

# PRODUCT NEWS

PN-U-002A

TYPE EXM / MEX

 **DIJET**®

## Multi EXTREME

For high feed machining and shoulder milling.

- Face mill type  $\phi 2.00'' \sim \phi 4.00''$  ( $\phi 50\text{mm} \sim \phi 80\text{mm}$ )
- Modular type  $\phi 1.25'' \sim \phi 1.50''$  ( $\phi 32\text{mm} \sim \phi 42\text{mm}$ )
- Endmill type  $\phi 1.25'' \sim \phi 1.50''$  ( $\phi 32\text{mm} \sim \phi 40\text{mm}$ )

High Feed Machining HF type



Shoulder Milling SM type



## Features

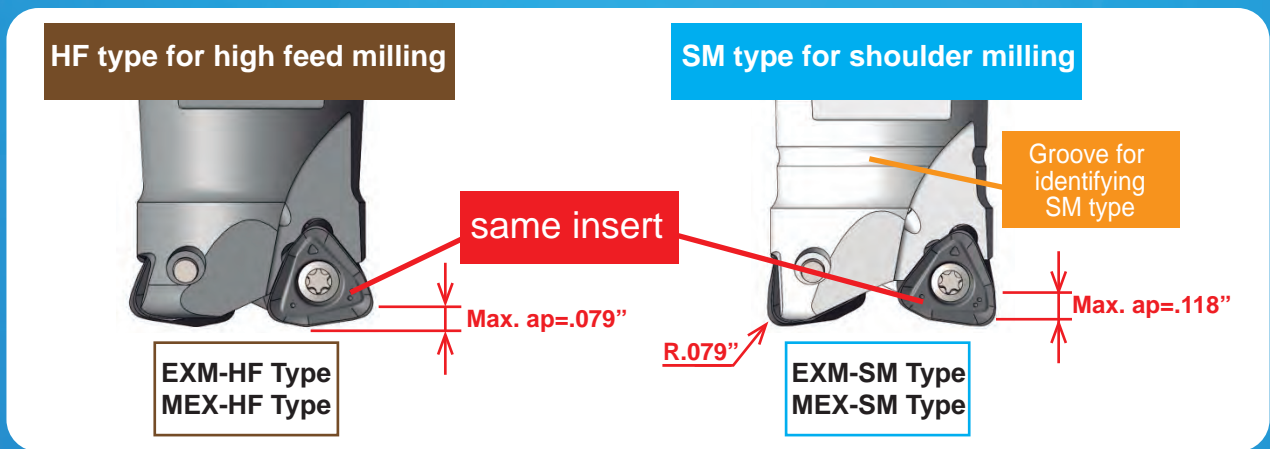
### Both high feed machining and shoulder

#### Feature 1

2 types of holders are available using the same insert:

HF type for high feed machining Max. depth of cut ( $A_p$ ) = .079”.

SM type is for shoulder milling, face milling, vertical wall milling and corner milling.



#### Feature 2

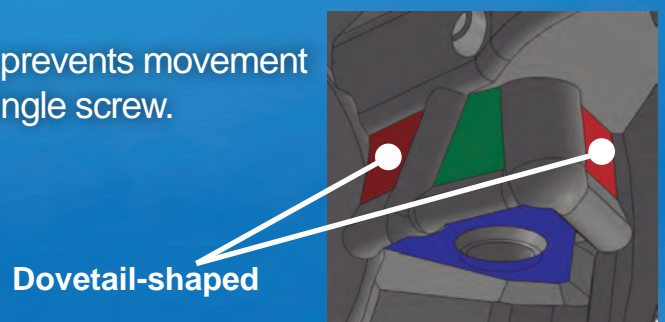
Economical double-sided insert (6 corners).

High efficient machining achieved due to multi blade specifications.



#### Feature 3

The dovetail-shaped binding face in the pocket prevents movement of inserts which occurs by cutting force with a single screw.





# milling is possible by using one type of insert.

## Feature 4

2 insert grades available:

PVD coated grade "JC8050" achieves both fracture toughness and wear resistance.

PVD coated grade "JC8118" provides high versatility and can be widely applied to general steel, mold steel and high hardened die steel less than 50HRC.

### Application

ISO	P					M					K				H			
	P01	P10	P20	P30	P40	M01	M10	M20	M30	M40	K01	K10	K20	K30	H01	H10	H20	
Applicable range			JC8050					JC8050										
		JC8118							JC8118			JC8118						JC8118

HF type for high feed milling

SM type for shoulder milling

# Multi EXTREME

## Cutting performance

● Tool life comparison (for high feed machining)

Material: Mold steel (P20)

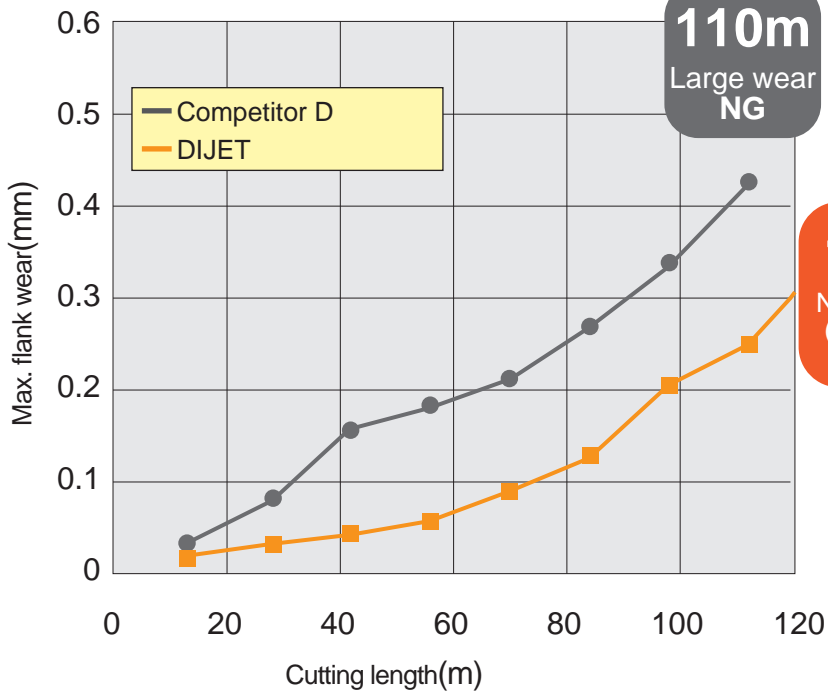
● Cutting conditions :  
Vc=200m/min, fz=1.5mm/t  
ap=1.5mm, ae=22mm

● Test by one insert

Machine: Vertical MC

● UP & DOWN CUT,  
Air blow

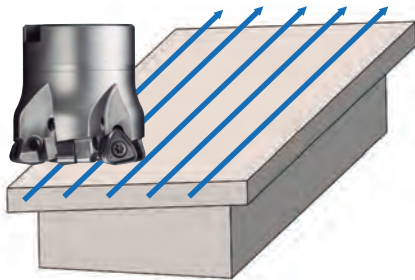
● Tool dia. :  $\phi 32$   
(MEX-2032-HF-M16)



## Cutting data

### 1. High feed machining on steel for structure

<Roughing slope surface>



#### Result

After 427m, still able to continue. Compared with competitor, tool cost can be reduced, due to increase number of insert corner (from 4 to 6 corners).

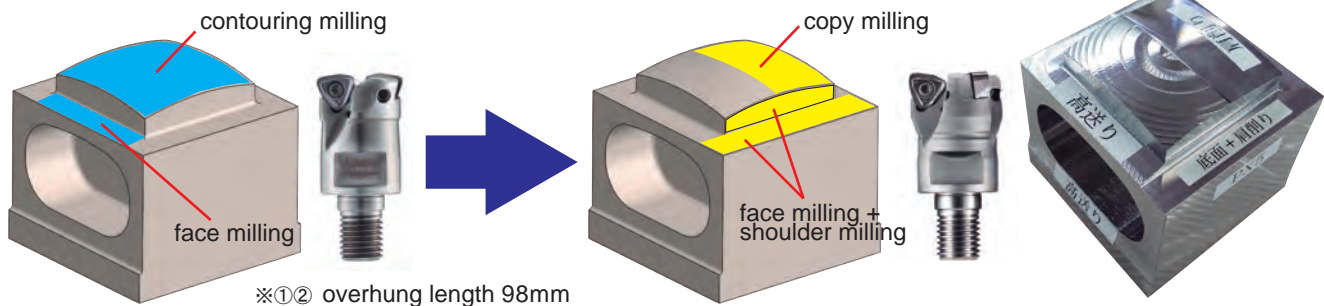
Work	Part name	Large welding jig	
	Material	A36 Steel for structure	
	Hardness	—	
Tool	Tool No.	EXM-5050R-HF-22 (φ 50)	
	Insert No.	WNMU070620ZER-PM (JC8050)	
Cutting conditions	Cutting speed	n	800 (min <sup>-1</sup> )
		V <sub>c</sub>	125 (m/min)
	Feed speed	V <sub>f</sub>	6,000 (mm/min)
		f <sub>z</sub>	1.5 (mm/t)
	a <sub>p</sub>	1.5 (mm)	
	a <sub>e</sub>	35 (mm)	
	Coolant	External	
	Machine	Vertical MC	

### 2. High feed machining to shoulder milling on mold steel

<Removal of machining steps in case of work material with slope & corner milling>

① Contouring milling of slope surface (by HF type)

② Copy milling of slope surface (by SM type)



Work	Part name	Test piece			
	Material	PX5 Mold steel (P20)			
	Hardness	30-36HRC			
Tool	Tool No.	① MEX-2032-HF-M16 (φ 32-2N) + MSN-M16-55-S32C		② MEX-2032-SM-M16 (φ 32-2N) + MSN-M16-55-S32C	
	Insert No.	WNMU070620ZER-PM (JC8118) ※in case of ①②, using same insert corner			
Cutting conditions	Cutting speed	n	① 1,500 (min <sup>-1</sup> )	② 2,000 (min <sup>-1</sup> )	
		V <sub>c</sub>	150 (m/min)	201 (m/min)	
	Feed speed	V <sub>f</sub>	3,600 (mm/min)	1,000 (mm/min)	
		f <sub>z</sub>	1.2 (mm/t)	0.25 (mm/t)	
	a <sub>p</sub>	0.8 (mm)	0.3 (mm)		
	a <sub>e</sub>	14 (mm)	1 (mm)		
	Coolant	External		Air blow (Internal)	
	Machine	Vertical MC			

#### Results

Possible to remove machining steps by using HF/SM types separately while achieving high accuracy in final finishing. Using the same insert for both types of cutters reduces the running costs.

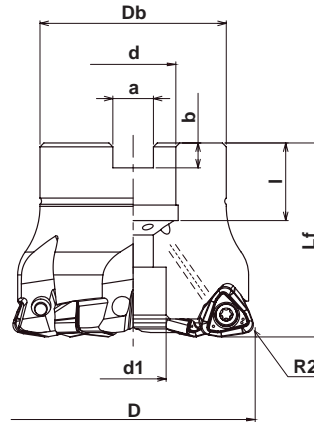


# Multi Extreme

INCH

METRIC

## Face Mill EXM-HF Type

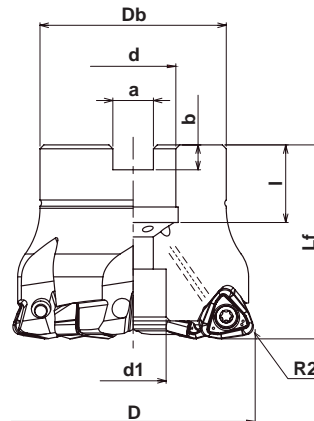


**G-Body**

### Specifications - Inch

CATALOG NUMBER	STK	DIMENSIONS								INSERT	Q	PARTS	
		D	Lf	Db	d	d1	a	b	l			Screw	Wrench
EXM-4200R-HF-075	•	2.00	2.00	1.77	.750	.590	.319	.197	.750	WNMU070620ZER-PM	4	TSW-410H	A-15T
EXM-5200R-HF-075	•	2.00	2.00	1.77	.750	.590	.319	.197	5				
EXM-6250R-HF-100	•	2.50	2.00	1.89	1.00	.787	.374	.236	.945		6		
EXM-7300R-HF-100	•	3.00	2.00	2.85	1.00	.787	.374	.236	.945		7		
EXM-7300R-HF-125	•	3.00	2.50	2.85	1.25	1.024	.500	.315	1.26		7		
EXM-7400R-HF-150	•	4.00	2.25	3.78	1.50	1.189	.636	.394	1.00		7		

Note: All cutters are supplied without inserts or wrenches.



**G-Body**

### Specifications - Metric

CATALOG NUMBER	STK	DIMENSIONS								INSERT	Q	PARTS	
		D	Lf	Db	d	d1	a	b	l			Screw	Wrench
EXM-5050R-HF-22	•	50	50	40	22	16.5	10.4	6.3	20	WNMU070620ZER-PM	5	TSW-410H	A-15T
EXM-5052R-HF-22	◦	52	50	40	22	16.5	10.4	6.3	20		5		
EXM-6063R-HF-22	•	63	50	48	22	17	10.4	6.3	20		6		
EXM-7080R-HF	•	80	70	65	31.75	26	12.7	8	32		7		
EXM-7080R-HF-27	•	80	55	65	27	20	12.4	7	22		7		

◦ - longer delivery may apply.

Note: All cutters are supplied without inserts or wrenches.



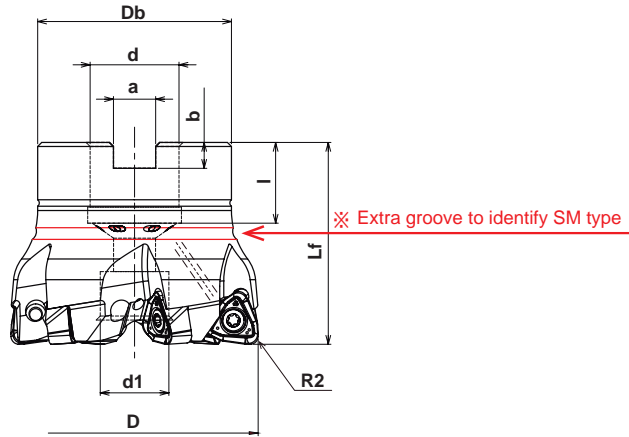


INCH

METRIC

# Multi Extreme

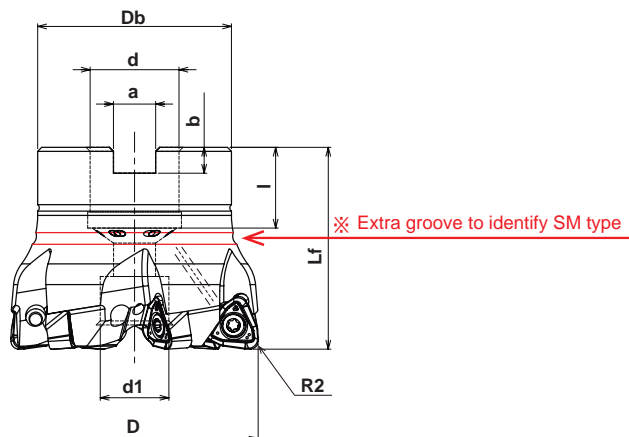
## Face Mill EXM-SM Type



### Specifications - Inch

CATALOG NUMBER	STK	DIMENSIONS								INSERT	Q	PARTS	
		D	Lf	Db	d	d1	a	b	l			Screw	Wrench
EXM-5200R-SM-075	•	2.00	2.00	1.77	.750	.590	.319	.197	.750	WNMU070620ZER-PM	5	TSW-410H	A-15T
EXM-6250R-SM-100	•	2.50	2.00	1.89	1.00	.787	.374	.236	.945		6		
EXM-7300R-SM-100	•	3.00	2.00	2.85	1.00	.787	.374	.236	.945		7		
EXM-7300R-SM-125	•	3.00	2.50	2.85	1.25	1.024	.500	.315	1.26		7		

Note: All cutters are supplied without inserts or wrenches.



### Specifications - Metric

CATALOG NUMBER	STK	DIMENSIONS								INSERT	Q	PARTS	
		D	Lf	Db	d	d1	a	b	l			Screw	Wrench
EXM-5050R-SM-22	•	50	50	40	22	16.5	10.4	6.3	20	WNMU070620ZER-PM	5	TSW-410H	A-15T
EXM-5052R-SM-22	◦	52	50	40	22	16.5	10.4	6.3	20		5		
EXM-6063R-SM-22	•	63	50	48	22	17	10.4	6.3	20		6		

◦ - longer delivery may apply.

Note: All cutters are supplied without inserts or wrenches.

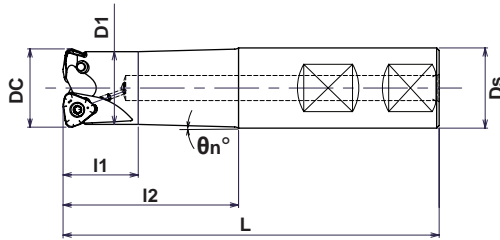
# Multi Extreme

INCH

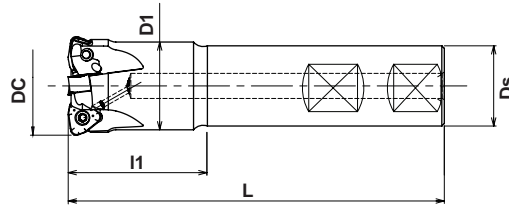
METRIC

## End Mill EXM-HF Type

● In case  $\phi D_c = \phi 1.25''$



● In case  $\phi D_c = \phi 1.50''$



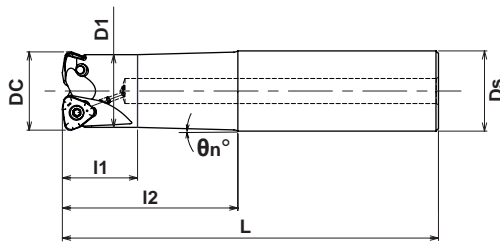
**G-Body**

### Specifications - Inch

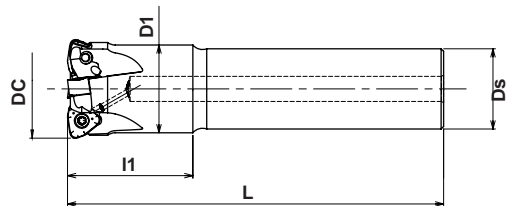
CATALOG NUMBER	STK	DIMENSIONS							INSERT	Q	PARTS	
		Dc	I1	I2	L	D1	Ds	$\theta_n^\circ$			Screw	Wrench
EXM-2125-HF-2.0-S125LG	●	1.25	1.18	2.00	7.00	1.14	1.25	1.5°	WNMU070620ZER-PM	2	TSW-410H	A-15T
EXM-2125-HF-3.0-S125LG	●	1.25	1.18	3.00	8.00	1.14	1.25	1°		2		
EXM-3150-HF-3.0-S125LG	●	1.50	3.00	-	7.00	1.30	1.25	-		3		
EXM-3150-HF-4.75-S125LG	●	1.50	4.75	-	8.00	1.30	1.25	-		3		

Note: All cutters are supplied without inserts or wrenches.

● In case  $\phi D_c = \phi 32$



● In case  $\phi D_c = \phi 35$  or  $40$



### Specifications - Metric

CATALOG NUMBER	STK	DIMENSIONS							INSERT	Q	PARTS	
		Dc	I1	I2	L	D1	Ds	$\theta_n^\circ$			Screw	Wrench
EXM-2032-HF-70-S32	●	32	30	70	150	29	32	1.5°	WNMU070620ZER-PM	2	TSW-410H	A-15T
EXM-2032-HF-120-S32	●	32	30	120	200	29	32	0.6°		2		
EXM-3035-HF-40-S32	●	35	40	-	150	31	32	-		3		
EXM-3035-HF-40L-S32	●	35	40	-	200	31	32	-		3		
EXM-4040-HF-50-S32	●	40	50	-	150	35	32	-		4		
EXM-4040-HF-50L-S32	●	40	50	-	200	35	32	-		4		

Note: All cutters are supplied without inserts or wrenches.

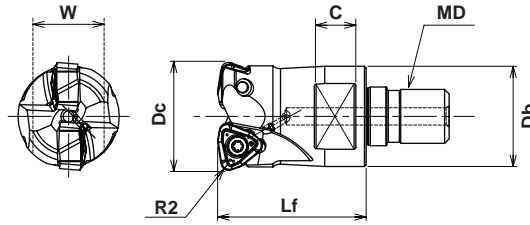


**INCH**

**METRIC**

# Multi Extreme

## Multi Extreme Modular Heads MEX-HF & MEX-SM Type



**G-Body**

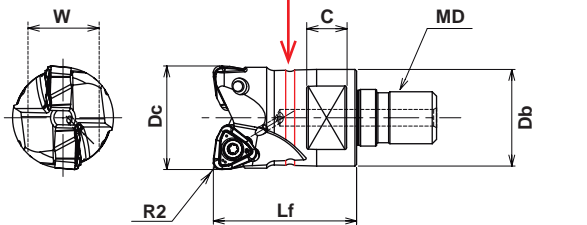


### Modular Head Specifications for HF style

	CATALOG NUMBER	STK	DIMENSIONS						INSERT	Q	PARTS	
			Dc	Lf	Db	MD	C	W			Screw	Wrench
INCH	MEX-2125-HF-M16	●	1.25	1.693	1.142	M16	12	22	WNMU070620ZER-PM	2	TSW-410H	T-15
	MEX-3150-HF-M16	●	1.50	1.693	1.142	M16	12	22		3		
METRIC	MEX-2032-HF-M16	●	32	43	29	M16	12	22		2		
	MEX-3035-HF-M16	●	35	43	29	M16	12	22		3		
	MEX-4040-HF-M16	●	40	43	32	M16	14	26		4		
	MEX-4042-HF-M16	○	42	43	32	M16	14	26		4		

○ - longer delivery may apply.

Note: All cutters are supplied without inserts or wrenches.



### Modular Head Specifications for SM style

	CATALOG NUMBER	STK	DIMENSIONS						INSERT	Q	PARTS	
			Dc	Lf	Db	MD	C	W			Screw	Wrench
INCH	MEX-2125-SM-M16	●	1.25	1.693	1.142	M16	12	22	WNMU070620ZER-PM	2	TSW-410H	T-15
	MEX-3150-SM-M16	●	1.50	1.693	1.142	M16	12	22		3		
METRIC	MEX-2032-SM-M16	●	32	43	29	M16	12	22		2		
	MEX-3035-SM-M16	●	35	43	29	M16	12	22		3		
	MEX-4040-SM-M16	●	40	43	32	M16	14	26		4		
	MEX-4042-SM-M16	○	42	43	32	M16	14	26		4		

○ - longer delivery may apply.

Note: All cutters are supplied without inserts or wrenches.

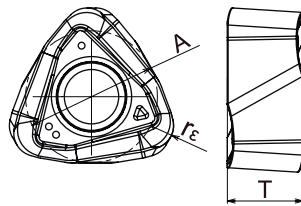
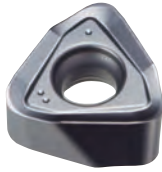


# Multi Extreme

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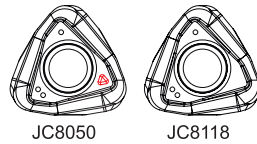
METRIC

## Inserts



Catalog Number	Tolerance	PVD Coated		Dimensions (mm)		
		JC8050	JC8118	A	T	r <sub>ε</sub>
WNMU070620ZER-PM	M	●	●	11.2	6.4	2

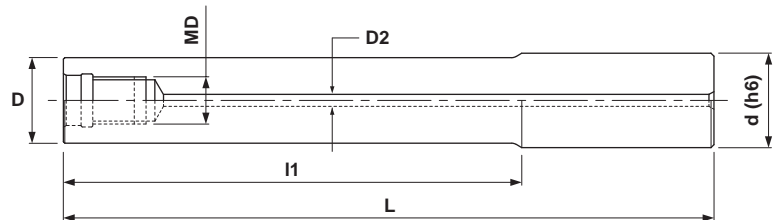
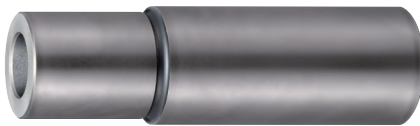
● Each grade shows different mark around the hole for identification.



JC8050

JC8118

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



### Specifications - Inch

CATALOG NUMBER	STK	DIMENSIONS					
		D	l1	L	d	MD	D2
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	l1	L	d	MD	D2
MGN-M16-37-S32	●	29	37	107	32	M16	6
MGN-M16-77-S32	●	29	77	157	32	M16	6



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# Multi Extreme

## MODULAR HEAD HOLDERS

MSN Type

Solid Carbide with Coolant Thru



Fig. 1

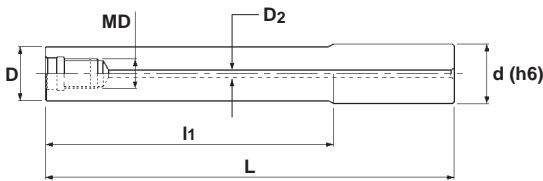
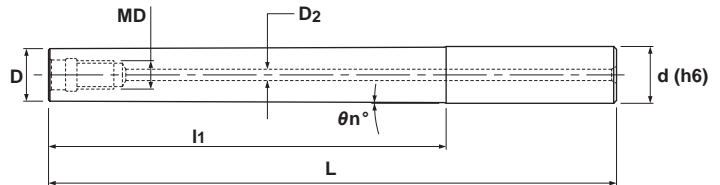


Fig. 2



### Specifications

	CATALOG NUMBER	STK	DIMENSIONS						FIG.	
			D	l1	L	d	θn°	MD		D2
INCH	MSN-M16-0.5-S125C	•	1.14	.500	3.50	1.25	-	M16	.315	1
	MSN-M16-1.0-S125C	•	1.14	1.00	4.00	1.25	-	M16	.315	1
	MSN-M16-2.0-S125C	•	1.14	2.00	5.00	1.25	-	M16	.315	1
	MSN-M16-4.0-S125C	•	1.14	4.00	7.00	1.25	-	M16	.315	1
	MSN-M16-6.0-S125C	•	1.14	6.00	9.00	1.25	-	M16	.315	1
	MSN-M16-8.0-S125C	•	1.14	8.00	11.00	1.25	-	M16	.315	1
METRIC	MSN-M16-25-S32C	•	29	25	90	32	-	M16	8	1
	MSN-M16-55-S32C	•	29	55	120	32	-	M16	8	1
	MSN-M16-77-S32C	•	29	77	157	32	-	M16	8	1
	MSN-M16-97-S32C	•	29	97	177	32	-	M16	8	1
	MSN-M16-105-S32C	•	29	105	170	32	-	M16	8	1
	MSN-M16-117T-S32C	•	29	117	197	32	0°38'	M16	8	2
	MSN-M16-127-S32C	•	29	127	207	32	-	M16	8	1
	MSN-M16-127T-S32C	•	29	127	207	32	0°30'	M16	8	2
	MSN-M16-155-S32C	•	29	155	220	32	-	M16	8	1
	MSN-M16-177-S32C	•	29	177	257	32	-	M16	8	1
	MSN-M16-177T-S32C	•	29	177	257	32	0°23'	M16	8	2
	MSN-M16-195-S32C	•	29	195	260	32	-	M16	8	1
	MSN-M16-197T-S32C	•	29	197	277	32	0°23'	M16	8	2
	MSN-M16-225-S32C	•	29	225	290	32	-	M16	8	1
	MSN-M16-245-S32C	•	29	245	310	32	-	M16	8	1
MSN-M16-295-S32C	•	29	295	360	32	-	M16	8	1	



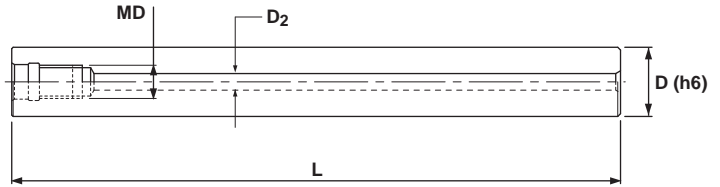
# Multi Extreme

**METRIC**

## MODULAR HEAD HOLDERS

MSN Type - Straight

Solid Carbide with Coolant Thru



### Specifications

CATALOG NUMBER	STK	DIMENSIONS			
		D	L	MD	D2
MSN-M16-160S-S28C	•	28	160	M16	8
MSN-M16-230S-S28C	•	28	230	M16	8
MSN-M16-310S-S28C	•	28	310	M16	8
MSN-M16-157S-S32C	•	32	157	M16	8
MSN-M16-217S-S32C	•	32	217	M16	8
MSN-M16-287S-S32C	•	32	287	M16	8
MSN-M16-357S-S32C	•	32	357	M16	8





# PROPER MOUNTING OF MODULAR HEADS

## ■ Cleaning

Remove dirt and chips with air from the connecting thread and 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.



Thread	Tightening torque	Spanner size
M6	8N · m	8 ◆
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.

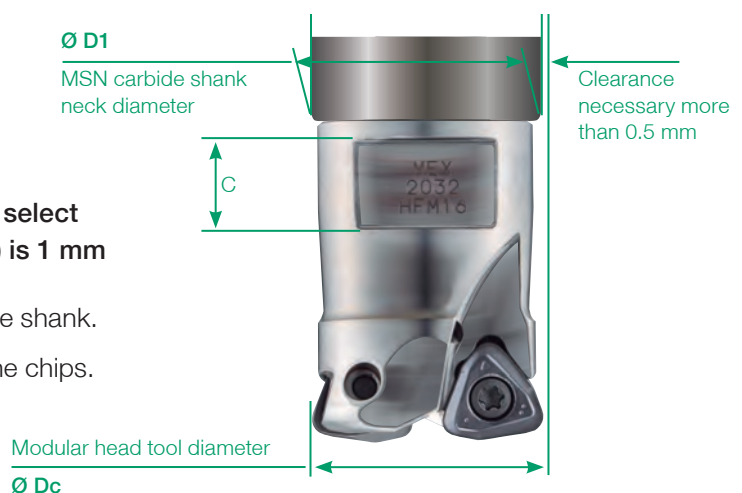
## SELECTION OF MSN CARBIDE SHANK HOLDER

$$\varnothing D_c - \varnothing D_1 \geq 1\text{mm}$$

When using modular head over  $\varnothing 16\text{mm}$ , please select MSN carbide shank which the diameter ( $\varnothing D_1$ ) is 1 mm or smaller than modular head ( $\varnothing D_c$ ).

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.

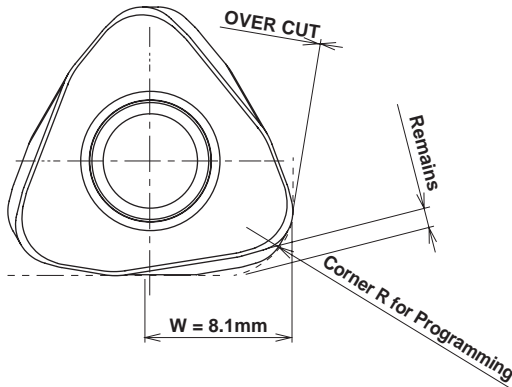


# Multi Extreme

INCH

METRIC

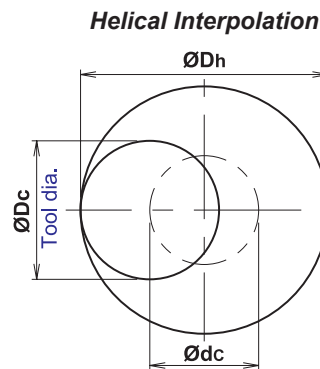
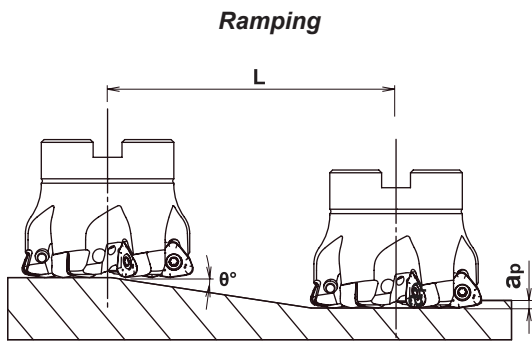
## Definition of corner shape for programming using HF type



Corner Radius for Programming	Over Cut	Remains
R3.0 (Standard)	0	0.8
R3.5	0.06	0.73
R4.0	0.21	0.66

(mm)

## Recommended Data for Profile Milling



- 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 AP
- Down cutting is recommended so tool pass rotation should be counterclockwise.

- In case of ramping and helical interpolation, apply 70% or less feed speed from standard cutting condition table.
- In case of drilling apply 50% or less Z axis feed speed from standard cutting condition table.
- Long consecutive chips may come out in case of drilling, confirm safe operating conditions.

	TOOL DIAMETER I	EFFECTIVE CUTTING DIA.	MAX. DEPTH OF CUT: AP	RAMPING		HELICAL INTERPOLATION		MAX. DRILLING DEPTH	
				Max Ramp Angle	Total Cutting Length at Max. AP: L	Min Bore Diameter: Dh min	Max Bore Diameter: Dh max		
INCH	High Feed (-HF)	1.25	.581	.079	2.5°	1.80	1.82	2.21	.024
		1.50	.831	.079	2.0°	2.25	2.32	2.71	.024
		2.00	1.33	.079	1.3°	3.47	3.32	3.71	.024
		2.50	1.83	.079	0.9°	5.01	4.32	4.71	.024
		3.00	2.33	.079	0.6°	7.52	5.32	5.71	.024
	4.00	3.33	.079	0.5°	9.02	7.32	7.71	.024	
	Shoulder Milling (-SM)	1.25	1.09	.098	0.8°	7.05	1.87	2.34	.024
		1.50	1.34	.098	0.8°	7.05	2.37	2.84	.024
		2.00	1.84	.098	0.8°	7.05	3.37	3.84	.024
		2.50	2.34	.098	0.8°	7.05	4.37	4.84	.024
3.00		2.84	.098	0.5°	11.28	5.37	5.84	.024	
METRIC	High Feed (-HF)	32	15	2	2.5°	46	47	58	0.6
		35	18	2	2.5°	46	53	64	0.6
		40	23	2	2.0°	57	63	74	0.6
		42	25	2	1.8°	64	63	78	0.6
		50	33	2	1.5°	76	83	94	0.6
		52	35	2	1.2°	95	87	98	0.6
		63	46	2	1.0°	115	109	120	0.6
		80	63	2	0.6°	191	143	154	0.6
	Shoulder Milling (-SM)	32	28	2.5	0.8°	179	48	60	0.6
		35	31	2.5	0.8°	179	54	66	0.6
		40	36	2.5	0.8°	179	64	76	0.6
		42	38	2.5	0.8°	179	68	80	0.6
		50	46	2.5	0.8°	179	84	96	0.6
		52	48	2.5	0.8°	179	88	100	0.6
		63	59	2.5	0.8°	179	110	122	0.6

**INCH****METRIC**

# Multi Extreme

## Recommended Cutting Data for Face Milling with -HF Style

Material	Grade	SFM	IPT	DOC	WOC
Gray Cast Iron	JC8118	600	.060"	.060" - .080"	70%
Nodular Cast Iron	JC8118	550	.060"	.040" - .060"	70%
Carbon Steel	JC8050	500	.060"	.040" - .060"	70%
Low Alloy Steel	JC8050	450	.060"	.040" - .060"	70%
Mold Steel	JC8118	400	.060"	.040" - .060"	60%
Tool & Die Steel (40-50 HRC)	JC8118	300	.040"	.020" - .040"	60%
Stainless (Austenitic) (300 Series)	JC8050	300	.050"	.030" - .050"	40-60%
Stainless (Martensitic) (400 Series)	JC8118	400	.050"	.020" - .040"	40-60%

## Recommended Cutting Data for -SM style, Side & Face Milling

Material	Grade	Side Milling				Face Milling			
		SFM	IPT	DOC	WOC	SFM	IPT	DOC	WOC
Gray Cast Iron	JC8118	700	.012"	.120"	12%	600	.012"	.060"	80%
Nodular Cast Iron	JC8118	650	.012"	.120"	10%	550	.012"	.060"	80%
Carbon Steel	JC8050	600	.012"	.120"	10%	500	.012"	.060"	80%
Low Alloy Steel	JC8050	550	.012"	.120"	10%	450	.012"	.060"	80%
Mold Steel	JC8118	500	.010"	.120"	8%	400	.010"	.060"	80%
Tool & Die Steel (40-50 HRC)	JC8118	400	.006"	.120"	6%	300	.006"	.040"	60%
Stainless (Austenitic) (300 Series)	JC8050	450	.010"	.120"	10%	300	.010"	.050"	60%
Stainless (Martensitic) (400 Series)	JC8118	500	.012"	.120"	10%	400	.012"	.060"	60%

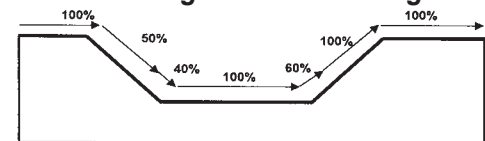
- NOTE:** 1. These parameters are for stable machining with steel bodies at lengths 4XD. See table below for longer applications.  
 2. If chatter occurs, recommend to reduce DOC or spindle speed and maintain IPT.  
 3. If machine does not have enough power, recommend reducing DOC or spindle speed and feed.  
 4.  $RPM = 3.82 \times SFM / Dia.$   
 5.  $IPM = RPM \times IPT \times \# \text{ of flutes (or teeth)}$

## Additional Cutting Data For Longer Tools

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

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

## Reduced Cutting Data For Cutting Pattern



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

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