

Carbide End Mills

# MS plus End Mill Series

Series  
Expansion

## Tough applications require "Plus" performance.



## Carbide End Mills

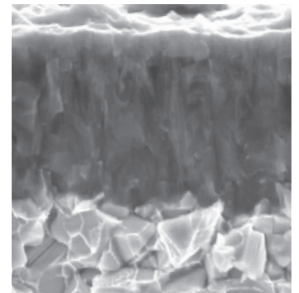
# MS plus

Tough applications require "Plus" performance.

### MS plus Coating

The original coating technology enables a multilayer of (Al,Ti)N and (Al, Cr)N, enabling the machining of a wide range of workpiece materials.

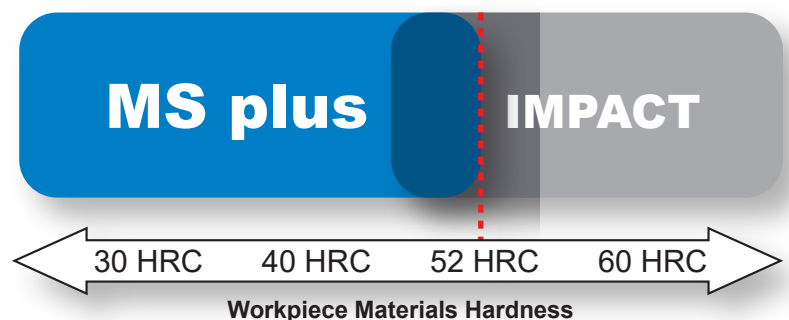
Properties			
	MS plus	(Al,Ti)N	(Al,Cr)N
Hardness (HV)	3200	2800	3100
Oxidation Temperature (°C)	1100	800	1100
Adhesion (N)	100	80	80



Greatly improved wear resistance even when machining hardened materials.

MS plus provides long tool life on materials up to 52 HRC.

For steels harder than 52 HRC, IMPACT MIRACLE end mills are recommended. (TOOLS NEWS B075)

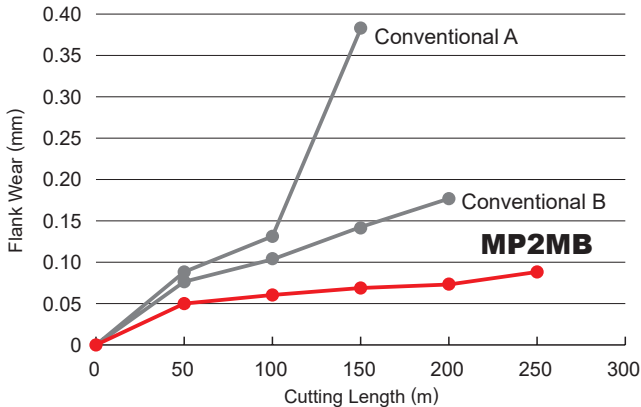


# MS plus Provides Superior Cost Performance

## Cutting Performance

Excellent wear resistance compared to conventional products.

### Carbon Steel JIS S55C

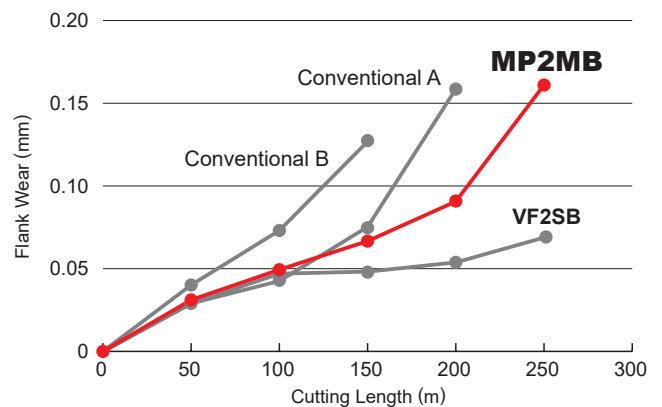


<Cutting Conditions>

Workpiece Material : JIS S55C (220 HB)  
 Tool : 2 flute ball nose end mill R3  
 Revolution : 16000 min<sup>-1</sup>  
 Cutting Speed : 284 m/min  
 Table Feed : 2000 mm/min  
 Feed per Tooth : 0.06 mm/t.  
 Depth of Cut : ap 2 mm, ae 0.3 mm  
 Overhang : 20 mm  
 Cutting Mode : Air Bow  
 Machine : Horizontal M/C (BT40)

### Alloy Steel, Tool Steel JIS SKD61 (52 HRC)

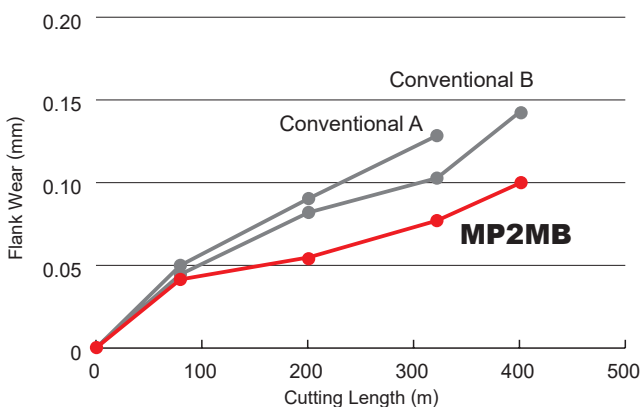
IMACT MIRACLE is suitable when even longer tool life is required.



<Cutting Conditions>

Workpiece Material : JIS SKD61 (52 HRC)  
 Tool : 2 flute ball nose end mill R3  
 Revolution : 17000 min<sup>-1</sup>  
 Cutting Speed : 300 m/min  
 Table Feed : 1700 mm/min  
 Feed per Tooth : 0.05 mm/t.  
 Depth of Cut : ap 2 mm, ae 0.3 mm  
 Overhang : 20 mm  
 Cutting Mode : Air Blow  
 Machine : Horizontal M/C (BT40)

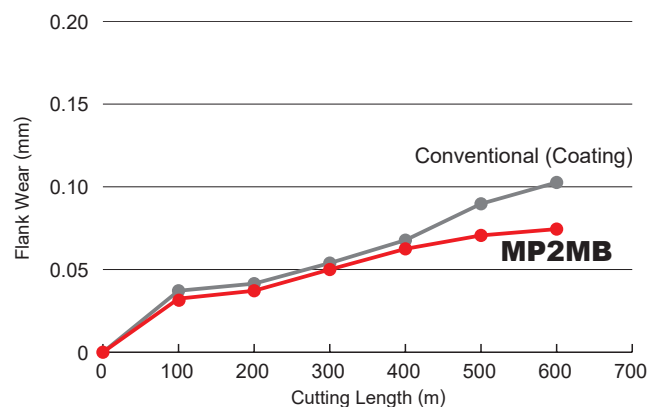
### Stainless Steel STAVAX (52 HRC)



<Cutting Conditions>

Workpiece Material : STAVAX (52 HRC)  
 Tool : 2 flute ball nose end mill R3  
 Revolution : 18000 min<sup>-1</sup>  
 Cutting Speed : 169 m/min  
 Table Feed : 3600 mm/min  
 Feed per Tooth : 0.1 mm/t.  
 Depth of Cut : ap 0.4 mm, ae 1 mm  
 Overhang : 20 mm  
 Cutting Mode : Air Blow  
 Machine : Horizontal M/C (BT40)

### Copper







<Cutting Conditions>







Workpiece Material : Copper  
 Tool : 2 flute ball nose end mill R3  
 Revolution : 15000 min<sup>-1</sup>  
 Cutting Speed : 267 m/min  
 Table Feed : 1500 mm/min  
 Feed per Tooth : 0.05 mm/t.  
 Depth of Cut : ap 2 mm, ae 0.2 mm  
 Overhang : 20 mm  
 Cutting Mode : Emulsion  
 Machine : Vertical M/C (BT40)

# MS plus End Mill Series




(mm)

No. of Flutes	Product Name	Specifications	Shape	Dia. DC		APMX	Size	Workpiece Material					Page	
				Min.	Max.	Max. DC		P	H	M	S	N		
								Carbon Steel	Tool Steel	-55HRC Steel	Stainless Steel	Heat Resistant Alloy		Copper Alloy
<b>Square</b>														
2	MP2ES	For Swiss-Type automatic lathes		3	10	15	7	○	○	○	○	○	○	P10
3	MP3ES	For Swiss-Type automatic lathes		3	12	15	10	○	○	○	○	○	○	P13
4	MP4EC	For Swiss-Type automatic lathes		3	14	15	14	○	○	○	○	○	○	P16
4	MPMHV	Irregular helix		1	20	50	14	○	○	○	○	○	○	P19
4		Irregular helix, Slim shank type		7	22	55	10	○	○	○	○	○	○	P19
4	MPJHV	Irregular helix, For vertical wall finishing		1	20	80	23	○	○	○	○	○	○	P22

(mm)

No. of Flutes	Product Name	Type	Shape	Ball Nose RE		APMX	Size	Workpiece Material					Page	
				Min.	Max.	Max. RE		P	H	M	S	N		
								Carbon Steel	Tool Steel	-55HRC Steel	Stainless Steel	Heat Resistant Alloy		Copper Alloy
<b>Ball Nose</b>														
2	MP2SSB	Short cut length, Short shank		0.1	6	12	16	○	○	○	○	○	○	P24
2	MP2SB	Short cut length		0.1	6	18	29	○	○	○	○	○	○	P25
2	MP2MB	Medium cut length		0.25	6	22	21	○	○	○	○	○	○	P26
2	MP2SDB	For semi-finishing of forging dies		0.5	6	22	16	○	○	○	○	○	○	P29
2	MP2XLB	Long neck		0.05	3	6	232	○	○	○	○	○	○	P31
3	MP3XB	Taper neck, For deep slotting of forging dies		0.5	6	18	125	○	○	○	○	○	○	P44

(mm)

No. of Flutes	Product Name	Specifications	Shape	Dia. DC		APMX	Size	Workpiece Material					Page
				Min.	Max.			Max. RE	Carbon Steel P	Tool Steel H	-55HRC Steel M	Stainless Steel S	
<b>Radius</b>													
4	MPMHVRB	Irregular helix		1	20	50	59	○	○	○	○	○	P53
4		Irregular helix, Slim shank type		10	12	30	9	○	○	○	○	○	P54
4	MPXLRB	For precise, high efficiency mould and die machining		0.2	6	6	101	○	○	○	○	○	P56
<b>Chamfering</b>													
3	MP3C	Chamfer machining		2	12	5.75	6	○	○	○	○	○	P7

## MS plus New Addition Chamfer Cutter

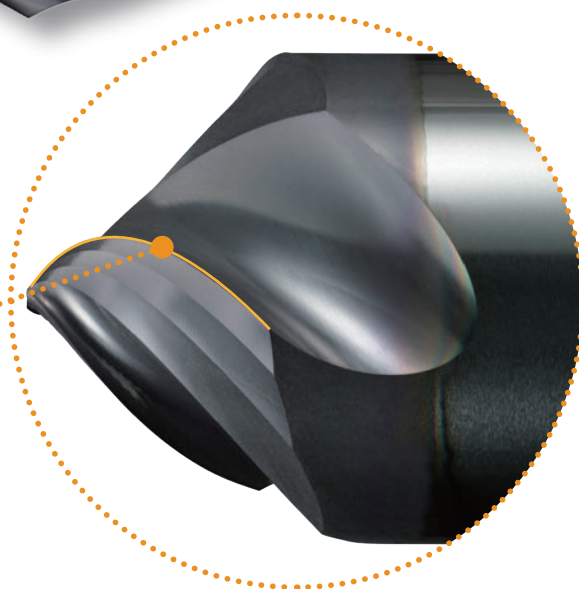
# MP3C

New, long tool life cutter  
for highly efficient  
chamfer machining.



### Sharp Helix Flute

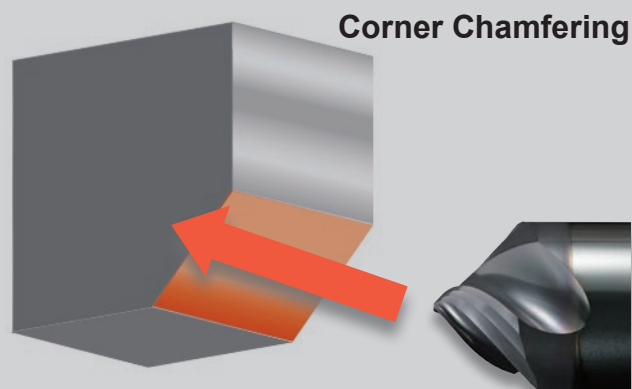
The optimum helix angle provides great sharpness and suppresses the occurrence of burrs. The chamfer angle is 45°.



## Highly Effective for Chamfer Machining

The 3-flute geometry achieves high feed and extended tool life, and the effects of the helical flutes suppress the occurrence of burrs chamfer machining.

DLE and GKCD type drills are recommended for centering.



**S55C**  
Comparison of Burrs  
After Chamfering

### MP3C 3-helical flutes

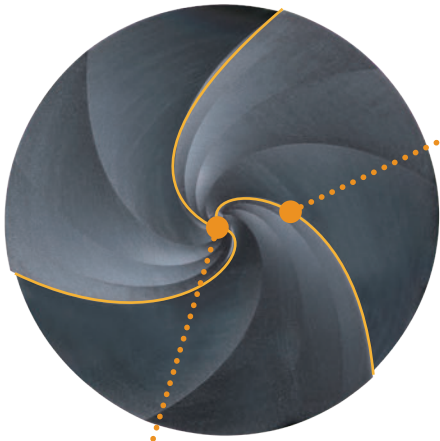


Good finish surface



## Specifications of 3-Flutes

High feed machining with an excellent balance between versatility and chip evacuation is achieved by adopting the 3-flute design. High efficiency machining is realised.

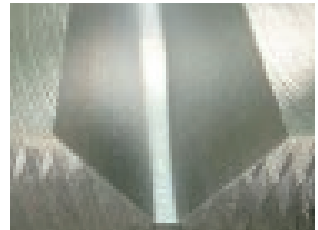


### End Cutting Edge

The end cutting edge can also be used for V-groove machining.

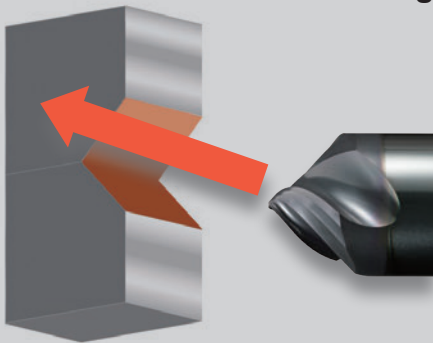


End Cutting Edge

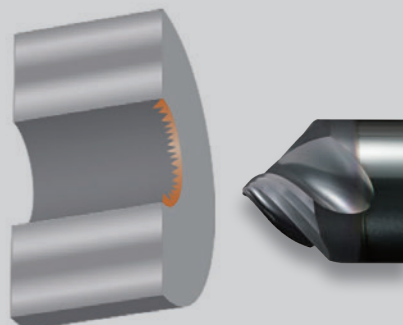


V-groove machining

### V-Grooving



### Chamfering



#### <Cutting Conditions>

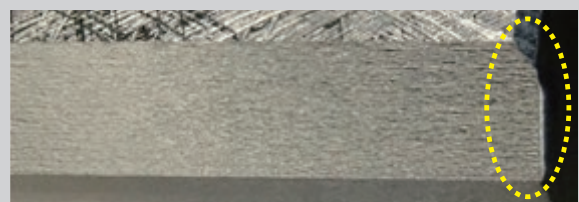
Workpiece Material	: JIS S55C
Tool	: DC=ø6 mm
Cutting Speed	: $v_c=100$ m/min
Revolution	: $n=5300$ min <sup>-1</sup>
Feed per Tooth	: $f_z=0.03$ mm/t.
Depth of Cut	: $a_p=1.2$ mm
Overhang Length	: 18 mm
Cutting Mode	: Air Blow

### Conventional cutter, 4-straight flutes



Burrs occur

### Conventional cutter, 2-straight flutes



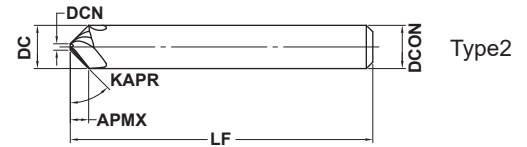
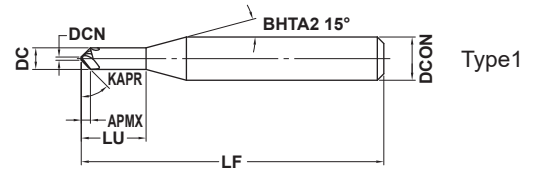
Burrs occur

# MS plus End Mill Series

## MP3C NEW Chamfer cutter, 3 flute



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
◎	◎	◎		○	○		



	DCN				
	± 0.03				
	DCON=6	8 ≤ DCON ≤ 10	DCON=12		
	$\begin{matrix} 0 \\ -0.008 \end{matrix}$	$\begin{matrix} 0 \\ -0.009 \end{matrix}$	$\begin{matrix} 0 \\ -0.011 \end{matrix}$		

- The optimum helix angle provides great sharpness and suppresses the occurrence of burrs.
- High feed machining is achieved by adopting 3 flutes.

(mm)

Order Number	DC	DCN	APMX	KAPR	LU	LF	DCON	No.F*	Stock	Type
MP3CD0200	2	0.3	0.85	45°	6	50	6	3	●	1
MP3CD0400	4	0.3	1.85	45°	12	50	6	3	●	1
MP3CD0600	6	0.3	2.85	45°	—	50	6	3	●	2
MP3CD0800	8	0.4	3.8	45°	—	60	8	3	●	2
MP3CD1000	10	0.5	4.75	45°	—	70	10	3	●	2
MP3CD1200	12	0.5	5.75	45°	—	75	12	3	●	2

\* Number of Flutes

**DC** = Cutting Diameter  
**DCN** = Cutting Diameter Min.  
**APMX** = Depth of Cut Max.  
**KAPR** = Tool Cutting Edge Angle  
**LU** = Usable Length  
**LF** = Functional Length  
**DCON** = Connection Diameter

● : Inventory maintained in Japan.



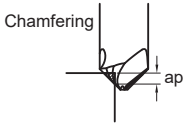
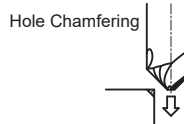
## Recommended Cutting Conditions

### Corner and Hole Chamfering

(mm)

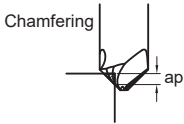
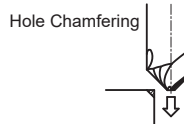
DC	Carbon Steel, Ductile Cast Iron, Non-alloy Steel (C $\geq$ 0.55%)					Alloy Steel (325HB) (38 – 45HRC)				
	Cutting Speed (m/min)	Revolution n (min <sup>-1</sup> )	Feed Rate vf (mm/min)	Corner Chamfering ap	Hole Chamfering ap	Cutting Speed (m/min)	Revolution n (min <sup>-1</sup> )	Feed Rate vf (mm/min)	Corner Chamfering ap	Hole Chamfering ap
<b>2</b>	100	16000	1400	$\leq 0.6$	$\leq 0.4$	70	11000	890	$\leq 0.6$	$\leq 0.4$
<b>4</b>	100	8000	720	$\leq 1.2$	$\leq 0.8$	70	5600	450	$\leq 1.2$	$\leq 0.8$
<b>6</b>	100	5300	480	$\leq 1.8$	$\leq 1.2$	70	3700	300	$\leq 1.8$	$\leq 1.2$
<b>8</b>	100	4000	360	$\leq 2.4$	$\leq 1.6$	70	2800	230	$\leq 2.4$	$\leq 1.6$
<b>10</b>	100	3200	290	$\leq 2.5$	$\leq 2.0$	70	2200	180	$\leq 2.5$	$\leq 2.0$
<b>12</b>	100	2700	240	$\leq 2.5$	$\leq 2.4$	70	1900	150	$\leq 2.5$	$\leq 2.4$

Depth of Cut	Chamfering	Hole Chamfering
		

DC	Austenitic Stainless, Titanium Alloys					Hardened Steel (45 – 55HRC)				
	Cutting Speed (m/min)	Revolution n (min <sup>-1</sup> )	Feed Rate vf (mm/min)	Corner Chamfering ap	Hole Chamfering ap	Cutting Speed (m/min)	Revolution n (min <sup>-1</sup> )	Feed Rate vf (mm/min)	Corner Chamfering ap	Hole Chamfering ap
<b>2</b>	60	9500	680	$\leq 0.6$	$\leq 0.4$	50	8000	480	$\leq 0.6$	$\leq 0.4$
<b>4</b>	60	4800	350	$\leq 1.2$	$\leq 0.8$	50	4000	240	$\leq 1.2$	$\leq 0.8$
<b>6</b>	60	3200	230	$\leq 1.8$	$\leq 1.2$	50	2700	160	$\leq 1.8$	$\leq 1.2$
<b>8</b>	60	2400	170	$\leq 2.4$	$\leq 1.6$	50	2000	120	$\leq 2.4$	$\leq 1.6$
<b>10</b>	60	1900	140	$\leq 2.5$	$\leq 2.0$	50	1600	96	$\leq 2.5$	$\leq 2.0$
<b>12</b>	60	1600	120	$\leq 2.5$	$\leq 2.4$	50	1300	78	$\leq 2.5$	$\leq 2.4$

Depth of Cut	Chamfering	Hole Chamfering
		

Note 1) For austenitic stainless steel the use of water-soluble coolant is effective.

Note 2) The revolution and feed rate can be increased with a smaller depth of cut.

Note 3) Vibration may occur if the rigidity of machine or workpiece material is low. In this case, please reduce the revolution and feed rate proportionately.

## MP3C

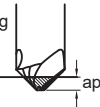
Chamfer cutter, 3 flute

### Recommended Cutting Conditions

#### ■ V-grooving

DC	Carbon Steel, Ductile Cast Iron, Non-alloy Steel(C≥0.55%)				Alloy Steel(325HB) (38 – 45HRC)				Austenitic Stainless, Titanium Alloys				Hardened Steel(45 – 55HRC)			
	Cutting Speed (m/min)	Revolution n (min <sup>-1</sup> )	Feed Rate vf (mm/min)	Depth of Cut ap	Cutting Speed (m/min)	Revolution n (min <sup>-1</sup> )	Feed Rate vf (mm/min)	Depth of Cut ap	Cutting Speed (m/min)	Revolution n (min <sup>-1</sup> )	Feed Rate vf (mm/min)	Depth of Cut ap	Cutting Speed (m/min)	Revolution n (min <sup>-1</sup> )	Feed Rate vf (mm/min)	Depth of Cut ap
<b>2</b>	80	13000	940	≤1.4	60	9500	620	≤1.4	50	8000	460	≤1.4	40	6400	310	≤1.4
<b>4</b>	80	6400	460	≤2.8	60	4800	310	≤2.8	50	4000	230	≤2.8	40	3200	150	≤2.8
<b>6</b>	80	4200	300	≤4.2	60	3200	210	≤4.2	50	2700	160	≤4.2	40	2100	100	≤4.2
<b>8</b>	80	3200	230	≤5.6	60	2400	160	≤5.6	50	2000	120	≤5.6	40	1600	77	≤5.6
<b>10</b>	80	2500	180	≤7.0	60	1900	120	≤7.0	50	1600	92	≤7.0	40	1300	62	≤7.0
<b>12</b>	80	2100	150	≤8.4	60	1600	100	≤8.4	50	1300	75	≤8.4	40	1100	53	≤8.4

Depth of Cut	 <p>V-Grooving Milling</p>
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Note 1) For austenitic stainless steel the use of water-soluble coolant is effective.

Note 2) The revolution and feed rate can be increased with a smaller depth of cut.

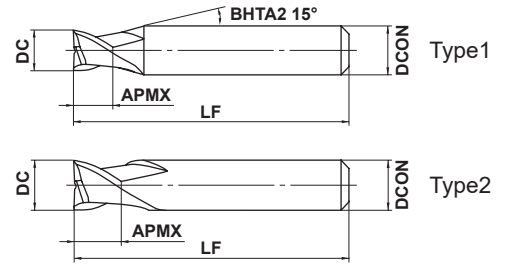
Note 3) Vibration may occur if the rigidity of machine or workpiece material is low. In this case, please reduce the revolution and feed rate proportionately.

# MP2ES

End mill, 2 flute, For Swiss-Type lathes



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○	○		○	○	○	



	3 ≤ DC ≤ 10			
	- 0.010 - 0.030			
	4 ≤ DCON ≤ 6	7 ≤ DCON ≤ 10		
	0 - 0.008	0 - 0.009		

- The optimised rake angle suppresses burrs.
- Cutting edge and overall length are optimised for the restricted space available in Swiss-type automatic lathes. (mm)

Order Number	DC	APMX	LF	DCON	* No.F	Stock	Type
MP2ESD0300S04	3	4.5	50	4	2	●	1
MP2ESD0400S04	4	6	50	4	2	●	2
MP2ESD0500S06	5	7.5	50	6	2	●	1
MP2ESD0600S06	6	9	50	6	2	●	2
MP2ESD0700S07	7	10.5	50	7	2	●	2
MP2ESD0800S08	8	12	50	8	2	●	2
MP2ESD1000S10	10	15	50	10	2	●	2

\* Number of Flutes

DC = Cutting Diameter  
APMX = Depth of Cut Max.

LF = Functional Length  
DCON = Connection Diameter

● : Inventory maintained in Japan.

# MS plus End Mill Series

## MP2ES

End mill, 2 flute, For Swiss-Type lathes

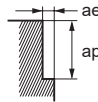
### Recommended Cutting Conditions

#### Side Milling

(mm)

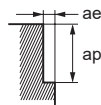
Dia. DC	Carbon steel, Cast iron, Alloy steel (–30HRC)				Alloy steel, Tool steel, Pre-hardened steel				Austenitic stainless steel, Titanium alloy			
	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Width of Cut ae	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Width of Cut ae	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Width of Cut ae
3	10000	600	3	0.6	7000	400	3	0.6	6000	300	3	0.6
4	7500	600	4	0.6	5200	400	4	0.6	4500	300	4	0.6
5	6000	600	5	0.6	4200	400	5	0.6	3600	300	5	0.6
6	5000	600	6	0.6	3500	400	6	0.6	3000	300	6	0.6
7	4500	560	7	0.6	3200	360	7	0.6	2700	280	7	0.6
8	4000	520	8	0.6	2800	350	8	0.6	2400	260	8	0.6
10	3200	450	10	0.6	2200	300	10	0.6	1900	230	10	0.6

Depth of cut



Dia. DC	Hardened steel (45–55HRC)				Copper, Copper Alloy			
	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Width of Cut ae	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Width of Cut ae
3	5000	120	3	0.2	13000	780	3	0.6
4	4000	120	4	0.2	9500	760	4	0.6
5	3200	120	5	0.2	7600	760	5	0.6
6	2700	120	6	0.2	6400	770	6	0.6
7	2300	110	7	0.2	5500	680	7	0.6
8	2000	110	8	0.2	4800	620	8	0.6
10	1600	100	10	0.2	3800	530	10	0.6

Depth of cut



Note 1) When cutting austenitic stainless steel, the use of water-soluble cutting fluid is effective.

Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.

Note 3) When drilling, please reduce the feed rates shown by 65% or more.

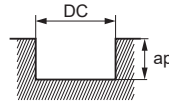
Note 4) Vibration may occur if the rigidity of machine or workpiece material is low. In this case, please reduce the revolution and feed rate proportionately.

## ■ Slotting

(mm)

Dia. DC	Carbon steel, Cast iron, Alloy steel (–30HRC)			Alloy steel, Tool steel, Pre-hardened steel			Austenitic stainless steel, Titanium alloy		
	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap
<b>3</b>	10000	600	0.6	7000	400	0.6	6000	300	0.6
<b>4</b>	7500	600	0.6	5200	400	0.6	4500	300	0.6
<b>5</b>	6000	600	0.6	4200	400	0.6	3600	300	0.6
<b>6</b>	5000	600	0.6	3500	400	0.6	3000	300	0.6
<b>7</b>	4500	560	0.6	3200	360	0.6	2700	280	0.6
<b>8</b>	4000	520	0.6	2800	350	0.6	2400	260	0.6
<b>10</b>	3200	450	0.6	2200	300	0.6	1900	230	0.6

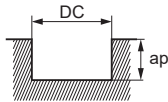
Depth of cut



DC: Diameter

Dia. DC	Hardened steel (45–55HRC)			Copper, Copper Alloy		
	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap
<b>3</b>	5000	120	0.2	13000	780	0.6
<b>4</b>	4000	120	0.2	9500	760	0.6
<b>5</b>	3200	120	0.2	7600	760	0.6
<b>6</b>	2700	120	0.2	6400	770	0.6
<b>7</b>	2300	110	0.2	5500	680	0.6
<b>8</b>	2000	110	0.2	4800	620	0.6
<b>10</b>	1600	100	0.2	3800	530	0.6

Depth of cut



DC: Diameter

Note 1) When cutting austenitic stainless steel, the use of water-soluble cutting fluid is effective.

Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.

Note 3) When drilling, please reduce the feed rates shown by 65% or more.

Note 4) Vibration may occur if the rigidity of machine or workpiece material is low. In this case, please reduce the revolution and feed rate proportionately.

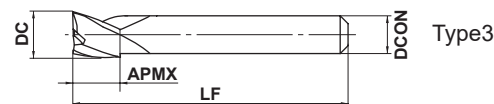
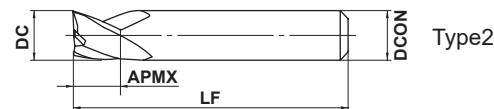
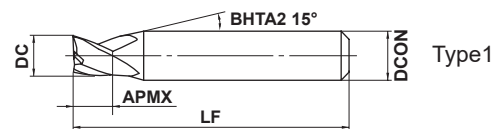
# MS plus End Mill Series

## MP3ES

End mill, 3 flute, For Swiss-Type lathes



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy	Copper Alloy	Aluminium Alloy
○	○	○	○	○	○	○	○



3 ≤ DC ≤ 12				
- 0.010				
- 0.030				
4 ≤ DCON ≤ 6	7 ≤ DCON ≤ 10	DCON = 12		
0	0	0		
- 0.008	- 0.009	- 0.011		

- The optimised rake angle suppresses burrs.
- Cutting edge and overall length are optimised for the restricted space available in Swiss-type automatic lathes.

(mm)

Order Number	DC	APMX	LF	DCON	* No.F	Stock	Type
MP3ESD0300S04	3	4.5	50	4	3	●	1
MP3ESD0400S04	4	6	50	4	3	●	2
MP3ESD0500S06	5	7.5	50	6	3	●	1
MP3ESD0600S06	6	9	50	6	3	●	2
MP3ESD0700S07	7	10.5	50	7	3	●	2
MP3ESD0800S08	8	12	50	8	3	●	2
MP3ESD0900S10	9	13.5	50	10	3	●	1
MP3ESD1000S10	10	15	50	10	3	●	2
MP3ESD1200S10	12	15	50	10	3	●	3
MP3ESD1200S12	12	15	50	12	3	●	2

\* Number of Flutes

DC = Cutting Diameter  
APMX = Depth of Cut Max.

LF = Functional Length  
DCON = Connection Diameter

● : Inventory maintained in Japan.



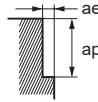
## Recommended Cutting Conditions

### Side Milling

(mm)

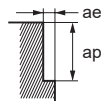
Dia. DC	Carbon steel, Cast iron, Alloy steel (–30HRC)				Alloy steel, Tool steel, Pre-hardened steel				Austenitic stainless steel, Titanium alloy			
	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Width of Cut ae	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Width of Cut ae	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Width of Cut ae
<b>3</b>	10000	720	3	0.6	7000	480	3	0.6	6000	360	3	0.6
<b>4</b>	7500	720	4	0.6	5200	480	4	0.6	4500	360	4	0.6
<b>5</b>	6000	720	5	0.6	4200	480	5	0.6	3600	360	5	0.6
<b>6</b>	5000	720	6	0.6	3500	480	6	0.6	3000	360	6	0.6
<b>7</b>	4500	670	7	0.6	3200	440	7	0.6	2700	340	7	0.6
<b>8</b>	4000	620	8	0.6	2800	420	8	0.6	2400	310	8	0.6
<b>9</b>	3500	580	9	0.6	2500	380	9	0.6	2100	290	9	0.6
<b>10</b>	3200	540	10	0.6	2200	360	10	0.6	1900	280	10	0.6
<b>12</b>	2700	490	12	0.6	1900	320	12	0.6	1600	250	12	0.6

Depth of cut



Dia. DC	Hardened steel (45–55HRC)				Copper, Copper Alloy			
	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Width of Cut ae	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Width of Cut ae
<b>3</b>	5000	140	3	0.2	13000	940	3	0.6
<b>4</b>	4000	140	4	0.2	9500	910	4	0.6
<b>5</b>	3200	140	5	0.2	7600	910	5	0.6
<b>6</b>	2700	140	6	0.2	6400	920	6	0.6
<b>7</b>	2300	130	7	0.2	5500	820	7	0.6
<b>8</b>	2000	130	8	0.2	4800	740	8	0.6
<b>9</b>	1800	130	9	0.2	4200	700	9	0.6
<b>10</b>	1600	120	10	0.2	3800	640	10	0.6
<b>12</b>	1300	120	12	0.2	3200	580	12	0.6

Depth of cut



Note 1) When cutting austenitic stainless steel, the use of water-soluble cutting fluid is effective.

Note 2) The revolution and feed rate can be increased with a smaller depth of cut.

Note 3) When drilling, please reduce the feed rates shown by 65% or more.

Note 4) Vibration may occur if the rigidity of machine or workpiece material is low. In this case, please reduce the revolution and feed rate proportionately.

## MP3ES

End mill, 3 flute, For Swiss-Type lathes

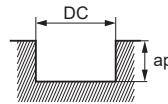
### Recommended Cutting Conditions

#### ■ Slotting

(mm)

Workpiece Material	Carbon steel, Cast iron, Alloy steel (–30HRC)			Alloy steel, Tool steel, Pre-hardened steel			Austenitic stainless steel, Titanium alloy			
	Dia. DC	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap
	3	10000	720	0.6	7000	480	0.6	6000	360	0.6
	4	7500	720	0.6	5200	480	0.6	4500	360	0.6
	5	6000	720	0.6	4200	480	0.6	3600	360	0.6
	6	5000	720	0.6	3500	480	0.6	3000	360	0.6
	7	4500	670	0.6	3200	440	0.6	2700	340	0.6
	8	4000	620	0.6	2800	420	0.6	2400	310	0.6
	9	3500	580	0.6	2500	380	0.6	2100	290	0.6
	10	3200	540	0.6	2200	360	0.6	1900	280	0.6
	12	2700	490	0.6	1900	320	0.6	1600	250	0.6

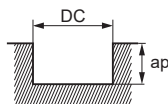
Depth of cut



DC: Diameter

Workpiece Material	Hardened steel (45–55HRC)			Copper, Copper Alloy			
	Dia. DC	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap
	3	5000	140	0.2	13000	940	0.6
	4	4000	140	0.2	9500	910	0.6
	5	3200	140	0.2	7600	910	0.6
	6	2700	140	0.2	6400	920	0.6
	7	2300	130	0.2	5500	820	0.6
	8	2000	130	0.2	4800	740	0.6
	9	1800	130	0.2	4200	700	0.6
	10	1600	120	0.2	3800	640	0.6
	12	1300	120	0.2	3200	580	0.6

Depth of cut



DC: Diameter

Note 1) When cutting austenitic stainless steel, the use of water-soluble cutting fluid is effective.

Note 2) The revolution and feed rate can be increased with a smaller depth of cut.

Note 3) When drilling, please reduce the feed rates shown by 65% or more.

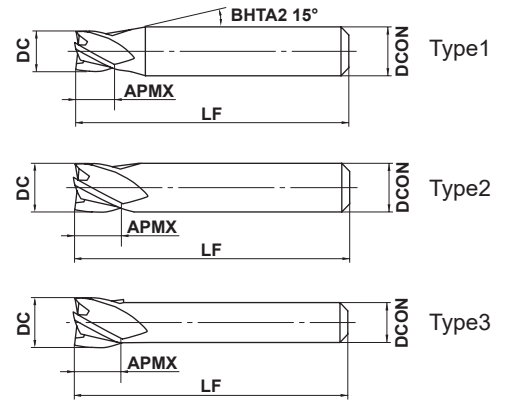
Note 4) Vibration may occur if the rigidity of machine or workpiece material is low. In this case, please reduce the revolution and feed rate proportionately.

# MP4EC

End mill, 4 flute, For Swiss-Type lathes



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○	○	○	○	○	○	○



	3 ≤ DC ≤ 12	DC = 14			
	- 0.010 - 0.030	- 0.010 - 0.040			
	4 ≤ DCON ≤ 6	7 ≤ DCON ≤ 10	DCON = 12		
	0 - 0.008	0 - 0.009	0 - 0.011		

- The optimised rake angle suppresses burrs.
- Cutting edge and overall length are optimised for the restricted space available in Swiss-type automatic lathes.

(mm)

Order Number	DC	APMX	LF	DCON	* No.F	Stock	Type
MP4ECD0300S04	3	4.5	50	4	4	●	1
MP4ECD0350S04	3.5	5	50	4	4	●	1
MP4ECD0400S04	4	6	50	4	4	●	2
MP4ECD0500S06	5	7.5	50	6	4	●	1
MP4ECD0600S06	6	9	50	6	4	●	2
MP4ECD0700S07	7	10.5	50	7	4	●	2
MP4ECD0800S07	8	12	50	7	4	●	3
MP4ECD0800S08	8	12	50	8	4	●	2
MP4ECD0900S10	9	13.5	50	10	4	●	1
MP4ECD1000S07	10	15	50	7	4	●	3
MP4ECD1000S10	10	15	50	10	4	●	2
MP4ECD1200S10	12	15	50	10	4	●	3
MP4ECD1200S12	12	15	50	12	4	●	2
MP4ECD1400S10	14	15	50	10	4	●	3

\* Number of Flutes

DC = Cutting Diameter  
APMX = Depth of Cut Max.

LF = Functional Length  
DCON = Connection Diameter

● : Inventory maintained in Japan.

# MS plus End Mill Series

## MP4EC

End mill, 4 flute, For small automatic lathes

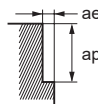
### Recommended Cutting Conditions

#### Side Milling

(mm)

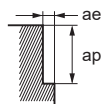
Dia. DC	Carbon steel, Cast iron, Alloy steel (–30HRC)				Alloy steel, Tool steel, Pre-hardened steel				Austenitic stainless steel, Titanium alloy			
	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Width of Cut ae	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Width of Cut ae	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Width of Cut ae
<b>3</b>	10000	900	3	0.6	7000	600	3	0.6	6000	450	3	0.6
<b>3.5</b>	8500	900	3.5	0.6	6000	600	3.5	0.6	5100	450	3.5	0.6
<b>4</b>	7500	900	4	0.6	5200	600	4	0.6	4500	450	4	0.6
<b>5</b>	6000	900	5	0.6	4200	600	5	0.6	3600	450	5	0.6
<b>6</b>	5000	900	6	0.6	3500	600	6	0.6	3000	450	6	0.6
<b>7</b>	4500	840	7	0.6	3200	540	7	0.6	2700	420	7	0.6
<b>8</b>	4000	780	8	0.6	2800	520	8	0.6	2400	390	8	0.6
<b>9</b>	3500	720	9	0.6	2500	480	9	0.6	2100	360	9	0.6
<b>10</b>	3200	680	10	0.6	2200	450	10	0.6	1900	340	10	0.6
<b>12</b>	2700	620	12	0.6	1900	410	12	0.6	1600	310	12	0.6
<b>14</b>	2300	550	14	0.6	1600	350	14	0.6	1400	280	14	0.6

Depth of cut



Dia. DC	Hardened steel (45–55HRC)				Copper, Copper Alloy			
	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Width of Cut ae	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Width of Cut ae
<b>3</b>	5000	180	3	0.2	13000	1200	3	0.6
<b>3.5</b>	4500	180	3.5	0.2	11000	1200	3.5	0.6
<b>4</b>	4000	180	4	0.2	9500	1100	4	0.6
<b>5</b>	3200	180	5	0.2	7600	1100	5	0.6
<b>6</b>	2700	180	6	0.2	6400	1100	6	0.6
<b>7</b>	2300	160	7	0.2	5500	1000	7	0.6
<b>8</b>	2000	160	8	0.2	4800	940	8	0.6
<b>9</b>	1800	150	9	0.2	4200	860	9	0.6
<b>10</b>	1600	140	10	0.2	3800	810	10	0.6
<b>12</b>	1300	120	12	0.2	3200	730	12	0.6
<b>14</b>	1200	120	14	0.2	2700	650	14	0.6

Depth of cut



Note 1) When cutting austenitic stainless steel, the use of water-soluble cutting fluid is effective.

Note 2) The revolution and feed rate can be increased with a smaller depth of cut.

Note 3) When drilling, please reduce the feed rates shown by 65% or more.

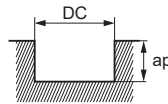
Note 4) Vibration may occur if the rigidity of machine or workpiece material is low. In this case, please reduce the revolution and feed rate proportionately.

## ■ Slotting

(mm)

Dia. DC	Carbon steel, Cast iron, Alloy steel (-30HRC)			Alloy steel, Tool steel, Pre-hardened steel			Austenitic stainless steel, Titanium alloy		
	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap
<b>3</b>	10000	900	0.6	7000	600	0.6	6000	450	0.6
<b>3.5</b>	8500	900	0.6	6000	600	0.6	5100	450	0.6
<b>4</b>	7500	900	0.6	5200	600	0.6	4500	450	0.6
<b>5</b>	6000	900	0.6	4200	600	0.6	3600	450	0.6
<b>6</b>	5000	900	0.6	3500	600	0.6	3000	450	0.6
<b>7</b>	4500	840	0.6	3200	540	0.6	2700	420	0.6
<b>8</b>	4000	780	0.6	2800	520	0.6	2400	390	0.6
<b>9</b>	3500	720	0.6	2500	480	0.6	2100	360	0.6
<b>10</b>	3200	680	0.6	2200	450	0.6	1900	340	0.6
<b>12</b>	2700	620	0.6	1900	410	0.6	1600	310	0.6
<b>14</b>	2300	550	0.6	1600	350	0.6	1400	280	0.6

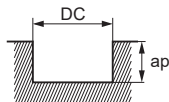
Depth of cut



DC: Diameter

Dia. DC	Hardened steel (45-55HRC)			Copper, Copper Alloy		
	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap
<b>3</b>	5000	180	0.2	13000	1200	0.6
<b>3.5</b>	4500	180	0.2	11000	1200	0.6
<b>4</b>	4000	180	0.2	9500	1100	0.6
<b>5</b>	3200	180	0.2	7600	1100	0.6
<b>6</b>	2700	180	0.2	6400	1100	0.6
<b>7</b>	2300	160	0.2	5500	1000	0.6
<b>8</b>	2000	160	0.2	4800	940	0.6
<b>9</b>	1800	150	0.2	4200	860	0.6
<b>10</b>	1600	140	0.2	3800	810	0.6
<b>12</b>	1300	120	0.2	3200	730	0.6
<b>14</b>	1200	120	0.2	2700	650	0.6

Depth of cut



DC: Diameter

Note 1) When cutting austenitic stainless steel, the use of water-soluble cutting fluid is effective.

Note 2) The revolution and feed rate can be increased with a smaller depth of cut.

Note 3) When drilling, please reduce the feed rates shown by 65% or more.

Note 4) Vibration may occur if the rigidity of machine or workpiece material is low. In this case, please reduce the revolution and feed rate proportionately.

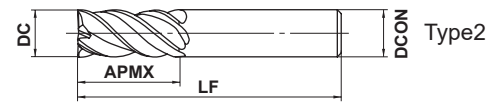
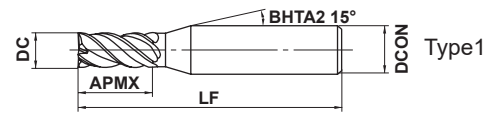
# MS plus End Mill Series

## MPMHV

End mill, Medium cut length, 4 flute, Irregular helix flutes



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel, Hardened Steel (<=45HRC)	Hardened Steel (<=55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○	○		○	○		



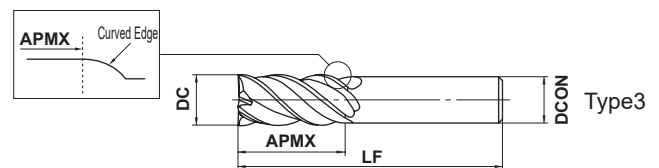
	DC≤12	DC>12			
	$\begin{matrix} 0 \\ -0.02 \end{matrix}$	$\begin{matrix} 0 \\ -0.03 \end{matrix}$			
	DCON=4	DCON=6	DCON=8		
	$\begin{matrix} 0 \\ -0.005 \end{matrix}$	$\begin{matrix} 0 \\ -0.005 \end{matrix}$	$\begin{matrix} 0 \\ -0.006 \end{matrix}$		
	DCON=6(DC=8)	DCON=8(DC=10)	DCON=10	12≤DCON≤16	DCON=20
	$\begin{matrix} 0 \\ -0.008 \end{matrix}$	$\begin{matrix} 0 \\ -0.009 \end{matrix}$	$\begin{matrix} 0 \\ -0.009 \end{matrix}$	$\begin{matrix} 0 \\ -0.011 \end{matrix}$	$\begin{matrix} 0 \\ -0.013 \end{matrix}$

- 4 flute irregular helix end mill for reduced vibration when machining stainless and carbon steels.
- Larger selection of the slim shank type.

(mm)

Order Number	DC	APMX	LF	DCON	No.F*	Stock	Type
MPMHVD0100	1	2.5	45	4	4	●	1
MPMHVD0150	1.5	3.8	45	4	4	●	1
MPMHVD0200	2	5	45	4	4	●	1
MPMHVD0250	2.5	6.3	45	4	4	●	1
MPMHVD0300	3	7.5	45	6	4	●	1
MPMHVD0400	4	10	45	6	4	●	1
MPMHVD0500	5	12.5	50	6	4	●	1
MPMHVD0600	6	15	60	6	4	●	2
MPMHVD0700	7	17.5	70	8	4	●	1
MPMHVD0800	8	20	70	8	4	●	2
MPMHVD1000	10	25	80	10	4	●	2
MPMHVD1200	12	30	100	12	4	●	2
MPMHVD1600	16	40	110	16	4	●	2
MPMHVD2000	20	50	125	20	4	●	2

\* Number of Flutes



### ■ Slim Shank

(mm)

Order Number	DC	APMX	LF	DCON	No.F*	Stock	Type
MPMHVD0700S06	7	17.5	80	6	4	●	3
MPMHVD0800S06	8	20	90	6	4	●	3
MPMHVD0900S08	9	22.5	90	8	4	●	3
MPMHVD1000S08	10	25	100	8	4	●	3
MPMHVD1100S10	11	28	100	10	4	●	3
MPMHVD1200S10	12	30	110	10	4	●	3
MPMHVD1300S12	13	32	110	12	4	●	3
MPMHVD1400S12	14	35	130	12	4	●	3
MPMHVD1800S16	18	45	150	16	4	●	3
MPMHVD2200S20	22	55	160	20	4	●	3

\* Number of Flutes

● : Inventory maintained in Japan.



## Recommended Cutting Conditions

### Side Milling

(mm)

DC	Carbon steel, Alloy steel (180–280HB) Ductile Cast Iron				Carbon steel, Alloy steel (280–350HB) Pre-hardened steel, Alloy tool steel				Austenitic stainless steel ( $\leq 200\text{HB}$ ) Titanium alloys				Hardened Steel (45–52HRC)			
	n (min <sup>-1</sup> )	vf (mm/min)	ap	ae	n (min <sup>-1</sup> )	vf (mm/min)	ap	ae	n (min <sup>-1</sup> )	vf (mm/min)	ap	ae	n (min <sup>-1</sup> )	vf (mm/min)	ap	ae
<b>1</b>	38000	910	1.7	0.2	31000	500	1.7	0.2	25000	500	1.7	0.2	18000	290	1.7	0.05
<b>1.5</b>	27000	970	2.5	0.3	22000	530	2.5	0.3	18000	500	2.5	0.3	13000	310	2.5	0.08
<b>2</b>	21000	1500	3.5	0.4	17000	820	3.5	0.4	14000	640	3.5	0.4	10000	320	3.5	0.1
<b>2.5</b>	18000	1700	4.2	0.5	15000	900	4.2	0.5	12000	820	4.2	0.5	8500	360	4.2	0.13
<b>3</b>	16000	1800	5	0.6	13000	940	5	0.6	11000	880	5	0.6	7400	380	5	0.15
<b>4</b>	12000	1700	7	0.8	9500	950	7	0.8	8000	900	7	0.8	5600	400	7	0.2
<b>5</b>	9500	1800	8.5	1	7600	1100	8.5	1	6400	900	8.5	1	4500	430	8.5	0.25
<b>6</b>	8000	2100	10	1.2	6400	1300	10	1.2	5300	1100	10	1.2	3700	440	10	0.3
<b>7</b>	6800	2000	12	1.4	5500	1400	12	1.4	4500	1200	12	1.4	3200	450	12	0.35
<b>8</b>	6000	2000	13.5	1.6	4800	1400	13.5	1.6	4000	1200	13.5	1.6	2800	450	13.5	0.4
<b>10</b>	4800	2100	17	2	3800	1500	17	2	3200	1100	17	2	2200	440	17	0.5
<b>12</b>	4000	1900	20.5	2.4	3200	1400	20.5	2.4	2700	1100	20.5	2.4	1900	380	20.5	0.6
<b>16</b>	3000	1400	27.2	3.2	2400	1100	27.2	3.2	2000	840	27.2	3.2	1400	340	27.2	0.8
<b>20</b>	2400	1200	34	4	1900	840	34	4	1600	670	34	4	1100	260	34	1

Depth of cut

### Side Milling (Slim Shank)

(mm)

DC	Carbon steel, Alloy steel (180–280HB) Ductile Cast Iron				Carbon steel, Alloy steel (280–350HB) Pre-hardened steel, Alloy tool steel				Austenitic stainless steel ( $\leq 200\text{HB}$ ) Titanium alloys				Hardened Steel (45–52HRC)			
	n (min <sup>-1</sup> )	vf (mm/min)	ap	ae	n (min <sup>-1</sup> )	vf (mm/min)	ap	ae	n (min <sup>-1</sup> )	vf (mm/min)	ap	ae	n (min <sup>-1</sup> )	vf (mm/min)	ap	ae
<b>7</b>	4100	1200	12	0.7	3300	860	12	0.7	2700	700	12	0.7	1900	270	12	0.35
<b>8</b>	3600	1200	13.5	0.8	2900	870	13.5	0.8	2400	720	13.5	0.8	1700	270	13.5	0.4
<b>9</b>	3200	1200	15	0.9	2500	900	15	0.9	2100	660	15	0.9	1500	270	15	0.45
<b>10</b>	2900	1300	17	1	2300	920	17	1	1900	670	17	1	1300	260	17	0.5
<b>11</b>	2600	1200	18.5	1.1	2100	880	18.5	1.1	1700	520	18.5	1.1	1200	190	18.5	0.55
<b>12</b>	2400	1200	20.5	1.2	1900	840	20.5	1.2	1600	650	20.5	1.2	1100	220	20.5	0.6
<b>13</b>	2200	1100	22	1.3	1800	790	22	1.3	1500	490	22	1.3	1000	160	22	0.65
<b>14</b>	2000	960	24	1.4	1600	700	24	1.4	1400	460	24	1.4	950	150	24	0.7
<b>18</b>	1600	770	31	1.8	1300	570	31	1.8	1100	360	31	1.8	740	120	31	0.9
<b>22</b>	1300	620	37.5	2.2	1000	440	37.5	2.2	870	280	37.5	2.2	610	98	37.5	1.2

Depth of cut

Note 1) Water-soluble cutting fluids are recommended for stainless steel and titanium alloys. Air blowing is recommended for carbon steel.

Note 2) Chattering can still occur if the machine rigidity and clamping method are insufficient.

In these cases the feed and speed should be reduced proportionately.

# MS plus End Mill Series

## MPMHV

End mill, Medium cut length, 4 flute, Irregular helix flutes

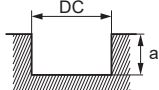
### Recommended Cutting Conditions

#### ■ Slotting

(mm)

DC	Carbon steel, Alloy steel (180–280HB) Ductile Cast Iron			Carbon steel, Alloy steel (280–350HB) Pre-hardened steel, Alloy tool steel			Austenitic stainless steel (≤200HB) Titanium alloys			Hardened Steel (45–52HRC)		
	n (min <sup>-1</sup> )	vf (mm/min)	ap	n (min <sup>-1</sup> )	vf (mm/min)	ap	n (min <sup>-1</sup> )	vf (mm/min)	ap	n (min <sup>-1</sup> )	vf (mm/min)	ap
<b>1</b>	31000	620	0.5	24000	380	0.5	20000	320	0.5	9500	110	0.2
<b>1.5</b>	22000	630	0.8	17000	410	0.8	14000	340	0.8	6400	130	0.3
<b>2</b>	17000	650	2	14000	450	2	11000	350	2	4800	130	0.4
<b>2.5</b>	15000	830	2.5	12000	580	2.5	9700	470	2.5	3800	130	0.5
<b>3</b>	13000	940	3	10000	660	3	8500	510	3	3200	140	0.6
<b>4</b>	9500	820	4	7600	600	4	6400	460	4	2400	150	0.8
<b>5</b>	7600	910	5	6100	670	5	5100	510	5	1900	170	1
<b>6</b>	6400	860	6	5100	630	6	4200	470	6	1600	190	1.2
<b>7</b>	5500	960	7	4400	710	7	3600	530	7	1400	190	1.4
<b>8</b>	4800	1000	8	3800	750	8	3200	580	8	1200	190	1.6
<b>10</b>	3800	910	10	3100	680	10	2500	500	10	950	150	2
<b>12</b>	3200	920	12	2500	660	12	2100	500	12	800	160	2.4
<b>16</b>	2400	690	16	1900	500	16	1600	380	16	600	120	3.2
<b>20</b>	1900	550	20	1500	400	20	1300	310	20	480	96	4

Depth of cut



DC: Diameter

Note 3) Slotting is not recommended when using a slim shank type.

# MPJHV

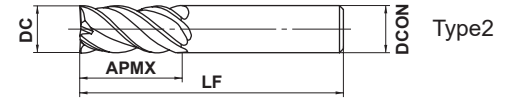
End mill, Semi long cut length, 4 flute, Irregular helix flutes



APMX=DCx3.3

APMX=DCx4

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel, Hardened Steel (<=45HRC)	Hardened Steel (<=55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○	○		○	○		



	DC≤12	DC>12			
	$\begin{matrix} 0 \\ -0.02 \end{matrix}$	$\begin{matrix} 0 \\ -0.03 \end{matrix}$			
	DCON=4	DCON=6	DCON=8		
	$\begin{matrix} 0 \\ -0.005 \end{matrix}$	$\begin{matrix} 0 \\ -0.005 \end{matrix}$	$\begin{matrix} 0 \\ -0.006 \end{matrix}$		
	DCON=10	DCON=12	DCON=16	DCON=20	
	$\begin{matrix} 0 \\ -0.009 \end{matrix}$	$\begin{matrix} 0 \\ -0.011 \end{matrix}$	$\begin{matrix} 0 \\ -0.011 \end{matrix}$	$\begin{matrix} 0 \\ -0.013 \end{matrix}$	

- 4 flute irregular helix end mill for reduced vibration when machining stainless and carbon steels.
- Semi long flute length suitable for vertical wall finishing.

(mm)

Order Number	DC	APMX	LF	DCON	No.F*	Stock	Type
MPJHVD0100AP04	1	4	45	4	4	●	1
MPJHVD0150AP06	1.5	6	45	4	4	●	1
MPJHVD0200AP06	2	6.5	60	6	4	●	1
MPJHVD0200AP08	2	8	60	6	4	●	1
MPJHVD0250AP10	2.5	10	60	6	4	●	1
MPJHVD0300AP10	3	10	60	6	4	●	1
MPJHVD0300AP12	3	12	60	6	4	●	1
MPJHVD0400AP13	4	13	60	6	4	●	1
MPJHVD0400AP16	4	16	60	6	4	●	1
MPJHVD0500AP17	5	17	60	6	4	●	1
MPJHVD0500AP20	5	20	60	6	4	●	1
MPJHVD0600AP20	6	20	60	6	4	●	2
MPJHVD0600AP24	6	24	60	6	4	●	2
MPJHVD0800AP26	8	26	80	8	4	●	2
MPJHVD0800AP32	8	32	80	8	4	●	2
MPJHVD1000AP33	10	33	100	10	4	●	2
MPJHVD1000AP40	10	40	100	10	4	●	2
MPJHVD1200AP40	12	40	110	12	4	●	2
MPJHVD1200AP48	12	48	110	12	4	●	2
MPJHVD1600AP53	16	53	125	16	4	●	2
MPJHVD1600AP64	16	64	125	16	4	●	2
MPJHVD2000AP66	20	66	140	20	4	●	2
MPJHVD2000AP80	20	80	140	20	4	●	2

\* Number of Flutes

DC = Cutting Diameter  
APMX = Depth of Cut Max.

LF = Functional Length  
DCON = Connection Diameter

● : Inventory maintained in Japan.

# MS plus End Mill Series

## MPJHV

End mill, Semi long cut length, 4 flute, Irregular helix flutes

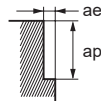
### Recommended Cutting Conditions

#### Side Milling

(mm)

Workpiece Material		Carbon steel, Alloy steel (180–280HB) Ductile Cast Iron				Carbon steel, Alloy steel (280–350HB) Pre-hardened steel, Alloy tool steel				Austenitic stainless steel (≤200HB) Titanium alloys				Hardened Steel (45–52HRC)			
DC	APMX	n (min <sup>-1</sup> )	vf (mm/min)	ap	ae	n (min <sup>-1</sup> )	vf (mm/min)	ap	ae	n (min <sup>-1</sup> )	vf (mm/min)	ap	ae	n (min <sup>-1</sup> )	vf (mm/min)	ap	ae
1	4	19000	300	3	0.03	15000	240	3	0.03	13000	210	3	0.03	13000	160	3	0.02
1.5	6	16000	320	4.5	0.05	13000	260	4.5	0.05	11000	220	4.5	0.05	8500	170	4.5	0.03
2	6.5	15000	500	5	0.1	12000	380	5	0.1	10000	320	5	0.1	7700	220	5	0.06
	8	14000	470	6	0.06	11000	350	6	0.06	9500	300	6	0.06	7300	200	6	0.04
2.5	10	13000	660	7.5	0.08	11000	520	7.5	0.08	8900	390	7.5	0.08	6300	250	7.5	0.05
3	10	13000	890	7.4	0.15	10000	620	7.4	0.15	8400	470	7.4	0.15	5900	300	7.4	0.09
	12	12000	820	9	0.09	9500	590	9	0.09	8000	450	9	0.09	5600	280	9	0.06
4	13	9400	940	9.9	0.2	7500	650	9.9	0.2	6300	530	9.9	0.2	4700	320	9.9	0.12
	16	9000	900	12	0.12	7200	620	12	0.12	6000	500	12	0.12	4500	310	12	0.08
5	17	7500	990	12.4	0.25	6000	680	12.4	0.25	5000	560	12.4	0.25	3800	350	12.4	0.15
	20	7200	950	15	0.15	5700	650	15	0.15	4800	540	15	0.15	3600	330	15	0.1
6	20	6300	1100	14.9	0.3	5000	760	14.9	0.3	4200	640	14.9	0.3	3200	350	14.9	0.18
	24	6000	1000	18	0.18	4800	730	18	0.18	4000	610	18	0.18	3000	330	18	0.12
8	26	4700	1100	19.8	0.4	3800	800	19.8	0.4	3100	620	19.8	0.4	2400	360	19.8	0.24
	32	4500	1000	24	0.24	3600	760	24	0.24	3000	600	24	0.24	2300	350	24	0.16
10	33	3800	1000	24.8	0.5	3000	760	24.8	0.5	2500	590	24.8	0.5	1900	330	24.8	0.3
	40	3600	970	30	0.3	2900	730	30	0.3	2400	570	30	0.3	1800	310	30	0.2
12	40	3100	1000	29.7	0.6	2500	720	29.7	0.6	2100	550	29.7	0.6	1600	300	29.7	0.36
	48	3000	970	36	0.36	2400	690	36	0.36	2000	520	36	0.36	1500	280	36	0.24
16	53	2400	780	27.2	0.48	1900	550	39.6	0.8	1600	420	39.6	0.8	1200	240	39.6	0.48
	64	2200	710	48	0.48	1800	520	48	0.48	1500	390	48	0.48	1100	220	48	0.32
20	66	1900	620	34	0.6	1500	430	49.5	1	1300	340	49.5	1	950	190	49.5	0.6
	80	1800	580	60	0.6	1400	400	60	0.6	1200	310	60	0.6	900	180	60	0.4

Depth of cut



Note 1) Water-soluble cutting fluids are recommended for stainless steel and titanium alloys. Air blowing is recommended for carbon steel.

Note 2) Chattering can still occur if the machine rigidity and clamping method are insufficient.

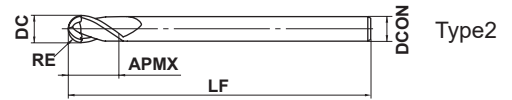
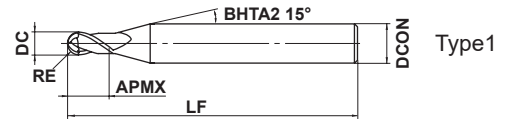
In these cases the feed and speed should be reduced proportionately.

# MP2SSB

Ball nose, Short cut length, 2 flute, Short shank



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○	○		○	○	○	



0.1 ≤ RE ≤ 6				
±0.005				
4 ≤ DCON ≤ 6	8 ≤ DCON ≤ 10	DCON = 12		
0 - 0.005	0 - 0.006	0 - 0.008		

- 2 flute ball nose end mills with short cutting edge length for general purpose machining.
- Excellent performance over a wide range of materials such as carbon, alloy and hardened steels.

(mm)

Order Number	RE	DC	APMX	LF	DCON	No.F*	Stock	Type
MP2SSBR0010	0.1	0.2	0.2	40	4	2	●	1
MP2SSBR0020	0.2	0.4	0.4	40	4	2	●	1
MP2SSBR0030	0.3	0.6	0.6	40	4	2	●	1
MP2SSBR0040	0.4	0.8	0.8	40	4	2	●	1
MP2SSBR0050	0.5	1	1	40	4	2	●	1
MP2SSBR0050S06	0.5	1	1	40	6	2	●	1
MP2SSBR0075	0.75	1.5	1.5	40	4	2	●	1
MP2SSBR0075S06	0.75	1.5	1.5	40	6	2	●	1
MP2SSBR0100	1	2	2	45	6	2	●	1
MP2SSBR0150	1.5	3	3	45	6	2	●	1
MP2SSBR0200	2	4	4	45	6	2	●	1
MP2SSBR0250	2.5	5	5	50	6	2	●	1
MP2SSBR0300	3	6	6	50	6	2	●	2
MP2SSBR0400	4	8	8	60	8	2	●	2
MP2SSBR0500	5	10	10	70	10	2	●	2
MP2SSBR0600	6	12	12	75	12	2	●	2

\* Number of Flutes

RE = Ball Nose  
DC = Cutting Diameter  
APMX = Depth of Cut Max.

LF = Functional Length  
DCON = Connection Diameter

● : Inventory maintained in Japan.

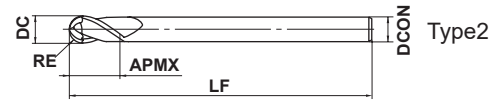
# MS plus End Mill Series

## MP2SB

Ball nose, Short cut length, 2 flute



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel, Hardened Steel (<=45HRC)	Hardened Steel (<=55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○	○		○	○	○	



	0.1 ≤ RE ≤ 6				
	±0.005				
	4 ≤ DCON ≤ 6	8 ≤ DCON ≤ 10	DCON = 12		
	<sup>0</sup> / <sub>-0.005</sub>	<sup>0</sup> / <sub>-0.006</sub>	<sup>0</sup> / <sub>-0.008</sub>		

- 2 flute ball nose end mills with short cutting edge length for general purpose machining.
- Excellent performance over a wide range of materials such as carbon, alloy and hardened steels.

(mm)

Order Number	RE	DC	APMX	LF	DCON	No.F*	Stock	Type
MP2SBR0010	0.1	0.2	0.3	45	4	2	●	1
MP2SBR0015	0.15	0.3	0.5	45	4	2	●	1
MP2SBR0020	0.2	0.4	0.6	45	4	2	●	1
MP2SBR0020S06	0.2	0.4	0.6	50	6	2	●	1
MP2SBR0025	0.25	0.5	0.8	45	4	2	●	1
MP2SBR0030	0.3	0.6	0.9	45	4	2	●	1
MP2SBR0030S06	0.3	0.6	0.9	50	6	2	●	1
MP2SBR0035	0.35	0.7	1.1	45	4	2	●	1
MP2SBR0040	0.4	0.8	1.2	45	4	2	●	1
MP2SBR0040S06	0.4	0.8	1.2	50	6	2	●	1
MP2SBR0045	0.45	0.9	1.4	45	4	2	●	1
MP2SBR0050	0.5	1	1.5	45	4	2	●	1
MP2SBR0050S06	0.5	1	1.5	50	6	2	●	1
MP2SBR0060	0.6	1.2	1.8	45	4	2	●	1
MP2SBR0070	0.7	1.4	2.1	45	4	2	●	1
MP2SBR0075	0.75	1.5	2.3	45	4	2	●	1
MP2SBR0075S06	0.75	1.5	2.3	50	6	2	●	1
MP2SBR0080	0.8	1.6	2.4	45	4	2	●	1
MP2SBR0090	0.9	1.8	2.7	45	4	2	●	1
MP2SBR0100	1	2	3	50	4	2	●	1
MP2SBR0100S06	1	2	3	50	6	2	●	1
MP2SBR0125	1.25	2.5	3.8	50	4	2	●	1
MP2SBR0150	1.5	3	4.5	70	6	2	●	1
MP2SBR0200	2	4	6	70	6	2	●	1
MP2SBR0250	2.5	5	7.5	80	6	2	●	1
MP2SBR0300	3	6	9	80	6	2	●	2
MP2SBR0400	4	8	12	90	8	2	●	2
MP2SBR0500	5	10	15	100	10	2	●	2
MP2SBR0600	6	12	18	110	12	2	●	2

\* Number of Flutes

RE = Ball Nose  
DC = Cutting Diameter  
APMX = Depth of Cut Max.

LF = Functional Length  
DCON = Connection Diameter

● : Inventory maintained in Japan.

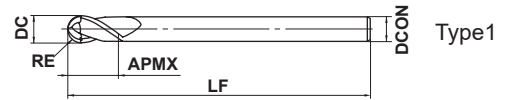
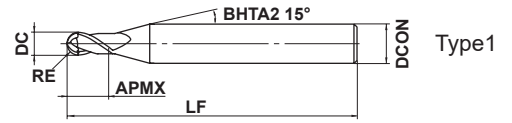


# MP2MB

Ball nose, Medium cut length, 2 flute



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel, Hardened Steel (<=45HRC)	Hardened Steel (<=55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○	○		○	○	○	



0.25 ≤ RE ≤ 6				
±0.005				
4 ≤ DCON ≤ 6	8 ≤ DCON ≤ 10	DCON = 12		
0 - 0.005	0 - 0.006	0 - 0.008		

- 2 flute ball nose end mills with medium cutting edge length for general purpose machining.
- Excellent performance over a wide range of materials such as carbon, alloy and hardened steels.

(mm)

Order Number	RE	DC	APMX	LF	DCON	No.F*	Stock	Type
MP2MBR0025	0.25	0.5	1	45	4	2	●	1
MP2MBR0030	0.3	0.6	1.2	45	4	2	●	1
MP2MBR0040	0.4	0.8	1.6	45	4	2	●	1
MP2MBR0050	0.5	1	2.5	45	4	2	●	1
MP2MBR0060	0.6	1.2	2.5	45	4	2	●	1
MP2MBR0070	0.7	1.4	3	45	4	2	●	1
MP2MBR0075	0.75	1.5	4	45	4	2	●	1
MP2MBR0080	0.8	1.6	4	45	4	2	●	1
MP2MBR0090	0.9	1.8	5	45	4	2	●	1
MP2MBR0100	1	2	6	50	4	2	●	1
MP2MBR0125	1.25	2.5	6	50	4	2	●	1
MP2MBR0150S03	1.5	3	8	70	3	2	●	2
MP2MBR0150	1.5	3	8	70	6	2	●	1
MP2MBR0175	1.75	3.5	8	70	6	2	●	1
MP2MBR0200S04	2	4	8	70	4	2	●	2
MP2MBR0200	2	4	8	70	6	2	●	1
MP2MBR0250	2.5	5	12	80	6	2	●	1
MP2MBR0300	3	6	12	80	6	2	●	2
MP2MBR0400	4	8	14	90	8	2	●	2
MP2MBR0500	5	10	18	100	10	2	●	2
MP2MBR0600	6	12	22	110	12	2	●	2

\* Number of Flutes

RE = Ball Nose  
DC = Cutting Diameter  
APMX = Depth of Cut Max.

LF = Functional Length  
DCON = Connection Diameter

# MS plus End Mill Series

Ball nose, Short cut length, 2 flute, Short shank **MP2SSB**

Ball nose, Short cut length, 2 flute **MP2SB** Ball nose, Medium cut length, 2 flute **MP2MB**

## Recommended Cutting Conditions

(mm)

Workpiece Material	Mild steel, Carbon steel, Alloy steel, Pre-hardened steel, Hardened steel (<450HB)						Austenitic stainless steel ( $\leq 200\text{HB}$ ) Titanium alloys					
	$\alpha \leq 15^\circ$		$\alpha > 15^\circ$		ap	ae	$\alpha \leq 15^\circ$		$\alpha > 15^\circ$		ap	ae
	n (min <sup>-1</sup> )	vf (mm/min)	n (min <sup>-1</sup> )	vf (mm/min)			n (min <sup>-1</sup> )	vf (mm/min)	n (min <sup>-1</sup> )	vf (mm/min)		
<b>R0.1</b>	40000	300	40000	250	0.003	0.02	40000	300	40000	250	0.003	0.02
<b>R0.15</b>	40000	500	40000	350	0.007	0.03	40000	500	40000	350	0.007	0.03
<b>R0.2</b>	40000	1600	40000	1200	0.02	0.04	40000	1500	40000	1000	0.015	0.04
<b>R0.25</b>	40000	2400	40000	1400	0.025	0.05	40000	2100	40000	1200	0.02	0.05
<b>R0.3</b>	40000	3200	40000	1600	0.03	0.06	40000	2800	40000	1400	0.03	0.06
<b>R0.4</b>	40000	4800	40000	2400	0.05	0.08	40000	4600	40000	2100	0.04	0.08
<b>R0.5</b>	40000	5600	40000	3200	0.06	0.1	40000	5600	40000	3400	0.05	0.1
<b>R0.75</b>	40000	6500	40000	4000	0.09	0.15	40000	6500	36000	3600	0.08	0.15
<b>R1</b>	40000	6500	39000	4700	0.11	0.2	40000	6500	35000	4000	0.11	0.2
<b>R1.25</b>	40000	7000	33000	4500	0.12	0.25	40000	7400	29000	4000	0.12	0.25
<b>R1.5</b>	40000	7500	27000	4300	0.13	0.3	36000	6900	24000	3900	0.13	0.3
<b>R2</b>	32000	7500	20000	3600	0.15	0.4	28000	6900	18000	3100	0.15	0.4
<b>R2.5</b>	25000	6000	16000	2900	0.2	0.5	22000	6200	14000	2600	0.2	0.5
<b>R3</b>	21000	5800	13000	2600	0.25	0.6	18000	5400	11000	2300	0.25	0.6
<b>R4</b>	16000	4500	10000	2000	0.3	0.8	14000	4100	9000	1700	0.3	0.8
<b>R5</b>	13000	3600	8000	1700	0.5	1.0	11000	3300	7200	1300	0.5	1.0
<b>R6</b>	9000	2500	6000	1300	0.5	1.2	8100	2300	5400	1100	0.5	1.2

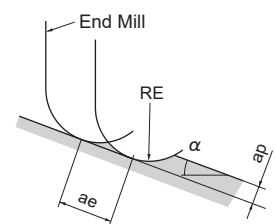
  

Depth of cut	
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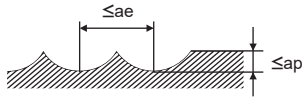
Note 1)  $\alpha$  is the inclination angle of the machined surface.

Note 2) The revolution and feed rate can be increased with a smaller depth of cut.

Note 3) Vibration may occur if the rigidity of machine or workpiece material is low. In this case, please reduce the revolution and feed rate proportionately.



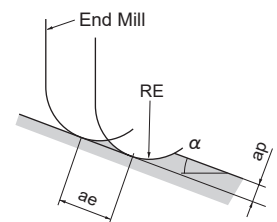
(mm)

Workpiece Material	Hardened steel (45—55HRC)						Copper, Copper alloys					
	$\alpha \leq 15^\circ$		$\alpha > 15^\circ$		ap	ae	$\alpha \leq 15^\circ$		$\alpha > 15^\circ$		ap	ae
	n (min <sup>-1</sup> )	vf (mm/min)	n (min <sup>-1</sup> )	vf (mm/min)			n (min <sup>-1</sup> )	vf (mm/min)	n (min <sup>-1</sup> )	vf (mm/min)		
<b>R0.1</b>	40000	300	40000	250	0.003	0.02	40000	300	40000	250	0.003	0.02
<b>R0.15</b>	40000	500	40000	350	0.007	0.03	40000	500	40000	350	0.007	0.03
<b>R0.2</b>	40000	1300	40000	950	0.015	0.04	40000	1300	40000	950	0.015	0.04
<b>R0.25</b>	40000	1900	40000	1100	0.02	0.05	40000	1900	40000	1100	0.02	0.05
<b>R0.3</b>	40000	2500	40000	1300	0.025	0.06	40000	2500	40000	1300	0.025	0.06
<b>R0.4</b>	40000	4000	40000	1900	0.04	0.08	40000	4000	40000	1900	0.04	0.08
<b>R0.5</b>	40000	5600	40000	3000	0.05	0.1	40000	5600	40000	3000	0.05	0.1
<b>R0.75</b>	40000	6500	32000	3200	0.08	0.15	40000	6500	32000	3200	0.08	0.15
<b>R1</b>	40000	6500	31000	3500	0.11	0.2	40000	6500	31000	3500	0.11	0.2
<b>R1.25</b>	36000	6500	26000	3500	0.12	0.25	36000	6500	26000	3500	0.12	0.25
<b>R1.5</b>	32000	6000	22000	3400	0.13	0.3	32000	6000	22000	3400	0.13	0.3
<b>R2</b>	25000	6000	16000	2700	0.15	0.4	25000	6000	16000	2700	0.15	0.6
<b>R2.5</b>	20000	5400	13000	2300	0.2	0.5	20000	5400	13000	2300	0.2	0.8
<b>R3</b>	17000	4700	10000	2000	0.25	0.6	17000	4700	10000	2000	0.25	0.9
<b>R4</b>	13000	3600	8000	1500	0.3	0.8	13000	3600	8000	1500	0.3	1.6
<b>R5</b>	10000	2900	6400	1200	0.5	1.0	10000	2900	6400	1200	0.5	2.0
<b>R6</b>	7200	2000	4800	1000	0.5	1.2	8500	2300	5300	1100	0.5	2.4
Depth of cut												

Note 1)  $\alpha$  is the inclination angle of the machined surface.

Note 2) The revolution and feed rate can be increased with a smaller depth of cut.

Note 3) Vibration may occur if the rigidity of machine or workpiece material is low. In this case, please reduce the revolution and feed rate proportionately.



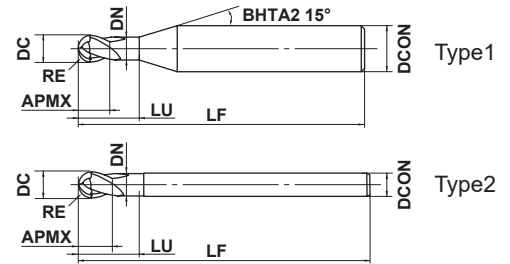
# MS plus End Mill Series

## MP2SDB

Ball nose, Short cut length, 2 flute, High strength



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel, Hardened Steel (<=45HRC)	Hardened Steel (<=55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○	○					



	0.5 ≤ RE ≤ 6				
	±0.01				
	4 ≤ DCON ≤ 6	DCON=8			
	<sup>0</sup> / <sub>-0.005</sub>	<sup>0</sup> / <sub>-0.006</sub>			
	DCON=10	DCON=12			
	<sup>0</sup> / <sub>-0.009</sub>	<sup>0</sup> / <sub>-0.011</sub>			

- Excellent chipping resistance with a strong S curve cutting edge.
- Ideal for semi-finish machining of forging dies.

(mm)

Order Number	RE	DC	APMX	LU	DN	LF	DCON	No.F*	Stock	Type
MP2SDBR0050	0.5	1	1	2	0.96	45	4	2	●	1
MP2SDBR0075S06	0.75	1.5	1.5	3	1.44	50	6	2	●	1
MP2SDBR0100	1	2	2	4	1.90	50	4	2	●	1
MP2SDBR0100S06	1	2	2	4	1.90	60	6	2	●	1
MP2SDBR0150	1.5	3	3	6	2.90	70	6	2	●	1
MP2SDBR0200	2	4	4	8	3.90	60	4	2	●	2
MP2SDBR0200S06	2	4	4	8	3.90	70	6	2	●	1
MP2SDBR0250	2.5	5	5	10	4.90	80	6	2	●	1
MP2SDBR0300	3	6	12	18	5.85	80	6	2	●	2
MP2SDBR0300A120	3	6	12	18	5.85	120	6	2	●	2
MP2SDBR0400	4	8	14	24	7.85	90	8	2	●	2
MP2SDBR0400A130	4	8	14	24	7.85	130	8	2	●	2
MP2SDBR0500	5	10	18	30	9.70	100	10	2	●	2
MP2SDBR0500A140	5	10	18	30	9.70	140	10	2	●	2
MP2SDBR0600	6	12	22	36	11.70	110	12	2	●	2
MP2SDBR0600A140	6	12	22	36	11.70	140	12	2	●	2

\* Number of Flutes

Note 1) MS plus end mills series MP2SB and MP2MB are recommended for finish surface machining.

RE = Ball Nose  
 DC = Cutting Diameter  
 APMX = Depth of Cut Max.  
 LU = Usable Length  
 DN = Neck Diameter  
 LF = Functional Length  
 DCON = Connection Diameter

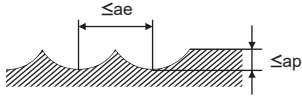
● : Inventory maintained in Japan.

## Recommended Cutting Conditions

### Overhang Below DC x 5 (DC: Dia.)

(mm)

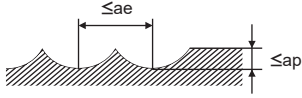
Workpiece Material	Carbon steel, Alloy steel (180–280HB) Alloy tool steel, Tool steel, Pre-hardened steel						Hardened steel (45–55HRC)					
	$\alpha \leq 15^\circ$		$\alpha > 15^\circ$		ap	ae	$\alpha \leq 15^\circ$		$\alpha > 15^\circ$		ap	ae
	n (min <sup>-1</sup> )	vf (mm/min)	n (min <sup>-1</sup> )	vf (mm/min)			n (min <sup>-1</sup> )	vf (mm/min)	n (min <sup>-1</sup> )	vf (mm/min)		
<b>R 0.5</b>	40000	3900	36000	2100	0.1	0.25	40000	4300	36000	2200	0.1	0.25
<b>R 0.75</b>	40000	4200	36000	2600	0.15	0.35	40000	4700	36000	2700	0.15	0.35
<b>R 1</b>	40000	4500	36000	3100	0.2	0.5	40000	5000	36000	3300	0.2	0.5
<b>R 1.5</b>	37000	5300	24000	2700	0.3	0.75	37000	5800	24000	2800	0.3	0.75
<b>R 2X4</b>	24000	3200	15000	2000	0.25	0.7	19000	2800	13000	1600	0.25	0.7
<b>R 2</b>	30000	4900	19000	2500	0.4	1	28000	5000	19000	2400	0.4	1
<b>R 2.5</b>	25000	4500	16000	2300	0.5	1.3	22000	4200	16000	2200	0.5	1.25
<b>R 3</b>	22000	4300	14000	2200	0.6	1.8	18000	3800	12000	1800	0.6	1.5
<b>R 4</b>	19000	3900	12000	2000	0.8	2.4	15000	3200	9500	1600	0.8	2
<b>R 5</b>	15000	3300	9500	1800	1	3	11000	2500	7000	1400	1	2.5
<b>R 6</b>	12000	2550	8000	1600	1.2	3.6	9000	2000	6000	1300	1.2	3

Depth of cut 

### Overhang Below DC x 7 (DC: Dia.)

(mm)

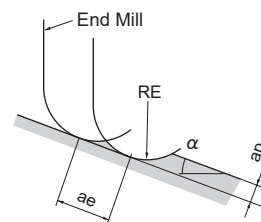
Workpiece Material	Carbon steel, Alloy steel (180–280HB) Alloy tool steel, Tool steel, Pre-hardened steel						Hardened steel (45–55HRC)					
	$\alpha \leq 15^\circ$		$\alpha > 15^\circ$		ap	ae	$\alpha \leq 15^\circ$		$\alpha > 15^\circ$		ap	ae
	n (min <sup>-1</sup> )	vf (mm/min)	n (min <sup>-1</sup> )	vf (mm/min)			n (min <sup>-1</sup> )	vf (mm/min)	n (min <sup>-1</sup> )	vf (mm/min)		
<b>R 3</b>	10000	1500	6900	1000	0.2	1	8000	1400	5300	770	0.2	0.8
<b>R 4</b>	8000	1400	5600	900	0.3	1.5	6400	1300	4000	650	0.3	1.2
<b>R 5</b>	6000	1200	4100	740	0.4	2	4800	1100	3200	580	0.4	1.6
<b>R 6</b>	5000	1000	3400	600	0.45	2.4	4000	900	2700	490	0.45	2

Depth of cut 

Note 1)  $\alpha$  is the inclination of the machined surface.

Note 2) The revolution and feed rate can be increased with a smaller depth of cut.

Note 3) Vibration may occur if the rigidity of machine or workpiece material is low. In this case, please reduce the revolution and feed rate proportionately.



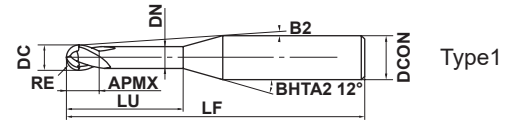
# MS plus End Mill Series

## MP2XLB

Ball nose, Short cut length, 2 flute, Long neck



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel, Hardened Steel (<=45HRC)	Hardened Steel (<=55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○	○		○	○	○	



	$0.05 \leq RE \leq 3$		
	$\pm 0.005$		
	$4 \leq DCON \leq 6$		
	$0$ $- 0.005$		

Please refer to pages 36-40 for the actual effective neck length for the B2 angle and workpiece inclination angle.

- 2 flute long neck ball nose end mills.
- Excellent performance over a wide range of materials such as carbon, alloy and hardened steels.

(mm)

Order Number	RE	DC	APMX	LU	DN	LF	DCON	No.F *	Stock	Type
MP2XLBR0005N003	0.05	0.1	0.08	0.3	0.085	50	4	2	●	1
MP2XLBR0005N005	0.05	0.1	0.08	0.5	0.085	50	4	2	●	1
MP2XLBR0010N005	0.1	0.2	0.15	0.5	0.18	50	4	2	●	1
MP2XLBR0010N008	0.1	0.2	0.15	0.75	0.18	50	4	2	●	1
MP2XLBR0010N010	0.1	0.2	0.15	1	0.18	50	4	2	●	1
MP2XLBR0010N013	0.1	0.2	0.15	1.25	0.18	50	4	2	●	1
MP2XLBR0010N015	0.1	0.2	0.15	1.5	0.18	50	4	2	●	1
MP2XLBR0010N018	0.1	0.2	0.15	1.75	0.18	50	4	2	●	1
MP2XLBR0010N020	0.1	0.2	0.15	2	0.18	50	4	2	●	1
MP2XLBR0010N025	0.1	0.2	0.15	2.5	0.18	50	4	2	●	1
MP2XLBR0015N005	0.15	0.3	0.24	0.5	0.28	50	4	2	●	1
MP2XLBR0015N008	0.15	0.3	0.24	0.75	0.28	50	4	2	●	1
MP2XLBR0015N010	0.15	0.3	0.24	1	0.28	50	4	2	●	1
MP2XLBR0015N013	0.15	0.3	0.24	1.25	0.28	50	4	2	●	1
MP2XLBR0015N015	0.15	0.3	0.24	1.5	0.28	50	4	2	●	1
MP2XLBR0015N018	0.15	0.3	0.24	1.75	0.28	50	4	2	●	1
MP2XLBR0015N020	0.15	0.3	0.24	2	0.28	50	4	2	●	1
MP2XLBR0015N025	0.15	0.3	0.24	2.5	0.28	50	4	2	●	1
MP2XLBR0015N030	0.15	0.3	0.24	3	0.28	50	4	2	●	1
MP2XLBR0015N035	0.15	0.3	0.24	3.5	0.28	50	4	2	●	1
MP2XLBR0015N040	0.15	0.3	0.24	4	0.28	50	4	2	●	1
MP2XLBR0015N010S06	0.15	0.3	0.24	1	0.28	50	6	2	●	1
MP2XLBR0015N013S06	0.15	0.3	0.24	1.25	0.28	50	6	2	●	1
MP2XLBR0015N015S06	0.15	0.3	0.24	1.5	0.28	50	6	2	●	1
MP2XLBR0020N005	0.2	0.4	0.3	0.5	0.37	50	4	2	●	1
MP2XLBR0020N008	0.2	0.4	0.3	0.75	0.37	50	4	2	●	1
MP2XLBR0020N010	0.2	0.4	0.3	1	0.37	50	4	2	●	1
MP2XLBR0020N015	0.2	0.4	0.3	1.5	0.37	50	4	2	●	1
MP2XLBR0020N020	0.2	0.4	0.3	2	0.37	50	4	2	●	1
MP2XLBR0020N025	0.2	0.4	0.3	2.5	0.37	50	4	2	●	1
MP2XLBR0020N030	0.2	0.4	0.3	3	0.37	50	4	2	●	1
MP2XLBR0020N035	0.2	0.4	0.3	3.5	0.37	50	4	2	●	1
MP2XLBR0020N040	0.2	0.4	0.3	4	0.37	50	4	2	●	1
MP2XLBR0020N045	0.2	0.4	0.3	4.5	0.37	50	4	2	●	1

\* Number of Flutes

● : Inventory maintained in Japan.

(mm)

Order Number	RE	DC	APMX	LU	DN	LF	DCON	No.F.*	Stock	Type
MP2XLBR0020N050	0.2	0.4	0.3	5	0.37	50	4	2	●	1
MP2XLBR0020N055	0.2	0.4	0.3	5.5	0.37	50	4	2	●	1
MP2XLBR0020N060	0.2	0.4	0.3	6	0.37	50	4	2	●	1
MP2XLBR0020N010S06	0.2	0.4	0.3	1	0.37	50	6	2	●	1
MP2XLBR0020N020S06	0.2	0.4	0.3	2	0.37	50	6	2	●	1
MP2XLBR0025N010	0.25	0.5	0.37	1	0.47	50	4	2	●	1
MP2XLBR0025N015	0.25	0.5	0.37	1.5	0.47	50	4	2	●	1
MP2XLBR0025N020	0.25	0.5	0.37	2	0.47	50	4	2	●	1
MP2XLBR0025N025	0.25	0.5	0.37	2.5	0.47	50	4	2	●	1
MP2XLBR0025N030	0.25	0.5	0.37	3	0.47	50	4	2	●	1
MP2XLBR0025N035	0.25	0.5	0.37	3.5	0.47	50	4	2	●	1
MP2XLBR0025N040	0.25	0.5	0.37	4	0.47	50	4	2	●	1
MP2XLBR0025N045	0.25	0.5	0.37	4.5	0.47	50	4	2	●	1
MP2XLBR0025N050	0.25	0.5	0.37	5	0.47	50	4	2	●	1
MP2XLBR0025N055	0.25	0.5	0.37	5.5	0.47	50	4	2	●	1
MP2XLBR0025N060	0.25	0.5	0.37	6	0.47	50	4	2	●	1
MP2XLBR0025N070	0.25	0.5	0.37	7	0.47	50	4	2	●	1
MP2XLBR0025N080	0.25	0.5	0.37	8	0.47	50	4	2	●	1
MP2XLBR0025N090	0.25	0.5	0.37	9	0.47	50	4	2	●	1
MP2XLBR0025N100	0.25	0.5	0.37	10	0.47	50	4	2	●	1
MP2XLBR0025N015S06	0.25	0.5	0.37	1.5	0.47	50	6	2	●	1
MP2XLBR0025N020S06	0.25	0.5	0.37	2	0.47	50	6	2	●	1
MP2XLBR0025N025S06	0.25	0.5	0.37	2.5	0.47	50	6	2	●	1
MP2XLBR0025N030S06	0.25	0.5	0.37	3	0.47	50	6	2	●	1
MP2XLBR0030N015	0.3	0.6	0.45	1.5	0.57	50	4	2	●	1
MP2XLBR0030N020	0.3	0.6	0.45	2	0.57	50	4	2	●	1
MP2XLBR0030N025	0.3	0.6	0.45	2.5	0.57	50	4	2	●	1
MP2XLBR0030N030	0.3	0.6	0.45	3	0.57	50	4	2	●	1
MP2XLBR0030N035	0.3	0.6	0.45	3.5	0.57	50	4	2	●	1
MP2XLBR0030N040	0.3	0.6	0.45	4	0.57	50	4	2	●	1
MP2XLBR0030N045	0.3	0.6	0.45	4.5	0.57	50	4	2	●	1
MP2XLBR0030N050	0.3	0.6	0.45	5	0.57	50	4	2	●	1
MP2XLBR0030N055	0.3	0.6	0.45	5.5	0.57	50	4	2	●	1
MP2XLBR0030N060	0.3	0.6	0.45	6	0.57	50	4	2	●	1
MP2XLBR0030N065	0.3	0.6	0.45	6.5	0.57	50	4	2	●	1
MP2XLBR0030N070	0.3	0.6	0.45	7	0.57	50	4	2	●	1
MP2XLBR0030N080	0.3	0.6	0.45	8	0.57	50	4	2	●	1
MP2XLBR0030N085	0.3	0.6	0.45	8.5	0.57	50	4	2	●	1
MP2XLBR0030N090	0.3	0.6	0.45	9	0.57	50	4	2	●	1
MP2XLBR0030N095	0.3	0.6	0.45	9.5	0.57	50	4	2	●	1
MP2XLBR0030N100	0.3	0.6	0.45	10	0.57	50	4	2	●	1
MP2XLBR0030N110	0.3	0.6	0.45	11	0.57	50	4	2	●	1
MP2XLBR0030N120	0.3	0.6	0.45	12	0.57	50	4	2	●	1
MP2XLBR0030N015S06	0.3	0.6	0.45	1.5	0.57	50	6	2	●	1
MP2XLBR0030N020S06	0.3	0.6	0.45	2	0.57	50	6	2	●	1
MP2XLBR0030N030S06	0.3	0.6	0.45	3	0.57	50	6	2	●	1
MP2XLBR0030N040S06	0.3	0.6	0.45	4	0.57	50	6	2	●	1
MP2XLBR0030N050S06	0.3	0.6	0.45	5	0.57	50	6	2	●	1
MP2XLBR0030N060S06	0.3	0.6	0.45	6	0.57	50	6	2	●	1
MP2XLBR0030N080S06	0.3	0.6	0.45	8	0.57	50	6	2	●	1
MP2XLBR0040N020	0.4	0.8	0.6	2	0.77	50	4	2	●	1
MP2XLBR0040N030	0.4	0.8	0.6	3	0.77	50	4	2	●	1

\* Number of Flutes

# MS plus End Mill Series

## MP2XLB

Ball nose, Short cut length, 2 flute, Long neck

(mm)

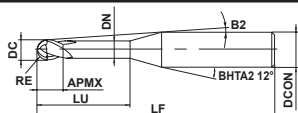
Order Number	RE	DC	APMX	LU	DN	LF	DCON	No.F.*	Stock	Type
MP2XLBR0040N040	0.4	0.8	0.6	4	0.77	50	4	2	●	1
MP2XLBR0040N050	0.4	0.8	0.6	5	0.77	50	4	2	●	1
MP2XLBR0040N060	0.4	0.8	0.6	6	0.77	50	4	2	●	1
MP2XLBR0040N070	0.4	0.8	0.6	7	0.77	50	4	2	●	1
MP2XLBR0040N080	0.4	0.8	0.6	8	0.77	50	4	2	●	1
MP2XLBR0040N090	0.4	0.8	0.6	9	0.77	50	4	2	●	1
MP2XLBR0040N100	0.4	0.8	0.6	10	0.77	50	4	2	●	1
MP2XLBR0040N120	0.4	0.8	0.6	12	0.77	50	4	2	●	1
MP2XLBR0040N020S06	0.4	0.8	0.6	2	0.77	50	6	2	●	1
MP2XLBR0040N024S06	0.4	0.8	0.6	2.4	0.77	50	6	2	●	1
MP2XLBR0040N030S06	0.4	0.8	0.6	3	0.77	50	6	2	●	1
MP2XLBR0040N040S06	0.4	0.8	0.6	4	0.77	50	6	2	●	1
MP2XLBR0050N030	0.5	1	0.75	3	0.96	50	4	2	●	1
MP2XLBR0050N040	0.5	1	0.75	4	0.96	50	4	2	●	1
MP2XLBR0050N050	0.5	1	0.75	5	0.96	50	4	2	●	1
MP2XLBR0050N060	0.5	1	0.75	6	0.96	50	4	2	●	1
MP2XLBR0050N070	0.5	1	0.75	7	0.96	50	4	2	●	1
MP2XLBR0050N080	0.5	1	0.75	8	0.96	50	4	2	●	1
MP2XLBR0050N090	0.5	1	0.75	9	0.96	50	4	2	●	1
MP2XLBR0050N100	0.5	1	0.75	10	0.96	50	4	2	●	1
MP2XLBR0050N120	0.5	1	0.75	12	0.96	50	4	2	●	1
MP2XLBR0050N140	0.5	1	0.75	14	0.96	55	4	2	●	1
MP2XLBR0050N160	0.5	1	0.75	16	0.96	55	4	2	●	1
MP2XLBR0050N180	0.5	1	0.75	18	0.96	55	4	2	●	1
MP2XLBR0050N200	0.5	1	0.75	20	0.96	55	4	2	●	1
MP2XLBR0050N030S06	0.5	1	0.75	3	0.96	50	6	2	●	1
MP2XLBR0050N040S06	0.5	1	0.75	4	0.96	50	6	2	●	1
MP2XLBR0050N050S06	0.5	1	0.75	5	0.96	50	6	2	●	1
MP2XLBR0050N060S06	0.5	1	0.75	6	0.96	50	6	2	●	1
MP2XLBR0050N080S06	0.5	1	0.75	8	0.96	50	6	2	●	1
MP2XLBR0050N100S06	0.5	1	0.75	10	0.96	60	6	2	●	1
MP2XLBR0050N120S06	0.5	1	0.75	12	0.96	60	6	2	●	1
MP2XLBR0050N160S06	0.5	1	0.75	16	0.96	65	6	2	●	1
MP2XLBR0050N200S06	0.5	1	0.75	20	0.96	65	6	2	●	1
MP2XLBR0060N060	0.6	1.2	0.9	6	1.16	50	4	2	●	1
MP2XLBR0060N080	0.6	1.2	0.9	8	1.16	50	4	2	●	1
MP2XLBR0060N100	0.6	1.2	0.9	10	1.16	50	4	2	●	1
MP2XLBR0060N120	0.6	1.2	0.9	12	1.16	50	4	2	●	1
MP2XLBR0060N140	0.6	1.2	0.9	14	1.16	55	4	2	●	1
MP2XLBR0060N160	0.6	1.2	0.9	16	1.16	55	4	2	●	1
MP2XLBR0060N180	0.6	1.2	0.9	18	1.16	60	4	2	●	1
MP2XLBR0060N200	0.6	1.2	0.9	20	1.16	60	4	2	●	1
MP2XLBR0060N240	0.6	1.2	0.9	24	1.16	60	4	2	●	1
MP2XLBR0060N060S06	0.6	1.2	0.9	6	1.16	55	6	2	●	1
MP2XLBR0060N080S06	0.6	1.2	0.9	8	1.16	55	6	2	●	1
MP2XLBR0060N100S06	0.6	1.2	0.9	10	1.16	55	6	2	●	1
MP2XLBR0060N120S06	0.6	1.2	0.9	12	1.16	65	6	2	●	1
MP2XLBR0060N160S06	0.6	1.2	0.9	16	1.16	65	6	2	●	1
MP2XLBR0070N080	0.7	1.4	1.05	8	1.34	50	4	2	●	1
MP2XLBR0070N120	0.7	1.4	1.05	12	1.34	50	4	2	●	1
MP2XLBR0070N160	0.7	1.4	1.05	16	1.34	50	4	2	●	1
MP2XLBR0075N030	0.75	1.5	1.1	3	1.44	50	4	2	●	1

\* Number of Flutes

● : Inventory maintained in Japan.



Type1



(mm)

Order Number	RE	DC	APMX	LU	DN	LF	DCON	No.F.*	Stock	Type
MP2XLBR0075N040	0.75	1.5	1.1	4	1.44	50	4	2	●	1
MP2XLBR0075N060	0.75	1.5	1.1	6	1.44	50	4	2	●	1
MP2XLBR0075N080	0.75	1.5	1.1	8	1.44	50	4	2	●	1
MP2XLBR0075N100	0.75	1.5	1.1	10	1.44	50	4	2	●	1
MP2XLBR0075N120	0.75	1.5	1.1	12	1.44	50	4	2	●	1
MP2XLBR0075N140	0.75	1.5	1.1	14	1.44	55	4	2	●	1
MP2XLBR0075N160	0.75	1.5	1.1	16	1.44	55	4	2	●	1
MP2XLBR0075N180	0.75	1.5	1.1	18	1.44	60	4	2	●	1
MP2XLBR0075N200	0.75	1.5	1.1	20	1.44	60	4	2	●	1
MP2XLBR0075N220	0.75	1.5	1.1	22	1.44	60	4	2	●	1
MP2XLBR0075N060S06	0.75	1.5	1.1	6	1.44	50	6	2	●	1
MP2XLBR0075N080S06	0.75	1.5	1.1	8	1.44	60	6	2	●	1
MP2XLBR0075N100S06	0.75	1.5	1.1	10	1.44	60	6	2	●	1
MP2XLBR0075N120S06	0.75	1.5	1.1	12	1.44	60	6	2	●	1
MP2XLBR0075N160S06	0.75	1.5	1.1	16	1.44	60	6	2	●	1
MP2XLBR0080N080	0.8	1.6	1.2	8	1.54	55	4	2	●	1
MP2XLBR0080N120	0.8	1.6	1.2	12	1.54	55	4	2	●	1
MP2XLBR0080N160	0.8	1.6	1.2	16	1.54	55	4	2	●	1
MP2XLBR0080N200	0.8	1.6	1.2	20	1.54	55	4	2	●	1
MP2XLBR0090N080	0.9	1.8	1.4	8	1.74	55	4	2	●	1
MP2XLBR0090N120	0.9	1.8	1.4	12	1.74	55	4	2	●	1
MP2XLBR0090N160	0.9	1.8	1.4	16	1.74	55	4	2	●	1
MP2XLBR0090N200	0.9	1.8	1.4	20	1.74	55	4	2	●	1
MP2XLBR0100N040	1	2	1.5	4	1.94	50	4	2	●	1
MP2XLBR0100N060	1	2	1.5	6	1.94	50	4	2	●	1
MP2XLBR0100N080	1	2	1.5	8	1.94	50	4	2	●	1
MP2XLBR0100N100	1	2	1.5	10	1.94	50	4	2	●	1
MP2XLBR0100N120	1	2	1.5	12	1.94	50	4	2	●	1
MP2XLBR0100N140	1	2	1.5	14	1.94	55	4	2	●	1
MP2XLBR0100N160	1	2	1.5	16	1.94	55	4	2	●	1
MP2XLBR0100N180	1	2	1.5	18	1.94	55	4	2	●	1
MP2XLBR0100N200	1	2	1.5	20	1.94	65	4	2	●	1
MP2XLBR0100N220	1	2	1.5	22	1.94	65	4	2	●	1
MP2XLBR0100N250	1	2	1.5	25	1.94	65	4	2	●	1
MP2XLBR0100N300	1	2	1.5	30	1.94	80	4	2	●	1
MP2XLBR0100N350	1	2	1.5	35	1.94	80	4	2	●	1
MP2XLBR0100N400	1	2	1.5	40	1.94	80	4	2	●	1
MP2XLBR0100N040S06	1	2	1.5	4	1.94	50	6	2	●	1
MP2XLBR0100N060S06	1	2	1.5	6	1.94	50	6	2	●	1
MP2XLBR0100N080S06	1	2	1.5	8	1.94	50	6	2	●	1
MP2XLBR0100N100S06	1	2	1.5	10	1.94	50	6	2	●	1
MP2XLBR0100N120S06	1	2	1.5	12	1.94	60	6	2	●	1
MP2XLBR0100N140S06	1	2	1.5	14	1.94	60	6	2	●	1
MP2XLBR0100N160S06	1	2	1.5	16	1.94	65	6	2	●	1
MP2XLBR0100N180S06	1	2	1.5	18	1.94	65	6	2	●	1
MP2XLBR0100N200S06	1	2	1.5	20	1.94	65	6	2	●	1
MP2XLBR0100N250S06	1	2	1.5	25	1.94	90	6	2	●	1
MP2XLBR0100N300S06	1	2	1.5	30	1.94	90	6	2	●	1
MP2XLBR0100N350S06	1	2	1.5	35	1.94	90	6	2	●	1
MP2XLBR0100N400S06	1	2	1.5	40	1.94	90	6	2	●	1
MP2XLBR0125N100	1.25	2.5	1.9	10	2.4	55	4	2	●	1
MP2XLBR0125N150	1.25	2.5	1.9	15	2.4	55	4	2	●	1

\* Number of Flutes

# MS plus End Mill Series

## MP2XLB

Ball nose, Short cut length, 2 flute, Long neck

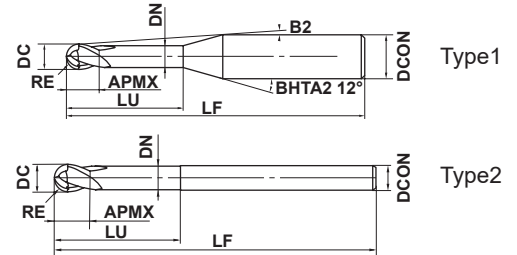
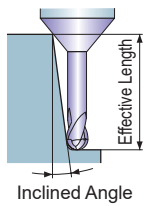
(mm)

Order Number	RE	DC	APMX	LU	DN	LF	DCON	No.F.*	Stock	Type
MP2XLBR0125N200	1.25	2.5	1.9	20	2.4	55	4	2	●	1
MP2XLBR0125N250	1.25	2.5	1.9	25	2.4	70	4	2	●	1
MP2XLBR0125N300	1.25	2.5	1.9	30	2.4	70	4	2	●	1
MP2XLBR0125N350	1.25	2.5	1.9	35	2.4	70	4	2	●	1
MP2XLBR0150N060S03	1.5	3	2.3	6	2.9	60	3	2	●	1
MP2XLBR0150N080	1.5	3	2.3	8	2.9	60	6	2	●	1
MP2XLBR0150N100	1.5	3	2.3	10	2.9	60	6	2	●	1
MP2XLBR0150N120	1.5	3	2.3	12	2.9	60	6	2	●	1
MP2XLBR0150N140	1.5	3	2.3	14	2.9	60	6	2	●	1
MP2XLBR0150N160	1.5	3	2.3	16	2.9	70	6	2	●	1
MP2XLBR0150N200	1.5	3	2.3	20	2.9	70	6	2	●	1
MP2XLBR0150N250	1.5	3	2.3	25	2.9	70	6	2	●	1
MP2XLBR0150N300	1.5	3	2.3	30	2.9	70	6	2	●	1
MP2XLBR0150N350	1.5	3	2.3	35	2.9	90	6	2	●	1
MP2XLBR0150N400	1.5	3	2.3	40	2.9	90	6	2	●	1
MP2XLBR0175N150	1.75	3.5	2.6	15	3.4	65	6	2	●	1
MP2XLBR0175N250	1.75	3.5	2.6	25	3.4	65	6	2	●	1
MP2XLBR0175N350	1.75	3.5	2.6	35	3.4	90	6	2	●	1
MP2XLBR0175N450	1.75	3.5	2.6	45	3.4	90	6	2	●	1
MP2XLBR0200N080S04	2	4	3	8	3.9	65	4	2	●	1
MP2XLBR0200N100	2	4	3	10	3.9	65	6	2	●	1
MP2XLBR0200N120	2	4	3	12	3.9	65	6	2	●	1
MP2XLBR0200N140	2	4	3	14	3.9	65	6	2	●	1
MP2XLBR0200N160	2	4	3	16	3.9	70	6	2	●	1
MP2XLBR0200N200	2	4	3	20	3.9	70	6	2	●	1
MP2XLBR0200N250	2	4	3	25	3.9	70	6	2	●	1
MP2XLBR0200N300	2	4	3	30	3.9	80	6	2	●	1
MP2XLBR0200N350	2	4	3	35	3.9	80	6	2	●	1
MP2XLBR0200N400	2	4	3	40	3.9	90	6	2	●	1
MP2XLBR0200N450	2	4	3	45	3.9	90	6	2	●	1
MP2XLBR0200N500	2	4	3	50	3.9	100	6	2	●	1
MP2XLBR0250N150	2.5	5	3.8	15	4.9	70	6	2	●	1
MP2XLBR0250N200	2.5	5	3.8	20	4.9	70	6	2	●	1
MP2XLBR0250N250	2.5	5	3.8	25	4.9	70	6	2	●	1
MP2XLBR0250N300	2.5	5	3.8	30	4.9	80	6	2	●	1
MP2XLBR0250N350	2.5	5	3.8	35	4.9	80	6	2	●	1
MP2XLBR0250N400	2.5	5	3.8	40	4.9	90	6	2	●	1
MP2XLBR0300N200	3	6	6	20	5.85	70	6	2	●	2
MP2XLBR0300N250	3	6	6	25	5.85	70	6	2	●	2
MP2XLBR0300N300	3	6	6	30	5.85	80	6	2	●	2
MP2XLBR0300N400	3	6	6	40	5.85	90	6	2	●	2
MP2XLBR0300N500	3	6	6	50	5.85	100	6	2	●	2

\* Number of Flutes

● : Inventory maintained in Japan.

## Effective Length for Inclined Angle



(mm)

Order Number	RE	B2	0.5°	1°	2°	3°	Type
MP2XLBR0005N003	0.05	11.6°	0.3	0.3	0.4	0.4	1
MP2XLBR0005N005	0.05	11.4°	0.5	0.5	0.6	0.7	1
MP2XLBR0010N005	0.1	11.5°	0.5	0.5	0.6	0.7	1
MP2XLBR0010N008	0.1	11.2°	0.8	0.8	0.9	1	1
MP2XLBR0010N010	0.1	10.9°	1	1.1	1.2	1.3	1
MP2XLBR0010N013	0.1	10.6°	1.3	1.4	1.5	1.7	1
MP2XLBR0010N015	0.1	10.4°	1.6	1.6	1.8	2	1
MP2XLBR0010N018	0.1	10.2°	1.8	1.9	2.1	2.3	1
MP2XLBR0010N020	0.1	9.9°	2.1	2.2	2.4	2.6	1
MP2XLBR0010N025	0.1	9.5°	2.6	2.7	3	3.3	1
MP2XLBR0015N005	0.15	11.5°	0.5	0.5	0.6	0.6	1
MP2XLBR0015N008	0.15	11.2°	0.8	0.8	0.9	1	1
MP2XLBR0015N010	0.15	10.9°	1	1.1	1.2	1.3	1
MP2XLBR0015N013	0.15	10.7°	1.3	1.4	1.5	1.6	1
MP2XLBR0015N015	0.15	10.4°	1.6	1.6	1.8	2	1
MP2XLBR0015N018	0.15	10.2°	1.8	1.9	2.1	2.3	1
MP2XLBR0015N020	0.15	9.9°	2.1	2.2	2.4	2.6	1
MP2XLBR0015N025	0.15	9.5°	2.6	2.7	3	3.3	1
MP2XLBR0015N030	0.15	9.1°	3.1	3.3	3.6	4	1
MP2XLBR0015N035	0.15	8.7°	3.7	3.8	4.2	4.6	1
MP2XLBR0015N040	0.15	8.4°	4.2	4.4	4.8	5.3	1
MP2XLBR0015N010S06	0.15	11.3°	1	1.1	1.2	1.3	1
MP2XLBR0015N013S06	0.15	11.1°	1.3	1.4	1.5	1.6	1
MP2XLBR0015N015S06	0.15	10.9°	1.6	1.6	1.8	2	1
MP2XLBR0020N005	0.2	11.6°	0.5	0.5	0.5	0.6	1
MP2XLBR0020N008	0.2	11.3°	0.7	0.8	0.9	0.9	1
MP2XLBR0020N010	0.2	11°	1	1.1	1.2	1.3	1
MP2XLBR0020N015	0.2	10.4°	1.5	1.6	1.7	1.9	1
MP2XLBR0020N020	0.2	9.9°	2.1	2.2	2.3	2.6	1
MP2XLBR0020N025	0.2	9.5°	2.6	2.7	2.9	3.3	1
MP2XLBR0020N030	0.2	9.1°	3.1	3.2	3.5	3.9	1
MP2XLBR0020N035	0.2	8.7°	3.6	3.8	4.1	4.6	1
MP2XLBR0020N040	0.2	8.4°	4.2	4.3	4.7	5.2	1
MP2XLBR0020N045	0.2	8°	4.7	4.9	5.3	5.9	1
MP2XLBR0020N050	0.2	7.7°	5.2	5.4	5.9	6.6	1
MP2XLBR0020N055	0.2	7.5°	5.7	6	6.5	7.2	1
MP2XLBR0020N060	0.2	7.2°	6.2	6.5	7.1	7.9	1
MP2XLBR0020N010S06	0.2	11.3°	1	1.1	1.2	1.3	1
MP2XLBR0020N020S06	0.2	10.6°	2.1	2.2	2.3	2.6	1
MP2XLBR0025N010	0.25	11°	1	1	1.1	1.2	1
MP2XLBR0025N015	0.25	10.4°	1.5	1.6	1.7	1.9	1
MP2XLBR0025N020	0.25	9.9°	2.1	2.1	2.3	2.6	1
MP2XLBR0025N025	0.25	9.5°	2.6	2.7	2.9	3.2	1

# MS plus End Mill Series

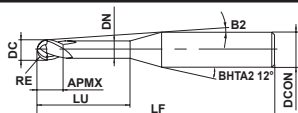
## MP2XLB

Ball nose, Short cut length, 2 flute, Long neck

(mm)

Order Number	RE	B2	0.5°	1°	2°	3°	Type
MP2XLBR0025N030	0.25	9.1°	3.1	3.2	3.5	3.9	1
MP2XLBR0025N035	0.25	8.7°	3.6	3.8	4.1	4.6	1
MP2XLBR0025N040	0.25	8.3°	4.1	4.3	4.7	5.2	1
MP2XLBR0025N045	0.25	8°	4.7	4.9	5.3	5.9	1
MP2XLBR0025N050	0.25	7.7°	5.2	5.4	5.9	6.6	1
MP2XLBR0025N055	0.25	7.4°	5.7	6	6.5	7.2	1
MP2XLBR0025N060	0.25	7.2°	6.2	6.5	7.1	7.9	1
MP2XLBR0025N070	0.25	6.7°	7.3	7.6	8.3	9.2	1
MP2XLBR0025N080	0.25	6.3°	8.3	8.7	9.5	10.5	1
MP2XLBR0025N090	0.25	5.9°	9.4	9.8	10.7	11.9	1
MP2XLBR0025N100	0.25	5.6°	10.4	10.9	11.9	13.2	1
MP2XLBR0025N015S06	0.25	11°	1.5	1.6	1.7	1.9	1
MP2XLBR0025N020S06	0.25	10.6°	2.1	2.1	2.3	2.6	1
MP2XLBR0025N025S06	0.25	10.3°	2.6	2.7	2.9	3.2	1
MP2XLBR0025N030S06	0.25	10°	3.1	3.2	3.5	3.9	1
MP2XLBR0030N015	0.3	10.4°	1.5	1.6	1.8	2	1
MP2XLBR0030N020	0.3	9.9°	2.1	2.2	2.4	2.6	1
MP2XLBR0030N025	0.3	9.4°	2.6	2.7	3	3.3	1
MP2XLBR0030N030	0.3	9°	3.1	3.3	3.6	4	1
MP2XLBR0030N035	0.3	8.6°	3.7	3.8	4.2	4.6	1
MP2XLBR0030N040	0.3	8.2°	4.2	4.4	4.8	5.3	1
MP2XLBR0030N045	0.3	7.9°	4.7	4.9	5.4	5.9	1
MP2XLBR0030N050	0.3	7.6°	5.2	5.5	6	6.6	1
MP2XLBR0030N055	0.3	7.3°	5.8	6	6.6	7.3	1
MP2XLBR0030N060	0.3	7.1°	6.3	6.6	7.2	7.9	1
MP2XLBR0030N065	0.3	6.8°	6.8	7.1	7.8	8.6	1
MP2XLBR0030N070	0.3	6.6°	7.3	7.6	8.4	9.3	1
MP2XLBR0030N080	0.3	6.2°	8.4	8.7	9.6	10.6	1
MP2XLBR0030N085	0.3	6°	8.9	9.3	10.2	11.3	1
MP2XLBR0030N090	0.3	5.8°	9.4	9.8	10.8	11.9	1
MP2XLBR0030N095	0.3	5.7°	9.9	10.4	11.4	12.6	1
MP2XLBR0030N100	0.3	5.5°	10.5	10.9	12	13.2	1
MP2XLBR0030N110	0.3	5.2°	11.5	12	13.2	14.6	1
MP2XLBR0030N120	0.3	5°	12.5	13.1	14.4	15.9	1
MP2XLBR0030N015S06	0.3	11°	1.5	1.6	1.8	2	1
MP2XLBR0030N020S06	0.3	10.6°	2.1	2.2	2.4	2.6	1
MP2XLBR0030N030S06	0.3	9.9°	3.1	3.3	3.6	4	1
MP2XLBR0030N040S06	0.3	9.3°	4.2	4.4	4.8	5.3	1
MP2XLBR0030N050S06	0.3	8.8°	5.2	5.5	6	6.6	1
MP2XLBR0030N060S06	0.3	8.3°	6.3	6.6	7.2	7.9	1
MP2XLBR0030N080S06	0.3	7.6°	8.4	8.7	9.6	10.6	1
MP2XLBR0040N020	0.4	9.9°	2.1	2.2	2.4	2.6	1
MP2XLBR0040N030	0.4	8.9°	3.1	3.3	3.6	3.9	1
MP2XLBR0040N040	0.4	8.2°	4.2	4.4	4.8	5.2	1
MP2XLBR0040N050	0.4	7.5°	5.2	5.5	6	6.6	1
MP2XLBR0040N060	0.4	6.9°	6.3	6.5	7.2	7.9	1
MP2XLBR0040N070	0.4	6.5°	7.3	7.6	8.4	9.2	1
MP2XLBR0040N080	0.4	6°	8.4	8.7	9.5	10.6	1
MP2XLBR0040N090	0.4	5.7°	9.4	9.8	10.7	11.9	1
MP2XLBR0040N100	0.4	5.4°	10.5	10.9	11.9	13.2	1
MP2XLBR0040N120	0.4	4.8°	12.5	13.1	14.3	15.9	1
MP2XLBR0040N020S06	0.4	10.6°	2.1	2.2	2.4	2.6	1

Type1



(mm)

Order Number	RE	B2	0.5°	1°	2°	3°	Type
MP2XLBR0040N024S06	0.4	10.3°	2.5	2.6	2.8	3.1	1
MP2XLBR0040N030S06	0.4	9.9°	3.1	3.3	3.6	3.9	1
MP2XLBR0040N040S06	0.4	9.3°	4.2	4.4	4.8	5.2	1
MP2XLBR0050N030	0.5	8.7°	3.2	3.4	3.7	4.1	1
MP2XLBR0050N040	0.5	7.9°	4.3	4.5	4.9	5.4	1
MP2XLBR0050N050	0.5	7.3°	5.3	5.6	6.1	6.7	1
MP2XLBR0050N060	0.5	6.7°	6.4	6.7	7.3	8.1	1
MP2XLBR0050N070	0.5	6.2°	7.4	7.8	8.5	9.4	1
MP2XLBR0050N080	0.5	5.8°	8.5	8.9	9.7	10.7	1
MP2XLBR0050N090	0.5	5.5°	9.5	10	10.9	12	1
MP2XLBR0050N100	0.5	5.1°	10.6	11.1	12.1	13.4	1
MP2XLBR0050N120	0.5	4.6°	12.7	13.2	14.5	16	1
MP2XLBR0050N140	0.5	4.2°	14.8	15.4	16.9	18.7	1
MP2XLBR0050N160	0.5	3.8°	16.9	17.6	19.3	21.3	1
MP2XLBR0050N180	0.5	3.5°	18.9	19.8	21.7	24	1
MP2XLBR0050N200	0.5	3.3°	21	22	24.1	26.6	1
MP2XLBR0050N030S06	0.5	9.8°	3.2	3.4	3.7	4.1	1
MP2XLBR0050N040S06	0.5	9.2°	4.3	4.5	4.9	5.4	1
MP2XLBR0050N050S06	0.5	8.6°	5.3	5.6	6.1	6.7	1
MP2XLBR0050N060S06	0.5	8.2°	6.4	6.7	7.3	8.1	1
MP2XLBR0050N080S06	0.5	7.3°	8.5	8.9	9.7	10.7	1
MP2XLBR0050N100S06	0.5	6.7°	10.6	11.1	12.1	13.4	1
MP2XLBR0050N120S06	0.5	6.1°	12.7	13.2	14.5	16	1
MP2XLBR0050N160S06	0.5	5.2°	16.9	17.6	19.3	21.3	1
MP2XLBR0050N200S06	0.5	4.6°	21	22	24.1	26.6	1
MP2XLBR0060N060	0.6	6.6°	6.4	6.7	7.3	8	1
MP2XLBR0060N080	0.6	5.7°	8.5	8.9	9.7	10.7	1
MP2XLBR0060N100	0.6	5°	10.6	11	12.1	13.3	1
MP2XLBR0060N120	0.6	4.4°	12.7	13.2	14.5	16	1
MP2XLBR0060N140	0.6	4°	14.8	15.4	16.9	18.7	1
MP2XLBR0060N160	0.6	3.7°	16.9	17.6	19.3	21.3	1
MP2XLBR0060N180	0.6	3.4°	18.9	19.8	21.7	24	1
MP2XLBR0060N200	0.6	3.1°	21	21.9	24	26.6	1
MP2XLBR0060N240	0.6	2.7°	25.2	26.3	28.8	*	1
MP2XLBR0060N060S06	0.6	8.1°	6.4	6.7	7.3	8	1
MP2XLBR0060N080S06	0.6	7.3°	8.5	8.9	9.7	10.7	1
MP2XLBR0060N100S06	0.6	6.6°	10.6	11	12.1	13.3	1
MP2XLBR0060N120S06	0.6	6°	12.7	13.2	14.5	16	1
MP2XLBR0060N160S06	0.6	5.1°	16.9	17.6	19.3	21.3	1
MP2XLBR0070N080	0.7	5.5°	8.4	8.8	9.6	10.6	1
MP2XLBR0070N120	0.7	4.3°	12.6	13.1	14.4	15.9	1
MP2XLBR0070N160	0.7	3.5°	16.8	17.5	19.2	21.2	1
MP2XLBR0075N030	0.75	8.6°	3.1	3.3	3.6	3.9	1
MP2XLBR0075N040	0.75	7.7°	4.2	4.4	4.8	5.2	1
MP2XLBR0075N060	0.75	6.3°	6.3	6.6	7.2	7.9	1
MP2XLBR0075N080	0.75	5.4°	8.4	8.8	9.6	10.6	1
MP2XLBR0075N100	0.75	4.7°	10.5	11	12	13.2	1
MP2XLBR0075N120	0.75	4.2°	12.6	13.1	14.4	15.9	1
MP2XLBR0075N140	0.75	3.8°	14.7	15.3	16.8	18.5	1
MP2XLBR0075N160	0.75	3.4°	16.8	17.5	19.2	21.2	1
MP2XLBR0075N180	0.75	3.1°	18.9	19.7	21.6	23.8	1
MP2XLBR0075N200	0.75	2.9°	21	21.9	23.9	*	1

\* No Interference

# MS plus End Mill Series

## MP2XLB

Ball nose, Short cut length, 2 flute, Long neck

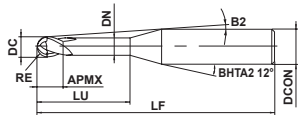
(mm)

Order Number	RE	B2	0.5°	1°	2°	3°	Type
MP2XLBR0075N220	0.75	2.7°	23	24	26.3	*	1
MP2XLBR0075N060S06	0.75	8°	6.3	6.6	7.2	7.9	1
MP2XLBR0075N080S06	0.75	7.2°	8.4	8.8	9.6	10.6	1
MP2XLBR0075N100S06	0.75	6.5°	10.5	11	12	13.2	1
MP2XLBR0075N120S06	0.75	5.9°	12.6	13.1	14.4	15.9	1
MP2XLBR0075N160S06	0.75	5°	16.8	17.5	19.2	21.2	1
MP2XLBR0080N080	0.8	5.3°	8.4	8.8	9.6	10.5	1
MP2XLBR0080N120	0.8	4.1°	12.6	13.1	14.4	15.9	1
MP2XLBR0080N160	0.8	3.3°	16.8	17.5	19.1	21.2	1
MP2XLBR0080N200	0.8	2.8°	21	21.9	23.9	*	1
MP2XLBR0090N080	0.9	5.1°	8.4	8.8	9.6	10.5	1
MP2XLBR0090N120	0.9	3.9°	12.6	13.1	14.3	15.8	1
MP2XLBR0090N160	0.9	3.1°	16.8	17.5	19.1	21.1	1
MP2XLBR0090N200	0.9	2.6°	20.9	21.8	23.9	*	1
MP2XLBR0100N040	1	7.2°	4.2	4.4	4.7	5.2	1
MP2XLBR0100N060	1	5.8°	6.3	6.6	7.1	7.8	1
MP2XLBR0100N080	1	4.8°	8.4	8.8	9.5	10.5	1
MP2XLBR0100N100	1	4.2°	10.5	10.9	11.9	13.1	1
MP2XLBR0100N120	1	3.6°	12.6	13.1	14.3	15.8	1
MP2XLBR0100N140	1	3.2°	14.7	15.3	16.7	18.4	1
MP2XLBR0100N160	1	2.9°	16.8	17.5	19.1	*	1
MP2XLBR0100N180	1	2.7°	18.9	19.7	21.5	*	1
MP2XLBR0100N200	1	2.4°	20.9	21.8	23.9	*	1
MP2XLBR0100N220	1	2.3°	23	24	26.3	*	1
MP2XLBR0100N250	1	2°	26.2	27.3	*	*	1
MP2XLBR0100N300	1	1.7°	31.4	32.7	*	*	1
MP2XLBR0100N350	1	1.5°	36.6	38.2	*	*	1
MP2XLBR0100N400	1	1.4°	41.8	43.6	*	*	1
MP2XLBR0100N040S06	1	9°	4.2	4.4	4.7	5.2	1
MP2XLBR0100N060S06	1	7.8°	6.3	6.6	7.1	7.8	1
MP2XLBR0100N080S06	1	6.9°	8.4	8.8	9.5	10.5	1
MP2XLBR0100N100S06	1	6.2°	10.5	10.9	11.9	13.1	1
MP2XLBR0100N120S06	1	5.6°	12.6	13.1	14.3	15.8	1
MP2XLBR0100N140S06	1	5.1°	14.7	15.3	16.7	18.4	1
MP2XLBR0100N160S06	1	4.7°	16.8	17.5	19.1	21.1	1
MP2XLBR0100N180S06	1	4.3°	18.9	19.7	21.5	23.8	1
MP2XLBR0100N200S06	1	4°	20.9	21.8	23.9	26.4	1
MP2XLBR0100N250S06	1	3.5°	26.2	27.3	29.9	33	1
MP2XLBR0100N300S06	1	3°	31.4	32.7	35.9	*	1
MP2XLBR0100N350S06	1	2.7°	36.6	38.2	41.8	*	1
MP2XLBR0100N400S06	1	2.4°	41.8	43.6	47.8	*	1
MP2XLBR0125N100	1.25	3.5°	10.4	10.8	11.8	12.9	1
MP2XLBR0125N150	1.25	2.5°	15.6	16.3	17.8	*	1
MP2XLBR0125N200	1.25	2°	20.8	21.7	*	*	1
MP2XLBR0125N250	1.25	1.6°	26.1	27.2	*	*	1
MP2XLBR0125N300	1.25	1.4°	31.3	32.6	*	*	1
MP2XLBR0125N350	1.25	1.2°	36.5	38.1	*	*	1
MP2XLBR0150N060S03	1.5	-	*	*	*	*	1
MP2XLBR0150N080	1.5	6.3°	8.3	8.6	9.3	10.2	1
MP2XLBR0150N100	1.5	5.5°	10.4	10.8	11.7	12.9	1
MP2XLBR0150N120	1.5	4.9°	12.5	13	14.1	15.5	1
MP2XLBR0150N140	1.5	4.4°	14.6	15.2	16.5	18.2	1

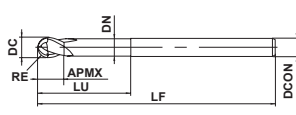
\* No Interference



Type1



Type2



(mm)

Order Number	RE	B2	0.5°	1°	2°	3°	Type
MP2XLBR0150N160	1.5	4°	16.7	17.3	18.9	20.8	1
MP2XLBR0150N200	1.5	3.4°	20.8	21.7	23.7	26.1	1
MP2XLBR0150N250	1.5	2.8°	26.1	27.2	29.7	*	1
MP2XLBR0150N300	1.5	2.5°	31.3	32.6	35.7	*	1
MP2XLBR0150N350	1.5	2.2°	36.5	38	41.7	*	1
MP2XLBR0150N400	1.5	1.9°	41.7	43.5	*	*	1
MP2XLBR0175N150	1.75	3.8°	15.6	16.2	17.7	19.4	1
MP2XLBR0175N250	1.75	2.5°	26	27.1	29.6	*	1
MP2XLBR0175N350	1.75	1.9°	36.5	38	*	*	1
MP2XLBR0175N450	1.75	1.5°	46.9	48.9	*	*	1
MP2XLBR0200N080S04	2	-	*	*	*	*	1
MP2XLBR0200N100	2	4.5°	10.4	10.8	11.6	12.7	1
MP2XLBR0200N120	2	3.9°	12.5	12.9	14	15.4	1
MP2XLBR0200N140	2	3.4°	14.6	15.1	16.4	18	1
MP2XLBR0200N160	2	3.1°	16.6	17.3	18.8	20.7	1
MP2XLBR0200N200	2	2.6°	20.8	21.7	23.6	*	1
MP2XLBR0200N250	2	2.1°	26	27.1	29.6	*	1
MP2XLBR0200N300	2	1.8°	31.2	32.6	*	*	1
MP2XLBR0200N350	2	1.6°	36.5	38	*	*	1
MP2XLBR0200N400	2	1.4°	41.7	43.5	*	*	1
MP2XLBR0200N450	2	1.2°	46.9	48.9	*	*	1
MP2XLBR0200N500	2	1.1°	52.1	54.3	*	*	1
MP2XLBR0250N150	2.5	2°	15.6	16.2	*	*	1
MP2XLBR0250N200	2.5	1.5°	20.8	21.6	*	*	1
MP2XLBR0250N250	2.5	1.2°	26	27.1	*	*	1
MP2XLBR0250N300	2.5	1°	31.2	*	*	*	1
MP2XLBR0250N350	2.5	0.9°	36.4	*	*	*	1
MP2XLBR0250N400	2.5	0.8°	41.7	*	*	*	1
MP2XLBR0300N200	3	-	*	*	*	*	2
MP2XLBR0300N250	3	-	*	*	*	*	2
MP2XLBR0300N300	3	-	*	*	*	*	2
MP2XLBR0300N400	3	-	*	*	*	*	2
MP2XLBR0300N500	3	-	*	*	*	*	2

\* No Interference

# MS plus End Mill Series

## MP2XLB

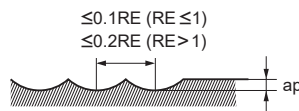
Ball nose, Short cut length, 2 flute, Long neck

### Recommended Cutting Conditions

(mm)

Workpiece Material		Carbon steel, Alloy steel (180–280HB) Alloy tool steel, Pre-hardened steel, Precipitation hardening stainless steel			Hardened steel (45–55HRC)			Copper, Copper alloys		
RE	LU	n (min <sup>-1</sup> )	vf (mm/min)	ap	n (min <sup>-1</sup> )	vf (mm/min)	ap	n (min <sup>-1</sup> )	vf (mm/min)	ap
0.05	0.3	50000	200	0.002	50000	200	0.002	50000	200	0.004
	0.5	50000	200	0.001	50000	200	0.002	50000	200	0.002
0.1	0.5	50000	400	0.003	50000	320	0.003	50000	320	0.006
	1	50000	400	0.002	50000	320	0.002	50000	320	0.004
	1.5	40000	300	0.001	40000	240	0.001	40000	240	0.002
	2	40000	200	0.001	40000	160	0.001	40000	160	0.002
	2.5	40000	100	0.001	40000	80	0.001	40000	80	0.002
0.15	1	50000	600	0.007	50000	480	0.007	50000	480	0.014
	1.5	50000	600	0.005	50000	480	0.005	50000	480	0.01
	2	50000	600	0.003	50000	480	0.003	50000	480	0.006
	2.5	40000	400	0.003	40000	320	0.003	40000	320	0.006
	3	40000	300	0.002	40000	240	0.002	40000	240	0.004
	3.5	30000	250	0.002	30000	200	0.002	30000	200	0.004
0.2	4	30000	200	0.002	30000	160	0.002	30000	160	0.004
	1	50000	1800	0.015	50000	1400	0.015	50000	1400	0.03
	2	50000	1300	0.01	50000	1000	0.01	50000	1000	0.02
	3	50000	900	0.005	50000	700	0.005	50000	700	0.01
	4	40000	600	0.004	40000	480	0.004	40000	480	0.008
	5	40000	400	0.003	40000	320	0.003	40000	320	0.006
0.25	6	30000	200	0.002	30000	160	0.002	30000	160	0.004
	2	50000	2500	0.02	50000	2000	0.02	50000	2000	0.04
	3	50000	1500	0.015	50000	1200	0.015	50000	1200	0.03
	4	45000	1200	0.01	45000	950	0.01	45000	950	0.02
	5	45000	900	0.007	45000	700	0.007	45000	700	0.014
	6	36000	600	0.006	36000	480	0.006	36000	480	0.012
	7	32000	400	0.005	32000	320	0.005	32000	320	0.01
	8	32000	300	0.003	32000	240	0.003	32000	240	0.006
0.3	10	26000	200	0.002	26000	160	0.002	26000	160	0.004
	2	50000	3500	0.03	50000	2800	0.03	50000	2800	0.06
	3	50000	3500	0.03	50000	2800	0.03	50000	2800	0.06
	4	44000	2500	0.02	44000	2000	0.02	44000	2000	0.04
	5	37000	1200	0.01	37000	950	0.01	37000	950	0.02
	6	37000	1000	0.008	37000	800	0.008	37000	800	0.016
	7	35000	750	0.008	35000	600	0.008	35000	600	0.016
	8	35000	600	0.006	35000	480	0.006	35000	480	0.012
	9	30000	500	0.004	30000	400	0.004	30000	400	0.008
	10	30000	500	0.003	30000	400	0.003	30000	400	0.006
	11	22000	300	0.002	22000	240	0.002	22000	240	0.004
	12	22000	200	0.002	22000	160	0.002	22000	160	0.004

Depth of cut



RE: Radius

Note 1) When the inclination angle of machined surface is high, or when machining at high loads; such as in corners, reduce the revolution and feed rate.

Note 2) The use of oil mist is recommended when machining with small diameter.

Note 3) The revolution and feed rate can be increased with a smaller depth of cut.

Note 4) Vibration may occur if the rigidity of machine or workpiece material is low. In this case, please reduce the revolution and feed rate proportionately.

Note 5) For hardened steel over 55HRC, use VF2XLB.

Note 6) Standard cutting conditions of austenitic stainless steel and titanium alloy, please reduce the revolution by 40% and the feed rate by 55%. (Hardened steel (45 – 55HRC) table above)



(mm)

Workpiece Material		Carbon steel, Alloy steel (180–280HB) Alloy tool steel, Pre-hardened steel, Precipitation hardening stainless steel			Hardened steel (45–55HRC)			Copper, Copper alloys		
RE	LU	n (min <sup>-1</sup> )	vf (mm/min)	ap	n (min <sup>-1</sup> )	vf (mm/min)	ap	n (min <sup>-1</sup> )	vf (mm/min)	ap
0.4	2	50000	4400	0.04	50000	3500	0.04	50000	3500	0.08
	3	50000	4000	0.04	50000	3200	0.04	50000	3200	0.08
	4	50000	4000	0.02	50000	3200	0.02	50000	3200	0.04
	5	35000	2400	0.02	35000	1900	0.02	35000	1900	0.04
	6	35000	2400	0.02	35000	1900	0.02	35000	1900	0.04
	7	30000	1500	0.015	30000	1200	0.015	30000	1200	0.03
	8	30000	1500	0.01	30000	1200	0.01	30000	1200	0.02
	10	30000	700	0.008	30000	560	0.008	30000	560	0.016
	12	22000	500	0.006	22000	400	0.006	22000	400	0.012
0.5	3	40000	4000	0.05	40000	3200	0.05	40000	3200	0.1
	4	40000	4000	0.05	40000	3200	0.05	40000	3200	0.1
	6	35000	3000	0.03	35000	2400	0.03	35000	2400	0.06
	8	30000	2000	0.02	30000	1600	0.02	30000	1600	0.04
	10	20000	1000	0.01	20000	800	0.01	20000	800	0.02
	12	20000	1000	0.01	20000	800	0.01	20000	800	0.02
	14	18000	600	0.008	18000	480	0.008	18000	480	0.016
	16	18000	500	0.008	18000	400	0.008	18000	400	0.016
	18	13000	300	0.005	13000	240	0.005	13000	240	0.01
	20	13000	250	0.005	13000	200	0.005	13000	200	0.01
0.6	6	40000	4400	0.04	40000	3500	0.04	40000	3500	0.08
	8	40000	4000	0.04	40000	3200	0.04	40000	3200	0.08
	10	27000	1900	0.02	27000	1500	0.02	27000	1500	0.04
	12	16000	1400	0.02	16000	1100	0.02	16000	1100	0.04
	18	15000	700	0.008	15000	560	0.008	15000	560	0.016
	24	11000	300	0.006	11000	240	0.006	11000	240	0.012
0.7	8	40000	4000	0.05	40000	3200	0.05	40000	2560	0.1
	12	26000	2000	0.04	26000	1600	0.04	26000	1280	0.08
	16	17000	1400	0.03	17000	1120	0.03	17000	896	0.06
0.75	6	40000	6000	0.07	36000	4300	0.07	36000	4300	0.14
	8	40000	6000	0.07	36000	4300	0.07	36000	4300	0.14
	10	40000	5000	0.06	36000	3600	0.06	36000	3600	0.12
	12	32000	3400	0.04	29000	2400	0.04	29000	2400	0.08
	16	15000	1400	0.03	15000	1100	0.03	15000	1100	0.06
	20	12000	900	0.02	12000	720	0.02	12000	720	0.04
0.8	8	40000	6000	0.08	32000	3800	0.08	32000	3800	0.16
	12	36000	4500	0.06	29000	2800	0.06	29000	2800	0.12
	16	14000	1400	0.04	14000	1100	0.04	14000	1100	0.08
	20	12000	1000	0.03	12000	800	0.03	12000	800	0.06
0.9	8	40000	6600	0.09	32000	4200	0.09	32000	4200	0.18
	12	40000	5000	0.07	32000	3200	0.07	32000	3200	0.14
	16	28000	2800	0.04	22000	1800	0.04	22000	1800	0.08
	20	10000	800	0.03	10000	640	0.03	10000	640	0.06
Depth of cut										
		RE: Radius								

Note 1) When the inclination angle of machined surface is high, or when machining at high loads; such as in corners, reduce the revolution and feed rate.

Note 2) The use of oil mist is recommended when machining with small diameter.

Note 3) The revolution and feed rate can be increased with a smaller depth of cut.

Note 4) Vibration may occur if the rigidity of machine or workpiece material is low. In this case, please reduce the revolution and feed rate proportionately.

Note 5) For hardened steel over 55HRC, use VF2XLB.

Note 6) Standard cutting conditions of austenitic stainless steel and titanium alloy, please reduce the revolution by 40% and the feed rate by 55%. (Hardened steel (45 – 55HRC) table above)

# MS plus End Mill Series

## MP2XLB

Ball nose, Short cut length, 2 flute, Long neck

(mm)

Workpiece Material		Carbon steel, Alloy steel (180–280HB) Alloy tool steel, Pre-hardened steel, Precipitation hardening stainless steel			Hardened steel (45–55HRC)			Copper, Copper alloys		
RE	LU	n (min <sup>-1</sup> )	vf (mm/min)	ap	n (min <sup>-1</sup> )	vf (mm/min)	ap	n (min <sup>-1</sup> )	vf (mm/min)	ap
1	4	40000	8000	0.1	32000	5000	0.1	32000	5000	0.2
	6	40000	8000	0.1	32000	5000	0.1	32000	5000	0.2
	8	40000	6000	0.1	32000	3800	0.1	32000	3800	0.2
	10	40000	5000	0.08	32000	3200	0.08	32000	3200	0.16
	12	40000	5000	0.08	32000	3200	0.08	32000	3200	0.16
	16	32000	3500	0.05	26000	2200	0.05	26000	2200	0.1
	20	10000	1000	0.04	10000	800	0.04	10000	800	0.08
	25	10000	1000	0.04	10000	800	0.04	10000	800	0.08
	30	10000	800	0.02	10000	640	0.02	10000	640	0.04
	35	10000	600	0.02	10000	480	0.02	10000	480	0.04
1.25	10	36000	6000	0.12	29000	3800	0.12	29000	3800	0.24
	15	32000	4500	0.1	26000	2900	0.1	26000	2900	0.2
	20	26000	3200	0.07	21000	2000	0.07	21000	2000	0.14
	25	12000	1400	0.06	8000	720	0.06	8000	720	0.12
	30	8000	900	0.04	8000	700	0.04	8000	700	0.08
	35	8000	800	0.02	8000	640	0.02	8000	510	0.04
1.5	6	32000	7000	0.15	26000	4500	0.15	22000	3800	0.3
	10	32000	7000	0.15	26000	4500	0.15	22000	3800	0.3
	16	32000	5000	0.1	26000	3200	0.1	22000	2700	0.2
	20	27000	3800	0.1	22000	2400	0.1	22000	2400	0.2
	25	21000	2700	0.08	17000	1700	0.08	17000	1700	0.16
	30	10000	700	0.08	6000	560	0.08	6000	560	0.16
	35	6000	700	0.06	6000	560	0.06	6000	560	0.12
	40	6000	600	0.04	6000	480	0.04	6000	480	0.08
1.75	15	27500	4400	0.13	22000	2800	0.13	18000	2300	0.26
	25	23000	3600	0.1	18000	2200	0.1	18000	2200	0.2
	35	10000	1400	0.08	10000	1100	0.08	10000	1100	0.16
	45	7500	900	0.04	7500	720	0.04	7500	720	0.08
2	10	24000	6000	0.2	19000	3800	0.2	16000	3200	0.4
	20	24000	3800	0.15	19000	2400	0.15	16000	2000	0.3
	30	20000	3000	0.1	16000	1900	0.1	16000	1900	0.2
	40	12000	1700	0.1	12000	1400	0.1	12000	1400	0.2
	50	8000	1000	0.05	8000	800	0.05	8000	800	0.1
2.5	20	22000	6000	0.2	18000	3800	0.2	13000	2800	0.4
	25	22000	4400	0.2	18000	2800	0.2	13000	2000	0.4
	30	22000	3800	0.15	18000	2400	0.15	13000	1700	0.3
	40	22000	3600	0.1	18000	2300	0.1	13000	1600	0.2
3	20	20000	6000	0.2	16000	3800	0.2	11000	2600	0.4
	30	20000	6000	0.2	16000	3800	0.2	11000	2600	0.4
	40	20000	4500	0.15	16000	2800	0.15	11000	2000	0.3
	50	20000	3000	0.15	16000	1900	0.15	11000	1300	0.3
Depth of cut		<p style="text-align: right;">RE: Radius</p>								

Note 1) When the inclination angle of machined surface is high, or when machining at high loads; such as in corners, reduce the revolution and feed rate.

Note 2) The use of oil mist is recommended when machining with small diameter.

Note 3) The revolution and feed rate can be increased with a smaller depth of cut.

Note 4) Vibration may occur if the rigidity of machine or workpiece material is low. In this case, please reduce the revolution and feed rate proportionately.

Note 5) For hardened steel over 55HRC, use VF2XLB.

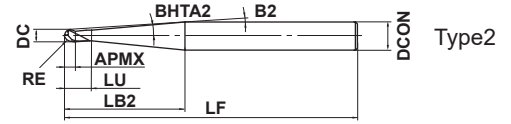
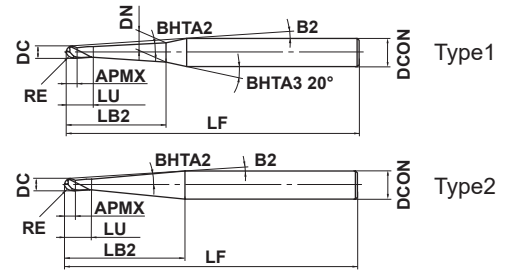
Note 6) Standard cutting conditions of austenitic stainless steel and titanium alloy, please reduce the revolution by 40% and the feed rate by 55%.  
(Hardened steel (45 – 55HRC) table above)

# MP3XB

Ball nose, 3 flute, Taper neck



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel, Hardened Steel (<=45HRC)	Hardened Steel (<=55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○	○		○	○	○	



	RE<=3	RE>=4			
	±0.005	±0.010			
	DCON=6	DCON=8			
	0 - 0.005	0 - 0.006			
	DCON=10	DCON>= 12			
	0 - 0.009	0 - 0.011			

Please refer to pages 47-49 for the actual effective neck length for the B2, BHTA2 angle and workpiece inclination angle.

- Ideal for rough milling of long overhang applications and semi-finishing of forging dies (40-52 HRC).
- Rigid, high helix, 3 flute design enables large depths of cut and high feed rates for increased machining efficiency.

(mm)

Order Number	RE	DC	APMX	LU	BD2	LB2	LF	DCON	No.F*	Stock	Type
MP3XBR0050N008T05	0.5	1	0.8	2.3	1.04	8	60	6	3	●	1
MP3XBR0050N010T10	0.5	1	0.8	2.3	1.2	10	60	6	3	●	1
MP3XBR0050N010T15	0.5	1	0.8	2.3	1.34	10	60	6	3	●	1
MP3XBR0050N010T30	0.5	1	0.8	2.3	1.74	10	60	6	3	●	1
MP3XBR0050N012T05	0.5	1	0.8	2.3	1.1	12	60	6	3	●	1
MP3XBR0050N016T05	0.5	1	0.8	2.3	1.18	16	60	6	3	●	1
MP3XBR0050N016T10	0.5	1	0.8	2.3	1.42	16	60	6	3	●	1
MP3XBR0050N016T15	0.5	1	0.8	2.3	1.66	16	60	6	3	●	1
MP3XBR0050N020T05	0.5	1	0.8	2.3	1.24	20	60	6	3	●	1
MP3XBR0050N020T10	0.5	1	0.8	2.3	1.56	20	60	6	3	●	1
MP3XBR0050N020T15	0.5	1	0.8	2.3	1.86	20	60	6	3	●	1
MP3XBR0050N020T30	0.5	1	0.8	2.3	2.8	20	60	6	3	●	1
MP3XBR0050N023T15	0.5	1	0.8	2.3	2.02	23	70	6	3	●	1
MP3XBR0050N025T05	0.5	1	0.8	2.3	1.34	25	70	6	3	●	1
MP3XBR0050N025T10	0.5	1	0.8	2.3	1.74	25	70	6	3	●	1
MP3XBR0050N025T15	0.5	1	0.8	2.3	2.12	25	70	6	3	●	1
MP3XBR0050N025T50	0.5	1	0.8	2.3	4.92	25	60	6	3	●	1
MP3XBR0050N030T05	0.5	1	0.8	2.3	1.42	30	70	6	3	●	1
MP3XBR0050N030T10	0.5	1	0.8	2.3	1.9	30	70	6	3	●	1
MP3XBR0050N030T30	0.5	1	0.8	2.3	3.84	30	70	6	3	●	1
MP3XBR0050N035T10	0.5	1	0.8	2.3	2.08	35	90	6	3	●	1
MP3XBR0050N042T30	0.5	1	0.8	2.3	5.1	42	90	6	3	●	1
MP3XBR0050N050T05	0.5	1	0.8	2.3	1.78	50	90	6	3	●	1
MP3XBR0050N050T10	0.5	1	0.8	2.3	2.6	50	90	6	3	●	1
MP3XBR0075N010T05	0.75	1.5	1.2	2.7	1.56	10	60	6	3	●	1
MP3XBR0075N010T10	0.75	1.5	1.2	2.7	1.7	10	60	6	3	●	1
MP3XBR0075N010T15	0.75	1.5	1.2	2.7	1.82	10	60	6	3	●	1
MP3XBR0075N016T05	0.75	1.5	1.2	2.7	1.68	16	60	6	3	●	1
MP3XBR0075N016T10	0.75	1.5	1.2	2.7	1.9	16	60	6	3	●	1
MP3XBR0075N016T15	0.75	1.5	1.2	2.7	2.14	16	60	6	3	●	1
MP3XBR0075N020T05	0.75	1.5	1.2	2.7	1.74	20	60	6	3	●	1
MP3XBR0075N020T10	0.75	1.5	1.2	2.7	2.04	20	60	6	3	●	1
MP3XBR0075N020T15	0.75	1.5	1.2	2.7	2.34	20	60	6	3	●	1
MP3XBR0075N025T15	0.75	1.5	1.2	2.7	2.6	25	80	6	3	●	1

\* Number of Flutes

● : Inventory maintained in Japan.

# MS plus End Mill Series

## MP3XB

Ball nose, 3 flute, Taper neck

(mm)

Order Number	RE	DC	APMX	LU	BD2	LB2	LF	DCON	No.F.*	Stock	Type
MP3XBR0075N030T05	0.75	1.5	1.2	2.7	1.92	30	80	6	3	●	1
MP3XBR0075N030T10	0.75	1.5	1.2	2.7	2.4	30	80	6	3	●	1
MP3XBR0075N030T15	0.75	1.5	1.2	2.7	2.86	30	80	6	3	●	1
MP3XBR0075N046T30	0.75	1.5	1.2	2.7	—	46	80	6	3	●	2
MP3XBR0100N016T05	1	2	1.6	3.6	2.12	16	60	6	3	●	1
MP3XBR0100N016T10	1	2	1.6	3.6	2.34	16	60	6	3	●	1
MP3XBR0100N016T15	1	2	1.6	3.6	2.54	16	60	6	3	●	1
MP3XBR0100N020T05	1	2	1.6	3.6	2.18	20	60	6	3	●	1
MP3XBR0100N020T10	1	2	1.6	3.6	2.48	20	60	6	3	●	1
MP3XBR0100N020T15	1	2	1.6	3.6	2.76	20	60	6	3	●	1
MP3XBR0100N020T30	1	2	1.6	3.6	3.62	20	60	6	3	●	1
MP3XBR0100N025T10	1	2	1.6	3.6	2.64	25	70	6	3	●	1
MP3XBR0100N025T15	1	2	1.6	3.6	3.02	25	70	6	3	●	1
MP3XBR0100N027T50	1	2	1.6	3.6	—	27	60	6	3	●	2
MP3XBR0100N030T05	1	2	1.6	3.6	2.36	30	70	6	3	●	1
MP3XBR0100N030T10	1	2	1.6	3.6	2.82	30	70	6	3	●	1
MP3XBR0100N030T15	1	2	1.6	3.6	3.28	30	70	6	3	●	1
MP3XBR0100N030T30	1	2	1.6	3.6	4.66	30	70	6	3	●	1
MP3XBR0100N035T05	1	2	1.6	3.6	2.44	35	80	6	3	●	1
MP3XBR0100N035T10	1	2	1.6	3.6	3	35	80	6	3	●	1
MP3XBR0100N035T15	1	2	1.6	3.6	3.54	35	80	6	3	●	1
MP3XBR0100N040T05	1	2	1.6	3.6	2.54	40	80	6	3	●	1
MP3XBR0100N040T10	1	2	1.6	3.6	3.18	40	80	6	3	●	1
MP3XBR0100N040T15	1	2	1.6	3.6	3.8	40	80	6	3	●	1
MP3XBR0100N042T30	1	2	1.6	3.6	—	42	80	6	3	●	2
MP3XBR0100N050T10	1	2	1.6	3.6	3.52	50	110	6	3	●	1
MP3XBR0100N070T10	1	2	1.6	3.6	4.22	70	110	6	3	●	1
MP3XBR0150N010T05	1.5	3	2.4	5.4	2.98	10	60	6	3	●	1
MP3XBR0150N020T05	1.5	3	2.4	5.4	3.16	20	60	6	3	●	1
MP3XBR0150N020T10	1.5	3	2.4	5.4	3.4	20	60	6	3	●	1
MP3XBR0150N020T15	1.5	3	2.4	5.4	3.66	20	60	6	3	●	1
MP3XBR0150N025T30	1.5	3	2.4	5.4	4.96	25	60	6	3	●	1
MP3XBR0150N030T05	1.5	3	2.4	5.4	3.32	30	70	6	3	●	1
MP3XBR0150N030T10	1.5	3	2.4	5.4	3.76	30	70	6	3	●	1
MP3XBR0150N030T15	1.5	3	2.4	5.4	4.18	30	70	6	3	●	1
MP3XBR0150N034T30	1.5	3	2.4	5.4	—	34	70	6	3	●	2
MP3XBR0150N035T10	1.5	3	2.4	5.4	3.94	35	80	6	3	●	1
MP3XBR0150N035T15	1.5	3	2.4	5.4	4.46	35	70	6	3	●	1
MP3XBR0150N040T05	1.5	3	2.4	5.4	3.5	40	80	6	3	●	1
MP3XBR0150N040T10	1.5	3	2.4	5.4	4.1	40	80	6	3	●	1
MP3XBR0150N040T15	1.5	3	2.4	5.4	4.72	40	80	6	3	●	1
MP3XBR0150N045T15	1.5	3	2.4	5.4	4.98	45	80	6	3	●	1
MP3XBR0150N050T05	1.5	3	2.4	5.4	3.68	50	90	6	3	●	1
MP3XBR0150N050T10	1.5	3	2.4	5.4	4.46	50	90	6	3	●	1
MP3XBR0150N052T15	1.5	3	2.4	5.4	5.34	52	90	6	3	●	1
MP3XBR0150N060T10	1.5	3	2.4	5.4	4.8	60	110	6	3	●	1
MP3XBR0150N064T15	1.5	3	2.4	5.4	—	64	110	6	3	●	2
MP3XBR0150N070T10	1.5	3	2.4	5.4	5.16	70	110	6	3	●	1
MP3XBR0150N040T30	1.5	3	2.4	5.4	6.52	40	90	8	3	●	1
MP3XBR0150N054T30	1.5	3	2.4	5.4	—	54	90	8	3	●	2
MP3XBR0200N020T10	2	4	3.2	6.2	4.38	20	70	6	3	●	1
MP3XBR0200N030T05	2	4	3.2	6.2	4.32	30	70	6	3	●	1

\* Number of Flutes

● : Inventory maintained in Japan.



(mm)

Order Number	RE	DC	APMX	LU	BD2	LB2	LF	DCON	No.F *	Stock	Type
MP3XBR0200N030T10	2	4	3.2	6.2	4.74	30	70	6	3	●	1
MP3XBR0200N035T10	2	4	3.2	6.2	4.9	35	70	6	3	●	1
MP3XBR0200N040T05	2	4	3.2	6.2	4.48	40	80	6	3	●	1
MP3XBR0200N040T10	2	4	3.2	6.2	5.08	40	80	6	3	●	1
MP3XBR0200N045T10	2	4	3.2	6.2	5.26	45	80	6	3	●	1
MP3XBR0200N060T05	2	4	3.2	6.2	4.84	60	100	6	3	●	1
MP3XBR0200N066T10	2	4	3.2	6.2	—	66	100	6	3	●	2
MP3XBR0200N030T30	2	4	3.2	6.2	6.4	30	90	8	3	●	1
MP3XBR0200N045T30	2	4	3.2	6.2	—	45	90	8	3	●	2
MP3XBR0200N050T15	2	4	3.2	6.2	6.2	50	90	8	3	●	1
MP3XBR0200N084T15	2	4	3.2	6.2	—	84	120	8	3	●	2
MP3XBR0250N038T10	2.5	5	4	7	—	38	80	6	3	●	2
MP3XBR0250N036T30	2.5	5	4	7	—	36	90	8	3	●	2
MP3XBR0250N050T10	2.5	5	4	7	6.4	50	90	8	3	●	1
MP3XBR0250N065T10	2.5	5	4	7	6.92	65	110	8	3	●	1
MP3XBR0250N066T15	2.5	5	4	7	—	66	110	8	3	●	2
MP3XBR0300N032T30	3	6	9	12	—	32	80	8	3	●	2
MP3XBR0300N040T10	3	6	9	12	6.82	40	80	8	3	●	1
MP3XBR0300N050T10	3	6	9	12	7.18	50	90	8	3	●	1
MP3XBR0300N053T15	3	6	9	12	—	53	90	8	3	●	2
MP3XBR0300N073T10	3	6	9	12	—	73	110	8	3	●	2
MP3XBR0300N090T10	3	6	9	12	8.58	90	140	10	3	●	1
MP3XBR0400N035T30	4	8	12	15	—	35	90	10	3	●	2
MP3XBR0400N040T15	4	8	12	15	9.16	40	90	10	3	●	1
MP3XBR0400N050T10	4	8	12	15	9.08	50	110	10	3	●	1
MP3XBR0400N056T15	4	8	12	15	—	56	110	10	3	●	2
MP3XBR0400N065T10	4	8	12	15	9.6	65	130	10	3	●	1
MP3XBR0400N076T10	4	8	12	15	—	76	130	10	3	●	2
MP3XBR0400N090T10	4	8	12	15	10.46	90	150	12	3	●	1
MP3XBR0500N046T30	5	10	15	25	—	46	100	12	3	●	2
MP3XBR0500N050T15	5	10	15	25	11	50	100	12	3	●	1
MP3XBR0500N060T10	5	10	15	25	10.92	60	120	12	3	●	1
MP3XBR0500N068T15	5	10	15	25	—	68	120	12	3	●	2
MP3XBR0500N070T10	5	10	15	25	11.28	70	120	12	3	●	1
MP3XBR0500N100T10	5	10	15	25	12.32	100	160	16	3	●	1
MP3XBR0600N069T30	6	12	18	28	—	69	130	16	3	●	2
MP3XBR0600N070T10	6	12	18	28	13.16	70	130	16	3	●	1
MP3XBR0600N080T15	6	12	18	28	14.42	80	130	16	3	●	1
MP3XBR0600N100T10	6	12	18	28	14.22	100	160	16	3	●	1

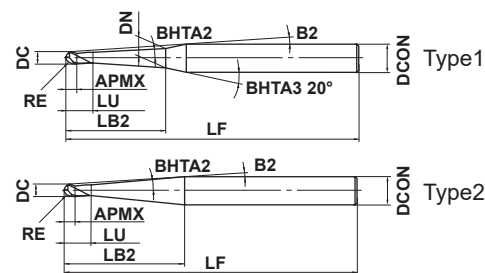
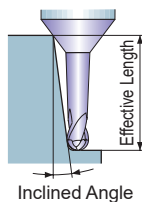
\* Number of Flutes

# MS plus End Mill Series

## MP3XB

Ball nose, 3 flute, Taper neck

### Effective Length for Inclined Angle



(mm)

Order Number	RE	BHTA2	B2	0.5°	1°	2°	3°	Type
MP3XBR0050N008T05	0.5	0.5°	9.3°	8.5	8.8	9.3	9.8	1
MP3XBR0050N010T10	0.5	1°	8.4°	—	10.6	11.2	11.8	1
MP3XBR0050N010T15	0.5	1.5°	8.5°	—	—	11	11.6	1
MP3XBR0050N010T30	0.5	3°	8.8°	—	—	—	10.8	1
MP3XBR0050N012T05	0.5	0.5°	7.5°	12.6	13	13.6	14.4	1
MP3XBR0050N016T05	0.5	0.5°	6.3°	16.6	17.1	18	18.9	1
MP3XBR0050N016T10	0.5	1°	6.4°	—	16.7	17.6	18.5	1
MP3XBR0050N016T15	0.5	1.5°	6.5°	—	—	17.2	18.1	1
MP3XBR0050N020T05	0.5	0.5°	5.4°	20.6	21.2	22.3	23.5	1
MP3XBR0050N020T10	0.5	1°	5.5°	—	20.7	21.8	23	1
MP3XBR0050N020T15	0.5	1.5°	5.6°	—	—	21.3	22.5	1
MP3XBR0050N020T30	0.5	3°	5.9°	—	—	—	20.9	1
MP3XBR0050N023T15	0.5	1.5°	5°	—	—	24.4	25.7	1
MP3XBR0050N025T05	0.5	0.5°	4.6°	25.7	26.3	27.7	29.3	1
MP3XBR0050N025T10	0.5	1°	4.7°	—	25.7	27.1	28.6	1
MP3XBR0050N025T15	0.5	1.5°	4.7°	—	—	26.5	27.9	1
MP3XBR0050N025T50	0.5	5°	5.4°	—	—	—	—	1
MP3XBR0050N030T05	0.5	0.5°	4°	30.7	31.5	33.1	35	1
MP3XBR0050N030T10	0.5	1°	4.1°	—	30.8	32.4	34.2	1
MP3XBR0050N030T30	0.5	3°	4.4°	—	—	—	31	1
MP3XBR0050N035T10	0.5	1°	3.6°	—	35.8	37.7	39.8	1
MP3XBR0050N042T30	0.5	3°	3.4°	—	—	—	43	1
MP3XBR0050N050T05	0.5	0.5°	2.6°	50.8	52.1	54.8	*	1
MP3XBR0050N050T10	0.5	1°	2.7°	—	50.9	53.6	*	1
MP3XBR0075N010T05	0.75	0.5°	7.8°	10.6	10.9	11.4	12	1
MP3XBR0075N010T10	0.75	1°	7.9°	—	10.6	11.2	11.8	1
MP3XBR0075N010T15	0.75	1.5°	8°	—	—	11	11.6	1
MP3XBR0075N016T05	0.75	0.5°	5.8°	16.6	17.1	17.9	18.9	1
MP3XBR0075N016T10	0.75	1°	5.9°	—	16.7	17.6	18.5	1
MP3XBR0075N016T15	0.75	1.5°	6°	—	—	17.2	18.1	1
MP3XBR0075N020T05	0.75	0.5°	5°	20.6	21.2	22.3	23.5	1
MP3XBR0075N020T10	0.75	1°	5.1°	—	20.7	21.8	23	1
MP3XBR0075N020T15	0.75	1.5°	5.1°	—	—	21.3	22.5	1
MP3XBR0075N025T15	0.75	1.5°	4.4°	—	—	26.5	27.9	1
MP3XBR0075N030T05	0.75	0.5°	3.7°	30.7	31.5	33.1	35	1
MP3XBR0075N030T10	0.75	1°	3.7°	—	30.8	32.4	34.2	1
MP3XBR0075N030T15	0.75	1.5°	3.8°	—	—	31.6	33.4	1
MP3XBR0075N046T30	0.75	3°	2.9°	—	—	—	*	2
MP3XBR0100N016T05	1	0.5°	5.2°	17	17.6	18.6	19.5	1
MP3XBR0100N016T10	1	1°	5.3°	—	17.1	18.2	19.1	1
MP3XBR0100N016T15	1	1.5°	5.4°	—	—	22.8	18.7	1

\* No Interference



(mm)

Order Number	RE	BHTA2	B2	0.5°	1°	2°	3°	Type
MP3XBR0100N020T05	1	0.5°	4.5°	21.1	21.8	22.9	24.1	1
MP3XBR0100N020T10	1	1°	4.5°	—	21.2	22.4	23.6	1
MP3XBR0100N020T15	1	1.5°	4.6°	—	—	21.9	23.1	1
MP3XBR0100N020T30	1	3°	4.8°	—	—	—	20.5	1
MP3XBR0100N025T10	1	1°	3.8°	—	26.2	27.7	29.2	1
MP3XBR0100N025T15	1	1.5°	3.9°	—	—	27.1	28.5	1
MP3XBR0100N027T50	1	5°	4.3°	—	—	—	—	2
MP3XBR0100N030T05	1	0.5°	3.3°	31.1	32.1	33.7	35.6	1
MP3XBR0100N030T10	1	1°	3.3°	—	31.3	33	34.8	1
MP3XBR0100N030T15	1	1.5°	3.4°	—	—	32.2	34	1
MP3XBR0100N030T30	1	3°	3.6°	—	—	—	30.6	1
MP3XBR0100N035T05	1	0.5°	2.9°	36.2	37.2	39.2	*	1
MP3XBR0100N035T10	1	1°	3°	—	36.3	38.3	40.4	1
MP3XBR0100N035T15	1	1.5°	3°	—	—	37.4	39.4	1
MP3XBR0100N040T05	1	0.5°	2.6°	41.2	42.4	44.6	*	1
MP3XBR0100N040T10	1	1°	2.7°	—	41.3	43.6	*	1
MP3XBR0100N040T15	1	1.5°	2.7°	—	—	42.6	*	1
MP3XBR0100N042T30	1	3°	2.8°	—	—	—	*	2
MP3XBR0100N050T10	1	1°	2.2°	—	51.4	54.2	*	1
MP3XBR0100N070T10	1	1°	1.7°	—	71.5	*	*	1
MP3XBR0150N010T05	1.5	0.5°	5.7°	11	11.4	12	12.6	1
MP3XBR0150N020T05	1.5	0.5°	3.5°	21.1	21.8	22.9	24.1	1
MP3XBR0150N020T10	1.5	1°	3.6°	—	21.3	22.4	23.6	1
MP3XBR0150N020T15	1.5	1.5°	3.7°	—	—	22	23.2	1
MP3XBR0150N025T30	1.5	3°	3.3°	—	—	—	26.8	1
MP3XBR0150N030T05	1.5	0.5°	2.6°	31.2	32.1	33.7	*	1
MP3XBR0150N030T10	1.5	1°	2.6°	—	31.3	33	*	1
MP3XBR0150N030T15	1.5	1.5°	2.7°	—	—	32.3	*	1
MP3XBR0150N034T30	1.5	3°	2.6°	—	—	—	*	2
MP3XBR0150N035T10	1.5	1°	2.3°	—	36.4	38.3	*	1
MP3XBR0150N035T15	1.5	1.5°	2.4°	—	—	37.5	*	1
MP3XBR0150N040T05	1.5	0.5°	2°	41.3	42.4	44.6	*	1
MP3XBR0150N040T10	1.5	1°	2.1°	—	41.4	43.6	*	1
MP3XBR0150N040T15	1.5	1.5°	2.1°	—	—	42.6	*	1
MP3XBR0150N045T15	1.5	1.5°	1.9°	—	—	*	*	1
MP3XBR0150N050T05	1.5	0.5°	1.7°	51.3	52.7	*	*	1
MP3XBR0150N050T10	1.5	1°	1.7°	—	51.5	*	*	1
MP3XBR0150N052T15	1.5	1.5°	1.7°	—	—	*	*	1
MP3XBR0150N060T10	1.5	1°	1.5°	—	61.5	*	*	1
MP3XBR0150N064T15	1.5	1.5°	1.4°	—	—	*	*	2
MP3XBR0150N070T10	1.5	1°	1.3°	—	71.6	*	*	1
MP3XBR0150N040T30	1.5	3°	3.4°	—	—	—	41.9	1
MP3XBR0150N054T30	1.5	3°	2.7°	—	—	—	*	2
MP3XBR0200N020T10	2	1°	2.6°	—	21.3	22.4	*	1
MP3XBR0200N030T05	2	0.5°	1.8°	31.2	32.1	*	*	1
MP3XBR0200N030T10	2	1°	1.8°	—	31.4	*	*	1
MP3XBR0200N035T10	2	1°	1.6°	—	36.4	*	*	1
MP3XBR0200N040T05	2	0.5°	1.4°	41.3	42.4	*	*	1
MP3XBR0200N040T10	2	1°	1.5°	—	41.4	*	*	1
MP3XBR0200N045T10	2	1°	1.3°	—	46.5	*	*	1
MP3XBR0200N060T05	2	0.5°	1°	61.4	63	*	*	1
MP3XBR0200N066T10	2	1°	1°	—	*	*	*	2

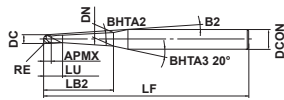
\* No Interference

# MS plus End Mill Series

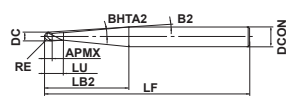
## MP3XB

Ball nose, 3 flute, Taper neck

Type1



Type2



(mm)

Order Number	RE	BHTA2	B2	0.5°	1°	2°	3°	Type
MP3XBR0200N030T30	2	3°	3.6°	—	—	—	31.9	1
MP3XBR0200N045T30	2	3°	2.6°	—	—	—	*	2
MP3XBR0200N050T15	2	1.5°	2.2°	—	—	53	*	1
MP3XBR0200N084T15	2	1.5°	1.5°	—	—	*	*	2
MP3XBR0250N038T10	2.5	1°	0.8°	—	*	*	*	2
MP3XBR0250N036T30	2.5	3°	2.4°	—	—	—	*	2
MP3XBR0250N050T10	2.5	1°	1.7°	—	51.5	*	*	1
MP3XBR0250N065T10	2.5	1°	1.4°	—	66.6	*	*	1
MP3XBR0250N066T15	2.5	1.5°	1.4°	—	—	*	*	2
MP3XBR0300N032T30	3	3°	1.9°	—	—	—	*	2
MP3XBR0300N040T10	3	1°	1.4°	—	41.8	*	*	1
MP3XBR0300N050T10	3	1°	1.2°	—	51.8	*	*	1
MP3XBR0300N053T15	3	1.5°	1.2°	—	—	*	*	2
MP3XBR0300N073T10	3	1°	0.9°	—	*	*	*	2
MP3XBR0300N090T10	3	1°	1.3°	—	92	*	*	1
MP3XBR0400N035T30	4	3°	1.7°	—	—	—	*	2
MP3XBR0400N040T15	4	1.5°	1.5°	—	—	*	*	1
MP3XBR0400N050T10	4	1°	1.2°	—	51.9	*	*	1
MP3XBR0400N056T15	4	1.5°	1.1°	—	—	*	*	2
MP3XBR0400N065T10	4	1°	1°	—	67	*	*	1
MP3XBR0400N076T10	4	1°	0.8°	—	*	*	*	2
MP3XBR0400N090T10	4	1°	1.3°	—	92.1	*	*	1
MP3XBR0500N046T30	5	3°	1.3°	—	—	—	*	2
MP3XBR0500N050T15	5	1.5°	1.2°	—	—	*	*	1
MP3XBR0500N060T10	5	1°	1°	—	62.6	*	*	1
MP3XBR0500N068T15	5	1.5°	0.9°	—	—	*	*	2
MP3XBR0500N070T10	5	1°	0.9°	—	*	*	*	1
MP3XBR0500N100T10	5	1°	1.7°	—	102.8	*	*	1
MP3XBR0600N069T30	6	3°	1.8°	—	—	—	*	2
MP3XBR0600N070T10	6	1°	1.6°	—	72.7	*	*	1
MP3XBR0600N080T15	6	1.5°	1.5°	—	—	*	*	1
MP3XBR0600N100T10	6	1°	1.2°	—	102.9	*	*	1

\* No Interference

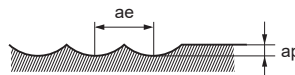


## Recommended Cutting Conditions

(mm)

Workpiece Material			Carbon steel, Alloy steel (180–280HB) Alloy tool steel (≤350HB) Pre-hardened steel (35–45HRC)				Hardened steel (45–55HRC)				Copper, Copper alloys				
RE	BHTA2	LB2	n (min <sup>-1</sup> )	vf (mm/min)	ap	ae	n (min <sup>-1</sup> )	vf (mm/min)	ap	ae	n (min <sup>-1</sup> )	vf (mm/min)	ap	ae	
<b>R0.5</b>	<b>0.5°</b>	<b>8</b>	40000	1200	0.07	0.22	39000	1200	0.06	0.19	39000	1200	0.12	0.38	
		<b>12</b>	40000	1200	0.06	0.19	39000	1200	0.05	0.16	39000	1200	0.1	0.32	
		<b>16</b>	35000	1100	0.06	0.18	33000	900	0.04	0.14	33000	900	0.09	0.29	
		<b>20</b>	32000	960	0.05	0.14	29000	800	0.04	0.11	29000	800	0.07	0.22	
		<b>25</b>	28000	830	0.03	0.11	24000	600	0.02	0.07	24000	600	0.05	0.15	
		<b>30</b>	24000	720	0.03	0.1	21000	450	0.02	0.06	21000	450	0.04	0.13	
		<b>50</b>	10000	300	0.003	0.015	11000	150	0.003	0.015	11000	150	0.006	0.019	
	<b>1°</b>	<b>10</b>	40000	1200	0.07	0.22	39000	1300	0.06	0.19	39000	1300	0.12	0.38	
		<b>16</b>	35000	1100	0.06	0.18	33000	1000	0.05	0.14	33000	1000	0.09	0.29	
		<b>20</b>	32000	960	0.05	0.14	29000	900	0.04	0.11	29000	900	0.07	0.22	
		<b>25</b>	28000	830	0.04	0.11	24000	700	0.03	0.08	24000	700	0.05	0.16	
		<b>30</b>	24000	720	0.03	0.1	21000	550	0.02	0.06	21000	550	0.04	0.13	
		<b>35</b>	17000	500	0.03	0.08	13000	350	0.02	0.05	13000	350	0.03	0.1	
		<b>50</b>	10000	300	0.003	0.015	11000	250	0.003	0.015	11000	250	0.006	0.019	
	<b>1.5°</b>	<b>10</b>	40000	1200	0.07	0.22	39000	1400	0.06	0.19	39000	1400	0.12	0.38	
		<b>16</b>	35000	1100	0.06	0.18	33000	1100	0.05	0.14	33000	1100	0.09	0.29	
		<b>20</b>	32000	960	0.05	0.14	29000	1000	0.04	0.11	29000	1000	0.07	0.22	
		<b>23</b>	27000	830	0.04	0.11	24000	800	0.03	0.08	24000	800	0.05	0.16	
		<b>25</b>	27000	830	0.04	0.12	24000	800	0.03	0.09	24000	800	0.05	0.17	
	<b>3°</b>	<b>10</b>	40000	1200	0.07	0.22	39000	1500	0.06	0.19	39000	1500	0.12	0.38	
		<b>20</b>	32000	960	0.05	0.14	29000	1100	0.04	0.11	29000	1100	0.07	0.22	
		<b>30</b>	22000	660	0.03	0.1	19000	700	0.02	0.06	19000	700	0.04	0.13	
		<b>42</b>	13000	390	0.005	0.02	11000	390	0.005	0.02	11000	390	0.01	0.03	
	<b>5°</b>	<b>25</b>	32000	960	0.04	0.11	29000	1000	0.03	0.08	29000	1000	0.05	0.16	
	<b>R0.75</b>	<b>0.5°</b>	<b>10</b>	30000	1800	0.11	0.34	28000	1500	0.1	0.3	28000	1500	0.19	0.61
			<b>16</b>	27000	1600	0.09	0.27	24000	1100	0.08	0.24	24000	1100	0.15	0.48
			<b>20</b>	26000	1500	0.08	0.24	24000	1100	0.07	0.21	24000	1100	0.13	0.42
			<b>30</b>	25000	1400	0.07	0.21	22000	1000	0.06	0.18	22000	1000	0.11	0.35
<b>1°</b>		<b>10</b>	30000	1900	0.11	0.34	28000	1600	0.1	0.3	28000	1600	0.19	0.61	
		<b>16</b>	26000	1600	0.09	0.27	24000	1200	0.08	0.24	24000	1200	0.15	0.48	
		<b>20</b>	27000	1700	0.08	0.24	24000	1200	0.07	0.21	24000	1200	0.13	0.42	
		<b>30</b>	25000	1500	0.07	0.21	22000	1100	0.06	0.18	22000	1100	0.11	0.35	
<b>1.5°</b>		<b>10</b>	30000	1900	0.11	0.34	28000	1700	0.1	0.3	28000	1700	0.19	0.61	
		<b>16</b>	27500	1700	0.09	0.27	24000	1300	0.08	0.24	24000	1300	0.15	0.48	
		<b>20</b>	26500	1700	0.08	0.24	24000	1300	0.07	0.21	24000	1300	0.13	0.42	
		<b>25</b>	26000	1600	0.07	0.22	23000	1200	0.06	0.19	23000	1200	0.12	0.38	
		<b>30</b>	25000	1500	0.07	0.21	22000	1100	0.06	0.18	22000	1100	0.11	0.35	
<b>3°</b>		<b>46</b>	15000	450	0.05	0.16	14000	800	0.04	0.13	14000	800	0.08	0.26	

Depth of cut



Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.

Note 2) Vibration may occur if the rigidity of machine or workpiece material is low. In this case, please reduce the revolution and feed rate proportionately.

# MS plus End Mill Series

## MP3XB

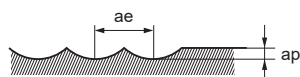
Ball nose, 3 flute, Taper neck

### Recommended Cutting Conditions

(mm)

Workpiece Material			Carbon steel, Alloy steel (180–280HB) Alloy tool steel (≤350HB) Pre-hardened steel (35–45HRC)				Hardened steel (45–55HRC)				Copper, Copper alloys				
RE	BHTA2	LB2	n (min <sup>-1</sup> )	vf (mm/min)	ap	ae	n (min <sup>-1</sup> )	vf (mm/min)	ap	ae	n (min <sup>-1</sup> )	vf (mm/min)	ap	ae	
<b>R1.0</b>	<b>0.5°</b>	<b>16</b>	25000	1500	0.14	0.45	22000	1600	0.13	0.42	22000	1600	0.26	0.83	
		<b>20</b>	23000	1400	0.1	0.3	20000	1400	0.09	0.27	20000	1400	0.17	0.54	
		<b>30</b>	20000	1200	0.05	0.17	18000	1100	0.06	0.18	18000	1100	0.13	0.42	
		<b>35</b>	19000	1100	0.05	0.15	17000	1000	0.05	0.16	17000	1000	0.12	0.38	
		<b>40</b>	19000	1100	0.04	0.14	16000	900	0.05	0.14	16000	900	0.11	0.35	
	<b>1°</b>	<b>16</b>	25000	2300	0.14	0.45	22000	1700	0.13	0.42	22000	1700	0.26	0.83	
		<b>20</b>	23000	2100	0.1	0.3	20000	1500	0.09	0.27	20000	1500	0.17	0.54	
		<b>25</b>	23000	1400	0.06	0.19	20000	1300	0.07	0.21	20000	1300	0.16	0.5	
		<b>30</b>	20000	1200	0.05	0.17	18000	1200	0.06	0.18	18000	1200	0.13	0.42	
		<b>35</b>	19000	1100	0.05	0.15	17000	1100	0.05	0.15	17000	1100	0.12	0.37	
		<b>40</b>	19000	1100	0.04	0.14	16000	1000	0.05	0.14	16000	1000	0.11	0.35	
		<b>50</b>	17000	900	0.03	0.09	15000	900	0.03	0.08	15000	900	0.06	0.19	
		<b>70</b>	13000	700	0.02	0.06	11000	650	0.02	0.05	11000	650	0.04	0.12	
	<b>1.5°</b>	<b>16</b>	25000	2300	0.14	0.45	22000	1800	0.13	0.42	22000	1800	0.26	0.83	
		<b>20</b>	23000	2100	0.1	0.3	20000	1600	0.09	0.27	20000	1600	0.17	0.54	
		<b>25</b>	23000	1600	0.06	0.19	20000	1400	0.07	0.21	20000	1400	0.16	0.5	
		<b>30</b>	20000	1200	0.05	0.17	18000	1300	0.06	0.18	18000	1300	0.13	0.42	
		<b>35</b>	19000	1100	0.05	0.15	16000	1100	0.05	0.16	17000	1100	0.12	0.38	
		<b>40</b>	19000	1100	0.04	0.14	16000	1000	0.05	0.14	16000	1000	0.11	0.35	
	<b>3°</b>	<b>20</b>	23000	2100	0.1	0.3	20000	1700	0.09	0.27	20000	1700	0.17	0.54	
		<b>30</b>	18000	1600	0.08	0.26	16000	1300	0.07	0.22	16500	1300	0.14	0.45	
		<b>42</b>	16000	1400	0.07	0.21	13000	1000	0.06	0.18	13000	1000	0.11	0.35	
	<b>5°</b>	<b>27</b>	18000	2200	0.09	0.29	17000	1900	0.08	0.26	17000	1900	0.16	0.51	
	<b>R1.5</b>	<b>0.5°</b>	<b>10</b>	20000	2400	0.22	0.7	17000	1900	0.21	0.67	17000	1900	0.42	1.34
			<b>20</b>	17000	2000	0.2	0.64	15000	1600	0.19	0.61	15000	1600	0.38	1.22
			<b>30</b>	16000	1700	0.14	0.45	13000	1400	0.13	0.42	13000	1400	0.26	0.83
			<b>40</b>	16000	1400	0.08	0.24	12000	1200	0.09	0.27	12000	1200	0.2	0.65
			<b>50</b>	13000	1100	0.06	0.2	11000	1100	0.07	0.22	11000	1100	0.17	0.54
<b>1°</b>		<b>20</b>	17000	2000	0.2	0.64	15000	1800	0.19	0.61	15000	1800	0.38	1.22	
		<b>30</b>	17000	1900	0.14	0.45	13000	1500	0.13	0.42	13000	1500	0.26	0.83	
		<b>35</b>	16000	1700	0.08	0.26	13000	1500	0.09	0.29	13000	1500	0.22	0.69	
		<b>40</b>	16000	1500	0.08	0.24	13000	1300	0.09	0.27	13000	1300	0.2	0.65	
		<b>50</b>	13000	1200	0.06	0.2	11000	1100	0.07	0.22	11000	1100	0.17	0.54	
		<b>60</b>	13000	1100	0.06	0.19	11000	1000	0.07	0.21	11000	1000	0.16	0.5	
		<b>70</b>	10000	800	0.05	0.17	9000	700	0.06	0.18	9000	700	0.13	0.42	
<b>1.5°</b>		<b>20</b>	17000	2000	0.2	0.64	15000	1900	0.19	0.61	15000	1900	0.38	1.22	
		<b>30</b>	16000	1800	0.14	0.45	13000	1600	0.13	0.42	13000	1600	0.26	0.83	
		<b>35</b>	15000	1700	0.08	0.26	12000	1400	0.09	0.29	12000	1400	0.22	0.69	
		<b>40</b>	15000	1600	0.08	0.24	12000	1300	0.09	0.27	12000	1300	0.2	0.65	
		<b>45</b>	13000	1400	0.07	0.22	11000	1300	0.08	0.24	11000	1300	0.18	0.58	
		<b>52</b>	13000	1300	0.06	0.2	11000	1100	0.07	0.22	11000	1100	0.17	0.54	
		<b>64</b>	10000	900	0.06	0.18	9000	900	0.06	0.19	9000	900	0.14	0.46	
<b>3°</b>		<b>25</b>	16000	2400	0.16	0.51	13000	1900	0.15	0.48	13000	1900	0.3	0.96	
		<b>34</b>	14000	2100	0.13	0.4	11000	1600	0.12	0.37	11000	1600	0.23	0.74	
		<b>40</b>	14000	1700	0.12	0.37	11000	1400	0.11	0.34	11000	1400	0.21	0.67	
		<b>54</b>	12000	1400	0.1	0.3	10000	1200	0.09	0.27	10000	1200	0.17	0.54	

Depth of cut



(mm)

Workpiece Material			Carbon steel, Alloy steel (180–280HB) Alloy tool steel (≤350HB) Pre-hardened steel (35–45HRC)				Hardened steel (45–55HRC)				Copper, Copper alloys				
RE	BHTA2	LB2	n (min <sup>-1</sup> )	vf (mm/min)	ap	ae	n (min <sup>-1</sup> )	vf (mm/min)	ap	ae	n (min <sup>-1</sup> )	vf (mm/min)	ap	ae	
R2.0	0.5°	30	14000	2100	0.23	0.74	11000	1800	0.22	0.7	11000	1800	0.44	1.41	
		40	12000	1800	0.19	0.61	10000	1600	0.18	0.58	10000	1600	0.36	1.15	
		60	9000	1300	0.06	0.19	8500	1400	0.07	0.21	8500	1400	0.16	0.5	
	1°	20	15000	2700	0.31	0.99	12000	2200	0.3	0.96	12000	2200	0.72	2.3	
		30	14000	2100	0.23	0.74	11000	1800	0.22	0.7	11000	1800	0.53	1.69	
		35	12000	1800	0.21	0.67	10000	1700	0.2	0.64	10000	1700	0.48	1.54	
		40	12000	1700	0.19	0.61	10000	1600	0.18	0.58	10000	1600	0.43	1.38	
		45	12000	1500	0.13	0.42	10000	1600	0.12	0.38	10000	1600	0.29	0.92	
	1.5°	66	9000	1100	0.08	0.24	8500	1300	0.07	0.21	8500	1300	0.16	0.5	
		50	12000	2200	0.11	0.35	10000	1700	0.1	0.32	10000	1700	0.24	0.77	
	3°	84	8000	1400	0.04	0.13	6500	900	0.03	0.1	6500	900	0.07	0.23	
		30	14000	2500	0.23	0.74	11000	2000	0.22	0.7	11000	2000	0.53	1.69	
	R2.5	1°	45	11000	1900	0.16	0.51	9000	1600	0.15	0.48	9000	1600	0.36	1.15
			38	10000	2200	0.28	0.9	8500	2000	0.27	0.86	8500	2000	0.65	2.07
50			9000	1900	0.24	0.77	8000	1800	0.23	0.74	8000	1800	0.55	1.77	
1.5°		65	8000	1600	0.16	0.51	6500	1400	0.15	0.48	6500	1400	0.36	1.15	
3°		66	8000	1600	0.16	0.51	6500	1500	0.15	0.48	6500	1500	0.36	1.15	
R3.0	1°	36	10000	2700	0.31	0.99	8500	2300	0.3	0.96	8500	2300	0.72	2.3	
		40	8000	2200	0.28	0.9	7500	2100	0.27	0.86	7500	2100	0.65	2.07	
		50	8000	2000	0.23	0.74	6500	1800	0.22	0.7	6500	1800	0.53	1.69	
		73	7000	1700	0.15	0.48	6500	1700	0.14	0.45	6500	1700	0.34	1.07	
	90	6500	1500	0.09	0.29	6000	1300	0.08	0.26	6000	1300	0.19	0.61		
1.5°	53	7000	2100	0.22	0.7	6500	1900	0.21	0.67	6500	1900	0.5	1.61		
3°	32	9000	2400	0.35	1.12	8000	2200	0.34	1.09	8000	2200	0.82	2.61		
R4.0	1°	40	6000	2200	0.41	1.31	5500	2000	0.4	1.28	5500	2000	0.96	3.07	
		65	6000	2000	0.36	1.15	5200	1700	0.35	1.12	5200	1700	0.84	2.69	
		76	6000	1800	0.29	0.93	5000	1500	0.28	0.9	5000	1500	0.67	2.15	
		90	5000	1400	0.19	0.61	4700	1200	0.18	0.58	4700	1200	0.43	1.38	
	1.5°	40	6000	2300	0.46	1.47	5800	2200	0.45	1.44	5800	2200	1.08	3.46	
	56	6000	2200	0.38	1.22	5500	2000	0.37	1.18	5500	2000	0.9	2.84		
3°	35	7000	2700	0.49	1.57	6000	2400	0.48	1.54	6000	2400	1.15	3.69		
R5.0	1°	60	5500	2600	0.51	1.63	4500	2300	0.5	1.6	4500	2300	1.2	3.84	
		70	5500	2600	0.46	1.47	4500	2200	0.45	1.44	4500	2200	1.08	3.46	
		100	5000	2400	0.36	1.15	4000	1900	0.35	1.12	4000	1900	0.84	2.69	
	1.5°	50	5000	2400	0.56	1.79	4600	2400	0.55	1.76	4600	2400	1.32	4.22	
	68	5000	2400	0.49	1.57	4600	2300	0.48	1.54	4600	2300	1.15	3.69		
3°	46	5000	2400	0.69	2.21	4800	2500	0.68	2.18	4800	2500	1.63	5.22		
R6.0	1°	70	4500	2600	0.81	2.59	4000	2100	0.8	2.56	4000	2100	1.92	6.14	
		100	4000	2200	0.61	1.95	3500	1800	0.6	1.92	3500	1800	1.44	4.61	
	1.5°	80	5000	2300	0.71	2.27	4000	2000	0.7	2.24	4000	2000	1.68	5.38	
	3°	69	5000	2700	0.81	2.59	4000	2200	0.8	2.56	4000	2200	1.92	6.14	
Depth of cut															

Note 1) If the depth of cut is shallow, the revolution and feed rate can be increased.

Note 2) Vibration may occur if the rigidity of machine or workpiece material is low. In this case, please reduce the revolution and feed rate proportionately.

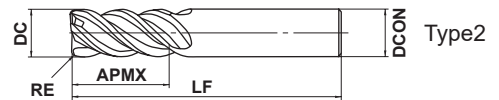
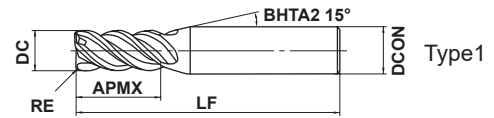
# MS plus End Mill Series

## MPMHVRB

Corner radius, Medium cut length, 4 flute, Irregular helix flutes



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel, Hardened Steel (<=45HRC)	Hardened Steel (<=55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○	○		◎	○		



	0.1 ≤ RE ≤ 5				
	±0.015				
	DC ≤ 12	DC > 12			
	0 - 0.02	0 - 0.03			
	DCON=4	DCON=6	DCON=8		
	0 - 0.005	0 - 0.005	0 - 0.006		
	DCON=8(DC=10)	DCON=10(DC=12)	DCON=10	12 ≤ DCON ≤ 16	DCON=20
	0 - 0.009	0 - 0.009	0 - 0.009	0 - 0.011	0 - 0.013

● 4 flute irregular helix end mill for reduced vibration when machining stainless and carbon steels.

(mm)

Order Number	DC	RE	APMX	LF	DCON	No.F*	Stock	Type
MPMHVRBD0100R010	1	0.1	2.5	45	4	4	●	1
MPMHVRBD0100R020	1	0.2	2.5	45	4	4	●	1
MPMHVRBD0200R010	2	0.1	5	45	4	4	●	1
MPMHVRBD0200R020	2	0.2	5	45	4	4	●	1
MPMHVRBD0200R030	2	0.3	5	45	4	4	●	1
MPMHVRBD0200R050	2	0.5	5	45	4	4	●	1
MPMHVRBD0300R010	3	0.1	7.5	45	6	4	●	1
MPMHVRBD0300R020	3	0.2	7.5	45	6	4	●	1
MPMHVRBD0300R030	3	0.3	7.5	45	6	4	●	1
MPMHVRBD0300R050	3	0.5	7.5	45	6	4	●	1
MPMHVRBD0400R010	4	0.1	10	45	6	4	●	1
MPMHVRBD0400R020	4	0.2	10	45	6	4	●	1
MPMHVRBD0400R030	4	0.3	10	45	6	4	●	1
MPMHVRBD0400R050	4	0.5	10	45	6	4	●	1
MPMHVRBD0400R100	4	1	10	45	6	4	●	1
MPMHVRBD0500R010	5	0.1	12.5	50	6	4	●	1
MPMHVRBD0500R020	5	0.2	12.5	50	6	4	●	1
MPMHVRBD0500R030	5	0.3	12.5	50	6	4	●	1
MPMHVRBD0500R050	5	0.5	12.5	50	6	4	●	1
MPMHVRBD0500R100	5	1	12.5	50	6	4	●	1
MPMHVRBD0600R010	6	0.1	15	60	6	4	●	2
MPMHVRBD0600R020	6	0.2	15	60	6	4	●	2
MPMHVRBD0600R030	6	0.3	15	60	6	4	●	2
MPMHVRBD0600R050	6	0.5	15	60	6	4	●	2
MPMHVRBD0600R100	6	1	15	60	6	4	●	2
MPMHVRBD0800R020	8	0.2	20	70	8	4	●	2
MPMHVRBD0800R030	8	0.3	20	70	8	4	●	2
MPMHVRBD0800R050	8	0.5	20	70	8	4	●	2
MPMHVRBD0800R100	8	1	20	70	8	4	●	2
MPMHVRBD0800R150	8	1.5	20	70	8	4	●	2
MPMHVRBD0800R200	8	2	20	70	8	4	●	2
MPMHVRBD0800R250	8	2.5	20	70	8	4	●	2

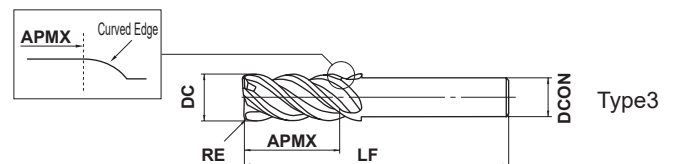
\* Number of Flutes

● : Inventory maintained in Japan.

(mm)

Order Number	DC	RE	APMX	LF	DCON	No.F <sup>*</sup>	Stock	Type
MPMHVRBD0800R300	8	3	20	70	8	4	●	2
MPMHVRBD1000R020	10	0.2	25	80	10	4	●	2
MPMHVRBD1000R030	10	0.3	25	80	10	4	●	2
MPMHVRBD1000R050	10	0.5	25	80	10	4	●	2
MPMHVRBD1000R100	10	1	25	80	10	4	●	2
MPMHVRBD1000R150	10	1.5	25	80	10	4	●	2
MPMHVRBD1000R200	10	2	25	80	10	4	●	2
MPMHVRBD1000R250	10	2.5	25	80	10	4	●	2
MPMHVRBD1000R300	10	3	25	80	10	4	●	2
MPMHVRBD1200R030	12	0.3	30	100	12	4	●	2
MPMHVRBD1200R050	12	0.5	30	100	12	4	●	2
MPMHVRBD1200R100	12	1	30	100	12	4	●	2
MPMHVRBD1200R150	12	1.5	30	100	12	4	●	2
MPMHVRBD1200R200	12	2	30	100	12	4	●	2
MPMHVRBD1200R300	12	3	30	100	12	4	●	2
MPMHVRBD1600R030	16	0.3	40	110	16	4	●	2
MPMHVRBD1600R050	16	0.5	40	110	16	4	●	2
MPMHVRBD1600R100	16	1	40	110	16	4	●	2
MPMHVRBD1600R200	16	2	40	110	16	4	●	2
MPMHVRBD1600R300	16	3	40	110	16	4	●	2
MPMHVRBD1600R500	16	5	40	110	16	4	●	2
MPMHVRBD2000R030	20	0.3	50	125	20	4	●	2
MPMHVRBD2000R050	20	0.5	50	125	20	4	●	2
MPMHVRBD2000R100	20	1	50	125	20	4	●	2
MPMHVRBD2000R200	20	2	50	125	20	4	●	2
MPMHVRBD2000R300	20	3	50	125	20	4	●	2
MPMHVRBD2000R500	20	5	50	125	20	4	●	2

\* Number of Flutes



### ■ Slim Shank

(mm)

Order Number	DC	RE	APMX	LF	DCON	No.F <sup>*</sup>	Stock	Type
MPMHVRBD1000R030S08	10	0.3	25	100	8	4	●	3
MPMHVRBD1000R050S08	10	0.5	25	100	8	4	●	3
MPMHVRBD1000R100S08	10	1	25	100	8	4	●	3
MPMHVRBD1000R200S08	10	2	25	100	8	4	●	3
MPMHVRBD1200R030S10	12	0.3	30	110	10	4	●	3
MPMHVRBD1200R050S10	12	0.5	30	110	10	4	●	3
MPMHVRBD1200R100S10	12	1	30	110	10	4	●	3
MPMHVRBD1200R200S10	12	2	30	110	10	4	●	3
MPMHVRBD1200R300S10	12	3	30	110	10	4	●	3

\* Number of Flutes

DC = Cutting Diameter  
 RE = Corner Radius  
 APMX = Depth of Cut Max.

LF = Functional Length  
 DCON = Connection Diameter

## MPMHVRB

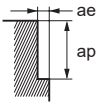
Corner radius, Medium cut length, 4 flute, Irregular helix flutes

### Recommended Cutting Conditions

#### Side Milling

(mm)

DC	Carbon steel, Alloy steel (180–280HB) Ductile Cast Iron				Carbon steel, Alloy steel (280–350HB) Pre-hardened steel, Alloy tool steel				Austenitic stainless steel (≤200HB) Titanium alloys				Hardened Steel (45–52HRC)			
	n (min <sup>-1</sup> )	vf (mm/min)	ap	ae	n (min <sup>-1</sup> )	vf (mm/min)	ap	ae	n (min <sup>-1</sup> )	vf (mm/min)	ap	ae	n (min <sup>-1</sup> )	vf (mm/min)	ap	ae
1	38000	910	1.7	0.2	31000	500	1.7	0.2	25000	500	1.7	0.2	18000	290	1.7	0.05
2	21000	1500	3.5	0.4	17000	820	3.5	0.4	14000	640	3.5	0.4	10000	320	3.5	0.1
3	16000	1800	5	0.6	13000	940	5	0.6	11000	880	5	0.6	7400	380	5	0.15
4	12000	1700	7	0.8	9500	950	7	0.8	8000	900	7	0.8	5600	400	7	0.2
5	9500	1800	8.5	1	7600	1100	8.5	1	6400	900	8.5	1	4500	430	8.5	0.25
6	8000	2100	10	1.2	6400	1300	10	1.2	5300	1100	10	1.2	3700	440	10	0.3
8	6000	2000	13.5	1.6	4800	1400	13.5	1.6	4000	1200	13.5	1.6	2800	450	13.5	0.4
10	4800	2100	17	2	3800	1500	17	2	3200	1100	17	2	2200	440	17	0.5
12	4000	1900	20.5	2.4	3200	1400	20.5	2.4	2700	1100	20.5	2.4	1900	380	20.5	0.6
16	3000	1400	27.2	3.2	2400	1100	27.2	3.2	2000	840	27.2	3.2	1400	340	27.2	0.8
20	2400	1200	34	4	1900	840	34	4	1600	670	34	4	1100	260	34	1



Note 1) When using a slim shank with DC=10 or 12, reduce the cutting speed by 60%, the feed rate by 80%, and the depth of cut ae by 50% from the above conditions.

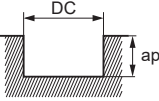
Note 2) Water-soluble cutting fluids are recommended for stainless steel and titanium alloys. Air blowing is recommended for carbon steel.

Note 3) Chattering can still occur if the machine rigidity and clamping method are insufficient. In these cases the feed and speed should be reduced proportionately.

#### Slotting

(mm)

DC	Carbon steel, Alloy steel (180–280HB) Ductile Cast Iron			Carbon steel, Alloy steel (280–350HB) Pre-hardened steel, Alloy tool steel			Austenitic stainless steel (≤200HB) Titanium alloys			Hardened Steel (45–52HRC)		
	n (min <sup>-1</sup> )	vf (mm/min)	ap	n (min <sup>-1</sup> )	vf (mm/min)	ap	n (min <sup>-1</sup> )	vf (mm/min)	ap	n (min <sup>-1</sup> )	vf (mm/min)	ap
1	31000	620	0.5	24000	380	0.5	20000	320	0.5	9500	110	0.2
2	17000	650	2	14000	450	2	11000	350	2	4800	130	0.4
3	13000	940	3	10000	660	3	8500	510	3	3200	140	0.6
4	9500	820	4	7600	600	4	6400	460	4	2400	150	0.8
5	7600	910	5	6100	670	5	5100	510	5	1900	170	1
6	6400	860	6	5100	630	6	4200	470	6	1600	190	1.2
8	4800	1000	8	3800	750	8	3200	580	8	1200	190	1.6
10	3800	910	10	3100	680	10	2500	500	10	950	150	2
12	3200	920	12	2500	660	12	2100	500	12	800	160	2.4
16	2400	690	16	1900	500	16	1600	380	16	600	120	3.2
20	1900	550	20	1500	400	20	1300	310	20	480	96	4



DC: Diameter

Note 4) Slotting is not recommended when using a slim shank type.

# MPXLRB

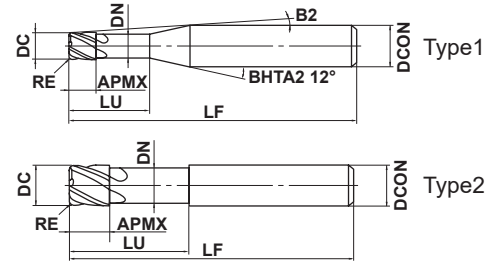
Corner radius, Short cut length, Long neck



DC ≤ 0.3

DC ≥ 0.4

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○	○		○	○	○	



	0.05 ≤ RE ≤ 0.5			
	±0.005			
	0.2 ≤ DC ≤ 6			
	0 - 0.01			
	4 ≤ DCON ≤ 6			
	0 - 0.005			

Please refer to pages 59-61 for the actual effective neck length for the B2 angle and workpiece inclination angle.

● Suitable for high precision and highly efficient mould and die machining.

(mm)

Order Number	DC	RE	APMX	LU	DN	LF	DCON	No. F.*	Stock	Type
MPXLRBD0020R005N005	0.2	0.05	0.2	0.5	0.18	50	4	2	●	1
MPXLRBD0020R005N010	0.2	0.05	0.2	1	0.18	50	4	2	●	1
MPXLRBD0030R005N010	0.3	0.05	0.3	1	0.28	50	4	2	●	1
MPXLRBD0030R005N020	0.3	0.05	0.3	2	0.28	50	4	2	●	1
MPXLRBD0040R005N020	0.4	0.05	0.4	2	0.37	50	4	4	●	1
MPXLRBD0040R005N030	0.4	0.05	0.4	3	0.37	50	4	4	●	1
MPXLRBD0040R005N040	0.4	0.05	0.4	4	0.37	50	4	4	●	1
MPXLRBD0050R005N020	0.5	0.05	0.5	2	0.47	50	4	4	●	1
MPXLRBD0050R005N030	0.5	0.05	0.5	3	0.47	50	4	4	●	1
MPXLRBD0050R005N040	0.5	0.05	0.5	4	0.47	50	4	4	●	1
MPXLRBD0050R005N050	0.5	0.05	0.5	5	0.47	50	4	4	●	1
MPXLRBD0060R005N020	0.6	0.05	0.6	2	0.57	50	4	4	●	1
MPXLRBD0060R005N040	0.6	0.05	0.6	4	0.57	50	4	4	●	1
MPXLRBD0060R005N060	0.6	0.05	0.6	6	0.57	50	4	4	●	1
MPXLRBD0080R005N040	0.8	0.05	0.8	4	0.77	50	4	4	●	1
MPXLRBD0080R005N060	0.8	0.05	0.8	6	0.77	50	4	4	●	1
MPXLRBD0100R005N030	1	0.05	1	3	0.96	50	4	4	●	1
MPXLRBD0100R005N040	1	0.05	1	4	0.96	50	4	4	●	1
MPXLRBD0100R005N050	1	0.05	1	5	0.96	50	4	4	●	1
MPXLRBD0100R005N060	1	0.05	1	6	0.96	50	4	4	●	1
MPXLRBD0100R005N080	1	0.05	1	8	0.96	50	4	4	●	1
MPXLRBD0100R005N100	1	0.05	1	10	0.96	50	4	4	●	1
MPXLRBD0100R005N120	1	0.05	1	12	0.96	50	4	4	●	1
MPXLRBD0100R010N030	1	0.1	1	3	0.96	50	4	4	●	1
MPXLRBD0100R010N040	1	0.1	1	4	0.96	50	4	4	●	1
MPXLRBD0100R010N050	1	0.1	1	5	0.96	50	4	4	●	1
MPXLRBD0100R010N060	1	0.1	1	6	0.96	50	4	4	●	1
MPXLRBD0100R010N080	1	0.1	1	8	0.96	50	4	4	●	1
MPXLRBD0100R010N100	1	0.1	1	10	0.96	50	4	4	●	1
MPXLRBD0100R010N120	1	0.1	1	12	0.96	50	4	4	●	1
MPXLRBD0120R010N100	1.2	0.1	1.2	10	1.16	50	4	4	●	1
MPXLRBD0120R020N100	1.2	0.2	1.2	10	1.16	50	4	4	●	1
MPXLRBD0150R010N060	1.5	0.1	1.5	6	1.44	50	4	4	●	1
MPXLRBD0150R010N120	1.5	0.1	1.5	12	1.44	50	4	4	●	1

\* Number of Flutes

● : Inventory maintained in Japan.



# MS plus End Mill Series

## MPXLRB

Corner radius, Short cut length, Long neck

(mm)

Order Number	DC	RE	APMX	LU	DN	LF	DCON	No.F.*	Stock	Type
MPXLRBD0150R010N180	1.5	0.1	1.5	18	1.44	60	4	4	●	1
MPXLRBD0150R020N060	1.5	0.2	1.5	6	1.44	50	4	4	●	1
MPXLRBD0150R020N120	1.5	0.2	1.5	12	1.44	50	4	4	●	1
MPXLRBD0150R020N180	1.5	0.2	1.5	18	1.44	60	4	4	●	1
MPXLRBD0150R030N060	1.5	0.3	1.5	6	1.44	50	4	4	●	1
MPXLRBD0150R030N120	1.5	0.3	1.5	12	1.44	50	4	4	●	1
MPXLRBD0150R030N180	1.5	0.3	1.5	18	1.44	60	4	4	●	1
MPXLRBD0200R010N080	2	0.1	2	8	1.94	50	4	4	●	1
MPXLRBD0200R010N120	2	0.1	2	12	1.94	50	4	4	●	1
MPXLRBD0200R010N160	2	0.1	2	16	1.94	60	4	4	●	1
MPXLRBD0200R010N200	2	0.1	2	20	1.94	60	4	4	●	1
MPXLRBD0200R010N240	2	0.1	2	24	1.94	70	4	4	●	1
MPXLRBD0200R020N080	2	0.2	2	8	1.94	50	4	4	●	1
MPXLRBD0200R020N120	2	0.2	2	12	1.94	50	4	4	●	1
MPXLRBD0200R020N160	2	0.2	2	16	1.94	60	4	4	●	1
MPXLRBD0200R020N200	2	0.2	2	20	1.94	60	4	4	●	1
MPXLRBD0200R020N240	2	0.2	2	24	1.94	70	4	4	●	1
MPXLRBD0200R030N080	2	0.3	2	8	1.94	50	4	4	●	1
MPXLRBD0200R030N120	2	0.3	2	12	1.94	50	4	4	●	1
MPXLRBD0200R030N160	2	0.3	2	16	1.94	60	4	4	●	1
MPXLRBD0200R030N200	2	0.3	2	20	1.94	60	4	4	●	1
MPXLRBD0200R030N240	2	0.3	2	24	1.94	70	4	4	●	1
MPXLRBD0300R010N080	3	0.1	3	8	2.9	60	6	4	●	1
MPXLRBD0300R010N120	3	0.1	3	12	2.9	60	6	4	●	1
MPXLRBD0300R010N180	3	0.1	3	18	2.9	70	6	4	●	1
MPXLRBD0300R010N240	3	0.1	3	24	2.9	70	6	4	●	1
MPXLRBD0300R010N300	3	0.1	3	30	2.9	70	6	4	●	1
MPXLRBD0300R010N360	3	0.1	3	36	2.9	90	6	4	●	1
MPXLRBD0300R020N120	3	0.2	3	12	2.9	60	6	4	●	1
MPXLRBD0300R020N180	3	0.2	3	18	2.9	60	6	4	●	1
MPXLRBD0300R020N240	3	0.2	3	24	2.9	70	6	4	●	1
MPXLRBD0300R020N300	3	0.2	3	30	2.9	70	6	4	●	1
MPXLRBD0300R020N360	3	0.2	3	36	2.9	90	6	4	●	1
MPXLRBD0300R030N120	3	0.3	3	12	2.9	60	6	4	●	1
MPXLRBD0300R030N180	3	0.3	3	18	2.9	60	6	4	●	1
MPXLRBD0300R030N240	3	0.3	3	24	2.9	70	6	4	●	1
MPXLRBD0300R030N300	3	0.3	3	30	2.9	70	6	4	●	1
MPXLRBD0300R030N360	3	0.3	3	36	2.9	90	6	4	●	1
MPXLRBD0300R050N120	3	0.5	3	12	2.9	60	6	4	●	1
MPXLRBD0300R050N180	3	0.5	3	18	2.9	60	6	4	●	1
MPXLRBD0300R050N240	3	0.5	3	24	2.9	70	6	4	●	1
MPXLRBD0300R050N300	3	0.5	3	30	2.9	70	6	4	●	1
MPXLRBD0300R050N360	3	0.5	3	36	2.9	90	6	4	●	1
MPXLRBD0400R010N160	4	0.1	4	16	3.9	70	6	4	●	1
MPXLRBD0400R010N240	4	0.1	4	24	3.9	70	6	4	●	1
MPXLRBD0400R010N320	4	0.1	4	32	3.9	70	6	4	●	1
MPXLRBD0400R010N480	4	0.1	4	48	3.9	90	6	4	●	1
MPXLRBD0400R020N160	4	0.2	4	16	3.9	70	6	4	●	1
MPXLRBD0400R020N240	4	0.2	4	24	3.9	70	6	4	●	1
MPXLRBD0400R020N320	4	0.2	4	32	3.9	70	6	4	●	1
MPXLRBD0400R020N480	4	0.2	4	48	3.9	90	6	4	●	1
MPXLRBD0400R030N160	4	0.3	4	16	3.9	70	6	4	●	1

\* Number of Flutes

● : Inventory maintained in Japan.



(mm)

Order Number	DC	RE	APMX	LU	DN	LF	DCON	No.F.*	Stock	Type
MPXLRBD0400R030N240	4	0.3	4	24	3.9	70	6	4	●	1
MPXLRBD0400R030N320	4	0.3	4	32	3.9	70	6	4	●	1
MPXLRBD0400R030N480	4	0.3	4	48	3.9	90	6	4	●	1
MPXLRBD0400R050N160	4	0.5	4	16	3.9	70	6	4	●	1
MPXLRBD0400R050N240	4	0.5	4	24	3.9	70	6	4	●	1
MPXLRBD0400R050N320	4	0.5	4	32	3.9	70	6	4	●	1
MPXLRBD0400R050N480	4	0.5	4	48	3.9	90	6	4	●	1
MPXLRBD0600R010N240	6	0.1	6	24	5.85	70	6	4	●	2
MPXLRBD0600R010N480	6	0.1	6	48	5.85	100	6	4	●	2
MPXLRBD0600R020N240	6	0.2	6	24	5.85	70	6	4	●	2
MPXLRBD0600R020N480	6	0.2	6	48	5.85	100	6	4	●	2
MPXLRBD0600R030N240	6	0.3	6	24	5.85	70	6	4	●	2
MPXLRBD0600R030N480	6	0.3	6	48	5.85	100	6	4	●	2
MPXLRBD0600R050N240	6	0.5	6	24	5.85	70	6	4	●	2
MPXLRBD0600R050N480	6	0.5	6	48	5.85	100	6	4	●	2

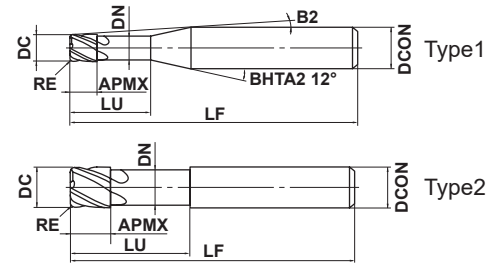
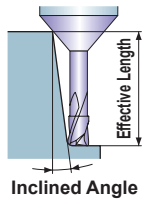
\* Number of Flutes

# MS plus End Mill Series

## MPXLRB

Corner radius, Short cut length, Long neck

### Effective Length for Inclined Angle



(mm)

Order Number	DC	B2	0.5°	1°	2°	3°	Type
MPXLRBD0020R005N005	0.2	11.4°	0.5	0.5	0.6	0.7	1
MPXLRBD0020R005N010	0.2	10.8°	1	1.1	1.2	1.3	1
MPXLRBD0030R005N010	0.3	10.8°	1	1.1	1.2	1.3	1
MPXLRBD0030R005N020	0.3	9.8°	2.1	2.2	2.4	2.7	1
MPXLRBD0040R005N020	0.4	9.8°	2.1	2.2	2.4	2.6	1
MPXLRBD0040R005N030	0.4	8.9°	3.1	3.3	3.6	4	1
MPXLRBD0040R005N040	0.4	8.2°	4.2	4.3	4.8	5.3	1
MPXLRBD0050R005N020	0.5	9.7°	2.1	2.2	2.4	2.6	1
MPXLRBD0050R005N030	0.5	8.9°	3.1	3.3	3.6	4	1
MPXLRBD0050R005N040	0.5	8.1°	4.2	4.3	4.8	5.3	1
MPXLRBD0050R005N050	0.5	7.5°	5.2	5.4	6	6.6	1
MPXLRBD0060R005N020	0.6	9.7°	2.1	2.2	2.4	2.6	1
MPXLRBD0060R005N040	0.6	8.1°	4.2	4.3	4.8	5.3	1
MPXLRBD0060R005N060	0.6	6.9°	6.2	6.5	7.2	7.9	1
MPXLRBD0080R005N040	0.8	7.9°	4.2	4.3	4.8	5.3	1
MPXLRBD0080R005N060	0.8	6.8°	6.2	6.5	7.2	7.9	1
MPXLRBD0100R005N030	1	8.3°	3.2	3.4	3.8	4.2	1
MPXLRBD0100R005N040	1	7.6°	4.3	4.5	5	5.6	1
MPXLRBD0100R005N050	1	7.0°	5.4	5.6	6.2	6.9	1
MPXLRBD0100R005N060	1	6.5°	6.4	6.7	7.4	8.2	1
MPXLRBD0100R005N080	1	5.6°	8.5	8.9	9.8	10.9	1
MPXLRBD0100R005N100	1	5.0°	10.6	11.1	12.2	13.5	1
MPXLRBD0100R005N120	1	4.5°	12.7	13.3	14.6	16.2	1
MPXLRBD0100R010N030	1	8.4°	3.2	3.4	3.8	4.2	1
MPXLRBD0100R010N040	1	7.6°	4.3	4.5	5	5.5	1
MPXLRBD0100R010N050	1	7.0°	5.3	5.6	6.2	6.9	1
MPXLRBD0100R010N060	1	6.5°	6.4	6.7	7.4	8.2	1
MPXLRBD0100R010N080	1	5.6°	8.5	8.9	9.8	10.8	1
MPXLRBD0100R010N100	1	5.0°	10.6	11.1	12.2	13.5	1
MPXLRBD0100R010N120	1	4.5°	12.7	13.3	14.6	16.2	1
MPXLRBD0120R010N100	1.2	4.8°	10.6	11.1	12.2	13.5	1
MPXLRBD0120R020N100	1.2	4.8°	10.6	11.1	12.2	13.5	1
MPXLRBD0150R010N060	1.5	6.0°	6.4	6.7	7.3	8.1	1
MPXLRBD0150R010N120	1.5	4.0°	12.6	13.2	14.5	16.1	1
MPXLRBD0150R010N180	1.5	3.0°	18.9	19.7	21.7	24	1
MPXLRBD0150R020N060	1.5	6.0°	6.4	6.7	7.3	8.1	1
MPXLRBD0150R020N120	1.5	4.0°	12.6	13.2	14.5	16	1
MPXLRBD0150R020N180	1.5	3.0°	18.9	19.7	21.7	*	1
MPXLRBD0150R030N060	1.5	6.1°	6.3	6.6	7.3	8	1
MPXLRBD0150R030N120	1.5	4.0°	12.6	13.2	14.5	16	1
MPXLRBD0150R030N180	1.5	3.0°	18.9	19.7	21.6	*	1
MPXLRBD0200R010N080	2	4.5°	8.5	8.8	9.7	10.8	1

\* No Interference

(mm)

Order Number	DC	B2	0.5°	1°	2°	3°	Type
MPXLRBD0200R010N120	2	3.4°	12.6	13.2	14.5	16.1	1
MPXLRBD0200R010N160	2	2.8°	16.8	17.6	19.3	*	1
MPXLRBD0200R010N200	2	2.3°	21	21.9	24.1	*	1
MPXLRBD0200R010N240	2	2.0°	25.2	26.3	*	*	1
MPXLRBD0200R020N080	2	4.5°	8.5	8.8	9.7	10.7	1
MPXLRBD0200R020N120	2	3.4°	12.6	13.2	14.5	*	1
MPXLRBD0200R020N160	2	2.8°	16.8	17.6	19.3	*	1
MPXLRBD0200R020N200	2	2.3°	21	21.9	24	*	1
MPXLRBD0200R020N240	2	2.0°	25.1	26.3	*	*	1
MPXLRBD0200R030N080	2	4.5°	8.5	8.8	9.7	10.7	1
MPXLRBD0200R030N120	2	3.5°	12.6	13.2	14.5	16	1
MPXLRBD0200R030N160	2	2.8°	16.8	17.5	19.2	*	1
MPXLRBD0200R030N200	2	2.3°	21	21.9	24	*	1
MPXLRBD0200R030N240	2	2.0°	25.1	26.3	*	*	1
MPXLRBD0300R010N080	3	5.7°	8.4	8.8	9.6	10.7	1
MPXLRBD0300R010N120	3	4.5°	12.6	13.1	14.4	16	1
MPXLRBD0300R010N180	3	3.4°	18.8	19.7	21.6	23.9	1
MPXLRBD0300R010N240	3	2.8°	25.1	26.2	28.8	*	1
MPXLRBD0300R010N300	3	2.3°	31.3	32.7	35.9	*	1
MPXLRBD0300R010N360	3	2.0°	37.6	39.3	*	*	1
MPXLRBD0300R020N120	3	4.5°	12.6	13.1	14.4	15.9	1
MPXLRBD0300R020N180	3	3.4°	18.8	19.6	21.6	23.9	1
MPXLRBD0300R020N240	3	2.8°	25.1	26.2	28.7	*	1
MPXLRBD0300R020N300	3	2.3°	31.3	32.7	35.9	*	1
MPXLRBD0300R020N360	3	2.0°	37.6	39.3	43.1	*	1
MPXLRBD0300R030N120	3	4.5°	12.5	13.1	14.4	15.9	1
MPXLRBD0300R030N180	3	3.5°	18.8	19.6	21.5	23.9	1
MPXLRBD0300R030N240	3	2.8°	25.1	26.2	28.7	*	1
MPXLRBD0300R030N300	3	2.3°	31.3	32.7	35.9	*	1
MPXLRBD0300R030N360	3	2.0°	37.6	39.2	*	*	1
MPXLRBD0300R050N120	3	4.6°	12.5	13.1	14.3	15.8	1
MPXLRBD0300R050N180	3	3.5°	18.8	19.6	21.5	23.8	1
MPXLRBD0300R050N240	3	2.8°	25.1	26.2	28.7	*	1
MPXLRBD0300R050N300	3	2.3°	31.3	32.7	35.9	*	1
MPXLRBD0300R050N360	3	2.0°	37.6	39.2	*	*	1
MPXLRBD0400R010N160	4	2.8°	16.7	17.5	19.2	*	1
MPXLRBD0400R010N240	4	2.0°	25.1	26.2	*	*	1
MPXLRBD0400R010N320	4	1.6°	33.4	34.9	*	*	1
MPXLRBD0400R010N480	4	1.1°	50.1	52.3	*	*	1
MPXLRBD0400R020N160	4	2.8°	16.7	17.5	19.2	*	1
MPXLRBD0400R020N240	4	2.0°	25.1	26.2	*	*	1
MPXLRBD0400R020N320	4	1.6°	33.4	34.9	*	*	1
MPXLRBD0400R020N480	4	1.1°	50.1	52.3	*	*	1
MPXLRBD0400R030N160	4	2.8°	16.7	17.5	19.1	*	1
MPXLRBD0400R030N240	4	2.0°	25.1	26.2	*	*	1
MPXLRBD0400R030N320	4	1.6°	33.4	34.9	*	*	1
MPXLRBD0400R030N480	4	1.1°	50.1	52.3	*	*	1
MPXLRBD0400R050N160	4	2.8°	16.7	17.4	19.1	*	1
MPXLRBD0400R050N240	4	2.0°	25.1	26.2	*	*	1
MPXLRBD0400R050N320	4	1.6°	33.4	34.9	*	*	1
MPXLRBD0400R050N480	4	1.1°	50.1	52.3	*	*	1
MPXLRBD0600R010N240	6	—	*	*	*	*	2

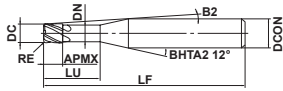
\* No Interference

# MS plus End Mill Series

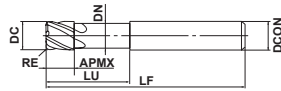
## MPXLRB

Corner radius, Short cut length, Long neck

Type1



Type2



(mm)

Order Number	DC	B2	0.5°	1°	2°	3°	Type
MPXLRBD0600R010N480	6	—	*	*	*	*	2
MPXLRBD0600R020N240	6	—	*	*	*	*	2
MPXLRBD0600R020N480	6	—	*	*	*	*	2
MPXLRBD0600R030N240	6	—	*	*	*	*	2
MPXLRBD0600R030N480	6	—	*	*	*	*	2
MPXLRBD0600R050N240	6	—	*	*	*	*	2
MPXLRBD0600R050N480	6	—	*	*	*	*	2

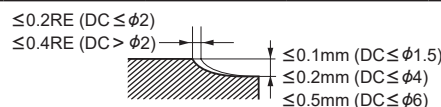
\* No Interference

## Recommended Cutting Conditions

(mm)

Workpiece Material		Carbon steel, Alloy steel (180—280HB) Pre-hardened steel, Alloy tool steel Precipitation stainless steel (<450HB)				Hardened Steel (45—52HRC)			
DC	LU	n (min <sup>-1</sup> )	vf (mm/min)	ap	ae	n (min <sup>-1</sup> )	vf (mm/min)	ap	ae
0.2	0.5	30000	180	0.003	0.04	30000	150	0.003	0.04
	1	30000	120	0.003	0.04	30000	100	0.003	0.04
0.3	1	30000	210	0.003	0.08	30000	180	0.003	0.08
	2	30000	120	0.003	0.08	30000	100	0.003	0.08
0.4	2	31000	970	0.005	0.10	31000	810	0.005	0.10
	3	31000	790	0.004	0.10	31000	660	0.004	0.10
	4	31000	540	0.003	0.10	31000	450	0.003	0.10
0.5	2	31000	1500	0.006	0.12	31000	1300	0.006	0.12
	3	31000	1300	0.005	0.12	31000	1100	0.005	0.12
	4	31000	970	0.004	0.12	31000	810	0.004	0.12
	5	25000	790	0.004	0.12	25000	660	0.004	0.12
0.6	2	31000	2100	0.020	0.13	31000	1800	0.020	0.13
	4	25000	1300	0.015	0.13	25000	1100	0.015	0.13
	6	20000	790	0.008	0.13	20000	660	0.008	0.13
0.8	4	25000	3200	0.025	0.20	25000	2700	0.025	0.20
	6	20000	2100	0.020	0.20	20000	1800	0.020	0.20
1	3	24000	2400	0.045	0.30	20000	2000	0.045	0.30
	4	24000	1900	0.040	0.30	20000	1600	0.040	0.30
	5	24000	1800	0.035	0.25	20000	1500	0.035	0.25
	6	20000	1400	0.030	0.25	17000	1200	0.030	0.25
	8	20000	1000	0.020	0.20	17000	880	0.020	0.20
	10	15000	800	0.015	0.10	13000	670	0.015	0.10
	12	15000	370	0.010	0.01	13000	310	0.010	0.01
1.2	10	18000	1500	0.030	0.25	15000	1300	0.030	0.25
1.5	6	20000	2400	0.050	0.40	17000	2000	0.050	0.40
	12	15000	1400	0.040	0.30	13000	1200	0.040	0.30
	18	12000	670	0.010	0.15	10000	560	0.010	0.15
2	8	15000	2600	0.050	0.50	13000	2200	0.050	0.50
	12	15000	2100	0.045	0.50	13000	1800	0.045	0.50
	16	14000	1900	0.040	0.35	12000	1600	0.040	0.35
	20	14000	1100	0.015	0.25	12000	960	0.015	0.25
	24	9300	930	0.010	0.20	7800	780	0.010	0.20
3	8	12000	3300	0.100	0.80	10000	2800	0.100	0.80
	12	12000	3100	0.080	0.80	10000	2600	0.080	0.80
	18	11000	3100	0.070	0.70	9600	2600	0.070	0.70
	24	11000	2600	0.060	0.50	9300	2200	0.060	0.50
	30	9000	1300	0.030	0.40	7500	1100	0.030	0.40
	36	6200	910	0.010	0.30	5200	760	0.010	0.30
4	16	9000	3200	0.100	1.00	7500	2700	0.100	1.00
	24	7900	2500	0.085	0.80	6600	2100	0.085	0.80
	32	6900	1600	0.040	0.70	5800	1400	0.040	0.70
	48	4800	740	0.010	0.35	4000	620	0.010	0.35
6	24	5500	2700	0.120	1.50	4600	2263	0.120	1.50
	48	3800	1200	0.050	1.20	3200	1000	0.050	1.20

Depth of cut



DC: Diameter

Note 1) The cutting conditions above are a guide only to machining with cutting edges with a corner radius. When machining with peripheral cutting edges, use the minimum feed rate as a guide.

Note 2) The revolution and feed rate can be increased with a smaller depth of cut.

Note 3) When profile machining, conditions may differ considerably depending on the workpiece material geometry, machining methods and depth of cut. Reduce the feed rate especially when machining the corner sections of a workpiece material.

Note 4) Vibration may occur if the rigidity of machine or workpiece material is low. In this case, please reduce the revolution and feed rate proportionately.

# MS plus End Mill Series

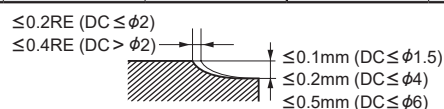
## MPXLRB

Corner radius, Short cut length, Long neck

(mm)

Workpiece Material		Austenitic stainless steel ( $\leq 200\text{HB}$ ) Titanium alloys ( $< 450\text{HB}$ )				Copper, Copper alloys			
DC	LU	n ( $\text{min}^{-1}$ )	vf ( $\text{mm}/\text{min}$ )	ap	ae	n ( $\text{min}^{-1}$ )	vf ( $\text{mm}/\text{min}$ )	ap	ae
0.2	0.5	33000	170	0.003	0.04	30000	150	0.003	0.08
	1	30000	110	0.003	0.04	30000	100	0.003	0.08
0.3	1	30000	200	0.003	0.08	30000	180	0.003	0.16
	2	30000	110	0.003	0.08	30000	100	0.003	0.16
0.4	2	31000	930	0.005	0.10	31000	810	0.005	0.20
	3	31000	750	0.004	0.10	31000	660	0.004	0.20
	4	31000	510	0.003	0.10	31000	450	0.003	0.20
0.5	2	31000	1400	0.006	0.12	31000	1300	0.006	0.24
	3	31000	1200	0.005	0.12	31000	1100	0.005	0.24
	4	31000	930	0.004	0.12	31000	810	0.004	0.24
	5	25000	750	0.004	0.12	25000	660	0.004	0.24
0.6	2	31000	2000	0.020	0.13	31000	1800	0.020	0.26
	4	25000	1200	0.015	0.13	25000	1100	0.015	0.26
	6	20000	750	0.008	0.13	20000	660	0.008	0.26
0.8	4	25000	3100	0.025	0.20	25000	2700	0.025	0.40
	6	20000	2000	0.020	0.20	20000	1800	0.020	0.40
1	3	23000	2300	0.045	0.30	20000	2000	0.045	0.60
	4	23000	1800	0.040	0.30	20000	1600	0.040	0.60
	5	23000	1700	0.035	0.25	20000	1500	0.035	0.50
	6	19000	1300	0.030	0.25	17000	1200	0.030	0.50
	8	19000	1000	0.020	0.20	17000	880	0.020	0.40
	10	14000	770	0.015	0.10	13000	670	0.015	0.20
	12	14000	350	0.010	0.01	13000	310	0.010	0.02
1.2	10	17000	1400	0.030	0.25	15000	1300	0.030	0.50
1.5	6	19000	2300	0.050	0.40	14700	1700	0.050	0.80
	12	14000	1300	0.040	0.30	11000	1000	0.040	0.60
	18	11000	640	0.010	0.15	8600	480	0.010	0.30
2	8	14000	2500	0.050	0.50	11000	1900	0.050	1.00
	12	14000	2000	0.045	0.50	11000	1500	0.045	1.00
	16	13000	1800	0.040	0.35	10000	1300	0.040	0.70
	20	13000	1100	0.015	0.25	10000	830	0.015	0.50
	24	8900	890	0.010	0.20	6700	670	0.010	0.40
3	8	11000	3200	0.100	0.80	8600	2400	0.100	1.60
	12	11000	2900	0.080	0.80	8600	2200	0.080	1.60
	18	11000	2900	0.070	0.70	8300	2200	0.070	1.40
	24	10000	2500	0.060	0.50	8000	1900	0.060	1.00
	30	8600	1200	0.030	0.40	6500	950	0.030	0.80
	36	5900	870	0.010	0.30	4500	660	0.010	0.60
4	16	8600	3100	0.100	1.00	6500	2300	0.100	2.00
	24	7500	2400	0.085	0.80	5700	1800	0.085	1.60
	32	6600	1600	0.040	0.70	5000	1200	0.040	1.40
	48	4600	710	0.010	0.35	3400	530	0.010	0.70
6	24	5200	2600	0.120	1.50	4000	1900	0.120	3.00
	48	3600	1100	0.050	1.20	2700	870	0.050	2.40

Depth of cut



DC: Diameter

Note 1) The cutting conditions above are a guide only to machining with cutting edges with a corner radius. When machining with peripheral cutting edges, use the minimum feed rate as a guide.

Note 2) The revolution and feed rate can be increased with a smaller depth of cut.

Note 3) When profile machining, conditions may differ considerably depending on the workpiece material geometry, machining methods and depth of cut. Reduce the feed rate especially when machining the corner sections of a workpiece material.

Note 4) Vibration may occur if the rigidity of machine or workpiece material is low. In this case, please reduce the revolution and feed rate proportionately.

For Swiss-Type Automatic Lathes  
MS plus End Mill Series

# MP2ES/3ES/4EC

Provides Stable Machining and Resists Edge Chipping Even when Overused

## New Tough Substrate

Fracture resistance is greatly improved and stable machining is accomplished by using a high-toughness carbide substrate.

## Cutting Edge Geometry

The optimised rake angle suppresses burrs.

## Improved Cutting Edge

To improve the fracture resistance of the cutting edge, a small gashed land is used on diameters of 6mm and larger.

## Ideal Tool Length

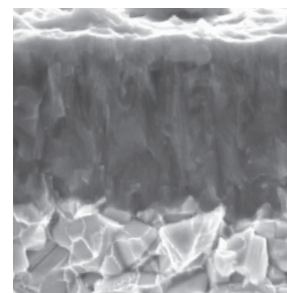
Cutting edge and overall length optimised for the restricted space available in Swiss-type automatic lathes.

## MS plus Coating

Original coating technology can create multi-layers of (Al, Ti)N and Al,Cr)N. This enables successful machining of a wider range of workpiece materials.

### Properties of MS plus coating

	(Al, Ti, Cr)N multilayer	(Al, Ti)N	(Al, Cr)N
Hardness (HV)	3200	2800	3100
Oxidation Temperature (°C)	1100	800	1100
Adhesion (N)	100	80	80

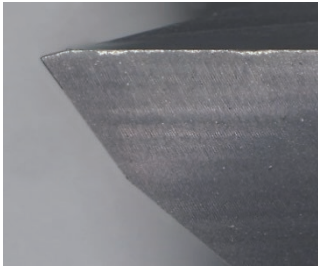




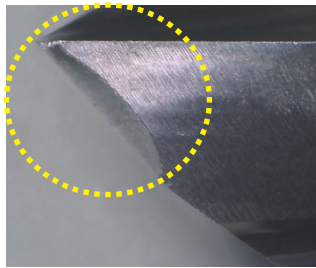
# Cutting Performance

## Comparison of Fracture Resistance - Machining SUS304

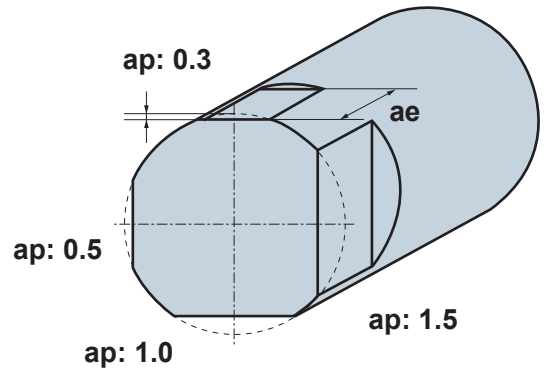
A round stainless steel bar is machined effectively due to the tough cemented carbide substrate and the gashed land providing improved fracture resistance.



**MP3ES**  
After machining  
2 components



Conventional  
After machining  
1 component



<Cutting Conditions>

Workpiece Material : JIS SUS304

Tool : MP3ESD0800S08(ø8)

Cutting Speed :  $vc = 50$  m/min

Feed Rate :  $f = 150$  mm/min

Feed per Tooth :  $fr = 0.025$  mm/t.

Depth of Cut :  $ap = 0.3-1.5$  mm

$ae = 6.0$  mm

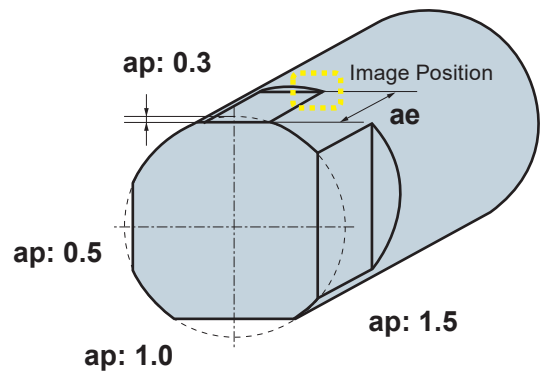
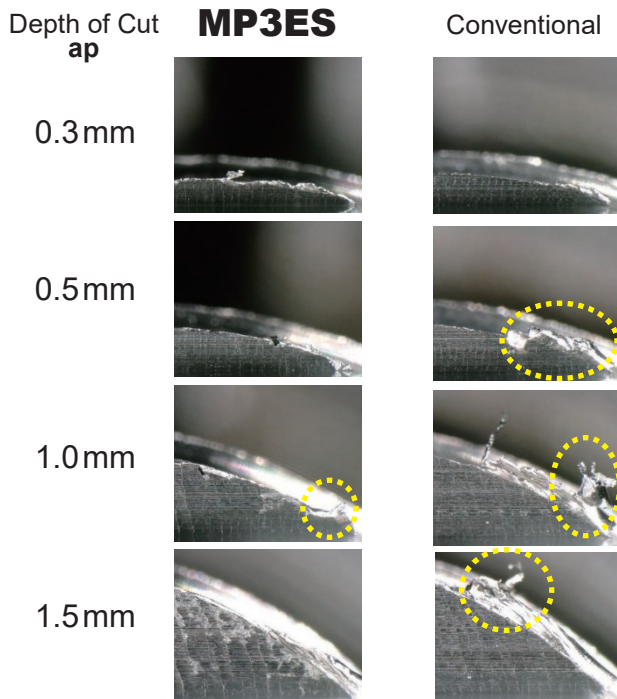
Cutting Mode : Wet Cutting (Oil)

Machine : Swiss-Type Automatic Lathe

Tool Post : Gang Type Tool Post

## Comparison of Burr Generation - Machining SUS304

The optimised cutting edge shape suppresses the occurrence of burrs.



<Cutting Conditions>

Workpiece Material : JIS SUS304

Tool : MP3ESD0800S08(ø8)

Cutting Speed :  $vc = 50$  m/min

Feed Rate :  $f = 150$  mm/min

Feed per Tooth :  $fr = 0.025$  mm/t.

Depth of Cut :  $ap = 0.3-1.5$  mm

$ae = 6.0$  mm

Cutting Mode : Wet Cutting (Oil)

Machine : Small Automatic Lathe

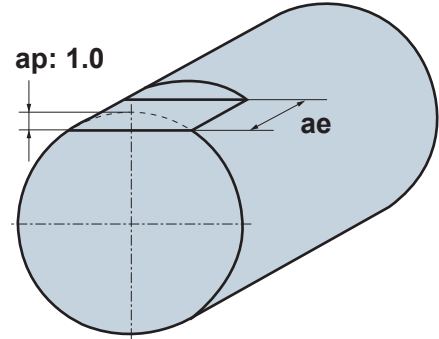
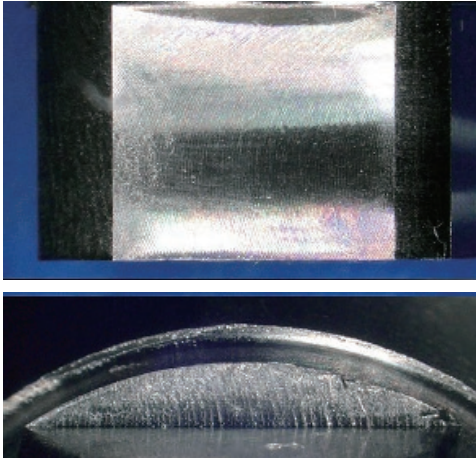
Tool Post : Gang Type Tool Post



## Comparison of Surface Finishes - Machining SUS304

The surface finish is greatly improved due to the improved chatter resistance.

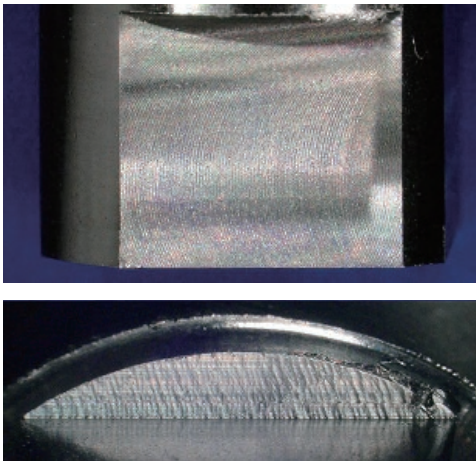
**MP3ES**  
Ra 0.21  $\mu\text{m}$



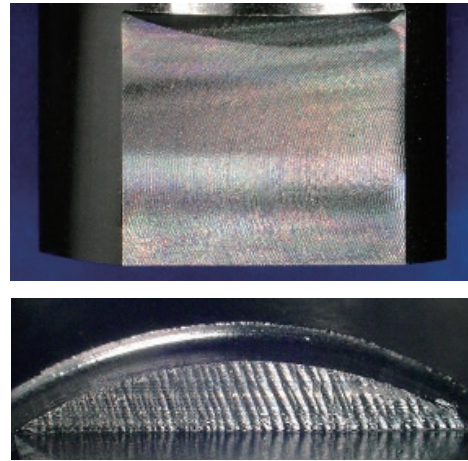
<Cutting Conditions>

Workpiece Material : JIS SUS304  
 Tool : MP3ESD0800S08( $\phi 8$ )  
 Cutting Speed :  $vc = 50 \text{ m/min}$   
 Feed Rate :  $f = 150 \text{ mm/min}$   
 Feed per Tooth :  $fr = 0.025 \text{ mm/t.}$   
 Depth of Cut :  $ap = 1.0 \text{ mm}$   
                    $ae = 6.0 \text{ mm}$   
 Cutting Mode : Wet Cutting (Oil)  
 Machine : Small Automatic Lathe  
 Tool Post : Gang Type Tool Post

Conventional A  
Ra 0.62  $\mu\text{m}$

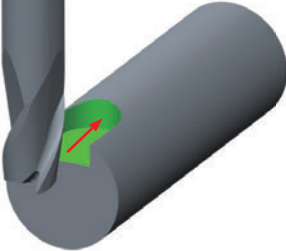
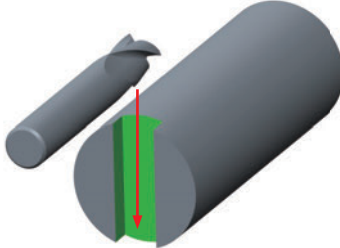
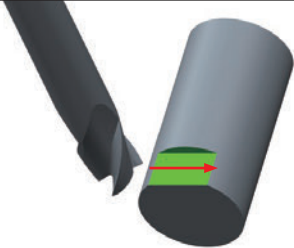
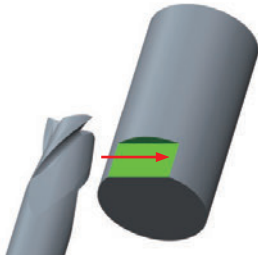


Conventional B  
Ra 0.75  $\mu\text{m}$



## End Mill Selection for Use on Swiss-Type Lathes

### ① Select the appropriate number of flutes according to the application

Cuttig Mode	Type	MP2ES	MP3ES	MP4EC
	Flutes	2 Flute	3 Flute	4 Flute
External Diameter Slotting		⊙	○	×
End Face Slotting		⊙	○	×
External Diameter Facing		△	⊙	○
Shoulder Milling		△	○	⊙

### ② Selection of Tools Other Than Dedicated Small Swiss-Types

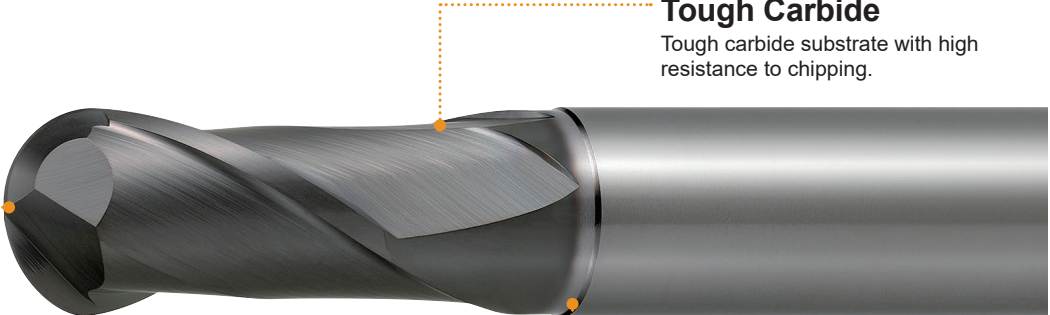
End mills with an overall length (LF=50 mm or less) can also be used. Select the tool according to the application and workpiece material.



## Ball Nose End Mills

### MP2SDB

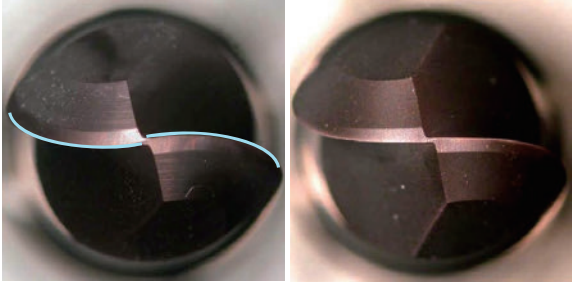
Tough carbide substrate with high chipping resistance. Ideal for semi-finishing of forging dies.



**Tough Carbide**  
Tough carbide substrate with high resistance to chipping.

**Strong S Curve**  
It has excellent chipping resistance so it can be used for rough machining.


**Neck Recess**



Conventional      **MP2SDB**

### MP3XB

Ideal for rough milling of long overhang applications and semi-finishing of forging dies (40-50 HRC).



**High Helix**  
Provides a good balance between chip discharge properties and tool life due to the use of a high helix angle and a strong cutting edge.

**Micro-grain Cemented Carbide Substrate**  
Higher wear resistance than conventional products.

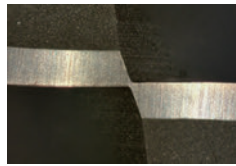


# MP2SSB/MP2SB/MP2MB/MP2XLB

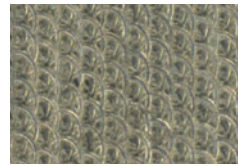
## MS plus

## Conventional

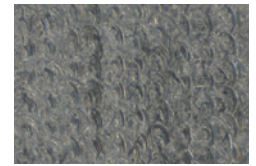
### End Cutting Edge Geometry



Sharp but strong cutting edge enables good surface finishes.



Sharp edges leave a uniform finish.



A dull edge leaves an undefined finish.



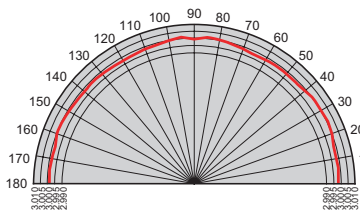
### Seamless Cutting Edge

Radius tolerance  $R \pm 0.005$  mm.

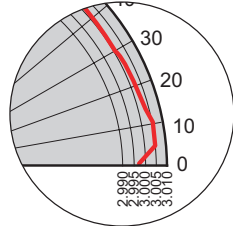
### Micro-grain Cemented Carbide Substrate

Higher wear resistance than conventional products.

## MS plus



## Conventional

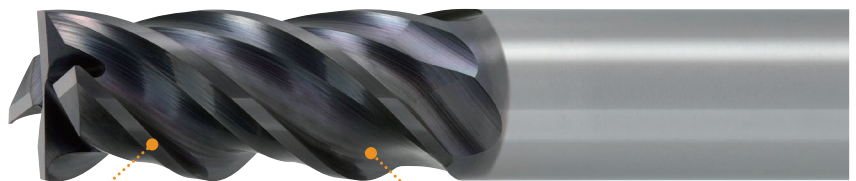


Good surface finishes possible even when simultaneously cutting with end and side edges; for example on drafts of dies and mould.

The irregular helix geometry reduces vibration to enable efficient machining of carbon and stainless components.

## MPMHV

Improved Geometry  
Expansion of Slim Shank



### Irregular Helix Flutes

Irregular helix flutes help prevent vibration.

### Length of Cut and Overall Length

Longer than standard DC x 2.5 flute length available.

## MPJHV

Ideal for Deep Wall  
Machining



### Flute Length Options

DC x 3.3 and DC x 4 flute length available.

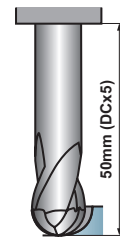
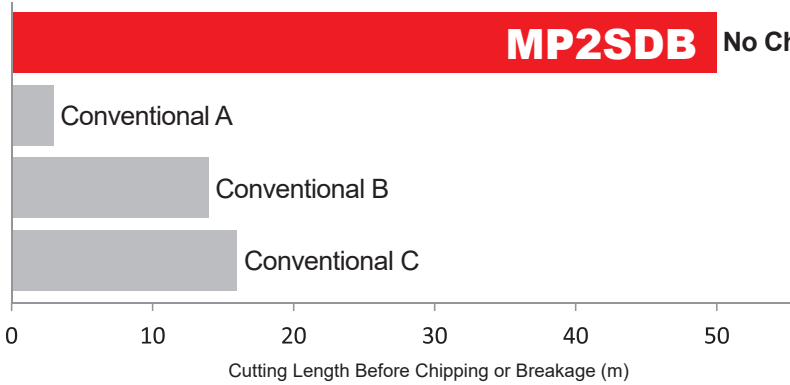
# MS plus Provides Superior Cost Performance

## Cutting Performance

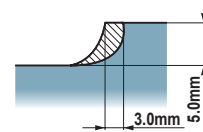
Excellent wear resistance compared to conventional products.

### Resistance to Chipping

MP2SDB shows excellent chipping resistance even at large depths of cut, high feed rates and long overhang applications.

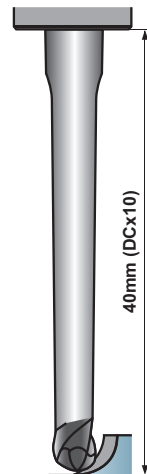
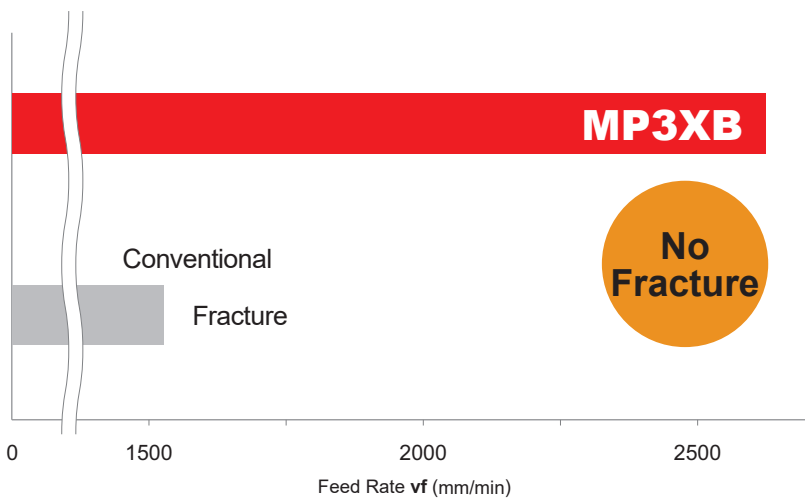


<Cutting Conditions>  
 Workpiece Material : JIS SKD61 (52 HRC)  
 Tool : MP2SDBR0500  
 Revolution : 5000 min<sup>-1</sup>  
 Cutting Speed : 157 m/min  
 Table Feed : 1000 mm/min  
 Feed per Tooth : 0.1 mm/t.  
 Depth of Cut : ap 5.0 mm, ae 3.0 mm  
 Overhang : 50 mm  
 Cutting Mode : Down(Climb)Cut  
 Air Blow :  
 Machine : Vertical MC (BT50)

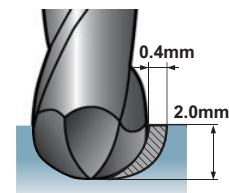


### Resistance to Chipping Overhang Length 40 mm

Continued reliability when rough milling long overhang applications.

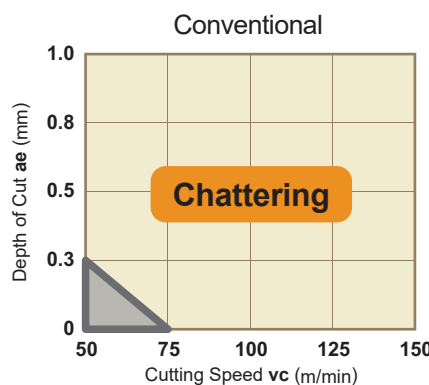
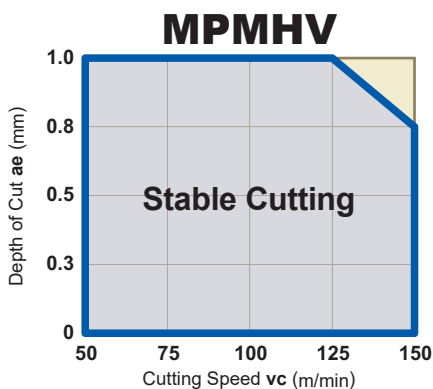


<Cutting Conditions>  
 Workpiece Material : JIS SKD61 (52 HRC)  
 Tool : MP3XBR0200N040T10  
 Revolution : 7500 min<sup>-1</sup>  
 Cutting Speed : 94 m/min  
 Depth of Cut : ap 2 mm, ae 0.4 mm  
 Overhang : 40 mm  
 Cutting Mode : Down(Climb)Cut  
 Air Blow :  
 Machine : Vertical MC (BT50)



### Resistance to Chattering

Excellent vibration control technology.

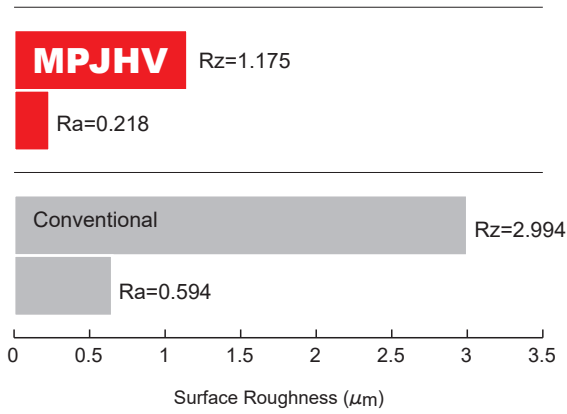


<Cutting Conditions>  
 Workpiece Material : JIS SUS304  
 Tool : MPMHVD1000  
 Cutting Speed : Table  
 Table Feed : 640-2240 mm/min  
 Feed per Tooth : 0.1 mm/t.  
 Depth of Cut : ap 20mm, ae Table  
 Overhang : 20 mm  
 Cutting Mode : Down(Climb)Cut  
 Emulsion :  
 Machine : Horizontal M/C (BT40)

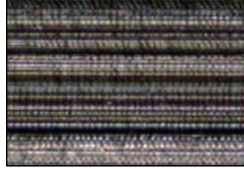


## Comparison of Surface Roughness

Good surface with no chattering due to an irregular helix.

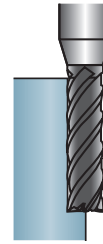


Machined Surface Photo Rz



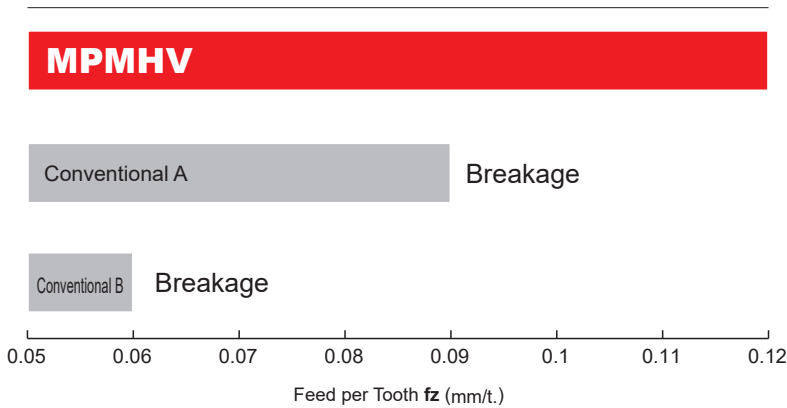
### <Cutting Conditions>

Workpiece Material : JIS SUS304  
 Tool : MPJHVD0100AP04  
 Revolution : 15900 min<sup>-1</sup>  
 Cutting Speed : 50 m/min  
 Table Feed : 357 mm/min  
 Feed per Tooth : 0.004 mm/t.  
 Depth of Cut : ap 3.2 mm, ae 0.003 mm  
 Overhang : 13 mm  
 Cutting Mode : Down(Climb)Cut  
 Emulsion :  
 Machine : Vertical M/C



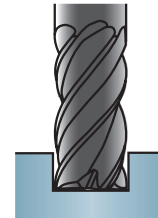
## Comparison of Feed Rate

Up to double the feed rate of conventional end mills.



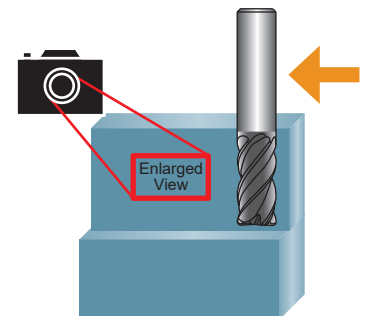
### <Cutting Conditions>

Workpiece Material : JIS SUS304  
 Tool : MPMHVD1000  
 Revolution : 2300 min<sup>-1</sup>  
 Cutting Speed : 72.3 m/min  
 Feed per Tooth : Table  
 Depth of Cut : ap 10 mm  
 Cutting Mode : Water Based  
 Machine : Vertical M/C (BT50)



## Vibration Resistance Comparison - Machining JIS SUS304

Revolution n min <sup>-1</sup>	2400	3200	4000
Cutting Speed vc m/min	75	100	125
<b>MPMHVRB</b>			
Conventional			

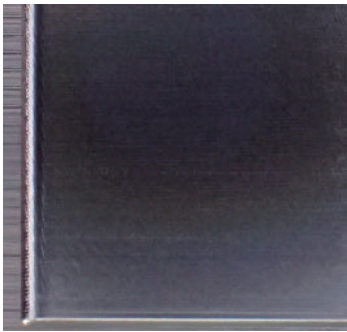


### <Cutting Conditions>

Workpiece Material : JIS SUS304  
 Tool : MPMHVRBD1000R100  
 Revolution : Table  
 Cutting Speed : Table  
 Table Feed : 960 – 1600 mm/min  
 Feed per Tooth : 0.1 mm/t.  
 Depth of Cut : ap 20 mm, ae 0.8 mm  
 Cutting Mode : Water Based  
 Machine : Vertical M/C (BT40)

# Cutting Performance

JIS SKD61 Angle of Cutting Surface 1°



**MPXLRB**



Conventional

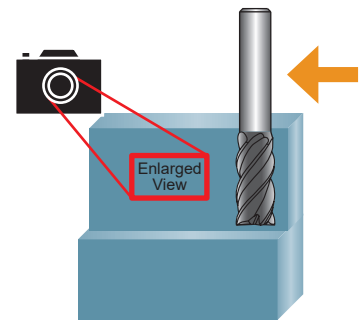
<Cutting Conditions>

- Workpiece Material : JIS SKD61 (52 HRC)
- Revolution : 17000 min<sup>-1</sup>
- Cutting Speed : 107 m/min
- Table Feed : 1200 mm/min
- Feed per Tooth : 0.025 mm/t.
- Depth of Cut : ap 0.1 mm, ae 0.06 mm
- Cutting Mode : Air Blow

## Vibration Resistance Comparison - Machining JIS SUS304

Shoulder Milling with Slim Shank End Mill (DC x 2)

Tool	Cutting Surface
<b>MPMHV</b>	
Conventional	



<Cutting Conditions>

- Workpiece Material : JIS SUS304
- Tool : MPMHVD1200S10
- Revolution : 2700 min<sup>-1</sup>
- Cutting Speed : 100 m/min
- Table Feed : 1000 mm/min
- Feed per Tooth : 0.1 mm/t.
- Depth of Cut : ap 20 mm x 2, ae 0.5 mm
- Cutting Mode : Water Based
- Machine : Vertical M/C (BT40)



# Memo

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A series of horizontal dashed lines for writing, spanning the width of the page.



Carbide End Mills

# MS plus End Mill Series

**For Your Safety**

●Don't handle inserts and chips without gloves. ●Please machine within the recommended application range and exchange expired tools with new ones in advance of breakage. ●Please use safety covers and wear safety glasses. ●When using compounded cutting oils, please take fire precautions. ●When attaching inserts or spare parts, please use only the correct wrench or driver. ●When using rotating tools, please make a trial run to check run-out, vibration and abnormal sounds etc.

 **MITSUBISHI MATERIALS CORPORATION**

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**Overseas Sales Dept, Asian Region**

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<http://www.mitsubishicarbide.com/en/>  
(Tools specifications subject to change without notice.)