



**INDEXABLE TOOLING**  
**VOLUME 1 | FINISHING TOOLS**

INNOVATION. ACCURACY. PERFORMANCE.

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# 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



QM Series

A41



Backdraft

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Back & Forth

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Diemaster 5G

A55

## 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.

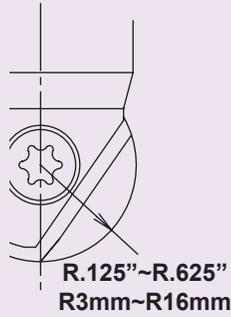
Regarding stock status:

- 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

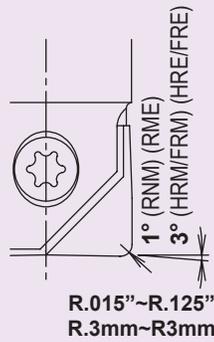
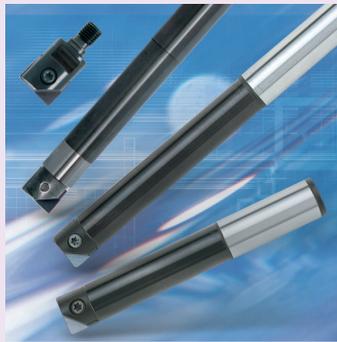




## Mirror Ball - BNM

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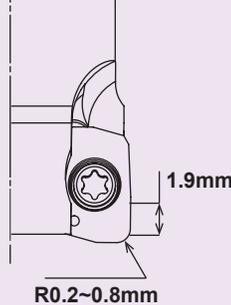
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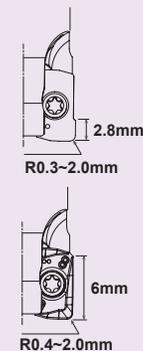


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\*Note: End mill style not G-body



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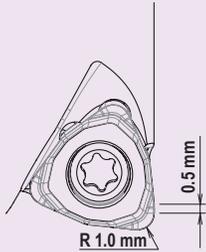
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\*Note: End mill style not G-body



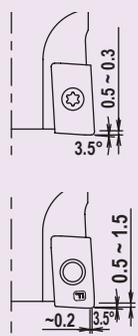




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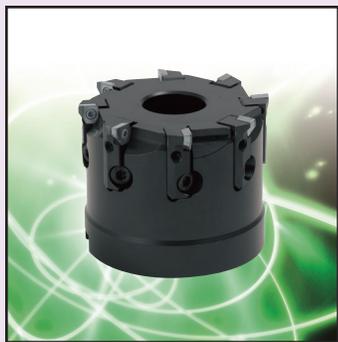
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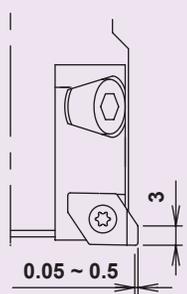




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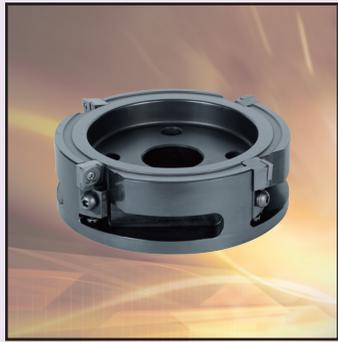
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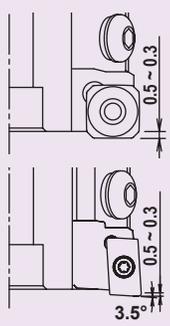




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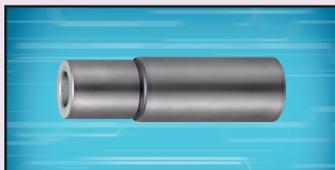
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# Mirror Ball

## High Precision Indexable Ball Nose End Mills

### 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

- Mirror Ball (neutral geometry) leaves a mirror finish.
- Mirror-S & -SS (helical geometry) great for high temp alloys and stainless.
- Mirror-TG & -TS (negative helix) for materials up to 60HRC with a strong edge.
- Mirror GRM, bull nose insert with large radius, allowing larger step over when finishing wide concave applications. Leaves smoother surface than standard ball nose.

#### • Precision clamp screw mounting

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

#### • DH coating

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

#### • DS Coating

- The DS coating has low chemical reactivity with the work piece. Best suited for titanium and Inconel materials.

#### • 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

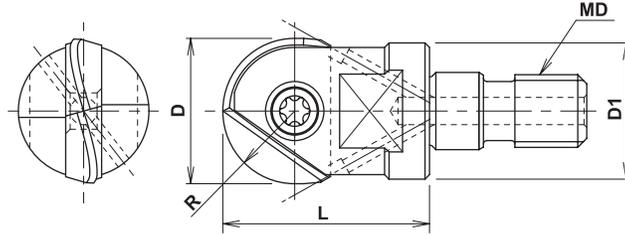
# Mirror Ball

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-2075-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	KSW-8025	T-30

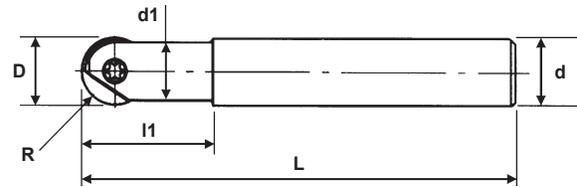
See page A-81 for Modular Head Shanks.

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)	KSW-8025	T-30
BNMM-300106S-S125	•	1.25	.625	7.32	1.02	4.17	1.25	-			

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

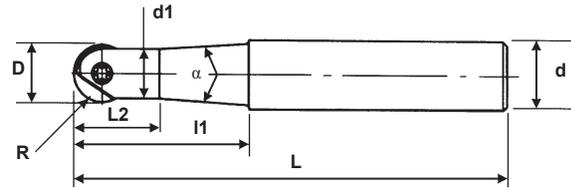


# Mirror Ball

**INCH**

## STEEL SHANK

### BNM Type - Taper Style



### Specifications

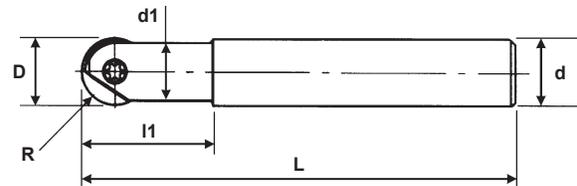
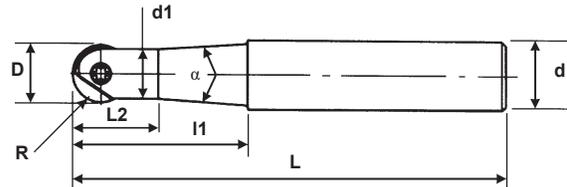
CATALOG NUMBER	STK	DIMENSIONS								INSERT INCH (METRIC)	PARTS	
		D	R	L	d1	l1	L2	d	$\alpha$		Screw	Wrench
BNMS-060035T-S037	•	.250	.125	3.62	.212	1.37	.590	.375	12°	BME-0250 (BNM-060) (BNM-070)	FSW-2005H	T-06
BNMS-080035T-S050	•	.312	.156	3.62	.283	1.37	.728	.500	21°17'	BME-0312 (BNM-080)	FSW-2506H	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)	KSW-8025	T-30
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 Reach****Tapered Reach**

### Specifications - Straight Reach

CATALOG NUMBER	STK	DIMENSIONS								INSERT METRIC (INCH)	PARTS	
		D	R	L	d1	l1	L2	d	a		Screw	Wrench
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)	KSW-8025	T-30
BNMM-300106S-S32	•	30	15	186	26	106	-	32	-			

Note: All cutters are supplied without inserts or wrenches.

### Specifications - Tapered Reach

CATALOG NUMBER	STK	DIMENSIONS								INSERT METRIC (INCH)	PARTS	
		D	R	L	d1	l1	L2	d	a		Screw	Wrench
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'			
BNMM-200075T-S20	•	20	10	141	17	75	34	20	2°	BNM-200 (BME-0750)	FSW-5016H	A-20
BNML-200115T-S25	•	20	10	191	17	115	34	25	1°50'			
BNMM-250090T-S25	•	25	12.5	166	21	90	41	25	2°20'	BNM-250 (BME-1000)	FSW-6020	T-30
BNML-250135T-S32	•	25	12.5	215	21	135	41	32	1°30'			
BNMM-300106T-S32	•	30	15	186	26	106	49	32	3°	BNM-300 or BNM-320 (BME-1250)	KSW-8025	T-30
BNML-300160T-S32	•	30	15	240	26	160	49	32	1°10'			

Note: All cutters are supplied without inserts or wrenches.

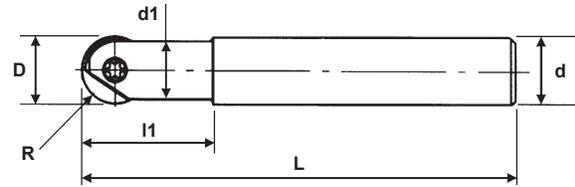


# Mirror Ball

**INCH**

## CARBIDE SHANK

### BNM-C Type - Straight Style



### Specifications

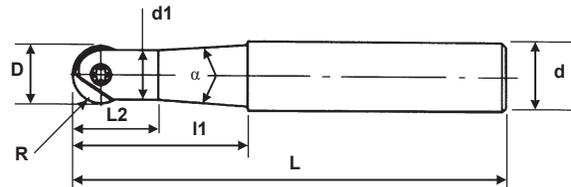
CATALOG NUMBER	STK	DIMENSIONS							INSERT INCH (METRIC)	PARTS	
		D	R	L	d1	l1	d	a		Screw	Wrench
BNMS-060016S-S025C	•	.250	.125	3.00	.216	.625	.250	-	BME-0250 (BNM-060) (BNM-070)	FSW-2005H	T-06
BNMS-060038S-S025C	•	.250	.125	3.75	.216	1.50	.250	-			
BNMM-060050S-S025C	•	.250	.125	4.25	.216	2.00	.250	-			
BNML-060076S-S025C	•	.250	.125	5.25	.216	3.00	.250	-			
BNMS-080038S-S031C	•	.312	.156	3.75	.295	1.50	.312	-	BME-0312 (BNM-080)	FSW-2506H	T-07
BNMM-080057S-S031C	•	.312	.156	4.50	.295	2.25	.312	-			
BNML-080089S-S031C	•	.312	.156	5.75	.295	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	.452	1.14	.500	-	BME-0500 (BNM-120)	FSW-3509H	T-10
BNMM-120063S-S050C	•	.500	.250	4.75	.452	2.50	.500	-			
BNML-120101S-S050C	•	.500	.250	6.35	.452	4.00	.500	-			
BNMS-160034S-S062C	•	.625	.312	3.70	.590	1.33	.625	-	BME-0625 (BNM-160)	FSW-4013H	T-15
BNMM-160063S-S062C	•	.625	.312	4.84	.590	2.48	.625	-			
BNML-160114S-S062C	•	.625	.312	7.10	.590	4.50	.625	-			
BNMS-200038S-S075C	•	.750	.375	4.09	.708	1.49	.750	-	BME-0750 (BNM-200)	FSW-5016H	A-20
BNMM-200075S-S075C	•	.750	.375	5.55	.708	2.95	.750	-			
BNML-200127S-S075C	•	.750	.375	8.00	.708	5.00	.750	-			
BNMM-250090S-S100C	•	1.00	.500	6.53	.945	3.54	1.00	-	BME-1000 (BNM-250)	FSW-6020	T-30
BNMM-250114S-S100C	•	1.00	.500	7.50	.945	4.50	1.00	-			
BNML-250152S-S100C	•	1.00	.500	10.00	.945	6.00	1.00	-			

Note: All cutters are supplied without inserts or wrenches.

**INCH**

# Mirror Ball

## 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	.216	1.26	.492	.375	10°	BME-0250 (BNM-060) (BNM-070)	FSW-2005H	T-06
BNMM-060050T-S037C	•	.250	.125	4.21	.216	1.96	.492	.375	5°			
BNML-060072T-S037C	•	.250	.125	5.07	.216	2.83	.88	.375	3°			
BNMS-080035T-S050C	•	.312	.156	3.62	.295	1.37	.787	.500	10°	BME-0312 (BNM-080)	FSW-2506H	T-07
BNMM-080053T-S050C	•	.312	.156	4.33	.295	2.08	.787	.500	8°			
BNML-080075T-S050C	•	.312	.156	5.19	.295	2.95	.787	.500	5°			
BNMS-100035T-S050C	•	.375	.187	3.62	.354	1.37	.886	.500	10°	BME-0375 (BNM-100) (BNM-110)	FSW-3007H	T-08
BNMM-100053T-S050C	•	.375	.187	4.33	.354	2.08	.886	.500	6°			
BNML-100075T-S050C	•	.375	.187	5.19	.354	2.95	.886	.500	3°			
BNMM-120053T-S050C	•	.500	.250	4.33	.452	2.08	1.02	.500	3°	BME-0500 (BNM-120)	FSW-3509H	T-10
BNML-120085T-S062C	•	.500	.250	5.70	.452	3.34	1.02	.625	4°			
BNML-160100T-S075C	•	.625	.312	6.53	.590	3.93	1.22	.750	2°	BME-0625 (BNM-160)	FSW-4013H	T-15
BNML-200115T-S100C	•	.750	.375	7.52	.708	4.52	1.41	1.00	5°	BME-0750 (BNM-200)	FSW-5016H	A-20

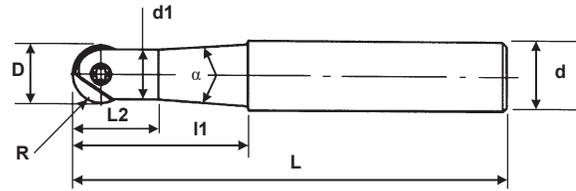
**Note: All cutters are supplied without inserts or wrenches.**



# Mirror Ball

**INCH**

## CARBIDE SHANK BNM-C Type - Taper Style

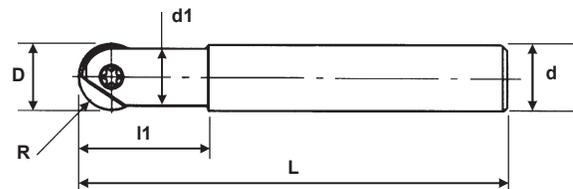


### Specifications

CATALOG NUMBER	STK	DIMENSIONS								INSERT METRIC (INCH)	PARTS	
		D	R	L	d1	L1	L2	d	$\alpha$		Screw	Wrench
BNMS-060030T-S10C	•	6	3	80	5.5	30	15	10	6°	BNM-060 BNM-070 (BME-0250)	FSW-2005H	T-06
BNML-080075T-S12C	•	8	4	132	7.5	75	20	12	2°	BNM-080 (BME-0312)	FSW-2506H	T-07
BNML-100075T-S12C	•	10	5	132	9.5	75	23	12	1°30'	BNM-100 BNM-110 (BME-0375)	FSW-3007H	T-08
BNML-120085T-S16C	•	12	6	145	11.5	85	27	16	2°30'	BNM-120 (BME-0500)	FSW-3509H	T-10
BNMM-160063T-S20C	•	16	8	123	15	63	30.5	20	4°	BNM-160 (BME-0625)	FSW-4013H	T-15
BNML-160100T-S20C	•	16	8	166	15	100	30.5	20	1°15'	BNM-160 (BME-0625)	FSW-4013H	T-15
BNML-200115T-S25C	•	20	10	19	19	115	36	25	2°	BNM-200 (BME-0750)	FSW-5016H	A-20

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	5.5	17	-	6	-	BNM-060 BNM-070 (BME-0250)	FSW-2005H	T-06
BNMM-060035S-S06C	•	6	3	92	5.5	35	-	6	-			
BNML-060017S-S06C	•	6	3	120	5.5	17	-	6	-			
BNMS-080025S-S08C	•	8	4	90	7.5	25	-	8	-	BNM-080 (BME-0312)	FSW-2506H	T-07
BNMM-080035S-S08C	•	8	4	92	7.5	35	-	8	-			
BNML-080075S-S08C	•	8	4	140	7.5	75	-	8	-			
BNML-080095S-S08C	•	8	4	160	7.5	95	-	8	-	BNM-100 BNM-110 (BME-0375)	FSW-3007H	T-08
BNMS-100030S-S10C	•	10	5	100	9.5	30	-	10	-			
BNMM-100043S-S10C	•	10	5	100	9.5	43	-	10	-			
BNML-100075S-S10C	•	10	5	140	9.5	75	-	10	-			
BNML-100080S-S10C	•	10	5	220	9.5	80	-	10	-			
BNML-100095S-S10C	•	10	5	160	9.5	95	-	10	-			
BNML-100140S-S10C	•	10	5	220	9.5	140	-	10	-			

Note: All cutters are supplied without inserts or wrenches.



**METRIC**

# Mirror Ball

## CARBIDE SHANK

**BNM-C Type - Straight Style**



Fig. 1

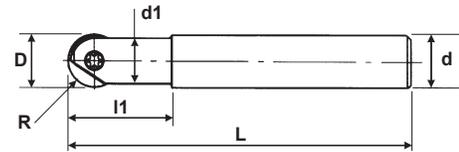
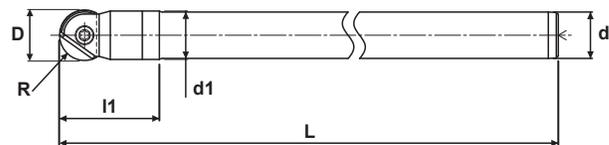


Fig. 2



### Specifications

CATALOG NUMBER	STK	DIMENSIONS						FIG.	INSERT METRIC (INCH)	PARTS	
		D	R	L	d1	l1	d			Screw	Wrench
BNMS-120028S-S12C	•	12	6	83	11.5	28	12	1	BNM-120 (BME-0500)	FSW-3509H	T-10
BNMM-120053S-S12C	•	12	6	110	11.5	53	12	1			
BNML-120095S-S12C	•	12	6	160	11.5	95	12	1			
BNML-120100S-S12C	•	12	6	220	11.5	100	12	1			
BNML-120130S-S12C	•	12	6	200	11.5	130	12	1			
BNML-120150S-S12C	•	12	6	220	11.5	150	12	1			
BNMS-160033S-S16C	•	16	8	92	15	33	16	1	BNM-160 (BME-0625)	FSW-4013H	T-15
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			
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	BNM-200 (BME-0750)	FSW-5016H	A-20
BNMM-200075S-S20C	•	20	10	141	19	75	20	1			
BNML-200100S-S20C	•	20	10	220	19	100	20	1			
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			
BNMM-250090S-S25C	•	25	12.5	166	24	90	25	1	BNM-250 (BME-1000)	FSW-6020	T-30
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)	KSW-8025	T-30
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 DH111 (metric)	JC8008 FZ05/FZ08	DS108/DH108	DH102	DH102
Gray Cast Iron (200-250 HB)	DH103	JC8008	DH108	DH102	DH102
Nodular Cast Iron (180-250 HB)	DH103	JC8008	DH108	DH102	DH102
Carbon Steel	DH111/DH103	JC8008	DH108	*	*
Low Alloy Steel	DH111/DH103	JC8008	DH108	*	*
Mold Steel (30-40 HRC)	DH103	JC8008	DH108	DH102	DH102
Tool & Die Steel (40-50 HRC)	DH103	JC8008	DH108	DH102	DH102
Hardened Die Steel (50-60 HRC)	DH103	*	DH108	DH102	DH102
Stainless Steel (45 HRC)	DH111/DH103	JC8008	DH108	*	*
Titanium	DH111/DH103	JC8008	DS108/DH108	*	*
Copper Alloys	DH111/DH103	JC8008	DH108	*	*
Aluminum	*	FZ05/FZ08	*	*	*
Inconel	*	JC8008	DS108/DH108	*	*

First Choice
Second Choice
Third Choice



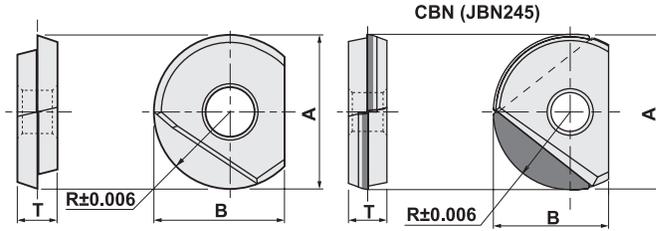
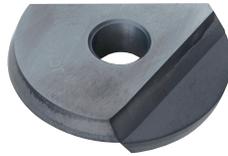
**INCH**

**METRIC**

# Mirror Ball

## 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	DH111	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	DH111					
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	•				



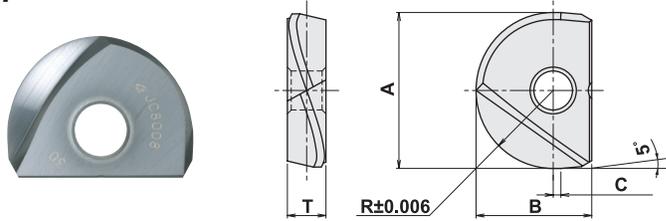
# Mirror Ball

**INCH**

**METRIC**

## 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 JC8008	DLC JC20003	UNCOATED FZ05 FZ08		
INCH SIZES	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	•			
METRIC SIZES	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		•	•	

Fig. 1

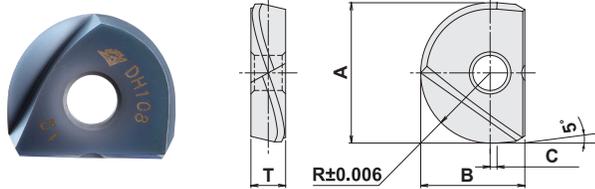
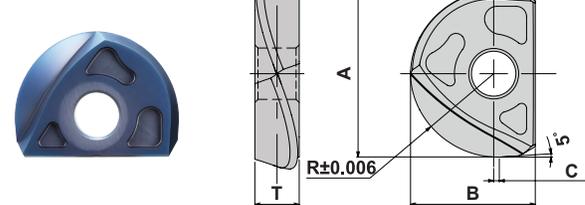


Fig. 2



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

CATALOG NUMBER	DIMENSIONS					RECOMMENDED TORQUE (lbs x ft)		FIG.	STOCK		
	A	R	B	C	T	lbs/ft	Nm		COATED DH108 DS108		
METRIC SIZES	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	•	•
	BNM-320-SS	32	16	23.5	1	7	4.43	6.0	2	•	•



**INCH**

**METRIC**

# Mirror Ball

## MIRROR BALL INSERTS

Mirror "SSR" & "TG" type

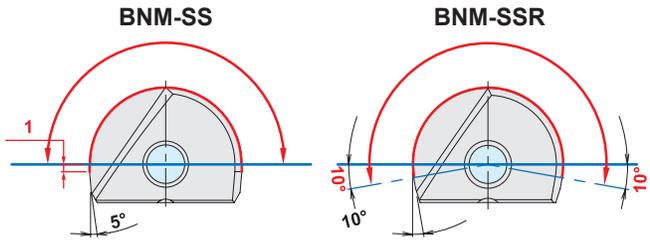


Fig. 1



Fig. 1

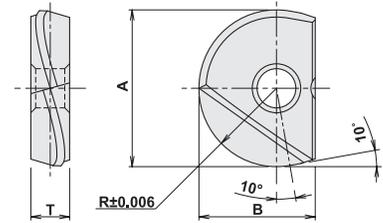
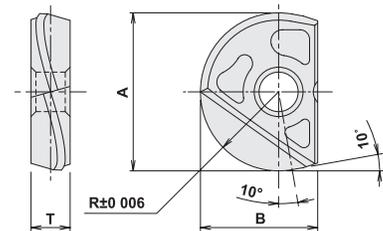


Fig. 2

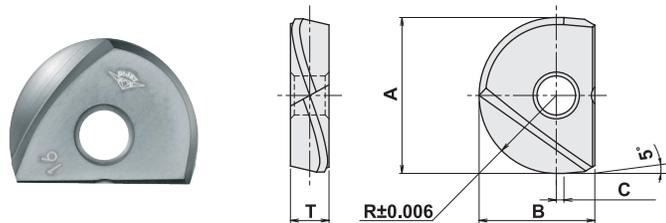


Fig. 2



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

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



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	.059	.118	1.48	2.0	•	
	BME-0750-TG	.750	.375	.570	.079	.196	2.95	4.0	•	
	BME-1000-TG	1.00	.500	.736	.079	.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	•		

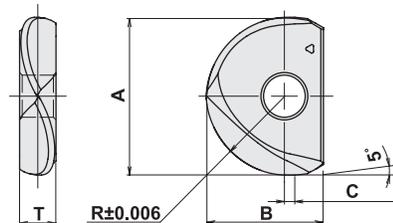
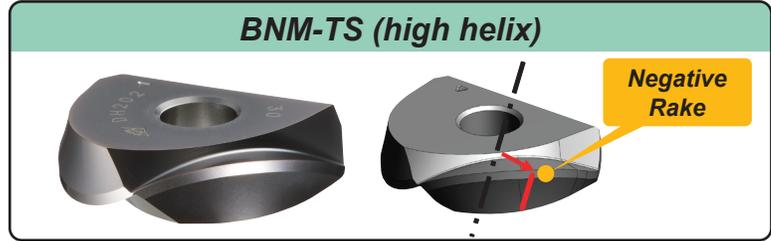
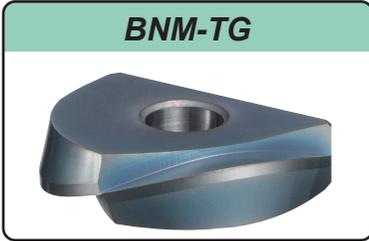


# Mirror Ball

**METRIC**

## MIRROR BALL INSERTS

Mirror "TS" & "GRM" type

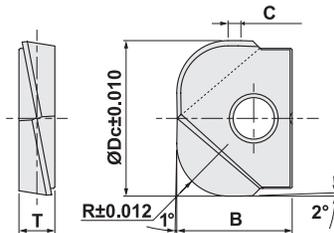
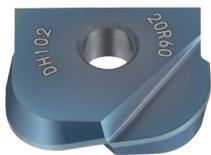


### Specifications - (radius tolerance +/- .006mm)

CATALOG NUMBER	DIMENSIONS					RECOMMENDED TORQUE (lbs x ft)		COATED
	A	R	B	C	T	lbs/ft	Nm	PVD DH102
BNM-060-TS	6	3	5	-	2	.37	.5	•
BNM-080-TS	8	4	7	0.5	2.4	.66	.9	•
BNM-100-TS	10	5	8.5	1	2.6	.89	1.2	•
BNM-120-TS	12	6	10	1.5	3	1.48	2.0	•
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)



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

CATALOG NUMBER	DIMENSIONS					RECOMMENDED TORQUE (lbs x ft)		STOCK	
								COATED	
	A	R	B	C	T	lbs/ft	Nm	DH102	JC8015
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	•	•

**INCH****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	BNM-0250
					BNM-060, BNM-070, FRM-060, HRM-060, RNM-060
TQC-07	T7	.66	0.9	B-07	BME-0312
					BNM-080, FRM-080, HRM-080, RNM-080
TQC-08	T8	.89	1.2	B-08	BME-0375, FRE-0375, HRE-0375, RME-0375
					BNM-100, BNM-110, FRM-100, HRM-100, RNM-100
TQC-10	T10	1.48	2.0	B-10	BME-0500, FRE-0500, HRE-0500, RME-0500
					BNM-120, FRM-120, FRM-130, HRM-120, RNM-120, RNM-130

## 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
KSW-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 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 (160-260 HB)	BNM / BME BNM / BME-TG BNM-TS	DH103 DH102	1150	RPM	18,570	13,930	12,730	10,610	8,950	7,160	6,370	5,310	4,970	
				IPM	293	219	251	209	247	226	201	176	157	
				DOC	.004	.004	.006	.006	.006	.006	.006	.006	.006	.006
				WOC	.004	.006	.008	.008	.008	.012	.016	.020	.020	
Nodular Cast Iron (170-300 HB)	BNM / BME BNM / BME-TG BNM-TS	DH103 DH102	1150	RPM	18,570	13,930	12,730	10,610	8,950	7,160	6,370	5,310	4,970	
				IPM	293	219	251	209	247	226	201	167	157	
				DOC	.004	.004	.006	.006	.006	.006	.006	.006	.006	
				WOC	.004	.006	.008	.008	.010	.012	.016	.020	.020	
Carbon Steel (-250 HB)	BNM / BME BME-S BNM-SS	DH111 DH103 JC8008 DH108	1150	RPM	18,570	13,930	12,730	10,610	8,950	7,160	6,370	5,310	4,970	
				IPM	219	165	200	167	211	197	176	146	137	
				DOC	.004	.004	.006	.006	.006	.006	.006	.006	.006	
				WOC	.004	.006	.008	.008	.010	.012	.016	.020	.020	
Low Alloy Steel (-255HB)	BNM / BME BME-S BNM-SS	DH111 DH103 JC8008 DH108	1150	RPM	18,570	13,930	12,730	10,610	8,950	7,160	6,370	5,310	4,970	
				IPM	219	165	200	167	211	197	176	146	137	
				DOC	.004	.004	.006	.006	.006	.006	.006	.006	.006	
				WOC	.004	.006	.008	.008	.010	.012	.016	.020	.020	
Mold Steel (30-36 HRC)	BNM / BME BME-S BNM-SS	DH103 JC8008 DH108	1150	RPM	18,570	13,930	12,730	10,610	8,950	7,160	6,370	5,310	4,970	
				IPM	219	165	200	167	211	197	176	146	137	
				DOC	.002	.002	.004	.004	.004	.004	.004	.004	.004	
				WOC	.004	.006	.008	.008	.010	.012	.016	.020	.020	
Mold Steel (38-43 HRC)	BNM / BME BME-S BNM-SS	DH103 JC8008 DH108	1000	RPM	15,920	11,940	11,140	9,280	7,960	6,370	5,730	4,770	4,480	
				IPM	125	94	131	109	157	150	135	113	106	
				DOC	.002	.002	.004	.004	.004	.004	.004	.004	.004	
				WOC	.004	.006	.008	.008	.010	.012	.016	.020	.020	
Tool & Die Steel (42-52 HRC)	BNM / BME-TG BNM-TS	DH102	820	RPM	13,260	9,950	9,550	7,960	6,960	5,570	5,090	4,240	3,980	
				IPM	104	78	113	94	137	131	120	100	94	
				DOC	.002	.002	.004	.004	.004	.004	.004	.004	.004	
				WOC	.004	.006	.008	.008	.010	.012	.016	.020	.020	
Hardened Die Steel (55-62 HRC)	BNM / BME-TG BNM-TS	DH102	650	RPM	10,610	7,960	7,960	6,630	5,970	4,770	4,460	3,710	3,480	
				IPM	83	63	94	78	118	113	106	88	82	
				DOC	.002	.002	.004	.004	.004	.004	.004	.004	.004	
				WOC	.004	.006	.006	.008	.010	.012	.016	.020	.020	
Stainless Steel	BNM / BME-S BNM-SS	DH111 JC8008 DH108	1150	RPM	18,570	13,930	12,730	10,610	8,950	7,160	6,370	5,310	4,970	
				IPM	219	165	200	167	211	197	176	146	137	
				DOC	.004	.004	.006	.006	.006	.006	.006	.006	.006	
				WOC	.004	.006	.008	.008	.010	.012	.016	.020	.020	
Titanium	BME-S BNM-SS	DS108 JC8008 DH108	650	RPM	10,610	7,960	9,550	7,960	5,970	4,770	4,460	3,710	3,480	
				IPM	125	94	150	125	118	113	106	88	82	
				DOC	.002	.002	.004	.004	.004	.006	.004	.004	.004	
				WOC	.004	.006	.006	.008	.010	.012	.016	.020	.020	
Inconel	BME-S BNM-SS	DS108 JC8008 DH108	500	RPM	7,960	5,970	6,370	5,310	4,970	3,980	3,820	3,180	2,980	
				IPM	63	47	75	63	78	63	60	50	47	
				DOC	.002	.002	.004	.004	.004	.004	.004	.004	.004	
				WOC	.004	.004	.004	.004	.004	.006	.008	.012	.012	
Copper Alloys	BNM BME / BNM-S	KT9 FZ05 FZ08 JC20003	1500	RPM	23,870	17,900	15,920	13,260	10,940	8,750	7,640	6,370	5,970	
				IPM	376	282	313	261	302	276	241	201	188	
				DOC	.006	.006	.008	.008	.008	.008	.008	.008	.008	
				WOC	.004	.006	.008	.008	.010	.012	.016	.020	.020	
Aluminum	BNM BME / BNM-S	KT9 FZ05 FZ08 JC20003	1500	RPM	23,870	17,900	15,920	13,260	10,940	8,750	7,640	6,370	5,970	
				IPM	376	282	313	261	302	276	241	201	188	
				DOC	.008	.008	.010	.010	.010	.010	.010	.010	.010	
				WOC	.004	.006	.008	.008	.010	.012	.016	.020	.020	
Graphite	BNM BNM-S	JC10000 JC20003	1500	RPM	23,870	17,900	15,920	13,260	10,940	8,750	7,640	6,370	5,970	
				IPM	376	282	313	261	302	276	241	201	188	
				DOC	.006	.006	.008	.008	.008	.008	.008	.008	.008	
				WOC	.004	.006	.008	.008	.010	.012	.016	.020	.020	

- NOTE:** 1. The above cutting conditions should be adjusted according to machine rigidity and workpiece rigidity.  
2. The above cutting conditions are for a overhang length of 3XD. Adjust the RPM and IPM according to the overhang length on page 19.  
3. If chattering occurs, reduce the DOC or IPM from the above values.  
4. Remove chips by air blow or coolant. Be especially careful when machining cavities with a vertical M/C.  
5. When using a steel shank, reduce the RPM and IPM to 80% of the above conditions.



# Mirror Ball

## Recommended Cutting Data for Mirror Ball with CBN

Material	Grade	SFM		16MM	20MM	25MM	30MM
Gray Cast Iron (160-260 HB)	JBN245	4500	RPM	27,000	22,000	17,500	15,000
			IPM	531	520	413	413
			DOC	.002	.002	.002	.002
			WOC	.010	.012	.016	.020
Nodular Cast Iron (170-300 HB)	JBN245	4000	RPM	24,000	19,500	15,500	13,000
			IPM	378	384	305	307
			DOC	.002	.002	.002	.002
			WOC	.010	.012	.016	.020
Hardened Die Steel (55-62 HRC)	JBN245	3000	RPM	18,000	14,500	11,500	9,700
			IPM	283	285	226	229
			DOC	.002	.002	.002	.002
			WOC	.006	.008	.010	.012

- NOTE:** 1. The above cutting conditions are shown for a high-speed machining.  
 2. Above cutting conditions are for a overhang length of 3XD. Adjust the RPM and IPM according to the overhang length on page 19.  
 3. Use balanced holder and carbide shank.  
 4. Create a program to avoid plunging as much as possible.  
 5. If adopting plunging, reduce IPM.  
 6. Semi-finish to ensure stock is even, this will affect tool life and machine surface finish.  
 7. When using a steel shank, reduce RPM and IPM to 80% of the above conditions.

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

Material	Grade	SFM		16MM	20MM	25MM	30MM
Gray Cast Iron (160-260 HB)	JBN245	3700	RPM	22,410	18,260	14,525	12,450
			IPM	441	431	343	343
			DOC	.002	.002	.002	.002
			WOC	.010 - .100	.012 - .120	.016 - .160	.020 - .200
Nodular Cast Iron (170-300 HB)	JBN245	3300	RPM	19,920	16,185	12,865	10,790
			IPM	314	319	253	255
			DOC	.002	.002	.002	.002
			WOC	.010 - .100	.012 - .120	.016 - .160	.020 - .200
Hardened Die Steel (55-62 HRC)	JBN245	2500	RPM	14,940	12,035	9,545	8,051
			IPM	235	237	188	190
			DOC	.002	.002	.002	.002
			WOC	.006 - .060	.008 - .080	.012 - .120	.014 - .140

- NOTE:** 1. The above cutting conditions are shown for a high-speed machining.  
 2. Above cutting conditions are for a overhang length of 3XD. Adjust the RPM and IPM according to the overhang length on page 19.  
 3. Use balanced holder and carbide shank.  
 4. Create a program to avoid plunging as much as possible.  
 5. If adopting plunging, reduce IPM.  
 6. Semi-finish to ensure stock is even, this will affect tool life and machine surface finish.  
 7. When using a steel shank, reduce RPM and IPM to 80% of the above conditions.



## Mirror Ball

### Recommended Cutting Data for Mirror Ball with GRM

Material	Grade	SFM		16MM	20MM	25MM	30MM
Gray Cast Iron (160-260 HB)	DH102 JC8015	1300	RPM	7,960	6,370	5,730	4,770
			IPM	219	201	180	150
			DOC	.006	.006	.006	.006
			WOC	.010 - .100	.012 - .120	.016 - .160	.020 - .200
Nodular Cast Iron (170-300 HB)	DH102 JC8015	1300	RPM	7,960	6,370	5,730	4,770
			IPM	219	201	180	150
			DOC	.006	.006	.006	.006
			WOC	.010 - .100	.012 - .120	.016 - .160	.020 - .200
Carbon Steel (-250 HB)	JC8015	1300	RPM	7,960	6,370	5,730	4,770
			IPM	188	176	158	131
			DOC	.006	.006	.006	.006
			WOC	.010 - .100	.012 - .120	.016 - .160	.020 - .200
Low Alloy Steel (-255 HB)	JC8015	1300	RPM	7,960	6,370	5,730	4,770
			IPM	188	176	158	131
			DOC	.006	.006	.006	.006
			WOC	.010 - .100	.012 - .120	.016 - .160	.020 - .200
Mold Steel (30-36 HRC)	DH102 JC8015	1300	RPM	7,960	6,370	5,730	4,770
			IPM	188	176	158	131
			DOC	.004	.004	.004	.004
			WOC	.010 - .100	.012 - .120	.016 - .160	.020 - .200
Mold Steel (38-43 HRC)	DH102 JC8015	1150	RPM	6,960	5,570	5,730	4,240
			IPM	137	131	120	100
			DOC	.004	.004	.004	.004
			WOC	.010 - .100	.012 - .120	.016 - .160	.020 - .200
Tool & Die Steel (42-52 HRC)	DH102	1000	RPM	5,970	4,770	4,460	3,710
			IPM	118	113	106	88
			DOC	.004	.004	.004	.004
			WOC	.010 - .100	.012 - .120	.016 - .160	.020 - .200
Hardened Die Steel (52-62 HRC)	DH012	1000	RPM	5,970	4,770	3,820	3,180
			IPM	118	113	90	75
			DOC	.004	.004	.004	.004
			WOC	.010 - .100	.012 - .120	.016 - .160	.020 - .200
Stainless Steel	JC8015	1300	RPM	7,960	6,370	5,730	4,770
			IPM	188	176	158	131
			DOC	.006	.006	.006	.006
			WOC	.010 - .100	.012 - .120	.016 - .160	.020 - .200
Titanium	JC8015	300	RPM	4,970	3,980	3,820	3,180
			IPM	98	94	90	75
			DOC	.004	.004	.004	.004
			WOC	.010 - .100	.012 - .120	.016 - .160	.020 - .200
Inconel	JC8015	250	RPM	3,980	3,180	3,180	2,650
			IPM	63	50	50	42
			DOC	.004	.004	.004	.004
			WOC	.010 - .040	.012 - .060	.016 - .080	.020 - .120

- NOTE:** 1. The above cutting conditions should be adjusted according to machine rigidity and workpiece rigidity.  
 2. Above cutting conditions are for an overhang length of 3XD. Adjust the RPM and IPM according to the overhang length on page 19.  
 3. If chattering occurs, reduce the DOC or IPM from the above values.  
 4. Remove chips by air blow or coolant. Be especially careful when machining cavities with a vertical M/C.  
 5. When using a steel shank, reduce the RPM and IPM to 80% of the above conditions.



# Mirror Ball

## Cutting Data for BNM

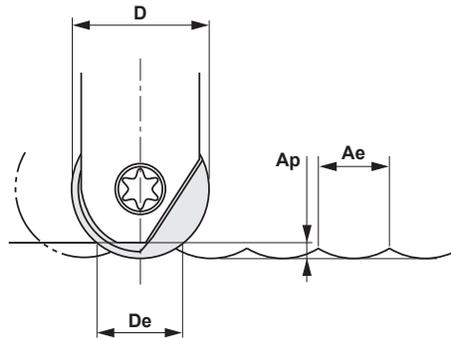
### Calculation of cutting data

#### 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

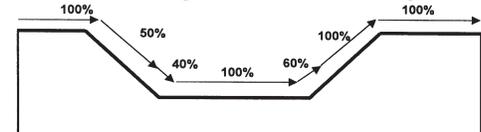
NOTE: When calculating SFM/RPM use De in place of D

### 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

## 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.



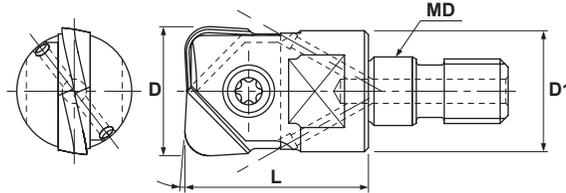
# Mirror Radius

INCH

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## 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, FRM-130	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, FRM-260	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	KSW-8025	T-30
MRX-320-M16	•	1.25"/32MM	1.69"	1.18"	M16	18.4	25	RME-1250	RNM-320, FRM-320	KSW-8025	T-30

See page A-81 for Modular Head Shanks.

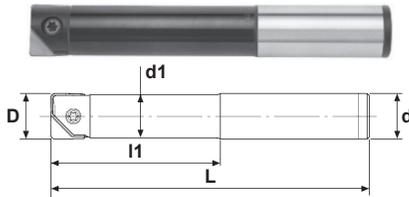
Note: All cutters are supplied without inserts or wrenches.



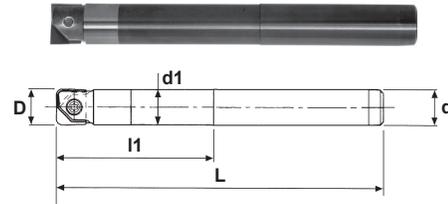
**INCH**

## 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	KSW-8025	T-30
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 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 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 FRM-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 FRM-260	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	KSW-8025	T-30
RNML-300152S-S125C	•	1.250	10.00	1.17	6.00	1.25				

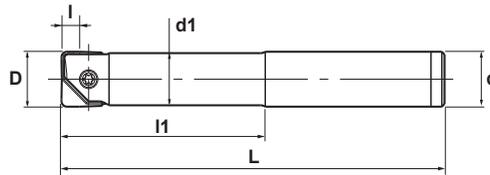
Note: All cutters are supplied without inserts or wrenches.



# Mirror Radius

**METRIC**

## STEEL SHANK

**RNM Type RNM-S - Straight Reach**


### Specifications

CATALOG NUMBER	STK	DIMENSIONS						INSERT (INCH)	PARTS	
		D	L	I	I1	d1	d		Screw	Wrench
RNMM-160070S-S16	•	16	140	5.3	70	15	16	RNM-160 RNM-170 (RME-0625)	FSW-4013H	T-15
RNMM-160090S-S16	•	16	160	5.3	90	15	16			
RNML-160100S-S16	•	16	200	5.3	100	15	16			
RNMM-200075S-S20	•	20	141	6.7	75	19	20	RNM-200 RNM-210 (RME-0750)	FSW-5016H	A-20W
RNMM-200105S-S20	•	20	180	6.7	105	19	20			
RNML-200125S-S20	•	20	250	6.7	125	19	20			
RNMM-250090S-S25	•	25	166	8.3	90	24	25	RNM-250 RNM-260 (RME-1000)	FSW-6020	T-30
RNMM-250140S-S25	•	25	220	8.3	140	24	25			
RNML-250150S-S25	•	25	250	8.3	150	24	25			
RNMM-300106S-S32	•	30	186	10	106	29	32	RNM-300 (RME-1250)	KSW-8025	T-30
RNMM-300140S-S32	•	30	220	10	140	29	32			
RNMM-320106S-S32	•	32	186	10.7	106	31	32	RNM-320 (RME-1250)	KSW-8025	T-30
RNMM-320140S-S32	•	32	220	10.7	140	31	32			

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

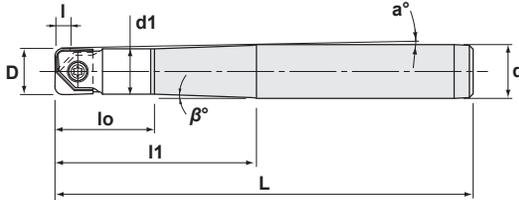
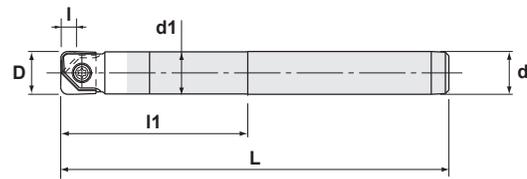


Fig. 2



## Specifications

CATALOG NUMBER	STK	DIMENSIONS									FIG.	INSERT (INCH)	PARTS	
		D	L	l	l <sub>o</sub>	l <sub>1</sub>	d <sub>1</sub>	d	a°	β°			Screw	Wrench
RNMM-080053T-S12C	•	8	110	2.7	20	53	7.8	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	7.8	8	-	-	2			
RNMM-100050S-S10C	•	10	110	3.3	-	50	9.8	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	9.8	12	1°7'	1°	1			
RNML-100075S-S10C	•	10	140	3.3	-	75	9.8	10	-	-	2			
RNMM-120053S-S12C	•	12	110	4	-	53	11.8	12	-	-	2	RNM-120, RNM-130 (RME-0500), HRM-120 HRM-130, FRM-120, FRM-130 (HRE-0500, FRE-0500)	FSW-3509H	T-10
RNML-120095S-S12C	•	12	160	4	-	95	11.8	12	-	-	2			
RNMM-160070S-S16C	•	16	140	5.3	-	70	15.8	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	15.8	16	-	-	2			
RNML-160120S-S16C	•	16	210	5.3	-	120	15.8	16	-	-	2			
RNML-160150S-S16C	•	16	220	5.3	-	150	15.8	16	-	-	2			
RNMM-200075S-S20C	•	20	141	6.7	-	75	19.8	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	19.8	20	-	-	2			
RNML-200150S-S20C	•	20	220	6.7	-	150	19.8	20	-	-	2			
RNML-200170S-S20C	•	20	250	6.7	-	170	19.8	20	-	-	2			
RNMM-250090S-S25C	•	25	166	8.3	-	90	24.8	25	-	-	2	RNM-250, RNM-260 FRM-250, FRM-260 (RME-1000, FRE-1000)	FSW-6020	T-30
RNMM-250140S-S25C	•	25	220	8.3	-	140	24.8	25	-	-	2			
RNML-250190S-S25C	•	25	260	8.3	-	190	24.8	25	-	-	2			
RNMM-300106S-S32C	•	30	186	10	-	106	29.8	32	-	-	2	RNM-320, RNM-320 FRM-300, (RME-1250)	KSW-8025	T-30
RNMM-320106S-S32C	•	32	186	10.7	-	106	31.8	32	-	-	2	RNM-320, FRM-320 (RME-1250)	KSW-8025	T-30

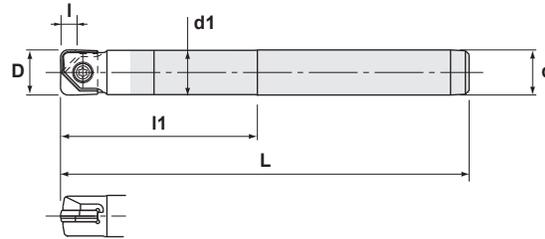
Note: All cutters are supplied without inserts or wrenches.



# Mirror Radius

**METRIC**

## CARBIDE SHANK RNMS-U Type

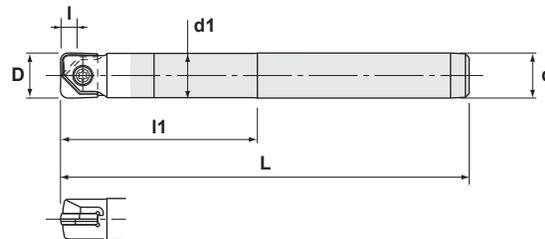


### Specifications

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, FRM-130 (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-5016H	A-20W

Note: All cutters are supplied without inserts or wrenches.

## CARBIDE SHANK RNMM-U Type



### Specifications

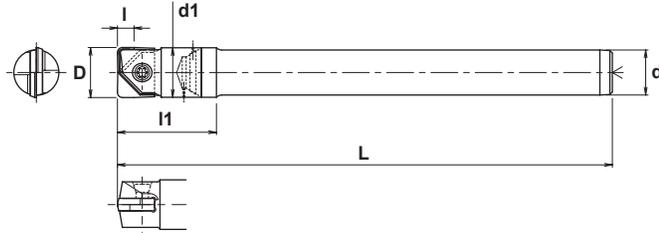
CATALOG NUMBER	STK	DIMENSIONS						INSERT (INCH)	PARTS	
		D	L	I	I1	d1	d		Screw	Wrench
RNMM-060030U-S06C	•	6	80	2	30	5.7	6	RNM-060, HRM-060, FRM-060	FSW-2005H	T-06
RNMM-080040U-S08C	•	8	90	2.7	40	7.6	8	RNM-080, HRM-080, HRM-090, FRM-080 (RME-0312, HRE-0312)	FSW-2506H	T-07
RNMM-100050U-S10C	•	10	100	3.3	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, FRM-130 (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, FRM-130 (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, FRM-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 / HRM	
	Neutral Geometry Finish		High Feed Geometry Semi-Finish Finish	
	<b>DH103</b> (JC8003) <b>JC8015</b> (JC5015)		<b>DH102</b> <b>JC8015</b>	
Gray Cast Iron (200-250 HB)	DH103 (JC8003)		DH102	
Nodular Cast Iron (180-250 HB)	DH103 (JC8003)		DH102	
Carbon Steel	JC8015 (JC5015)		JC8015	
Low Alloy Steel	JC8015 (JC5015)		JC8015	
Mold Steel (30-40 HRC)	DH103 (JC8003)		DH102	
Tool & Die Steel (40-50 HRC)	DH103 (JC8003)		DH102	
Hardened Die Steel (50-60 HRC)	DH103 (JC8003)		DH102	
Stainless Steel (45 HRC)	JC8015 (JC5015)		JC8015	
Titanium	JC8015 (JC5015)		JC8015	
Copper Alloys	KT9	JC8015 (JC5015)	JC8015	
Aluminum	KT9	JC8015 (JC5015)	JC8015	
Inconel	JC8015 (JC5015)		JC8015	
Graphite	JC100000		*	

First Choice

Second Choice



**INCH**

# Mirror Radius

## INSERTS Mirror Radius

Fig. 1

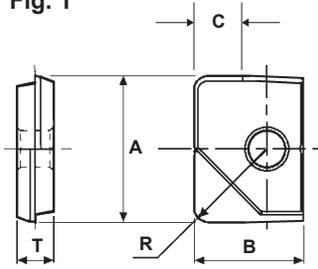
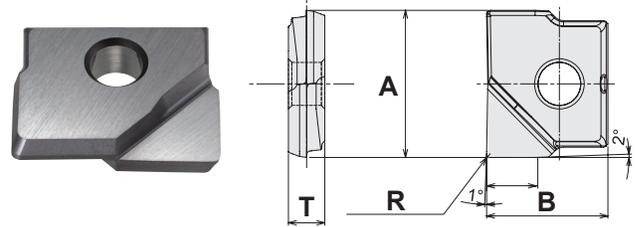


Fig. 2



## Specifications

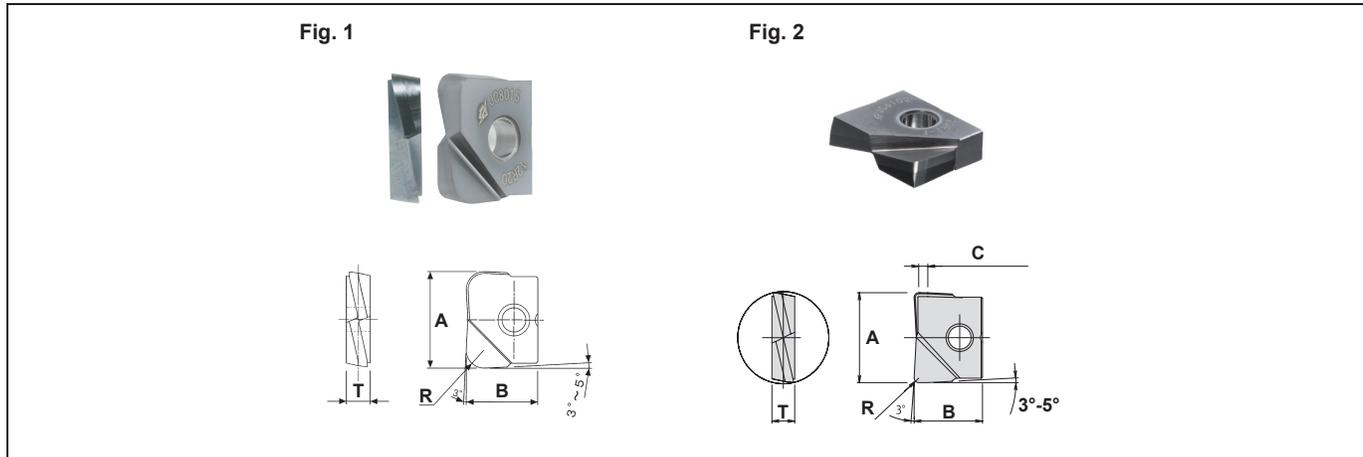
CATALOG NUMBER	DIMENSIONS					FIG.	RECOMMENDED TORQUE		STOCK			
									COATED			
	A	R	B	C	T		lbs./ft	Nm	DH103	JC8003	JC5015	JC8015
RME-0312-031	.312	.031	.275	.102	.094	2	.66	.9	•			
RME-0375-015	.375	.015	.326	.126	.102	2	.89	1.2	•			•
RME-0375-031	.375	.031	.326	.126	.102	2	.89	1.2	•			
RME-0375-062	.375	.062	.326	.126	.102	2	.89	1.2	•			
RME-0500-015	.500	.015	.409	.165	.118	2	1.48	2.0		•		•
RME-0500-031	.500	.031	.409	.165	.118	2	1.48	2.0	•			•
RME-0500-062	.500	.062	.409	.165	.118	2	1.48	2.0	•			•
RME-0625-031	.625	.031	.472	.209	.157	2	2.21	3.0	•			•
RME-0625-062	.625	.062	.472	.209	.157	2	2.21	3.0	•			•
RME-0625-125	.625	.125	.472	.209	.157	1	2.21	3.0				•
RME-0750-031	.750	.031	.570	.252	.196	2	2.95	4.0	•			•
RME-0750-062	.750	.062	.570	.252	.196	2	2.95	4.0	•			•
RME-0750-125	.750	.125	.570	.252	.196	2	2.95	4.0	•		•	
RME-1000-031	1.00	.031	.736	.335	.236	2	3.69	5.0				•
RME-1000-062	1.00	.062	.736	.335	.236	2	3.69	5.0	•			•
RME-1000-125	1.00	.125	.736	.335	.236	2	3.69	5.0	•			•
RME-1000-250	1.00	.250	.736	.335	.236	1	3.69	5.0				•
RME-1250-062	1.25	.062	.925	.417	.275	2	4.43	6.0	•			•
RME-1250-125	1.25	.125	.925	.417	.275	2	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		DH102	JC8015
FRE-0250-015	.250	.015	.203	.031	.078	2	•	
FRE-0250-031	.250	.031	.203	.031	.078	2	•	
FRE-0250-062	.250	.062	.203	.031	.078	2	•	
FRE-0375-031	.375	.031	.325	.059	.102	2	•	•
HRE-0375-062	.375	.062	.325	-	.102	1		•
FRE-0500-031	.500	.031	.407	.059	.118	2	•	•
FRE-0500-062	.500	.062	.407	.059	.118	2	•	•
HRE-0500-125	.500	.125	.407	-	.118	1		•
FRE-0625-062	.625	.062	.470	.078	.157	2		•
HRE-0625-125	.625	.125	.470	-	.157	1		•
FRE-0750-031	.750	.031	.572	.078	.197	2	•	•
FRE-0750-062	.750	.062	.572	.078	.197	2	•	•
HRE-0750-125	.750	.125	.572	-	.197	1		•
FRE-1000-031	1.00	.031	.735	.078	.236	2	•	•
FRE-1000-062	1.00	.062	.735	.078	.236	2	•	•
HRE-1000-125	1.00	.125	.735	-	.236	1		•

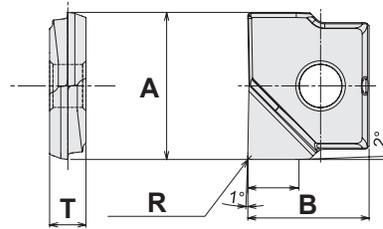


**METRIC**

# 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		•		

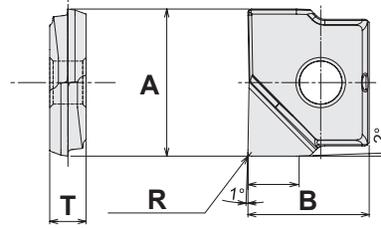


# Mirror Radius

**METRIC**

## INSERTS

### Mirror Radius



### Specifications

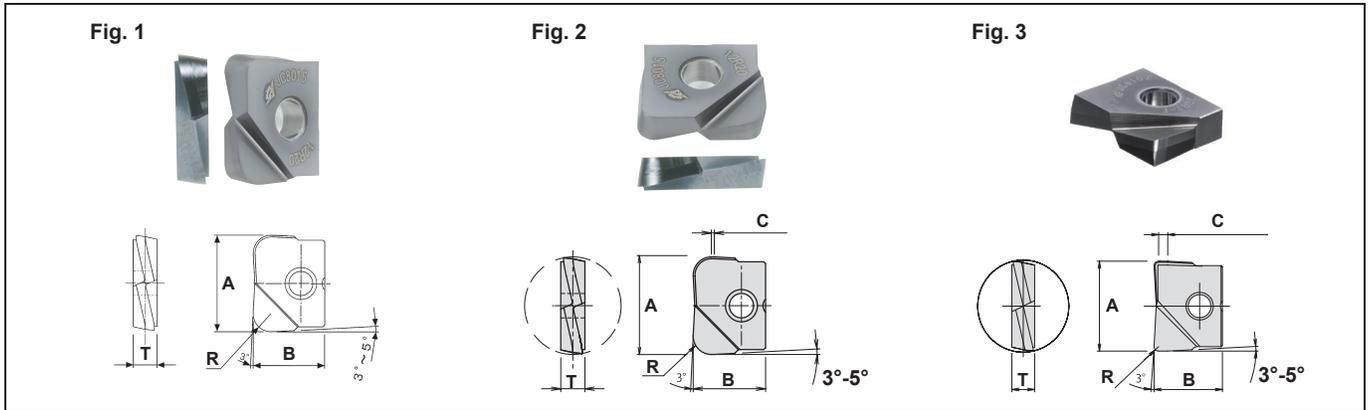
CATALOG NUMBER	DIMENSIONS					RECOMMENDED TORQUE		STOCK COATED	
	A	R	B	I	T	lbs./ft	Nm	DH103	JC8015
RNM-250-R0	25	0.1	18.5	8.3	6	3.69	5.0		•
RNM-250-R03	25	0.3	18.5	8.3	6	3.69	5.0	•	•
RNM-250-R05	25	0.5	18.5	8.3	6	3.69	5.0	•	•
RNM-250-R10	25	1.0	18.5	8.3	6	3.69	5.0	•	•
RNM-250-R15	25	1.5	18.5	8.3	6	3.69	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

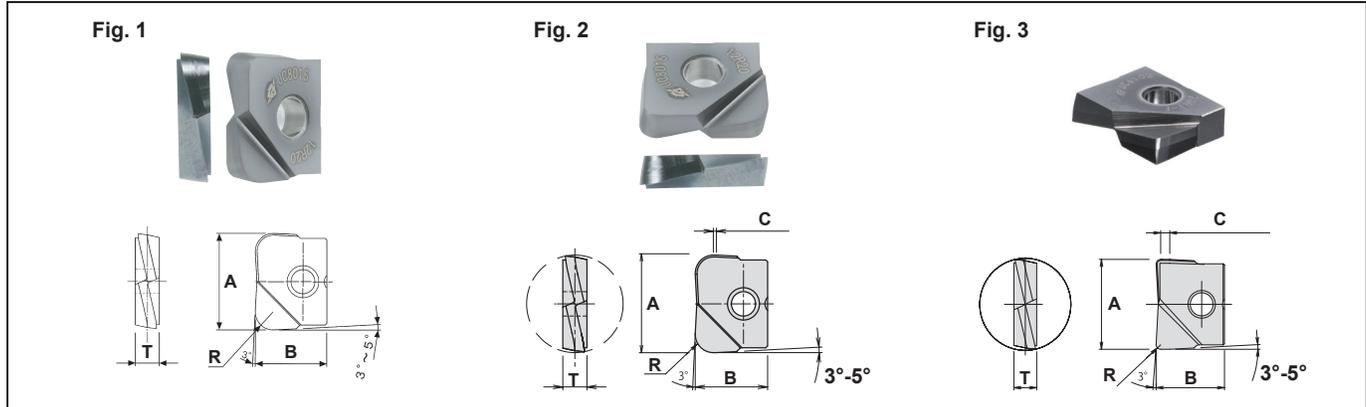
CATALOG NUMBER	DIMENSIONS					FIG.	COATED GRADE	
	A	R	B	C	T		DH102	JC8015
FRM-060-R0	6	0	5	0.8	2	3		•
FRM-060-R03	6	0.3	5	0.8	2	3	•	•
FRM-060-R05	6	0.5	5	0.8	2	3	•	•
FRM-060-R10	6	1.0	5	0.8	2	3	•	•
HRM-060-R05	6	0.5	5	-	2	1		•
HRM-060-R10	6	1.0	5	-	2	1		•
HRM-060-R15	6	1.5	5	-	2	1		•
FRM-080-R0	8	0	7	1.2	2.4	3		•
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-R0	10	0	8.5	1.5	2.6	3		•
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-R0	12	0	10	1.5	3	3		•
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-R15	12	1.5	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	•	•
FRM-130-R05	13	0.5	10	1.5	3	3		•
FRM-130-R10	13	1.0	10	1.5	3	3		•
HRM-130-R20	13	2.0	10	0.5	3	2		•



# Mirror Radius

**METRIC**

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



### Specifications

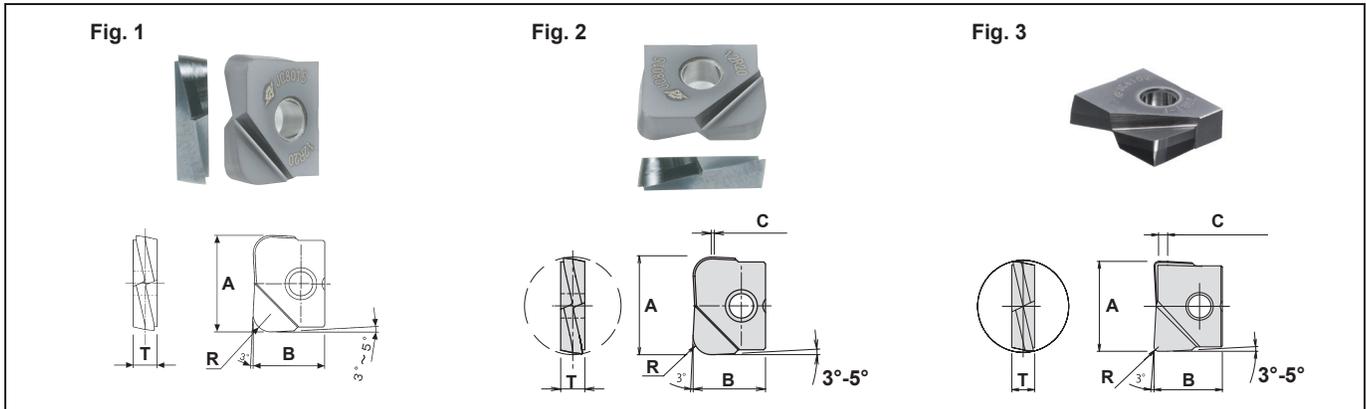
CATALOG NUMBER	DIMENSIONS					FIG.	COATED GRADE	
	A	R	B	C	T		DH102	JC8015
FRM-160-R0	16	0	12	2	4	3		•
FRM-160-R03	16	0.3	12	2	4	3	•	•
FRM-160-R05	16	0.5	12	2	4	3	•	•
FRM-160-R10	16	1.0	12	2	4	3	•	•
FRM-160-R15	16	1.5	12	2	4	3	•	
FRM-160-R20	16	2.0	12	2	4	3	•	•
HRM-160-R20	16	2.0	12	0.5	4	2		•
FRM-160-R30	16	3.0	12	2	4	3	•	
HRM-160-R30	16	3.0	12	0.5	4	2		•
FRM-170-R03	17	0.3	12	2	4	3		•
FRM-170-R05	17	0.5	12	2	4	3		•
FRM-170-R10	17	1.0	12	2	4	3	•	•
FRM-170-R20	17	2	12	2	4	3		•
HRM-170-R30	17	3.0	12	0.5	4	2		•
FRM-200-R0	20	0	15	2	5	3		•
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	15	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-R05	21	0.5	15	2	5	3		•
FRM-210-R10	21	1.0	15	2	5	3	•	•
FRM-210-R20	21	2	15	2	5	3		•
HRM-220-R30	22	3.0	15	0.5	5	2		•



**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-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-R15	25	1.5	18.8	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-260-R03	26	0.3	18.5	2.5	6	3		•
FRM-260-R05	26	0.5	18.5	2.5	6	3		•
FRM-260-R10	26	1.0	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	•	



## Mirror Radius

INCH

METRIC

### 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, FRM-060, HRM-060, RNM-060
TQC-07	T7	.66	0.9	B-07	BME-0312
					BNM-080, FRM-080, HRM-080, HRM-090, RNM-080
TQC-08	T8	.89	1.2	B-08	BME-0375, FRE-0375, HRE-0375, RME-0375
					BNM-100, BNM-110, FRM-100, HRM-100, HRM-110, RNM-100
TQC-10	T10	1.48	2.0	B-10	BME-0500, FRE-0500, HRE-0500, RME-0500
					BNM-120, FRM-120, FRM-130, HRM-120, HRM-130, RNM-120, RNM-130

### 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
KSW-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

## Recommended Cutting Data for Mirror Radius - Side Finishing

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 (160-260 HB)	FRM / FRE RNM / RME HRM / HRE	DH102 DH103 JC8015	1150	RPM	18,570	13,930	11,140	9,280	6,960	5,570	4,460	3,710	3,480
				IPM	256	192	154	128	137	131	106	88	82
				DOC	.008	.012	.012	.012	.016	.020	.031	.039	.047
				WOC	.004	.004	.006	.008	.008	.008	.008	.008	.008
Nodular Cast Iron (170-300 HB)	FRM / FRE RNM / RME HRM / HRE	DH102 DH103 JC8015	1150	RPM	18,570	13,930	11,140	9,280	6,960	5,570	4,460	3,710	3,480
				IPM	256	192	154	128	137	131	106	88	82
				DOC	.008	.012	.012	.012	.016	.020	.031	.039	.047
				WOC	.004	.004	.006	.008	.008	.008	.008	.008	.008
Carbon Steel (-250 HB)	RNM / RME HRM / HRE FRM / FRE	DH103 JC8015	1000	RPM	15,920	11,940	9,550	7,960	5,970	4,770	3,820	3,180	2,980
				IPM	157	118	113	94	94	75	60	50	47
				DOC	.008	.012	.012	.012	.016	.020	.031	.039	.047
				WOC	.004	.004	.004	.004	.004	.004	.004	.004	.004
Low Alloy Steel (-255 HB)	RNM / RME HRM / HRE FRM / FRE	DH103 JC8015	1000	RPM	15,920	11,940	9,550	7,960	5,970	4,770	3,820	3,180	2,980
				IPM	157	118	113	94	94	75	60	50	47
				DOC	.008	.012	.012	.012	.016	.020	.031	.039	.047
				WOC	.004	.004	.004	.004	.004	.004	.004	.004	.004
Mold Steel (30-36 HRC)	RNM / RME HRM / HRE FRM / FRE	DH103 JC8015	1000	RPM	15,920	11,940	9,550	7,960	5,970	4,770	3,820	3,180	2,980
				IPM	157	118	113	94	94	75	60	50	47
				DOC	.008	.012	.012	.012	.016	.020	.031	.039	.047
				WOC	.004	.004	.004	.004	.004	.004	.004	.004	.004
Mold Steel (38-43 HRC)	RNM / RME HRM / HRE FRM / FRE	DH103 JC8015	900	RPM	14,850	11,140	8,910	7,430	5,570	4,460	3,570	2,970	2,790
				IPM	146	110	105	88	66	53	42	35	33
				DOC	.008	.012	.012	.012	.016	.020	.031	.039	.047
				WOC	.004	.004	.004	.004	.004	.004	.004	.004	.004
Tool & Die Steel (42-52 HRC)	HRM / HRE FRM / FRE	DH102 JC8015	820	RPM	13,260	9,950	7,960	6,630	4,970	3,980	3,180	2,650	2,490
				IPM	52	39	31	26	30	24	19	16	15
				DOC	.008	.008	.012	.012	.016	.020	.024	.031	.039
				WOC	.004	.004	.004	.004	.004	.004	.004	.004	.004
Hardened Die Steel (55-62 HRC)	FRM / FRE	DH102	650	RPM	10,610	7,960	6,370	5,310	3,980	3,180	2,550	2,120	1,990
				IPM	42	31	25	21	24	19	15	13	12
				DOC	.008	.008	.012	.012	.016	.020	.024	.031	.039
				WOC	.004	.004	.004	.004	.004	.004	.004	.004	.004
Stainless Steel	RNM / RME HRM / HRE FRM / FRE	JC8015	920	RPM	14,850	11,140	8,910	7,430	5,570	4,460	3,570	2,970	2,790
				IPM	176	131	105	88	88	70	56	47	44
				DOC	.008	.008	.012	.012	.016	.020	.024	.031	.039
				WOC	.004	.004	.004	.004	.004	.004	.004	.004	.004
Titanium	HRM / HRE FRM / FRE	JC8015	330	RPM	5,310	3,980	3,180	2,650	1,990	1,590	1,270	1,060	990
				IPM	42	31	30	25	19	15	13	11	10
				DOC	.008	.008	.010	.010	.012	.014	.016	.016	.016
				WOC	.004	.004	.004	.004	.004	.004	.004	.004	.004
Inconel	HRM / HRE FRM / FRE	JC8015	260	RPM	4,240	3,180	2,550	2,120	1,590	1,270	1,020	850	800
				IPM	33	25	24	20	15	12	10	8	8
				DOC	.008	.008	.010	.010	.010	.012	.014	.016	.016
				WOC	.004	.004	.004	.004	.004	.004	.004	.004	.004
Copper Alloys	RNM / RME FRM / FRE	KT9 JC8015	820	RPM	13,260	9,950	7,960	6,630	4,970	3,980	3,180	2,650	2,490
				IPM	209	157	125	104	98	79	63	52	49
				DOC	.008	.010	.012	.016	.020	.028	.031	.039	.039
				WOC	.006	.006	.006	.006	.006	.006	.006	.006	.006
Aluminum	RNM / RME FRM / FRE	KT9 JC8015	1150	RPM	18,570	13,930	11,140	9,280	6,960	5,570	4,460	3,710	3,480
				IPM	293	219	176	146	138	110	88	73	69
				DOC	.012	.016	.020	.024	0.31	0.39	.047	.063	.063
				WOC	.008	.008	.008	.008	.008	.008	.008	.008	.008
Graphite	RNM / RME	JC10000	1150	RPM	18,570	13,930	11,140	9,280	6,960	5,570	4,460	3,710	3,480
				IPM	293	219	176	146	138	110	88	73	69
				DOC	.012	.016	.020	.024	.031	.039	.047	.063	.063
				WOC	.008	.008	.008	.008	.008	.008	.008	.008	.008

**NOTE:** 1. These parameters represent stable machining with a steel body at lengths 4XD. See table on page 39 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.



# Mirror Radius

## Recommended Cutting Data for Mirror Radius - Bottom Finishing

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 (160-260 HB)	RNM / RME HRM / HRE FRM / FRE	DH102 DH103 / JC8003 JC8015	1000	RPM	15,920	11,940	9,550	7,960	5,970	4,770	3,820	3,180	2,980	
				IPM	188	165	131	125	94	75	75	63	59	
				DOC	.004	.006	.006	.008	.008	.008	.008	.008	.008	.008
				WOC	.039	.047	.047	.059	.079	.098	.157	.165	.165	
Nodular Cast Iron (170-300 HB)	RNM / RME HRM / HRE FRM / FRE	DH102 DH103 / JC8003 JC8015	1000	RPM	15,920	11,940	9,550	7,960	5,970	4,770	3,820	3,180	2,980	
				IPM	188	165	131	125	94	75	75	63	59	
				DOC	.004	.006	.006	.008	.008	.008	.008	.008	.008	
				WOC	.039	.047	.047	.059	.079	.098	.157	.165	.165	
Carbon Steel (-250 HB)	RNM / RME HRM / HRE FRM / FRE	DH103 / JC8003 JC8015	850	RPM	13,790	10,350	8,280	6,900	5,170	4,140	3,310	2,760	2,590	
				IPM	136	122	98	81	81	65	52	43	41	
				DOC	.004	.006	.006	.008	.008	.008	.008	.008	.008	
				WOC	.039	.047	.047	.059	.079	.098	.157	.165	.165	
Low Alloy Steel (-255 HB)	RNM / RME HRM / HRE FRM / FRE	DH103 / JC8003 JC8015	850	RPM	13,790	10,350	8,280	6,900	5,170	4,140	3,310	2,760	2,590	
				IPM	136	122	98	81	81	65	52	43	41	
				DOC	.004	.006	.006	.008	.008	.008	.008	.008	.008	
				WOC	.039	.047	.047	.059	.079	.098	.157	.165	.165	
Mold Steel (30-36 HRC)	RNM / RME HRM / HRE FRM / FRE	DH103 / JC8003 JC8015	850	RPM	13,790	10,350	8,280	6,900	5,170	4,140	3,310	2,760	2,590	
				IPM	136	122	98	81	81	65	52	43	41	
				DOC	.004	.006	.006	.008	.008	.008	.008	.008	.008	
				WOC/	.039	.047	.047	.059	.079	.098	.157	.165	.165	
Mold Steel (38-43 HRC)	RNM / RME HRM / HRE FRM / FRE	DH103 / JC8003 JC8015	800	RPM	12,730	9,550	7,640	6,370	4,770	3,820	3,060	2,550	2,390	
				IPM	125	113	90	75	56	45	36	30	28	
				DOC	.004	.006	.006	.008	.008	.008	.008	.008	.008	
				WOC	.039	.047	.047	.059	.079	.098	.157	.165	.165	
Tool & Die Steel (42-52 HRC)	HRM / HRE FRM / FRE	DH102 JC8015	620	RPM	10,080	7,560	6,050	5,040	3,780	3,020	2,420	2,020	1,890	
				IPM	40	30	24	24	22	18	14	12	11	
				DOC	.002	.002	.003	.004	.004	.006	.006	.006	.006	
				WOC	.039	.047	.047	.059	.079	.098	.157	.165	.165	
Hardened Die Steel (55-62 HRC)	FRM / FRE	DH102	420	RPM	6,900	5,170	4,140	3,450	2,590	2,070	1,660	1,380	1,290	
				IPM	27	20	16	16	15	12	10	8	7	
				DOC	.002	.002	.003	.004	.004	.006	.006	.006	.006	
				WOC	.039	.047	.047	.059	.079	.098	.157	.165	.165	
Stainless Steel	RNM / RME HRM / HRE FRM / FRE	JC8015	800	RPM	12,730	9,550	7,640	6,370	4,770	3,820	3,060	2,550	2,390	
				IPM	125	113	90	75	75	60	48	40	38	
				DOC	.004	.006	.006	.006	.006	.006	.006	.006	.006	
				WOC	.039	.047	.047	.059	.079	.098	.157	.165	.165	
Titanium	HRM / HRE FRM / FRE	JC8015	180	RPM	2,920	2,190	1,750	1,460	1,090	880	700	580	550	
				IPM	23	17	14	11	9	7	6	5	4	
				DOC	.004	.006	.006	.006	.006	.008	.008	.008	.008	
				WOC	.039	.047	.047	.059	.079	.098	.157	.165	.165	
Inconel	HRM / HRE FRM / FRE	JC8015	180	RPM	2,920	2,190	1,750	1,460	1,090	880	700	580	550	
				IPM	23	17	14	11	9	7	6	5	4	
				DOC	.004	.006	.006	.006	.006	.008	.008	.008	.008	
				WOC	.039	.047	.047	.059	.079	.098	.157	.165	.165	
Copper Alloys	RNM RME	KT9 JC8015	650	RPM	10,610	9,950	6,370	5,310	3,980	3,180	2,550	2,120	1,990	
				IPM	125	157	75	63	47	37	30	25	24	
				DOC	.006	.008	.008	.008	.008	.010	.010	.010	.010	
				WOC	.039	.047	.047	.059	.079	.098	.157	.165	.165	
Aluminum	RNM RME	KT9 JC8015	1000	RPM	15,920	13,930	9,550	7,960	5,970	4,770	3,820	3,180	2,980	
				IPM	251	219	150	125	141	113	90	75	70	
				DOC	.008	.010	.010	.010	.010	.012	.012	.012	.012	
				WOC	.039	.047	.047	.059	.079	.098	.157	.165	.165	
Graphite	RNM	JC10000	1000	RPM	15,920	13,930	9,550	7,960	5,970	4,770	3,820	3,180	2,980	
				IPM	251	219	150	125	141	113	90	75	70	
				DOC	.008	.010	.010	.010	.010	.012	.012	.012	.012	
				WOC	.039	.047	.047	.059	.079	.098	.157	.165	.165	

- NOTE:** 1. These parameters represent stable machining with a steel body at lengths 4XD. See table on page 39 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.



# Mirror Radius

## Recommended Cutting Data for Mirror Radius - High Feed

Material	Insert Style	Grade	SFM		6mm	8mm 5/16"	10mm 3/8"	12mm 1/2"	16mm 5/8"	20mm 22mm 3/4"	1"
Gray Cast Iron (160-260 HB)	HRM / HRE	JC8015	450	RPM	7,400	6,400	5,100	4,200	3,200	2,500	2,000
				IPM	260	299	240	197	150	118	94
				DOC	.008	.016	.016	.016	.024	.024	.024
				WOC	.083	.110	.165	.220	.275	.386	.465
Nodular Cast Iron (170-300 HB)	HRM / HRE	JC8015	450	RPM	7,400	6,400	5,100	4,200	3,200	2,500	2,000
				IPM	260	299	240	197	150	118	94
				DOC	.008	.016	.016	.016	.024	.024	.024
				WOC	.083	.110	.165	.220	.275	.386	.465
Carbon Steel (-250 HB)	HRM / HRE	JC8015	550	RPM	9,000	7,500	6,000	6,000	3,800	3,000	2,400
				IPM	315	323	283	283	177	142	113
				DOC	.008	.016	.016	.016	.024	.024	.024
				WOC	.083	.110	.165	.220	.275	.386	.465
Low Alloy Steel (-255 HB)	HRM / HRE	JC8015	520	RPM	8,500	7,100	5,700	5,700	3,500	2,800	2,200
				IPM	299	307	268	268	165	130	104
				DOC	.008	.016	.016	.016	.024	.024	.024
				WOC	.083	.110	.165	.220	.275	.386	.465
Mold Steel (30-43 HRC))	HRM / HRE	JC8015	520	RPM	8,500	7,100	5,700	5,700	3,500	2,800	2,200
				IPM	299	307	268	268	165	130	104
				DOC	.008	.016	.016	.016	.024	.024	.024
				WOC	.083	.110	.165	.220	.275	.386	.465
Tool & Die Steel (42-52 HRC)	HRM / HRE	JC8015	420	RPM	6,900	6,000	4,700	4,700	3,000	2,400	1,900
				IPM	217	260	220	220	142	110	87
				DOC	.006	.008	.008	.008	.012	.012	.012
				WOC	.083	.110	.165	.220	.276	.386	.465
Stainless Steel	HRM / HRE	JC8015	500	RPM	8,000	6,700	5,400	5,400	3,400	2,700	2,100
				IPM	252	287	252	252	157	126	98
				DOC	.008	.016	.016	.016	.024	.024	.024
				WOC	.083	.110	.165	.220	.275	.386	.465

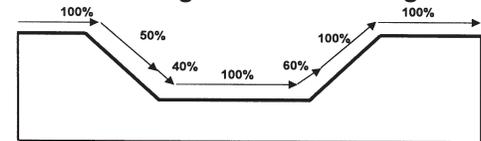
- NOTE:** 1. These parameters represent stable machining with a steel body at 4XD. See table below for longer applications.  
 2. Parameters for carbide bodies can be run with 25% more surface footage & chip load.  
 3. For best performance use carbide bodies on tools 5/8" diameter and smaller over 3XD.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

### 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, PME & MPT Styles For Finishing



- High speed and high efficient finishing.
- Two styles of bodies.
  - Finishing (MPM, PME type)
  - High Precision Finishing (MPT type)
- 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.



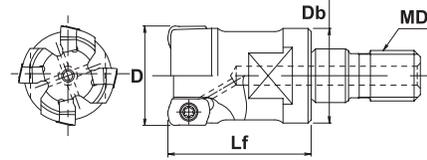
## QM Mini

INCH

METRIC

### QM MINI

New Generation of High Feed Mills  
MPM Style - G Body



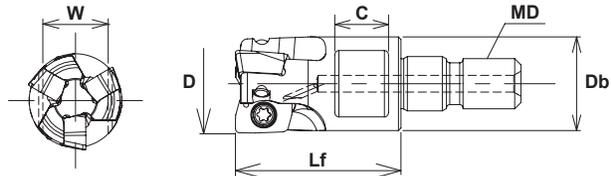
### Modular Head Specifications

	CATALOG NUMBER	STK	DIMENSIONS				HEAD TORQUE		INSERT	Q	PARTS	
			D	Lf	Db	MD	lbs./ft	Nm			Screw	Wrench
INCH	MPM-3050-M6	•	.500	.787	.452	M6	5.9	8	YOHW0602**ZER-12 ZOMT0602**ZER-PL	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		
METRIC	MPM-2010-M6	•	10	18	9.5	M6	5.9	8	YOHW0602**ZER-12 ZOMT0602**ZER-PL	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-3015-M8	•	15	23	14	M8	11.8	16		3		
	MPM-4016-M8	•	16	23	15	M8	11.8	16		4		
	MPM-4017-M8	•	17	23	15	M8	11.8	16		4		
	MPM-4018-M8	•	18	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-81 for Modular Head Shanks.

Note: All cutters are supplied without inserts, wrenches or moly.

### MPT Style - High Precision



### Specifications - Metric

CATALOG NUMBER	STK	DIMENSIONS						HEAD TORQUE		INSERT	Q	PARTS
		D	Lf	Db	MD	C	W	lbs./ft	Nm			Screw / Wrench
MPT-2010A00-M6	•	10	18	9.5	M6	6.5	8	5.9	8	YOHW0602**ZER-12 ZOMT0602**ZER-PL	2	DSW-1840H T-06
MPT-2011A00-M6	•	11	18	9.7	M6			5.9	8		2	
MPT-3012A00-M6	•	12	20	11.2	M6			5.9	8		3	
MPT-3013A00-M6	•	13	20	11.5	M6			5.9	8		3	
MPT-4016A00-M8	•	16	23	15	M8			8	12		11.8	

See page A-81 for Modular Head Shanks.

Note: All cutters are supplied without inserts, wrenches or moly.

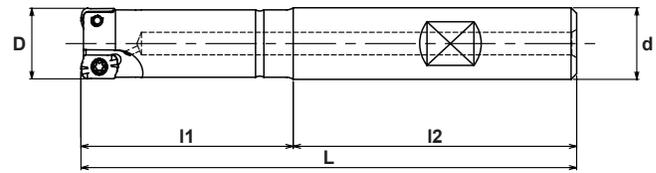


INCH

METRIC

QM Mini

## PME Style



## Specifications for End Mill - Inch

CATALOG NUMBER	STK	DIMENSIONS					INSERT	Q	PARTS	
		D	L	I1	I2	d			Screw	Wrench
PME-3050-1.5-S050LG	•	.500	3.50	1.50	2.00	.500	YOHW0602**ZER-12	3	DSW-1840H	T-06
PME-4062-1.5-S062LG	•	.625	4.50	1.50	3.00	.625	ZOMT0602**ZER-PL	4		

Note: All cutters are supplied without inserts, wrenches or moly.



Fig. 1

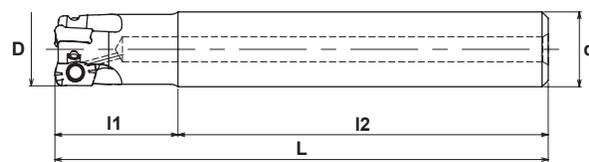
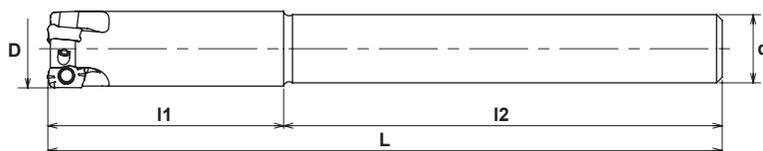


Fig. 2



## Specifications for End Mill - Metric

CATALOG NUMBER	STK	DIMENSIONS					FIG.	INSERT	Q	PARTS	
		D	L	I1	I2	d				Screw	Wrench
PME2010S10	•	10	80	20	60	10	1	YOHW0602**ZER-12 ZOMT0602**ZER-PL	2	DSW-1840H	T-06
PME3012S12	•	12	80	20	60	12	1		3		
PME3014S12	•	14	80	20	60	12	1		3		
PME2011S10-LS	•	11	120	33	87	10	2		2		
PME3013S12-LS	•	13	120	39	81	12	2		3		
PME3014S12-LS	•	14	120	42	78	12	2		3		

Note: All cutters are supplied without inserts, wrenches or moly.

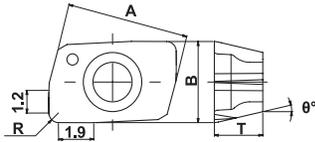


# QM Mini

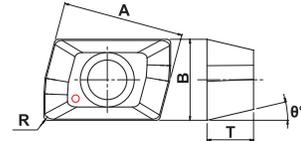
**METRIC**

## INSERTS

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



**Shoulder milling insert (ZOMT)**



TYPE	CATALOG NUMBER	TOLERANCE	DIMENSIONS					PVD COATED			
			A	B	T	R	∅	JC8118	DH102	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°		•	•	
Shoulder milling insert	ZOMT060202ZER-PL	M	6.5	4.3	2.5	0.2	13°	•			•
	ZOMT060204ZER-PL	M	6.5	4.3	2.5	0.4	13°	•			•
	ZOMT060208ZER-PL	M	6.5	4.3	2.5	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

## Recommended Cutting Data for QM Mini

Material	Parameters	Finish			
		Side		Bottom	
		ZOMT	YOHW	ZOMT	YOHW
Gray Cast Iron (160-260 HB)	SFM	1,050	1,310	590	660
	IPT	.006	.006	.006	.006
	DOC	.118	.047	.006	.006
	WOC	.005	.005	.024	.024
	Grade	JC8118	DH102	JC8118	DH102
Nodular Cast Iron (170-300HB)	SFM	1,050	1,310	590	660
	IPT	.006	.006	.006	.006
	DOC	.118	.047	.006	.006
	WOC	.005	.005	.024	.024
	Grade	JC8118	DH102	JC8118	DH102
Carbon Steel (-250HB)	SFM	1,050	1,310	740	820
	IPT	.006	.006	.006	.006
	DOC	.118	.047	.005	.005
	WOC	.004	.004	.024	.024
	Grade	JC8050	JC8015	JC8050	JC8015
Low Alloy Steel (-255HB)	SFM	920	1,150	680	750
	IPT	.006	.006	.007	.007
	DOC	.118	.039	.005	.005
	WOC	.004	.004	.024	.024
	Grade	JC8050	JC8015	JC8050	JC8015
Mold Steel (30-36HRC)	SFM	920	1,150	680	750
	IPT	.006	.006	.007	.007
	DOC	.118	.039	.005	.005
	WOC	.004	.004	.024	.024
	Grade	JC8118	JC8015	JC8118	JC8015
Mold Steel (38-43HRC)	SFM	790	980	590	660
	IPT	.005	.005	.005	.005
	DOC	.098	.039	.005	.005
	WOC	.004	.004	.024	.024
	Grade	JC8118	DH102	JC8118	DH102
Tool & Die Steel (42-52HRC)	SFM	520	660	350	390
	IPT	.004	.004	.004	.004
	DOC	.079	.031	.004	.004
	WOC	.004	.004	.016	.016
	Grade	JC8118	DH102	JC8118	DH102
Hardened Die Steel (55-62HRC)	SFM	390	490	210	230
	IPT	.004	.004	.003	.003
	DOC	.059	.020	.004	.004
	WOC	.004	.004	.016	.016
	Grade	JC8118	DH102	JC8118	DH102
Stainless Steel	SFM	920	1,150	680	750
	IPT	.006	.006	.007	.007
	DOC	.118	.039	.005	.005
	WOC	.004	.004	.024	.024
	Grade	JC8050	JC8015	JC8050	JC8015
Titanium	SFM	260	330	190	210
	IPT	.005	.005	.005	.005
	DOC	.079	.039	.005	.005
	WOC	.004	.004	.016	.016
	Grade	JC8050	JC8015	JC8050	JC8015
Inconel	SFM	180	230	130	150
	IPT	.004	.004	.004	.004
	DOC	.079	.039	.005	.005
	WOC	.004	.004	.016	.016
	Grade	JC8119	JC8015	JC8118	DH102

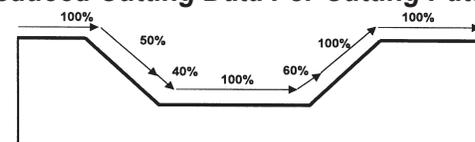
- NOTE:** 1. These parameters represent stable machining with steel body at 4XD - see table below for longer applications.  
 2. Above parameters should be adjusted according to machine & work rigidity.  
 3. If chatter occurs, recommend to reduce DOC or IPT.  
 4. If machine does not have enough power, reduce DOC or spindle speed and feed.

### 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 Max

## MQX & MQT Style For Finishing



- High speed and high efficient finishing.
- Two styles of bodies.
  - finishing (MQX & QXPS) types
  - high precision finishing MQT type
- 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.

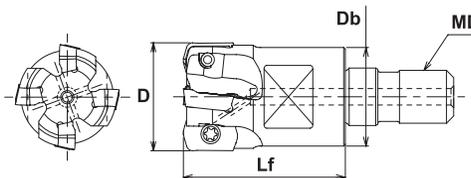


## QM Max

INCH

METRIC

### MQX Style


**G-Body**

### Specifications

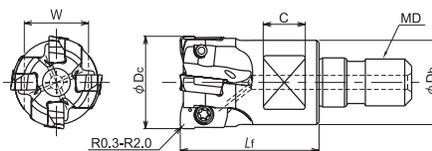
CATALOG NUMBER	STK	DIMENSIONS				HEAD TORQUE		INSERT	Q	PARTS	
		D	Lf	Db	MD	lbs./ft	Nm			Screw	Wrench
INCH	MQX-3075-M10	•	.750	1.18	.708	M10	11.8	16	3	TSW-2556H	T-08
	MQX-5100-M12	•	1.00	1.38	.809	M12	14.7	20	5	DSW-2563H	T-08
	MQX-5125-M16	•	1.25	1.69	1.14	M16	18.4	25	5		
METRIC	MQX-2016-M8	•	16	23	14	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-5028-M12	•	28	35	23.6	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-81 for Modular Head Shanks.

Note: All cutters are supplied without inserts, wrenches or moly.

### MQT Style

#### High Precision



### Specifications

INCLINE ANGLE $\theta^\circ$	CATALOG NUMBER	STK	DIMENSIONS (mm)						INSERT	Q	PARTS	
			$\phi D_c$	Lf	$\phi D_b$	MD	C	W			SCREW	WRENCH
0°	MQT-2016A00-M8	•	16	23	14	M8	8	12	XP**100308ZWE-R YPHW1003**Z*R** ZPMT1003**ZER-PL	2	TSW-2556H	T-08
	MQT-4020A00-M10	•	20	30	18	M10	9	14		4		
	MQT-5025A00-M12	•	25	35	22.5	M12	10	17		5		
	MQT-6035A00-M16	•	35	43	29	M16	12	22		6		

See page A-81 for Modular Head Shanks.

Note: All cutters are supplied without inserts, wrenches or moly.



**INCH**

**METRIC**

**QM Max**

**QXP Style**

**G-Body**



Fig. 1

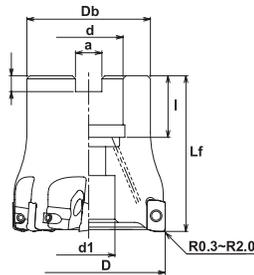
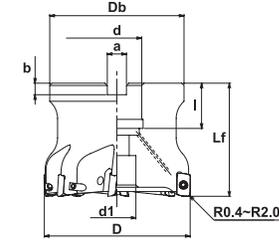


Fig. 2

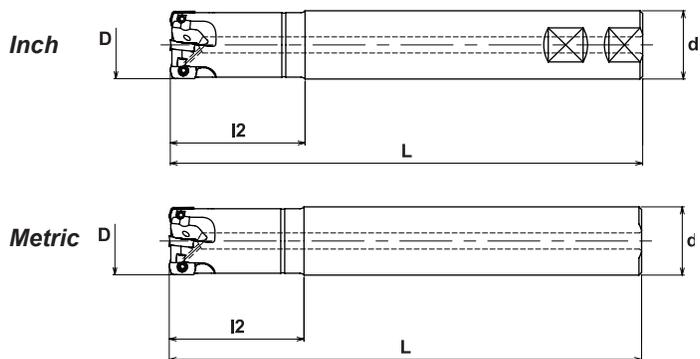


**Specifications**

	CATALOG NUMBER	STK	DIMENSIONS								FIG.	INSERT	Q	PARTS	
			D	Lf	Db	d	d1	a	b	l				Screw	Wrench
INCH	QXP-8200R-075	•	2.00	2.00	1.77	.750	.63	.319	.197	.750	1		8	DSW-2563H	T-08
METRIC	QXP-6040R-16	•	40	45	35	16	14	8.4	5.6	18	1	YPHW1003**Z*R-** ZPMT1003**ZER-PL	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, wrenches or moly.

**QXPS & QXP Style**



**Specifications**

	CATALOG NUMBER	STK	DIMENSIONS				INSERT	Q	PARTS	
			D	L	l2	d			Screw	Wrench
INCH	QXPS-3075-2.0-S075NP	•	.750	5.00	2.00	.750	ZPMT1003**ZER-** YPHW1003**ZER-*	3	DSW-2563H	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		
	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		
METRIC	QXP-2016-30-S16	o	16	100	30	16		2	DSW-2563H	T-08
	QXP-3020-50-S20	o	20	130	50	20		3		
	QXP-4025-60-S25	o	25	140	60	25		4		
	QXP-5032-70-S32	o	32	150	70	32		5		
	QXP-6040-45-S32	o	40	150	45	32		6		

o = Phasing out

Note: All cutters are supplied without inserts, wrenches or moly.

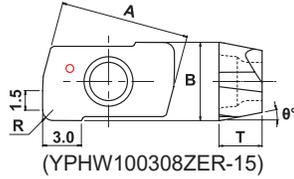
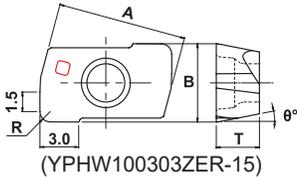
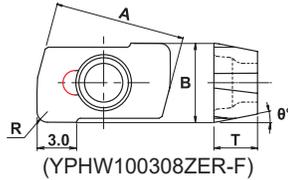


# QM Max

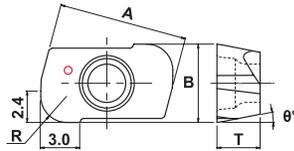
**METRIC**

## QM Max Inserts

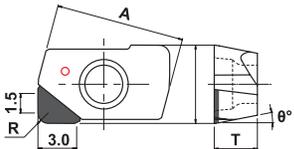
"Mirror Insert" for finishing side & bottom face  
(YPHW1003\*\*ZER-15) (YPHW100308ZTR-F1) (YPHW100308ZER-F)



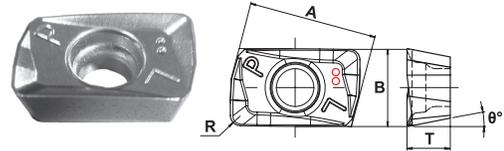
"Mirror Insert" for finishing side & bottom face and contouring  
(YPHW100320ZER-24)



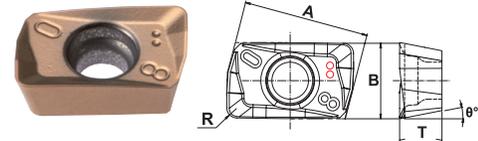
CBN



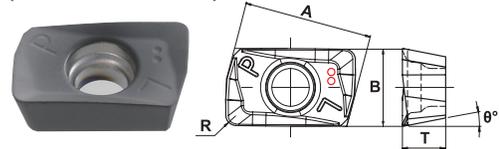
Shoulder insert for aluminum  
(ZPMT1003\*\*ZER-NL)



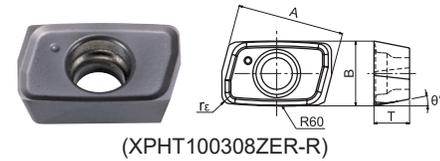
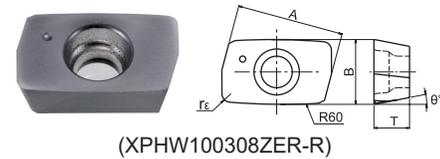
Shoulder insert for TiAlloy  
(ZPMT1003\*\*ZER-SL)



Shoulder insert for semi-finishing to side and bottom finishing  
(ZPMT1003\*\*ZER-PL)



For tapered wall finishing  
(XPHW100308ZER-R) (XPHT100308ZER-R)



## Specifications for inserts

CATALOG NUMBER	TOLERANCE	DIMENSIONS					COATED					Cermet	CBN	UNCOATED
							PVD COATED							
		A	T	B	R	Ø	JC8118	DH102	JC8015	DS118	JC7518			
ZPMT100304ZER-PL	M	10.08	3.4	6	0.4	11°	•	•						
ZPMT100308ZER-PL	M	10.08	3.4	6	0.8	11°	•	•						
ZPMT100316ZER-PL	M	10.08	3.4	6	1.6	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°		•	•					
XPHW100308ZER-R	H	10.06	3.35	6	0.8	11°		•	•		•			
XPHT100308ZER-R	H	10.06	3.35	6	0.8	11°			•		•			



# QM Max

## 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	*	*	*	*	*	DS118/JC7518
Inconel	SFM	*	*	*	*	*	300
	IPT	*	*	*	*	*	.005"
	DOC	*	*	*	*	*	.040"
	WOC	*	*	*	*	*	.004"
	Grade	*	*	*	*	*	DS118/JC7518
Aluminum	SFM	*	*	*	*	2,000	*
	IPT	*	*	*	*	.008"	*
	DOC	*	*	*	*	.080"	*
	WOC	*	*	*	*	.010"	*
	Grade	*	*	*	*	FC18	*

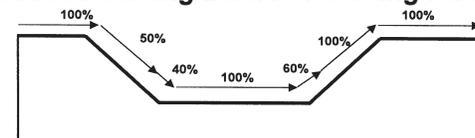
- NOTE:** 1. Above parameters should be adjusted according to machine & work rigidity.  
 2. If chatter occurs, recommend reducing DOC or IPT.  
 3. If machine does not have enough power, reduce the DOC or spindle speed & feed.  
 4. If dry cutting, recommend using air blow to remove chips.

### 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

### 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	*	*	*	*	*	DS118/JC7518
Inconel	SFM	*	*	*	*	*	70
	IPT	*	*	*	*	*	.003"
	DOC	*	*	*	*	*	.005"
	WOC	*	*	*	*	*	40%
	Grade	*	*	*	*	*	DS118/JC7518
Aluminum	SFM	*	*	*	*	1,400	*
	IPT	*	*	*	*	.008"	*
	DOC	*	*	*	*	.080"	*
	WOC	*	*	*	*	.010"	*
	Grade	*	*	*	*	FC18	*

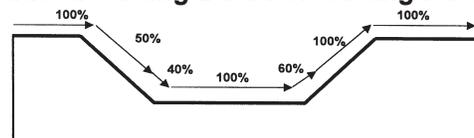
- NOTE:** 1. Above parameters should be adjusted according to machine & work rigidity.  
 2. If chatter occurs, recommend reducing DOC or IPT.  
 3. If machine does not have enough power, reduce the DOC or spindle speed & feed.  
 4. If dry cutting, recommend using air blow to remove chips.

### 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

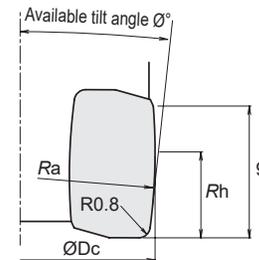
## Recommended cutting Data for MQT - Side Finishing with XPHW/XPHT

### MQT with MSN type

Material	Grade	SFM		16mm	20mm	25mm	35mm
Gray Cast Iron (160~250HB)	XPHW (XPHT) JC8015 (DH102)	1,970	RPM	12,000	9,600	7,640	5,460
			IPT	.010"	.010"	.010"	.010"
			DOC	.060"	.060"	.060"	.060"
			WOC	.005"	.005"	.005"	.005"
Nodular Cast Iron (180~300HB)	XPHW (XPHT) JC8015 (DH102)	1,970	RPM	12,000	9,600	7,640	5,460
			IPT	.010"	.010"	.010"	.010"
			DOC	.060"	.060"	.060"	.060"
			WOC	.005"	.005"	.005"	.005"
Carbon Steel (~250HB)	XPHT (XPHW) JC8015	1,970	RPM	12,000	9,600	7,640	5,460
			IPT	.008"	.008"	.008"	.008"
			DOC	.060"	.060"	.060"	.060"
			WOC	.005"	.005"	.005"	.005"
Low Alloy Steel	XPHT (XPHW) JC8015	1,650	RPM	10,000	8,000	6,400	5,460
			IPT	.008"	.008"	.008"	.008"
			DOC	.060"	.060"	.060"	.060"
			WOC	.005"	.005"	.005"	.005"
Mold Steel (30~36HRC)	XPHT (XPHW) JC8015 (DH102)	1,480	RPM	9,000	7,200	5,730	4,090
			IPT	.008"	.008"	.008"	.008"
			DOC	.050"	.050"	.050"	.050"
			WOC	.005"	.005"	.005"	.005"
Prehardened Die Steel (38~43HRC)	XPHW DH102 (JC8015)	1,320	RPM	8,000	7,200	5,100	3,640
			IPT	.008"	.008"	.008"	.008"
			DOC	.040"	.040"	.040"	.040"
			WOC	.005"	.005"	.005"	.005"
Hardened Die Steel (43~52HRC)	XPHW DH102 (JC8015)	820	RPM	5,000	4,000	3,180	2,280
			IPT	.006"	.006"	.006"	.006"
			DOC	.040"	.040"	.040"	.040"
			WOC	.004"	.004"	.004"	.004"
Hardened Die Steel (55~62HRC)	XPHW DH102	590	RPM	3,600	2,860	2,300	1,640
			IPT	.004"	.004"	.004"	.004"
			DOC	.040"	.040"	.040"	.040"
			WOC	.004"	.004"	.004"	.004"
Stainless Steel	XPHT (XPHW) JC8015	1,650	RPM	10,000	8,000	6,400	4,550
			IPT	.008"	.008"	.008"	.008"
			DOC	.050"	.050"	.050"	.050"
			WOC	.005"	.005"	.005"	.005"



### Definition of edge shape for programming



#### • Dimensions when using XPHW/T insert

Available tilt angle $\theta^\circ$	CATALOG NUMBER	DIMENSIONS (mm)		
		$\text{ØDc}$	$Ra$	$Rh$
$0^\circ \sim 3^\circ$	MQT-2016A00-M8	16	R63.27	5.48
$0^\circ \sim 3^\circ$	MQT-4020A00-M10	20	R64.29	5.48
$0^\circ \sim 3^\circ$	MQT-5025A00-M12	25	R63.26	5.48
$0^\circ \sim 3^\circ$	MQT-6035A00-M16	35	R62.16	5.48

#### • Dimensions when using YPHW insert

Available tilt angle $\theta^\circ$	CATALOG NUMBER	DIMENSIONS (mm)
		$\text{ØDc}$
$0^\circ$	MQT-2016A00-M8	16
$0^\circ$	MQT-4020A00-M10	20
$0^\circ$	MQT-5025A00-M12	25
$0^\circ$	MQT-6035A00-M16	35

Cusp Height (Inch)	ap (Inch)	Cusp Height (Inch)	ap (Inch)
0.000020	.020"	0.000132	.052"
0.000028	.024"	0.000153	.056"
0.000038	.028"	0.000176	.060"
0.000050	.032"	0.000200	.064"
0.000063	.036"	0.000226	.068"
0.000078	.040"	0.000253	.072"
0.000094	.044"	0.000282	.076"
0.000113	.048"	0.000313	.080"

- Note:**
1. Figure to be adjusted according to machine rigidity or work rigidity.
  2. If chattering occurs, recommend reducing DOC & WOC.
  3. Use air





# Diemaster 5G

*High Efficient Finisher with Double-Sided Insert*



- Capable of side wall & bottom finishing, semi-finishing, and both finishing & semi-finishing in plunging application.
- Double-sided insert with 6 cutting edges.
- Highly accurate insert with H class tolerance.
- Insert has double wiper - for face cutting and periphery cutting.

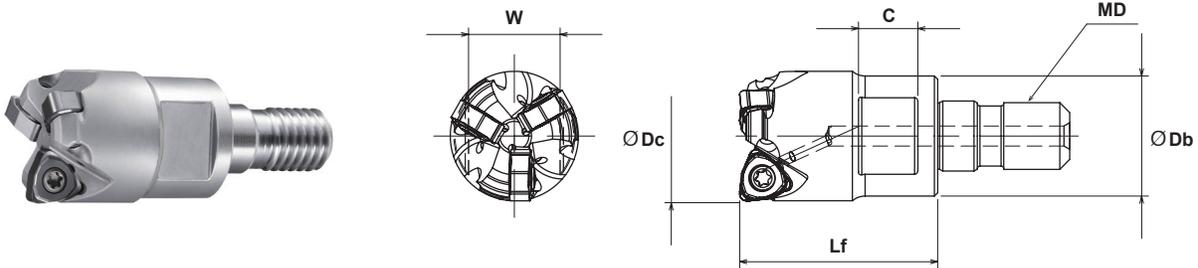


# Diemaster 5G

INCH

METRIC

## MODULAR HEAD MXF Type



### Specifications - Inch

CATALOG NUMBER	STK	DIMENSIONS						HEAD TORQUE LBS/FT	INSERT	Q	PARTS	
		ØDc	Lf	ØDb	MD	C	W				Screw	Wrench
MXF-3075-M10	•	.750	1.18	.708	M10	.354	.551	11.8	WNHU04T310ZER	3	TSW-2567H	T-08
MXF-4100-M12	•	1.00	1.38	.866	M12	.433	.748	14.7		4		
MXF-5125-M16	•	1.25	1.69	1.14	M16	.472	.866	18.4		5		

See page A-81 for Modular Head Shanks.

Note: All cutters supplied without inserts, wrenches, &amp; moly.

### Specifications - Metric

CATALOG NUMBER	STK	DIMENSIONS						HEAD TORQUE Nm	INSERT	Q	PARTS	
		ØDc	Lf	ØDb	MD	C	W				Screw	Wrench
MXF-2016-M8	•	16	23	14	M8	8	12	8	WNHU04T310ZER	2	TSW-2567H	T-08
MXF-3020-M10	•	20	30	18	M10	9	14	16		3		
MXF-4025-M12	•	25	35	22	M12	11	19	20		4		
MXF-5032-M16	•	32	43	29	M16	12	22	25		5		
MXF-5035-M16	•	35	43	29	M16	12	22	25		6		
MXF-6040-M16	•	40	43	32	M16	12	26	25		6		
MXF-6042-M16	⊙	42	43	32	M16	12	26	25		6		

See page A-81 for Modular Head Shanks.

Note: All cutters supplied without inserts, wrenches, &amp; moly.

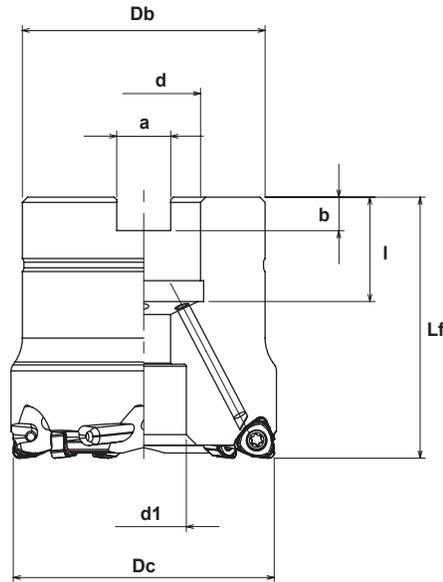
⊙ - longer delivery may apply.



**METRIC**

# Diemaster 5G

## FACE MILL XFG Type



### Specifications

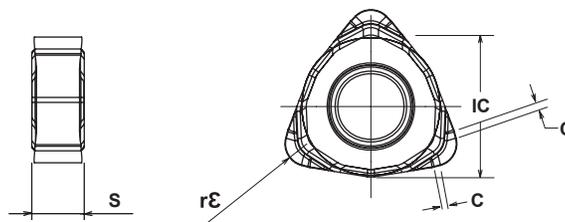
CATALOG NUMBER	STK	DIMENSIONS								ARBOR BOLT	Q	INSERT & PARTS
		Dc	Lf	Db	d	d1	a	b	l			
XFG-6050R-22	•	50	50	47	22	16.5	10.4	6.3	20	M10	6	WNHU04T310ZER TSW-2567H T-08
XFG-6052R-22	⊙	52	50	47	22	16.5	10.4	6.3	20	M10	6	
XFG-7063R-27	•	63	50	48	27	20	12.4	7	22	M12x1.75x30*	7	
XFG-7066R-27	⊙	66	50	48	27	20	12.4	7	22	M12x1.75x30*	7	

⊙ - longer delivery may apply.

Note: All cutters supplied without inserts, wrenches, & moly.

NOTE: Arbor bolt included with cutters marked with \*, other cutters use bolt supplied with arbor.

## INSERT WNHU04 type



### Specifications

CATALOG NUMBER	TOLERANCE	DIMENSIONS				PVD COATED	
		IC	S	rE	C	JC8015	DH103
WNHU04T310ZER	H	6.35	3.33	1	0.3	•	•



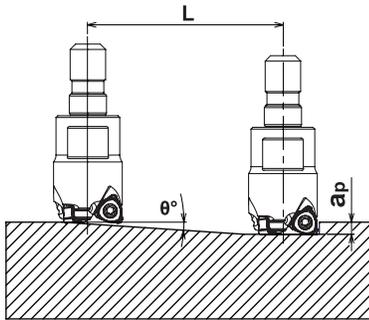
# Diemaster 5G

INCH

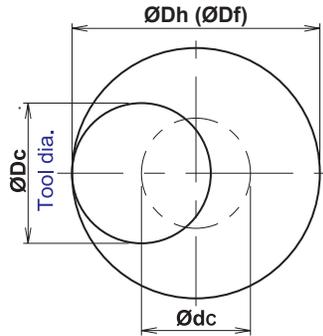
METRIC

## Recommended Data for Profile Milling

### Ramping



### Helical Interpolation



- Calculation of tool pass dia.

$$\text{Tool pass dia.} = \text{Bore dia.} - \text{Tool Dia.}$$

Tool pass dia.                      Bore dia.                      Tool Dia.

- Depth of cut per one circuit should not exceed max. depth of cut  $a_p$
- Down cutting is recommended so tool pass rotation should be counterclockwise.
- To obtain a flat bottom surface when helical milling, it requires removing "the uncut part" in the center of work materials at final pass.

- In case of ramping and helical interpolation, apply 80% or less feed speed from standard cutting condition table.
- In case of helical interpolation, recommend wet cutting by coolant through the tool.

CATALOG NUMBER	TOOL DIAMETER $D_c$	MAX. DEPTH OF CUT: $a_p$	RAMPING		HELICAL INTERPOLATION			
			Max Ramp Angle	Total Cutting Length at Max. $a_p$ : L	Min Through Bore Diameter: $D_h$ min	Max Through Bore Diameter: $D_h$ max	Min. Counter Bore Diameter: $D_f$ Min.	
INCH	MXF-3075-M10	0.75	.02"	0.3°	3.76"	1.35"	1.46"	1.41"
	MXF-4100-M12	1.00	.02"	0.2°	5.64"	1.85"	1.96"	1.91"
	MXF-5125-M16	1.25	.02"	0.15°	7.52"	2.35"	2.46"	2.41"
METRIC	MXF-2016-M8	16	0.5	0.4°	72	28.2	31	29.6
	MXF-3020-M10	20	0.5	0.3°	95	36.2	39	37.6
	MXF-4025-M12	25	0.5	0.2°	143	46.2	49	47.6
	MXF-5032-M16	32	0.5	0.15°	191	60.2	63	61.6
	MXF-5035-M16	35	0.5	0.15°	191	66.2	69	67.6
	MXG-6040-M16	40	0.5	0.1°	286	76.20	79	77.6
	MXF-6042-M16	42	0.5	0.1°	286	80.2	83	81.6
	XFG-6050R-22	50	0.5	0.1°	280	96.20	99	97.6
	XFG-6052R-22	52	0.5	0.1°	286	100.2	103	101.6
	XFG-7063R-27	63	0.5	Not Recommended				
XFG-7066R-27	66	0.5						

NOTE: Drilling is not recommended.



# Diemaster 5G

## Recommended Cutting Data for Diemaster 5G

Material	Insert Grade		Finishing	
			Side Wall	Bottom Face
Gray Cast Iron	DH103 (JC8015)	SFM	1,150	1,000
		IPT	.010"	.008"
		DOC	.012"	.008"
		WOC	.008"	.080"
Nodular Cast Iron	DH103 (JC8015)	SFM	1,150	1,000
		IPT	.010"	.008"
		DOC	.012"	.008"
		WOC	.008"	.080"
Carbon Steel	JC8015	SFM	1,000	850
		IPT	.008"	.008"
		DOC	.012"	.006"
		WOC	.004"	.080"
Low Alloy Steel	JC8015	SFM	1,000	850
		IPT	.008"	.008"
		DOC	.012"	.006"
		WOC	.004"	.080"
Mold Steel	DH103 (JC8015)	SFM	900	800
		IPT	.006"	.006"
		DOC	.012"	.006"
		WOC	.004"	.080"
Tool & Die Steel (40-50HRC)	DH103 (JC8015)	SFM	800	650
		IPT	.006"	.003"
		DOC	.012"	.004"
		WOC	.004"	.080"
Hardened Die Steel (50-60HRC)	DH103	SFM	600	450
		IPT	.004"	.003"
		DOC	.008"	.004"
		WOC	.004"	.080"
Stainless Steel	JC8015	SFM	900	750
		IPT	.012"	.008"
		DOC	.012"	.006"
		WOC	.004"	.080"
Titanium Alloy	JC8015	SFM	330	200
		IPT	.004"	.004"
		DOC	.010"	.006"
		WOC	.004"	.080"
Inconel	JC8015	SFM	260	180
		IPT	.004"	.004"
		DOC	.010"	.006"
		WOC	.004"	.080"

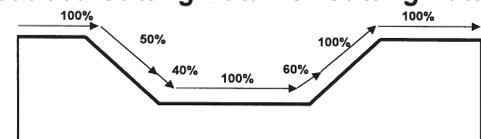
- NOTE:**
1. The above cutting conditions should be adjusted according to machine rigidity and workpiece rigidity.
  2. The above cutting conditions are for a overhung length of 3Dc. See table below for longer applications.
  3. If chattering occurs, reduce the depth of cut to a shallower depth or lower the feed rate.
  4. Remove chips by air blow. Be especially careful when machining cavities with a Vertical MC.
  5. If using a steel shank, reduce the SFM and IPT to 80% of above conditions.

### 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



# Diemaster 5G

## Recommended Cutting Data for Diemaster 5G

Material	Insert Grade	Semi-finishing		Plunging (See diagram below)	
		SFM	IPT	SFM	IPT
Gray Cast Iron	DH103 (JC8015)	SFM	530	SFM	1,600
		IPT	.024"	IPT	.004"
		DOC	.008"	ae	.008"
		WOC	45%	PF	3%
Nodular Cast Iron	DH103 (JC8015)	SFM	530	SFM	1,600
		IPT	.024"	IPT	.004"
		DOC	.008"	ae	.008"
		WOC	45%	PF	3%
Carbon Steel	JC8015	SFM	620	SFM	1,300
		IPT	.024"	IPT	.004"
		DOC	.008"	ae	.008"
		WOC	45%	PF	3%
Low Alloy Steel	JC8015	SFM	620	SFM	1,300
		IPT	.024"	IPT	.004"
		DOC	.008"	ae	.008"
		WOC	45%	PF	3%
Mold Steel	DH103 (JC8015)	SFM	530	SFM	800
		IPT	.024"	IPT	.004"
		DOC	.008"	ae	.008"
		WOC	45%	PF	3%
Tool & Die Steel (40-50HRC)	DH103 (JC8015)	SFM	480	SFM	600
		IPT	.024"	IPT	.003"
		DOC	.008"	ae	.008"
		WOC	45%	PF	3%
Hardened Die Steel (50-60HRC)	DH103	SFM	300	SFM	400
		IPT	.012"	IPT	.003"
		DOC	.008"	ae	.006"
		WOC	45%	PF	3%
Stainless Steel	JC8015	SFM	550	SFM	800
		IPT	.024"	IPT	.004"
		DOC	.008"	ae	.008"
		WOC	45%	PF	3%
Titanium Alloy	JC8015	SFM	150	SFM	330
		IPT	.016"	IPT	.003"
		DOC	.008"	ae	.008"
		WOC	.024"	PF	3%
Inconel	JC8015	SFM	130	SFM	260
		IPT	.012"	IPT	.003"
		DOC	.008"	ae	.006"
		WOC	45%	PF	3%

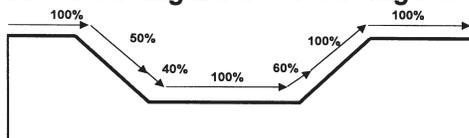
- NOTE:** 1. The above cutting conditions should be adjusted according to machine rigidity and workpiece rigidity.  
 2. The above cutting conditions are for a overhung length of 3Dc. See table below for longer applications.  
 3. If chattering occurs, reduce the depth of cut to a shallower depth or lower the feed rate.  
 4. Remove chips by air blow. Be especially careful when machining cavities with a Vertical MC.  
 5. If using a steel shank, reduce the SFM and IPT to 80% of above conditions.  
 6. For up and down milling, use ae = .004" or less.

### Additional Cutting Data For Longer Tools

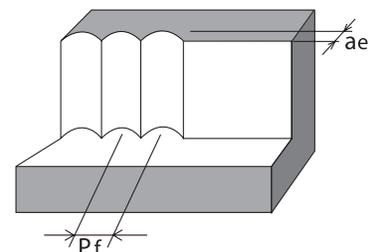
Reach/Dia.	~4.0	4.0~4.5	4.5~5.3	5.3~5.7	5.7~6.2	6.3~
rpm %	100	90	80	80	75	70
Feed %	100	90	90	80	75	70

**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





# BackDraft

## High Productivity Radius Endmill



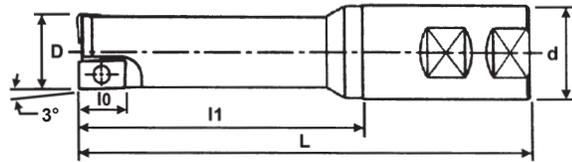
- Predominantly for cavity milling and profile milling.
- Available in CBN for bottom face finishing.
- DBD-F style has 2mm side wiper which allows for side & bottom finishing.
- DBD-30 style insert has a wider wiper and large radius shape for better surface finishing.
- Capable of using from roughing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



# BackDraft

**INCH**

## END MILL DBD Type



### 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-4075H	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				

Note: All cutters are supplied without inserts, wrenches or moly.

## FACE MILL & END CAP DBD Type



Fig. 1

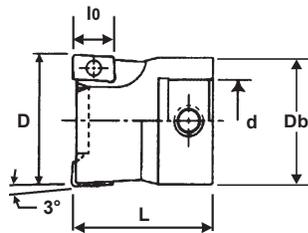
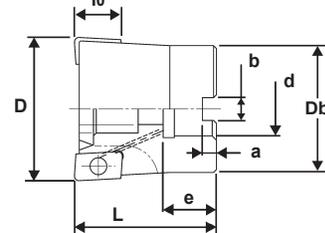


Fig. 2

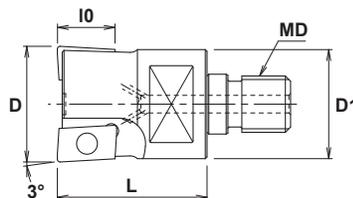


### Specifications

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-...	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	DBD-170408...	4	DSW-4085	T-15

Note: All cutters are supplied without inserts, wrenches or moly.

## MODULAR HEAD 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-4075H	T-15

See page A-81 for Modular Head Shanks.

Note: All cutters are supplied without inserts, wrenches or moly.



**METRIC**

**BackDraft**

### END MILL & FACE MILL DBD Type



Fig. 1

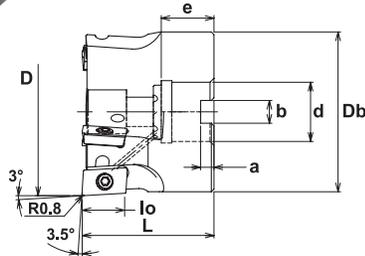
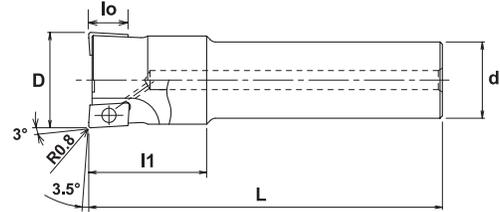


Fig. 2

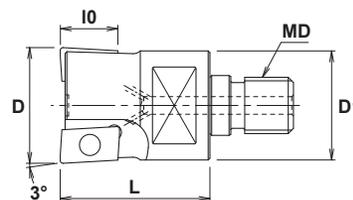


### Specifications

CATALOG NUMBER	STK	DIMENSIONS									INSERT	Q	PARTS	
		D	L	I0	Db	d	b/l1	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-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, wrenches or moly.

### 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-4075H	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-81 for Modular Head Shanks.

Note: All cutters are supplied without inserts, wrenches or moly.



# BackDraft

INCH

## INSERTS DBD Type

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

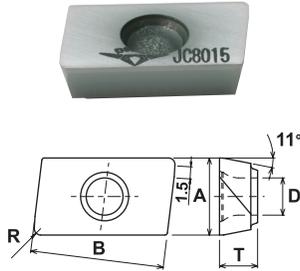


Fig. 2 For bottom face finishing  
DBD-187-031 (JBN500)

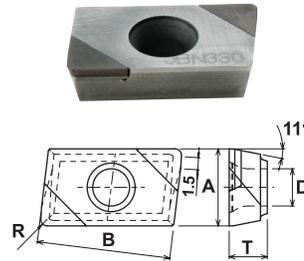


Fig. 3 For bottom face finishing &  
better surface roughness  
DBD170408-30 (DH103, CX75)

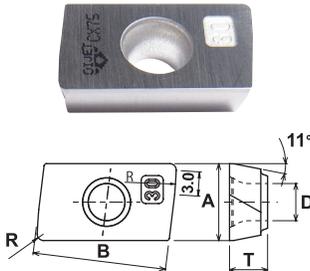
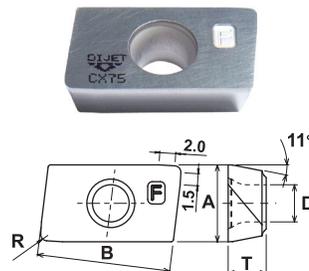


Fig. 4 For finishing side &  
bottom face at once  
DBD170408-F (DH103, CX75)



CATALOG NUMBER	A	B	T	R	D	FIG.	STOCK					
							CBN	COATED		CERMET		
								JBN500	DH103	JC8015	CX75	CX90
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-170404	.375	.656	.187	.015	.181	1			•			
DBD-170408-30	.375	.656	.187	.031	.181	3		•			•	
DBD-170408-F	.375	.656	.187	.031	.181	4		•			•	

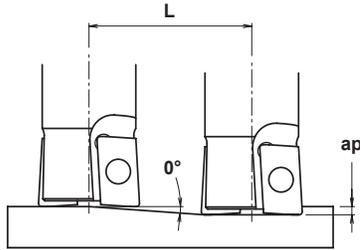


INCH

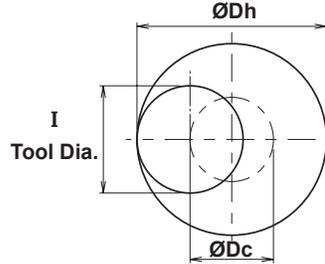
# BackDraft

## Recommended Data for Profile Milling with DBD

Ramping



Helical Interpolation



• Calculation of tool pass dia.

$$\text{ØDc} = \text{ØDh} - I$$

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 ap.
- In case of ramping and helical interpolation, apply 70% or less feed (F) from standard cutting condition table.

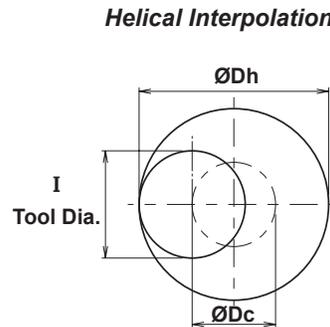
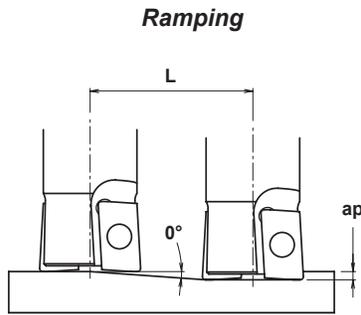
TOOL DIAMETER I	INSERT CORNER RADIUS	EFFECTIVE CUTTING DIA.	MAX. DEPTH OF CUT: ap	RAMPING		HELICAL INTERPOLATION		MAXIMUM DRILLING DEPTH: Z	
				MAX. RAMP ANGLE	TOTAL CUTTING LENGTH AT MAX ap: L	MIN. BORE DIAMETER: Dh min	TOOL PASS DIAMETER: Dc		
INCH	1.00	0.015	0.932	0.016	1°30'	0.600	1.37	1.88	0.012
	1.00	0.031	0.900	0.016	1°30'	0.600	1.37	1.88	0.012
	1.00	0.062	0.850	0.016	1°30'	0.600	1.37	1.88	0.012
	1.00	0.125	0.724	0.016	1°30'	0.600	1.37	1.88	0.012
	1.25	0.015	1.182	0.016	1°	0.900	1.87	2.38	0.012
	1.25	0.031	1.150	0.016	1°	0.900	1.87	2.38	0.012
	1.25	0.062	1.100	0.016	1°	0.900	1.87	2.38	0.012
	1.25	0.125	0.974	0.016	1°	0.900	1.87	2.38	0.012
	2.00	0.015	1.932	0.016	0°30'	1.800	3.37	3.88	0.012
	2.00	0.031	1.900	0.016	0°30'	1.800	3.37	3.88	0.012
	2.00	0.062	1.850	0.016	0°30'	1.800	3.37	3.88	0.012
	2.00	0.125	1.724	0.016	0°30'	1.800	3.37	3.88	0.012
	2.50	0.015	2.432	0.016	0°25'	2.170	4.37	4.88	0.012
	2.50	0.031	2.400	0.016	0°25'	2.170	4.37	4.88	0.012
	2.50	0.062	2.350	0.016	0°25'	2.170	4.37	4.88	0.012
	2.50	0.125	2.224	0.016	0°25'	2.170	4.37	4.88	0.012



# BackDraft

**METRIC**

## Recommended Data for Profile Milling with DBD



- Calculation of tool pass dia.

$$\text{ØDc} = \text{ØDh} - I$$

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: Dh min	TOOL PASS DIAMETER: Dc		
METRIC	20	0.4	18.8	0.4	2°	11.5	25	37	0.3
	20	0.8	18.0	0.4	2°	11.5	25	37	0.3
	20	1.6	16.0	0.4	2°	11.5	25	37	0.3
	20	3.2	12.8	0.4	2°	11.5	25	37	0.3
	25	0.4	23.8	0.4	1°30'	15.3	34	47	0.3
	25	0.8	23.0	0.4	1°30'	15.3	34	47	0.3
	25	1.6	21.0	0.4	1°30'	15.3	34	47	0.3
	25	3.2	17.8	0.4	1°30'	15.3	34	47	0.3
	26	0.4	24.8	0.4	1°30'	15.3	36	49	0.3
	26	0.8	24.0	0.4	1°30'	15.3	36	49	0.3
	26	1.6	22.0	0.4	1°30'	15.3	36	49	0.3
	26	3.2	18.8	0.4	1°30'	15.3	36	49	0.3
	32	0.4	30.8	0.4	1°	22.9	48	61	0.3
	32	0.8	30.0	0.4	1°	22.9	48	61	0.3
	32	1.6	28.0	0.4	1°	22.9	48	61	0.3
	32	3.2	24.8	0.4	1°	22.9	48	61	0.3
	33	0.4	31.8	0.4	1°	22.9	50	63	0.3
	33	0.8	31.0	0.4	1°	22.9	50	63	0.3
	33	1.6	29.0	0.4	1°	22.9	50	63	0.3
	33	3.2	25.8	0.4	1°	22.9	50	63	0.3
	40	0.4	38.8	0.4	0°45'	30.5	64	77	0.3
	40	0.8	38.0	0.4	0°45'	30.5	64	77	0.3
	40	1.6	36.0	0.4	0°45'	30.5	64	77	0.3
	40	3.2	32.8	0.4	0°45'	30.5	64	77	0.3
	50	0.4	48.8	0.4	0°30'	45.8	82	97	0.3
	50	0.8	48.0	0.4	0°30'	45.8	82	97	0.3
	50	1.6	46.0	0.4	0°30'	45.8	82	97	0.3
	50	3.2	42.8	0.4	0°30'	45.8	82	97	0.3
63	0.4	61.8	0.4	0°25'	55.1	110	123	0.3	
63	0.8	61.0	0.4	0°25'	55.1	110	123	0.3	
63	1.6	59.0	0.4	0°25'	55.1	110	123	0.3	
63	3.2	55.8	0.4	0°25'	55.1	110	123	0.3	
80	0.4	78.8	0.4	0°20'	68.8	114	157	0.3	
80	0.8	78.0	0.4	0°20'	68.8	114	157	0.3	
80	1.6	76.0	0.4	0°20'	68.8	114	157	0.3	
80	3.2	72.8	0.4	0°20'	68.8	114	157	0.3	



# 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	JC8015	300	.015"	.020"	60%
	Finish	JC8015	500	.008"	.010"	40%
	CBN	*	*	*	*	*

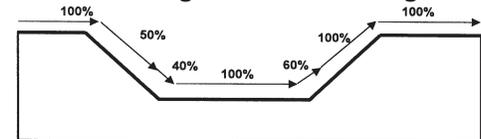
- NOTE:** 1. Above parameters should be adjusted according to machine & work rigidity.  
 2. If chatter occurs, recommend reducing DOC or IPT.  
 3. If machine does not have enough power, reduce the DOC or spindle speed & feed.  
 4. If dry cutting, recommend using air blow to remove chips.

## 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.



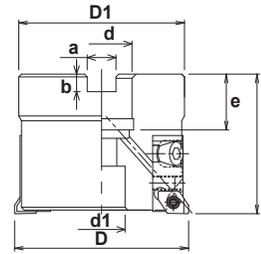
# Back & Forth Cutter

**METRIC**

## FACE MILL

### PFC Type

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



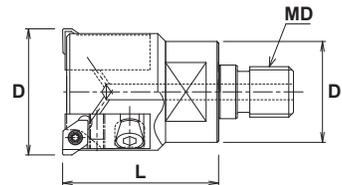
### Specifications

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, wrenches or moly.

## MODULAR HEAD

### MPF Type



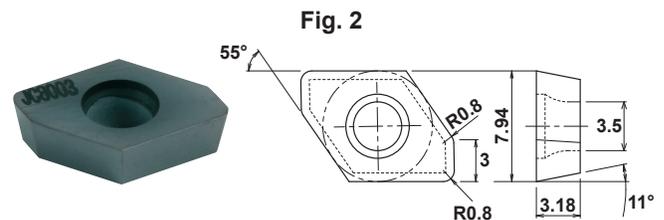
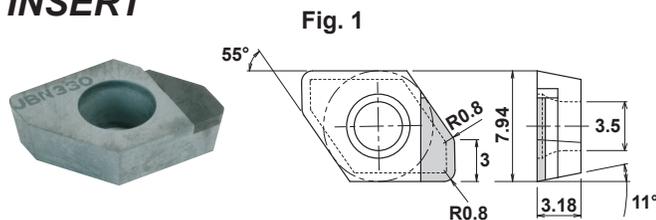
### Specifications

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-81 for Modular Head Shanks.

Note: All cutters are supplied without inserts, wrenches or moly.

## INSERT



### Specifications

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

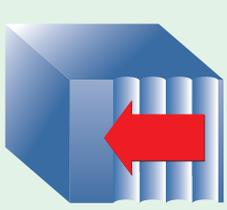


**METRIC**

# Back & Forth Cutter

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

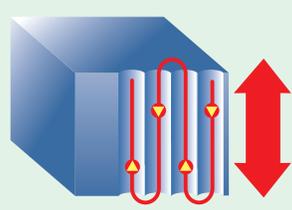
**Current method: by end mill**



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

➔

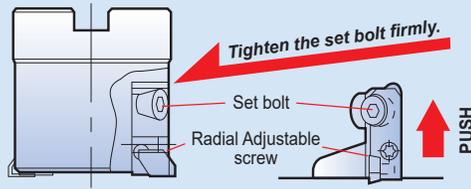
**Improved method: by up and down cutting motion**



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

Excellent verticalness and surface finish

**STEP 1**



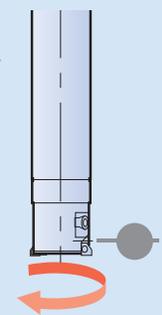
Tighten the set bolt firmly.

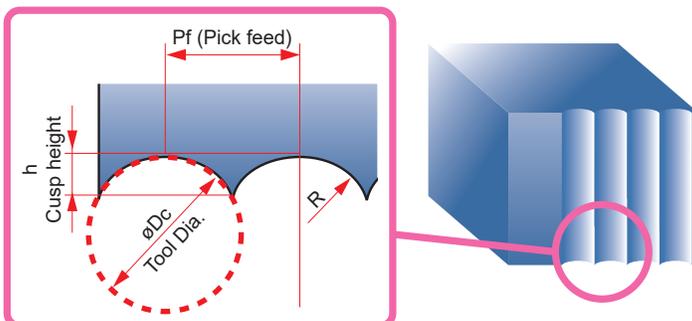
Labels: Set bolt, Radial Adjustable screw, PUSH

- 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.





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

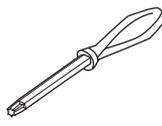
$$R: \frac{\varnothing Dc \text{ (Tool dia.)}}{2}$$

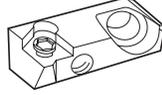
It is efficient to use large diameter cutter to increase the pick feed. But large diameter cutter may cause interference in case of complex work.



## 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	DH102	1,300	.006"	.004"	.006" - .030"
	CBN	JBN500	4,000	.006"	.004"	.004" - .012"
Nodular Cast Iron (180-250 HB)	Finish	DH102	1,200	.006"	.004"	.006" - .030"
	CBN	JBN500	3,500	.006"	.004"	.004" - .012"
Carbon Steel	Finish	DH102	650	.006"	.008"	.006" - .030"
	CBN	*	*	*	*	*
Low Alloy Steel	Finish	DH102	650	.006"	.004"	.006" - .030"
	CBN	*	*	*	*	*
Mold Steel (30-40 HRC)	Finish	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. If machined surface is rough or vibration occurs due to low rigidity of machine or workpiece, reduce spindle speed and feed.  
 2. When finishing with traverse feed, recommend  $f_z = .002"$  or less.

# 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.

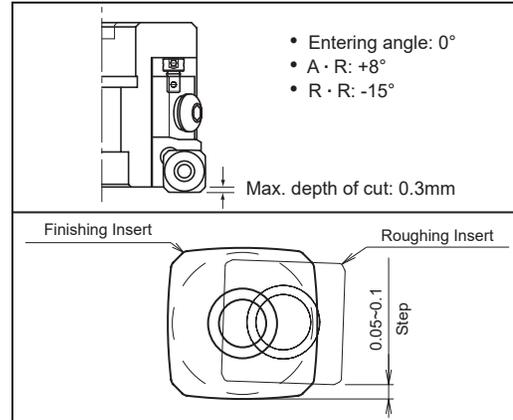
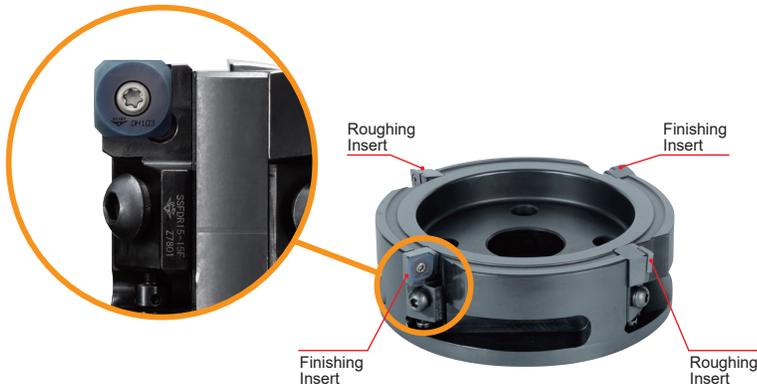


- Can fit the Backdraft cartridges/inserts for shoulder milling.

- 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

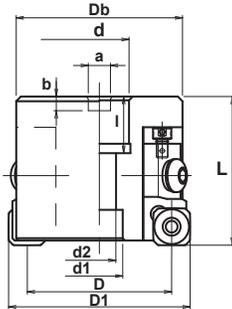


Fig.2

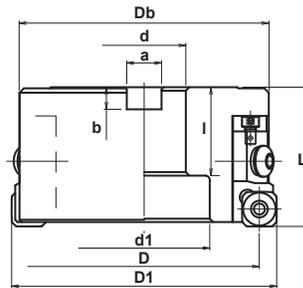
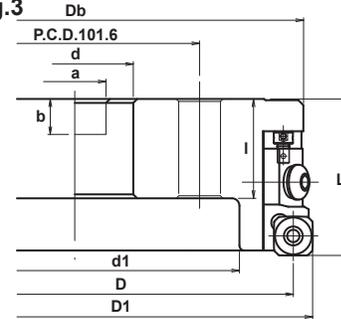


Fig.3



## Specifications

CATALOG NUMBER	STK	DIMENSIONS										FIG.	PARTS		
		D1	D	Db	L	d	d1	d2	a	b	l		Insert Cartridge Insert Screw	Cartridge Parts: Set Bolt 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, wrenches or moly.

**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 <math><0.1\text{mm}</math>



Fig.1

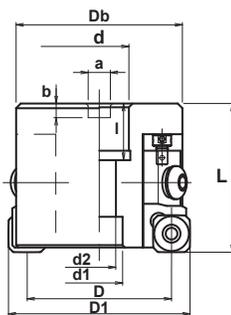


Fig.2

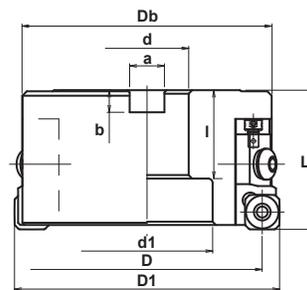
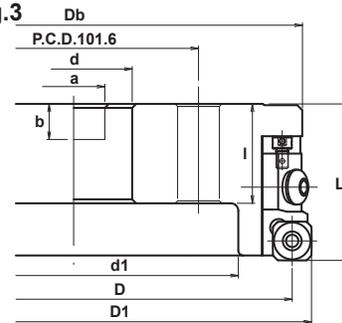


Fig.3



## Specifications

CATALOG NUMBER	STK	DIMENSIONS										FIG.	PARTS		
		D1	D	Db	L	d	d1	d2	a	b	l		Insert Cartridge Insert Screw	Cartridge Parts: Set 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, wrenches or moly.

# Finish Jet Mill

**METRIC**

SDHW1504ADFN-W1 (Finishing insert)

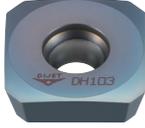
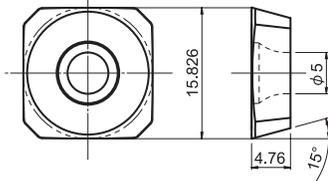


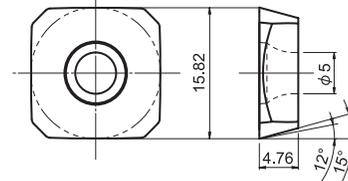
Fig.1



SDHW1504ADE (F) N-W2 (Finishing insert)



Fig.2



SDHW1504ADEN-F1 (Finishing insert for thin plate)

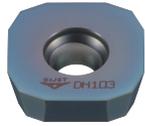
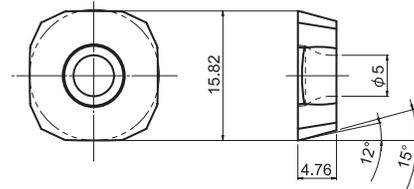


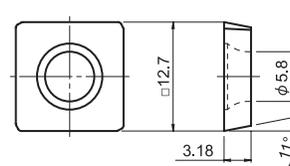
Fig.3



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 Adjustable Rest Button	Adjustable Rest Button	Bolt Ring
LW-050	AD-2080	ADS-513	SBZ-8



## 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.

# Finish Jet Mill

**METRIC**

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

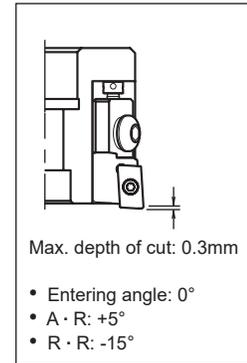
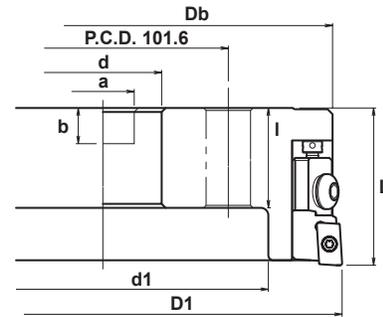
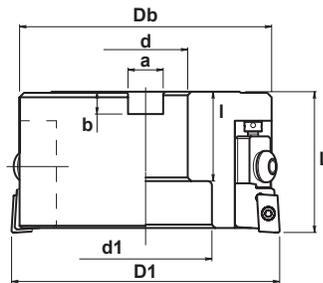
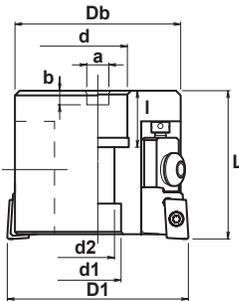


Fig. 1

Fig. 2

Fig. 3



## Specifications

CATALOG NUMBER	STK	DIMENSIONS									FIG.	PARTS		
		D1	Db	L	d	d1	d2	a	b	l		Insert Cartridge	Cartridge Parts: Set 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			

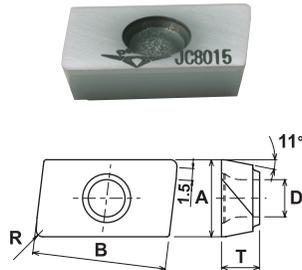
Note: All cutters are supplied without inserts, wrenches or moly.

**INCH**
**METRIC**

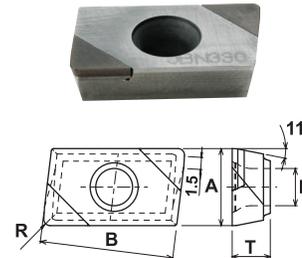
# Finish Jet Mill

## BackDraft Inserts

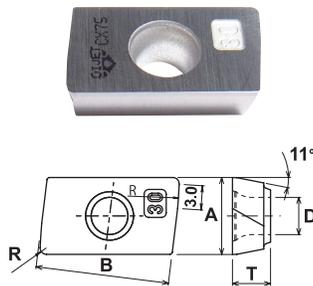
**Fig. 1** For bottom face finishing  
DBD-187-\* (JC8015, CX90)



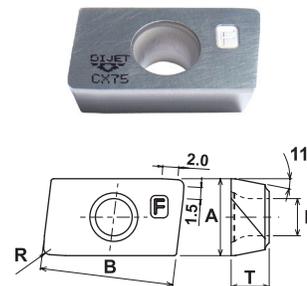
**Fig. 2** For bottom face finishing  
DBD-187-031 (JBN500)



**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				
							CBN	COATED		CERMET	
							JBN500	DH103	JC8015	CX75	CX90
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-170404	.375	.656	.187	.015	.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 Adjustable Rest Button	Adjustable Rest Button	Bolt Ring
LW-050	AD-2080	ADS-513	SBZ-8

## Finish Jet Mill

### Recommended Cutting Data for FJM-BD

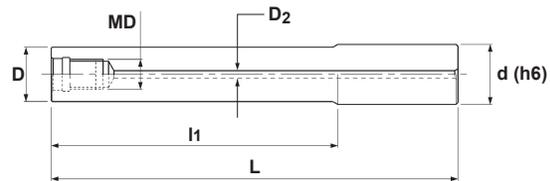
Material	Application	Grade	SFM	IPT	DOC	WOC
Gray Cast Iron (200-250 HB)	Finish	DH103 JC8015	700	.006"	.012"	70%
	CBN	JBN500	2,500	.004"	.006"	70%
Nodular Cast Iron (180-250 HB)	Finish	DH103 JC8015	600	.006"	.012"	70%
	CBN	JBN500	2,500	.004"	.006"	70%
Carbon Steel	Finish	DH103 JC8015, CX75 (CX90)	600	.006"	.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.

**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-M6-4.0-S050C	•	.452	4.00	6.12	.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-M10-8.0-S075C	•	.728	8.00	10.63	.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-M12-10.0-S100C	•	.945	10.00	12.60	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
MSN-M16-10.0-S125C	•	1.14	10.00	13.00	1.25	M16	.315
MSN-M16-12.0-S125C	•	1.14	12.00	15.00	1.25	M16	.315

# Modular Head Holders

**METRIC**

## Modular Head Holders

### MSN Type

### Solid Carbide with coolant thru



Fig. 1

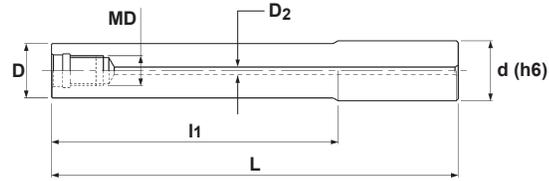
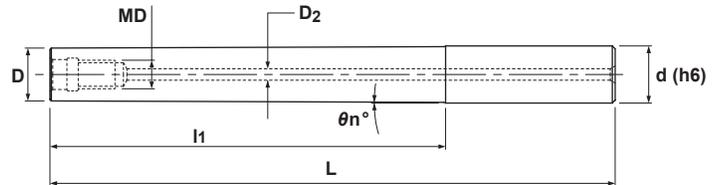


Fig. 2



## 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-M6-120-S10C	•	9.7	120	170	10	-	M6	3	1
MSN-M6-170-S10C	O	9.7	170	220	10	-	M6	3	1
MSN-M6-35T-S12C	•	9.5	35	92	12	1°30'	M6	3	2
MSN-M6-57T-S12C	•	9.5	57	114	12	1	M6	3	2
MSN-M6-60T-S12C	•	9.5	60	200	12	0°54'	M6	3	2
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-M6-50-S12C	•	11.5	50	100	12	-	M6	3	1
MSN-M6-80-S12C	•	11.5	80	130	12	-	M6	3	1
MSN-M6-120-S12C	•	11.5	120	170	12	-	M6	3	1
MSN-M6-170-S12C	O	11.5	170	220	12	-	M6	3	1
MSN-M6-65T-S16C	•	11.2	65	125	16	1°45'	M6	3	2
MSN-M6-120T-S16C	•	11.2	120	200	16	1°	M6	3	2
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-M8-50-S16C	•	15.5	80	135	16	-	M8	4	1
MSN-M8-60-S16C	•	15.5	60	115	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-M8-40T-S20C	•	14.5	40	100	20	3°30'	M8	4	2
MSN-M8-77T-S20C	•	14.5	77	143	20	1°45'	M8	4	2
MSN-M8-120T-S20C	•	14.5	120	250	20	1°9'	M8	4	2
MSN-M8-90T-S25C	•	14.5	90	165	25	3°	M8	6	2
MSN-M8-80T-S25C	•	14.5	80	250	25	3°30'	M8	4	2

O - Made to order

**METRIC**

# Modular Head Holders

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



Fig. 1

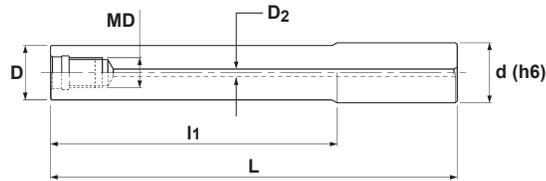
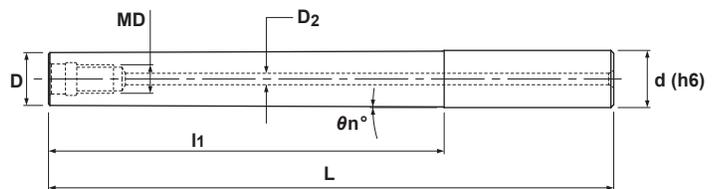


Fig. 2



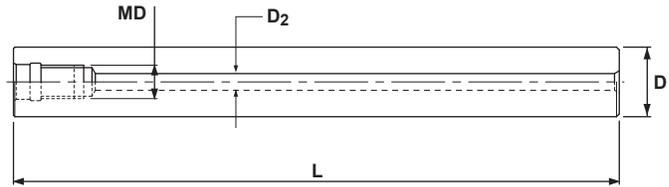
## Specifications

CATALOG NUMBER	STK	DIMENSIONS							FIG.
		D	l1	L	d	$\theta n^\circ$	MD	D2	
MSN-M10-20-S20C	•	19.5	20	80	20	-	M10	4	1
MSN-M10-40-S20C	•	19.5	40	100	20	-	M10	4	1
MSN-M10-50-S20C	•	19.5	50	110	20	-	M10	4	1
MSN-M10-70-S20C	•	19.5	70	130	20	-	M10	4	1
MSN-M10-90-S20C	•	19.5	90	150	20	-	M10	4	1
MSN-M10-140-S20C	•	19.5	140	200	20	-	M10	4	1
MSN-M10-160-S20C	•	19.5	160	220	20	-	M10	4	1
MSN-M10-210-S20C	•	19.5	210	270	20	-	M10	4	1
MSN-M10-40T-S20C	•	18.5	40	100	20	0°43'	M10	4	2
MSN-M10-90T-S20C	•	18.5	90	150	20	0°19'	M10	4	2
MSN-M10-140T-S20C	•	18.5	140	200	20	0°12'	M10	4	2
MSN-M10-85T-S25C	•	18.5	88	161	25	2°	M10	4	2
MSN-M10-150T-S25C	•	18.5	150	300	25	1°6'	M10	4	2
MSN-M10-105T-S32C	•	18.5	105	300	32	3°30'	M10	4	2
MSN-M10-115T-S32C	•	18.5	115	195	32	3°	M10	8	2
MSN-M12-25-S25C	•	24	25	90	25	-	M12	6	1
MSN-M12-55-S25C	•	24	55	120	25	-	M12	6	1
MSN-M12-70-S25C	•	24	70	135	25	-	M12	6	1
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-M12-255-S25C	•	24	255	320	25	-	M12	6	1
MSN-M12-100T-S32C	•	23.5	100	180	32	2°	M12	6	2
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-M16-127-S32C	•	29	127	207	32	-	M16	8	1
MSN-M16-155-S32C	•	29	155	220	32	-	M16	8	1
MSN-M16-177-S32C	•	29	177	257	32	-	M16	8	1
MSN-M16-195-S32C	•	29	195	260	32	-	M16	8	1
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
MSN-M16-315-S32C	•	29	315	380	32	-	M16	8	1
MSN-M16-117T-S32C	•	29	117	197	32	0°38'	M16	8	2
MSN-M16-127T-S32C	•	29	127	207	32	0°30'	M16	8	2
MSN-M16-177T-S32C	•	29	177	257	32	0°23'	M16	8	2
MSN-M16-197T-S32C	•	29	197	277	32	0°23'	M16	8	2

# Modular Head Holders

**METRIC**

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



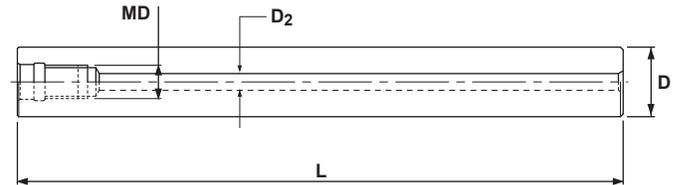
## Specifications

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-M6-167S-S10C	•	10	167	M6	3
MSN-M6-220S-S10C	○	10	220	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-M6-170S-S12C	•	12	170	M6	3
MSN-M6-220S-S12C	•	12	220	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-M8-217S-S15C	•	15	217	M8	4
MSN-M8-107S-S16C	•	16	107	M8	4
MSN-M8-157S-S16C	•	16	157	M8	4
MSN-M8-220S-S16C	•	16	220	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-M10-270S-S18C	•	18	270	M10	4
MSN-M10-130S-S18C	•	20	130	M10	4
MSN-M10-190S-S18C	•	20	190	M10	4
MSN-M10-250S-S18C	•	20	250	M10	4
MSN-M10-270S-S18C	•	20	270	M10	4

**METRIC**

## Modular Head Holders

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



### Specifications

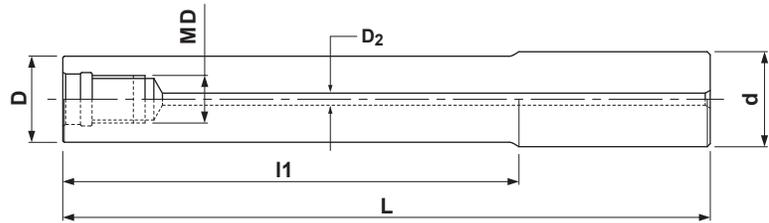
CATALOG NUMBER	STK	DIMENSIONS			
		D	L	MD	D2
MSN-M12-145S-S23C	•	23	145	M12	6
MSN-M12-185S-S23C	•	23	185	M12	6
MSN-M12-265S-S23C	•	23	265	M12	6
MSN-M12-185S-S24C	•	24	185	M12	6
MSN-M12-265S-S24C	•	24	265	M12	6
MSN-M12-145S-S25C	•	25	145	M12	6
MSN-M12-215S-S25C	•	25	215	M12	6
MSN-M12-285S-S25C	•	25	285	M12	6
MSN-M12-320S-S25C	•	25	320	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-M16-380S-S28C	•	28	380	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
MSN-M16-380S-S32C	•	32	380	M16	8

# Modular Head Holders

INCH

METRIC

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

# PROPER MOUNTING OF MODULAR HEADS

## ■ Cleaning

Remove dirt and chips with air from the connecting thread, face of modular head and MSN/MGN shank holder.

## ■ Initial Tightening

Tighten by hand until the head and the shank holder faces touch.

## ■ Final Tightening

Tighten slowly with torque control spanner wrench or DIJET DS type spanner wrench and confirm that there is no gap.

Attention: Final tightening without initial tightening cause connecting thread damage.



### Steel Modular Heads

Thread	Tightening torque	Spanner size
M8	16N·m	10, 12 ✧
M10	16N·m	14, 15
M12	20N·m	17, 19
M16	25N·m	22, 26

Modular heads are supplied without spanner wrench.

In case of choosing torque control spanner wrench, confirm that the wrench size is matched to the dimensions W & C of each modular head. (There are some cases that modifying the thickness of spanner wrench is necessary)

✧ = DIJET stocks DS-8 and DS-12 type spanner wrenches.

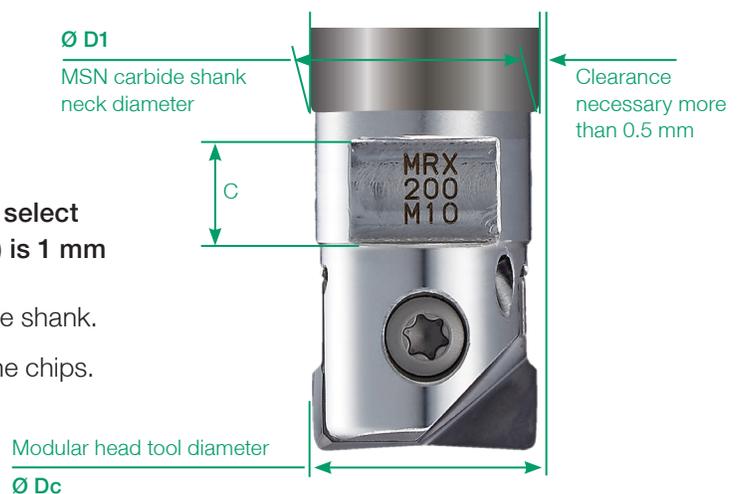
### SELECTION OF MSN CARBIDE SHANK HOLDER

$$\varnothing Dc - \varnothing D1 \geq 1\text{mm}$$

When using modular head over  $\varnothing 16\text{mm}$ , **please select MSN carbide shank which the diameter ( $\varnothing D1$ ) is 1 mm or smaller than modular head ( $\varnothing Dc$ ).**

Wrong selection can cause damage to the carbide shank.

Coolant or air blow is recommended to remove the chips.



#### Caution for mounting in shrink fit holder.

When you use a carbide shank and a modular head on a shrink fit holder, please shrink fit only the carbide shank without mounting the modular head. Mount the modular head on the shank after shrink fit operation is complete.

In case of shrink fit MSN shank + modular head together, it will be difficult to loosen due to heat dissipation.

CATALOG NUMBER	DESCRIPTION	PAGE NUMBER
<b>A</b>		
A-15T	Wrench	A-63
A-20	Wrench	A-3, A-4, A-5, A-6, A-7, A-8, A-9, A-74, A-75, A-76, A-79
A-20L	Wrench	A-74, A-75, A-76, A-79
A-20W	Wrench	A-2, A-22, A-23, A-24, A-25, A-26, A-27
AD-2080	Wrench	A-74, A-76, A-78, A-79
ADS-513	Finish Jet Mill Adjustable Rest Button	A-74, A-75, A-76, A-78, A-79
<b>B</b>		
B-..	Controlled Torque Wrench Blade	A-16, A-36
BBH-825	Finish Jet Mill Cartridge Set Bolt	A-74, A-75, A-76, A-78, A-79
BME-...A	Mirror Ball Insert Inch	A-11
BME-...S	Mirror Ball Insert Inch	A-12
BME-...TG	Mirror Ball Insert Inch	A-13
BNM-...	Mirror Ball Insert Metric	A-11
BNM-...AAA	Mirror Ball Insert Metric	A-11
BNM-...S	Mirror Ball Insert Metric	A-12
BNM-...SS	Mirror Ball Insert Metric	A-12
BNM-...SSR	Mirror Ball Insert Metric	A-13
BNM-...TG	Mirror Ball Insert Metric	A-13
BNM-...TS	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-6
BNML-...S-..C	Mirror Ball Straight Carbide Shank Metric	A-8, A-9
BNML-...T	Mirror Ball Taper Steel Inch	A-4
BNML-...T	Mirror Ball Taper Steel Metric	A-5
BNML-...T-..C	Mirror Ball Taper Carbide Shank Inch	A-7
BNML-...T-..C	Mirror Ball Taper Carbide Shank Metric	A-8
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-6
BNMM-...S-..C	Mirror Ball Straight Carbide Shank Metric	A-8, A-9
BNMM-...T	Mirror Ball Taper Steel Inch	A-4
BNMM-...T	Mirror Ball Taper Steel Metric	A-5
BNMM-...T-..C	Mirror Ball Taper Carbide Shank Inch	A-7
BNMM-...T-..C	Mirror Ball Taper Carbide Shank Metric	A-8
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-6
BNMS-...S-..C	Mirror Ball Straight Carbide Shank Metric	A-8, A-9
BNMS-...T	Mirror Ball Taper Steel Inch	A-4
BNMS-...T-..C	Mirror Ball Taper Carbide Shank Inch	A-7
BNMS-...T-..C	Mirror Ball Taper Carbide Shank Metric	A-8
<b>D</b>		
DBD-...	BackDraft End Mill Inch	A-62
DBD-...	BackDraft Face Mill Inch	A-62
DBD-...	BackDraft End Mill Metric	A-63
DBD-...	BackDraft Face Mill Metric	A-63
DBD-...	BackDraft Insert	A-64, A-79
DPGT0903-W3	Back & Forth Insert	A-70
DSW-1840H	Screw	A-42, A-43
DSW-2563H	Screw	A-48, A-49
DSW-307H	Screw	A-70, A-72
DSW-4075H	Screw	A-63
DSW-4085	Screw	A-62, A-63, A-78, A-79
DSW-4510H	Screw	A-74, A-75, A-76

CATALOG NUMBER	DESCRIPTION	PAGE NUMBER
<b>E</b>		
ECS-0030	Screw	A-62
<b>F</b>		
FJM-...	Finish Jet Mill	A-74
FJM-...BD	Finish Jet Mill BackDraft	A-78
FJM-...F4	Finish Jet Mill	A-75
FRE-...-...	Mirror Radius High Feed Insert Inch	A-30
FRM-...-R..	Mirror Radius High Feed Insert Metric	A-33, A-34, A-35
FSW-2005H	Mirror Insert Screw	A-4, A-6, A-7, A-8, A-26
FSW-2506H	Mirror Insert Screw	A-4, A-6, A-7, A-8, A-23, A-25, A-26, A-27
FSW-3007H	Mirror Insert Screw	A-2, A-4, A-6, A-7, A-8, A-22, A-23, A-25, A-26, A-27
FSW-3509H	Mirror Insert Screw	A-2, A-3, A-4, A-6, A-7, A-9, A-22, A-23, 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-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-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-9, A-22, A-23, A-24, A-25
<b>G</b>		
GRM-...-R..	Mirror Ball Insert Metric	A-14
<b>H</b>		
HCS5-10	Back & Forth Cartridge Set Bolt	A-70, A-72
HRM-...-R..	Mirror Radius High Feed Insert Metric	A-33, A-34
<b>K</b>		
KSW-8025	Mirror Insert Screw	A-2, A-3, A-4, A-5, A-9, A-22, A-23, A-24, A-25
<b>L</b>		
LW-040	Back & Forth Cartridge Wrench	A-70, A-72
LW-050	Wrench	A-74, A-76, A-78, A-79
<b>M</b>		
MAGNETISER	Magnetizer	A-44
MBX-...	Mirror Ball Modular Heads	A-2
MDB-...	BackDraft Modular Head Inch	A-62
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JQA-2089 JQA-EM1580

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