

For Swiss Type Automatic Lathes MS plus End Mill Series

# MP2ES/3ES/4EC

New  
Products

## Enhanced Burr Reduction and Fracture Resistance to Solve Typical Swiss Lathe Machining Problems



For Swiss Type Automatic Lathes  
MS plus End Mill Series

# MP2ES/3ES/4EC

Provides Stable Machining and Resists Edge Chipping Even when Overused

## New Tough Substrate

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

## Cutting Edge Geometry

The optimised rake angle suppresses burrs.

## Improved Cutting Edge

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

## Ideal Tool Length

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

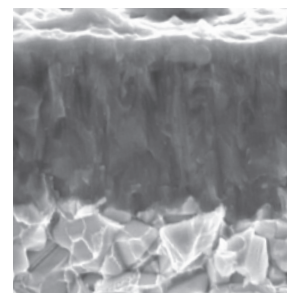
## (Al, Ti, Cr)N Multilayer Coating (MS plus)

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

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

### Properties of MS plus coating

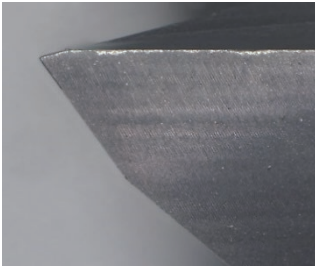
	(Al,Ti,Cr)N multilayer	(Al,Ti)N	(Al,Cr)N
Hardness (HV)	3200	2800	3100
Oxidation Temperature (°C)	1100	800	1100
Adhesion (N)	100	80	80



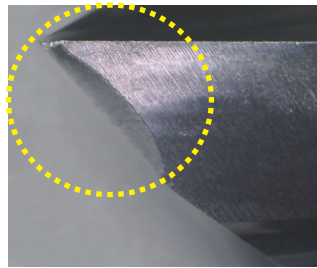
# Cutting Performance

## Comparison of Fracture Resistance - Machining SUS304

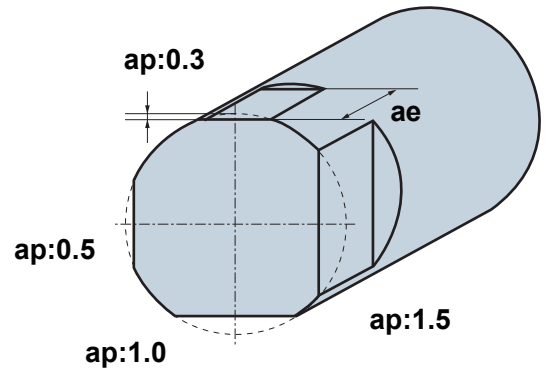
A round stainless steel bar is machined effectively due to the tough cemented carbide substrate and the gashed land providing improved fracture resistance.



**MP3ES**  
After machining  
2 components



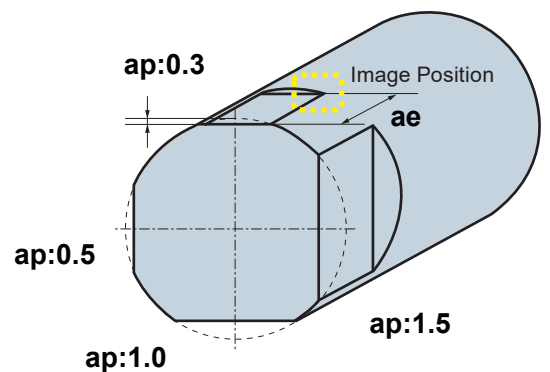
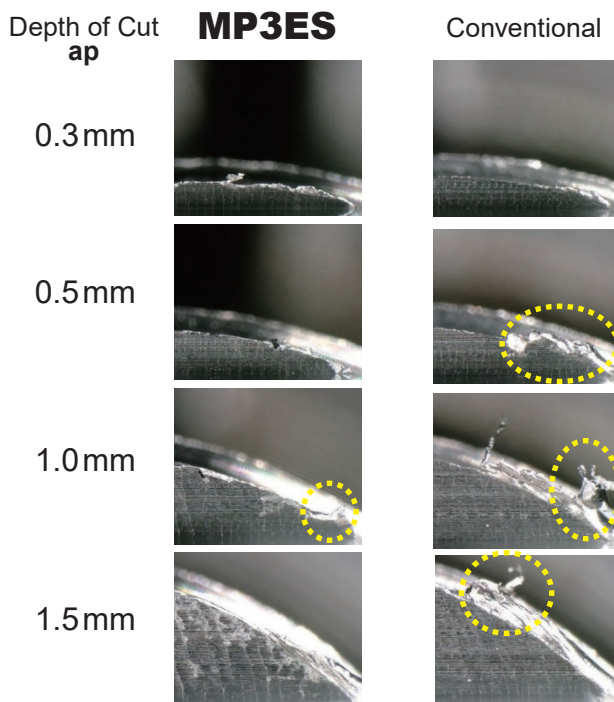
Conventional  
After machining  
1 component



<Cutting Conditions>  
 Workpiece Material : JIS SUS304  
 Tool : MP3ESD0800S08(ø8)  
 Cutting Speed :  $vc = 50$  m/min  
 Feed Rate :  $f = 150$  mm/min  
 Feed per Tooth :  $fr = 0.025$  mm/t.  
 Depth of Cut :  $ap = 0.3-1.5$  mm  
                    $ae = 6.0$  mm  
 Cutting Mode : Wet Cutting (Oil)  
 Machine : Small Automatic Lathe  
 Tool Post : Gang Type Tool Post

## Comparison of Burr Generation - Machining SUS304

The optimised cutting edge shape suppresses the occurrence of burrs.



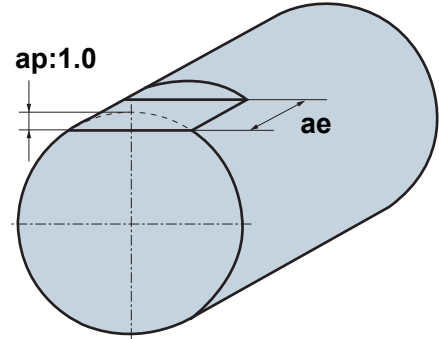
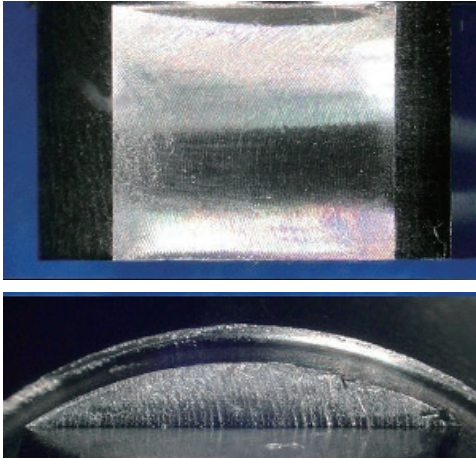
<Cutting Conditions>  
 Workpiece Material : JIS SUS304  
 Tool : MP3ESD0800S08(ø8)  
 Cutting Speed :  $vc = 50$  m/min  
 Feed Rate :  $f = 150$  mm/min  
 Feed per Tooth :  $fr = 0.025$  mm/t.  
 Depth of Cut :  $ap = 0.3-1.5$  mm  
                    $ae = 6.0$  mm  
 Cutting Mode : Wet Cutting (Oil)  
 Machine : Small Automatic Lathe  
 Tool Post : Gang Type Tool Post

## Cutting Performance

### Comparison of Surface Finishes - Machining SUS304

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

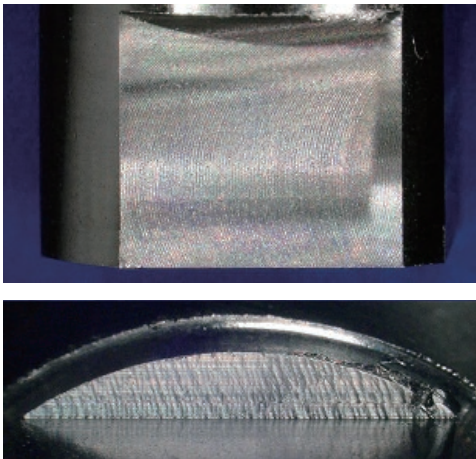
**MP3ES**  
Ra 0.21  $\mu\text{m}$



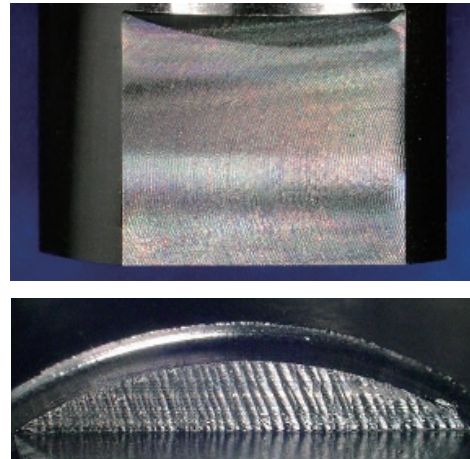
<Cutting Conditions>

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

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

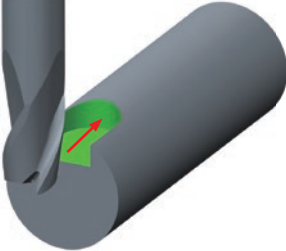
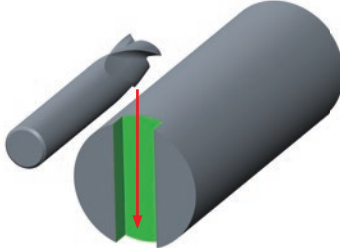
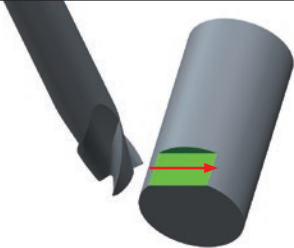
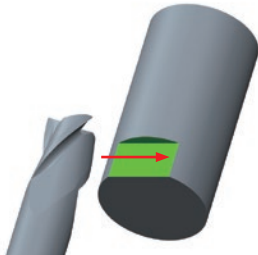


Conventional B  
Ra 0.75  $\mu\text{m}$



## End Mill Selection for Use on Swiss Type Lathes

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

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

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

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

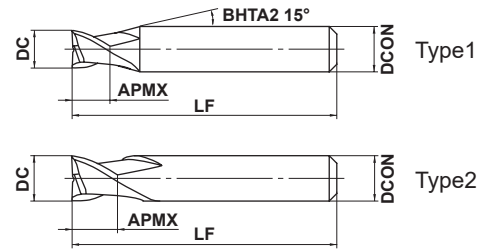
# For Swiss Type Automatic Lathes MS plus End Mill Series

## MP2ES NEW

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	Aluminium Alloy
○	○	○	○	○	○	○	○



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

● 2 flute end mill.

Order Number	DC	APMX	LF	DCON	(mm)		
					* 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 = Dia.  
APMX = Length of Cut

LF = Overall Length  
DCON = Shank Dia.

● : Inventory maintained in Japan.

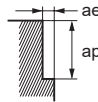
## Recommended Cutting Conditions

### Side Milling

(mm)

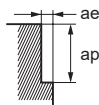
Dia. DC	Carbon steel, Cast iron, Alloy steel (–30HRC) AISI 1050, AISI No 35 B, AISI P20				Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21				Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V			
	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Width of Cut ae	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Width of Cut ae	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Width of Cut ae
3	10000	600	3	0.6	7000	400	3	0.6	6000	300	3	0.6
4	7500	600	4	0.6	5200	400	4	0.6	4500	300	4	0.6
5	6000	600	5	0.6	4200	400	5	0.6	3600	300	5	0.6
6	5000	600	6	0.6	3500	400	6	0.6	3000	300	6	0.6
7	4500	560	7	0.6	3200	360	7	0.6	2700	280	7	0.6
8	4000	520	8	0.6	2800	350	8	0.6	2400	260	8	0.6
10	3200	450	10	0.6	2200	300	10	0.6	1900	230	10	0.6

Depth of cut



Dia. DC	Hardened steel (45–55HRC) AISI H13				Copper, Copper Alloy			
	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Width of Cut ae	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Width of Cut ae
3	5000	120	3	0.2	13000	780	3	0.6
4	4000	120	4	0.2	9500	760	4	0.6
5	3200	120	5	0.2	7600	760	5	0.6
6	2700	120	6	0.2	6400	770	6	0.6
7	2300	110	7	0.2	5500	680	7	0.6
8	2000	110	8	0.2	4800	620	8	0.6
10	1600	100	10	0.2	3800	530	10	0.6

Depth of cut



Note 1) When cutting austenitic stainless 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 work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

# For Swiss Type Automatic Lathes MS plus End Mill Series

## MP2ES

End mill, 2 flute, For swiss type lathe

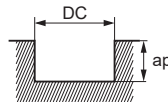
### Recommended Cutting Conditions

#### ■ Slotting

(mm)

Dia. DC	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		
	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap
<b>3</b>	10000	600	0.6	7000	400	0.6	6000	300	0.6
<b>4</b>	7500	600	0.6	5200	400	0.6	4500	300	0.6
<b>5</b>	6000	600	0.6	4200	400	0.6	3600	300	0.6
<b>6</b>	5000	600	0.6	3500	400	0.6	3000	300	0.6
<b>7</b>	4500	560	0.6	3200	360	0.6	2700	280	0.6
<b>8</b>	4000	520	0.6	2800	350	0.6	2400	260	0.6
<b>10</b>	3200	450	0.6	2200	300	0.6	1900	230	0.6

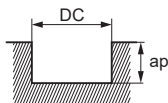
Depth of cut



DC: Dia.

Dia. DC	Hardened steel (45–55HRC) AISI H13			Copper, Copper Alloy		
	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap
<b>3</b>	5000	120	0.2	13000	780	0.6
<b>4</b>	4000	120	0.2	9500	760	0.6
<b>5</b>	3200	120	0.2	7600	760	0.6
<b>6</b>	2700	120	0.2	6400	770	0.6
<b>7</b>	2300	110	0.2	5500	680	0.6
<b>8</b>	2000	110	0.2	4800	620	0.6
<b>10</b>	1600	100	0.2	3800	530	0.6

Depth of cut



DC: 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 work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

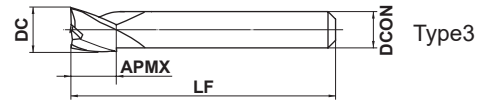
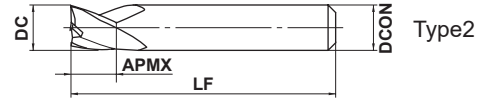
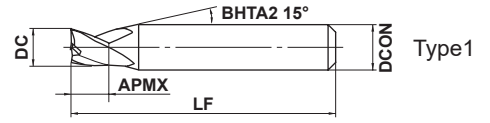


# MP3ES NEW

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	Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	○	○		○	○	○	



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

● 3 flute end mill.

Order Number	DC	APMX	LF	DCON	(mm)		
					* 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 = Dia.  
APMX = Length of Cut

LF = Overall Length  
DCON = Shank Dia.

● : Inventory maintained in Japan.

## MP3ES

End mill, 3 flute, For swiss type lathe

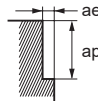
### Recommended Cutting Conditions

#### Side Milling

(mm)

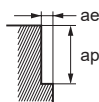
Dia. DC	Carbon steel, Cast iron, Alloy steel (–30HRC) AISI 1050, AISI No 35 B, AISI P20				Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21				Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V			
	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Width of Cut ae	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Width of Cut ae	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Width of Cut ae
3	10000	720	3	0.6	7000	480	3	0.6	6000	360	3	0.6
4	7500	720	4	0.6	5200	480	4	0.6	4500	360	4	0.6
5	6000	720	5	0.6	4200	480	5	0.6	3600	360	5	0.6
6	5000	720	6	0.6	3500	480	6	0.6	3000	360	6	0.6
7	4500	670	7	0.6	3200	440	7	0.6	2700	340	7	0.6
8	4000	620	8	0.6	2800	420	8	0.6	2400	310	8	0.6
9	3500	580	9	0.6	2500	380	9	0.6	2100	290	9	0.6
10	3200	540	10	0.6	2200	360	10	0.6	1900	280	10	0.6
12	2700	490	12	0.6	1900	320	12	0.6	1600	250	12	0.6

Depth of cut



Dia. DC	Hardened steel (45–55HRC) AISI H13				Copper, Copper Alloy			
	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Width of Cut ae	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Width of Cut ae
3	5000	140	3	0.2	13000	940	3	0.6
4	4000	140	4	0.2	9500	910	4	0.6
5	3200	140	5	0.2	7600	910	5	0.6
6	2700	140	6	0.2	6400	920	6	0.6
7	2300	130	7	0.2	5500	820	7	0.6
8	2000	130	8	0.2	4800	740	8	0.6
9	1800	130	9	0.2	4200	700	9	0.6
10	1600	120	10	0.2	3800	640	10	0.6
12	1300	120	12	0.2	3200	580	12	0.6

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.

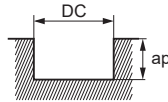
Note 4) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

## ■ Slotting

(mm)

Dia. DC	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		
	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap
3	10000	720	0.6	7000	480	0.6	6000	360	0.6
4	7500	720	0.6	5200	480	0.6	4500	360	0.6
5	6000	720	0.6	4200	480	0.6	3600	360	0.6
6	5000	720	0.6	3500	480	0.6	3000	360	0.6
7	4500	670	0.6	3200	440	0.6	2700	340	0.6
8	4000	620	0.6	2800	420	0.6	2400	310	0.6
9	3500	580	0.6	2500	380	0.6	2100	290	0.6
10	3200	540	0.6	2200	360	0.6	1900	280	0.6
12	2700	490	0.6	1900	320	0.6	1600	250	0.6

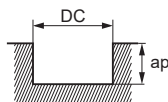
Depth of cut



DC:Dia.

Dia. DC	Hardened steel (45–55HRC) AISI H13			Copper, Copper Alloy		
	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap
3	5000	140	0.2	13000	940	0.6
4	4000	140	0.2	9500	910	0.6
5	3200	140	0.2	7600	910	0.6
6	2700	140	0.2	6400	920	0.6
7	2300	130	0.2	5500	820	0.6
8	2000	130	0.2	4800	740	0.6
9	1800	130	0.2	4200	700	0.6
10	1600	120	0.2	3800	640	0.6
12	1300	120	0.2	3200	580	0.6

Depth of cut



DC: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 work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

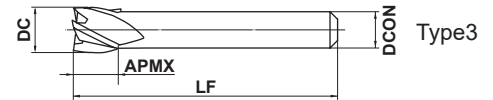
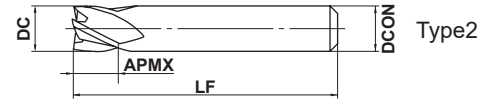
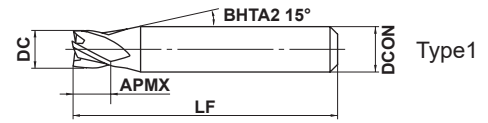
# For Swiss Type Automatic Lathes MS plus End Mill Series

## MP4EC NEW

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	Aluminium Alloy
○	○	○		○	○	○	



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

● 4 flute end mill.

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 = Dia.

APMX = Length of Cut

LF = Overall Length

DCON = Shank Dia.

● : Inventory maintained in Japan.

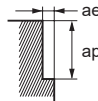
## Recommended Cutting Conditions

### Side Milling

(mm)

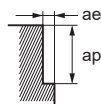
Dia. DC	Carbon steel, Cast iron, Alloy steel (–30HRC) AISI 1050, AISI No 35 B, AISI P20				Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21				Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V			
	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Width of Cut ae	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Width of Cut ae	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Width of Cut ae
<b>3</b>	10000	900	3	0.6	7000	600	3	0.6	6000	450	3	0.6
<b>3.5</b>	8500	900	3.5	0.6	6000	600	3.5	0.6	5100	450	3.5	0.6
<b>4</b>	7500	900	4	0.6	5200	600	4	0.6	4500	450	4	0.6
<b>5</b>	6000	900	5	0.6	4200	600	5	0.6	3600	450	5	0.6
<b>6</b>	5000	900	6	0.6	3500	600	6	0.6	3000	450	6	0.6
<b>7</b>	4500	840	7	0.6	3200	540	7	0.6	2700	420	7	0.6
<b>8</b>	4000	780	8	0.6	2800	520	8	0.6	2400	390	8	0.6
<b>9</b>	3500	720	9	0.6	2500	480	9	0.6	2100	360	9	0.6
<b>10</b>	3200	680	10	0.6	2200	450	10	0.6	1900	340	10	0.6
<b>12</b>	2700	620	12	0.6	1900	410	12	0.6	1600	310	12	0.6
<b>14</b>	2300	550	14	0.6	1600	350	14	0.6	1400	280	14	0.6

Depth of cut



Dia. DC	Hardened steel (45–55HRC) AISI H13				Copper, Copper Alloy			
	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Width of Cut ae	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Width of Cut ae
<b>3</b>	5000	180	3	0.2	13000	1200	3	0.6
<b>3.5</b>	4500	180	3.5	0.2	11000	1200	3.5	0.6
<b>4</b>	4000	180	4	0.2	9500	1100	4	0.6
<b>5</b>	3200	180	5	0.2	7600	1100	5	0.6
<b>6</b>	2700	180	6	0.2	6400	1100	6	0.6
<b>7</b>	2300	160	7	0.2	5500	1000	7	0.6
<b>8</b>	2000	160	8	0.2	4800	940	8	0.6
<b>9</b>	1800	150	9	0.2	4200	860	9	0.6
<b>10</b>	1600	140	10	0.2	3800	810	10	0.6
<b>12</b>	1300	120	12	0.2	3200	730	12	0.6
<b>14</b>	1200	120	14	0.2	2700	650	14	0.6

Depth of cut



Note 1) When cutting austenitic stainless 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 work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

## MP4EC

End mill, 4 flute, For small automatic lathes

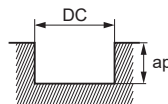
### Recommended Cutting Conditions

#### Slotting

(mm)

Workpiece Material	Carbon steel, Cast iron, Alloy steel (-30HRC)			Alloy steel, Tool steel, Pre-hardened steel			Austenitic stainless steel, Titanium alloy		
	AISI 1050, AISI No 35 B, AISI P20			AISI H13, AISI W1-10, AISI P21			AISI 304, AISI 306, Ti-6Al-4V		
Dia. DC	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap
3	10000	900	0.6	7000	600	0.6	6000	450	0.6
3.5	8500	900	0.6	6000	600	0.6	5100	450	0.6
4	7500	900	0.6	5200	600	0.6	4500	450	0.6
5	6000	900	0.6	4200	600	0.6	3600	450	0.6
6	5000	900	0.6	3500	600	0.6	3000	450	0.6
7	4500	840	0.6	3200	540	0.6	2700	420	0.6
8	4000	780	0.6	2800	520	0.6	2400	390	0.6
9	3500	720	0.6	2500	480	0.6	2100	360	0.6
10	3200	680	0.6	2200	450	0.6	1900	340	0.6
12	2700	620	0.6	1900	410	0.6	1600	310	0.6
14	2300	550	0.6	1600	350	0.6	1400	280	0.6

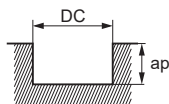
Depth of cut



DC: Dia.

Workpiece Material	Hardened steel (45-55HRC)			Copper, Copper Alloy		
	AISI H13					
Dia. DC	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of Cut ap
3	5000	180	0.2	13000	1200	0.6
3.5	4500	180	0.2	11000	1200	0.6
4	4000	180	0.2	9500	1100	0.6
5	3200	180	0.2	7600	1100	0.6
6	2700	180	0.2	6400	1100	0.6
7	2300	160	0.2	5500	1000	0.6
8	2000	160	0.2	4800	940	0.6
9	1800	150	0.2	4200	860	0.6
10	1600	140	0.2	3800	810	0.6
12	1300	120	0.2	3200	730	0.6
14	1200	120	0.2	2700	650	0.6

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 work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

# Memo

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A series of horizontal dashed lines for writing.



For Swiss Type Automatic Lathes  
MS plus End Mill Series

# MP2ES/3ES/4EC

**For Your Safety**

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

 **MITSUBISHI MATERIALS CORPORATION**

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