"	.006"	.008"	.008"	.010"	.010"
				WOC	.004"	.004"	.006"	.006"	.008"	.008"	.010"	.010"
Copper Alloys	BNM BME/BNM-S	KT9 FZ05 JC20003	500	RPM	7,600	6,000	5,000	3,800	3,000	2,500	1,900	1,500
				IPM	150	120	150	120	120	100	100	75
				DOC	.006"	.006"	.008"	.008"	.010"	.010"	.012"	.012"
				WOC	.008"	.008"	.010"	.010"	.012"	.012"	.015"	.015"
Aluminum	BNM BME/BNM-SS	KT9 FZ05 JC20003	2000	RPM	30,000	25,000	20,000	15,000	12,500	10,000	7,600	6,000
				IPM	600	500	400	300	300	250	225	180
				DOC	.008"	.010"	.012"	.015"	.015"	.020"	.020"	.025"
				WOC	.008"	.010"	.012"	.015"	.015"	.020"	.020"	.025"
Graphite	BNM BNM-S	JC10000 JC20003	2500	RPM	38,000	30,000	25,000	19,000	15,000	12,500	9,500	7,600
				IPM	600	700	600	550	480	400	320	260
				DOC	.006"	.008"	.010"	.012"	.015"	.015"	.020"	.020"
				WOC	.008"	.008"	.010"	.012"	.012"	.012"	.015"	.015"

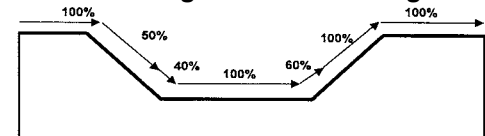
- NOTE:** 1. These parameters represent stable machining with a steel body at lengths 4XD. See table below for longer applications.  
 2. Parameters for carbide bodies please refer to effective diameter chart on A-19.  
 3. For best performance use carbide bodies on tools 5/8" diameter and smaller over 3XD.  
 4. IPT = IPM / RPM / # of teeth

### Additional Cutting Data For Longer Tools

Reach/Dia.	~4.0	4.1~4.5	4.6~5.3	5.4~5.7	5.8~6.2	6.3~6.8	6.9~
rpm %	100	90	80	80	75	70	65
Feed %	100	90	90	80	75	70	65

**NOTE:** The above percentages should be applied, according to tool ratio.

### Reduced Cutting Data For Cutting Pattern



**NOTE:** Feed should be reduced when cutting the above pattern



# Mirror Ball

**METRIC**

## Recommended Cutting Data for Mirror Ball with CBN

Material	Grade	SFM		16mm	20mm	25mm	30mm
Gray Cast Iron (200-250 HB)	JBN245	4500	RPM	27,000	22,000	17,500	15,000
			IPM	450	350	280	240
			DOC	.004"	.006"	.008"	.010"
			WOC	.006"	.008"	.010"	.012"
Nodular Cast Iron (180-250 HB)	JBN245	4000	RPM	24,000	19,500	15,500	13,000
			IPM	380	300	250	200
			DOC	.004"	.006"	.008"	.010"
			WOC	.006"	.008"	.010"	.012"
Hardened Die Steel (50-60 HRC)	JBN245	3000	RPM	18,000	14,500	11,500	9,700
			IPM	290	230	180	160
			DOC	.003"	.004"	.005"	.006"
			WOC	.004"	.005"	.006"	.008"

- NOTE:** 1. These parameters represent stable machining with a steel body at lengths 4XD.  
See table below for longer applications.  
2. Parameters for carbide bodies please refer to effective diameter chart on A-19.  
3. For best performance use carbide bodies on tools 5/8" diameter and smaller over 3XD.  
4. IPT = IPM / RPM / # of teeth

## Recommended Cutting Data for Mirror Ball with GRM insert in CBN

Material	Grade	SFM		16mm	20mm	25mm	30mm
Gray Cast Iron (200-250 HB)	JBN245	4500	RPM	27,000	22,000	17,500	15,000
			IPM	450	350	280	240
			DOC	.004"	.006"	.008"	.010"
			WOC	.012"	.015"	.018"	.020"
Nodular Cast Iron (180-250 HB)	JBN245	4000	RPM	24,000	19,500	15,500	13,000
			IPM	380	300	250	200
			DOC	.004"	.006"	.008"	.010"
			WOC	.012"	.015"	.018"	.020"
Hardened Die Steel (50-60 HRC)	JBN245	3000	RPM	18,000	14,500	11,500	9,700
			IPM	290	230	180	160
			DOC	.003"	.004"	.005"	.006"
			WOC	.010"	.012"	.015"	.020"

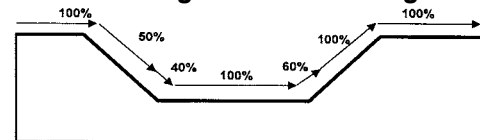
- NOTE:** 1. These parameters represent stable machining with a steel body at lengths 4XD.  
See table below for longer applications.  
2. Parameters for carbide bodies please refer to effective diameter chart on A-19.  
3. For best performance use carbide bodies on tools 5/8" diameter and smaller over 3XD.  
4. IPT = IPM / RPM / # of teeth

## Additional Cutting Data For Longer Tools

Reach/Dia.	~4.0	4.1~4.5	4.6~5.3	5.4~5.7	5.8~6.2	6.3~6.8	6.9~
rpm %	100	90	80	80	75	70	65
Feed %	100	90	90	80	75	70	65

**NOTE:** The above percentages should be applied, according to tool ratio.

## Reduced Cutting Data For Cutting Pattern



**NOTE:** Feed should be reduced when cutting the above pattern



**METRIC**

# Mirror Ball

## Recommended Cutting Data for Mirror Ball with GRM Insert

Material	Grade	SFM		16mm	20mm	25mm	30mm
Gray Cast Iron (200-250 HB)	DH102 JC8015	1200	RPM	7,400	6,000	4,500	3,600
			IPM	220	180	180	140
			DOC	.012"	.012"	.015"	.015"
			WOC	.015"	.020"	.025"	.030"
Nodular Cast Iron (180-250 HB)	DH102 JC8015	1000	RPM	6,500	5,500	4,200	3,300
			IPM	200	165	170	130
			DOC	.012"	.012"	.015"	.015"
			WOC	.015"	.020"	.025"	.030"
Carbon Steel	JC8015	900	RPM	6,000	5,000	3,800	3,000
			IPM	180	150	150	120
			DOC	.010"	.010"	.012"	.012"
			WOC	.015"	.020"	.025"	.030"
Low Alloy Steel	JC8015	800	RPM	5,000	4,000	3,000	2,500
			IPM	150	120	120	100
			DOC	.010"	.010"	.010"	.010"
			WOC	.015"	.020"	.025"	.030"
Mold Steel (30-40 HRC)	DH102 JC8015	800	RPM	5,500	4,500	3,500	2,750
			IPM	130	135	100	100
			DOC	.010"	.010"	.012"	.012"
			WOC	.015"	.020"	.025"	.030"
Tool & Die Steel (40-50 HRC)	DH102	550	RPM	4,600	3,800	2,800	2,300
			IPM	100	100	90	70
			DOC	.010"	.010"	.012"	.012"
			WOC	.015"	.020"	.025"	.030"
Hardened Die Steel (50-60 HRC)	DH102	450	RPM	3,700	3,000	2,300	1,800
			IPM	65	60	50	45
			DOC	.009"	.010"	.010"	.010"
			WOC	.012"	.015"	.020"	.025"
Stainless Steel (45 HRC)	JC8015	650	RPM	4,000	3,300	2,500	2,000
			IPM	80	80	75	60
			DOC	.010"	.010"	.012"	.012"
			WOC	.015"	.020"	.025"	.030"
Titanium	JC8015	300	RPM	1,800	1,500	1,150	900
			IPM	14	12	12	9
			DOC	.008"	.008"	.010"	.010"
			WOC	.010"	.012"	.015"	.020"
Copper Alloys	JC8015	700	RPM	3,000	2,500	1,900	1,500
			IPM	120	100	100	75
			DOC	.010"	.010"	.012"	.012"
			WOC	.020"	.025"	.030"	.035"

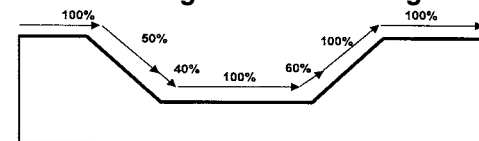
- NOTE:** 1. These parameters represent stable machining with a steel body at lengths 4XD. See table below for longer applications.  
 2. Parameters for carbide bodies please refer to effective diameter chart on A-19.  
 3. For best performance use carbide bodies on tools 5/8" diameter and smaller over 3XD.  
 4. IPT = IPM / RPM / # of teeth

### Additional Cutting Data For Longer Tools

Reach/Dia.	~4.0	4.1~4.5	4.6~5.3	5.4~5.7	5.8~6.2	6.3~6.8	6.9~
rpm %	100	90	80	80	75	70	65
Feed %	100	90	90	80	75	70	65

**NOTE:** The above percentages should be applied, according to tool ratio.

### Reduced Cutting Data For Cutting Pattern



**NOTE:** Feed should be reduced when cutting the above pattern



# Mirror Ball

**INCH**

## Cutting Data for BNM

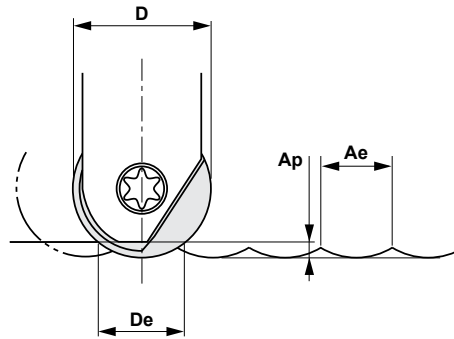
### Calculation of cutting data

#### Spindle speed

$$RPM = 3.82 \times SFM \div D$$

$$SFM = .262 \times RPM \times D$$

$$De = 2 \times \sqrt{Ap \times (D - Ap)}$$



#### Feed

$$IPM = RPM \times IPT \times \# \text{ of teeth}$$

$$IPT = IPM \div RPM \div \# \text{ of teeth}$$

RPM = Rotations per min (spindle speed)

De = Effective diameter (for carbide shank tools use table below)

SFM = Surface footage per minute

D = Diameter of tool

IPM = Inches per minute (feed)

Ap = Axial depth of cut (step down)

IPT = Inches per tooth (chip load)

Ae = Radial depth of cut (step over)

1 inch = 25.4 mm

1 mm = 0.03937"

### Effective tool diameter chart for carbide shank tools

Cutter Dia. D (inch)	Effective Tool Diameter : De (inch)													
	Axial Depth of Cut : Ap (inch)													
	.005"	.010"	.015"	.025"	.035"	.050"	.100"	.125"	.150"	.200"	.250"	.300"	.350"	.400"
1/4"	0.070	0.098	0.119	0.150	0.173	0.200	0.245	0.250						
5/16"	0.078	0.110	0.133	0.169	0.197	0.229	0.291	0.306	0.312					
3/8"	0.086	0.121	0.147	0.187	0.218	0.255	0.332	0.354	0.367	0.374				
1/2"	0.099	0.140	0.171	0.218	0.255	0.300	0.400	0.433	0.458	0.490	0.500			
5/8"	0.111	0.157	0.191	0.245	0.287	0.339	0.458	0.500	0.534	0.583	0.612	0.624		
3/4"	0.122	0.172	0.210	0.269	0.316	0.374	0.510	0.559	0.600	0.663	0.707	0.734	0.748	
1"	0.141	0.199	0.243	0.312	0.368	0.436	0.600	0.661	0.714	0.800	0.866	0.917	0.954	0.980
1 1/4"	0.158	0.223	0.272	0.350	0.412	0.490	0.678	0.750	0.812	0.917	1.000	1.070	1.122	1.116

**NOTE:** When calculating SFM/RPM use De in place of D



# Mirror Radius

## High Precision Indexable Radius End Mill

### High Precision:

Precision indexable end mill with two effective cutting edges.  
Corner radius accuracy within  $\pm .0004$ ".  
Bottom edge run out from radius to radius below  $.0002$ ".



- **Precision clamp screw mounting**

Insert is precisely located using a ground screw to obtain high accuracy.

- **Versatility of insert**

Mirror Radius insert can be used in our Mirror Ball Bodies, only in finishing applications of removing stock below  $1/40 \times D$ .

- **The High Feed Mirror Radius**

- Insert has positive geometry reducing the cutting force and chatter.
- Smaller side wiper has less deflection when finishing vertical walls, when compared to the neutral geometry.

- **High tolerance**

High precision machining giving superior quality when finishing side and bottom face surfaces.



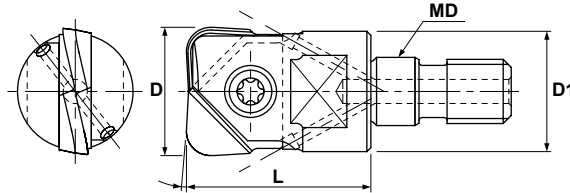
# Mirror Radius

INCH

METRIC

## MODULAR HEAD

MRX Type - Coolant Thru



### Specifications

CATALOG NUMBER	STK	DIMENSIONS				HEAD TORQUE		INSERT		PARTS	
		D	L	D1	MD	lbs/ft	Nm	Inch	Metric	Screw	Wrench
MRX-100-M6	•	10mm	18mm	9.7mm	M6	5.90	8	-	RNM-100, HRM-100, HRM-110, FRM-100	FSW-3007H	T-08
MRX-120-M6	•	.500"/12mm	.787"	.452"	M6	5.90	8	RME-500, HRE-0500, FRE-0500	RNM-120, RNM-130, HRM-120, HRM-130, FRM-120	FSW-3509H	T-10
MRX-160-M8	•	.625"/16mm	.903"	.591"	M8	11.8	16	RME-0625, HRE-0625, FRE-0625	RNM-160, RNM-170, HRM-160, HRM-170, FRM-160, FRM-170	FSW-4013H	T-15
MRX-2075-M10	•	.750"	1.16"	.728"	M10	11.8	16	RME-0750, HRE-0750, FRE-0750	RNM-200, RNM-210, HRM-200, HRM-220, FRM-200, FRM-210	FSW-5016H	A-20W
MRX-200-M10	•	20mm	1.16"	.748"	M10	11.8	16	-	RNM-200, RNM-210, HRM-200, HRM-220, FRM-200, FRM-210	FSW-5016H	A-20W
MRX-250-M12	•	1.0"/25mm	1.38"	.945"	M12	14.7	20	RME-1000, HRE-1000, FRE-1000	RNM-250, RNM-260, FRM-250	FSW-6020	T-30
MRX-300-M16	•	1.25"/30mm or 32mm	1.69"	1.14"	M16	18.4	25	RME-1250	RNM-300, RNM-320, FRM-300, FRM-320	FSW-8025	A-40
MRX-320-M16	•	1.25"/32MM	1.69"	1.14"	M16	18.4	25	RME-1250	RNM-320, FRM-320	FSW-8025	A-40

See page A-77 for Modular Head Shanks

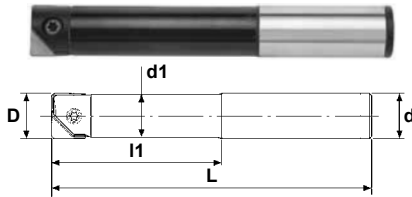
Note: All cutters are supplied without inserts or wrenches.



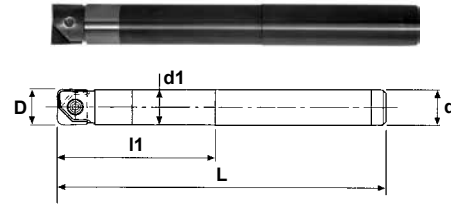
**INCH**

# Mirror Radius

## RNM Type - Steel Shank



## RNM Type - Carbide Shank



### Specifications - Steel Shank

CATALOG NUMBER	STK	DIMENSIONS					INSERT INCH	INSERT METRIC	PARTS	
		D	L	d1	l1	d			Screw	Wrench
RNMM-080057S-S031	•	.312	4.50	.307	2.25	.312	RME-0312	RNM-080	FSW-2506H	T-07
RNML-080088S-S031	•	.312	5.75	.307	3.50	.312				
RNMM-100057S-S037	•	.375	4.50	.366	2.25	.375	RME-0375	RNM-100	FSW-3007H	T-08
RNML-100088S-S037	•	.375	5.75	.366	3.50	.375				
RNMM-120063S-S050	•	.500	4.75	.492	2.50	.500	RME-0500		FSW-3509H	T-10
RNML-120101S-S050	•	.500	6.35	.492	4.00	.500				
RNMM-160063S-S062	•	.625	4.75	.614	2.50	.625	RME-0625	RNM-160	FSW-4013H	T-15
RNML-160114S-S062	•	.625	7.10	.614	4.50	.625				
RNMM-200088S-S075	•	.750	5.75	.740	3.50	.750	RME-0750	RNM-200	FSW-5016H	A-20W
RNML-200127S-S075	•	.750	8.00	.740	5.00	.750				
RNMS-250076S-S100	•	1.000	6.00	.976	3.00	1.00	RME-1000	RNM-250	FSW-6020	T-30
RNMM-250114S-S100	•	1.000	7.50	.976	4.50	1.00				
RNML-250152S-S100	•	1.000	10.00	.976	6.00	1.00				
RNMM-300114S-S125	•	1.250	7.50	1.17	4.50	1.25	RME-1250	RNM-300 RNM-320	FSW-8025	A-40
RNML-300152S-S125	•	1.250	10.00	1.17	6.00	1.25				

### Specifications - Carbide Shank

Note: All cutters are supplied without inserts or wrenches.

CATALOG NUMBER	STK	DIMENSIONS					INSERT INCH	INSERT METRIC	PARTS	
		D	L	d1	l1	d			Screw	Wrench
RNMS-080035U-S031C	•	.312	3.62	.295	1.37	.312	RME-0312 HRE-0312	RNM-080 HRM-080 HRM-090 FRM-080	FSW-2506H	T-07
RNMM-080057S-S031C	•	.312	4.50	.307	2.25	.312				
RNML-080088S-S031C	•	.312	5.75	.307	3.50	.312				
RNMS-100035U-S037C	•	.375	3.62	.354	1.37	.375	RME-0375 HRE-0375	RNM-100 HRM-100 HRM-110 FRM-100	FSW-3007H	T-08
RNMM-100057S-S037C	•	.375	4.50	.366	2.25	.375				
RNML-100088S-S037C	•	.375	5.75	.366	3.50	.375				
RNMS-120029U-S050C	•	.500	3.28	.480	1.14	.500	RME-0500 HRE-0500 FRE-0500	HRM-130	FSW-3509H	T-10
RNMM-120063S-S050C	•	.500	4.75	.492	2.50	.500				
RNML-120101S-S050C	•	.500	6.35	.492	4.00	.500				
RNMS-160034U-S062C	•	.625	3.70	.602	1.33	.625	RME-0625 HRE-0625 FRE-0625	RNM-160, RNM-170 HRM-160, HRM-170 FRM-160, FRM-170	FSW-4013H	T-15
RNMM-160063S-S062C	•	.625	4.75	.614	2.50	.625				
RNML-160114S-S062C	•	.625	7.10	.614	4.50	.625				
RNMS-200038U-S075C	•	.750	4.09	.728	1.49	.750	RME-0750 HRE-0750 FRE-0750	RNM-200, RNM-210 HRM-200, HRM-220 FRM-200, FRM-210	FSW-5016H	A-20W
RNMM-200088S-S075C	•	.750	5.75	.740	3.50	.750				
RNML-200127S-S075C	•	.750	8.00	.740	5.00	.750				
RNMS-250076S-100C	•	1.000	6.00	.976	3.00	1.00	RME-1000 HRE-1000 FRE-1000	RNM-250 RNM-260 FRM-250	FSW-6020	T-30
RNMM-250114S-S100C	•	1.000	7.50	.976	4.50	1.00				
RNML-250152S-S100C	•	1.000	10.00	.976	6.00	1.00				
RNMM-300114S-S125C	•	1.250	7.50	1.17	4.50	1.25	RME-1250	RNM-300, RNM-320 FRM-300, FRM-320	FSW-8025	A-40
RNML-300152S-S125C	•	1.250	10.00	1.17	6.00	1.25				

Note: All cutters are supplied without inserts or wrenches.



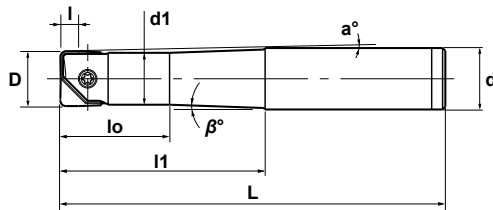
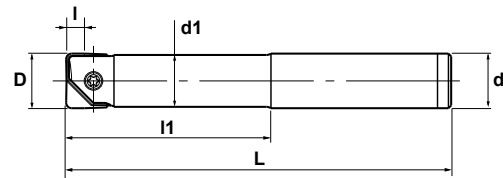


# Mirror Radius

**METRIC**

## STEEL SHANK

**RNM Type RNM-S - Straight Reach**
**RNM-T - Tapered Reach**

**Fig. 1**

**Fig. 2**


## Specifications

CATALOG NUMBER	STK	DIMENSIONS										FIG.	INSERT (INCH)	PARTS	
		D	L	I	lo	l1	d1	d	a°	β°	Screw			Wrench	
RNMM-080053T-S12	•	8	110	2.7	18.5	53	7.2	12	2°10'	2°30'	1	RNM-080 (RME-0312)	FSW-2506H	T-07	
RNML-080075T-S12	•	8	140	2.7	18.5	75	7.2	12	1°32'	2°	1				
RNMM-100053T-S12	•	10	110	3.3	21	53	9	12	1°5'	2°	1	RNM-100 (RME-0375)	FSW-3007H	T-08	
RNML-100075T-S12	•	10	140	3.3	21	75	9	12	0°46'	1°	1				
RNMM-120053S-S12	•	12	110	4	-	53	11	12	-	-	2	RNM-120 RNM-130 (RME-0500)	FSW-3509H	T-10	
RNML-120095T-S16	•	12	160	4	22	95	11	16	1°12'	1°15'	1				
RNMM-160070S-S16	•	16	140	5.3	-	70	15	16	-	-	2	RNM-160 RNM-170 (RME-0625)	FSW-4013H	T-15	
RNMM-160090S-S16	•	16	160	5.3	-	90	15	16	-	-	2				
RNML-160100S-S16	•	16	200	5.3	-	100	15	16	-	-	2				
RNMM-200075S-S20	•	20	141	6.7	-	75	19	20	-	-	2	RNM-200 RNM-210 (RME-0750)	FSW-5016H	A-20W	
RNMM-200105S-S20	•	20	180	6.7	-	105	19	20	-	-	2				
RNML-200125S-S20	•	20	250	6.7	-	125	19	20	-	-	2				
RNMM-250090S-S25	•	25	166	8.3	-	90	24	25	-	-	2	RNM-250 RNM-260 (RME-1000)	FSW-6020	T-30	
RNMM-250140S-S25	•	25	220	8.3	-	140	24	25	-	-	2				
RNML-250150S-S25	•	25	250	8.3	-	150	24	25	-	-	2				
RNMM-300106S-S32	•	30	186	10	-	106	29	32	-	-	2	RNM-300 (RME-1250)	FSW-8025	A-40	
RNMM-300140S-S32	•	30	220	10	-	140	29	32	-	-	2				
RNMM-320106S-S32	•	32	186	10.7	-	106	31	32	-	-	2	RNM-320 (RME-1250)	FSW-8025	A-40	
RNMM-320140S-S32	•	32	220	10.7	-	140	31	32	-	-	2				

**Note: All cutters are supplied without inserts or wrenches.**



**METRIC**

# Mirror Radius

## CARBIDE SHANK

**RNM Type** *RNM-S - Straight Reach*  
*RNM-T - Tapered Reach*



Fig. 1

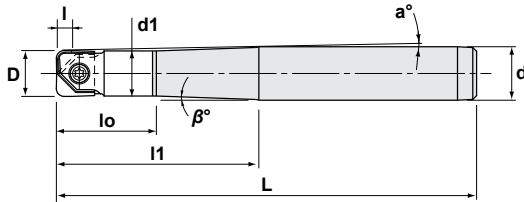
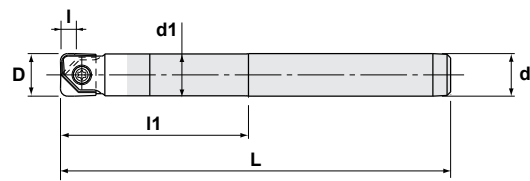


Fig. 2



### Specifications

CATALOG NUMBER	STK	DIMENSIONS									FIG.	INSERT (INCH)	PARTS	
		D	L	l	l <sub>0</sub>	l <sub>1</sub>	d <sub>1</sub>	d	a°	β°			Screw	Wrench
RNMM-080053T-S12C	•	8	110	2.7	20	53	7.2	12	2°12'	2°	1	RNM-080, (RME-0312) HRM-080, HRM-090 FRM-080, (HRE-0312)	FSW-2506H	T-07
RNML-080075S-S08C	•	8	140	2.7	-	75	7.2	8	-	-	2			
RNMM-100050S-S10C	•	10	110	3.3	-	50	9	10	-	-	2	RNM-100, (RME-0375) HRM-100, HRM-110 FRM-100, (HRE-0375)	FSW-3007H	T-08
RNMM-100053T-S12C	•	10	110	3.3	22.5	53	9	12	1°7'	1°	1			
RNML-100075S-S10C	•	10	140	3.3	-	75	9	10	-	-	2			
RNMM-120053S-S12C	•	12	110	4	-	53	11	12	-	-	2	RNM-120, RNM-130 (RME-0500), HRM-120 HRM-130, FRM-120 (HRE-0500, FRE-0500)	FSW-3509H	T-10
RNML-120095S-S12C	•	12	160	4	-	95	11	12	-	-	2			
RNMM-160070S-S16C	•	16	140	5.3	-	70	15	16	-	-	2	RNM-160, RNM-170 (RME-0625) HRM-160, HRM-170 FRM-160, FRM-170 (HRE-0625, FRE-0625)	FSW-4013H	T-15
RNMM-160090S-S16C	•	16	160	5.3	-	90	15	16	-	-	2			
RNML-160120S-S16C	•	16	210	5.3	-	120	15	16	-	-	2			
RNML-160150S-S16C	•	16	220	5.3	-	150	15	16	-	-	2			
RNMM-200075S-S20C	•	20	141	6.7	-	75	19	20	-	-	2	RNM-200, RNM-210 HRM-200, HRM-220 FRM-200, FRM-210	FSW-5016H	A-20W
RNMM-200105S-S20C	•	20	180	6.7	-	105	19	20	-	-	2			
RNML-200150S-S20C	•	20	220	6.7	-	150	19	20	-	-	2			
RNML-200170S-S20C	•	20	250	6.7	-	170	19	20	-	-	2			
RNMM-250090S-S25C	•	25	166	8.3	-	90	24	25	-	-	2	RNM-250, RNM-260 FRM-250 (RME-1000, FRE-1000)	FSW-6020	T-30
RNMM-250140S-S25C	•	25	220	8.3	-	140	24	25	-	-	2			
RNML-250190S-S25C	•	25	260	8.3	-	190	24	25	-	-	2			
RNMM-300106S-S32C	•	30	186	10	-	106	29	32	-	-	2	RNM-320, RNM-320 FRM-300, (RME-1250)	FSW-8025	A-40
RNMM-320106S-S32C	•	32	186	10.7	-	106	31	32	-	-	2	RNM-320, FRM-320 (RME-1250)	FSW-8025	A-40

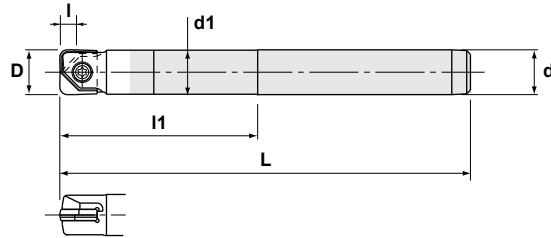
Note: All cutters are supplied without inserts or wrenches.



# Mirror Radius

**METRIC**

## CARBIDE SHANK RNMS-U Type

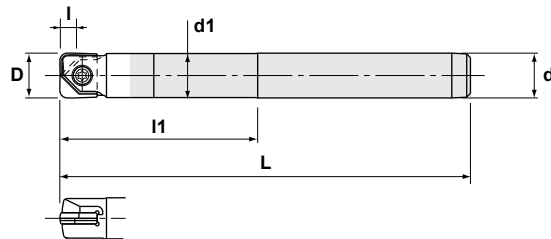


### Specifications

CATALOG NUMBER	STK	DIMENSIONS						INSERT (INCH)	PARTS	
		D	L	I	I1	d1	d		Screw	Wrench
RNMS-060015U-S06C	•	6	60	2	15	5.7	6	RNM-060, HRM-060, FRM-060	FSW-2005H	T-06
RNMS-080020U-S08C	•	8	70	2.7	20	7.6	8	RNM-080, HRM-080, HRM-090, FRM-080 (RME-0312, HRE-0312)	FSW-2506H	T-07
RNMS-100025U-S10C	•	10	75	3.3	25	9.5	10	RNM-100, HRM-100 HRM-110, FRM-100	FSW-3007H	T-08
RNMS-120030U-S12C	•	12	80	4	30	11.5	12	RNM-120, RNM-130 HRM-120, HRM-130, FRM-120 (RME-0500, HRE-0500, FRE-0500)	FSW-3509H	T-10
RNMS-160035U-S16C	•	16	90	5.3	35	15.5	16	RNM-160, RNM-170, HRM-160 HRM-170, FRM-160, FRM-170 (RME-0625, HRE-0625, FRE-0625)	FSW-4013H	T-15
RNMS-200040U-S20C	•	20	105	6.7	40	19.5	20	RNM-200, RNM-210, HRM-200 HRM-220, FRM-200, FRM-210	FSW-5016	A-20W

Note: All cutters are supplied without inserts or wrenches.

## CARBIDE SHANK RNMM-U Type



### Specifications

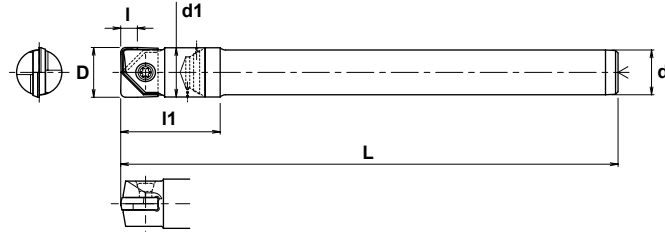
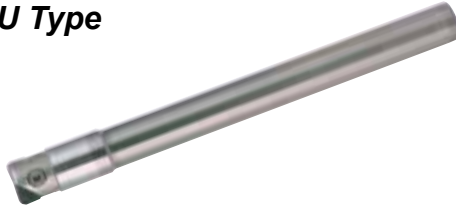
CATALOG NUMBER	STK	DIMENSIONS						INSERT (INCH)	PARTS	
		D	L	I	I1	d1	d		Screw	Wrench
RNMM-060030U-S06C	•	6	80	2	30	5.7	6	RNM-060, HRM-060, FRM-060	FSW-2005H	T-06
RNMM-080040U-S08C	•	8	90	2.7	40	7.6	8	RNM-080, HRM-080, HRM-090, FRM-080 (RME-0312, HRE-0312)	FSW-2506H	T-07
RNMM-100050U-S10C	•	10	100	3.3	50	9.5	10	RNM-100, HRM-100 HRM-110, FRM-100	FSW-3007H	T-08
RNMM-120060U-S12C	•	12	110	4	60	11.5	12	RNM-120, RNM-130 HRM-120, HRM-130, FRM-120 (RME-0500, HRE-0500, FRE-0500)	FSW-3509H	T-10

Note: All cutters are supplied without inserts or wrenches.

**METRIC**

# Mirror Radius

## CARBIDE SHANK RNMU Type



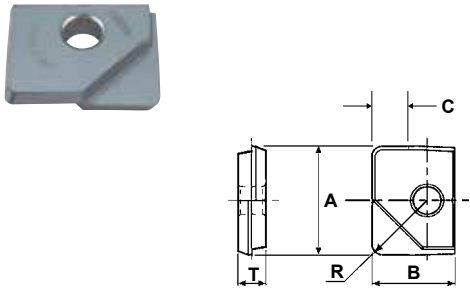
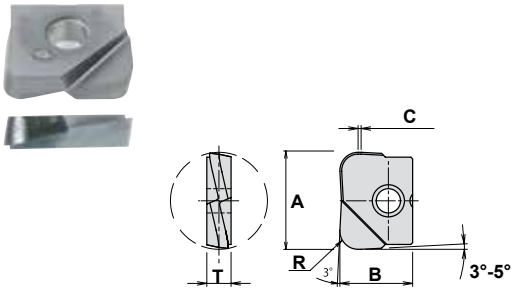
### Specifications

CATALOG NUMBER	STK	DIMENSIONS						INSERT (INCH)	PARTS	
		D	L	I	I1	d1	d		Screw	Wrench
RNMU-080075S-S7.8C	•	8	75	2.7	25	7.8	7.8	RNM-080 (RME-0312) HRM-080, HRM-090 FRM-080 (HRE-0312)	FSW-2506H	T-07
RNMU-080110S-S7.8C	•	8	110	2.7	25	7.8	7.8			
RNMU-090090S-S08C	•	9	90	2.7	25	7.8	8	HRM-090-R20	FSW-2506H	T-07
RNMU-090130S-S08C	•	9	130	2.7	25	7.8	8			
RNMU-100085S-S9.8C	•	10	85	3.3	27	9.8	9.8	RNM-100 HRM-100 HRM-110 FRM-100	FSW-3007H	T-08
RNMU-100130S-S9.8C	•	10	130	3.3	27	9.8	9.8			
RNMU-110100S-S10C	•	11	100	3.3	27	9.8	10	HRM-110-R20	FSW-3007H	T-08
RNMU-110150S-S10C	•	11	150	3.3	27	9.8	10			
RNMU-120110S-S11C	•	12	110	4	30	11.8	11	RNM-120, RNM-130 (RME-0500) HRM-120, HRM-130 FRM-120 (HRE-0500, FRE-0500)	FSW-3509H	T-10
RNMU-120160S-S11C	•	12	160	4	30	11.8	11			
RNMU-130110S-S12C	•	13	110	4	30	11.8	12	RNM-130 (RME-0500) (HRE-0500, FRE-0500) HRM-130	FSW-3509H	T-10
RNMU-130160S-S12C	•	13	160	4	30	11.8	12			
RNMU-160120S-S15C	•	16	120	5.3	35	15.8	15	RNM-160, RNM-170 HRM-160, HRM-170 FRM-160, FRM-170	FSW-4013H	T-15
RNMU-160170S-S15C	•	16	170	5.3	35	15.8	15			
RNMU-170130S-S16C	•	17	130	5.3	35	15.8	16	RNM-170 HRM-170 FRM-170	FSW-4013H	T-15
RNMU-170180S-S16C	•	17	180	5.3	35	15.8	16			
RNMU-200140S-S18C	•	20	140	6.7	40	19.8	18	RNM-200, RNM-210 HRM-200, HRM-220 FRM-200, FRM-210	FSW-5016H	A-20W
RNMU-200200S-S18C	•	20	200	6.7	40	19.8	18			
RNMU-220150S-S20C	•	22	150	6.7	40	19.8	20	HRM-220-R30	FSW-5016H	A-20W
RNMU-220220S-S20C	•	22	220	6.7	40	19.8	20			

**Note: All cutters are supplied without inserts or wrenches.**



## Mirror Radius Insert Selection

Material	RME / RNM	FRE / FRM
		
	Neutral Geometry Finish	High Feed Geometry Semi-Finish Finish
	DH103 (JC5003 / JC8003) JC8015 (JC5015)	DH102 (JC6102) JC8015
Gray Cast Iron (200-250 HB)	DH103 (JC5003 / JC8003)	DH102 (JC6102)
Nodular Cast Iron (180-250 HB)	DH103 (JC5003 / JC8003)	DH102 (JC6102)
Carbon Steel	JC8015 (JC5015)	JC8015
Low Alloy Steel	JC8015 (JC5015)	JC8015
Mold Steel (30-40 HRC)	DH103 (JC5003 / JC8003)	DH102 (JC6102)
Tool & Die Steel (40-50 HRC)	DH103 (JC5003 / JC8003)	DH102 (JC6102)
Hardened Die Steel (50-60 HRC)	DH103 (JC5003 / JC8003)	DH102 (JC6102)
Stainless Steel (45 HRC)	JC8015 (JC5015)	JC8015
Titanium	JC8015 (JC5015)	JC8015
Copper Alloys	JC8015 (JC5015)	JC8015
Aluminum	JC8015 (JC5015)	JC8015

First Choice

Second Choice

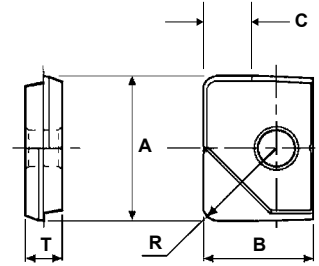


**INCH**

# Mirror Radius

## INSERTS

### Mirror Radius



### Specifications

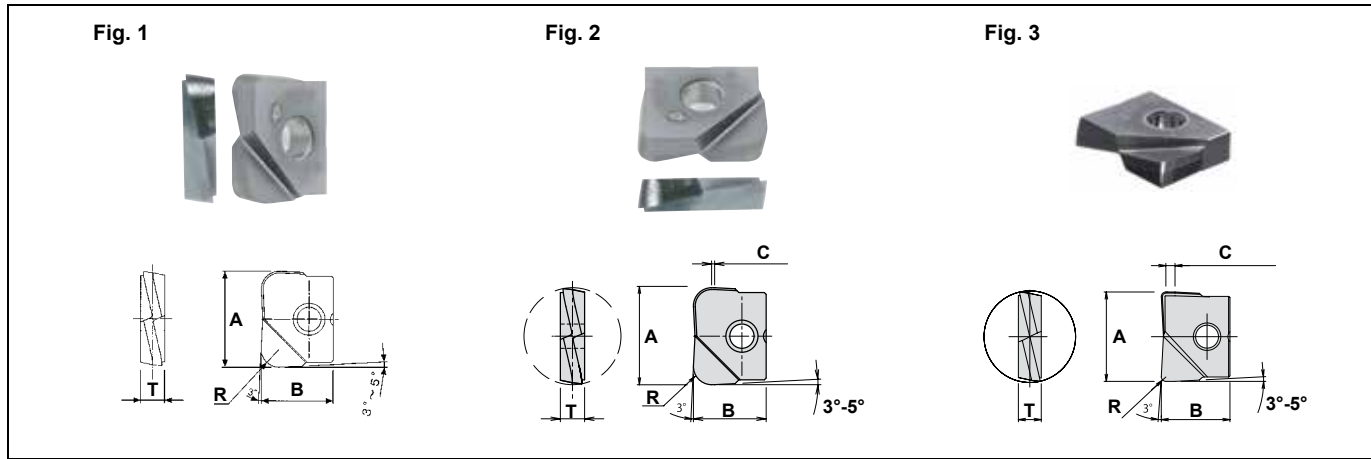
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	A	R	B	C	T	lbs./ft	Nm	DH103	JC5003	JC8003	JC5015	JC8015
RME-0312-015	.312	.015	.275	.102	.094	.66	.9				•	
RME-0312-031	.312	.031	.275	.102	.094	.66	.9	•			•	
RME-0312-062	.312	.062	.275	.102	.094	.66	.9		•		•	
RME-0375-015	.375	.015	.326	.126	.102	.89	1.2			•		•
RME-0375-031	.375	.031	.326	.126	.102	.89	1.2	•				
RME-0375-062	.375	.062	.326	.126	.102	.89	1.2	•			•	
RME-0500-015	.500	.015	.409	.165	.118	1.48	2.0			•		•
RME-0500-031	.500	.031	.409	.165	.118	1.48	2.0	•				•
RME-0500-062	.500	.062	.409	.165	.118	1.48	2.0	•				•
RME-0625-031	.625	.031	.472	.209	.157	2.21	3.0	•				•
RME-0625-062	.625	.062	.472	.209	.157	2.21	3.0	•				•
RME-0625-125	.625	.125	.472	.209	.157	2.21	3.0					•
RME-0750-031	.750	.031	.570	.252	.196	2.95	4.0	•				•
RME-0750-062	.750	.062	.570	.252	.196	2.95	4.0	•				•
RME-0750-125	.750	.125	.570	.252	.196	2.95	4.0	•			•	
RME-1000-031	1.00	.031	.736	.335	.236	3.69	5.0					•
RME-1000-062	1.00	.062	.736	.335	.236	3.69	5.0	•				•
RME-1000-125	1.00	.125	.736	.335	.236	3.69	5.0	•				•
RME-1000-250	1.00	.250	.736	.335	.236	3.69	5.0					•
RME-1250-062	1.25	.062	.925	.417	.275	4.43	6.0	•				•
RME-1250-125	1.25	.125	.925	.417	.275	4.43	6.0			•		•
RME-1250-250	1.25	.250	.925	.417	.275	4.43	6.0		•			



# Mirror Radius

**INCH**

## High Feed Mirror Radius Inserts FRE/HRE - Styles



### Specifications

CATALOG NUMBER	DIMENSIONS					FIG.	COATED GRADE		
	A	R	B	C	T		JC6102	DH102	JC8015
FRE-0250-031	.250	.031	.203	.031	.078	3		•	
FRE-0250-062	.250	.062	.203	.031	.078	3		•	
HRE-0312-062	.312	.062	.275	-	.094	1			•
HRE-0312-078	.312	.078	.275	-	.094	1			•
HRE-0375-031-F	.375	.031	.325	.059	.102	3	•		
FRE-0375-031	.375	.031	.325	.059	.102	3			•
HRE-0375-062	.375	.062	.325	-	.102	1			•
HRE-0375-078	.375	.078	.325	-	.102	1			•
FRE-0500-031	.500	.031	.407	.059	.118	3		•	•
FRE-0500-062	.500	.062	.407	.059	.118	3		•	•
HRE-0500-078	.500	.078	.407	-	.118	1			•
HRE-0500-125	.500	.125	.407	-	.118	1			•
FRE-0625-062	.625	.062	.470	.078	.157	3			•
HRE-0625-125	.625	.125	.470	-	.157	1			•
FRE-0750-031	.750	.031	.572	.078	.197	3		•	•
FRE-0750-062	.750	.062	.572	.078	.197	3		•	•
HRE-0750-125	.750	.125	.572	-	.197	1			•
FRE-1000-031	1.00	.031	.735	.078	.238	3		•	•
FRE-1000-062	1.00	.062	.735	.078	.236	3		•	•
HRE-1000-125	1.00	.125	.735	-	.236	1			•



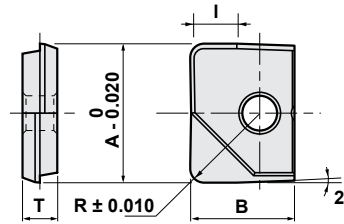


**METRIC**

# Mirror Radius

## INSERTS

### Mirror Radius



### Specifications

CATALOG NUMBER	DIMENSIONS					RECOMMENDED TORQUE		STOCK			
	A	R	B	I	T	lbs./ft	Nm	COATED	UNCOATED	DIAMOND	
								DH103	JC8015	KT9	JC10000
RNM-060-R03	6	0.3	5	2	2	.37	.5	•	•		
RNM-060-R05	6	0.5	5	2	2	.37	.5	•	•		
RNM-060-R10	6	1.0	5	2	2	.37	.5	•	•		
RNM-080-R03	8	0.3	7	2.7	2.4	.66	.9	•	•	•	
RNM-080-R05	8	0.5	7	2.7	2.4	.66	.9	•	•	•	•
RNM-080-R10	8	1.0	7	2.7	2.4	.66	.9	•	•	•	•
RNM-100-R0	10	0.1	8.5	3.3	2.6	1.22	1.2		•		
RNM-100-R03	10	0.3	8.5	3.3	2.6	.89	1.2	•	•	•	
RNM-100-R05	10	0.5	8.5	3.3	2.6	.89	1.2	•	•	•	•
RNM-100-R10	10	1.0	8.5	3.3	2.6	.89	1.2	•	•	•	•
RNM-100-R15	10	1.5	8.5	3.3	2.6	.89	1.2		•	•	
RNM-100-R20	10	2.0	8.5	3.3	2.6	.89	1.2	•	•	•	
RNM-120-R0	12	0.1	10	4	3	1.48	2.0		•		
RNM-120-R03	12	0.3	10	4	3	1.48	2.0	•	•	•	
RNM-120-R05	12	0.5	10	4	3	1.48	2.0	•	•	•	•
RNM-120-R10	12	1.0	10	4	3	1.48	2.0	•	•	•	•
RNM-120-R15	12	1.5	10	4	3	1.48	2.0	•	•	•	
RNM-120-R20	12	2.0	10	4	3	1.48	2.0	•	•	•	
RNM-130-R03	13	0.3	10	4	3	1.48	2.0		•		
RNM-130-R05	13	0.5	10	4	3	1.48	2.0		•		
RNM-130-R10	13	1.0	10	4	3	1.48	2.0		•		
RNM-130-R20	13	2.0	10	4	3	1.48	2.0		•		
RNM-160-R0	16	0.1	12	5.3	4	2.21	3.0		•		
RNM-160-R03	16	0.3	12	5.3	4	2.21	3.0	•	•	•	
RNM-160-R05	16	0.5	12	5.3	4	2.21	3.0	•	•	•	
RNM-160-R10	16	1.0	12	5.3	4	2.21	3.0	•	•	•	
RNM-160-R15	16	1.5	12	5.3	4	2.21	3.0	•	•	•	
RNM-160-R20	16	2.0	12	5.3	4	2.21	3.0	•	•	•	
RNM-170-R03	17	0.3	12	5.3	4	2.21	3.0		•		
RNM-170-R05	17	0.5	12	5.3	4	2.21	3.0		•		
RNM-170-R10	17	1.0	12	5.3	4	2.21	3.0		•		
RNM-170-R20	17	2.0	12	5.3	4	2.21	3.0		•		
RNM-200-R0	20	0.1	15	6.7	5	2.95	4.0		•		
RNM-200-R03	20	0.3	15	6.7	5	2.95	4.0	•	•	•	
RNM-200-R05	20	0.5	15	6.7	5	2.95	4.0	•	•	•	
RNM-200-R10	20	1.0	15	6.7	5	2.95	4.0	•	•	•	
RNM-200-R15	20	1.5	15	6.7	5	2.95	4.0	•	•	•	
RNM-200-R20	20	2.0	15	6.7	5	2.95	4.0	•	•	•	
RNM-200-R30	20	3.0	15	6.7	5	2.95	4.0		•		
RNM-210-R03	21	0.3	15	6.7	5	2.95	4.0		•		
RNM-210-R05	21	0.5	15	6.7	5	2.95	4.0		•		
RNM-210-R10	21	1.0	15	6.7	5	2.95	4.0		•		
RNM-210-R20	21	2.0	15	6.7	5	2.95	4.0		•		

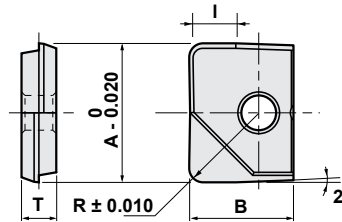


# Mirror Radius

**METRIC**

## INSERTS

### Mirror Radius



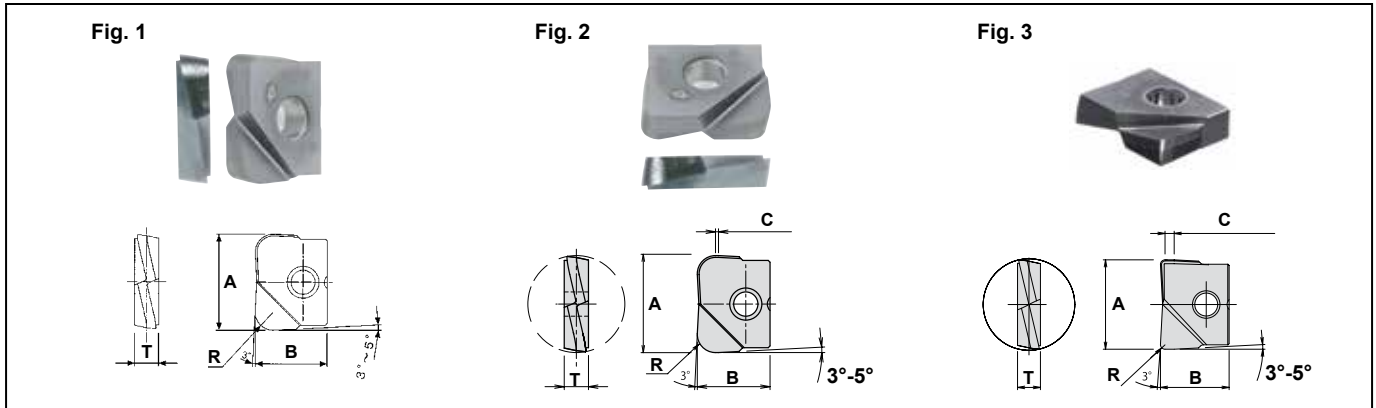
### Specifications

CATALOG NUMBER	DIMENSIONS					RECOMMENDED TORQUE		STOCK		
	A	R	B	I	T	lbs./ft	Nm	COATED		
								DH103	JC8015	
RNM-250-R0	25	0.1	18.5	8.3	6	3.69	5.0		•	
RNM-250-R03	25	0.3	18.5	8.3	6	3.69	5.0	•	•	
RNM-250-R05	25	0.5	18.5	8.3	6	3.69	5.0	•	•	
RNM-250-R10	25	1.0	18.5	8.3	6	3.69	5.0	•	•	
RNM-250-R15	25	1.5	18.5	8.3	6	3.69	5.0	•	•	
RNM-250-R20	25	2.0	18.5	8.3	6	3.69	5.0	•	•	
RNM-250-R30	25	3.0	18.5	8.3	6	3.69	5.0		•	
RNM-260-R03	26	0.3	18.5	8.3	6	3.69	5.0		•	
RNM-260-R05	26	0.5	18.5	8.3	6	3.69	5.0		•	
RNM-260-R10	26	1.0	18.5	8.3	6	3.69	5.0		•	
RNM-260-R20	26	2.0	18.5	8.3	6	3.69	5.0		•	
RNM-300-R03	30	0.3	22.5	10	7	4.43	6.0	•	•	
RNM-300-R05	30	0.5	22.5	10	7	4.43	6.0	•	•	
RNM-300-R10	30	1.0	22.5	10	7	4.43	6.0	•	•	
RNM-300-R15	30	1.5	22.5	10	7	4.43	6.0		•	
RNM-300-R20	30	2.0	22.5	10	7	4.43	6.0	•	•	
RNM-300-R30	30	3.0	22.5	10	7	4.43	6.0		•	
RNM-320-R03	32	0.3	23.5	10.7	7	4.43	6.0	•	•	
RNM-320-R05	32	0.5	23.5	10.7	7	4.43	6.0	•	•	
RNM-320-R10	32	1.0	23.5	10.7	7	4.43	6.0	•	•	
RNM-320-R15	32	1.5	23.5	10.7	7	4.43	6.0		•	
RNM-320-R20	32	2.0	23.5	10.7	7	4.43	6.0	•	•	
RNM-320-R30	32	3.0	23.5	10.7	7	4.43	6.0		•	

**METRIC**

# Mirror Radius

## High Feed Mirror Radius Inserts FRM/HRM - Styles



### Specifications

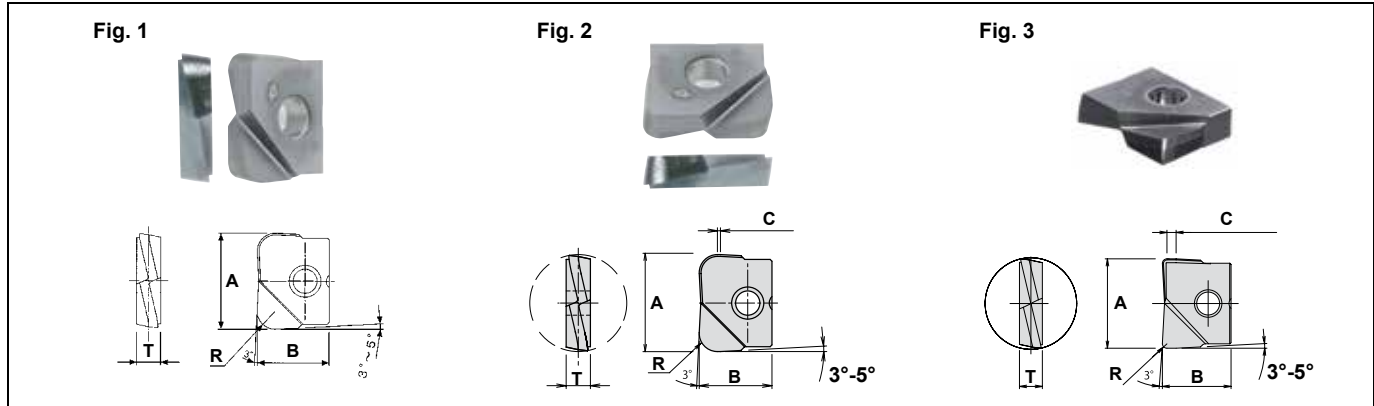
CATALOG NUMBER	DIMENSIONS					FIG.	COATED GRADE	
	A	R	B	C	T		DH102	JC8015
FRM-060-R03	6	0.3	5	0.8	2	3	•	
FRM-060-R05	6	0.5	5	0.8	2	3	•	•
FRM-060-R10	6	1.0	5	0.8	2	3	•	•
HRM-060-R05	6	0.5	5	-	2	1		•
HRM-060-R10	6	1.0	5	-	2	1		•
HRM-060-R15	6	1.5	5	-	2	1		•
FRM-080-R03	8	0.3	7	1.2	2.4	3	•	
FRM-080-R05	8	0.5	7	1.2	2.4	3	•	•
FRM-080-R10	8	1.0	7	1.2	2.4	3	•	•
HRM-080-R20	8	2.0	7	0.3	2.4	2		•
HRM-090-R20	9	2.0	7	0.3	2.4	2		•
FRM-100-R03	10	0.3	8.5	1.5	2.6	3	•	
FRM-100-R05	10	0.5	8.5	1.5	2.6	3	•	•
FRM-100-R10	10	1.0	8.5	1.5	2.6	3	•	•
FRM-100-R20	10	2.0	8.5	1.5	2.6	3	•	
HRM-100-R20	10	2.0	8.5	0.3	2.6	2		•
HRM-110-R20	11	2.0	8.5	0.3	2.6	2		•
FRM-120-R03	12	0.3	10	1.5	3	3	•	
FRM-120-R05	12	0.5	10	1.5	3	3	•	•
FRM-120-R10	12	1.0	10	1.5	3	3	•	•
FRM-120-R20	12	2.0	10	1.5	3	3	•	•
HRM-120-R20	12	2.0	10	0.5	3	2		•
FRM-120-R30	12	3.0	10	1.5	3	3	•	
HRM-130-R20	13	2.0	10	0.5	3	2		•
FRM-160-R03	16	0.3	12	2	4	3	•	
FRM-160-R05	16	0.5	12	2	4	3	•	•
FRM-160-R10	16	1.0	12	2	4	3	•	•
FRM-160-R15	16	1.5	12	2	4	3	•	
FRM-160-R20	16	2.0	12	2	4	3	•	•
HRM-160-R20	16	2.0	12	0.5	4	2		•
FRM-160-R30	16	3.0	12	2	4	3	•	
HRM-160-R30	16	3.0	12	0.5	4	2		•



# Mirror Radius

**METRIC**

## High Feed Mirror Radius Inserts FRM/HRM - Styles



### Specifications

CATALOG NUMBER	DIMENSIONS					FIG.	COATED GRADE	
	A	R	B	C	T		DH102	JC8015
FRM-170-R10	17	1.0	12	2	4	3	•	•
HRM-170-R30	17	3.0	12	0.5	4	2		•
FRM-200-R03	20	0.3	15	2	5	3	•	
FRM-200-R05	20	0.5	15	2	5	3	•	•
FRM-200-R10	20	1.0	15	2	5	3	•	•
FRM-200-R15	20	1.5	15	2	5	3	•	
FRM-200-R20	20	2.0	15	2	5	3	•	•
HRM-200-R20	20	2.0	26	0.5	5	2		•
FRM-200-R30	20	3.0	15	2	5	3	•	
HRM-200-R30	20	3.0	15	0.5	5	2		•
FRM-210-R10	21	1.0	15	2	5	3	•	•
HRM-220-R30	22	3.0	15	0.5	5	2		•
FRM-250-R03	25	0.3	18.5	2.5	6	3	•	
FRM-250-R05	25	0.5	18.5	2.5	6	3	•	
FRM-250-R10	25	1.0	18.5	2.5	6	3	•	•
FRM-250-R20	25	2.0	18.5	2.5	6	3	•	•
FRM-250-R30	25	3.0	18.5	2.5	6	3	•	
FRM-300-R03	30	0.3	22.5	3	7	3	•	
FRM-300-R05	30	0.5	22.5	3	7	3	•	
FRM-300-R10	30	1.0	22.5	3	7	3	•	•
FRM-300-R20	30	2.0	22.5	3	7	3	•	•
FRM-300-R30	30	3.0	22.5	3	7	3	•	
FRM-320-R03	32	0.3	23.5	3	7	3	•	
FRM-320-R05	32	0.5	23.5	3	7	3	•	
FRM-320-R10	32	1.0	23.5	3	7	3	•	•
FRM-320-R20	32	2.0	23.5	3	7	3	•	•
FRM-320-R30	32	3.0	23.5	3	7	3	•	



**INCH**

**METRIC**

## Mirror Radius

### Controlled Torque Wrenches

Wrenches are pre-set to protect screws and bodies against damage during both the tightening and loosening process.



### Controlled Torque Wrenches (with replaceable blades)

CATALOG NUMBER	TORQUE #	RECOMMENDED TORQUE		REPLACEMENT BLADE	APPLICABLE INSERT
		lbs./ft	Nm		
TQC-06	T6	.37	0.5	B-06	BME-0250, BNM-060, BNM-070, HRM-060, RNM-060
TQC-07	T7	.66	0.9	B-07	BME-0312, RME-0312, HRE-0312 BNM-080, RNM-080, HRM-080, HRM-090, FRM-080
TQC-08	T8	.89	1.2	B-08	BME-0375, RME-0375, HRE-0375 BNM-100, BNM-110, RNM-100, HRM-100, HRM-110, FRM-100
TQC-10	T10	1.48	2.0	B-10	BME-0500, RME-0500, HRE-0500, FRE-0500 BNM-120, RNM-120, RNM-130, HRM-120, HRM-130, FRM-120

### Insert Mounting Information

1. Make sure the insert seat on body is carefully cleaned.
2. Make sure insert itself is clean, especially the hole and face location.
3. Change insert screw when threads start to wear.  
(approximately every 10-15 inserts)
4. Do not over tighten screw, see table for torque specifications.

SCREW	RECOMMENDED TORQUE	
	lbs./ft	Nm
FSW-2005H	.37	0.5
FSW-2506H	.66	0.9
FSW-3007H	.89	1.2
FSW-3509H	1.48	2.0
FSW-4013H	2.21	3.0
FSW-5016H	2.95	4.0
FSW-6020	3.69	5.0
FSW-8025	4.43	6.0

### Modular Head Mounting Information

1. Make sure the mounting surface of the modular head and the carbide holder are clean.
2. Make sure after tightening there is no gap between the head and the carbide holder.
3. Do not over tighten head, see table for torque specification.

MODULAR HEAD THREAD SIZE	RECOMMENDED TORQUE	
	lbs./ft	Nm
M6	5.90	8
M8	11.8	16
M10	11.8	16
M12	14.7	20
M16	18.4	25



# Mirror Radius

INCH

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## Recommended Cutting Data for Mirror Radius - Side Finishing

Material	Grade	SFM		6mm	8mm 5/16"	10mm 3/8"	12mm 1/2"	16mm 5/8"	20mm 3/4"	25mm 1"	30mm 32mm 1-1/4"
Gray Cast Iron (200-250 HB)	DH103 (JC5003 / JC8003) JC8015 (JC5015)	1200	RPM	18,000	15,000	12,000	9,000	7,300	6,000	4,600	3,600
			IPM	200	180	190	180	175	180	165	145
			DOC	.025"	.030"	.035"	.040"	.045"	.050"	.055"	.060"
			WOC	.003"	.003"	.004"	.004"	.005"	.005"	.006"	.006"
Nodular Cast Iron (180-250 HB)	DH103 (JC5003 / JC8003) JC8015 (JC5015)	1000	RPM	15,000	12,300	10,000	7,600	6,000	5,000	3,800	3,000
			IPM	180	150	160	150	145	150	135	120
			DOC	.025"	.030"	.035"	.040"	.045"	.050"	.055"	.060"
			WOC	.003"	.003"	.004"	.004"	.005"	.005"	.006"	.006"
Carbon Steel	DH103 (JC5003 / JC8003) JC8015 (JC5015)	900	RPM	13,700	11,000	9,000	6,800	5,500	4,600	3,400	2,700
			IPM	165	130	145	110	90	75	70	55
			DOC	.020"	.020"	.025"	.025"	.035"	.040"	.045"	.050"
			WOC	.003"	.003"	.004"	.004"	.005"	.005"	.006"	.006"
Low Alloy Steel	DH103 (JC5003 / JC8003) JC8015 (JC5015)	800	RPM	12,000	9,800	8,200	6,000	4,900	4,000	3,000	2,500
			IPM	145	120	100	90	80	65	60	50
			DOC	.020"	.020"	.025"	.025"	.030"	.030"	.035"	.035"
			WOC	.003"	.003"	.004"	.005"	.005"	.005"	.006"	.006"
Mold Steel (30-40 HRC)	DH103 (JC5003 / JC8003) JC8015 (JC5015)	800	RPM	12,000	9,800	8,200	6,000	4,900	4,000	3,000	2,500
			IPM	145	160	165	145	150	120	110	100
			DOC	.020"	.025"	.030"	.035"	.040"	.045"	.050"	.060"
			WOC	.003"	.004"	.005"	.006"	.007"	.008"	.008"	.010"
Tool & Die Steel (40-50 HRC)	DH103 (JC5003 / JC8003) JC8015 (JC5015)	550	RPM	8,400	6,700	5,600	4,200	3,400	2,800	2,100	1,700
			IPM	100	90	90	70	70	60	50	40
			DOC	.015"	.015"	.020"	.025"	.030"	.035"	.040"	.040"
			WOC	.003"	.004"	.004"	.005"	.005"	.006"	.006"	.008"
Hardened Die Steel (50-60 HRC)	DH103 (JC5003 / JC8003) JC8015 (JC5015)	450	RPM	6,900	5,500	4,600	3,400	2,700	2,300	1,700	1,300
			IPM	55	45	55	40	45	35	35	25
			DOC	.010"	.012"	.015"	.020"	.025"	.030"	.035"	.040"
			WOC	.003"	.003"	.004"	.004"	.005"	.005"	.005"	.005"
Stainless Steel (45 HRC)	JC8015 (JC5015) DH103 (JC5003 / JC8003)	650	RPM	9,900	8,000	6,600	5,000	3,900	3,300	2,400	2,000
			IPM	100	80	80	75	60	55	50	40
			DOC	.015"	.018"	.020"	.025"	.030"	.035"	.040"	.040"
			WOC	.003"	.004"	.005"	.005"	.006"	.006"	.008"	.008"
Titanium	JC8015 (JC5015) DH103 (JC5003 / JC8003)	300	RPM	4,500	3,600	3,000	2,300	1,800	1,500	1,100	900
			IPM	36	28	24	18	18	15	13	11
			DOC	.008"	.010"	.012"	.015"	.018"	.020"	.025"	.030"
			WOC	.003"	.003"	.004"	.004"	.004"	.004"	.005"	.005"
Copper Alloys	DH103 (JC5003 / JC8003) JC8015 (JC5015)	700	RPM	10,700	8,600	7,100	5,300	4,300	3,500	2,700	2,100
			IPM	130	100	115	85	85	70	65	50
			DOC	.010"	.012"	.012"	.015"	.015"	.020"	.025"	.030"
			WOC	.003"	.004"	.004"	.004"	.006"	.006"	.006"	.008"
Aluminum	JC8015 (JC5015) DH103 (JC5003 / JC8003)	1500	RPM	23,000	18,000	15,000	11,500	9,100	7,600	5,700	4,600
			IPM	275	220	240	190	180	185	170	140
			DOC	.020"	.025"	.030"	.035"	.040"	.045"	.050"	.060"
			WOC	.004"	.004"	.006"	.006"	.008"	.008"	.010"	.010"

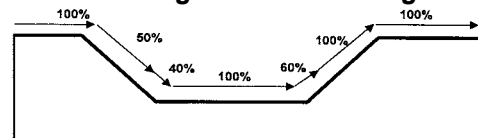
- NOTE:** 1. These parameters represent stable machining with a steel body at lengths 4XD. See table below for longer applications.  
 2. Parameters for carbide bodies can be run with 25% more surface footage & chip load.  
 3. For best performance use carbide bodies on tools 5/8" diameter and smaller over 3XD.  
 4. Maximum ramping angle of up to 2°30' recommended.  
 5. IPT = IPM / RPM / # of teeth

### Additional Cutting Data For Longer Tools

Reach/Dia.	~4.0	4.1~4.5	4.6~5.3	5.4~5.7	5.8~6.2	6.3~6.8	6.9~
rpm %	100	90	80	80	75	70	65
Feed %	100	90	90	80	75	70	65

**NOTE:** The above percentages should be applied, according to tool ratio.

### Reduced Cutting Data For Cutting Pattern



**NOTE:** Feed should be reduced when cutting the above pattern



**INCH**

**METRIC**

# Mirror Radius

## Recommended Cutting Data for Mirror Radius - Bottom Finishing

Material	Grade	SFM		6mm	8mm 5/16"	10mm 3/8"	12mm 1/2"	16mm 5/8"	20mm 3/4"	25mm 1"	30mm 32mm 1-1/4"
			RPM	IPM	DOC	WOC	RPM	IPM	DOC	WOC	RPM
Gray Cast Iron (200-250 HB)	DH103 (JC5003 / JC8003) JC8015 (JC5015)	1200	RPM	18,000	15,000	12,000	9,000	7,300	6,000	4,600	3,600
			IPM	200	180	190	145	145	120	110	85
			DOC	.006"	.006"	.006"	.008"	.008"	.008"	.010"	.010"
			WOC	.075"	.095"	.110"	.150"	.190"	.225"	.300"	.375"
Nodular Cast Iron (180-250 HB)	DH103 (JC5003 / JC8003) JC8015 (JC5015)	1000	RPM	15,000	12,300	10,000	7,600	6,000	5,000	3,800	3,000
			IPM	180	150	160	120	120	100	90	75
			DOC	.006"	.006"	.006"	.008"	.008"	.008"	.010"	.010"
			WOC	.075"	.095"	.110"	.150"	.190"	.225"	.300"	.375"
Carbon Steel	DH103 (JC5003 / JC8003) JC8015 (JC5015)	900	RPM	13,700	11,000	9,000	6,800	5,500	4,600	3,400	2,700
			IPM	150	135	110	110	90	75	70	55
			DOC	.006"	.006"	.006"	.008"	.008"	.008"	.010"	.010"
			WOC	.075"	.095"	.110"	.150"	.190"	.225"	.300"	.375"
Low Alloy Steel	DH103 (JC5003 / JC8003) JC8015 (JC5015)	800	RPM	12,000	9,800	8,200	6,000	4,900	4,000	3,000	2,500
			IPM	135	120	100	95	80	70	60	50
			DOC	.006"	.006"	.006"	.008"	.008"	.008"	.010"	.010"
			WOC	.075"	.095"	.110"	.150"	.190"	.225"	.300"	.375"
Mold Steel (30-40 HRC)	DH103 (JC5003 / JC8003) JC8015 (JC5015)	800	RPM	12,000	9,800	8,200	6,000	4,900	4,000	3,000	2,500
			IPM	145	120	130	95	100	95	80	75
			DOC	.006"	.006"	.006"	.008"	.008"	.008"	.010"	.010"
			WOC	.075"	.095"	.110"	.150"	.190"	.225"	.300"	.375"
Tool & Die Steel (40-50 HRC)	DH103 (JC5003 / JC8003) JC8015 (JC5015)	550	RPM	8,400	6,700	5,600	4,200	3,400	2,800	2,100	1,700
			IPM	70	70	60	50	40	45	35	30
			DOC	.005"	.005"	.006"	.006"	.007"	.007"	.008"	.008"
			WOC	.050"	.065"	.075"	.100"	.125"	.150"	.200"	.250"
Hardened Die Steel (50-60 HRC)	DH103 (JC5003 / JC8003) JC8015 (JC5015)	450	RPM	6,900	5,500	4,600	3,400	2,700	2,300	1,700	1,300
			IPM	55	45	45	35	30	25	25	20
			DOC	.005"	.005"	.006"	.006"	.007"	.007"	.008"	.008"
			WOC	.050"	.065"	.075"	.100"	.125"	.150"	.200"	.250"
Stainless Steel (45 HRC)	JC8015 (JC5015) DH103 (JC5003 / JC8003)	650	RPM	9,900	8,000	6,600	5,000	3,900	3,300	2,400	2,000
			IPM	120	100	90	70	60	55	50	40
			DOC	.006"	.006"	.006"	.008"	.008"	.008"	.010"	.010"
			WOC	.075"	.095"	.110"	.150"	.190"	.225"	.300"	.375"
Titanium	DH103 (JC5003 / JC8003) JC8015 (JC5015)	300	RPM	4,500	3,600	3,000	2,300	1,800	1,500	1,100	900
			IPM	27	22	24	18	18	15	13	11
			DOC	.006"	.006"	.006"	.008"	.008"	.008"	.010"	.010"
			WOC	.050"	.065"	.075"	.100"	.125"	.150"	.200"	.250"
Copper Alloys	JC8015 (JC5015) DH103 (JC5003 / JC8003)	700	RPM	10,700	8,600	7,100	5,300	4,300	3,500	2,700	2,100
			IPM	130	100	115	85	90	70	65	50
			DOC	.006"	.006"	.006"	.008"	.008"	.008"	.010"	.010"
			WOC	.075"	.095"	.110"	.150"	.190"	.225"	.300"	.375"
Aluminum	JC8015 (JC5015) DH103 (JC5003 / JC8003)	1500	RPM	23,000	18,000	15,000	11,500	9,100	7,600	5,700	4,600
			IPM	275	220	240	190	180	150	140	110
			DOC	.006"	.006"	.006"	.008"	.008"	.008"	.010"	.010"
			WOC	.075"	.095"	.110"	.150"	.190"	.225"	.300"	.375"

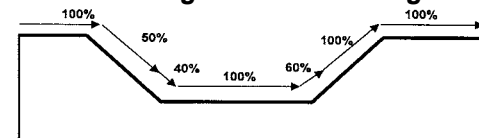
- NOTE:** 1. These parameters represent stable machining with a steel body at lengths 4XD. See table below for longer applications.  
 2. Parameters for carbide bodies can be run with 25% more surface footage & chip load.  
 3. For best performance use carbide bodies on tools 5/8" diameter and smaller over 3XD.  
 4. Maximum ramping angle of up to 2°30' recommended.  
 5. IPT = IPM / RPM / # of teeth

### Additional Cutting Data For Longer Tools

Reach/Dia.	~4.0	4.1~4.5	4.6~5.3	5.4~5.7	5.8~6.2	6.3~6.8	6.9~
rpm %	100	90	80	80	75	70	65
Feed %	100	90	90	80	75	70	65

**NOTE:** The above percentages should be applied, according to tool ratio.

### Reduced Cutting Data For Cutting Pattern



**NOTE:** Feed should be reduced when cutting the above pattern





# Mirror Radius

INCH

METRIC

## Recommended Cutting Data for Mirror Radius - High Feed

Material	Grade	SFM		6mm	8mm 5/16"	10mm 3/8"	12mm 1/2"	16mm 5/8"	20mm 3/4"	25mm 1"	30mm 32mm 1-1/4"
				RPM	IPM	DOC	WOC	RPM	IPM	DOC	WOC
Gray Cast Iron (200-250 HB)	DH102 (JC6102) JC8015	1200	RPM	18,000	15,000	12,000	9,000	7,300	6,000	4,600	3,600
			IPM	280	240	240	180	175	145	140	110
			DOC	.006"	.006"	.006"	.008"	.008"	.008"	.010"	.010"
			WOC	.095"	.125"	.150"	.200"	.250"	.300"	.400"	.500"
Nodular Cast Iron (180-250 HB)	DH102 (JC6102) JC8015	1000	RPM	15,000	12,300	10,000	7,600	6,000	5,000	3,800	3,000
			IPM	240	200	200	150	145	120	115	90
			DOC	.006"	.006"	.006"	.008"	.008"	.008"	.010"	.010"
			WOC	.095"	.125"	.150"	.200"	.250"	.300"	.400"	.500"
Carbon Steel	DH102 (JC6102) JC8015	900	RPM	13,700	11,000	9,000	6,800	5,500	4,600	3,400	2,700
			IPM	220	180	180	135	130	110	100	80
			DOC	.006"	.006"	.006"	.008"	.008"	.008"	.010"	.010"
			WOC	.095"	.125"	.150"	.200"	.250"	.300"	.400"	.500"
Low Alloy Steel	DH102 (JC6102) JC8015	800	RPM	12,000	9,800	8,200	6,000	4,900	4,000	3,000	2,500
			IPM	190	160	165	120	120	100	90	75
			DOC	.006"	.006"	.006"	.008"	.008"	.008"	.010"	.010"
			WOC	.095"	.125"	.150"	.200"	.250"	.300"	.400"	.500"
Mold Steel (30-40 HRC)	DH102 (JC6102) JC8015	800	RPM	12,000	9,800	8,200	6,000	4,900	4,000	3,000	2,500
			IPM	195	175	165	120	120	120	120	100
			DOC	.006"	.006"	.006"	.008"	.008"	.008"	.010"	.010"
			WOC	.095"	.125"	.150"	.200"	.250"	.300"	.400"	.500"
Tool & Die Steel (40-50 HRC)	DH102 (JC6102) JC8015	550	RPM	8,400	6,700	5,600	4,200	3,400	2,800	2,100	1,700
			IPM	100	80	90	70	70	55	50	40
			DOC	.005"	.005"	.006"	.006"	.007"	.007"	.008"	.008"
			WOC	.075"	.095"	.110"	.150"	.190"	.225"	.300"	.375"
Hardened Die Steel (50-60 HRC)	DH102 (JC6102) JC8015	450	RPM	6,900	5,500	4,600	3,400	2,700	2,300	1,700	1,300
			IPM	80	65	75	55	55	45	40	30
			DOC	.005"	.005"	.006"	.006"	.007"	.007"	.008"	.008"
			WOC	.050"	.065"	.075"	.100"	.125"	.150"	.200"	.250"
Stainless Steel (45 HRC)	JC8015	650	RPM	10,000	8,000	6,600	5,000	3,900	3,300	2,400	2,000
			IPM	120	130	130	100	80	80	60	60
			DOC	.006"	.006"	.006"	.008"	.008"	.008"	.010"	.010"
			WOC	.095"	.125"	.150"	.200"	.250"	.300"	.400"	.500"
Titanium	JC8015	300	RPM	4,500	3,600	3,000	2,300	1,800	1,500	1,100	900
			IPM	55	45	35	35	30	25	22	18
			DOC	.006"	.006"	.006"	.008"	.008"	.008"	.010"	.010"
			WOC	.050"	.065"	.075"	.100"	.125"	.150"	.200"	.250"
Copper Alloys	DH102 (JC6102) JC8015	700	RPM	10,700	8,600	7,100	5,300	4,300	3,500	2,700	2,100
			IPM	170	140	145	105	100	85	80	65
			DOC	.006"	.006"	.006"	.008"	.008"	.008"	.010"	.010"
			WOC	.095"	.125"	.150"	.200"	.250"	.300"	.400"	.500"
Aluminum	JC8015 DH102 (JC6102)	1500	RPM	23,000	18,000	15,000	11,500	9,100	7,600	5,700	4,600
			IPM	275	220	300	230	220	180	170	185
			DOC	.006"	.006"	.006"	.008"	.008"	.008"	.010"	.010"
			WOC	.095"	.125"	.150"	.200"	.250"	.300"	.400"	.500"

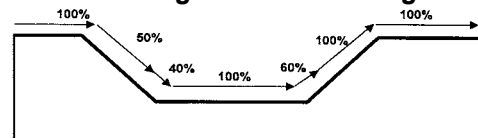
- NOTE:** 1. These parameters represent stable machining with a steel body at lengths 4XD. See table below for longer applications.  
 2. Parameters for carbide bodies can be run with 25% more surface footage & chip load.  
 3. For best performance use carbide bodies on tools 5/8" diameter and smaller over 3XD.  
 4. Maximum ramping angle of up to 2°30' recommended.  
 5. IPT = IPM / RPM / # of teeth

### Additional Cutting Data For Longer Tools

Reach/Dia.	~4.0	4.1~4.5	4.6~5.3	5.4~5.7	5.8~6.2	6.3~6.8	6.9~
rpm %	100	90	80	80	75	70	65
Feed %	100	90	90	80	75	70	65

**NOTE:** The above percentages should be applied, according to tool ratio.

### Reduced Cutting Data For Cutting Pattern



**NOTE:** Feed should be reduced when cutting the above pattern



Face Milling



Pocket Milling



Slotting

# Econo Ball



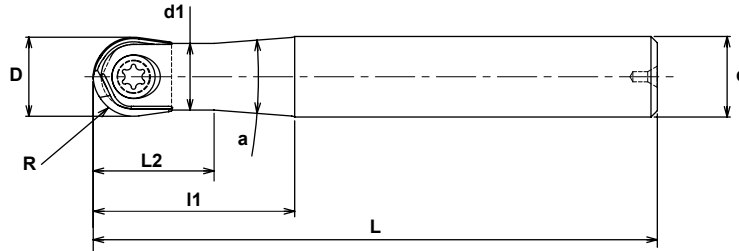
- Good for semi-roughing and finishing.
- Strong clamping mechanism with single accurate ground screw.
- General purpose economical ball nose.



# Econo Ball

**INCH**

## EBEM Type



### Specifications

CATALOG NUMBER	STK	DIMENSIONS								INSERT INCH (METRIC)	PARTS	
		D	R	L	d1	L1	L2	d	a		Screw	Wrench
EBEM-120032T-S050	•	.500	.250	3.50	.413	1.25	.750	.500	8.8°	DEB-0500-T	EBSW-5009	A-20
EBEM-120050T-S050	•	.500	.250	5.25	.413	2.00	.750	.500	3.5°			
EBEM-120063T-S050	•	.500	.250	6.00	.413	2.50	.750	.500	2.5°			
EBEM-200045T-S075	•	.750	.375	4.50	.670	1.75	1.00	.750	5.4°	DEB-0750-T	EBSW-5015	A-20
EBEM-200075T-S075	•	.750	.375	7.00	.670	3.00	1.00	.750	2°			
EBEM-250050T-S100	•	1.00	.500	6.25	.860	2.00	1.50	1.00	14.4°	DEB-1000-T	EBSW-6020	T-30
EBEM-250095T-S100	•	1.00	.500	7.50	.860	3.75	1.50	1.00	3.3°			
EBEM-250126T-S100	•	1.00	.500	9.00	.860	5.00	1.50	1.00	2°			

**Note:** All cutters are supplied without inserts or wrenches.

Fig. 1

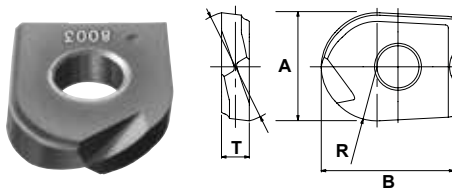
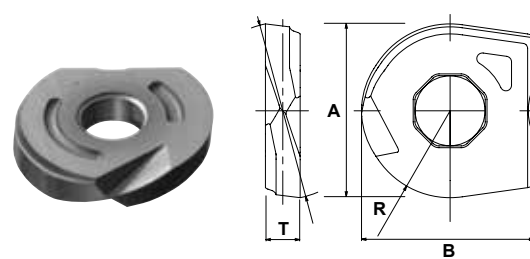


Fig. 2



### Specifications

CATALOG NUMBER INCH	DIMENSIONS				FIG.	GRADE	
	A	R	B	T		JC5118	JC8003
DEB-0500-T	.500	.250	.486	.098	1	•	
DEB-0750-T	.750	.375	.611	.118	2	•	•
DEB-1000-T	1.00	.500	.854	.157	2	•	•



**INCH**

# Econo Ball

## Recommended Cutting Data for Econo Ball

Material	Grade	SFM		1/2"	3/4"	1"
Gray Cast Iron (200-250 HB)	JC5118 JC8003	1200	RPM	9,000	6,000	4,500
			IPM	220	180	180
			DOC	.010"	.012"	.015"
			WOC	.010"	.012"	.015"
Nodular Cast Iron (180-250 HB)	JC5118 JC8003	1100	RPM	8,500	5,500	4,200
			IPM	200	165	170
			DOC	.010"	.012"	.015"
			WOC	.010"	.012"	.015"
Carbon Steel	JC5118 JC8003	1000	RPM	7,600	5,000	3,800
			IPM	180	150	150
			DOC	.008"	.010"	.012"
			WOC	.008"	.010"	.012"
Low Alloy Steel	JC5118 JC8003	800	RPM	6,000	4,000	3,000
			IPM	150	120	120
			DOC	.008"	.010"	.010"
			WOC	.008"	.010"	.012"
Mold Steel (30-40 HRC)	JC5118 JC8003	900	RPM	7,000	4,500	3,500
			IPM	140	135	100
			DOC	.008"	.010"	.012"
			WOC	.010"	.012"	.012"
Tool & Die Steel (40-50 HRC)	JC8003 JC5118	750	RPM	5,700	3,800	2,800
			IPM	115	100	90
			DOC	.008"	.010"	.012"
			WOC	.008"	.010"	.012"
Hardened Die Steel (50-60 HRC)	JC8003 JC5118	600	RPM	4,600	3,000	2,300
			IPM	70	60	50
			DOC	.008"	.010"	.010"
			WOC	.008"	.010"	.010"
Stainless Steel (45 HRC)	JC5118 JC8003	650	RPM	5,000	3,300	2,500
			IPM	100	80	75
			DOC	.008"	.010"	.012"
			WOC	.008"	.010"	.012"

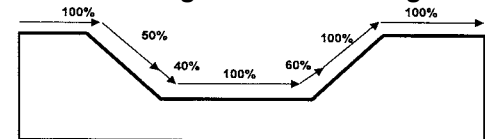
**NOTE:** 1. Above parameters for bodies at lengths of 4XD. See table below for longer applications.  
 2. IPT = IPM / RPM / # of teeth

## Additional Cutting Data For Longer Tools

Reach/Dia.	~4.0	4.1~4.5	4.6~5.3	5.4~5.7	5.8~6.2	6.3~6.8	6.9~
rpm %	100	90	80	80	75	70	65
Feed %	100	90	90	80	75	70	65

**NOTE:** The above percentages should be applied, according to tool ratio.

## Reduced Cutting Data For Cutting Pattern



**NOTE:** Feed should be reduced when cutting the above pattern





# QM Mini

## *MPM Style For Finishing*



- High speed and high efficient finishing.
- Multiple insert choices - High Feed Milling, Shoulder Milling of steel & aluminum, Milling of high hardened steels, Finishing side & bottom face. See catalog A2 for High Feed and Shoulder cutting.
- Able to machine wide variety of materials including high temp alloys.
- Capable of running on low horse power & compact machines.
- G-body is a GN surface-hardening treatment on thermal resistant high strength steel giving a hardness over 65 HRC and secures insert pocket and holder against thermal deformation improving body durability.



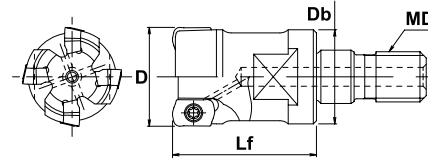
# QM Mini

**INCH**

**METRIC**

## QM MINI

New Generation of High Feed Mills  
MPM Style - G Body

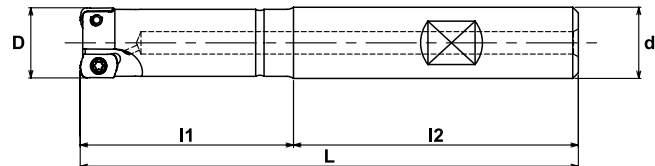


### Modular Head Specifications

	CATALOG NUMBER	STK	DIMENSIONS				HEAD TORQUE		INSERT	Q	PARTS	
			D	Lf	Db	MD	lbs./ft	Nm			Screw	Wrench
<b>INCH</b>	MPM-3050-M6	•	.500	.787	.452	M6	5.9	8	YOHW0602**ZER-12	3	DSW-1840H	T-06
	MPM-4062-M8	•	.625	.905	.590	M8	11.8	16		4		
	MPM-5075-M10	•	.750	1.18	.708	M10	11.8	16		5		
	MPM-6100-M12	•	1.00	1.37	.945	M12	14.7	20		6		
	MPM-8125-M16	•	1.25	1.69	1.14	M16	18.4	25		8		
<b>METRIC</b>	MPM-2010-M6	•	10	18	9.5	M6	5.9	8	YOHW0602**ZER-12	2	DSW-1840H	T-06
	MPM-2011-M6	•	11	18	9.7	M6	5.9	8		2		
	MPM-3012-M6	•	12	20	11.2	M6	5.9	8		3		
	MPM-3013-M6	•	13	20	11.5	M6	5.9	8		3		
	MPM-4016-M8	•	16	23	15	M8	11.8	16		4		
	MPM-4017-M8	•	17	23	15	M8	11.8	16		4		
	MPM-5020-M10	•	20	30	19	M10	11.8	16		5		
	MPM-5021-M10	•	21	30	19	M10	11.8	16		5		
	MPM-6025-M12	•	25	35	23.6	M12	14.7	20		6		
	MPM-7030-M16	•	30	43	29	M16	18.4	25		7		
	MPM-8032-M16	•	32	43	29	M16	18.4	25		8		

See page A-77 for Modular Head Shanks.

Note: All cutters are supplied without inserts or wrenches.



### Specifications for End Mill

CATALOG NUMBER	STK	DIMENSIONS					INSERT	Q	PARTS	
		D	L	L1	L2	d			Screw	Wrench
PME-3050-1.5-S050LG	•	.500	3.50	1.50	2.0	.500	YOHW0602**ZER-12	2	DSW-1840H	T-06

Note: All cutters are supplied without inserts or wrenches.



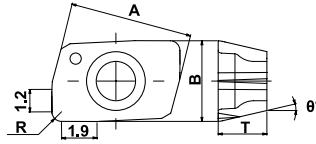


**METRIC**

**QM Mini**

**INSERTS**

"MIRROR INSERT" for finishing side & bottom face (YOHW)



TYPE	CATALOG NUMBER	TOLERANCE	DIMENSIONS					PVD COATED					
			A	B	T	R	Ø	JC5118	JC8118	DH102	JC7560	JC8015	JC8050
"MIRROR INSERT" for finishing side & bottom face	YOHW060203ZER-12	H	6.5	4.3	2.6	0.3	13°			•		•	
	YOHW060205ZER-12	H	6.5	4.3	2.6	0.5	13°			•		•	
	YOHW060208ZER-12	H	6.5	4.3	2.6	0.8	13°			•		•	

**MAGNETISER**



- Magnetizing and demagnetizing the wrench can easily be done by inserting the tip into the magnetizer and rubbing lightly.
- Do not use in the vicinity of the equipment that can be influenced with magnetism.

CATALOG NUMBER	STOCK
MAGNETISER	•



## QM Mini

INCH

METRIC

### Recommended Cutting Data for QM Mini

Material	Parameters	Finish	
		YOHW Side	YOHW Bottom
Gray Cast Iron	SFM	1,200	720
	IPT	.006"	.007"
	DOC	.030"	.005"
	WOC	.004"	60%
	Grade	DH102	DH102
Nodular Cast Iron	SFM	1,100	660
	IPT	.006"	.007"
	DOC	.030"	.005"
	WOC	.004"	60%
	Grade	DH102	DH102
Carbon Steel	SFM	1,000	600
	IPT	.006"	.007"
	DOC	.025"	.005"
	WOC	.004"	60%
	Grade	DH102	DH102
Low Alloy Steel	SFM	1,000	600
	IPT	.006"	.007"
	DOC	.025"	.005"
	WOC	.004"	60%
	Grade	DH102	DH102
Mold Steel	SFM	900	540
	IPT	.005"	.006"
	DOC	.025"	.005"
	WOC	.004"	60%
	Grade	DH102	DH102
Tool & Die Steel (40-50 HRC)	SFM	750	450
	IPT	.005"	.006"
	DOC	.020"	.004"
	WOC	.004"	40%
	Grade	DH102	DH102
Hardened Die Steel (50-60 HRC)	SFM	600	360
	IPT	.004"	.005"
	DOC	.020"	.004"
	WOC	.003"	40%
	Grade	DH102	DH102
Stainless Steel	SFM	250	150
	IPT	.005"	.006"
	DOC	.025"	.005"
	WOC	.004"	60%
	Grade	JC8015	JC8015
Titanium	SFM	300	180
	IPT	.003"	.004"
	DOC	.020"	.004"
	WOC	.003"	60%
	Grade	JC8015	JC8015
Inconel	SFM	200	120
	IPT	.003"	.004"
	DOC	.015"	.003"
	WOC	.003"	40%
	Grade	JC8015	JC8015
Graphite	SFM	*	*
	IPT	*	*
	DOC	*	*
	WOC	*	*
	Grade	*	*

**NOTE:** 1. These parameters are for stable machining with steel bodies at lengths 4XD. See table below for longer applications.

2.  $RPM = 3.82 \times SFM / Dia.$

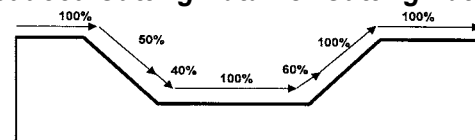
3.  $IPM = RPM \times IPT \times \# \text{ of flutes (or teeth)}$

### Additional Cutting Data For Longer Tools

Reach/Dia.	~4.0	4.0~4.5	4.5~5.3	5.3~5.7	5.7~6.2	6.3~
rpm %	100	90	80	80	75	70
Feed %	100	90	90	80	75	70

**NOTE:** The above percentages should be applied, according to tool ratio.

### Reduced Cutting Data For Cutting Pattern



**NOTE:** Feed should be reduced when cutting the above pattern



# QM Max

## *MQX Style For Finishing*



- High speed and high efficient finishing.
- Multiple insert choices - High Feed Milling, Shoulder Milling of steel & aluminum, Milling of high hardened steels, Finishing side & bottom face. See catalog A2 for High Feed and Shoulder Cutting.
- Low cutting force good for long reach applications.
- Able to machine most materials.
- G-body is a GN surface-hardening treatment on thermal resistant high strength steel giving a hardness over 65 HRC and secures insert pocket and holder against thermal deformation improving body durability.



# QM Max

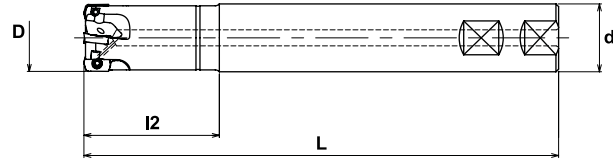
**INCH**

**METRIC**

## QM Max

New Generation of High Feed Mills

QXPS Style

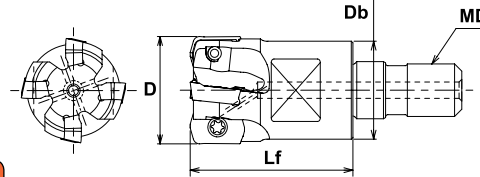


### Specifications - Inch

CATALOG NUMBER	STK	DIMENSIONS				INSERT	Q	PARTS	
		D	L	l2	d			Screw	Wrench
QXPS-3075-2.0-S075NP	•	.750	5.00	2.00	.750	ZPMT1003**ZER-PL ZPMT1003**ZER-NL ZPMT1003**ZER-SL YPHW1003**Z*R** YPHW100320ZER-24	3	TSW-2556H	T-08
QXPS-3075-3.0-S075NP	•	.750	6.25	3.00	.750		3		
QXPS-4100-2.0-S100NP	•	1.00	7.00	2.00	1.00		4	DSW-2563H	T-08
QXPS-4100-3.0-S100NP	•	1.00	8.00	3.00	1.00		4		
QXPS-5125-3.0-S125NP	•	1.25	5.50	3.00	1.25		5		
QXPS-5125-4.75-S125NP	•	1.25	8.00	4.75	1.25		5		
QXPS-6150-3.0-S125NP	•	1.50	5.50	3.00	1.50		6		
QXPS-6150-4.75-S125NP	•	1.50	8.00	4.75	1.50		6		

Note: All cutters are supplied without inserts or wrenches.

## MQX Style



### Specifications

	CATALOG NUMBER	STK	DIMENSIONS				HEAD TORQUE		INSERT	Q	PARTS	
			D	Lf	Db	MD	lbs./ft	Nm			Screw	Wrench
INCH	MQX-3075-M10	•	.750	1.18	.708	M10	11.8	16	ZPMT1003**ZER-PL ZPMT1003**ZER-NL ZPMT1003**ZER-SL YPHW1003**Z*R** YPHW100320ZER-24	3	TSW-2556H	T-08
	MQX-5100-M12	•	1.00	1.38	.809	M12	14.7	20		5	DSW-2563H	T-08
	MQX-5125-M16	•	1.25	1.69	1.14	M16	18.4	25		5		
METRIC	MQX-2016-M8	•	16	23	14	M8	11.8	16		2	TSW-2556H	T-08
	MQX-2017-M8	•	17	23	14	M8	11.8	16		2		
	MQX-3020-M10	•	20	30	18	M10	11.8	16		3		
	MQX-4020-M10	•	20	30	18	M10	11.8	16		4		
	MQX-4021-M10	•	21	30	18	M10	11.8	16		4		
	MQX-4025-M12	•	25	35	22.5	M12	14.7	20	4			
	MQX-5025-M12	•	25	35	22.5	M12	14.7	20	5	DSW-2563H	T-08	
	MQX-4026-M12	•	26	35	22.5	M12	14.7	20	4			
	MQX-5026-M12	•	26	35	22.5	M12	14.7	20	5			
	MQX-5030-M16	•	30	43	27	M16	18.4	25	5			
	MQX-5032-M16	•	32	43	29	M16	18.4	25	5			
	MQX-6032-M16	•	32	43	29	M16	18.4	25	6			
	MQX-5035-M16	•	35	43	29	M16	18.4	25	5			
	MQX-6035-M16	•	35	43	29	M16	18.4	25	6			
	MQX-6040-M16	•	40	43	32	M16	18.4	25	6			
	MQX-7040-M16	•	40	43	32	M16	18.4	25	7			
	MQX-6042-M16	•	42	43	32	M16	18.4	25	6			

See page A-77 for Modular Head Shanks.

Note: All cutters are supplied without inserts or wrenches.



INCH

METRIC

QM Max

QXP Style

G-Body



Fig. 1

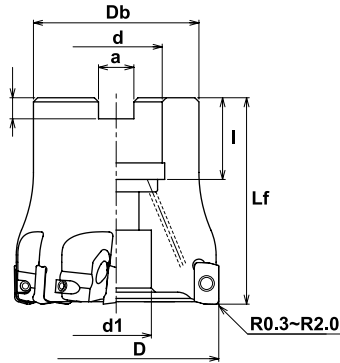
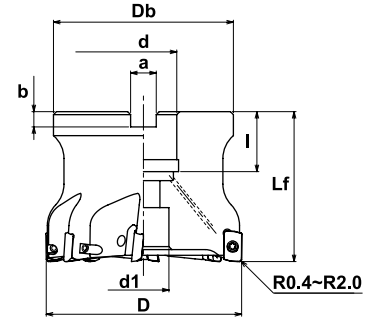


Fig. 2



Specifications - Inch

CATALOG NUMBER	STK	DIMENSIONS								FIG.	INSERT	Q	PARTS	
		D	Lf	Db	d	d1	a	b	l				Screw	Wrench
QXP-8200R-075	•	2.00	2.00	1.77	.750	.63	.319	.197	.750	1	ZPMT1003**ZER-PL ZPMT1003**ZER-NL ZPMT1003**ZER-SL YPHW100308Z*R-** YPHW100320ZER-24	8	DSW-2563H	T-08

Note: All cutters are supplied without inserts or wrenches.

Specifications - Metric

CATALOG NUMBER	STK	DIMENSIONS								FIG.	INSERT	Q	PARTS	
		D	Lf	Db	d	d1	a	b	l				Screw	Wrench
QXP-6040R-16	•	40	45	35	16	14	8.4	5.6	18	1	ZPMT1003**ZER-PL ZPMT1003**ZER-NL ZPMT1003**ZER-SL YPHW100308Z*R-** YPHW100320ZER-24	6	DSW-2563H	T-08
QXP-7040R-16	•	40	45	35	16	14	8.4	5.6	18	1		7		
QXP-7050R-22	•	50	50	40	22	17	10.4	6.3	20	1		7		
QXP-8050R	•	50	50	40	22.225	17	8.4	5	20	1		8		
QXP-8050R-22	•	50	50	40	22	17	10.4	6.3	20	1		8		
QXP-8052R-22	•	52	50	40	22	17	10.4	6.3	20	1		8		
QXP-8063R	•	63	50	48	22.225	17	8.4	5	20	1		8		
QXP-8063R-22	•	63	50	48	22	17	10.4	6.3	20	1		8		
QXP-8066R	•	66	50	60	22.225	17	8.4	5	20	2		8		
QXP-8066R-27	•	66	50	48	27	20	12.4	7	22	2	8			

Note: All cutters are supplied without inserts or wrenches.



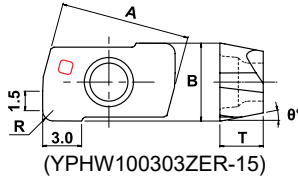
# QM Max

**INCH**

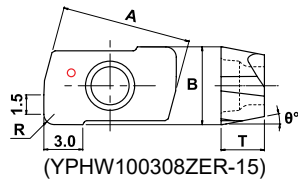
**METRIC**

## QM Max Inserts

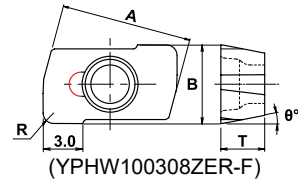
"Mirror Insert" for finishing side & bottom face  
(YPHW1003\*\*ZER-15) (YPHW100308ZTR-F1) (YPHW100308ZER-F)



(YPHW100303ZER-15)

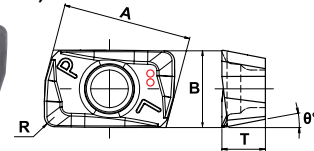


(YPHW100308ZER-15)

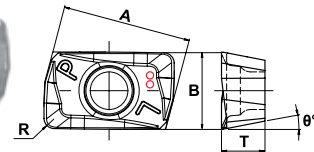


(YPHW100308ZER-F)

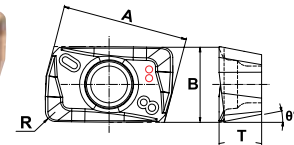
Shoulder insert for semi-finishing to side and bottom finishing  
(ZPMT100308ZER-PL)



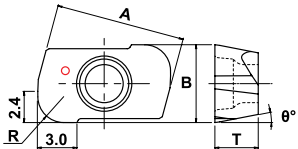
Shoulder insert for aluminum  
(ZPMT100308ZER-NL)



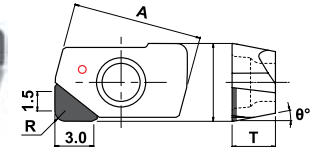
Shoulder insert for TiAlloy  
(ZPMT100308ZER-SL)



"Mirror Insert" for finishing side & bottom face and contouring  
(YPHW100320ZER-24)



CBN



### Specifications for inserts

CATALOG NUMBER	TOLERANCE	DIMENSIONS					COATED				CBN	CERMET	UNCOATED
							PVD COATED						
		A	T	B	R	Ø	JC8118	DH102	JC8015	JC7518			
ZPMT100304ZER-PL	M	10.08	3.4	6	0.4	11°	•	•			•		
ZPMT100308ZER-PL	M	10.08	3.4	6	0.8	11°	•	•			•		
ZPMT100320ZER-PL	M	10.08	3.4	6	2.0	11°	•	•			•		
ZPMT100304ZER-NL	M	10.08	3.4	6	0.4	11°						•	
ZPMT100308ZER-NL	M	10.08	3.4	6	0.8	11°						•	
ZPMT100320ZER-NL	M	10.08	3.4	6	2.0	11°						•	
ZPMT100304ZER-SL	M	10.08	3.4	6	0.4	11°				•			
ZPMT100308ZER-SL	M	10.08	3.4	6	0.8	11°				•			
ZPMT100320ZER-SL	M	10.08	3.4	6	2.0	11°				•			
YPHW100303ZER-15	H	10.06	3.35	6	0.3	11°		•	•		•		
YPHW100308ZER-15	H	10.08	3.35	6	0.8	11°		•			•		
YPHW100308ZER-F	H	10.06	3.35	6	0.8	11°			•				
YPHW100308ZER-F1	H	10.06	3.35	6	0.8	11°				•			
YPHW100320ZER-24	H	10.06	3.35	6	2.0	11°		•	•				



INCH

METRIC

### Recommended Cutting Data for QM Max - Side Finishing

Material	Parameters	ZPMT-PL	YPHW-F	YPHW-15/-24	YPHW-F1	ZPMT-NL	ZPMT-SL
Gray Cast Iron	SFM	1,200	1,200	1,200	2,500	*	*
	IPT	.010"	.008"	.008"	.004"	*	*
	DOC	.125"	.080"	.040"	.030"	*	*
	WOC	.010"	.008"	.008"	.004"	*	*
	Grade	DH102	JC8015	DH102	JBN795	*	*
Nodular Cast Iron	SFM	1,100	1,100	1,100	2,500	*	*
	IPT	.010"	.008"	.008"	.004"	*	*
	DOC	.080"	.080"	.040"	.030"	*	*
	WOC	.010"	.008"	.008"	.004"	*	*
	Grade	DH102	JC8015	DH102	JBN795	*	*
Carbon Steel	SFM	1,000	1,000	1,000	*	*	*
	IPT	.010"	.008"	.008"	*	*	*
	DOC	.125"	.080"	.040"	*	*	*
	WOC	.008"	.008"	.008"	*	*	*
	Grade	DH102	JC8015	DH102	*	*	*
Low Alloy Steel	SFM	1,000	1,000	1,000	*	*	*
	IPT	.008"	.008"	.008"	*	*	*
	DOC	.125"	.080"	.040"	*	*	*
	WOC	.008"	.008"	.008"	*	*	*
	Grade	DH102	JC8015	DH102	*	*	*
Mold Steel	SFM	900	900	900	*	*	*
	IPT	.008"	.008"	.008"	*	*	*
	DOC	.125"	.080"	.040"	*	*	*
	WOC	.010"	.008"	.008"	*	*	*
	Grade	DH102	JC8015	DH102	*	*	*
Tool & Die Steel (40-50 HRC)	SFM	750	750	750	2,000	*	*
	IPT	.006"	.006"	.006"	.004"	*	*
	DOC	.100"	.080"	.040"	.020"	*	*
	WOC	.008"	.008"	.008"	.003"	*	*
	Grade	DH102	JC8015	DH102	JBN795	*	*
Hardened Die Steel (50-60 HRC)	SFM	600	600	600	1,500	*	*
	IPT	.004"	.004"	.004"	.003"	*	*
	DOC	.080"	.060"	.030"	.015"	*	*
	WOC	.004"	.004"	.004"	.003"	*	*
	Grade	DH102	JC8015	DH102	JBN795	*	*
Stainless Steel	SFM	250	250	250	*	*	*
	IPT	.008"	.008"	.008"	*	*	*
	DOC	.080"	.060"	.030"	*	*	*
	WOC	.008"	.008"	.008"	*	*	*
	Grade	JC8118	JC8015	JC8015	*	*	*
Titanium	SFM	*	*	*	*	*	300
	IPT	*	*	*	*	*	.005"
	DOC	*	*	*	*	*	.040"
	WOC	*	*	*	*	*	.004"
	Grade	*	*	*	*	*	JC7518
Inconel	SFM	*	*	*	*	*	300
	IPT	*	*	*	*	*	.005"
	DOC	*	*	*	*	*	.040"
	WOC	*	*	*	*	*	.004"
	Grade	*	*	*	*	*	JC7518
Aluminum	SFM	*	*	*	*	2,000	*
	IPT	*	*	*	*	.008"	*
	DOC	*	*	*	*	.080"	*
	WOC	*	*	*	*	.010"	*
	Grade	*	*	*	*	FC18	*

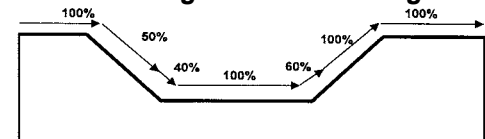
**NOTE:** 1. These parameters are for stable machining with steel bodies at lengths 4XD. See table below for longer applications.  
 2. RPM = 3.82 x SFM / Dia.  
 3. IPM = RPM x IPT x # of flutes (or teeth)

### Additional Cutting Data For Longer Tools

Reach/Dia.	~4.0	4.0~4.5	4.5~5.3	5.3~5.7	5.7~6.2	6.3~
rpm %	100	90	80	80	75	70
Feed %	100	90	90	80	75	70

**NOTE:** The above percentages should be applied, according to tool ratio.

### Reduced Cutting Data For Cutting Pattern



**NOTE:** Feed should be reduced when cutting the above pattern





# QM Max

**INCH**
**METRIC**

## Recommended Cutting Data for QM Max - Bottom Finishing

Material	Parameters	ZPMT-PL	YPHW-F	YPHW-15/-24	YPHW-F1	ZPMT-NL	ZPMT-SL
Gray Cast Iron	SFM	840	840	840	1,750	*	*
	IPT	.008"	.010"	.012"	.004"	*	*
	DOC	.008"	.008"	.010"	.003"	*	*
	WOC	60%	60%	60%	60%	*	*
	Grade	DH102	JC8015	DH102	JBN795	*	*
Nodular Cast Iron	SFM	770	770	770	1,750	*	*
	IPT	.008"	.010"	.012"	.004"	*	*
	DOC	.008"	.008"	.010"	.003"	*	*
	WOC	60%	60%	60%	60%	*	*
	Grade	DH102	JC8015	DH102	JBN795	*	*
Carbon Steel	SFM	700	700	700	*	*	*
	IPT	.010"	.010"	.012"	*	*	*
	DOC	.008"	.008"	.010"	*	*	*
	WOC	60%	60%	60%	*	*	*
	Grade	DH102	JC8015	DH102	*	*	*
Low Alloy Steel	SFM	700	700	700	*	*	*
	IPT	.008"	.010"	.012"	*	*	*
	DOC	.006"	.008"	.010"	*	*	*
	WOC	60%	60%	60%	*	*	*
	Grade	DH102	JC8015	DH102	*	*	*
Mold Steel	SFM	630	630	630	*	*	*
	IPT	.006"	.008"	.010"	*	*	*
	DOC	.006"	.008"	.010"	*	*	*
	WOC	60%	60%	60%	*	*	*
	Grade	DH102	JC8015	DH102	*	*	*
Tool & Die Steel (40-50 HRC)	SFM	525	525	525	1,400	*	*
	IPT	.006"	.006"	.008"	.004"	*	*
	DOC	.005"	.008"	.008"	.003"	*	*
	WOC	60%	60%	60%	60%	*	*
	Grade	DH102	JC8015	DH102	JBN795	*	*
Hardened Die Steel (50-60 HRC)	SFM	420	420	420	1,050	*	*
	IPT	.004"	.004"	.006"	.003"	*	*
	DOC	.004"	.005"	.005"	.003"	*	*
	WOC	40%	40%	40%	60%	*	*
	Grade	DH102	JC8015	DH102	JBN795	*	*
Stainless Steel	SFM	175	175	175	*	*	*
	IPT	.008"	.010"	.012"	*	*	*
	DOC	.006"	.008"	.010"	*	*	*
	WOC	60%	60%	60%	*	*	*
	Grade	JC8118	JC8015	JC8015	*	*	*
Titanium	SFM	*	*	*	*	*	210
	IPT	*	*	*	*	*	.005"
	DOC	*	*	*	*	*	.006"
	WOC	*	*	*	*	*	40%
	Grade	*	*	*	*	*	JC7518
Inconel	SFM	*	*	*	*	*	70
	IPT	*	*	*	*	*	.003"
	DOC	*	*	*	*	*	.005"
	WOC	*	*	*	*	*	40%
	Grade	*	*	*	*	*	JC7518
Aluminum	SFM	*	*	*	*	1,400	*
	IPT	*	*	*	*	.008"	*
	DOC	*	*	*	*	.080"	*
	WOC	*	*	*	*	.010"	*
	Grade	*	*	*	*	FC18	*

**NOTE:** 1. These parameters are for stable machining with steel bodies at lengths 4XD. See table below for longer applications.

2. RPM = 3.82 x SFM / Dia.

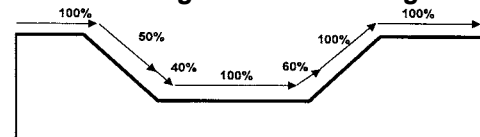
3. IPM = RPM x IPT x # of flutes (or teeth)

### Additional Cutting Data For Longer Tools

Reach/Dia.	~4.0	4.0~4.5	4.5~5.3	5.3~5.7	5.7~6.2	6.3~
rpm %	100	90	80	80	75	70
Feed %	100	90	90	80	75	70

**NOTE:** The above percentages should be applied, according to tool ratio.

### Reduced Cutting Data For Cutting Pattern



**NOTE:** Feed should be reduced when cutting the above pattern

**INCH****METRIC****Recommended Cutting Data for QM Max - Vertical Side Finishing**

Material	Parameters	YPHW-15	YPHW-F
Gray Cast Iron	SFM	1,800	1,800
	IPT	.006"	.006"
	Peck Feed	.020" x D	.020" x D
	WOC	< .008"	< .008"
	Grade	JC8015	JC8015
Nodular Cast Iron	SFM	1,800	1,800
	IPT	.006"	.006"
	Peck Feed	.020" x D	.020" x D
	WOC	< .008"	< .008"
	Grade	JC8015	JC8015
Carbon Steel	SFM	1,480	1,480
	IPT	.007"	.007"
	Peck Feed	.020" x D	.020" x D
	WOC	< .008"	< .008"
	Grade	JC8015	JC8015
Low Alloy Steel	SFM	1,310	1,310
	IPT	.007"	.007"
	Peck Feed	.020" x D	.020" x D
	WOC	< .008"	< .008"
	Grade	JC8015	JC8015
Mold Steel	SFM	1,150	1,150
	IPT	.006"	.006"
	Peck Feed	.020" x D	.020" x D
	WOC	< .008"	< .008"
	Grade	JC8015	JC8015
Tool & Die Steel (40-50 HRC)	SFM	560	560
	IPT	.004"	.004"
	Peck Feed	.020" x D	.020" x D
	WOC	< .006"	< .006"
	Grade	DH102	JC8015
Hardened Die Steel (50-60 HRC)	SFM	*	*
	IPT	*	*
	Peck Feed	*	*
	WOC	*	*
	Grade	*	*
Stainless Steel	SFM	*	*
	IPT	*	*
	Peck Feed	*	*
	WOC	*	*
	Grade	*	*
Titanium	SFM	*	*
	IPT	*	*
	Peck Feed	*	*
	WOC	*	*
	Grade	*	*
Inconel	SFM	*	*
	IPT	*	*
	Peck Feed	*	*
	WOC	*	*
	Grade	*	*

- NOTE:** 1. These parameters are for stable machining with steel bodies at lengths 4XD. See table below for longer applications.  
 2. RPM = 3.82 x SFM / Dia.  
 3. IPM = RPM x IPT x # of flutes (or teeth)





# BackDraft

## High Productivity Radius Endmill



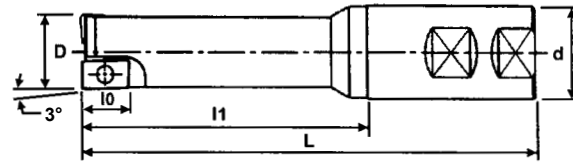
- Predominantly for cavity milling and profile milling.
- Available in CBN for bottom face finishing.
- DBD-F style has 2mm side wiper which allows for side & bottom finishing.
- DBD-30 style insert has a wider wiper and large radius shape for better surface finishing.
- Capable of using from roughing to finishing applications.



## BackDraft

**INCH**

### BACKDRAFT - END MILL STYLE



#### Specifications

CATALOG NUMBER	STK	DIMENSIONS						INSERT	Q	PARTS	
		D	L	I0	I1	I2	d			Screw	Wrench
DBD-2100AR-S3.1-S125	•	1.00	5.45	.656	3.17	2.67	1.25	DBD-187-... DBD-170408...	2	DSW-4075	T-15
DBD-2100AR-S4.7-S125	•	1.00	7.00	.656	4.72	4.22	1.25				
DBD-2100AR-S5.5-S125	•	1.00	7.78	.656	5.50	5.00	1.25				
DBD-2100AR-S6.3-S125	•	1.00	8.58	.656	6.30	5.80	1.25				
DBD-2125AR-S4.7-S125	•	1.25	7.39	.656	4.70	4.21	1.25	DBD-187-... DBD-170408...	2	DSW-4085	T-15
DBD-2125AR-S5.9-S125	•	1.25	8.60	.656	5.91	5.42	1.25				

Note: All cutters are supplied without inserts or wrenches.

### BACKDRAFT - FACE MILL & END CAP STYLE



Fig. 1

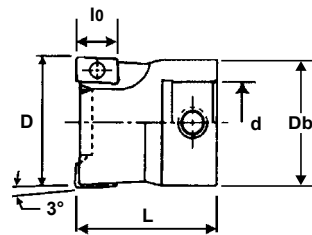
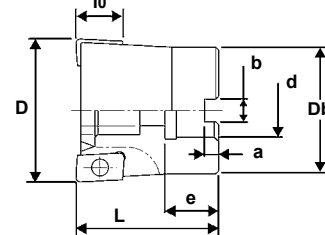


Fig. 2



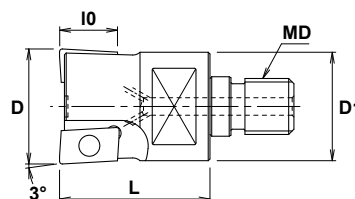
#### Specifications

CATALOG NUMBER	STK	DIMENSIONS								FIG.	INSERT	Q	PARTS	
		D	L	Db	I0	d	a	b	e				Screw	Wrench
DBD-4200-EC-AR	•	2.00	2.25	1.93	.656	1.25	-	-	-	1	DBD-187-... DBD-170408...	4	DSW-4085 ECS-0030	T-15 A-316
DBD-4200-75R-AR	•	2.00	2.00	1.77	.656	.750	.196	.318	.750	2		4	DSW-4085	T-15
DBD-5250-100R	•	2.50	2.00	2.16	.656	1.00	.236	.374	.945	2		5		

Note: All cutters are supplied without inserts or wrenches.

### MODULAR HEADS

#### MDB type



#### Specifications

CATALOG NUMBER	STK	DIMENSIONS					HEAD TORQUE		INSERT	Q	PARTS	
		D	L	I0	D1	MD	lbs./ft	Nm			Screw	Wrench
MDB-2100-M12	•	1.00	1.38	.656	.905	M12	14.7	20	DBD-187-... DBD-170408...	2	DSW-4075	T-15

See page A-77 for Modular Head Shanks

Note: All cutters are supplied without inserts or wrenches.



**METRIC**

# BackDraft

## BACKDRAFT - END MILL & FACE MILL STYLE



Fig. 1

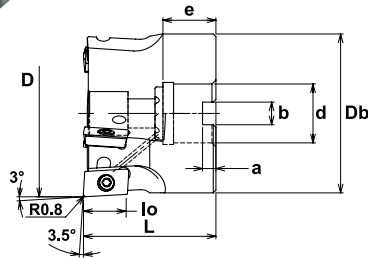
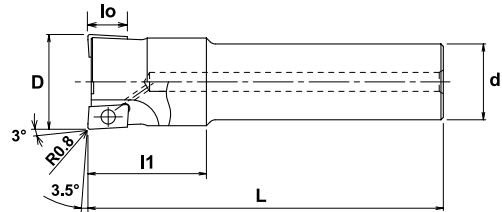


Fig. 2



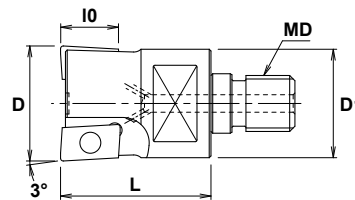
### Specifications

CATALOG NUMBER	STK	DIMENSIONS									INSERT	Q	PARTS	
		D	L	I0	Db	d	b / I1	a	e	FIG.			Screw	Wrench
DBD-4050R	•	50	50	16	47	22.225	8.4	5	20	1	DBD-187-... DBD-170408...	4	DSW-4085	A-15T
DBD-4050R-22	•	50	50	16	47	22	10.4	6.3	20	1		4		
DBD-5063R	•	63	50	16	60	22.225	8.4	5	20	1		5		
DBD-5063R-22	•	63	50	16	60	22	10.4	6.3	20	1		5		
DBD-5063R-27	•	63	50	16	60	27	12.4	7	22	1		5		
DBD-6080R	•	80	63	16	76	31.75	12.7	8	32	1		6		
DBD-6080R-27	•	80	50	16	76	27	12.4	7	22	1		6		
DBD-3040-50-S32	•	40	150	16	-	32	50	-	-	2		3		
DBD-3040-50L-S32	•	40	250	16	-	32	50	-	-	2	3			

Note: All cutters are supplied without inserts or wrenches.

### MODULAR HEADS

#### MDB type



### Specifications

CATALOG NUMBER	STK	DIMENSIONS					HEAD TORQUE		INSERT	Q	PARTS	
		D	L	I0	D1	MD	lbs./ft	Nm			Screw	Wrench
MDB-1020-M10	•	20	35	16	19	M10	11.8	16	DBD-187-... DBD-170408...	1	DSW-4075	A-15T
MDB-2025-M12	•	25	35	16	23	M12	14.7	20		2		
MDB-2026-M12	•	26	35	16	24	M12	14.7	20		2		
MDB-2032-M16	•	32	43	16	30	M16	18.4	25		2		
MDB-2033-M16	•	33	43	16	31	M16	18.4	25		2		
MDB-3040-M16	•	40	43	16	32	M16	18.4	25		3		

See page A-77 for Modular Head Shanks

Note: All cutters are supplied without inserts or wrenches.



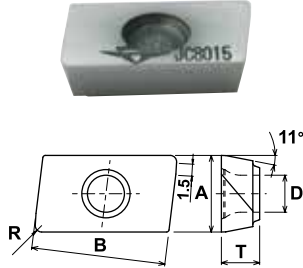
# BackDraft

**INCH**

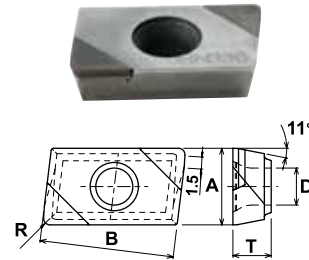
**METRIC**

## BACKDRAFT INSERTS

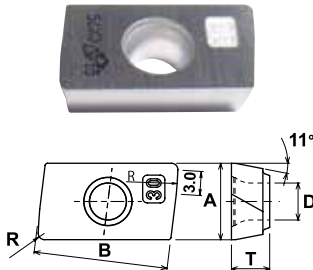
**Fig. 1** For bottom face finishing  
DBD-187-\* (JC8015, CX90)



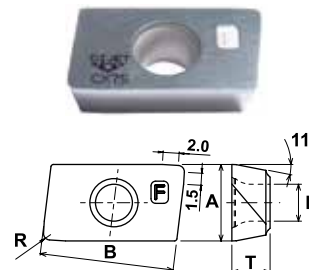
**Fig. 2** For bottom face finishing  
DBD-187-031 (JBN500)



**Fig. 3** For bottom face finishing & better surface roughness  
DBD170408-30 (DH103, CX75)



**Fig. 4** For finishing side & bottom face at once  
DBD170408-F (DH103, CX75)



CATALOG NUMBER	A	B	T	R	D	FIG.	STOCK				
							CBN	COATED			CERMET
								JBN500	DH103	JC8015	
DBD-187-031	.375	.656	.187	.031	.181	1			•		•
DBD-187-031	.375	.656	.187	.031	.181	2	•				
DBD-187-062	.375	.656	.187	.062	.181	1			•		
DBD-187-125	.375	.656	.187	.125	.181	1			•		
DBD-170408-30	.375	.656	.187	.031	.181	3		•			•
DBD-170408-F	.375	.656	.187	.031	.181	4		•			•





**INCH**

# BackDraft

## Recommended Cutting Data for BackDraft

Material	Application	Grade	SFM	IPT	DOC	WOC
Gray Cast Iron (200-250 HB)	Rough	JC8015	600	.010"	.040"	60%
	Finish	DH103	900	.005"	.010"	60%
	CBN	JBN500	1,500	.010"	.010"	40%
Nodular Cast Iron (180-250 HB)	Rough	JC8015	600	.010"	.040"	60%
	Finish	DH103	900	.005"	.010"	60%
	CBN	JBN500	1,500	.010"	.010"	40%
Carbon Steel	Rough	JC8015, CX90	650	.010"	.020"	60%
	Finish	DH103, CX75	700	.005"	.010"	60%
	CBN	*	*	*	*	*
Low Alloy Steel	Rough	JC8015	450	.010"	.020"	60%
	Finish	DH103	600	.005"	.010"	60%
	CBN	JBN500	1,500	.008"	.010"	40%
Mold Steel (30-40 HRC)	Rough	JC8015, CX90	500	.015"	.025"	60%
	Finish	DH103, CX75	500	.008"	.010"	40%
	CBN	*	*	*	*	*
Tool & Die Steel (40-50 HRC)	Rough	JC8015	400	.008"	.015"	40%
	Finish	DH103	700	.005"	.008"	40%
	CBN	JBN500	1,500	.006"	.008"	30%
Hardened Die Steel (50-60 HRC)	Rough	JC8015	250	.005"	.010"	40%
	Finish	DH103	500	.005"	.005"	30%
	CBN	JBN500	1,200	.006"	.006"	20%
Stainless Steel (45 HRC)	Rough	JB8015	300	.015"	.020"	60%
	Finish	JC8015	500	.008"	.010"	40%
	CBN	*	*	*	*	*

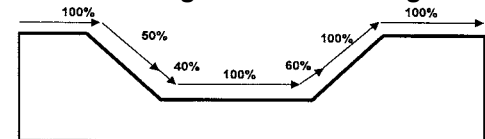
**NOTE:** 1. Above parameters for bodies at lengths of 4XD. See table below for longer applications.  
 2. RPM = 3.82 x SFM / Dia.  
 3. IPM = RPM x IPT x # of flutes (or teeth)

### Additional Cutting Data For Longer Tools

Reach/Dia.	~4.0	4.1~4.5	4.6~5.3	5.4~5.7	5.8~6.2	6.3~6.8	6.9~
rpm %	100	90	80	80	75	70	65
Feed %	100	90	90	80	75	70	65

**NOTE:** The above percentages should be applied, according to tool ratio.

### Reduced Cutting Data For Cutting Pattern



**NOTE:** Feed should be reduced when cutting the above pattern

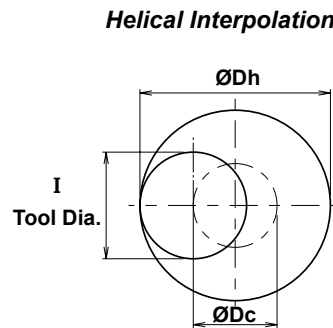
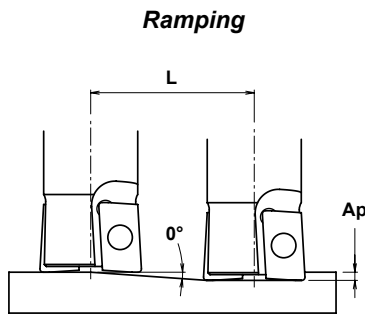


# BackDraft

INCH

METRIC

## HELICAL INTERPOLATION CUTTING DATA



- Calculation of tool pass dia.

$$\text{Tool pass dia. } \varnothing D_c = \text{Bore dia. } \varnothing D_h - \text{Tool Dia. } I$$

Tool pass dia.      Bore dia.      Tool Dia.

- Down cutting is recommended, tool pass rotation should be counterclockwise.
- Depth of cut per one circuit should not exceed max. depth of cut  $A_p$ .
- In case of ramping and helical interpolation, apply 70% or less feed (F) from standard cutting condition table.

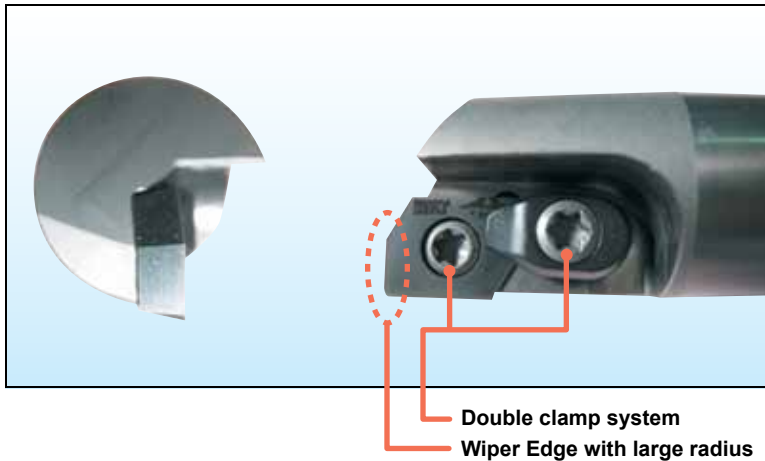
	TOOL DIAMETER I	INSERT CORNER RADIUS	EFFECTIVE CUTTING DIA.	MAX. DEPTH OF CUT: $A_p$	RAMPING		HELICAL INTERPOLATION		MAXIMUM DRILLING DEPTH: Z
					MAX. RAMP ANGLE	TOTAL CUTTING LENGTH AT MAX $A_p$ : L	MIN. BORE DIAMETER: $D_h$ min	TOOL PASS DIAMETER: $D_c$	
INCH	1.00	.031	.900	.016	1°30'	.600	1.37	1.88	.012
	1.00	.062	.850	.016	1°30'	.600	1.37	1.88	.012
	1.25	.031	1.15	.016	1°	.900	1.87	2.38	.012
	1.25	.062	1.10	.016	1°	.900	1.87	2.38	.012
	2.00	.031	1.90	.016	0°30'	1.80	3.37	3.88	.012
	2.00	.062	1.85	.016	0°30'	1.80	3.37	3.88	.012
	2.50	.031	2.40	.016	0°25'	2.17	4.37	4.88	.012
	2.50	.062	2.35	.016	0°25'	2.17	4.37	4.88	.012
METRIC	20	0.8	18	0.4	2°	11.5	25	37	0.3
	20	1.6	16	0.4	2°	11.5	25	37	0.3
	25	0.8	23	0.4	1°30'	15.3	34	47	0.3
	25	1.6	21	0.4	1°30'	15.3	34	47	0.3
	26	0.8	24	0.4	1°30'	15.3	36	49	0.3
	26	1.6	22	0.4	1°30'	15.3	36	49	0.3
	32	0.8	30	0.4	1°	22.9	48	61	0.3
	32	1.6	28	0.4	1°	22.9	48	61	0.3
	33	0.8	31	0.4	1°	22.9	50	63	0.3
	33	1.6	29	0.4	1°	22.9	50	63	0.3
	40	0.8	38	0.4	0°45'	30.5	64	77	0.3
	40	1.6	36	0.4	0°45'	30.5	64	77	0.3
	50	0.8	48	0.4	0°30'	45.8	82	97	0.3
	50	1.6	46	0.4	0°30'	45.8	82	97	0.3
	63	0.8	61	0.4	0°25'	55.1	110	123	0.3
	63	1.6	59	0.4	0°25'	55.1	110	123	0.3
80	0.8	78	0.4	0°20'	68.8	114	157	0.3	
80	1.6	76	0.4	0°20'	68.8	114	157	0.3	

# Finish-One

## Finishing Indexable End Mill

### Features:

- Can attain 1um or less surface finish on 2D work.
- Finish achieved using wiper edge with large radius.
- No tool deflection occurs due to single cutting edge design.
- Insert available in DV coated and cermet.



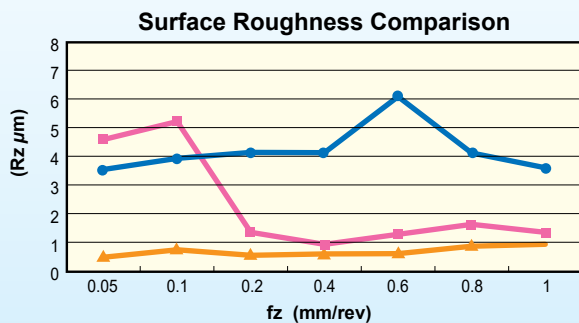
### PERFORMANCE RESULTS

**Material:** Carbon Steel (S50C)  
(200-250HB)

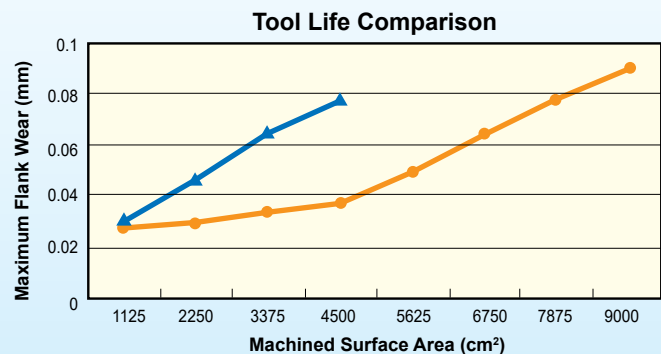
**Tool:** T-Fon-1200 (Ø20mm)

**Insert:** LDGW120308

**Running Parameters:**  
n=4775 min<sup>-1</sup>  
ap=0.1mm  
ap=10mm

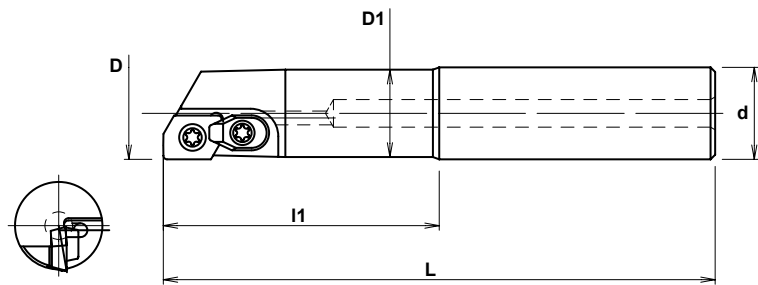


● RNM-200-R10 JC8015  
■ T-FON-1200 JC8003  
▲ T-FON-1200 CX75



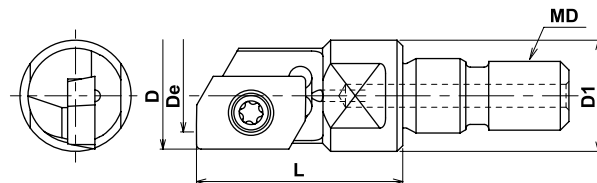
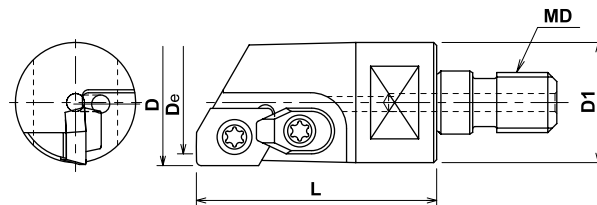
● T-FON-1200 CX75  
▲ RNM-200-R10 JC8015

# Finish-One Indexable End Mill

**METRIC**
**T-Fon type**
**G-Body**

**Specifications**

CATALOG NUMBER	STK	DIMENSIONS					INSERT	Q	PARTS		
		D	D1	L	I1	d			Screw	Wrench	Clamp
T-FON1160	•	16	15	110	60	16	LDGW120308	1	CSW-406H	T-15	DCM-18
T-FON1200	•	20	19	120	60	20	LDGW120308	1	CSW-408H	T-15	DCM-18

**Note: All cutters are supplied without inserts or wrenches.**
**MODULAR HEADS**
**MFO type**

**Fig. 1**

**Fig. 2**

**Specifications**

CATALOG NUMBER	STK	DIMENSIONS					HEAD TORQUE		FIG.	INSERT	Q	PARTS		
		D	De	L	D1	MD	lbs./ft	Nm				Screw	Clamp	Wrench
MFO-100-M6	•	10	7	18	9.7	M6	5.9	8	1	LPGW090204	1	CSW-2547	-	T-07
MFO-120-M6	•	12	9	20	11.5	M6	5.9	8	1		1			
MFO-170-M8	•	17	13.5	40	16	M8	11.8	16	2	LDGW120308	1	CSW-406H	DCM-18	T-15
MFO-210-M10	•	21	17.5	40	20	M10	11.8	16	2		2			

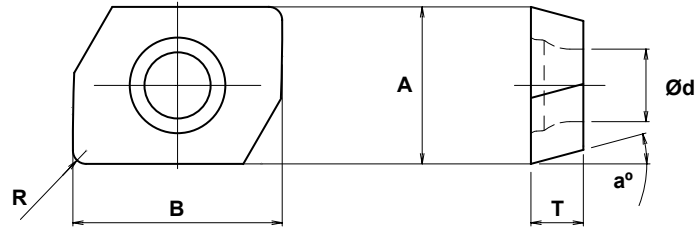
**See page A-77 for Modular Head Shanks**
**Note: All cutters are supplied without inserts or wrenches.**



**METRIC**

## Finish-One Indexable End Mill

### T-Fon type Inserts



### Specifications

CATALOG NUMBER	IC TOLERANCE	DIMENSIONS						PVD COATED		CERMET
		A	B	T	R	d	a°	JC8003	DH103	CX75
LPGW090204	G	6.35	9.525	2.38	0.4	2.8	11		•	•
LDGW120308		9.525	12.7	3.18	0.8	4.4	15	•	•	•

### Recommended Cutting Data for Finish-One

Material	Grade	SFM	IPT	DOC	WOC
Gray Cast Iron (200-250 HB)	JC8003 / DH103	1,500	.015"	.005"	60%
Nodular Cast Iron (180-250 HB)	JC8003 / DH103	1,200	.015"	.005"	60%
Carbon Steel	JC8003 / DH103, CX75	650	.012"	.004"	60%
Low Alloy Steel	JC8003 / DH103	500	.010"	.004"	60%
Mold Steel (30-40 HRC)	JC8003 / DH103, CX75	700	.015"	.004"	60%
Tool & Die Steel (40-50 HRC)	JC8003 / DH103	400	.008"	.003"	60%
Hardened Die Steel (50-60 HRC)	JC8003 / DH103	200	.006"	.003"	60%

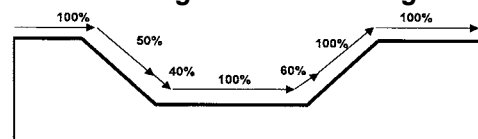
NOTE: 1. Above parameters for bodies at lengths of 4XD. See table below for longer applications.  
 2. RPM = 3.82 x SFM / Dia.  
 3. IPM = RPM x IPT x # of flutes (or teeth)

### Additional Cutting Data For Longer Tools

Reach/Dia.	~4.0	4.1~4.5	4.6~5.3	5.4~5.7	5.8~6.2	6.3~6.8	6.9~
rpm %	100	90	80	80	75	70	65
Feed %	100	90	90	80	75	70	65

NOTE: The above percentages should be applied, according to tool ratio.

### Reduced Cutting Data For Cutting Pattern



NOTE: Feed should be reduced when cutting the above pattern





Up & Down Milling



Up & Down Milling

# Back & Forth Cutter

## *High Speed Side Milling*



- Excellent for finishing vertical walls with high accuracy.
- Can cut in both directions for shorter machining time.
- Less deflection due to plunge style finishing.
- Available in CBN for super-finishing, leaving an excellent surface finish.



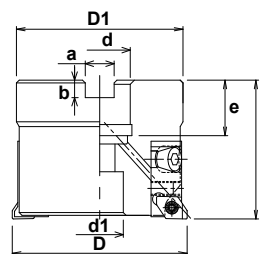
# Back & Forth Cutter

**METRIC**

## FACE MILL

### PFC Type

- High speed side milling by up & down cutting.
- From semi to super finishing



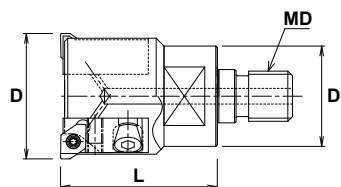
### Specifications

CATALOG NUMBER	STK	DIMENSIONS								INSERT	Q	PARTS		
		D	D1	L	d	d1	a	b	e			Insert Screw / Wrench	Cartridge / Adjustable Radial Screw	Cartridge Set Bolt / Cartridge Wrench
PFC-4050R-22	•	50	47	50	22	17	10.4	6.3	20	DPGT0903-W3	4	DSW-307H T-10SD	SDGPR09CA-PFC RSW-05008	HCS5-10 LW-040
PFC-4063R-22	•	63	60	50	22	17	10.4	6.3	20		4			
PFC-6063R-22	•	63	60	50	22	17	10.4	6.3	20		6			
PFC-6063R-27	•	63	60	50	27	20	12.4	7	22		6			
PFC-4080R-27	•	80	76	50	27	20	12.4	7	22		4			
PFC-8080R-27	•	80	76	50	27	20	12.4	7	22		8			
PFC-4080R	•	80	76	63	31.75	26	12.7	8	32		4			
PFC-8080R	•	80	76	63	31.75	26	12.7	8	32		8			

Note: All cutters are supplied without inserts or wrenches.

## MODULAR HEAD

### MPF Type



### Specifications

CATALOG NUMBER	STK	DIMENSIONS				HEAD TORQUE Nm	INSERT	Q	PARTS		
		D	L	D1	MD				Insert Screw / Wrench	Cartridge / Adjustable Radial Screw	Cartridge Set Bolt / Cartridge Wrench
MPF-2030-M16	•	30	50	28	M16	25	DPGT0903-W3	2	DSW-307H T-10SD	SDGPR09CA-PFC RSW-05008	HCS5-10 LW-040
MPF-2033-M16	•	33	50	32	M16	25		2			
MPF-3040-M16	•	40	50	32	M16	25		3			

See page A-77 for Modular Head Shanks

Note: All cutters are supplied without inserts or wrenches.

## INSERT



Fig. 1

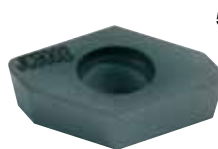
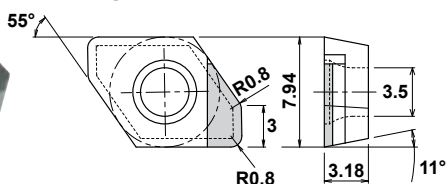
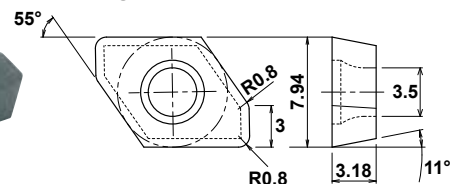


Fig. 2



### Specifications

CATALOG NUMBER	DIMENSIONS			COATED (Fig. 2)		CBN (Fig. 1)	
	IC	T	IC TOLERANCE	JC8003	DH102	JBN795	JBN500
DPGT0903-W3	7.94	3.18	G	•	•	•	•



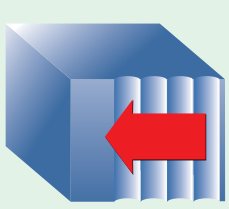


**METRIC**

# Back & Forth Cutter

High speed and high accuracy finishing can be achieved. ➔ Surface roughness and deflection: 0.01mm or less (feed & pick direction).

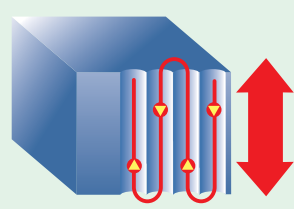
**Current method: by end mill**



- Long machining time
- Deflection and waviness problems are common.

➔

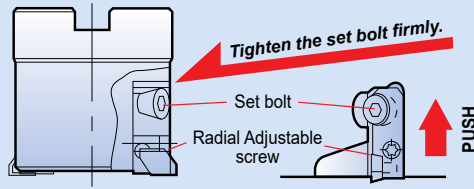
**Improved method: by up and down cutting motion**



- Short machining time
- Excellent surface finish
- Deflection & waviness are eliminated

Excellent verticalness and surface finish

**STEP 1**



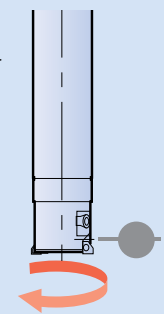
Tighten the set bolt firmly.

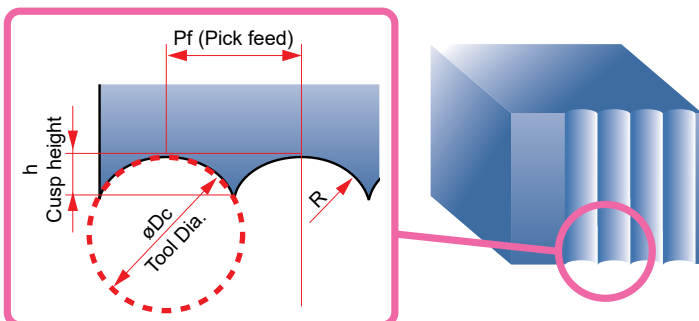
Labels: Set bolt, Radial Adjustable screw, PUSH

- 1) Loosen the all radial adjustable screws on cartridges.
- 2) Tighten the set bolt after cartridge is pushed against axial pocket side.
- 3) Set the cutter body on arbor.

**STEP 2 On the machine**

- 4) Measure the O.D. run out on machine. Using the highest insert, adjust the lower insert to the same height by tightening the radial adjustable screw. Do the adjustment while set bolt is tightened firmly. Do not loosen it.
- O.D. run out must be 0.01 mm or less. Target 0.005mm.





$$h \text{ (Cusp height) } \mu\text{m} = \frac{(Pf)^2}{8R} \times 1000$$


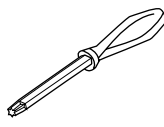
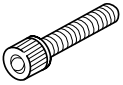
$$R: \frac{\phi Dc \text{ (Tool dia.)}}{2}$$

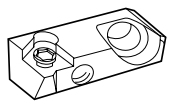

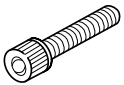

It is efficient to use large diameter cutter to increase the pick feed. But large diameter cutter may cause interference in case of complex work.



## Back & Forth Cutter

**METRIC**

Insert Screw	Insert Screw Wrench	Bolt
 Torque 2.1 N-m		
DSW-307H	T-10SD	M12 x 1.75 x 30

Cartridge	Adjustable Radial Screw	Cartridge Set Bolt	Cartridge Bolt Wrench
			
SDGPR09CA-PFC	RSW-05008	HCS5-10	LW-040

### Recommended Cutting Data for Back & Forth

Material	Application	Grade	SFM	IPT	DOC	WOC
Gray Cast Iron (200-250 HB)	Finish	JC8003	1,300	.006"	.004"	.006" - .030"
	CBN	JBN500	4,000	.006"	.004"	.004" - .012"
Nodular Cast Iron (180-250 HB)	Finish	JC8003	1,200	.006"	.004"	.006" - .030"
	CBN	JBN500	3,500	.006"	.004"	.004" - .012"
Carbon Steel	Finish	JC8003	650	.006"	.008"	.006" - .030"
	CBN	*	*	*	*	*
Low Alloy Steel	Finish	JC8003	650	.006"	.004"	.006" - .030"
	CBN	*	*	*	*	*
Mold Steel (30-40 HRC)	Finish	JC8003, DH102	900	.006"	.006"	.006" - .025"
	CBN	JBN795	1,400	.006"	.004"	.004" - .010"
Tool & Die Steel (40-52 HRC)	Finish	DH102	750	.004"	.004"	.004" - .020"
	CBN	JBN795	1,500	.004"	.004"	.004" - .010"

NOTE: 1. RPM = 3.82 x SFM / Dia.  
 2. IPM = RPM x IPT x # of flutes (or teeth)

# Finish Jet Mill

## Super Finishing Cutter

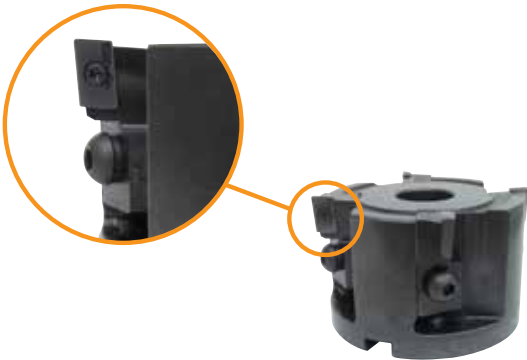


- Combination of both finishing & roughing cartridges allow stable finishing.

- Able to use 4 finishing cartridges when depth of cut is below 0.1mm.

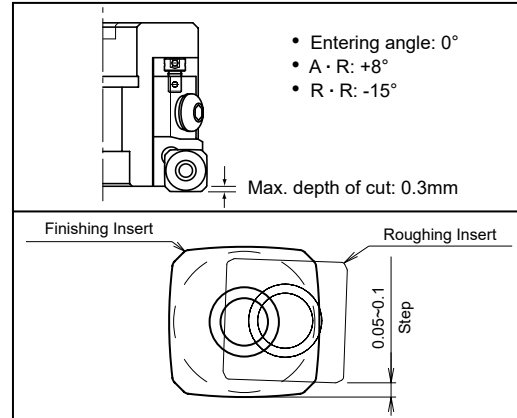
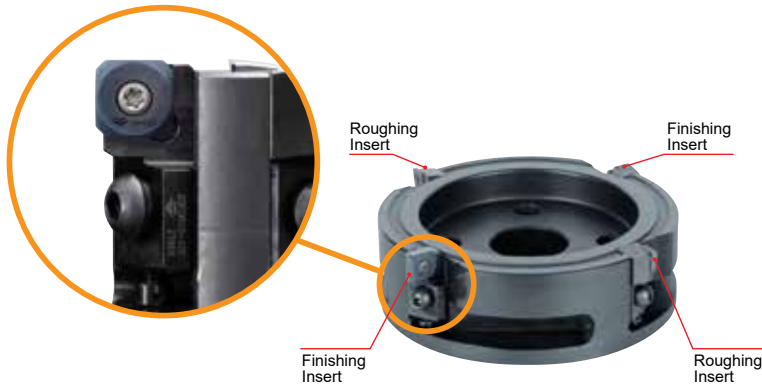
- Can fit the Backdraft cartridges/inserts for shoulder milling.

- One body is able to use any of the cartridges, easy to adjust face run out.



# Finish Jet Mill

**METRIC**



## FACE MILL FJM Type

- For super finishing, using a combination of 2 finishing inserts & 2 roughing inserts, giving a stable finishing quality
- Higher feed speed can be achieved by using 4 effective finishing cartridges with  $a_p$  of  $<0.1\text{mm}$



Fig.1

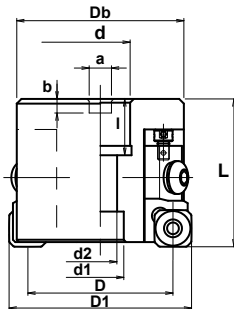


Fig.2

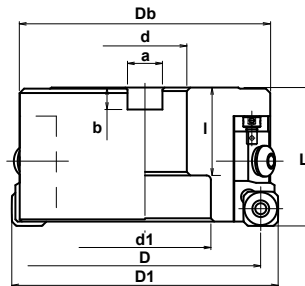
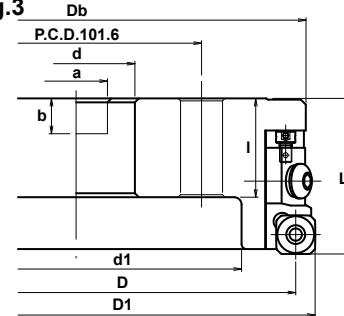


Fig.3



## Specifications

CATALOG NUMBER	STK	DIMENSIONS										FIG.	PARTS		
		D1	D	Db	L	d	d1	d2	a	b	l		Insert Cartridge Insert Screw	Cartridge Parts: Bolt Bolt Ring Adjustable Rest Button	Wrenches
FJM-4080R	•	80	65	71	63	25.4	20	14.3	9.5	6	24	1	SDHW1504ADFN-* (2) SSFDR15-15F (2) SPHW1203ZPTR (2) SSFPR15-12R (2) DSW-4510H	BBH-825 SBZ-8 ADS-513	A-20 (80-200Ø) A-20L (250Ø) LW-050 AD-2080
FJM-4080R-27	•	80	65	71	63	27	20	14.3	12.4	7	22	1			
FJM-4100R	•	100	85	90	63	31.75	26	17	12.7	8	32	1			
FJM-4100R-32	•	100	85	90	63	32	26	17	14.4	8	32	1			
FJM-4125R	•	125	110	114	63	38.1	60	-	15.9	10	40	2			
FJM-4125R-40	•	125	110	114	63	40	60	-	16.4	9	40	2			
FJM-4160R	•	160	145	148	63	50.8	75	-	19	11	40	2			
FJM-4160R-40	•	160	145	148	63	40	75	-	16.4	9	40	2			
FJM-4200R	•	200	185	186	63	47.625	134	-	25.4	14.3	40	3			
FJM-4200R-60	•	200	185	186	63	60	134	-	25.7	14	40	3			
FJM-4250R	•	250	235	237	63	47.625	182	-	25.4	14.3	40	3			
FJM-4250R-60	•	250	235	237	63	60	182	-	25.7	14	40	3			

Note: All cutters are supplied without inserts or wrenches.

**METRIC**
**Finish Jet Mill**
**FACE MILL**
**FJM-F4 Type**

- Super finishing with higher feed speed is achieved by using 4 effective finishing cartridges with ap of <0.1mm



Fig.1

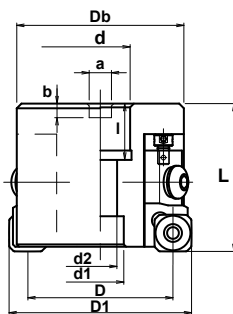


Fig.2

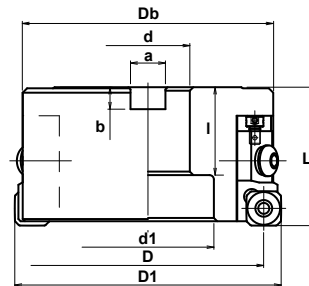
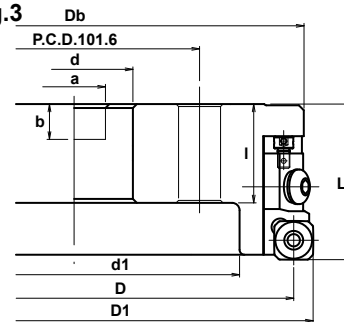


Fig.3


**Specifications**

CATALOG NUMBER	STK	DIMENSIONS										FIG.	PARTS		
		D1	D	Db	L	d	d1	d2	a	b	l		Insert Cartridge Insert Screw	Cartridge Parts: Bolt Bolt Ring Adjustable Rest Button	Wrenches
FJM-4080R-F4	•	80	65	71	63	25.4	20	14.3	9.5	6	24	1	SDHW1504ADFN-* (4) SSFDR15-15F (4) DSW-4510H	BBH-825 SBZ-8 ADS-513	A-20 (80-200Ø) A-20L (250Ø)
FJM-4080R-27-F4	•	80	65	71	63	27	20	14.3	12.4	7	22	1			
FJM-4100R-F4	•	100	85	90	63	31.75	26	17	12.7	8	32	1			
FJM-4100R-32-F4	•	100	85	90	63	32	26	17	14.4	8	32	1			
FJM-4125R-F4	•	125	110	114	63	38.1	60	-	15.9	10	40	2			
FJM-4125R-40-F4	•	125	110	114	63	40	60	-	16.4	9	40	2			
FJM-4160R-F4	•	160	145	148	63	50.8	75	-	19	11	40	2			
FJM-4160R-40-F4	•	160	145	148	63	40	75	-	16.4	9	40	2			
FJM-4200R-F4	•	200	185	186	63	47.625	134	-	25.4	14.3	40	3			
FJM-4200R-60-F4	•	200	185	186	63	60	134	-	25.7	14	40	3			
FJM-4250R-F4	•	250	235	237	63	47.625	182	-	25.4	14.3	40	3			
FJM-4250R-60-F4	•	250	235	237	63	60	182	-	25.7	14	40	3			

Note: All cutters are supplied without inserts or wrenches.

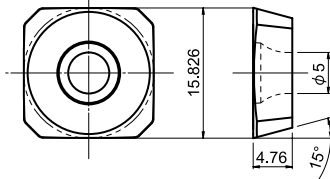
# Finish Jet Mill

**METRIC**

SDHW1504ADFN-W1 (Finishing insert)



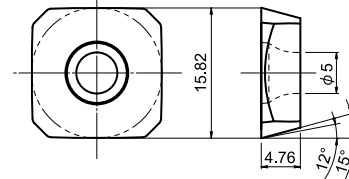
Fig.1



SDHW1504ADE (F) N-W2 (Finishing insert)



Fig.2



SDHW1504ADEN-F1 (Finishing insert for thin plate)

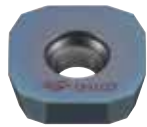
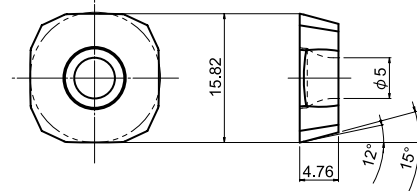


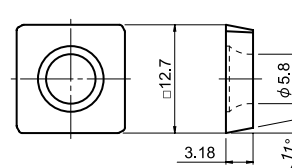
Fig.3



SPHW1203ZPTR (Roughing insert)



Fig.4



CATALOG NUMBER	PVD COATED		CERMET	TOLERANCE	FIG.	APPLICATION
	DH103	JC8015	CX75			
SDHW1504ADFN-W1 Finishing	•			H	1	For cast iron & cast steel
SDHW1504ADFN-W2 Finishing			•	H	2	For carbon steel & alloy steel
SDHW1504ADEN-W2 Finishing	•			H	2	For mold steel & hardened die steel
SDHW1504ADEN-F1 Finishing for thin plate	•		•	H	3	DH103...For low rigidity work of cast iron & cast steel CX75...For low rigidity work of carbon steel & alloy steel
SPHW1203ZPTR Roughing		•		H	4	

## Parts for FJM/FJM-F4 type

Clamp Screw	Wrench	Cartridge for Finishing Insert	Cartridge for Roughing Insert	Set Bolt for Cartridge
Recommended Torque 6.0 N·m DSW-4510H	A-20 (Ø80~Ø200) A-20L (Ø250)	SSFDR15-15F	SSFPR15-12R	BBH-825

Wrench for Cartridge	Wrench for Axial Adjust Screw	Axial Adjust Screw	Spring Washer
LW-050	AD-2080	ADS-513	SBZ-8



**METRIC**

# Finish Jet Mill

## Recommended Cutting Data for FJM & FJM-4

Material	Application	Insert	Grade	SFM	IPT	DOC	WOC
Gray Cast Iron (200-250 HB)	2 Rough + 2 Finish Inserts	SDHW1504ADFN-W1 (SDHW1504ADEN-F1)	DH103	700	.040"	.012"	0.8 x Dia
	4 Finish Inserts		DH103	700	.060"	.004"	0.8 x Dia
Nodular Cast Iron (180-250 HB)	2 Rough + 2 Finish Inserts	SDHW1504ADFN-W1 (SDHW1504ADEN-F1)	DH103	600	.040"	.012"	0.8 x Dia
	4 Finish Inserts		DH103	600	.060"	.004"	0.8 x Dia
Carbon Steel	2 Rough + 2 Finish Inserts	SDHW1504ADFN-W2 (SDHW1504ADEN-F1)	DH103 CX75	600	.040"	.012"	0.8 x Dia
	4 Finish Inserts		DH103 CX75	600	.060"	.004"	0.8 x Dia
Low Alloy Steel	2 Rough + 2 Finish Inserts	SDHW1504ADFN-W2 (SDHW1504ADEN-F1)	DH103 CX75	500	.040"	.012"	0.8 x Dia
	4 Finish Inserts		DH103 CX75	500	.060"	.004"	0.8 x Dia
Mold Steel (30-40 HRC)	2 Rough + 2 Finish Inserts	SDHW1504ADFN-W2 (SDHW1504ADEN-F1)	DH103	500	.020"	.008"	0.8 x Dia
Tool & Die Steel (40-50 HRC)	2 Rough + 2 Finish Inserts	SDHW1504ADFN-W2 (SDHW1504ADEN-F1)	DH103	300	.020"	.008"	0.8 x Dia
	4 Finish Inserts		DH103	300	.030"	.004"	0.8 x Dia
Hardened Die Steel (50-60 HRC)	2 Rough + 2 Finish Inserts	SDHW1504ADFN-W2 (SDHW1504ADEN-F1)	DH103	200	.015"	.006"	0.8 x Dia
Stainless Steel (45 HRC)	2 Rough + 2 Finish Inserts	SDHW1504ADFN-W2 (SDHW1504ADEN-F1)	DH103	300	.030"	.008"	0.8 x Dia
	4 Finish Inserts		DH103	300	.060"	.004"	0.8 x Dia

- NOTE:** 1. Recommend using coolant when cutting stainless steel.  
 2. For low rigidity work, use insert in parenthesis.  
 3.  $RPM = 3.82 \times SFM / Dia$ .  
 4.  $IPM = RPM \times IPT \times \# \text{ of flutes (or teeth)}$

# Finish Jet Mill

**METRIC**

**FACE MILL**  
**FJM-BD Type**  
 - For shoulder milling

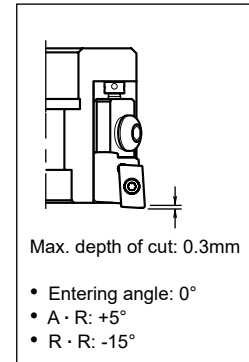
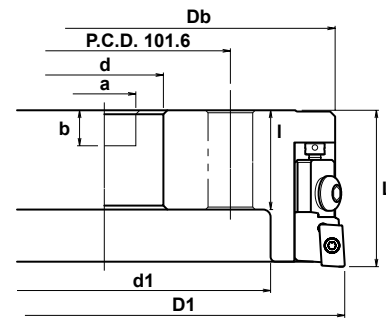
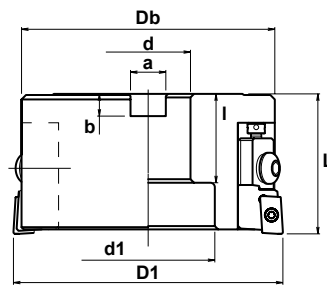
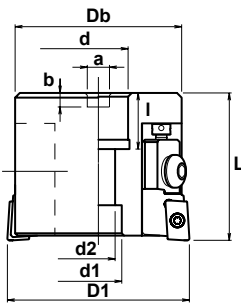


Fig. 1

Fig. 2

Fig. 3



## Specifications

CATALOG NUMBER	STK	DIMENSIONS									FIG.	PARTS		
		D1	Db	L	d	d1	d2	a	b	l		Insert Cartridge Insert Screw	Cartridge Parts: Bolt Bolt Ring Adjustable Rest Button	Wrenches
FJM-4080R-BD	•	80.5	71	63	25.4	20	14.3	9.5	6	24	1	DBD-... (4) SDFPR15-17F (4) DSW-4085	BBH-825 SBZ-8 ADS-513	T-15 LW-050 AD-2080
FJM-4080R-27-BD	•	80.5	71	63	27	20	14.3	12.4	7	22	1			
FJM-4100R-BD	•	100.5	90	63	31.75	26	17	12.7	8	32	1			
FJM-4100R-32-BD	•	100.5	90	63	32	26	17	14.4	8	32	1			
FJM-4125R-BD	•	125.5	114	63	38.1	60	-	15.9	10	40	2			
FJM-4125R-40-BD	•	125.5	114	63	40	60	-	16.4	9	40	2			
FJM-4160R-BD	•	160.5	148	63	50.8	75	-	19	11	40	2			
FJM-4160R-40-BD	•	160.5	148	63	40	75	-	16.4	9	40	2			
FJM-4200R-BD	•	200.5	186	63	47.625	134	-	25.4	14.3	40	3			
FJM-4200R-60-BD	•	200.5	186	63	60	134	-	25.7	14	40	3			
FJM-4250R-BD	•	250.5	237	63	47.625	182	-	25.4	14.3	40	3			
FJM-4250R-60-BD	•	250.5	237	63	60	182	-	25.7	14	40	3			

Note: All cutters are supplied without inserts or wrenches.





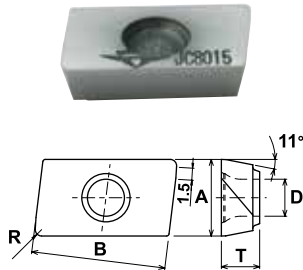
**INCH**

**METRIC**

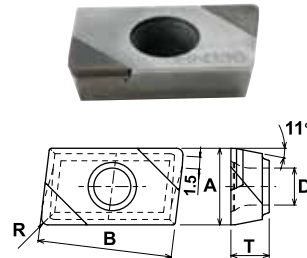
# Finish Jet Mill

## BackDraft Inserts

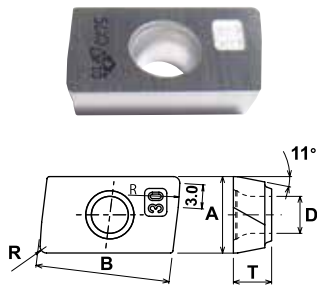
**Fig. 1** For bottom face finishing  
DBD-187-\* (JC8015, CX90)



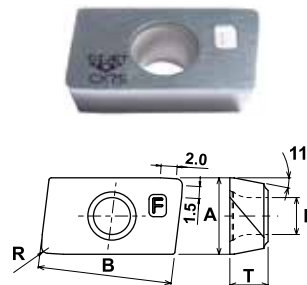
**Fig. 2** For bottom face finishing  
DBD-187-031 (JBN500)



**Fig. 3** For bottom face finishing & better surface roughness  
DBD170408-30 (DH103, CX75)



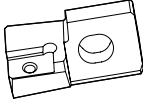
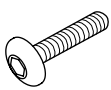

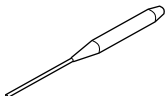




**Fig. 4** For finishing side & bottom face at once  
DBD170408-F (DH103, CX75)



CATALOG NUMBER	A	B	T	R	D	FIG.	STOCK				
							COATED				CERMET
							JBN500	DH103	JC8015	CX75	
DBD-187-031	.375	.656	.187	.031	.181	1			•		•
DBD-187-031	.375	.656	.187	.031	.181	2	•				
DBD-187-062	.375	.656	.187	.062	.181	1			•		
DBD-170408-30	.375	.656	.187	.031	.181	3		•		•	
DBD-170408-F	.375	.656	.187	.031	.181	4		•		•	

### Parts for FJM-BD type

Clamp Screw	Wrench	BackDraft Cartridge	Set Bolt for Cartridge
 Recommended Torque 3.6 N·m			
DSW-4085	T-15	SDFPR15-17F	BBH-825
Wrench for Cartridge	Wrench for Axial Adjust Screw	Axial Adjust Screw	Spring Washer
			
LW-050	AD-2080	ADS-513	SBZ-8

# Finish Jet Mill

**INCH**

## Recommended Cutting Data for FJM-BD

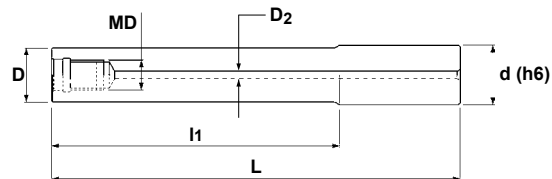
Material	Application	Grade	SFM	IPT	DOC	WOC
Gray Cast Iron (200-250 HB)	Finish	DH103 JC8015	700	.006"	.012"	70%
	CBN	JBN500	2,500	.004"	.006"	70%
Nodular Cast Iron (180-250 HB)	Finish	DH103 JC8015	600	.006"	.012"	70%
	CBN	JBN500	2,500	.004"	.006"	70%
Carbon Steel	Finish	DH103 JC8015, CX75 (CX90)	600	.006"	.012"	70%
	CBN	*	*	*	*	*
Low Alloy Steel	Finish	DH103 JC8015 CX75 (CX90)	500	.006"	.012"	70%
	CBN	*	*	*	*	*
Mold Steel (30-40 HRC)	Finish	DH103 JC8015	500	.006"	.008"	70%
	CBN	*	*	*	*	*
Tool & Die Steel (40-50 HRC)	Finish	DH103 JC8015	400	.006"	.006"	70%
	CBN	JBN500	1,500	.004"	.004"	70%
Hardened Die Steel (50-60 HRC)	Finish	DH103 JC8015	250	.006"	.004"	70%
	CBN	JBN500	1,200	.004"	.004"	70%
Stainless Steel (45 HRC)	Finish	JC8015	500	.006"	.008"	70%
	CBN	*	*	*	*	*

- NOTE:** 1. Recommend using coolant when cutting stainless steel.  
 2. Use insert DBD170408-30 for better surface finish or high feed machining.  
 3.  $RPM = 3.82 \times SFM / Dia.$   
 4.  $IPM = RPM \times IPT \times \# \text{ of flutes (or teeth)}$

**INCH**

# Modular Head Holders

**Modular Head Holders**  
**MSN Type**  
**Solid Carbide with coolant thru**



## Specifications

CATALOG NUMBER	STK	DIMENSIONS					
		D	I1	L	d	MD	D2
MSN-M6-0.5-S050C	•	.452	.500	2.50	.500	M6	.118
MSN-M6-1.0-S050C	•	.452	1.00	3.15	.500	M6	.118
MSN-M6-2.0-S050C	•	.452	2.00	3.93	.500	M6	.118
MSN-M6-3.0-S050C	•	.452	3.00	5.12	.500	M6	.118
MSN-M8-0.5-S062C	•	.591	.500	3.50	.625	M8	.157
MSN-M8-1.0-S062C	•	.591	1.00	4.00	.625	M8	.157
MSN-M8-2.0-S062C	•	.591	2.00	5.00	.625	M8	.157
MSN-M8-4.0-S062C	•	.591	4.00	7.00	.625	M8	.157
MSN-M8-6.0-S062C	•	.591	6.00	9.00	.625	M8	.157
MSN-M10-0.5-S075C	•	.728	.500	3.50	.750	M10	.157
MSN-M10-1.0-S075C	•	.728	1.00	4.00	.750	M10	.157
MSN-M10-2.0-S075C	•	.728	2.00	5.00	.750	M10	.157
MSN-M10-3.0-S075C	•	.728	3.00	6.00	.750	M10	.157
MSN-M10-4.0-S075C	•	.728	4.00	7.00	.750	M10	.157
MSN-M10-5.0-S075C	•	.728	5.00	8.00	.750	M10	.157
MSN-M10-6.0-S075C	•	.728	6.00	9.00	.750	M10	.157
MSN-M12-0.5-S100C	•	.945	.500	3.50	1.00	M12	.236
MSN-M12-1.0-S100C	•	.945	1.00	4.00	1.00	M12	.236
MSN-M12-2.0-S100C	•	.945	2.00	5.00	1.00	M12	.236
MSN-M12-3.0-S100C	•	.945	3.00	6.00	1.00	M12	.236
MSN-M12-4.0-S100C	•	.945	4.00	7.00	1.00	M12	.236
MSN-M12-5.0-S100C	•	.945	5.00	8.00	1.00	M12	.236
MSN-M12-6.0-S100C	•	.945	6.00	9.00	1.00	M12	.236
MSN-M12-8.0-S100C	•	.945	8.00	11.00	1.00	M12	.236
MSN-M16-0.5-S125C	•	1.14	.500	3.50	1.25	M16	.315
MSN-M16-1.0-S125C	•	1.14	1.00	4.00	1.25	M16	.315
MSN-M16-2.0-S125C	•	1.14	2.00	5.00	1.25	M16	.315
MSN-M16-4.0-S125C	•	1.14	4.00	7.00	1.25	M16	.315
MSN-M16-6.0-S125C	•	1.14	6.00	9.00	1.25	M16	.315
MSN-M16-8.0-S125C	•	1.14	8.00	11.00	1.25	M16	.315

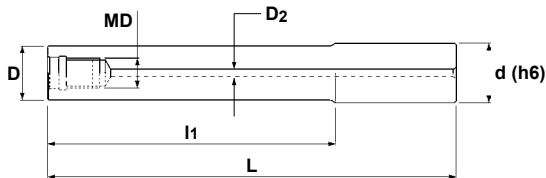
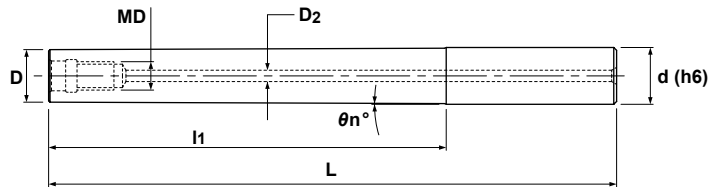
# Modular Head Holders

**METRIC**

## Modular Head Holders

### MSN Type

#### Solid Carbide with coolant thru


**Fig. 1**

**Fig. 2**


## Specifications

CATALOG NUMBER	STK	DIMENSIONS							FIG.
		D	l1	L	d	$\theta_n^\circ$	MD	D2	
MSN-M6-12-S10C	•	9.7	12	60	10	-	M6	3	1
MSN-M6-30-S10C	•	9.7	30	80	10	-	M6	3	1
MSN-M6-50-S10C	•	9.7	50	100	10	-	M6	3	1
MSN-M6-80-S10C	•	9.7	80	130	10	-	M6	3	1
MSN-M6-15-S12C	•	11.5	15	60	12	-	M6	3	1
MSN-M6-30-S12C	•	11.5	30	80	12	-	M6	3	1
MSN-M6-35T-S12C	•	9.5	35	92	12	3°	M6	3	2
MSN-M6-50-S12C	•	11.5	50	100	12	-	M6	3	1
MSN-M6-57T-S12C	•	9.5	57	114	12	2°	M6	3	2
MSN-M6-65T-S16C	•	11.2	65	125	16	3°30'	M6	3	2
MSN-M6-80-S12C	•	11.5	80	130	12	-	M6	3	1
MSN-M6-15-S16C	•	13.5	15	60	16	-	M6	3	1
MSN-M6-30-S16C	•	13.5	30	80	16	-	M6	3	1
MSN-M6-50-S16C	•	13.5	50	100	16	-	M6	3	1
MSN-M6-80-S16C	•	13.5	80	130	16	-	M6	3	1
MSN-M8-20-S16C	•	15.5	20	75	16	-	M8	4	1
MSN-M8-40-S16C	•	15.5	40	95	16	-	M8	4	1
MSN-M8-40T-S20C	•	14.5	40	100	20	7°	M8	4	2
MSN-M8-77T-S20C	•	14.5	77	143	20	3°30'	M8	4	2
MSN-M8-80-S16C	•	15.5	80	135	16	-	M8	4	1
MSN-M8-120-S16C	•	15.5	120	175	16	-	M8	4	1
MSN-M8-152-S16C	•	15.5	152	207	16	-	M8	4	1
MSN-M10-20-S20C	•	19.5	20	80	20	-	M10	6	1
MSN-M10-40-S20C	•	19.5	40	100	20	-	M10	4	1
MSN-M10-40T-S20C	•	18.5	40	100	20	0°43'	M10	4	2
MSN-M10-70-S20C	•	19.5	70	130	20	-	M10	4	1
MSN-M10-85T-S25C	•	18.5	85	161	25	4°	M10	4	2
MSN-M10-90-S20C	•	19.5	90	150	20	-	M10	4	1
MSN-M10-90T-S20C	•	18.5	90	150	20	0°19'	M10	4	2
MSN-M10-140-S20C	•	19.5	140	200	20	-	M10	4	1
MSN-M10-140T-S20C	•	18.5	140	200	20	0°12'	M10	4	2
MSN-M10-160-S20C	•	19.5	160	220	20	-	M10	4	1
MSN-M10-210-S20C	•	19.5	210	270	20	-	M10	4	1

**METRIC**

# Modular Head Holders

**Modular Head Holders**  
**MSN Type**  
**Solid Carbide with coolant thru**



Fig. 1

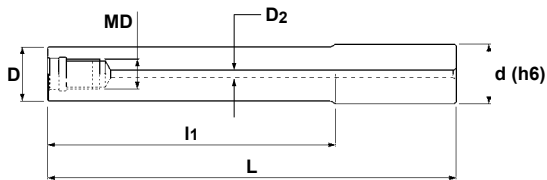
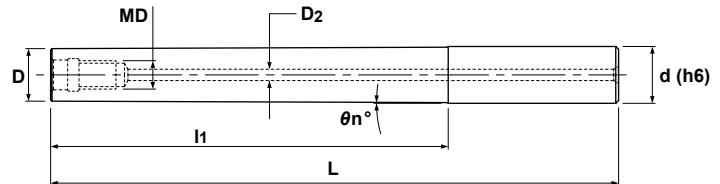


Fig. 2



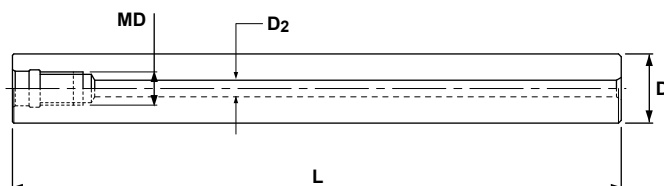
## Specifications

CATALOG NUMBER	STK	DIMENSIONS							FIG.
		D	l1	L	d	$\theta n^\circ$	MD	D2	
MSN-M12-25-S25C	•	24	25	90	25	-	M12	6	1
MSN-M12-55-S25C	•	24	55	120	25	-	M12	6	1
MSN-M12-100T-S32C	•	23.5	100	180	32	4°	M12	6	2
MSN-M12-105-S25C	•	24	105	170	25	-	M12	6	1
MSN-M12-135-S25C	•	24	135	215	25	-	M12	6	1
MSN-M12-155-S25C	•	24	155	220	25	-	M12	6	1
MSN-M12-200-S25C	•	24	200	265	25	-	M12	6	1
MSN-M16-25-S32C	•	29	25	90	32	-	M16	8	1
MSN-M16-55-S32C	•	29	55	120	32	-	M16	8	1
MSN-M16-77-S32C	•	29	77	157	32	-	M16	8	1
MSN-M16-97-S32C	•	29	97	177	32	-	M16	8	1
MSN-M16-105-S32C	•	29	105	170	32	-	M16	8	1
MSN-M16-117T-S32C	•	29	117	197	32	1°15'	M16	8	2
MSN-M16-127-S32C	•	29	127	207	32	-	M16	8	1
MSN-M16-127T-S32C	•	29	127	207	32	1°	M16	8	2
MSN-M16-155-S32C	•	29	155	220	32	-	M16	8	1
MSN-M16-177-S32C	•	29	177	257	32	-	M16	8	1
MSN-M16-177T-S32C	•	29	177	257	32	0°45'	M16	8	2
MSN-M16-195-S32C	•	29	195	260	32	-	M16	8	1
MSN-M16-197T-S32C	•	29	197	277	32	0°45'	M16	8	2
MSN-M16-225-S32C	•	29	225	290	32	-	M16	8	1
MSN-M16-245-S32C	•	29	245	310	32	-	M16	8	1
MSN-M16-295-S32C	•	29	295	360	32	-	M16	8	1

# Modular Head Holders

**METRIC**

**Modular Head Holders**  
**MSN Type - Straight**  
**Solid Carbide with coolant thru**



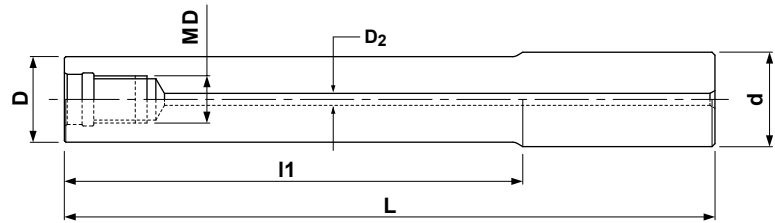
## Specifications

CATALOG NUMBER	STK	DIMENSIONS			
		D	L	MD	D2
MSN-M6-67S-S9.8C	•	9.8	67	M6	3
MSN-M6-107S-S9.8C	•	9.8	107	M6	3
MSN-M6-82S-S10C	•	10	82	M6	3
MSN-M6-122S-S10C	•	10	122	M6	3
MSN-M6-80S-S11.8C	•	11.8	80	M6	3
MSN-M6-120S-S11.8C	•	11.8	120	M6	3
MSN-M6-90S-S12C	•	12	90	M6	3
MSN-M6-130S-S12C	•	12	130	M6	3
MSN-M8-87S-S14C	•	14	87	M8	4
MSN-M8-137S-S14C	•	14	137	M8	4
MSN-M8-97S-S15C	•	15	97	M8	4
MSN-M8-147S-S15C	•	15	147	M8	4
MSN-M8-197S-S15C	•	15	197	M8	4
MSN-M8-107S-S16C	•	16	107	M8	4
MSN-M8-157S-S16C	•	16	157	M8	4
MSN-M10-130S-S18C	•	18	130	M10	4
MSN-M10-190S-S18C	•	18	190	M10	4
MSN-M10-240S-S18C	•	18	240	M10	4
MSN-M10-130S-S20C	•	20	130	M10	4
MSN-M10-190S-S20C	•	20	190	M10	4
MSN-M10-250S-S20C	•	20	250	M10	4
MSN-M12-185S-S23C	•	23	185	M12	6
MSN-M12-265S-S23C	•	23	265	M12	6
MSN-M12-185S-S24C	•	24	185	M12	6
MSN-M12-265S-S24C	•	24	265	M12	6
MSN-M12-145S-S25C	•	25	145	M12	6
MSN-M12-215S-S25C	•	25	215	M12	6
MSN-M12-285S-S25C	•	25	285	M12	6
MSN-M16-160S-S28C	•	28	160	M16	8
MSN-M16-230S-S28C	•	28	230	M16	8
MSN-M16-310S-S28C	•	28	310	M16	8
MSN-M16-157S-S32C	•	32	157	M16	8
MSN-M16-217S-S32C	•	32	217	M16	8
MSN-M16-287S-S32C	•	32	287	M16	8
MSN-M16-357S-S32C	•	32	357	M16	8

**INCH**
**METRIC**

# Modular Head Holders

**Modular Head Holders**  
**MGN Type**  
**G-Body with coolant thru**



## Specifications - Inch

CATALOG NUMBER	STK	DIMENSIONS					
		D	I1	L	d	MD	D2
MGN-M6-0.5-S050	•	.452	.500	2.50	.500	M6	.118
MGN-M6-1.0-S050	•	.452	1.00	3.15	.500	M6	.118
MGN-M6-2.0-S050	•	.452	2.00	3.93	.500	M6	.118
MGN-M8-0.5-S062	•	.591	.500	3.50	.625	M8	.157
MGN-M8-1.0-S062	•	.591	1.00	4.00	.625	M8	.157
MGN-M8-2.0-S062	•	.591	2.00	5.00	.625	M8	.157
MGN-M10-0.5-S075	•	.728	.500	3.50	.750	M10	.157
MGN-M10-1.0-S075	•	.728	1.00	4.00	.750	M10	.157
MGN-M10-2.0-S075	•	.728	2.00	5.00	.750	M10	.157
MGN-M12-0.5-S100	•	.945	.500	3.50	1.00	M12	.236
MGN-M12-1.0-S100	•	.945	1.00	4.00	1.00	M12	.236
MGN-M12-2.0-S100	•	.945	2.00	5.00	1.00	M12	.236
MGN-M12-3.0-S100	•	.945	3.00	6.00	1.00	M12	.236
MGN-M16-0.5-S125	•	1.14	.500	3.50	1.25	M16	.315
MGN-M16-1.0-S125	•	1.14	1.00	4.00	1.25	M16	.315
MGN-M16-2.0-S125	•	1.14	2.00	5.00	1.25	M16	.315
MGN-M16-3.0-S125	•	1.14	3.00	6.00	1.25	M16	.315

## Specifications - Metric

CATALOG NUMBER	STK	DIMENSIONS					
		D	I1	L	d	MD	D2
MGN-M8-17-S16	•	15.5	17	97	16	M8	4
MGN-M10-30-S20	•	19	30	100	20	M10	4
MGN-M12-35-S25	•	24	35	105	25	M12	4
MGN-M12-85-S25	•	24	85	165	25	M12	4
MGN-M16-37-S32	•	29	37	107	32	M16	6
MGN-M16-77-S32	•	29	77	157	32	M16	6

CATALOG NUMBER	DESCRIPTION	PAGE NUMBER
<b>A</b>		
A-15T	Wrench	A-57
A-20	Wrench	A-3, A-4, A-5, A-6, A-7, A-8, A-9, A-10, A-40, A-70, A-71
A-20L	Wrench	A-70, A-71
A-20W	Wrench	A-2, A-22, A-23, A-24, A-25, A-26, A-27
A-316	Wrench	A-56
A-40	Wrench	A-2, A-3, A-4, A-5, A-6, A-9, A-10, A-22, A-23, A-24, A-25
AD-2080	Wrench	A-70, A-72, A-74, A-75
ADS-513	Adjustable Rest Button	A-70, A-71, A-74, A-75
<b>B</b>		
B-...	Controlled Torque Wrench Blade	A-16, A-35
BBH-825	Cartridge Bolt	A-70, A-71, A-72, A-74, A-75
BME-0250A	Mirror Ball Insert Inch	A-12
BME-0250-S	Mirror Ball Insert Inch	A-13
BME-0312A	Mirror Ball Insert Inch	A-12
BME-0312-S	Mirror Ball Insert Inch	A-13
BME-0375A	Mirror Ball Insert Inch	A-12
BME-0375-S	Mirror Ball Insert Inch	A-13
BME-0375-TG	Mirror Ball Insert Inch	A-14
BME-0500A	Mirror Ball Insert Inch	A-12
BME-0500-S	Mirror Ball Insert Inch	A-13
BME-0500-TG	Mirror Ball Insert Inch	A-14
BME-0625A	Mirror Ball Insert Inch	A-12
BME-0625-S	Mirror Ball Insert Inch	A-13
BME-0750A	Mirror Ball Insert Inch	A-12
BME-0750-S	Mirror Ball Insert Inch	A-13
BME-0750-TG	Mirror Ball Insert Inch	A-14
BME-1000A	Mirror Ball Insert Inch	A-12
BME-1000-S	Mirror Ball Insert Inch	A-13
BME-1000-TG	Mirror Ball Insert Inch	A-14
BME-1250A	Mirror Ball Insert Inch	A-12
BME-1250-S	Mirror Ball Insert Inch	A-13
BNM-...T-S..LS	Mirror Ball Tapered Steel Metric	A-6
BNM-060	Mirror Ball Insert Metric	A-12
BNM-060-AAA	Mirror Ball Insert Metric	A-12
BNM-060-S	Mirror Ball Insert Metric	A-13
BNM-060-SS	Mirror Ball Insert Metric	A-13
BNM-060-TG	Mirror Ball Insert Metric	A-14
BNM-070	Mirror Ball Insert Metric	A-12
BNM-080	Mirror Ball Insert Metric	A-12
BNM-080-AAA	Mirror Ball Insert Metric	A-12
BNM-080-S	Mirror Ball Insert Metric	A-13
BNM-080-SS	Mirror Ball Insert Metric	A-13
BNM-080-SSR	Mirror Ball Insert Metric	A-14
BNM-080-TG	Mirror Ball Insert Metric	A-14
BNM-100	Mirror Ball Insert Metric	A-12
BNM-100-AAA	Mirror Ball Insert Metric	A-12
BNM-100-S	Mirror Ball Insert Metric	A-13
BNM-100-SS	Mirror Ball Insert Metric	A-13
BNM-100-SSR	Mirror Ball Insert Metric	A-14
BNM-100-TG	Mirror Ball Insert Metric	A-14
BNM-110	Mirror Ball Insert Metric	A-12
BNM-120	Mirror Ball Insert Metric	A-12
BNM-120-AAA	Mirror Ball Insert Metric	A-12
BNM-120-S	Mirror Ball Insert Metric	A-13
BNM-120-SS	Mirror Ball Insert Metric	A-13
BNM-120-SSR	Mirror Ball Insert Metric	A-14
BNM-120-TG	Mirror Ball Insert Metric	A-14
BNM-160	Mirror Ball Insert Metric	A-12
BNM-160-AAA	Mirror Ball Insert Metric	A-12



CATALOG NUMBER	DESCRIPTION	PAGE NUMBER
<b>B</b>		
BNM-160-S	Mirror Ball Insert Metric	A-13
BNM-160-SS	Mirror Ball Insert Metric	A-13
BNM-160-SSR	Mirror Ball Insert Metric	A-14
BNM-160-TG	Mirror Ball Insert Metric	A-14
BNM-160-TS	Mirror Ball Insert Metric	A-15
BNM-200	Mirror Ball Insert Metric	A-12
BNM-200-AAA	Mirror Ball Insert Metric	A-12
BNM-200-S	Mirror Ball Insert Metric	A-13
BNM-200-SS	Mirror Ball Insert Metric	A-13
BNM-200-SSR	Mirror Ball Insert Metric	A-14
BNM-200-TG	Mirror Ball Insert Metric	A-14
BNM-200-TS	Mirror Ball Insert Metric	A-15
BNM-250	Mirror Ball Insert Metric	A-12
BNM-250-AAA	Mirror Ball Insert Metric	A-12
BNM-250-S	Mirror Ball Insert Metric	A-13
BNM-250-SS	Mirror Ball Insert Metric	A-13
BNM-250-SSR	Mirror Ball Insert Metric	A-14
BNM-250-TG	Mirror Ball Insert Metric	A-14
BNM-250-TS	Mirror Ball Insert Metric	A-15
BNM-300	Mirror Ball Insert Metric	A-12
BNM-300-AAA	Mirror Ball Insert Metric	A-12
BNM-300-S	Mirror Ball Insert Metric	A-13
BNM-300-SS	Mirror Ball Insert Metric	A-13
BNM-300-SSR	Mirror Ball Insert Metric	A-14
BNM-300-TG	Mirror Ball Insert Metric	A-14
BNM-300-TS	Mirror Ball Insert Metric	A-15
BNM-320	Mirror Ball Insert Metric	A-12
BNM-320-AAA	Mirror Ball Insert Metric	A-12
BNM-320-S	Mirror Ball Insert Metric	A-13
BNM-320-TG	Mirror Ball Insert Metric	A-14
BNML-...S	Mirror Ball Straight Steel Inch	A-3
BNML-...S-..C	Mirror Ball Straight Carbide Shank Inch	A-7
BNML-...S-..C	Mirror Ball Straight Carbide Shank Metric	A-9, A-10
BNML-...T	Mirror Ball Tapered Steel Inch	A-4
BNML-...T	Mirror Ball Tapered Steel Metric	A-6
BNML-...T-..C	Mirror Ball Tapered Carbide Shank Inch	A-8
BNML-...T-..C	Mirror Ball Tapered Carbide Shank Metric	A-9
BNMM-...S	Mirror Ball Straight Steel Inch	A-3
BNMM-...S	Mirror Ball Straight Steel Metric	A-5
BNMM-...S-..C	Mirror Ball Straight Carbide Shank Inch	A-7
BNMM-...S-..C	Mirror Ball Straight Carbide Shank Metric	A-9, A-10
BNMM-...T	Mirror Ball Tapered Steel Inch	A-4
BNMM-...T	Mirror Ball Tapered Steel Metric	A-6
BNMM-...T-..C	Mirror Ball Tapered Carbide Shank Inch	A-8
BNMM-...T-..C	Mirror Ball Tapered Carbide Shank Metric	A-9
BNMS-...S	Mirror Ball Straight Steel Inch	A-3
BNMS-...S	Mirror Ball Straight Steel Metric	A-5
BNMS-...S-..C	Mirror Ball Straight Carbide Shank Inch	A-7
BNMS-...S-..C	Mirror Ball Straight Carbide Shank Metric	A-9, A-10
BNMS-...T	Mirror Ball Tapered Steel Inch	A-4
BNMS-...T	Mirror Ball Tapered Steel Metric	A-6
BNMS-...T-..C	Mirror Ball Tapered Carbide Shank Inch	A-8
BNMS-...T-..C	Mirror Ball Tapered Carbide Shank Metric	A-9
BNMU-...S-..C	Mirror Ball Straight Carbide Shank Metric	A-10
<b>C</b>		
CSW-2547	Screw	A-62
CSW-406H	Screw	A-62
CSW-408H	Screw	A-62

CATALOG NUMBER	DESCRIPTION	PAGE NUMBER
<b>D</b>		
DBD-...	BackDraft Inserts	A-58, A-75
DBD-...AR-S	BackDraft End Mill Inch	A-56
DBD-...R	BackDraft Face Mill Inch	A-56
DBD-...R	BackDraft Face Mill Metric	A-57
DBD-...AR	BackDraft Face Mill Inch	A-56
DBD-...EC-AR	BackDraft End Cap Inch	A-56
DBD-...L-S	BackDraft End mill Metric	A-56
DCM-18	Clamp	A-62
DEB-...-T	Econo Ball Insert Inch	A-40
DPGT0903-W3	Back & Forth Insert	A-66
DSW-1840H	Screw	A-44
DSW-2556H	Screw	A-48
DSW-2563H	Screw	A-48, A-49
DSW-307H	Screw	A-66, A-67
DSW-4075	Screw	A-56, A-57
DSW-4085	Screw	A-56, A-57, A-74, A-75
DSW-4510H	Screw	A-70, A-71, A-72, A-74
<b>E</b>		
EBEM-...	Econo Ball Steel Shank	A-40
EBSW-...	Econo Ball Screw	A-40
ECS-0030	Screw	A-56
<b>F</b>		
FJM-...R	Finish Jet Mill	A-70
FJM-...R-BD	Finish Jet Mill	A-74
FJM-...R-F4	Finish Jet Mill	A-70
FRE-0250-...	1/4" High Feed Mirror Ball Insert	A-30
FRE-0375-...	3/8" High Feed Mirror Ball Insert	A-30
FRE-0500-...	1/2" High Feed Mirror Radius Insert	A-30
FRE-0625-...	5/8" High Feed Mirror Radius Insert	A-30
FRE-0750-...	3/4" High Feed Mirror Radius Insert	A-30
FRE-1000-...	1" High Feed Mirror Radius Insert	A-30
FRM-060-...	6mm High Feed Mirror Radius Insert	A-33
FRM-080-...	8mm High Feed Mirror Radius Insert	A-33
FRM-100-...	10mm High Feed Mirror Radius Insert	A-33
FRM-120-...	12mm High Feed Mirror Radius Insert	A-33
FRM-160-...	16mm High Feed Mirror Radius Insert	A-33
FRM-170-R10	17mm High Feed Mirror Radius Insert	A-34
FRM-200-...	20mm High Feed Mirror Radius Insert	A-34
FRM-210-R10	21mm High Feed Mirror Radius Insert	A-34
FRM-250-...	25mm High Feed Mirror Radius Insert	A-34
FRM-300-...	30mm High Feed Mirror Radius Insert	A-34
FRM-320-...	32mm High Feed Mirror Radius Insert	A-34
FSW-2005H	Mirror Insert Screw	A-4, A-6, A-7, A-8, A-9, A-26
FSW-2506H	Mirror Insert Screw	A-4, A-6, A-7, A-8, A-9, A-23, A-24, A-25, A-26, A-27
FSW-3007H	Mirror Insert Screw	A-2, A-4, A-6, A-7, A-8, A-9, A-22, A-23, A-24, A-25, A-26, A-27
FSW-3509H	Mirror Insert Screw	A-2, A-3, A-4, A-5, A-6, A-7, A-8, A-9, A-10, A-22, A-23, A-24, A-25, A-26, A-27
FSW-4013H	Mirror Insert Screw	A-2, A-3, A-4, A-5, A-6, A-7, A-8, A-9, A-10, A-22, A-23, A-24, A-25, A-26, A-27
FSW-5016H	Mirror Insert Screw	A-2, A-3, A-4, A-5, A-6, A-7, A-8, A-9, A-10, A-22, A-23, A-24, A-25, A-26, A-27
FSW-6020	Mirror Insert Screw	A-2, A-3, A-4, A-5, A-6, A-7, A-10, A-22, A-23, A-24, A-25
FSW-8025	Mirror Insert Screw	A-2, A-3, A-4, A-5, A-6, A-9, A-10, A-22, A-23, A-24, A-25

CATALOG NUMBER	DESCRIPTION	PAGE NUMBER
<b>G</b>		
GRM-160-R50	Mirror Ball Insert Metric	A-15
GRM-200-R60	Mirror Ball Insert Metric	A-15
GRM-250-R80	Mirror Ball Insert Metric	A-15
GRM-300-R10	Mirror Ball Insert Metric	A-15
<b>H</b>		
HCS5-10	Screw	A-66, A-68
HRE-0312-...	5/16" High Feed Mirror Radius Insert	A-30
HRE-0375-...	3/8" High Feed Mirror Radius Insert	A-30
HRE-0500-...	1/2" High Feed Mirror Radius Insert	A-30
HRE-0625-...	5/8" High Feed Mirror Radius Insert	A-30
HRE-0750-...	3/4" High Feed Mirror Radius Insert	A-30
HRE-1000-...	1" High Feed Mirror Radius Insert	A-30
HRM-060-...	6mm High Feed Mirror Radius Insert	A-33
HRM-080-...	8mm High Feed Mirror Radius Insert	A-33
HRM-090-R20	9mm High Feed Mirror Radius Insert	A-33
HRM-100-R20	10mm High Feed Mirror Radius Insert	A-33
HRM-110-R20	11mm High Feed Mirror Radius Insert	A-33
HRM-120-R20	12mm High Feed Mirror Radius insert	A-33
HRM-130-R20	13mm High Feed Mirror Radius Insert	A-33
HRM-160-...	16mm High Feed Mirror Radius Insert	A-33
HRM-170-R30	17mm High Feed Mirror Radius Insert	A-34
HRM-200-...	20mm High Feed Mirror Radius Insert	A-34
HRM-220-R30	22mm High Feed Mirror Radius Insert	A-34
<b>L</b>		
LDGW120308	Finish One Insert	A-63
LPGW090204	Finish One Insert	A-63
LW-040	Wrench	A-66, A-68
LW-050	Wrench	A-70, A-72, A-74, A-75
<b>M</b>		
MBX-...	Mirror Ball Modular Heads	A-2
MDB-...	BackDraft Modular Head Metric	A-57
MDB-2100-M12	BackDraft Modular Head Inch	A-56
MFO-...	Finish-One Modular Head	A-62
MGN-...	Modular Head Steel Holder Inch	A-81
MGN-...	Modular Head Steel Holder Metric	A-81
MPF-...	Back & Forth Modular Head Metric	A-66
MPM-...	QM Mini Modular Head	A-44
MQX-...	QM Mini Max Modular Head	A-48
MRX-...	Mirror Radius Modular Heads	A-22
MSN-...-S...C	Modular Head Carbide Holder Inch	A-77
MSN-...-S...C	Modular Head Carbide Holder Metric	A-78
MSN-...-S-S...C	Modular Head Carbide Holder Metric	A-80
MSN-...-T-S...C	Modular Head Carbide Holder Metric	A-78
<b>P</b>		
PFC-...	Back & Forth Face Mill Metric	A-66
PME-3050-1.5-S050LG	1/2" QM Mini End Mill	A-44
<b>Q</b>		
QXP-...	QM Max Face Mill	A-49
QXPS-...	QM Max End Mill	A-48

CATALOG NUMBER	DESCRIPTION	PAGE NUMBER
<b>R</b>		
RME-0312-...	5/16" Mirror Radius Insert	A-29
RME-0375-...	3/8" Mirror Radius Insert	A-29
RME-0500-...	1/2" Mirror Radius Insert	A-29
RME-0625-...	5/8" Mirror Radius Insert	A-29
RME-0750-...	3/4" Mirror Radius Insert	A-29
RME-1000-...	1" Mirror Radius Insert	A-29
RME-1250-...	1-1/4" Mirror Radius Insert	A-29
RNM-060-...	6mm Mirror Radius Insert	A-31
RNM-080-...	8mm Mirror Radius Insert	A-31
RNM-100-...	10mm Mirror Radius Insert	A-31
RNM-120-...	12mm Mirror Radius Insert	A-31
RNM-130-...	13mm Mirror Radius Insert	A-31
RNM-160-...	16mm Mirror Radius Insert	A-31
RNM-170-...	17mm Mirror Radius Insert	A-31
RNM-200-...	20mm Mirror Radius Insert	A-31
RNM-210-...	21mm Mirror Radius Insert	A-31
RNM-250-...	25mm Mirror Radius Insert	A-32
RNM-260-...	26mm Mirror Radius Insert	A-32
RNM-300-...	30mm Mirror Radius Insert	A-32
RNM-320-...	32mm Mirror Radius Insert	A-32
RNML-...S	Mirror Radius Straight Steel Shank Inch	A-23
RNML-...S	Mirror Radius Straight Steel Shank Metric	A-24
RNML-...S-...C	Mirror Radius Straight Carbide Shank Inch	A-23
RNML-...S-...C	Mirror Radius Straight Carbide Shank Metric	A-25
RNML-...T	Mirror Radius Tapered Steel Shank Metric	A-24
RNMM-...S	Mirror Radius Straight Steel Shank Inch	A-23
RNMM-...S	Mirror Radius Straight Steel Shank Metric	A-24
RNMM-...S-...C	Mirror Radius Straight Carbide Shank Inch	A-23
RNMM-...S-...C	Mirror Radius Straight Carbide Shank Metric	A-25
RNMM-...T	Mirror Radius Tapered Steel Shank Metric	A-24
RNMM-...T-...C	Mirror Radius Tapered Carbide Shank Metric	A-25
RNMM-...U-...C	Mirror Radius Straight Carbide Shank Metric	A-26
RNMS-...S	Mirror Radius Straight Steel Shank Inch	A-23
RNMS-...S-...C	Mirror Radius Straight Carbide Shank Inch	A-23
RNMS-...U-...C	Mirror Radius Straight Carbide Shank Inch	A-23
RNMS-...U-...C	Mirror Radius Straight Carbide Shank Metric	A-26
RNMU-...S-...C	Mirror Radius Undersized Carbide Shank Metric	A-27
RSW-5008	Screw	A-66, A-68
<b>S</b>		
SBZ-8	Bolt Ring	A-70, A-71, A-72, A-74, A-75
SDFPR15-17F	Cartridge	A-74, A-75
SDGPR09CA-PFC	Cartridge	A-66, A-68
SDHW1504ADEN-F1	Finish Jet Mill Insert	A-72
SDHW1504ADEN-W2	Finish Jet Mill Insert	A-72
SDHW1504ADFN-W1	Finish Jet Mill Insert	A-72
SDHW1504ADFN-W2	Finish Jet Mill Insert	A-72
SPHW1203ZPTR	Finish Jet Mill Insert	A-72
SSFDR15-15F	Cartridge	A-70, A-71, A-72
SSFPR15-12R	Cartridge	A-70, A-72
<b>T</b>		
T-06	Wrench	A-4, A-6, A-7, A-8, A-9, A-26, A-44
T-07	Wrench	A-4, A-6, A-7, A-8, A-9, A-23, A-24, A-25, A-26, A-27, A-62
T-08	Wrench	A-2, A-4, A-6, A-7, A-8, A-9, A-22, A-23, A-24, A-25, A-26, A-27, A-48, A-49
T-10	Wrench	A-2, A-3, A-4, A-5, A-6, A-7, A-8, A-9, A-10, A-22, A-23, A-24, A-25, A-26, A-27

CATALOG NUMBER	DESCRIPTION	PAGE NUMBER
<b>T</b>		
T-10SD	Wrench	A-66, A-68
T-15	Wrench	A-2, A-3, A-4, A-5, A-6, A-7, A-8, A-9, A-10, A-22, A-23, A-24, A-25, A-26, A-27, A-56, A-62, A-74, A-75
T-30	Wrench	A-2, A-3, A-4, A-5, A-6, A-7, A-10, A-22, A-23, A-24, A-25, A-40
T-FON....	Finish-One End Mill	A-62
TQC-06	Controlled Mirror Ball Torque Wrench	A-16, A-35
TQC-07	Controlled Mirror Ball Torque Wrench	A-16, A-35
TQC-08	Controlled Mirror Ball Torque Wrench	A-16, A-35
TQC-10	Controlled Mirror Ball Torque Wrench	A-16, A-35
<b>Y</b>		
YOHW0602..ZER-12	QM Mini Finishing Insert	A-45
YPHW1003..ZER-..	QM Max Insert	A-50
<b>Z</b>		
ZPMT1003..ZER-PL	QM Max Finishing Insert	A-50
ZPMT1003..ZER-NL	QM Max Insert	A-50
ZPMT1003..ZER-SL	QM Max Insert	A-50













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