MITSUBISHI MATERIALS

MS PLUS
End Mill Series

TOUGH APPLICATIONS
REQUIRE “PLUS”
PERFORMANCE

TOOL NEWS **B205A**

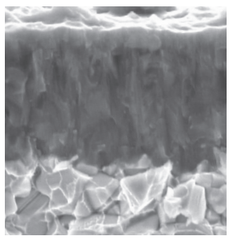
Carbide End Mills

MS plus

General purpose end mill optimized "plus" performance.

(Al,Ti,Cr)N Multilayer Coating (MS plus)

Our original coating technology enables a multilayer of (Al,Ti)N and (Al,Cr)N.
It allows machining of a wide range of workpiece materials.

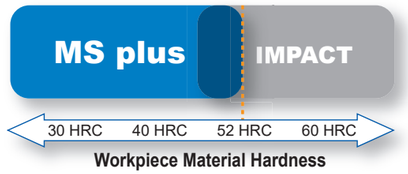


Properties of (Al,Ti,Cr)N Multilayer Coating (MS plus)

	(Al,Ti,Cr)N Multilayer	(Al,Ti)N	(Al,Cr)N
Hardness (HV)	**3200**	2800	3100
Oxidation Temperature (°F)	**2.012**	1.472	2.012
Adhesion (N)	**100**	80	80

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

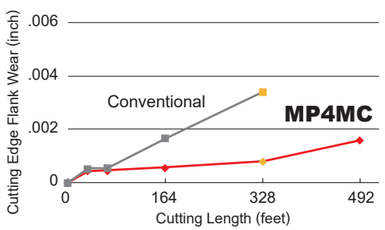
For steels harder than 52 HRC, IMPACT MIRACLE end mills are recommended.
(TOOL NEWS B075)



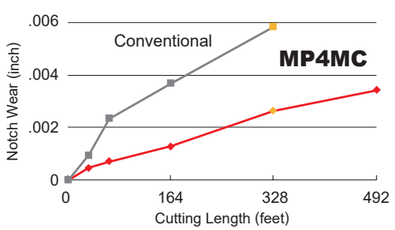
Cutting Performance

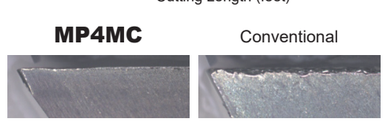
Carbon Steel AISI 1050

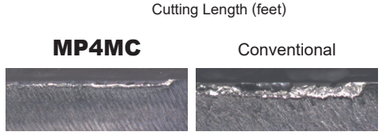
Cutting Edge Flank Wear

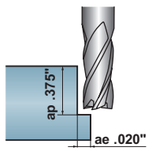


Notch Wear









<Cutting Conditions>
Workpiece Material : AISI 1050 (240 HB)
Tool : 4 flute end mill medium cut length DC= .3750"
Revolution : 3200 min^{-1}
Cutting Speed : 315 SFM
Table Feed : 25.2 IPM
Depth of Cut : ae .020", ap .375"
Cutting Length : 1.181"
Cutting Mode : Down(Climb) Cut Air Blow
Machine : Horizontal MC (BT40)

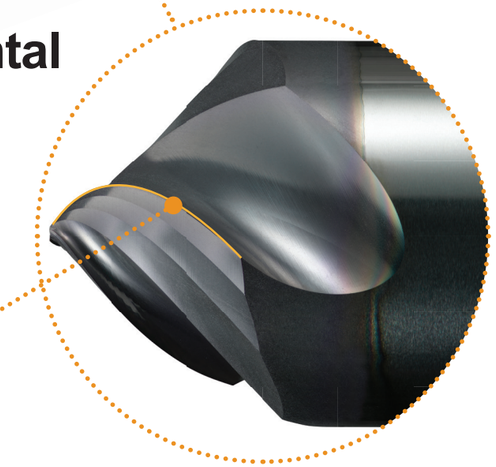
MS plus New Line-up

Chamfer Cutter

MP3C

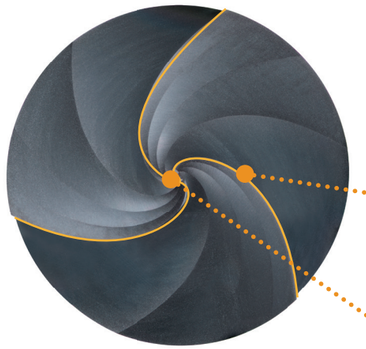
Chamfer cutter with excellent efficiency and great tool life with horizontal chamfering

MS plus enables machining of a wide range of workpiece materials.



Sharp Helix Flute

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



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 realized.

End Cutting Edge

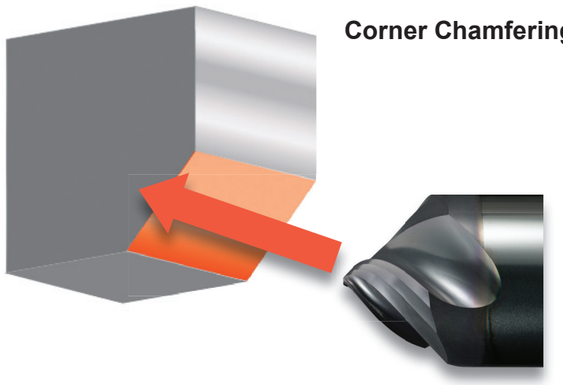
End cutting edge can also be used for V-groove machining.

End Cutting Edge

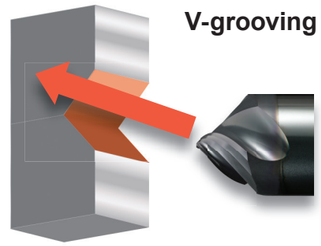
V-groove machining

Greatly Effective for Feed Chamfering

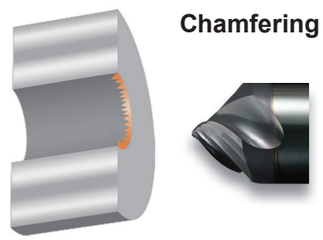
The 3-flute geometry achieves high feed and extended tool life, and the effects of the twisted, helical flute suppress the occurrence of burrs when horizontal feed chamfering.



Corner Chamfering



V-grooving

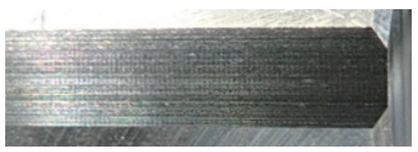


Chamfering

The leading drill series DLE, GKCD are recommended for centering.

S55C Comparison of Burrs After Chamfering

MP3C 3-helical flutes



Good finish surface

Conventional 4-straight flutes

Burrs occur

Conventional 2-straight flutes

Burrs occur

<Cutting Conditions>

Workpiece Material	: JIS S55C
Tool	: DC=ø6mm
Cutting Speed	: vc=100 m/min
Revolution	: n=5300 min^{-1}
Feed per Tooth	: fz=0.03 mm/t.
Depth of Cut	: ap=1.2 mm
Overhang Length	: 18 mm
Cutting Mode	: Air Blow

Product Code	Shape	Size Range	Sizes	Workpiece Material: P – Carbon Steel, Alloy Steel, Cast Iron	P – Tool Steel, Prehardened Steel, Hardened Steel	H – Hardened Steel(~55HRC)	H – Hardened Steel(55HRC~)	M – Austenitic Stainless Steel	S – Titanium Alloy, Heat Resistant Alloy	N – Copper Alloy	N – Aluminum Alloy	Dimensions	Cutting Conditions
Square End Mills													
MP2ES	End mill, 2 flute, For swiss-type lathe	METRIC DC 3–10	7	◎	◎	○		○	○	○		P13	P14
MP3ES	End mill, 3 flute, For swiss-type lathe	METRIC DC 3–12	10	◎	◎	○		○	○	○		P16	P17
MP3MC	End mill, Medium cut length, 3 flute	INCH DC .0312–.5000	11	◎	◎	○		○	○			P7	P8
MP4EC	End mill, 4 flute, For swiss-type lathe	METRIC DC 3–14	14	◎	◎	○		○	○	○		P19	P20
MP4MC	End mill, Medium cut length, 4 flute	INCH DC .0312–.5000	11	◎	◎	○		○	○			P9	P10
MP4JC	End mill, Semi long cut length, 4 flute	INCH DC .0625–.5000	8	◎	◎	○		○	○			P11	P12
Ball Nose End Mills													
MP2SSB	Ball nose, Short cut length, 2 flute, Short shank	METRIC RE 0.1 – 6	16	◎	◎	◎		○	○	○		P26	P29
MP2SB	Ball nose, Short cut length, 2 flute	METRIC RE 0.1 – 6	29	◎	◎	◎		○	○	○		P27	P29
MP2MB	Ball nose, Medium cut length, 2 flute	INCH RE .0156- .2500	8	◎	◎	◎		○	○	○		P24	P25
		METRIC RE 0.25 – 6	21									P28	P29
MP2SDB	Ball nose, Short cut length, 2 flute, High strength	METRIC RE 0.5 – 6	16	◎	◎	◎						P31	P32
MP2XLB	Ball nose, Short cut length, 2 flute, Long neck	METRIC RE 0.05 – 3	232	◎	◎	◎		○	○	○		P33	P39

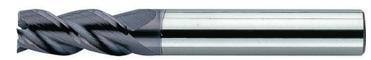
Product Code	Shape	Size Range	Sizes	Workpiece Material: P – Carbon Steel, Alloy Steel, Cast Iron	P – Tool Steel, Pre-hardened Steel, Hardened Steel	H – Hardened Steel(~55HRC)	H – Hardened Steel(55HRC~)	M – Austenitic Stainless Steel	S – Titanium Alloy, Heat Resistant Alloy	N – Copper Alloy	N – Aluminum Alloy	Dimensions	Cutting Conditions
Radius End Mills													
MP4MRB	Corner radius, Medium cut length, 4 flute	INCH DC .1250–.5000	24	◎	◎	◎		○	○			P22	P23
Chamfer Cutter													
MP3C	Chamfer cutter, 3 flute	METRIC DC 2–12	6	◎	◎	◎		○	○			P42	P43

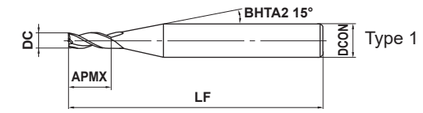
MS plus End Mill Series

MP3MC - Inch Sizes

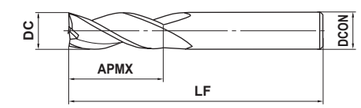
End mill, Medium cut length, 3 flute

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	Aluminum Alloy
◎	◎	○		○	○		





Type 1



Type 2

DC<.5000"	DC=.5000"		
0 - .0008"	0 - .0012"		
DCON=.1250"	.250"≤DCON≤.375"	DCON=.500"	
0 - .00024"	0 - .00035"	0 - .00043"	

(inch)

Order Number	DC	APMX	LF	DCON	* No.F	Stock	Type
MP3MCD1/32	.0312	.0780	1.50	.1250	3	●	1
MP3MCD1/16	.0625	.1560	1.50	.1250	3	●	1
MP3MCD3/32	.0938	.2340	1.50	.1250	3	●	1
MP3MCD1/8	.1250	.3130	1.50	.1250	3	●	2
MP3MCD5/32	.1562	.3910	2.00	.2500	3	●	1
MP3MCD3/16	.1875	.4690	2.00	.2500	3	●	1
MP3MCD7/32	.2188	.5470	2.50	.2500	3	●	1
MP3MCD1/4	.2500	.6250	2.50	.2500	3	●	2
MP3MCD5/16	.3125	.7810	2.75	.3125	3	●	2
MP3MCD3/8	.3750	.9380	3.00	.3750	3	●	2
MP3MCD1/2	.5000	1.2500	3.50	.5000	3	●	2

* Number of Flutes

DC = Cutting dia.
APMX = Depth of cut max.
LF = Functional length
DCON = Connection dia.

● : USA Stock

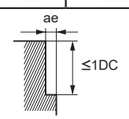
MP3MC - Inch Sizes

End mill, Medium cut length, 3 flute

Recommended Cutting Conditions

Shoulder Milling

(inch)

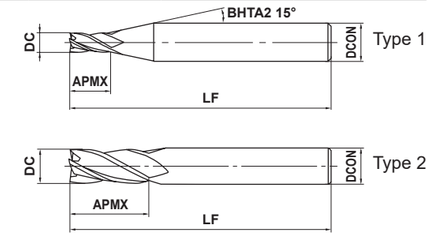
Workpiece Material	Carbon Steel,Alloy Steel (≤280HB) Mild Steel			Carbon Steel,Alloy Steel (>280HB) Alloy Tool Steel Pre-hardened Steel			Austenitic Stainless Steels Titanium Alloys			Hardened Steel (40-55HRC)		
DC	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ae**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ae**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ae**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ae**
1/32	30000	53.1	.006	30000	53.1	.006	28000	49.6	.006	20000	35.4	.002
1/16	30000	70.9	.012	15000	35.4	.012	14000	33.1	.012	10000	23.6	.003
3/32	13400	31.7	.019	10000	23.6	.019	9400	22.2	.019	6700	15.8	.006
1/8	10000	35.4	.025	7500	26.6	.025	7000	24.8	.025	5000	17.7	.006
5/32	8000	33.1	.031	6000	24.8	.031	5600	23.1	.031	4000	16.5	.008
3/16	6700	31.7	.037	5000	23.6	.037	4700	22.2	.037	3300	15.6	.009
7/32	5700	26.9	.044	4300	20.3	.044	4000	18.9	.044	2900	13.7	.011
1/4	5000	26.6	.050	3800	20.2	.050	3500	18.6	.050	2500	13.3	.013
5/16	4000	23.6	.062	3000	17.7	.062	2800	16.5	.062	2000	11.8	.016
3/8	3300	23.4	.075	2500	17.7	.075	2300	16.3	.075	1700	12.0	.019
1/2	2500	17.7	.100	1900	13.5	.100	1800	12.8	.100	1300	9.2	.025
Depth of Cut	 DC : Dia											

(Note 1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is especially effective.
(Note 2) If the depth of cut is smaller than this table, feed rate can be increased.
(Note 3) If the rigidity of the machine or the workpiece material installation is very low, or chattering and noise are generated, please reduce the revolution and the feed rate proportionately.

MP4MC - Inch Sizes

End mill, Medium cut length, 4 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	Aluminum Alloy
◎	◎	○		○	○		



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0 - .0008"	0 - .0012"		
DCON=.1250"	.250"≤DCON≤.375"	DCON=.500"	
0 - .00024"	0 - .00035"	0 - .00043"	

(inch)

Order Number	DC	APMX	LF	DCON	* No.F	Stock	Type
MP4MCD1/32	.0312	.0780	1.50	.1250	4	●	1
MP4MCD1/16	.0625	.1560	1.50	.1250	4	●	1
MP4MCD3/32	.0938	.2340	1.50	.1250	4	●	1
MP4MCD1/8	.1250	.3130	1.50	.1250	4	●	2
MP4MCD5/32	.1562	.3910	2.00	.2500	4	●	1
MP4MCD3/16	.1875	.4690	2.00	.2500	4	●	1
MP4MCD7/32	.2188	.5470	2.50	.2500	4	●	1
MP4MCD1/4	.2500	.6250	2.50	.2500	4	●	2
MP4MCD5/16	.3125	.7810	2.75	.3125	4	●	2
MP4MCD3/8	.3750	.9380	3.00	.3750	4	●	2
MP4MCD1/2	.5000	1.2500	3.50	.5000	4	●	2

* Number of Flutes

DC = Cutting dia.
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LF = Functional length
DCON = Connection dia.

● : USA Stock

MP4MC - Inch Sizes

End mill, Medium cut length, 4 flute

Recommended Cutting Conditions

Shoulder Milling

(inch)

Workpiece Material	Carbon Steel,Alloy Steel (≤280HB) Mild Steel			Carbon Steel,Alloy Steel (>280HB) Alloy Tool Steel Pre-hardened Steel			Austenitic Stainless Steels Titanium Alloys			Hardened Steel (40-55HRC)		
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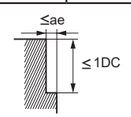
5/16	4000	31.5	.062	3000	23.6	.062	2800	22.0	.062	2000	15.7	.016
3/8	3300	31.2	.075	2500	23.6	.075	2300	21.7	.075	1700	16.1	.019
1/2	2500	23.6	.100	1900	18.0	.100	1800	17.0	.100	1300	12.3	.025

Depth of Cut



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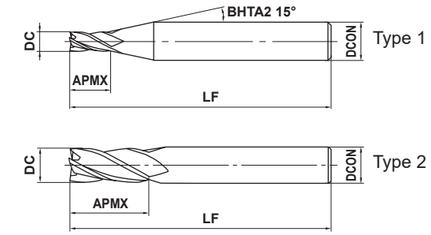
MP4JC - Inch Sizes

End mill, Semi long cut length, 4 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	Aluminum Alloy
◎	◎	○		○	○		



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MP4JCD3/16	.1875	.7500	2.50	.2500	4	●	1
MP4JCD1/4	.2500	1.0000	2.50	.2500	4	●	2
MP4JCD5/16	.3125	1.2500	2.75	.3125	4	●	2
MP4JCD3/8	.3750	1.5000	3.50	.3750	4	●	2
MP4JCD1/2	.5000	2.0000	4.50	.5000	4	●	2

* Number of Flutes

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● : **USA Stock**

MP4JC - Inch Sizes

End mill, Semi long cut length, 4 flute

Recommended Cutting Conditions

Shoulder Milling

(inch)

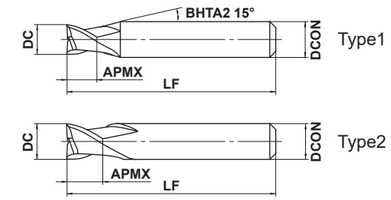
Workpiece Material	Carbon Steel,Alloy Steel (≤280HB) Mild Steel			Carbon Steel,Alloy Steel (>280HB) Alloy Tool Steel Pre-hardened Steel			Austenitic Stainless Steels Titanium Alloys			Hardened Steel (40-55HRC)		
DC	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ae**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ae**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ae**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ae**
1/16	18100	39.9	.012	14000	30.9	.012	12000	26.5	.012	10000	22.0	.0010
3/32	12000	26.5	.019	9400	20.7	.019	8000	17.6	.019	6700	14.8	.0020
1/8	9000	29.8	.025	7000	23.1	.025	6000	19.8	.025	5000	16.5	.0030
3/16	6000	26.5	.037	4700	20.7	.037	4000	17.6	.037	3300	14.6	.0040
1/4	4500	22.7	.050	3500	17.6	.050	3000	15.1	.050	2500	12.6	.0050
5/16	3600	19.8	.062	2800	15.4	.062	2400	13.2	.062	2000	11.0	.0060
3/8	3000	19.8	.075	2300	15.2	.075	2000	13.2	.075	1700	11.3	.0080
1/2	2300	15.2	.100	1800	11.9	.100	1500	9.9	.100	1300	8.6	.0100
Depth of Cut										DC : Dia		

(Note 1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is especially effective.
(Note 2) If the depth of cut is smaller than this table, feed rate can be increased.
(Note 3) If the rigidity of the machine or the workpiece material installation is very low, or chattering and noise are generated, please reduce the revolution and the feed rate proportionately.

MP2ES

End mill, 2 flute, For swiss-type lathe

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	Aluminum Alloy
◎	◎	○		○	○	○	



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

●2 flute end mill.

(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 dia.
APMX = Depth of cut max.
LF = Functional length
DCON = Connection dia.

● : USA Stock ★ : Stocked in Japan

MP2ES

End mill, 2 flute, For swiss-type lathe

Recommended Cutting Conditions

■Side Milling

(inch)

Workpiece Material		Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20				Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21				Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V			
Dia. **DC** (mm)	Dia. **DC** (inch)	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Depth of Cut **ae**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Depth of Cut **ae**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Depth of Cut **ae**
3	**.118**	10000	23.6	.118	.024	7000	15.7	.118	.024	6000	11.8	.118	.024
4	**.157**	7500	23.6	.157	.024	5200	15.7	.157	.024	4500	11.8	.157	.024
5	**.197**	6000	23.6	.197	.024	4200	15.7	.197	.024	3600	11.8	.197	.024
6	**.236**	5000	23.6	.236	.024	3500	15.7	.236	.024	3000	11.8	.236	.024
7	**.276**	4500	22.0	.276	.024	3200	14.2	.276	.024	2700	11.0	.276	.024
8	**.315**	4000	20.5	.315	.024	2800	13.8	.315	.024	2400	10.2	.315	.024
10	**.394**	3200	17.7	.394	.024	2200	11.8	.394	.024	1900	9.1	.394	.024

Depth of Cut

Workpiece Material		Hardened steel (45−55HRC) AISI H13				Copper, Copper Alloy			
Dia. **DC** (mm)	Dia. **DC** (inch)	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Depth of Cut **ae**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Depth of Cut **ae**
3	**.118**	5000	4.7	.118	.008	13000	30.7	.118	.024
4	**.157**	4000	4.7	.157	.008	9500	29.9	.157	.024
5	**.197**	3200	4.7	.197	.008	7600	29.9	.197	.024
6	**.236**	2700	4.7	.236	.008	6400	30.3	.236	.024
7	**.276**	2300	4.3	.276	.008	5500	26.8	.276	.024
8	**.315**	2000	4.3	.315	.008	4800	24.4	.315	.024
10	**.394**	1600	3.9	.394	.008	3800	20.9	.394	.024

Depth of Cut

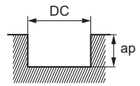
Note 1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) When drilling, please set the feed rate at 1/3 or below the values above.
Note 4) If the rigidity of the machine or the workpiece material installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

■Slotting

(inch)

Workpiece Material		Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20			Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21			Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		
Dia. **DC** (mm)	Dia. **DC** (inch)	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**
3	**.118**	10000	23.6	.024	7000	15.7	.024	6000	11.8	.024
4	**.157**	7500	23.6	.024	5200	15.7	.024	4500	11.8	.024
5	**.197**	6000	23.6	.024	4200	15.7	.024	3600	11.8	.024
6	**.236**	5000	23.6	.024	3500	15.7	.024	3000	11.8	.024
7	**.276**	4500	22.0	.024	3200	14.2	.024	2700	11.0	.024
8	**.315**	4000	20.5	.024	2800	13.8	.024	2400	10.2	.024
10	**.394**	3200	17.7	.024	2200	11.8	.024	1900	9.1	.024

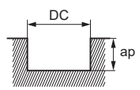
Depth of Cut



DC:Dia.

Workpiece Material		Hardened steel (45−55HRC) AISI H13			Copper, Copper Alloy		
Dia. **DC** (mm)	Dia. **DC** (inch)	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**
3	**.118**	5000	4.7	.008	13000	30.7	.024
4	**.157**	4000	4.7	.008	9500	29.9	.024
5	**.197**	3200	4.7	.008	7600	29.9	.024
6	**.236**	2700	4.7	.008	6400	30.3	.024
7	**.276**	2300	4.3	.008	5500	26.8	.024
8	**.315**	2000	4.3	.008	4800	24.4	.024
10	**.394**	1600	3.9	.008	3800	20.9	.024

Depth of Cut



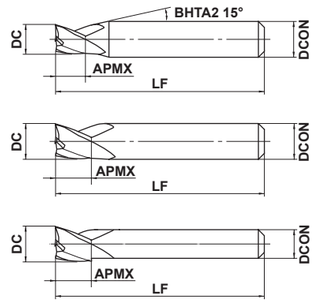
DC:Dia.

Note 1) When cutting austenitic stainless steels, 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 set the feed rate at 1/3 or below the values above.
Note 4) If the rigidity of the machine or the workpiece material installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MP3ES

End mill, 3 flute, For swiss-type lathe

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	Aluminum Alloy
◎	◎	○		○	○	○	



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

●3 flute end mill.

(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 dia. **LF** = Functional length
APMX = Depth of cut max. **DCON** = Connection dia.

● : USA Stock ★ : Stocked in Japan

Recommended Cutting Conditions

■Side Milling

(inch)

Workpiece Material		Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20				Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21				Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V			
Dia. DC (mm)	Dia. DC (inch)	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Depth of Cut **ae**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Depth of Cut **ae**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Depth of Cut **ae**
3	**.118**	10000	28.3	.118	.024	7000	18.9	.118	.024	6000	14.2	.118	.024
4	**.157**	7500	28.3	.157	.024	5200	18.9	.157	.024	4500	14.2	.157	.024
5	**.197**	6000	28.3	.197	.024	4200	18.9	.197	.024	3600	14.2	.197	.024
6	**.236**	5000	28.3	.236	.024	3500	18.9	.236	.024	3000	14.2	.236	.024
7	**.276**	4500	26.4	.276	.024	3200	17.3	.276	.024	2700	13.4	.276	.024
8	**.315**	4000	24.4	.315	.024	2800	16.5	.315	.024	2400	12.2	.315	.024
9	**.354**	3500	22.8	.354	.024	2500	15.0	.354	.024	2100	11.4	.354	.024
10	**.394**	3200	21.3	.394	.024	2200	14.2	.394	.024	1900	11.0	.394	.024
12	**.472**	2700	19.3	.472	.024	1900	12.6	.472	.024	1600	9.8	.472	.024
Depth of Cut													

Workpiece Material		Hardened steel (45−55HRC) AISI H13				Copper, Copper Alloy			
Dia. DC (mm)	Dia. DC (inch)	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Depth of Cut **ae**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Depth of Cut **ae**
3	**.118**	5000	5.5	.118	.008	13000	37.0	.118	.024
4	**.157**	4000	5.5	.157	.008	9500	35.8	.157	.024
5	**.197**	3200	5.5	.197	.008	7600	35.8	.197	.024
6	**.236**	2700	5.5	.236	.008	6400	36.2	.236	.024
7	**.276**	2300	5.1	.276	.008	5500	32.3	.276	.024
8	**.315**	2000	5.1	.315	.008	4800	29.1	.315	.024
9	**.354**	1800	5.1	.354	.008	4200	27.6	.354	.024
10	**.394**	1600	4.7	.394	.008	3800	25.2	.394	.024
12	**.472**	1300	4.7	.472	.008	3200	22.8	.472	.024
Depth of Cut									

Note 1) When cutting austenitic stainless steels, 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 set the feed rate at 1/3 or below the values above.
Note 4) If the rigidity of the machine or the workpiece material installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MP3ES

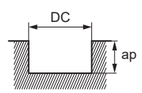
End mill, 3 flute, For swiss-type lathe

■Slotting

(inch)

Workpiece Material		Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20			Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21			Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		
Dia. **DC** (mm)	(inch)	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**
3	**.118**	10000	28.3	.024	7000	18.9	.024	6000	14.2	.024
4	**.157**	7500	28.3	.024	5200	18.9	.024	4500	14.2	.024
5	**.197**	6000	28.3	.024	4200	18.9	.024	3600	14.2	.024
6	**.236**	5000	28.3	.024	3500	18.9	.024	3000	14.2	.024
7	**.276**	4500	26.4	.024	3200	17.3	.024	2700	13.4	.024
8	**.315**	4000	24.4	.024	2800	16.5	.024	2400	12.2	.024
9	**.354**	3500	22.8	.024	2500	15.0	.024	2100	11.4	.024
10	**.394**	3200	21.3	.024	2200	14.2	.024	1900	11.0	.024
12	**.472**	2700	19.3	.024	1900	12.6	.024	1600	9.8	.024

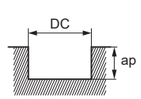
Depth of Cut



DC:Dia.

Workpiece Material		Hardened steel (45−55HRC) AISI H13			Copper, Copper Alloy		
Dia. **DC** (mm)	(inch)	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**
3	**.118**	5000	5.5	.008	13000	37.0	.024
4	**.157**	4000	5.5	.008	9500	35.8	.024
5	**.197**	3200	5.5	.008	7600	35.8	.024
6	**.236**	2700	5.5	.008	6400	36.2	.024
7	**.276**	2300	5.1	.008	5500	32.3	.024
8	**.315**	2000	5.1	.008	4800	29.1	.024
9	**.354**	1800	5.1	.008	4200	27.6	.024
10	**.394**	1600	4.7	.008	3800	25.2	.024
12	**.472**	1300	4.7	.008	3200	22.8	.024

Depth of Cut



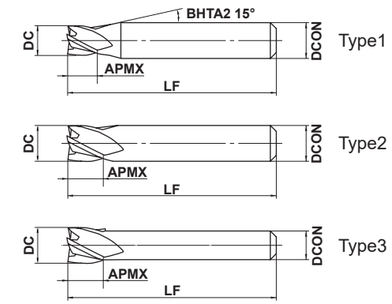
DC:Dia.

Note 1) When cutting austenitic stainless steels, 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 set the feed rate at 1/3 or below the values above.
Note 4) If the rigidity of the machine or the workpiece material installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MP4EC

End mill, 4 flute, For swiss-type lathe

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	Aluminum 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		

●4 flute end mill.

(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 dia. **LF** = Functional length
APMX = Depth of cut max. **DCON** = Connection dia.

● : USA Stock ★ : Stocked in Japan

MP4EC

End mill, 4 flute, For small automatic lathes

Recommended Cutting Conditions

■Side Milling

(inch)

Workpiece Material		Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20				Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21				Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V			
Dia. **DC** (mm)	Dia. **DC** (inch)	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Depth of Cut **ae**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Depth of Cut **ae**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Depth of Cut **ae**
3	**.118**	10000	35.4	.118	.024	7000	23.6	.118	.024	6000	17.7	.118	.024
3.5	**.138**	8500	35.4	.138	.024	6000	23.6	.138	.024	5100	17.7	.138	.024
4	**.157**	7500	35.4	.157	.024	5200	23.6	.157	.024	4500	17.7	.157	.024
5	**.197**	6000	35.4	.197	.024	4200	23.6	.197	.024	3600	17.7	.197	.024
6	**.236**	5000	35.4	.236	.024	3500	23.6	.236	.024	3000	17.7	.236	.024
7	**.276**	4500	33.1	.276	.024	3200	21.3	.276	.024	2700	16.5	.276	.024
8	**.315**	4000	30.7	.315	.024	2800	20.5	.315	.024	2400	15.4	.315	.024
9	**.354**	3500	28.3	.354	.024	2500	18.9	.354	.024	2100	14.2	.354	.024
10	**.394**	3200	26.8	.394	.024	2200	17.7	.394	.024	1900	13.4	.394	.024
12	**.472**	2700	24.4	.472	.024	1900	16.1	.472	.024	1600	12.2	.472	.024
14	**.551**	2300	21.7	.551	.024	1600	13.8	.551	.024	1400	11.0	.551	.024

Depth of cut

Workpiece Material		Hardened steel (45−55HRC) AISI H13				Copper, Copper Alloy			
Dia. **DC** (mm)	Dia. **DC** (inch)	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Depth of Cut **ae**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Depth of Cut **ae**
3	**.118**	5000	7.1	.118	.008	13000	47.2	.118	.024
3.5	**.138**	4500	7.1	.138	.008	11000	47.2	.138	.024
4	**.157**	4000	7.1	.157	.008	9500	43.3	.157	.024
5	**.197**	3200	7.1	.197	.008	7600	43.3	.197	.024
6	**.236**	2700	7.1	.236	.008	6400	43.3	.236	.024
7	**.276**	2300	6.3	.276	.008	5500	39.4	.276	.024
8	**.315**	2000	6.3	.315	.008	4800	37.0	.315	.024
9	**.354**	1800	5.9	.354	.008	4200	33.9	.354	.024
10	**.394**	1600	5.5	.394	.008	3800	31.9	.394	.024
12	**.472**	1300	4.7	.472	.008	3200	28.7	.472	.024
14	**.551**	1200	4.7	.551	.008	2700	25.6	.551	.024

Depth of cut

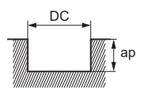
Note 1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) When drilling, please set the feed rate at 1/3 or below the values above.
Note 4) If the rigidity of the machine or the workpiece material installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

■Slotting

(inch)

Workpiece Material		Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20			Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21			Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		
Dia. **DC** (mm)	Dia. **DC** (inch)	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**
3	**.118**	10000	35.4	.024	7000	23.6	.024	6000	17.7	.024
3.5	**.138**	8500	35.4	.024	6000	23.6	.024	5100	17.7	.024
4	**.157**	7500	35.4	.024	5200	23.6	.024	4500	17.7	.024
5	**.197**	6000	35.4	.024	4200	23.6	.024	3600	17.7	.024
6	**.236**	5000	35.4	.024	3500	23.6	.024	3000	17.7	.024
7	**.276**	4500	33.1	.024	3200	21.3	.024	2700	16.5	.024
8	**.315**	4000	30.7	.024	2800	20.5	.024	2400	15.4	.024
9	**.354**	3500	28.3	.024	2500	18.9	.024	2100	14.2	.024
10	**.394**	3200	26.8	.024	2200	17.7	.024	1900	13.4	.024
12	**.472**	2700	24.4	.024	1900	16.1	.024	1600	12.2	.024
14	**.551**	2300	21.7	.024	1600	13.8	.024	1400	11.0	.024

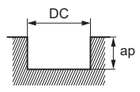
Depth of Cut



DC:Dia.

Workpiece Material		Hardened steel (45−55HRC) AISI H13			Copper, Copper Alloy		
Dia. **DC** (mm)	Dia. **DC** (inch)	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**
3	**.118**	5000	7.1	.008	13000	47.2	.024
3.5	**.138**	4500	7.1	.008	11000	47.2	.024
4	**.157**	4000	7.1	.008	9500	43.3	.024
5	**.197**	3200	7.1	.008	7600	43.3	.024
6	**.236**	2700	7.1	.008	6400	43.3	.024
7	**.276**	2300	6.3	.008	5500	39.4	.024
8	**.315**	2000	6.3	.008	4800	37.0	.024
9	**.354**	1800	5.9	.008	4200	33.9	.024
10	**.394**	1600	5.5	.008	3800	31.9	.024
12	**.472**	1300	4.7	.008	3200	28.7	.024
14	**.551**	1200	4.7	.008	2700	25.6	.024

Depth of Cut



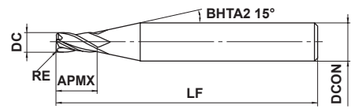
DC:Dia.

Note 1) When cutting austenitic stainless steels, 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 set the feed rate at 1/3 or below the values above.
Note 4) If the rigidity of the machine or the workpiece material installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

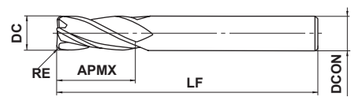
MP4MRB - Inch Sizes

Corner radius, Medium cut length, 4 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	Aluminum Alloy
◎	◎	◎		○	○		



Type 1



Type 2

	RE<.0200"	.0200"≤RE≤.0450"
DC<.3750"	± .0006"	± .0008"
DC=.5000"	± .0008"	± .0008"

DC<.5000"	DC=.5000"
0 - .0008"	0 - .0012"

DCON=.1250"	.250"≤DCON≤.375"	DCON=.500"
0 - .00024"	0 - .00035"	0 - .00043"

(inch)

Order Number	DC	RE	APMX	LF	DCON	* No.F	Stock	Type
MP4MRBD1/8R010	.1250	.0100	.3130	1.50	.1250	4	●	2
MP4MRBD1/8R015	.1250	.0150	.3130	1.50	.1250	4	●	2
MP4MRBD1/8R020	.1250	.0200	.3130	1.50	.1250	4	●	2
MP4MRBD3/16R010	.1875	.0100	.4690	2.00	.2500	4	●	1
MP4MRBD3/16R015	.1875	.0150	.4690	2.00	.2500	4	●	1
MP4MRBD3/16R020	.1875	.0200	.4690	2.00	.2500	4	●	1
MP4MRBD3/16R030	.1875	.0300	.4690	2.00	.2500	4	●	1
MP4MRBD1/4R010	.2500	.0100	.6250	2.50	.2500	4	●	2
MP4MRBD1/4R015	.2500	.0150	.6250	2.50	.2500	4	●	2
MP4MRBD1/4R020	.2500	.0200	.6250	2.50	.2500	4	●	2
MP4MRBD1/4R030	.2500	.0300	.6250	2.50	.2500	4	●	2
MP4MRBD1/4R045	.2500	.0450	.6250	2.50	.2500	4	●	2
MP4MRBD5/16R015	.3125	.0150	.7810	2.75	.3125	4	●	2
MP4MRBD5/16R020	.3125	.0200	.7810	2.75	.3125	4	●	2
MP4MRBD5/16R030	.3125	.0300	.7810	2.75	.3125	4	●	2
MP4MRBD5/16R045	.3125	.0450	.7810	2.75	.3125	4	●	2
MP4MRBD3/8R015	.3750	.0150	.9380	3.00	.3750	4	●	2
MP4MRBD3/8R020	.3750	.0200	.9380	3.00	.3750	4	●	2
MP4MRBD3/8R030	.3750	.0300	.9380	3.00	.3750	4	●	2
MP4MRBD3/8R045	.3750	.0450	.9380	3.00	.3750	4	●	2
MP4MRBD1/2R015	.5000	.0150	1.2500	3.50	.5000	4	●	2
MP4MRBD1/2R020	.5000	.0200	1.2500	3.50	.5000	4	●	2
MP4MRBD1/2R030	.5000	.0300	1.2500	3.50	.5000	4	●	2
MP4MRBD1/2R045	.5000	.0450	1.2500	3.50	.5000	4	●	2

* Number of Flutes

DC = Cutting dia.
RE = Corner radius
APMX = Depth of cut max.
LF = Functional length
DCON = Connection dia.

● : **USA Stock**

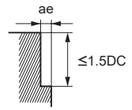
Recommended Cutting Conditions

Shoulder Milling

(inch)

Workpiece Material	Carbon Steel,Alloy Steel (≤280HB) Mild Steel			Carbon Steel,Alloy Steel (>280HB) Alloy Tool Steel Pre-hardened Steel			Austenitic Stainless Steels Titanium Alloys			Hardened Steel (40-55HRC)		
DC	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ae**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ae**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ae**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ae**
1/8	10000	47.2	.025	7500	8.9	.025	7000	8.3	.025	5000	5.9	.006
3/16	6700	42.2	.037	5000	7.9	.037	4700	7.4	.037	3300	5.2	.009
1/4	5000	35.4	.050	3800	6.7	.050	3500	6.2	.050	2500	4.4	.013
5/16	4000	31.5	.062	3000	5.9	.062	2800	5.5	.062	2000	3.9	.016
3/8	3300	31.2	.075	2500	5.9	.075	2300	5.4	.075	1700	4.0	.019
1/2	2500	23.6	.100	1900	4.5	.100	1800	4.3	.100	1300	3.1	.025

Depth of Cut



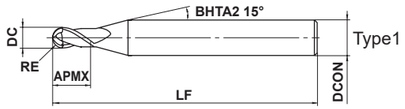
DC : Dia

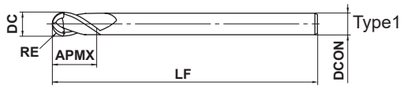
(Note 1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is especially effective.
(Note 2) If the depth of cut is smaller than this table, feed rate can be increased.
(Note 3) If the rigidity of the machine or the workpiece material installation is very low, or chattering and noise are generated, please reduce the revolution and the feed rate proportionately.

MP2MB - Inch Sizes

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	Aluminum Alloy
◎	◎	◎		○	○	○	





.0312"≤DCON≤.5000"			
±.0002"			
DCON=.125"	.250"≤DCON≤.375"	DCON=.500"	
0 - .00020"	0 - .00024"	0 - .00031"	

● 2 flute ball nose end mills with medium cutting edge length for general purpose. Excellent performance for a wide range of workpiece material such as carbon steel, alloy steel and hardened steel.

(inch)

Order Number	RE	DC	APMX	LF	DCON	No.F *	Stock	Type
MP2MBD1/32	.0156	.0312	.0630	1.50	.1250	2	●	1
MP2MBD1/16	.0312	.0625	.1250	1.50	.1250	2	●	1
MP2MBD1/8	.0625	.1250	.2500	1.50	.1250	2	●	2
MP2MBD3/16	.0938	.1875	.3750	2.00	.2500	2	●	1
MP2MBD1/4	.1250	.2500	.5000	2.50	.2500	2	●	2
MP2MBD5/16	.1562	.3125	.6250	3.25	.3125	2	●	2
MP2MBD3/8	.1875	.3750	.7500	3.50	.3750	2	●	2
MP2MBD1/2	.2500	.5000	1.0000	4.00	.5000	2	●	2

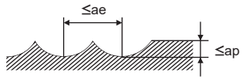
* Number of Flutes

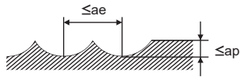
RE = Radius of ball nose
DC = Cutting dia.
APMX = Depth of cut max.
LF = Functional length
DCON = Connection dia.

● : USA Stock

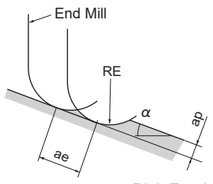
Recommended Cutting Conditions

(inch)

Workpiece Material		Mild Steel, Carbon Steel (180-280HB) Alloy Steel, Pre-hardened Steel, Precipitation Hardening Stainless Steel (<450HB)						Austenitic Stainless Steels (≤200HB) Titanium Alloys					
DC	**RE**	α≤15°		α>15°		Depth of Cut **ap**	Depth of Cut **ae**	α≤15°		α>15°		Depth of Cut **ap**	Depth of Cut **ae**
		Revolution (min-1)	Feed Rate (IPM)	Revolution (min-1)	Feed Rate (IPM)			Revolution (min-1)	Feed Rate (IPM)	Revolution (min-1)	Feed Rate (IPM)		
1/32	**0.397**	40000	189.0	40000	189.0	.002	.003	40000	157.5	40000	74.8	.002	.003
1/16	**0.794**	40000	255.9	40000	255.9	.004	.006	40000	255.9	32000	126.0	.004	.006
1/8	**1.588**	40000	295.3	40000	295.3	.005	.012	32000	236.2	22000	133.9	.005	.012
3/16	**2.381**	25000	236.2	25000	236.2	.008	.020	20000	212.6	13000	90.6	.008	.020
1/4	**3.175**	21000	228.3	21000	228.3	.010	.024	17000	185.0	10000	78.7	.010	.024
5/16	**3.969**	16000	177.2	16000	177.2	.012	.032	13000	141.7	8000	59.1	.012	.032
3/8	**4.763**	13000	141.7	13000	141.7	.020	.039	10000	114.2	6400	47.2	.020	.039
1/2	**6.35**	9000	98.4	9000	98.4	.020	.047	8500	90.6	5300	43.3	.020	.047
Depth of Cut													

Workpiece Material		Hardened Steel (40-55HRC)						Copper, Copper Alloys					
DC	**RE**	α≤15°		α>15°		Depth of Cut **ap**	Depth of Cut **ae**	α≤15°		α>15°		Depth of Cut **ap**	Depth of Cut **ae**
		Revolution (min-1)	Feed Rate (IPM)	Revolution (min-1)	Feed Rate (IPM)			Revolution (min-1)	Feed Rate (IPM)	Revolution (min-1)	Feed Rate (IPM)		
1/32	**.397**	40000	126.0	40000	59.8	.002	.003	40000	189.0	40000	189.0	.002	.003
1/16	**.794**	40000	204.7	32000	100.8	.004	.006	40000	255.9	40000	255.9	.004	.006
1/8	**1.588**	32000	189.0	22000	107.1	.005	.012	40000	295.3	40000	295.3	.005	.012
3/16	**2.381**	20000	170.1	13000	72.5	.008	.020	25000	236.2	25000	236.2	.008	.020
1/4	**3.175**	17000	148.0	10000	63.0	.010	.024	21000	228.3	21000	228.3	.010	.024
5/16	**3.969**	13000	113.4	8000	47.3	.012	.032	16000	177.2	16000	177.2	.012	.032
3/8	**4.763**	10000	91.4	6400	37.8	.020	.039	13000	141.7	13000	141.7	.020	.039
1/2	**6.35**	8500	72.5	5300	34.6	.020	.047	9000	98.4	9000	98.4	.020	.047
Depth of Cut													

(Note 1) α is the inclination angle of the machined surface.
(Note 2) If the depth of cut is smaller, the revolution and the feed rate can be increased.
(Note 3) If the rigidity of the workpiece material installation is very low, or chattering and noise are generated, reduce the revolution and the feed rate proportionately.

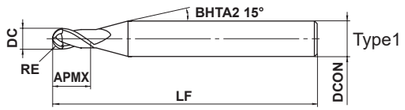


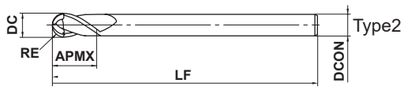
ae = Pick Feed

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	Aluminum 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. Excellent performance for a wide range of workpiece materials such as carbon steel, alloy steel and hardened steel.

(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

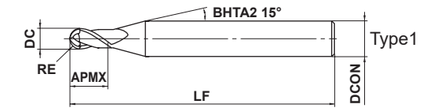
RE = Radius of ball nose
DC = Cutting dia.
APMX = Depth of cut max.
LF = Functional length
DCON = Connection dia.

● : USA Stock

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	Aluminum 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. Excellent performance for a wide range of workpiece materials such as carbon steel, alloy steel and hardened steel.

(mm)

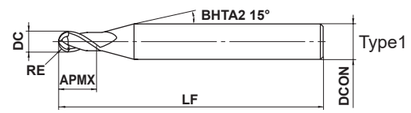
Order Number	RE	DC	APMX	LF	DCON	* No.F	Stock	Type
MP2SBR0010	0.1	0.2	0.3	45	4	2	●	1
MP2SBR0015	0.15	0.3	0.5	45	4	2	●	1
MP2SBR0020	0.2	0.4	0.6	45	4	2	●	1
MP2SBR0020S06	0.2	0.4	0.6	50	6	2	●	1
MP2SBR0025	0.25	0.5	0.8	45	4	2	●	1
MP2SBR0030	0.3	0.6	0.9	45	4	2	●	1
MP2SBR0030S06	0.3	0.6	0.9	50	6	2	●	1
MP2SBR0035	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

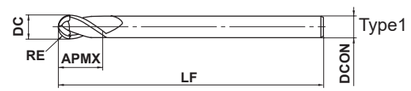
* Number of Flutes

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	Aluminum 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. Excellent performance for a wide range of workpiece materials such as carbon steel, alloy steel and hardened steel.

(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 = Radius of ball nose
DC = Cutting dia.
APMX = Depth of cut max.
LF = Functional length
DCON = Connection dia.

● : **USA Stock**

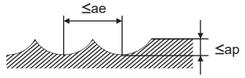
Ball nose, Short cut length, 2 flute, Short shank **MP2SSB**
Ball nose, Short cut length, 2 flute **MP2SB** Ball nose, Medium cut length, 2 flute **MP2MB**

Recommended Cutting Conditions

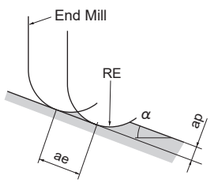
(inch)

Workpiece Material	Mild Steel,Carbon Steel (180−280HB), Alloy Steel, Pre-hardened Steel, Precipitation Hardening Stainless Steel (<450HB)						Austenitic Stainless Steels (≤200HB) Titanium Alloys					
RE (mm)	α≤15°		α>15°		Depth of Cut ap	Depth of Cut ae	α≤15°		α>15°		Depth of Cut ap	Depth of Cut ae
	Revolution (min⁻¹)	Feed Rate (IPM)	Revolution (min⁻¹)	Feed Rate (IPM)			Revolution (min⁻¹)	Feed Rate (IPM)	Revolution (min⁻¹)	Feed Rate (IPM)		
R0.1	40000	11.8	40000	9.8	.0001	.0008	40000	11.8	40000	9.8	.0001	.0008
R0.15	40000	19.7	40000	13.8	.0003	.0012	40000	19.7	40000	13.8	.0003	.0012
R0.2	40000	63.0	40000	47.2	.0008	.0016	40000	59.1	40000	39.4	.0006	.0016
R0.25	40000	94.5	40000	55.1	.0010	.0020	40000	82.7	40000	47.2	.0008	.0020
R0.3	40000	126.0	40000	63.0	.0012	.0024	40000	110.2	40000	55.1	.0012	.0024
R0.4	40000	189.0	40000	94.5	.002	.003	40000	181.1	40000	82.7	.002	.003
R0.5	40000	220.5	40000	126.0	.002	.004	40000	220.5	40000	133.9	.002	.004
R0.75	40000	255.9	40000	157.5	.004	.006	40000	255.9	36000	141.7	.003	.006
R1	40000	255.9	39000	185.0	.004	.008	40000	255.9	35000	157.5	.004	.008
R1.25	40000	275.6	33000	177.2	.005	.010	40000	291.3	29000	157.5	.005	.010
R1.5	40000	295.3	27000	169.3	.005	.012	36000	271.7	24000	153.5	.005	.012
R2	32000	295.3	20000	141.7	.006	.016	28000	271.7	18000	122.0	.006	.016
R2.5	25000	236.2	16000	114.2	.008	.020	22000	244.1	14000	102.4	.008	.020
R3	21000	228.3	13000	102.4	.010	.024	18000	212.6	11000	90.6	.010	.024
R4	16000	177.2	10000	78.7	.012	.031	14000	161.4	9000	66.9	.012	.031
R5	13000	141.7	8000	66.9	.020	.039	11000	129.9	7200	51.2	.020	.039
R6	9000	98.4	6000	51.2	.020	.047	8100	90.6	5400	43.3	.020	.047

Depth of Cut



(Note 1) α is the inclination angle of the machined surface.
(Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
(Note 3) If the rigidity of the machine or the workpiece material installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.



ae = Pick Feed

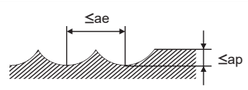
Ball nose, Short cut length, 2 flute, Short shank **MP2SSB**
Ball nose, Short cut length, 2 flute **MP2SB** Ball nose, Medium cut length, 2 flute **MP2MB**

Recommended Cutting Conditions

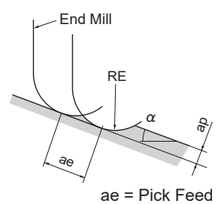
(inch)

Workpiece Material	Hardened Steel (45—55HRC)						Copper, Copper Alloys					
RE (mm)	α≤15°		α>15°		Depth of Cut ap	Depth of Cut ae	α≤15°		α>15°		Depth of Cut ap	Depth of Cut ae
	Revolution (min-1)	Feed Rate (IPM)	Revolution (min-1)	Feed Rate (IPM)			Revolution (min-1)	Feed Rate (IPM)	Revolution (min-1)	Feed Rate (IPM)		
R0.1	40000	11.8	40000	9.8	.0001	.0008	40000	11.8	40000	9.8	.0001	.0008
R0.15	40000	19.7	40000	13.8	.0003	.0012	40000	19.7	40000	13.8	.0003	.0012
R0.2	40000	51.2	40000	37.4	.0006	.0016	40000	51.2	40000	37.4	.0006	.0016
R0.25	40000	74.8	40000	43.3	.0008	.0020	40000	74.8	40000	43.3	.0008	.0020
R0.3	40000	98.4	40000	51.2	.0010	.0024	40000	98.4	40000	51.2	.0010	.0024
R0.4	40000	157.5	40000	74.8	.002	.003	40000	157.5	40000	74.8	.002	.003
R0.5	40000	220.5	40000	118.1	.002	.004	40000	220.5	40000	118.1	.002	.004
R0.75	40000	255.9	32000	126.0	.003	.006	40000	255.9	32000	126.0	.003	.006
R1	40000	255.9	31000	137.8	.004	.008	40000	255.9	31000	137.8	.004	.008
R1.25	36000	255.9	26000	137.8	.005	.010	36000	255.9	26000	137.8	.005	.010
R1.5	32000	236.2	22000	133.9	.005	.012	32000	236.2	22000	133.9	.005	.012
R2	25000	236.2	16000	106.3	.006	.016	25000	236.2	16000	106.3	.006	.024
R2.5	20000	212.6	13000	90.6	.008	.020	20000	212.6	13000	90.6	.008	.031
R3	17000	185.0	10000	78.7	.010	.024	17000	185.0	10000	78.7	.010	.035
R4	13000	141.7	8000	59.1	.012	.031	13000	141.7	8000	59.1	.012	.063
R5	10000	114.2	6400	47.2	.020	.039	10000	114.2	6400	47.2	.020	.079
R6	7200	78.7	4800	39.4	.020	.047	8500	90.6	5300	43.3	.020	.094

Depth of Cut



(Note 1) α is the inclination angle of the machined surface.
(Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
(Note 3) If the rigidity of the machine or the workpiece material installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

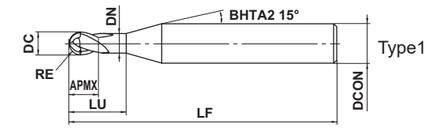


ae = Pick Feed

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	Aluminum Alloy
◎	◎	◎					



0.5≤RE≤6				
±0.01				
4≤DCON≤6	DCON=8			
h5 0 / - 0.005	0 / - 0.006			
DCON=10	DCON=12			
h6 0 / - 0.009	0 / - 0.011			

● 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	50	4	2	●	1
MP2SDBR0075S06	0.75	1.5	1.5	3	1.46	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 processing.

RE = Radius of ball nose
DC = Cutting dia.
APMX = Depth of cut max.
LU = Usable length
DN = Neck dia.
LF = Functional length
DCON = Connection dia.

● : USA Stock

MP2SDB

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

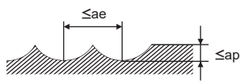
Recommended Cutting Conditions

■ Overhang Below DC x 5 (DC : Dia.)

(inch)

Workpiece Material	Carbon Steel, Alloy Steel (180–280HB) Alloy Tool Steel, Tool Steel, Pre-hardened Steel						Hardened Steel (45–55HRC)					
RE (mm)	α≤15°		α>15°		Depth of Cut ap	Depth of Cut ae	α≤15°		α>15°		Depth of Cut ap	Depth of Cut ae
	Revolution (min-1)	Feed Rate (IPM)	Revolution (min-1)	Feed Rate (IPM)			Revolution (min-1)	Feed Rate (IPM)	Revolution (min-1)	Feed Rate (IPM)		
R 0.5	40000	153.5	36000	82.7	.004	.010	40000	169.3	36000	86.6	.004	.010
R 0.75	40000	165.4	36000	102.4	.006	.014	40000	185.0	36000	106.3	.006	.014
R 1	40000	177.2	36000	122.0	.008	.020	40000	196.9	36000	129.9	.008	.020
R 1.5	37000	208.7	24000	106.3	.012	.030	37000	228.3	24000	110.2	.012	.030
R 2X4	24000	126.0	15000	78.7	.010	.028	19000	110.2	13000	63.0	.010	.028
R 2	30000	192.9	19000	98.4	.016	.039	28000	196.9	19000	94.5	.016	.039
R 2.5	25000	177.2	16000	90.6	.020	.051	22000	165.4	16000	86.6	.020	.049
R 3	22000	169.3	14000	86.6	.024	.071	18000	149.6	12000	70.9	.024	.059
R 4	19000	153.5	12000	78.7	.031	.094	15000	126.0	9500	63.0	.031	.079
R 5	15000	129.9	9500	70.9	.039	.118	11000	98.4	7000	55.1	.039	.098
R 6	12000	100.4	8000	63.0	.047	.142	9000	78.7	6000	51.2	.047	.118

Depth of Cut

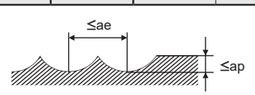


■ Overhang Below DC x 7 (DC : Dia.)

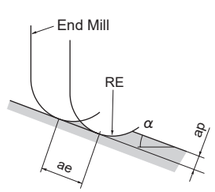
(inch)

Workpiece Material	Carbon Steel, Alloy Steel (180–280HB) Alloy Tool Steel, Tool Steel, Pre-hardened Steel						Hardened Steel (45–55HRC)					
RE (mm)	α≤15°		α>15°		Depth of Cut ap	Depth of Cut ae	α≤15°		α>15°		Depth of Cut ap	Depth of Cut ae
	Revolution (min-1)	Feed Rate (IPM)	Revolution (min-1)	Feed Rate (IPM)			Revolution (min-1)	Feed Rate (IPM)	Revolution (min-1)	Feed Rate (IPM)		
R 3	10000	59.1	6900	39.4	.008	.039	8000	55.1	5300	30.3	.008	.031
R 4	8000	55.1	5600	35.4	.012	.059	6400	51.2	4000	25.6	.012	.047
R 5	6000	47.2	4100	29.1	.016	.079	4800	43.3	3200	22.8	.016	.063
R 6	5000	39.4	3400	23.6	.018	.094	4000	35.4	2700	19.3	.018	.079

Depth of Cut



(Note 1) α is the inclination angle of the machined surface.
(Note 2) If the depth of cut is smaller than this table, feed rate can be increased.
(Note 3) If the rigidity of the machine or the workpiece material installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

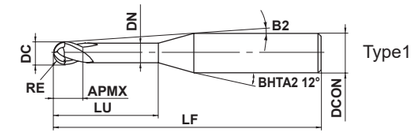


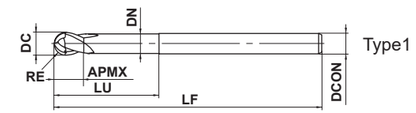
ae = Pick Feed

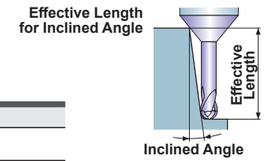
MP2XLB

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	Aluminum Alloy
◎	◎	◎		○	○	○	







0.05≤RE≤3			
±0.005			
4≤DCON≤6			
0 / - 0.005			

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

(mm)

Order Number	RE	DC	APMX	LU	DN	B2	LF	DCON	No.F *	Stock	Type	Effective Length for Inclined Angle 0.5°	1°	2°	3°
MP2XLBR0005N003	0.05	0.1	0.08	0.3	0.085	11.6°	50	4	2	●	1	0.3	0.3	0.4	0.4
MP2XLBR0005N005	0.05	0.1	0.08	0.5	0.085	11.4°	50	4	2	●	1	0.5	0.5	0.6	0.7
MP2XLBR0010N005	0.1	0.2	0.15	0.5	0.18	11.5°	50	4	2	●	1	0.5	0.5	0.6	0.7
MP2XLBR0010N008	0.1	0.2	0.15	0.75	0.18	11.2°	50	4	2	●	1	0.8	0.8	0.9	1.0
MP2XLBR0010N010	0.1	0.2	0.15	1	0.18	10.9°	50	4	2	●	1	1.0	1.1	1.2	1.3
MP2XLBR0010N013	0.1	0.2	0.15	1.25	0.18	10.6°	50	4	2	●	1	1.3	1.4	1.5	1.7
MP2XLBR0010N015	0.1	0.2	0.15	1.5	0.18	10.4°	50	4	2	●	1	1.6	1.6	1.8	2.0
MP2XLBR0010N018	0.1	0.2	0.15	1.75	0.18	10.2°	50	4	2	●	1	1.8	1.9	2.1	2.3
MP2XLBR0010N020	0.1	0.2	0.15	2	0.18	9.9°	50	4	2	●	1	2.1	2.2	2.4	2.6
MP2XLBR0010N025	0.1	0.2	0.15	2.5	0.18	9.5°	50	4	2	●	1	2.6	2.7	3.0	3.3
MP2XLBR0015N005	0.15	0.3	0.24	0.5	0.28	11.5°	50	4	2	●	1	0.5	0.5	0.6	0.6
MP2XLBR0015N008	0.15	0.3	0.24	0.75	0.28	11.2°	50	4	2	●	1	0.8	0.8	0.9	1.0
MP2XLBR0015N010	0.15	0.3	0.24	1	0.28	10.9°	50	4	2	●	1	1.0	1.1	1.2	1.3
MP2XLBR0015N010S06	0.15	0.3	0.24	1	0.28	11.3°	50	6	2	●	1	1.0	1.1	1.2	1.3
MP2XLBR0015N013	0.15	0.3	0.24	1.25	0.28	10.7°	50	4	2	●	1	1.3	1.4	1.5	1.6
MP2XLBR0015N013S06	0.15	0.3	0.24	1.25	0.28	11.1°	50	6	2	●	1	1.3	1.4	1.5	1.6
MP2XLBR0015N015	0.15	0.3	0.24	1.5	0.28	10.4°	50	4	2	●	1	1.6	1.6	1.8	2.0
MP2XLBR0015N015S06	0.15	0.3	0.24	1.5	0.28	10.9°	50	6	2	●	1	1.6	1.6	1.8	2.0
MP2XLBR0015N018	0.15	0.3	0.24	1.75	0.28	10.2°	50	4	2	●	1	1.8	1.9	2.1	2.3
MP2XLBR0015N020	0.15	0.3	0.24	2	0.28	9.9°	50	4	2	●	1	2.1	2.2	2.4	2.6
MP2XLBR0015N025	0.15	0.3	0.24	2.5	0.28	9.5°	50	4	2	●	1	2.6	2.7	3.0	3.3
MP2XLBR0015N030	0.15	0.3	0.24	3	0.28	9.1°	50	4	2	●	1	3.1	3.3	3.6	4.0
MP2XLBR0015N035	0.15	0.3	0.24	3.5	0.28	8.7°	50	4	2	●	1	3.7	3.8	4.2	4.6
MP2XLBR0015N040	0.15	0.3	0.24	4	0.28	8.4°	50	4	2	●	1	4.2	4.4	4.8	5.3
MP2XLBR0020N005	0.2	0.4	0.3	0.5	0.37	11.6°	50	4	2	●	1	0.5	0.5	0.5	0.6
MP2XLBR0020N008	0.2	0.4	0.3	0.75	0.37	11.3°	50	4	2	●	1	0.7	0.8	0.9	0.9
MP2XLBR0020N010	0.2	0.4	0.3	1	0.37	11°	50	4	2	●	1	1.0	1.1	1.2	1.3
MP2XLBR0020N010S06	0.2	0.4	0.3	1	0.37	11.3°	50	6	2	●	1	1.0	1.1	1.2	1.3
MP2XLBR0020N015	0.2	0.4	0.3	1.5	0.37	10.4°	50	4	2	●	1	1.5	1.6	1.7	1.9
MP2XLBR0020N020	0.2	0.4	0.3	2	0.37	9.9°	50	4	2	●	1	2.1	2.2	2.3	2.6

* Number of Flutes

● : USA Stock

MP2XLB

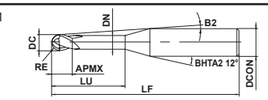
Ball nose, Short cut length, 2 flute, Long neck

(mm)

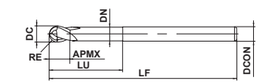
Order Number	RE	DC	APMX	LU	DN	B2	LF	DCON	No.F *	Stock	Type	Effective Length for Inclined Angle			
												0.5°	1°	2°	3°
MP2XLBR0020N020S06	0.2	0.4	0.3	2	0.37	10.6°	50	6	2	●	1	2.1	2.2	2.3	2.6
MP2XLBR0020N025	0.2	0.4	0.3	2.5	0.37	9.5°	50	4	2	●	1	2.6	2.7	2.9	3.3
MP2XLBR0020N030	0.2	0.4	0.3	3	0.37	9.1°	50	4	2	●	1	3.1	3.2	3.5	3.9
MP2XLBR0020N035	0.2	0.4	0.3	3.5	0.37	8.7°	50	4	2	●	1	3.6	3.8	4.1	4.6
MP2XLBR0020N040	0.2	0.4	0.3	4	0.37	8.4°	50	4	2	●	1	4.2	4.3	4.7	5.2
MP2XLBR0020N045	0.2	0.4	0.3	4.5	0.37	8°	50	4	2	●	1	4.7	4.9	5.3	5.9
MP2XLBR0020N050	0.2	0.4	0.3	5	0.37	7.7°	50	4	2	●	1	5.2	5.4	5.9	6.6
MP2XLBR0020N055	0.2	0.4	0.3	5.5	0.37	7.5°	50	4	2	●	1	5.7	6.0	6.5	7.2
MP2XLBR0020N060	0.2	0.4	0.3	6	0.37	7.2°	50	4	2	●	1	6.2	6.5	7.1	7.9
MP2XLBR0025N010	0.25	0.5	0.37	1	0.47	11°	50	4	2	●	1	1.0	1.0	1.1	1.2
MP2XLBR0025N015	0.25	0.5	0.37	1.5	0.47	10.4°	50	4	2	●	1	1.5	1.6	1.7	1.9
MP2XLBR0025N015S06	0.25	0.5	0.37	1.5	0.47	11°	50	6	2	●	1	1.5	1.6	1.7	1.9
MP2XLBR0025N020	0.25	0.5	0.37	2	0.47	9.9°	50	4	2	●	1	2.1	2.1	2.3	2.6
MP2XLBR0025N020S06	0.25	0.5	0.37	2	0.47	10.6°	50	6	2	●	1	2.1	2.1	2.3	2.6
MP2XLBR0025N025	0.25	0.5	0.37	2.5	0.47	9.5°	50	4	2	●	1	2.6	2.7	2.9	3.2
MP2XLBR0025N025S06	0.25	0.5	0.37	2.5	0.47	10.3°	50	6	2	●	1	2.6	2.7	2.9	3.2
MP2XLBR0025N030	0.25	0.5	0.37	3	0.47	9.1°	50	4	2	●	1	3.1	3.2	3.5	3.9
MP2XLBR0025N030S06	0.25	0.5	0.37	3	0.47	10°	50	6	2	●	1	3.1	3.2	3.5	3.9
MP2XLBR0025N035	0.25	0.5	0.37	3.5	0.47	8.7°	50	4	2	●	1	3.6	3.8	4.1	4.6
MP2XLBR0025N040	0.25	0.5	0.37	4	0.47	8.3°	50	4	2	●	1	4.1	4.3	4.7	5.2
MP2XLBR0025N045	0.25	0.5	0.37	4.5	0.47	8°	50	4	2	●	1	4.7	4.9	5.3	5.9
MP2XLBR0025N050	0.25	0.5	0.37	5	0.47	7.7°	50	4	2	●	1	5.2	5.4	5.9	6.6
MP2XLBR0025N055	0.25	0.5	0.37	5.5	0.47	7.4°	50	4	2	●	1	5.7	6.0	6.5	7.2
MP2XLBR0025N060	0.25	0.5	0.37	6	0.47	7.2°	50	4	2	●	1	6.2	6.5	7.1	7.9
MP2XLBR0025N070	0.25	0.5	0.37	7	0.47	6.7°	50	4	2	●	1	7.3	7.6	8.3	9.2
MP2XLBR0025N080	0.25	0.5	0.37	8	0.47	6.3°	50	4	2	●	1	8.3	8.7	9.5	10.5
MP2XLBR0025N090	0.25	0.5	0.37	9	0.47	5.9°	50	4	2	●	1	9.4	9.8	10.7	11.9
MP2XLBR0025N100	0.25	0.5	0.37	10	0.47	5.6°	50	4	2	●	1	10.4	10.9	11.9	13.2
MP2XLBR0030N015	0.3	0.6	0.45	1.5	0.57	10.4°	50	4	2	●	1	1.5	1.6	1.8	2.0
MP2XLBR0030N015S06	0.3	0.6	0.45	1.5	0.57	11°	50	6	2	●	1	1.5	1.6	1.8	2.0
MP2XLBR0030N020	0.3	0.6	0.45	2	0.57	9.9°	50	4	2	●	1	2.1	2.2	2.4	2.6
MP2XLBR0030N020S06	0.3	0.6	0.45	2	0.57	10.6°	50	6	2	●	1	2.1	2.2	2.4	2.6
MP2XLBR0030N025	0.3	0.6	0.45	2.5	0.57	9.4°	50	4	2	●	1	2.6	2.7	3.0	3.3
MP2XLBR0030N030	0.3	0.6	0.45	3	0.57	9°	50	4	2	●	1	3.1	3.3	3.6	4.0
MP2XLBR0030N030S06	0.3	0.6	0.45	3	0.57	9.9°	50	6	2	●	1	3.1	3.3	3.6	4.0
MP2XLBR0030N035	0.3	0.6	0.45	3.5	0.57	8.6°	50	4	2	●	1	3.7	3.8	4.2	4.6
MP2XLBR0030N040	0.3	0.6	0.45	4	0.57	8.2°	50	4	2	●	1	4.2	4.4	4.8	5.3
MP2XLBR0030N040S06	0.3	0.6	0.45	4	0.57	9.3°	50	6	2	●	1	4.2	4.4	4.8	5.3
MP2XLBR0030N045	0.3	0.6	0.45	4.5	0.57	7.9°	50	4	2	●	1	4.7	4.9	5.4	5.9
MP2XLBR0030N050	0.3	0.6	0.45	5	0.57	7.6°	50	4	2	●	1	5.2	5.5	6.0	6.6
MP2XLBR0030N050S06	0.3	0.6	0.45	5	0.57	8.8°	50	6	2	●	1	5.2	5.5	6.0	6.6
MP2XLBR0030N055	0.3	0.6	0.45	5.5	0.57	7.3°	50	4	2	●	1	5.8	6.0	6.6	7.3
MP2XLBR0030N060	0.3	0.6	0.45	6	0.57	7.1°	50	4	2	●	1	6.3	6.6	7.2	7.9
MP2XLBR0030N060S06	0.3	0.6	0.45	6	0.57	8.3°	50	6	2	●	1	6.3	6.6	7.2	7.9
MP2XLBR0030N065	0.3	0.6	0.45	6.5	0.57	6.8°	50	4	2	●	1	6.8	7.1	7.8	8.6
MP2XLBR0030N070	0.3	0.6	0.45	7	0.57	6.6°	50	4	2	●	1	7.3	7.6	8.4	9.3
MP2XLBR0030N080	0.3	0.6	0.45	8	0.57	6.2°	50	4	2	●	1	8.4	8.7	9.6	10.6
MP2XLBR0030N080S06	0.3	0.6	0.45	8	0.57	7.6°	50	6	2	●	1	8.4	8.7	9.6	10.6

* Number of Flutes

Type1



Type2



(mm)

Order Number	RE	DC	APMX	LU	DN	B2	LF	DCON	No.F *	Stock	Type	Effective Length for Inclined Angle			
												0.5°	1°	2°	3°
MP2XLBR0030N085	0.3	0.6	0.45	8.5	0.57	6°	50	4	2	●	1	8.9	9.3	10.2	11.3
MP2XLBR0030N090	0.3	0.6	0.45	9	0.57	5.8°	50	4	2	●	1	9.4	9.8	10.8	11.9
MP2XLBR0030N095	0.3	0.6	0.45	9.5	0.57	5.7°	50	4	2	●	1	9.9	10.4	11.4	12.6
MP2XLBR0030N100	0.3	0.6	0.45	10	0.57	5.5°	50	4	2	●	1	10.5	10.9	12.0	13.2
MP2XLBR0030N110	0.3	0.6	0.45	11	0.57	5.2°	50	4	2	●	1	11.5	12.0	13.2	14.6
MP2XLBR0030N120	0.3	0.6	0.45	12	0.57	5°	50	4	2	●	1	12.5	13.1	14.4	15.9
MP2XLBR0040N020	0.4	0.8	0.6	2	0.77	9.9°	50	4	2	●	1	2.1	2.2	2.4	2.6
MP2XLBR0040N020S06	0.4	0.8	0.6	2	0.77	10.6°	50	6	2	●	1	2.1	2.2	2.4	2.6
MP2XLBR0040N024S06	0.4	0.8	0.6	2.4	0.77	10.3°	50	6	2	●	1	2.5	2.6	2.8	3.1
MP2XLBR0040N030	0.4	0.8	0.6	3	0.77	8.9°	50	4	2	●	1	3.1	3.3	3.6	3.9
MP2XLBR0040N030S06	0.4	0.8	0.6	3	0.77	9.9°	50	6	2	●	1	3.1	3.3	3.6	3.9
MP2XLBR0040N040	0.4	0.8	0.6	4	0.77	8.2°	50	4	2	●	1	4.2	4.4	4.8	5.2
MP2XLBR0040N040S06	0.4	0.8	0.6	4	0.77	9.3°	50	6	2	●	1	4.2	4.4	4.8	5.2
MP2XLBR0040N050	0.4	0.8	0.6	5	0.77	7.5°	50	4	2	●	1	5.2	5.5	6.0	6.6
MP2XLBR0040N060	0.4	0.8	0.6	6	0.77	6.9°	50	4	2	●	1	6.3	6.5	7.2	7.9
MP2XLBR0040N070	0.4	0.8	0.6	7	0.77	6.5°	50	4	2	●	1	7.3	7.6	8.4	9.2
MP2XLBR0040N080	0.4	0.8	0.6	8	0.77	6°	50	4	2	●	1	8.4	8.7	9.5	10.6
MP2XLBR0040N090	0.4	0.8	0.6	9	0.77	5.7°	50	4	2	●	1	9.4	9.8	10.7	11.9
MP2XLBR0040N100	0.4	0.8	0.6	10	0.77	5.4°	50	4	2	●	1	10.5	10.9	11.9	13.2
MP2XLBR0040N120	0.4	0.8	0.6	12	0.77	4.8°	50	4	2	●	1	12.5	13.1	14.3	15.9
MP2XLBR0050N030	0.5	1	0.75	3	0.96	8.7°	50	4	2	●	1	3.2	3.4	3.7	4.1
MP2XLBR0050N030S06	0.5	1	0.75	3	0.96	9.8°	50	6	2	●	1	3.2	3.4	3.7	4.1
MP2XLBR0050N040	0.5	1	0.75	4	0.96	7.9°	50	4	2	●	1	4.3	4.5	4.9	5.4
MP2XLBR0050N040S06	0.5	1	0.75	4	0.96	9.2°	50	6	2	●	1	4.3	4.5	4.9	5.4
MP2XLBR0050N050	0.5	1	0.75	5	0.96	7.3°	50	4	2	●	1	5.3	5.6	6.1	6.7
MP2XLBR0050N050S06	0.5	1	0.75	5	0.96	8.6°	50	6	2	●	1	5.3	5.6	6.1	6.7
MP2XLBR0050N060	0.5	1	0.75	6	0.96	6.7°	50	4	2	●	1	6.4	6.7	7.3	8.1
MP2XLBR0050N060S06	0.5	1	0.75	6	0.96	8.2°	50	6	2	●	1	6.4	6.7	7.3	8.1
MP2XLBR0050N070	0.5	1	0.75	7	0.96	6.2°	50	4	2	●	1	7.4	7.8	8.5	9.4
MP2XLBR0050N080	0.5	1	0.75	8	0.96	5.8°	50	4	2	●	1	8.5	8.9	9.7	10.7
MP2XLBR0050N080S06	0.5	1	0.75	8	0.96	7.3°	50	6	2	●	1	8.5	8.9	9.7	10.7
MP2XLBR0050N090	0.5	1	0.75	9	0.96	5.5°	50	4	2	●	1	9.5	10.0	10.9	12.0
MP2XLBR0050N100	0.5	1	0.75	10	0.96	5.1°	50	4	2	●	1	10.6	11.1	12.1	13.4
MP2XLBR0050N100S06	0.5	1	0.75	10	0.96	6.7°	60	6	2	●	1	10.6	11.1	12.1	13.4
MP2XLBR0050N120	0.5	1	0.75	12	0.96	4.6°	50	4	2	●	1	12.7	13.2	14.5	16.0
MP2XLBR0050N120S06	0.5	1	0.75	12	0.96	6.1°	60	6	2	●	1	12.7	13.2	14.5	16.0
MP2XLBR0050N140	0.5	1	0.75	14	0.96	4.2°	55	4	2	●	1	14.8	15.4	16.9	18.7
MP2XLBR0050N160	0.5	1	0.75	16	0.96	3.8°	55	4	2	●	1	16.9	17.6	19.3	21.3
MP2XLBR0050N160S06	0.5	1	0.75	16	0.96	5.2°	65	6	2	●	1	16.9	17.6	19.3	21.3
MP2XLBR0050N180	0.5	1	0.75	18	0.96	3.5°	55	4	2	●	1	18.9	19.8	21.7	24.0
MP2XLBR0050N200	0.5	1	0.75	20	0.96	3.3°	55	4	2	●	1	21.0	22.0	24.1	26.6
MP2XLBR0050N200S06	0.5	1	0.75	20	0.96	4.6°	65	6	2	●	1	21.0	22.0	24.1	26.6
MP2XLBR0060N060	0.6	1.2	0.9	6	1.16	6.6°	50	4	2	●	1	6.4	6.7	7.3	8.0
MP2XLBR0060N060S06	0.6	1.2	0.9	6	1.16	8.1°	55	6	2	●	1	6.4	6.7	7.3	8.0
MP2XLBR0060N080	0.6	1.2	0.9	8	1.16	5.7°	50	4	2	●	1	8.5	8.9	9.7	10.7
MP2XLBR0060N080S06	0.6	1.2	0.9	8	1.16	7.3°	55	6	2	●	1	8.5	8.9	9.7	10.7
MP2XLBR0060N100	0.6	1.2	0.9	10	1.16	5°	50	4	2	●	1	10.6	11.0	12.1	13.3
MP2XLBR0060N100S06	0.6	1.2	0.9	10	1.16	6.6°	55	6	2	●	1	10.6	11.0	12.1	13.3

* Number of Flutes

● : USA Stock

MP2XLB

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

(mm)

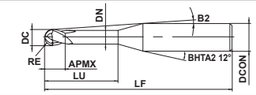
Order Number	RE	DC	APMX	LU	DN	B2	LF	DCON	No.F *	Stock	Type	Effective Length for Inclined Angle 0.5°	1°	2°	3°
MP2XLBR0060N120	0.6	1.2	0.9	12	1.16	4.4°	50	4	2	●	1	12.7	13.2	14.5	16.0
MP2XLBR0060N120S06	0.6	1.2	0.9	12	1.16	6°	65	6	2	●	1	12.7	13.2	14.5	16.0
MP2XLBR0060N140	0.6	1.2	0.9	14	1.16	4°	55	4	2	●	1	14.8	15.4	16.9	18.7
MP2XLBR0060N160	0.6	1.2	0.9	16	1.16	3.7°	55	4	2	●	1	16.9	17.6	19.3	21.3
MP2XLBR0060N160S06	0.6	1.2	0.9	16	1.16	5.1°	65	6	2	●	1	16.9	17.6	19.3	21.3
MP2XLBR0060N180	0.6	1.2	0.9	18	1.16	3.4°	60	4	2	●	1	18.9	19.8	21.7	24.0
MP2XLBR0060N200	0.6	1.2	0.9	20	1.16	3.1°	60	4	2	●	1	21.0	21.9	24.0	26.6
MP2XLBR0060N240	0.6	1.2	0.9	24	1.16	2.7°	60	4	2	●	1	25.2	26.3	28.8	*
MP2XLBR0070N080	0.7	1.4	1.05	8	1.34	5.5°	50	4	2	●	1	8.4	8.8	9.6	10.6
MP2XLBR0070N120	0.7	1.4	1.05	12	1.34	4.3°	50	4	2	●	1	12.6	13.1	14.4	15.9
MP2XLBR0070N160	0.7	1.4	1.05	16	1.34	3.5°	50	4	2	●	1	16.8	17.5	19.2	21.2
MP2XLBR0075N030	0.75	1.5	1.1	3	1.44	8.6°	50	4	2	●	1	3.1	3.3	3.6	3.9
MP2XLBR0075N040	0.75	1.5	1.1	4	1.44	7.7°	50	4	2	●	1	4.2	4.4	4.8	5.2
MP2XLBR0075N060	0.75	1.5	1.1	6	1.44	6.3°	50	4	2	●	1	6.3	6.6	7.2	7.9
MP2XLBR0075N060S06	0.75	1.5	1.1	6	1.44	8°	50	6	2	●	1	6.3	6.6	7.2	7.9
MP2XLBR0075N080	0.75	1.5	1.1	8	1.44	5.4°	50	4	2	●	1	8.4	8.8	9.6	10.6
MP2XLBR0075N080S06	0.75	1.5	1.1	8	1.44	7.2°	60	6	2	●	1	8.4	8.8	9.6	10.6
MP2XLBR0075N100	0.75	1.5	1.1	10	1.44	4.7°	50	4	2	●	1	10.5	11.0	12.0	13.2
MP2XLBR0075N100S06	0.75	1.5	1.1	10	1.44	6.5°	60	6	2	●	1	10.5	11.0	12.0	13.2
MP2XLBR0075N120	0.75	1.5	1.1	12	1.44	4.2°	50	4	2	●	1	12.6	13.1	14.4	15.9
MP2XLBR0075N120S06	0.75	1.5	1.1	12	1.44	5.9°	60	6	2	●	1	12.6	13.1	14.4	15.9
MP2XLBR0075N140	0.75	1.5	1.1	14	1.44	3.8°	55	4	2	●	1	14.7	15.3	16.8	18.5
MP2XLBR0075N160	0.75	1.5	1.1	16	1.44	3.4°	55	4	2	●	1	16.8	17.5	19.2	21.2
MP2XLBR0075N160S06	0.75	1.5	1.1	16	1.44	5°	60	6	2	●	1	16.8	17.5	19.2	21.2
MP2XLBR0075N180	0.75	1.5	1.1	18	1.44	3.1°	60	4	2	●	1	18.9	19.7	21.6	23.8
MP2XLBR0075N200	0.75	1.5	1.1	20	1.44	2.9°	60	4	2	●	1	21.0	21.9	23.9	*
MP2XLBR0075N220	0.75	1.5	1.1	22	1.44	2.7°	60	4	2	●	1	23.0	24.0	26.3	*
MP2XLBR0080N080	0.8	1.6	1.2	8	1.54	5.3°	55	4	2	●	1	8.4	8.8	9.6	10.5
MP2XLBR0080N120	0.8	1.6	1.2	12	1.54	4.1°	55	4	2	●	1	12.6	13.1	14.4	15.9
MP2XLBR0080N160	0.8	1.6	1.2	16	1.54	3.3°	55	4	2	●	1	16.8	17.5	19.1	21.2
MP2XLBR0080N200	0.8	1.6	1.2	20	1.54	2.8°	55	4	2	●	1	21.0	21.9	23.9	*
MP2XLBR0090N080	0.9	1.8	1.4	8	1.74	5.1°	55	4	2	●	1	8.4	8.8	9.6	10.5
MP2XLBR0090N120	0.9	1.8	1.4	12	1.74	3.9°	55	4	2	●	1	12.6	13.1	14.3	15.8
MP2XLBR0090N160	0.9	1.8	1.4	16	1.74	3.1°	55	4	2	●	1	16.8	17.5	19.1	21.1
MP2XLBR0090N200	0.9	1.8	1.4	20	1.74	2.6°	55	4	2	●	1	20.9	21.8	23.9	*
MP2XLBR0100N040	1	2	1.5	4	1.94	7.2°	50	4	2	●	1	4.2	4.4	4.7	5.2
MP2XLBR0100N040S06	1	2	1.5	4	1.94	9°	50	6	2	●	1	4.2	4.4	4.7	5.2
MP2XLBR0100N060	1	2	1.5	6	1.94	5.8°	50	4	2	●	1	6.3	6.6	7.1	7.8
MP2XLBR0100N060S06	1	2	1.5	6	1.94	7.8°	50	6	2	●	1	6.3	6.6	7.1	7.8
MP2XLBR0100N080	1	2	1.5	8	1.94	4.8°	50	4	2	●	1	8.4	8.8	9.5	10.5
MP2XLBR0100N080S06	1	2	1.5	8	1.94	6.9°	50	6	2	●	1	8.4	8.8	9.5	10.5
MP2XLBR0100N100	1	2	1.5	10	1.94	4.2°	50	4	2	●	1	10.5	10.9	11.9	13.1
MP2XLBR0100N100S06	1	2	1.5	10	1.94	6.2°	50	6	2	●	1	10.5	10.9	11.9	13.1
MP2XLBR0100N120	1	2	1.5	12	1.94	3.6°	50	4	2	●	1	12.6	13.1	14.3	15.8
MP2XLBR0100N120S06	1	2	1.5	12	1.94	5.6°	60	6	2	●	1	12.6	13.1	14.3	15.8
MP2XLBR0100N140	1	2	1.5	14	1.94	3.2°	55	4	2	●	1	14.7	15.3	16.7	18.4
MP2XLBR0100N140S06	1	2	1.5	14	1.94	5.1°	60	6	2	●	1	14.7	15.3	16.7	18.4
MP2XLBR0100N160	1	2	1.5	16	1.94	2.9°	55	4	2	●	1	16.8	17.5	19.1	*

* Number of Flutes

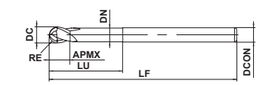
* No Interference

● : USA Stock

Type1



Type2



(mm)

Order Number	RE	DC	APMX	LU	DN	B2	LF	DCON	No.F *	Stock	Type	Effective Length for Inclined Angle 0.5°	1°	2°	3°
MP2XLBR0100N160S06	1	2	1.5	16	1.94	4.7°	65	6	2	●	1	16.8	17.5	19.1	21.1
MP2XLBR0100N180	1	2	1.5	18	1.94	2.7°	55	4	2	●	1	18.9	19.7	21.5	*
MP2XLBR0100N180S06	1	2	1.5	18	1.94	4.3°	65	6	2	●	1	18.9	19.7	21.5	23.8
MP2XLBR0100N200	1	2	1.5	20	1.94	2.4°	65	4	2	●	1	20.9	21.8	23.9	*
MP2XLBR0100N200S06	1	2	1.5	20	1.94	4°	65	6	2	●	1	20.9	21.8	23.9	26.4
MP2XLBR0100N220	1	2	1.5	22	1.94	2.3°	65	4	2	●	1	23.0	24.0	26.3	*
MP2XLBR0100N250	1	2	1.5	25	1.94	2°	65	4	2	●	1	26.2	27.3	*	*
MP2XLBR0100N250S06	1	2	1.5	25	1.94	3.5°	90	6	2	●	1	26.2	27.3	29.9	33
MP2XLBR0100N300	1	2	1.5	30	1.94	1.7°	80	4	2	●	1	31.4	32.7	*	*
MP2XLBR0100N300S06	1	2	1.5	30	1.94	3°	90	6	2	●	1	31.4	32.7	35.9	*
MP2XLBR0100N350	1	2	1.5	35	1.94	1.5°	80	4	2	●	1	36.6	38.2	*	*
MP2XLBR0100N350S06	1	2	1.5	35	1.94	2.7°	90	6	2	●	1	36.6	38.2	41.8	*
MP2XLBR0100N400	1	2	1.5	40	1.94	1.4°	80	4	2	●	1	41.8	43.6	*	*
MP2XLBR0100N400S06	1	2	1.5	40	1.94	2.4°	90	6	2	●	1	41.8	43.6	47.8	*
MP2XLBR0125N100	1.25	2.5	1.9	10	2.4	3.5°	55	4	2	●	1	10.4	10.8	11.8	12.9
MP2XLBR0125N150	1.25	2.5	1.9	15	2.4	2.5°	55	4	2	●	1	15.6	16.3	17.8	*
MP2XLBR0125N200	1.25	2.5	1.9	20	2.4	2°	55	4	2	●	1	20.8	21.7	*	*
MP2XLBR0125N250	1.25	2.5	1.9	25	2.4	1.6°	70	4	2	●	1	26.1	27.2	*	*
MP2XLBR0125N300	1.25	2.5	1.9	30	2.4	1.4°	70	4	2	●	1	31.3	32.6	*	*
MP2XLBR0125N350	1.25	2.5	1.9	35	2.4	1.2°	70	4	2	●	1	36.5	38.1	*	*
MP2XLBR0150N060S03	1.5	3	2.3	6	2.9	—	60	3	2	●	1	*	*	*	*
MP2XLBR0150N080	1.5	3	2.3	8	2.9	6.3°	60	6	2	●	1	8.3	8.6	9.3	10.2
MP2XLBR0150N100	1.5	3	2.3	10	2.9	5.5°	60	6	2	●	1	10.4	10.8	11.7	12.9
MP2XLBR0150N120	1.5	3	2.3	12	2.9	4.9°	60	6	2	●	1	12.5	13.0	14.1	15.5
MP2XLBR0150N140	1.5	3	2.3	14	2.9	4.4°	60	6	2	●	1	14.6	15.2	16.5	18.2
MP2XLBR0150N160	1.5	3	2.3	16	2.9	4°	70	6	2	●	1	16.7	17.3	18.9	20.8
MP2XLBR0150N200	1.5	3	2.3	20	2.9	3.4°	70	6	2	●	1	20.8	21.7	23.7	26.1
MP2XLBR0150N250	1.5	3	2.3	25	2.9	2.8°	70	6	2	●	1	26.1	27.2	29.7	*
MP2XLBR0150N300	1.5	3	2.3	30	2.9	2.5°	70	6	2	●	1	31.3	32.6	35.7	*
MP2XLBR0150N350	1.5	3	2.3	35	2.9	2.2°	90	6	2	●	1	36.5	38.0	41.7	*
MP2XLBR0150N400	1.5	3	2.3	40	2.9	1.9°	90	6	2	●	1	41.7	43.5	*	*
MP2XLBR0175N150	1.75	3.5	2.6	15	3.4	3.8°	65	6	2	●	1	15.6	16.2	17.7	19.4
MP2XLBR0175N250	1.75	3.5	2.6	25	3.4	2.5°	65	6	2	●	1	26.0	27.1	29.6	*
MP2XLBR0175N350	1.75	3.5	2.6	35	3.4	1.9°	90	6	2	●	1	36.5	38.0	*	*
MP2XLBR0175N450	1.75	3.5	2.6	45	3.4	1.5°	90	6	2	●	1	46.9	48.9	*	*
MP2XLBR0200N080S04	2	4	3	8	3.9	—	65	4	2	●	2	*	*	*	*
MP2XLBR0200N100	2	4	3	10	3.9	4.5°	65	6	2	●	1	10.4	10.8	11.6	12.7
MP2XLBR0200N120	2	4	3	12	3.9	3.9°	65	6	2	●	1	12.5	12.9	14.0	15.4
MP2XLBR0200N140	2	4	3	14	3.9	3.4°	65	6	2	●	1	14.6	15.1	16.4	18.0
MP2XLBR0200N160	2	4	3	16	3.9	3.1°	70	6	2	●	1	16.6	17.3	18.8	20.7
MP2XLBR0200N200	2	4	3	20	3.9	2.6°	70	6	2	●	1	20.8	21.7	23.6	*
MP2XLBR0200N250	2	4	3	25	3.9	2.1°	70	6	2	●	1	26.0	27.1	29.6	*
MP2XLBR0200N300	2	4	3	30	3.9	1.8°	80	6	2	●	1	31.2	32.6	*	*
MP2XLBR0200N350	2	4	3	35	3.9	1.6°	80	6	2	●	1	36.5	38.0	*	*
MP2XLBR0200N400	2	4	3	40	3.9	1.4°	90	6	2	●	1	41.7	43.5	*	*
MP2XLBR0200N450	2	4	3	45	3.9	1.2°	90	6	2	●	1	46.9	48.9	*	*
MP2XLBR0200N500	2	4	3	50	3.9	1.1°	100	6	2	●	1	52.1	54.3	*	*
MP2XLBR0250N150	2.5	5	3.8	15	4.9	2°	70	6	2	●	1	15.6	16.2	*	*

* Number of Flutes

* No Interference

MP2XLB

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

(mm)

Order Number	RE	DC	APMX	LU	DN	B2	LF	DCON	No.F*	Stock	Type	Effective Length for Inclined Angle			
												0.5°	1°	2°	3°
MP2XLBR0250N200	2.5	5	3.8	20	4.9	1.5°	70	6	2	●	1	20.8	21.6	*	*
MP2XLBR0250N250	2.5	5	3.8	25	4.9	1.2°	70	6	2	●	1	26.0	27.1	*	*
MP2XLBR0250N300	2.5	5	3.8	30	4.9	1°	80	6	2	●	1	31.2	*	*	*
MP2XLBR0250N350	2.5	5	3.8	35	4.9	0.9°	80	6	2	●	1	36.4	*	*	*
MP2XLBR0250N400	2.5	5	3.8	40	4.9	0.8°	90	6	2	●	1	41.7	*	*	*
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

* No Interference

RE = Radius of ball nose
DC = Cutting dia.
APMX = Depth of cut max.
LU = Usable length
DN = Neck dia.
LF = Functional length
DCON = Connection dia.

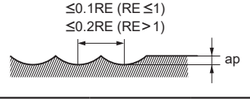
● : **USA Stock**

Recommended Cutting Conditions

(inch)

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 (mm)	**LU (mm)**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**
0.05	**0.3**	50000	7.9	.00008	50000	7.9	.00008	50000	7.9	.00016
	0.5	50000	7.9	.00004	50000	7.9	.00008	50000	7.9	.00008
0.1	**0.5**	50000	15.7	.00012	50000	12.6	.00012	50000	12.6	.00024
	1	50000	15.7	.00008	50000	12.6	.00008	50000	12.6	.00016
	1.5	40000	11.8	.00004	40000	9.4	.00004	40000	9.4	.00008
	2	40000	7.9	.00004	40000	6.3	.00004	40000	6.3	.00008
	2.5	40000	3.9	.00004	40000	3.1	.00004	40000	3.1	.00008
0.15	**1**	50000	23.6	.00028	50000	18.9	.00028	50000	18.9	.00055
	1.5	50000	23.6	.00020	50000	18.9	.00020	50000	18.9	.00039
	2	50000	23.6	.00012	50000	18.9	.00012	50000	18.9	.00024
	2.5	40000	15.7	.00012	40000	12.6	.00012	40000	12.6	.00024
	3	40000	11.8	.00008	40000	9.4	.00008	40000	9.4	.00016
	3.5	30000	9.8	.00008	30000	7.9	.00008	30000	7.9	.00016
	4	30000	7.9	.00008	30000	6.3	.00008	30000	6.3	.00016
0.2	**1**	50000	70.9	.00059	50000	55.1	.00059	50000	55.1	.00118
	2	50000	51.2	.00039	50000	39.4	.00039	50000	39.4	.00079
	3	50000	35.4	.00020	50000	27.6	.00020	50000	27.6	.00039
	4	40000	23.6	.00016	40000	18.9	.00016	40000	18.9	.00031
	5	40000	15.7	.00012	40000	12.6	.00012	40000	12.6	.00024
	6	30000	7.9	.00008	30000	6.3	.00008	30000	6.3	.00016
0.25	**2**	50000	98.4	.00079	50000	78.7	.00079	50000	78.7	.00157
	3	50000	59.1	.00059	50000	47.2	.00059	50000	47.2	.00118
	4	45000	47.2	.00039	45000	37.4	.00039	45000	37.4	.00079
	5	45000	35.4	.00028	45000	27.6	.00028	45000	27.6	.00055
	6	36000	23.6	.00024	36000	18.9	.00024	36000	18.9	.00047
	7	32000	15.7	.00020	32000	12.6	.00020	32000	12.6	.00039
	8	32000	11.8	.00012	32000	9.4	.00012	32000	9.4	.00024
	10	26000	7.9	.00008	26000	6.3	.00008	26000	6.3	.00016
0.3	**2**	50000	137.8	.00118	50000	110.2	.00118	50000	110.2	.00236
	3	50000	137.8	.00118	50000	110.2	.00118	50000	110.2	.00236
	4	44000	98.4	.00079	44000	78.7	.00079	44000	78.7	.00157
	5	37000	47.2	.00039	37000	37.4	.00039	37000	37.4	.00079
	6	37000	39.4	.00031	37000	31.5	.00031	37000	31.5	.00063
	7	35000	29.5	.00031	35000	23.6	.00031	35000	23.6	.00063
	8	35000	23.6	.00024	35000	18.9	.00024	35000	18.9	.00047
	9	30000	19.7	.00016	30000	15.7	.00016	30000	15.7	.00031
	10	30000	19.7	.00012	30000	15.7	.00012	30000	15.7	.00024
	11	22000	11.8	.00008	22000	9.4	.00008	22000	9.4	.00016
	12	22000	7.9	.00008	22000	6.3	.00008	22000	6.3	.00016
0.4	**2**	50000	173.2	.00157	50000	137.8	.00157	50000	137.8	.00315
	3	50000	157.5	.00157	50000	126.0	.00157	50000	126.0	.00315
	4	50000	157.5	.00079	50000	126.0	.00079	50000	126.0	.00157
	5	35000	94.5	.00079	35000	74.8	.00079	35000	74.8	.00157
	6	35000	94.5	.00079	35000	74.8	.00079	35000	74.8	.00157
	7	30000	59.1	.00059	30000	47.2	.00059	30000	47.2	.00118
	8	30000	59.1	.00039	30000	47.2	.00039	30000	47.2	.00079
	10	30000	27.6	.00031	30000	22.0	.00031	30000	22.0	.00063
	12	22000	19.7	.00024	22000	15.7	.00024	22000	15.7	.00047

Depth of Cut



RE : Radius

MP2XLB

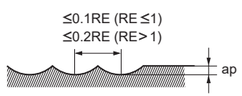
Ball nose, Short cut length, 2 flute, Long neck

Recommended Cutting Conditions

(inch)

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 (mm)	**LU (mm)**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**
0.5	**3**	40000	157.5	.00197	40000	126.0	.00197	40000	126.0	.00394
	4	40000	157.5	.00197	40000	126.0	.00197	40000	126.0	.00394
	6	35000	118.1	.00118	35000	94.5	.00118	35000	94.5	.00236
	8	30000	78.7	.00079	30000	63.0	.00079	30000	63.0	.00157
	10	20000	39.4	.00039	20000	31.5	.00039	20000	31.5	.00079
	12	20000	39.4	.00039	20000	31.5	.00039	20000	31.5	.00079
	14	18000	23.6	.00031	18000	18.9	.00031	18000	18.9	.00063
	16	18000	19.7	.00031	18000	15.7	.00031	18000	15.7	.00063
	18	13000	11.8	.00020	13000	9.4	.00020	13000	9.4	.00039
	20	13000	9.8	.00020	13000	7.9	.00020	13000	7.9	.00039
0.6	**6**	40000	173.2	.0016	40000	137.8	.0016	40000	137.8	.0031
	8	40000	157.5	.0016	40000	126.0	.0016	40000	126.0	.0031
	10	27000	74.8	.0008	27000	59.1	.0008	27000	59.1	.0016
	12	16000	55.1	.0008	16000	43.3	.0008	16000	43.3	.0016
	18	15000	27.6	.0003	15000	22.0	.0003	15000	22.0	.0006
	24	11000	11.8	.0002	11000	9.4	.0002	11000	9.4	.0005
0.7	**8**	40000	157.5	.0020	40000	126.0	.0020	40000	100.8	.0039
	12	26000	78.7	.0016	26000	63.0	.0016	26000	50.4	.0031
	16	17000	55.1	.0012	17000	44.1	.0012	17000	35.3	.0024
0.75	**6**	40000	236.2	.0028	36000	169.3	.0028	36000	169.3	.0055
	8	40000	236.2	.0028	36000	169.3	.0028	36000	169.3	.0055
	10	40000	196.9	.0024	36000	141.7	.0024	36000	141.7	.0047
	12	32000	133.9	.0016	29000	94.5	.0016	29000	94.5	.0031
	16	15000	55.1	.0012	15000	43.3	.0012	15000	43.3	.0024
	20	12000	35.4	.0008	12000	28.3	.0008	12000	28.3	.0016
	30	9000	15.7	.0004	9000	12.6	.0004	9000	12.6	.0008
0.8	**8**	40000	236.2	.0031	32000	149.6	.0031	32000	149.6	.0063
	12	36000	177.2	.0024	29000	110.2	.0024	29000	110.2	.0047
	16	14000	55.1	.0016	14000	43.3	.0016	14000	43.3	.0031
	20	12000	39.4	.0012	12000	31.5	.0012	12000	31.5	.0024
0.9	**8**	40000	259.8	.0035	32000	165.4	.0035	32000	165.4	.0071
	12	40000	196.9	.0028	32000	126.0	.0028	32000	126.0	.0055
	16	28000	110.2	.0016	22000	70.9	.0016	22000	70.9	.0031
	20	10000	31.5	.0012	10000	25.2	.0012	10000	25.2	.0024
1	**4**	40000	315.0	.0039	32000	196.9	.0039	32000	196.9	.0079
	6	40000	315.0	.0039	32000	196.9	.0039	32000	196.9	.0079
	8	40000	236.2	.0039	32000	149.6	.0039	32000	149.6	.0079
	10	40000	196.9	.0031	32000	126.0	.0031	32000	126.0	.0063
	12	40000	196.9	.0031	32000	126.0	.0031	32000	126.0	.0063
	16	32000	137.8	.0020	26000	86.6	.0020	26000	86.6	.0039
	20	10000	39.4	.0016	10000	31.5	.0016	10000	31.5	.0031
	25	10000	39.4	.0016	10000	31.5	.0016	10000	31.5	.0031
	30	10000	31.5	.0008	10000	25.2	.0008	10000	25.2	.0016
	35	10000	23.6	.0008	10000	18.9	.0008	10000	18.9	.0016
	40	8000	15.7	.0004	8000	12.6	.0004	8000	12.6	.0008

Depth of Cut

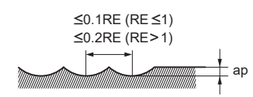


RE : Radius

(inch)

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 (mm)	**LU (mm)**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**
1.25	**10**	36000	236.2	.0047	29000	149.6	.0047	29000	149.6	.0094
	15	32000	177.2	.0039	26000	114.2	.0039	26000	114.2	.0079
	20	26000	126.0	.0028	21000	78.7	.0028	21000	78.7	.0055
	25	12000	55.1	.0024	8000	28.3	.0024	8000	28.3	.0047
	30	8000	35.4	.0016	8000	27.6	.0016	8000	27.6	.0031
	35	8000	31.5	.0008	8000	25.2	.0008	8000	20.1	.0016
1.5	**6**	32000	275.6	.0059	26000	177.2	.0059	22000	149.6	.0118
	10	32000	275.6	.0059	26000	177.2	.0059	22000	149.6	.0118
	16	32000	196.9	.0039	26000	126.0	.0039	22000	106.3	.0079
	20	27000	149.6	.0039	22000	94.5	.0039	22000	94.5	.0079
	25	21000	106.3	.0031	17000	66.9	.0031	17000	66.9	.0063
	30	10000	27.6	.0031	6000	22.0	.0031	6000	22.0	.0063
	35	6000	27.6	.0024	6000	22.0	.0024	6000	22.0	.0047
	40	6000	23.6	.0016	6000	18.9	.0016	6000	18.9	.0031
1.75	**15**	27500	173.2	.0051	22000	110.2	.0051	18000	90.6	.0102
	25	23000	141.7	.0039	18000	86.6	.0039	18000	86.6	.0079
	35	10000	55.1	.0031	10000	43.3	.0031	10000	43.3	.0063
	45	7500	35.4	.0016	7500	28.3	.0016	7500	28.3	.0031
2	**10**	24000	236.2	.0079	19000	149.6	.0079	16000	126.0	.0157
	20	24000	149.6	.0059	19000	94.5	.0059	16000	78.7	.0118
	30	20000	118.1	.0039	16000	74.8	.0039	16000	74.8	.0079
	40	12000	66.9	.0039	12000	55.1	.0039	12000	55.1	.0079
	50	8000	39.4	.0020	8000	31.5	.0020	8000	31.5	.0039
2.5	**20**	22000	236.2	.0079	18000	149.6	.0079	13000	110.2	.0157
	25	22000	173.2	.0079	18000	110.2	.0079	13000	78.7	.0157
	30	22000	149.6	.0059	18000	94.5	.0059	13000	66.9	.0118
	40	22000	141.7	.0039	18000	90.6	.0039	13000	63.0	.0079
3	**20**	20000	236.2	.0079	16000	149.6	.0079	11000	102.4	.0157
	30	20000	236.2	.0079	16000	149.6	.0079	11000	102.4	.0157
	40	20000	177.2	.0059	16000	110.2	.0059	11000	78.7	.0118
	50	20000	118.1	.0059	16000	74.8	.0059	11000	51.2	.0118

Depth of Cut



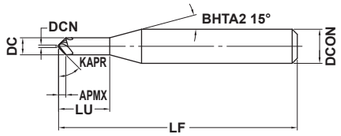
RE : Radius

(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 effective when machining with small diameter.
(Note 3) If the depth of cut is smaller than this table, feed rate can be increased.
(Note 4) If the rigidity of the machine or the workpiece material installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.
(Note 5) For hardened steel over 55 HRC, use VF2XLB.
(Note 6) For cutting conditions for austenitic stainless steel and titanium alloy, use the high hardness steel (45-55 HRC) table but reduce the spindle speed by 40% and the feed rate by 55%.

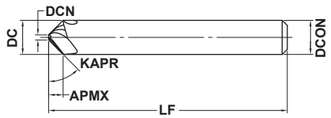
MP3C NEW

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	Copper Alloy	Aluminum Alloy
◎	◎	○		◎	◎		



Type1



Type2

DCN				
±0.03				
DCON=6	8≤DCON≤10	DCON=12		
0 - 0.008	0 - 0.009	0 - 0.011		

●The optimum helix flutes provides great sharpness and suppresses the occurrence of burrs.

(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

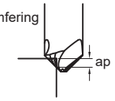
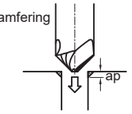
DC = Cutting dia.
DCN = Cutting dia. min.
APMX = Depth of cut max.
KAPR = Tool cutting edge angle
LU = Usable length
LF = Functional length
DCON = Connection dia.

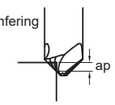
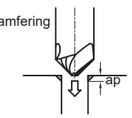
● : USA Stock ★ : Stocked in Japan

Recommended Cutting Conditions

■Corner and Hole Chamfering

(inch)

Workpiece Material		Carbon Steel, Ductile Cast Iron, Non-alloy Steel (C≥0.55%)				Alloy Steel (325HB) (38—45HRC)			
Dia. DC		Revolution n	Feed Rate vf	Corner Chamfering	Hole Chamfering	Revolution n	Feed Rate vf	Corner Chamfering	Hole Chamfering
(mm)	(inch)	(min^{-1})	(IPM)	ap	ap	(min^{-1})	(IPM)	ap	ap
2	.079	16000	55.1	≤.024	≤.016	11000	35.0	≤.024	≤.016
4	.157	8000	28.3	≤.047	≤.031	5600	17.7	≤.047	≤.031
6	.236	5300	18.9	≤.071	≤.047	3700	11.8	≤.071	≤.047
8	.315	4000	14.2	≤.094	≤.063	2800	9.1	≤.094	≤.063
10	.394	3200	11.4	≤.098	≤.079	2200	7.1	≤.098	≤.079
12	.472	2700	9.4	≤.098	≤.094	1900	5.9	≤.098	≤.094
Depth of Cut		Corner Chamfering 				Hole Chamfering 			

Workpiece Material		Austenitic Stainless, Titanium Alloys				Hardened Steel (45—55HRC)			
Dia. DC		Revolution n	Feed Rate vf	Corner Chamfering	Hole Chamfering	Revolution n	Feed Rate vf	Corner Chamfering	Hole Chamfering
(mm)	(inch)	(min^{-1})	(IPM)	ap	ap	(min^{-1})	(IPM)	ap	ap
2	.079	9500	26.8	≤.024	≤.016	8000	18.9	≤.024	≤.016
4	.157	4800	13.8	≤.047	≤.031	4000	9.4	≤.047	≤.031
6	.236	3200	9.1	≤.071	≤.047	2700	6.3	≤.071	≤.047
8	.315	2400	6.7	≤.094	≤.063	2000	4.7	≤.094	≤.063
10	.394	1900	5.5	≤.098	≤.079	1600	3.8	≤.098	≤.079
12	.472	1600	4.7	≤.098	≤.094	1300	3.1	≤.098	≤.094
Depth of Cut		Corner 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

(inch)

Workpiece Material		Carbon Steel, Ductile Cast Iron, Non-alloy Steel (C≥0.55%)			Alloy Steel (325HB) (38—45HRC)			Austenitic Stainless, Titanium Alloys			Hardened Steel (45—55HRC)		
DC		Revolution n	Feed Rate vf	Depth of Cut	Revolution n	Feed Rate vf	Depth of Cut	Revolution n	Feed Rate vf	Depth of Cut	Revolution n	Feed Rate vf	Depth of Cut
(mm)	(inch)	(min^{-1})	(IPM)	ap	(min^{-1})	(IPM)	ap	(min^{-1})	(IPM)	ap	(min^{-1})	(IPM)	ap
2	**.079**	13000	37.0	≤.055	9500	24.4	≤.055	8000	18.1	≤.055	6400	12.2	≤.055
4	**.157**	6400	18.1	≤.110	4800	12.2	≤.110	4000	9.1	≤.110	3200	5.9	≤.110
6	**.236**	4200	11.8	≤.165	3200	8.3	≤.165	2700	6.3	≤.165	2100	3.9	≤.165
8	**.315**	3200	9.1	≤.220	2400	6.3	≤.220	2000	4.7	≤.220	1600	3.0	≤.220
10	**.394**	2500	7.1	≤.276	1900	4.7	≤.276	1600	3.6	≤.276	1300	2.4	≤.276
12	**.472**	2100	5.9	≤.331	1600	3.9	≤.331	1300	3.0	≤.331	1100	2.1	≤.331

Depth of Cut

V-Grooving Milling

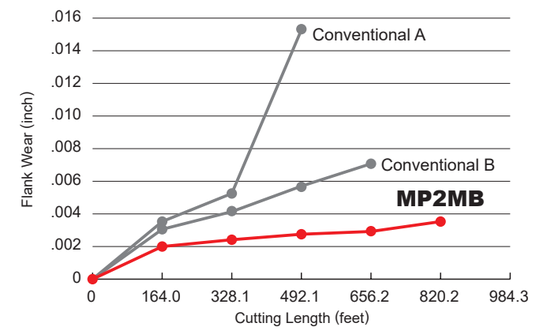
(Note 1) For austenitic stainless steel the use of water-soluble coolant is effective.
(Note 2) The revolution and feed rate can be increased with a smaller depth of cut.
(Note 3) Vibration may occur if the rigidity of machine or workpiece material is low. In this case, please reduce the revolution and feed rate proportionately.

MS plus Provides Superior Cost Performance

Cutting Performance

Carbon Steel AISI 1050

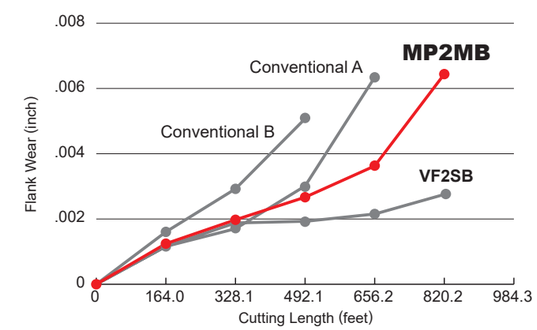
MS plus gives excellent wear resistance and significantly longer tool life compared to conventional products when machining carbon steel.



<Cutting Conditions>
Workpiece Material : AISI 1050 (220 HB)
Tool : 2 flute ball nose end mill R3
Revolution : 16000 min^{-1}
Cutting Speed : 930 SFM
Table Feed : 78.4 IPM
Feed per Tooth : .0024 IPT
Depth of Cut : ap .079 inch, ae .012 inch
Overhang Length : .787 inch
Cutting Mode : Air Bow
Machine : Horizontal MC (BT40)

Alloy Steel, Tool Steel AISI H13 (52 HRC)

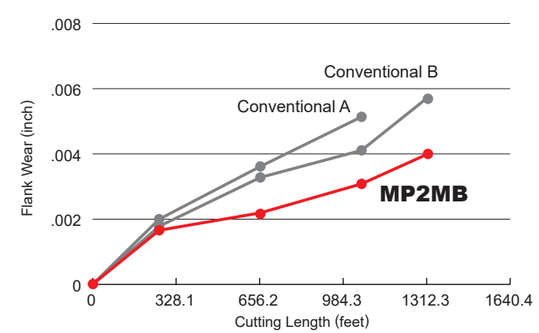
MS plus shows higher wear resistance than conventional products when machining AISI H13(52 HRC).
IMPACT MIRACLE is suitable when even longer tool life is required.



<Cutting Conditions>
Workpiece Material : AISI H13 (52 HRC)
Tool : 2 flute ball nose end mill R3
Revolution : 17000 min^{-1}
Cutting Speed : 985 SFM
Table Feed : 66.9 IPM
Feed per Tooth : .0020 IPT
Depth of Cut : ap .079 inch, ae .012 inch
Overhang Length : .787 inch
Cutting Mode : Air Blow
Machine : Horizontal MC (BT40)

Stainless Steel STAVAX (52 HRC)

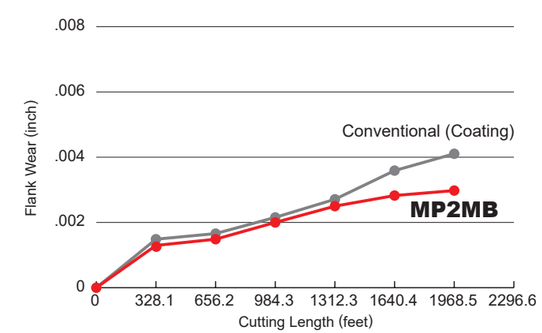
MS plus shows higher wear resistance compared to conventional products when machining stainless steel.



<Cutting Conditions>
Workpiece Material : STAVAX (52 HRC)
Tool : 2 flute ball nose end mill R3
Revolution : 18000 min^{-1}
Cutting Speed : 555 SFM
Table Feed : 141.7 IPM
Feed per Tooth : .0039 IPT
Depth of Cut : ap .016 inch, ae .039 inch
Overhang Length : .787 inch
Cutting Mode : Air Blow
Machine : Horizontal MC (BT40)

Copper

MS plus shows excellent wear resistance and provides a significantly longer tool life compared to conventional products when machining copper.

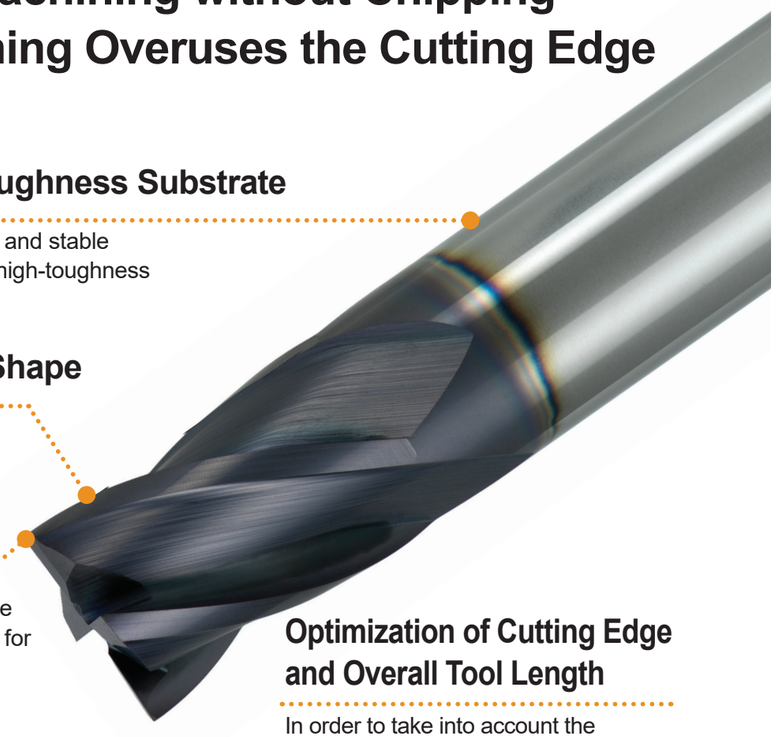


<Cutting Conditions>
Workpiece Material : Copper
Tool : 2 flute ball nose end mill R3
Revolution : 15000 min^{-1}
Cutting Speed : 875 SFM
Table Feed : 59.1 IPM
Feed per Tooth : .0020 IPT
Depth of Cut : ap .079 inch, ae .008 inch
Overhang Length : .787 inch
Cutting Mode : Emulsion
Machine : Vertical MC (BT40)

For Swiss-Type Automatic Lathes
MS plus End Mill Series

MP2ES/3ES/4EC

Achieves Stable Machining without Chipping Even when Machining Overuses the Cutting Edge



Adoption of New High-Toughness Substrate

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

Optimized Cutting Edge Shape

The optimized rake angle suppresses burrs.

Improved Cutting Edge Machining

To improve the fracture resistance of the cutting edge, a small gash land is used for Ø6mm or greater.

Optimization of Cutting Edge and Overall Tool Length

In order to take into account the protrusion of the small Swiss-Type Automatic Lathes, the cutting edge and overall tool length have been optimized.

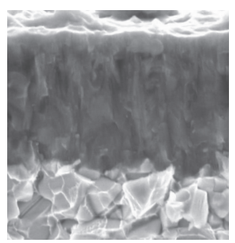
(Al, Ti, Cr)N Multilayer Coating (MS plus)

Suitable coating for a broad range of workpiece materials such as carbon steels and stainless steels.

Our original coating technology incorporates a multilayer of (Al, Ti)N and (Al, Cr)N.
It allows machining of a wide range of workpiece materials.

Properties

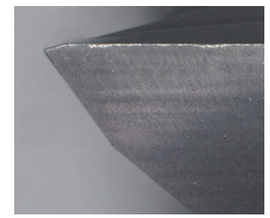
	(Al,Ti,Cr)N multilayer	(Al,Ti)N	(Al,Cr)N
Hardness (HV)	**3200**	2800	3100
Oxidation Temperature (F°)	**2.012**	1.472	2.012
Adhesion (N)	**100**	80	80



Cutting Performance

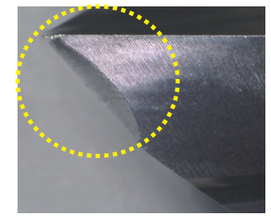
Machining 304 - Comparison of Fracture Resistance

The round, stainless steel bar is machined using a D-cut. The adoption of the high toughness cemented carbide and gash land provides highly improved fracture resistance.



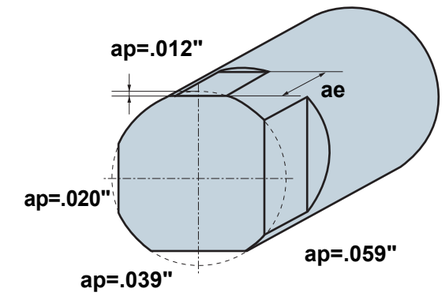
MP3ES

After machining of 2 pieces



Conventional

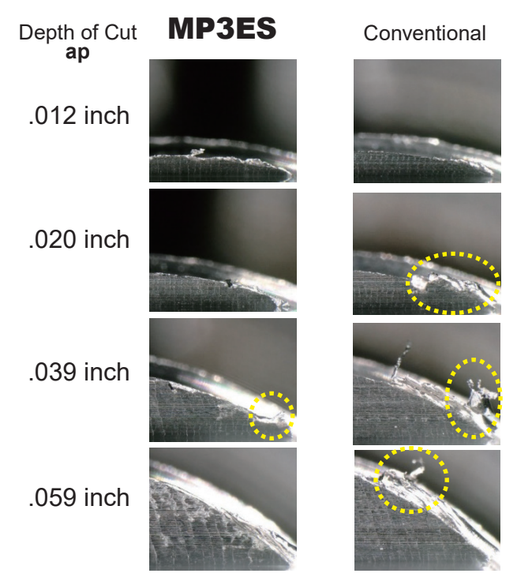
After machining 1 piece
Fracture of the tip of the tool.

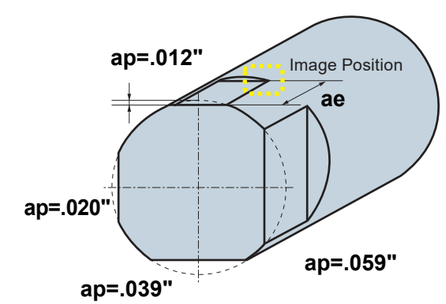


<Cutting Conditions>
Workpiece Material : AISI 304
Tool : MP3ESD0800S08
Cutting Speed : vc = 165 SFM
Feed Rate : f = 5.9 IPM
Feed per Tooth : fr = .0010 inch
Depth of Cut : ap = .012-.059 inch
ae = .236
Cutting Mode : Wet Cutting (Oil)
Machine : Swiss-Type Lathe
Tool Post : Gang Type Tool Post

Machined 304 - Comparison of Burr Generation

The optimized cutting edge shape suppresses the occurrence of burrs.





<Cutting Conditions>
Workpiece Material : AISI 304
Tool : MP3ESD0800S08
Cutting Speed : vc = 165 SFM
Feed Rate : f = 5.9 IPM
Feed per Tooth : fr = .0010 inch
Depth of Cut : ap = .012-.059 inch
ae = .236
Cutting Mode : Wet Cutting (Oil)
Machine : Swiss-Type Lathe
Tool Post : Gang Type Tool Post

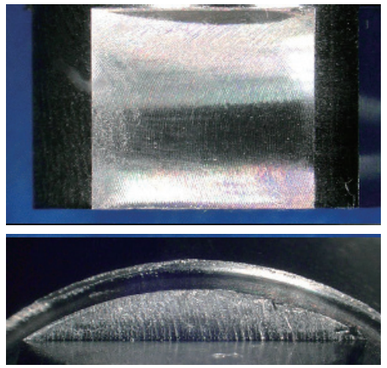
Cutting Performance

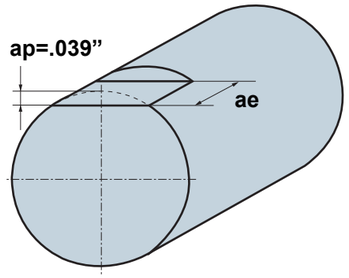
Machined 304 - Comparison of Surface Finishes

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

MP3ES

Ra .008 µ-inch



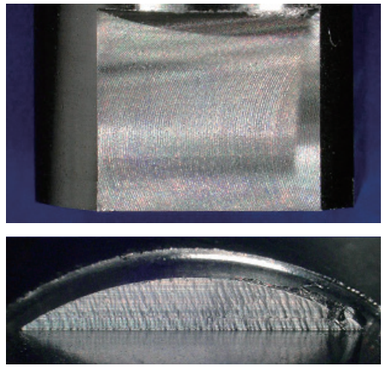


<Cutting Conditions>

Workpiece Material	: JIS SUS304
Tool	: MP3ESD0800S08
Cutting Speed	: vc = 165 SFM
Feed Rate	: f = 5.9 IPM
Feed per Tooth	: fr = .0010 inch
Depth of Cut	: ap = .039 inch
	ae = .236
Cutting Mode	: Wet Cutting (Oil)
Machine	: Swiss-Type Lathe
Tool Post	: Gang Type Tool Post

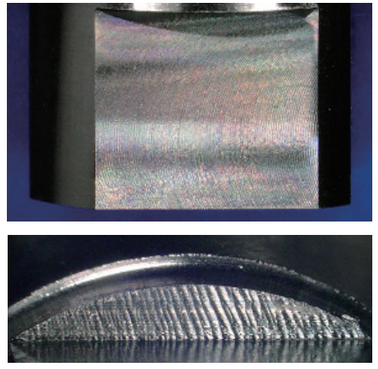
Conventional A

Ra .024 µ-inch



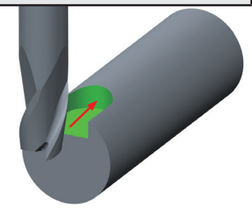
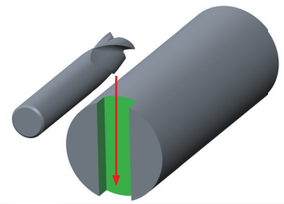
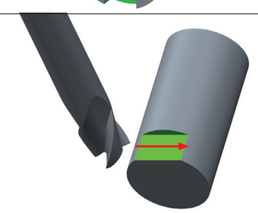
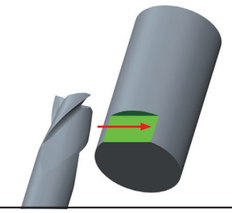
Conventional B

Ra .030 µ-inch



Selection of End Mill for Swiss-Type Lathe

① The number of Flutes must be selected according to the type of machining.

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

② Selecting Tools Other Than Small Swiss-Type Automatic Lathe End Mills

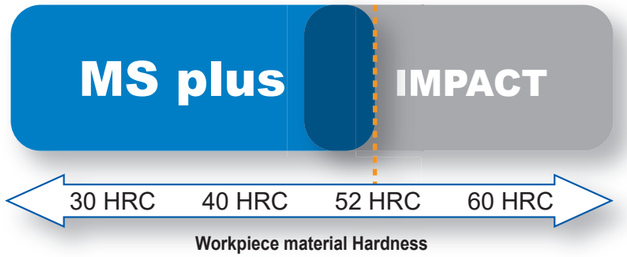
End Mills with an overall tool length of LF=50 mm or less can be used even with small Swiss-Type automatic lathe end mills. Select the necessary tools according to the workpiece material and machining method (such as every 0.1 or radius).

MP2SSB/MP2SB/MP2MB/MP2XLB

Greatly improved wear resistance even when machining hardened materials.

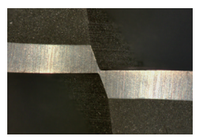
MS plus provides long tool life on materials up to 52 HRC.

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

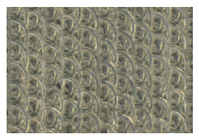


End Cutting Edge Geometry

MS plus



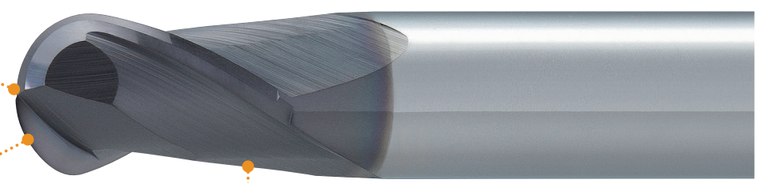
Sharp but strong cutting edge enables good surface finishes.



Sharp edges leave a uniform finish.

Conventional

A dull edge leaves an undefined finish.



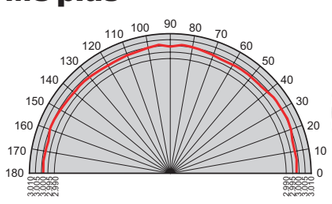
Seamless Cutting Edge

Radius tolerance R ±196.9 μ-inch.

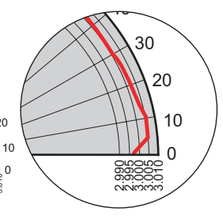
Micro-grain Cemented Carbide Substrate

Higher wear resistance than conventional products.

MS plus



Conventional



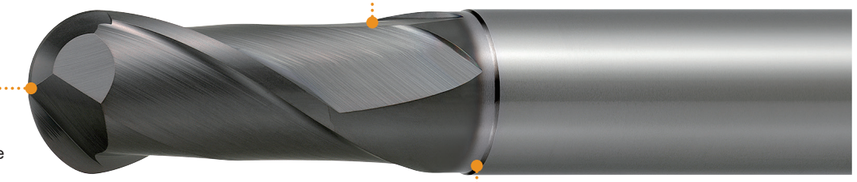
Good surface finishes possible even when simultaneously cutting with end and side edges; for example on drafts of dies and molds.

MP2SDB

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

Tough Carbide

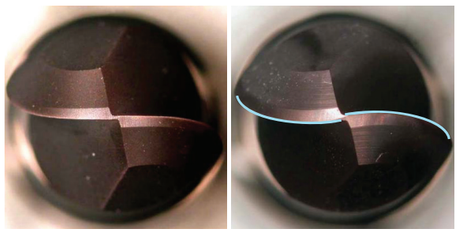
Tough carbide substrate with high resistance to chipping.



Strong S Curve

Strong S curve with negative rake enables high efficiency machining.

Neck Recess

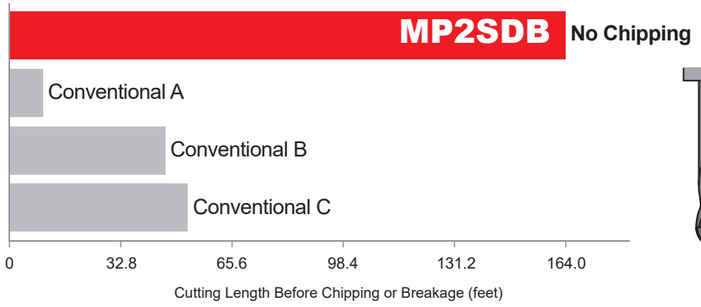


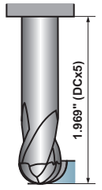
Conventional

MP2SDB

Resistance to Chipping

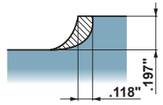
MP2SDB shows excellent chipping resistance even at large depths of cut, high feed rates and long overhang applications.





<Cutting Conditions>

Workpiece Material	: AISI H13 (52 HRC)
Tool	: MP2SDBR0500
Revolution	: 5000 min^{-1}
Cutting Speed	: 515 SFM
Table Feed	: 39.4 IPM
Feed per Tooth	: .0039 IPT
Depth of Cut	: ap .197 inch, ae .118 inch
Overhang Length	: 1.969 inch
Cutting Mode	: Down (Climb) Cut Air Blow
Machine	: Vertical MC (BT50)



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Fax: 248.308.2627

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.

www.mmc-carbide.com/us

Tools specifications subject to change without notice.

B205A-US-2024.2