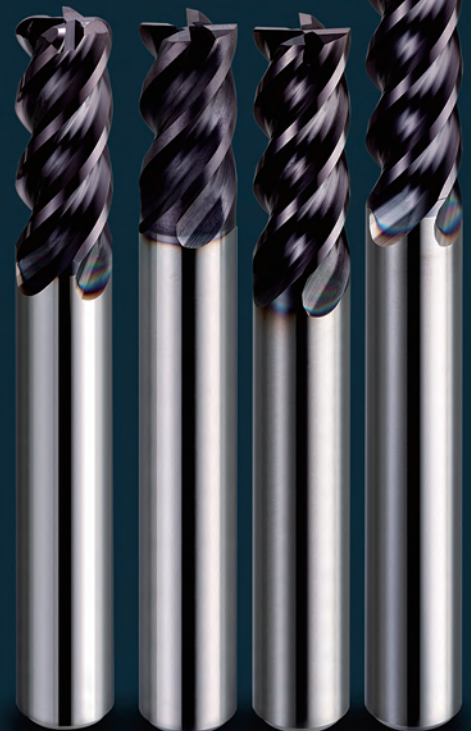
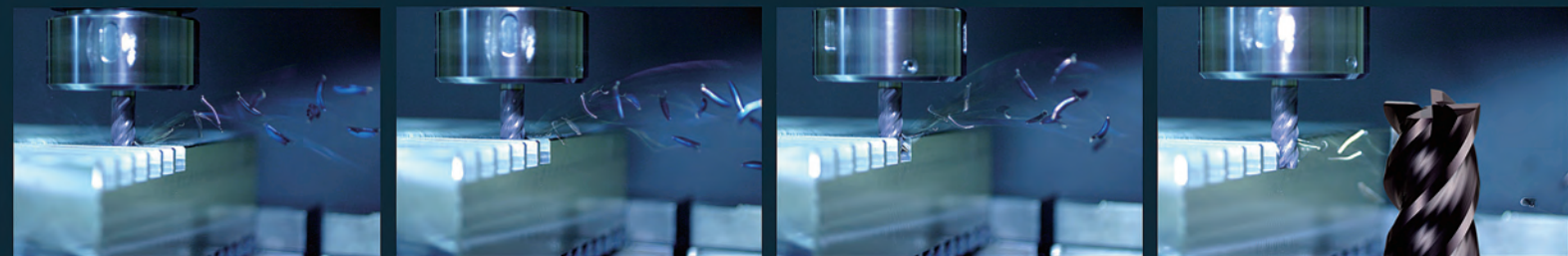
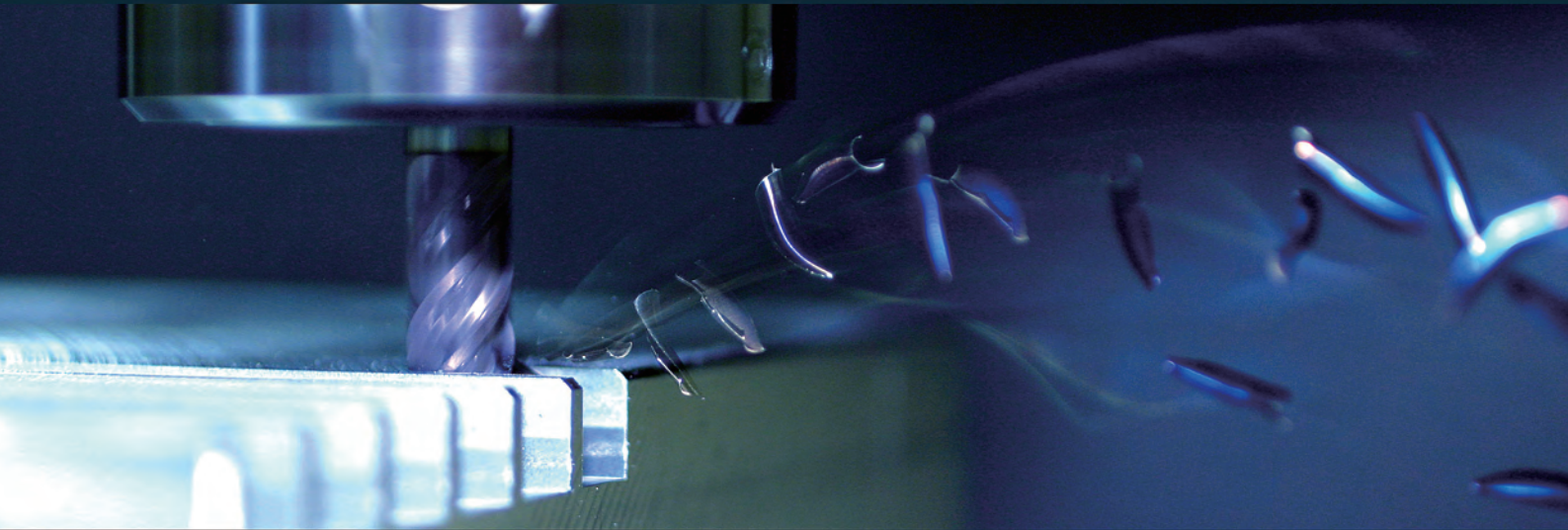


MSTAR high power end mill series

***MSSH0 MSMHD***

***MSJHD MSMHDRB***



New addition to  
the ***MSTAR*** series.  
4 flute high power end mills  
now available.

# MSTAR high power end mill series

***MSSH*** **NEW**  
MSTAR high power end mill (S)

***MSMHD***  
MSTAR high power end mill (M)

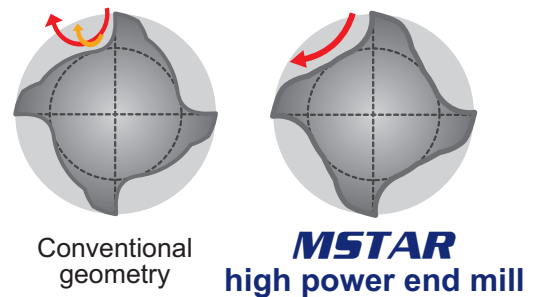
***MSJHD*** **NEW**  
MSTAR high power end mill (J)

***MSMHDRB*** **NEW**  
MSTAR high power corner radius end mill (M)

New addition to the ***MSTAR*** series.  
4 flute high power end mills now available.

## Features

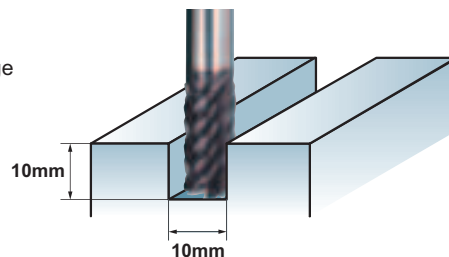
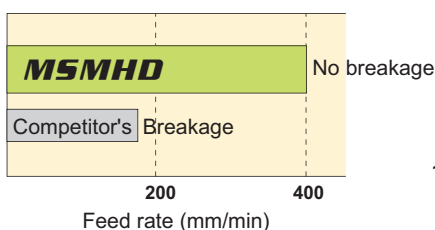
- A new flute geometry for slotting, with excellent chip disposability.
- For high efficiency slotting and conventional milling.
- New added short, medium, semi long cut length type and corner radius type !  
151 different sizes available.



## Machining Example (*MSMHD*)

### Slotting

Newly designed geometry for excellent chip disposability during slotting.



End mill	MSMHD $\phi 10$
Work material	Stainless steel (SUS304)
Revolution	1,600min <sup>-1</sup> (50m/min)
Feed rate	50–400mm/min
Cutting method	Slotting, Air blow

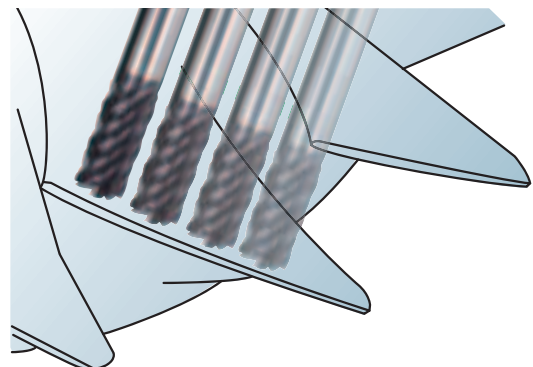
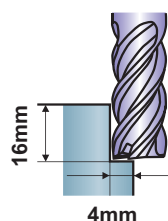
### Side milling of aircraft component

Higher efficiency than conventional end mills.

7-9 components completed.

Feed rate: Increased x 1.7

End mill	MSMHD $\phi 16$	Competitor's
Work material	Nickel-base heat-resistant alloys	
Revolution	600min <sup>-1</sup> (30m/min)	360min <sup>-1</sup> (18m/min)
Feed rate	<b>85mm/min</b> (0.035mm/tooth)	<b>50mm/min</b> (0.035mm/tooth)
Cutting method	Climb cut, Emulsion	



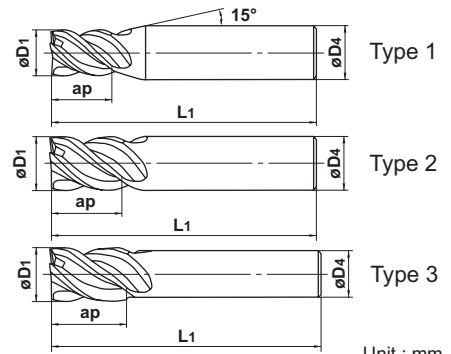
# MSTAR END MILL

## MSSHDD NEW

High power, Short cut length, 4 flute



D1 ≤ 12 0 - -0.02  
12 < D1 0 - -0.03



Unit : mm

● High rigidity short cut length type which adopted a new flute geometry and high helix.

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MSSHDD0300	3	4.5	45	6	4	●	1
D0350	3.5	5.3	45	6	4	●	1
D0400	4	6	45	6	4	●	1
D0450	4.5	6.8	45	6	4	●	1
D0500	5	7.5	50	6	4	●	1
D0550	5.5	8.3	50	6	4	●	1
D0600	6	9	50	6	4	●	2
D0650	6.5	9.8	60	8	4	●	1
D0700	7	10.5	60	8	4	●	1
D0750	7.5	11.3	60	8	4	●	1
D0800	8	12	60	8	4	●	2
D0850	8.5	12.8	70	10	4	●	1
D0900	9	13.5	70	10	4	●	1
D0950	9.5	14.3	70	10	4	●	1
D1000	10	15	70	10	4	●	2
D1100	11	16.5	75	12	4	●	1
D1200	12	18	75	12	4	●	2
D1300	13	19.5	75	12	4	●	3
D1400	14	21	90	16	4	●	1
D1500	15	22.5	90	16	4	●	1
D1600	16	24	90	16	4	●	2
D1700	17	25.5	100	16	4	●	3
D1800	18	27	100	16	4	●	3
D1900	19	28.5	110	20	4	●	1
D2000	20	30	110	20	4	●	2

● : Inventory maintained.

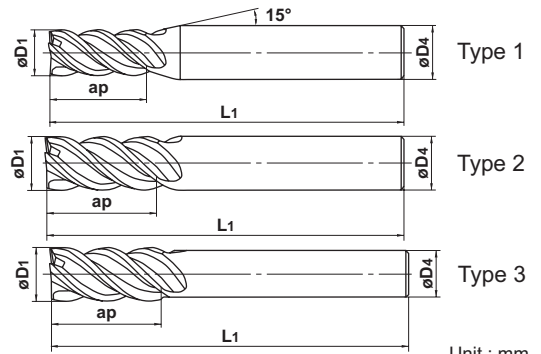
# MSTAR END MILL

## MSMHD

High power, Medium cut length, 4 flute



D1 ≤ 12 0 - -0.02  
12 < D1 0 - -0.03



Unit : mm

● A new flute geometry and high helix allows heavy cutting in shoulder milling and slotting.

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
<b>MSMHDD0200</b>	2	4	45	4	4	●	1
<b>D0210</b>	2.1	5	45	4	4	●	1
<b>D0220</b>	2.2	5	45	4	4	●	1
<b>D0230</b>	2.3	5	45	4	4	●	1
<b>D0240</b>	2.4	5	45	4	4	●	1
<b>D0250</b>	2.5	5	45	4	4	●	1
<b>D0260</b>	2.6	6	45	4	4	●	1
<b>D0270</b>	2.7	6	45	4	4	●	1
<b>D0280</b>	2.8	6	45	4	4	●	1
<b>D0290</b>	2.9	6	45	4	4	●	1
<b>D0300</b>	3	8	45	6	4	●	1
<b>D0310</b>	3.1	8	45	6	4	●	1
<b>D0320</b>	3.2	8	45	6	4	●	1
<b>D0330</b>	3.3	8	45	6	4	●	1
<b>D0340</b>	3.4	8	45	6	4	●	1
<b>D0350</b>	3.5	8	45	6	4	●	1
<b>D0360</b>	3.6	11	45	6	4	●	1
<b>D0370</b>	3.7	11	45	6	4	●	1
<b>D0380</b>	3.8	11	45	6	4	●	1
<b>D0390</b>	3.9	11	45	6	4	●	1
<b>D0400</b>	4	11	45	6	4	●	1
<b>D0410</b>	4.1	12	45	6	4	●	1
<b>D0420</b>	4.2	12	45	6	4	●	1
<b>D0430</b>	4.3	12	45	6	4	●	1
<b>D0440</b>	4.4	12	45	6	4	●	1
<b>D0450</b>	4.5	12	45	6	4	●	1
<b>D0460</b>	4.6	13	50	6	4	●	1
<b>D0470</b>	4.7	13	50	6	4	●	1
<b>D0480</b>	4.8	13	50	6	4	●	1
<b>D0490</b>	4.9	13	50	6	4	●	1
<b>D0500</b>	5	13	50	6	4	●	1
<b>D0510</b>	5.1	13	50	6	4	●	1
<b>D0520</b>	5.2	13	50	6	4	●	1
<b>D0530</b>	5.3	13	50	6	4	●	1
<b>D0540</b>	5.4	13	50	6	4	●	1
<b>D0550</b>	5.5	13	50	6	4	●	1
<b>D0560</b>	5.6	13	50	6	4	●	1
<b>D0570</b>	5.7	13	50	6	4	●	1

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type	
<b>MSMHDD0580</b>	5.8	13	50	6	4	●	1	
<b>D0590</b>	5.9	13	50	6	4	●	1	
<b>D0600</b>	6	13	50	6	4	●	2	
<b>D0650</b>	6.5	16	60	8	4	●	1	
<b>D0700</b>	7	19	60	8	4	●	1	
<b>D0750</b>	7.5	19	60	8	4	●	1	
<b>D0800</b>	8	19	60	8	4	●	2	
<b>D0850</b>	8.5	19	70	10	4	●	1	
<b>D0900</b>	9	22	70	10	4	●	1	
<b>D0950</b>	9.5	22	70	10	4	●	1	
<b>D1000</b>	10	22	70	10	4	●	2	
<b>D1100</b>	11	26	75	12	4	●	1	
<b>D1200S10</b>	12	26	75	10	4	●	3	
<b>D1200</b>	12	26	75	12	4	●	2	
<b>D1300</b>	13	26	75	12	4	●	3	
<b>D1400</b>	14	30	90	16	4	●	1	
<b>D1500</b>	15	35	90	16	4	●	1	
<b>D1600</b>	16	35	90	16	4	●	2	
<b>D1700</b>	17	35	100	16	4	●	3	
<b>D1800</b>	18	40	100	16	4	●	3	
<b>D1900</b>	19	40	110	20	4	●	1	
<b>D2000</b>	20	45	110	20	4	●	2	
<b>D2200</b>	22	50	125	20	4	●	3	
<b>D2500</b>	25	55	125	25	4	●	2	



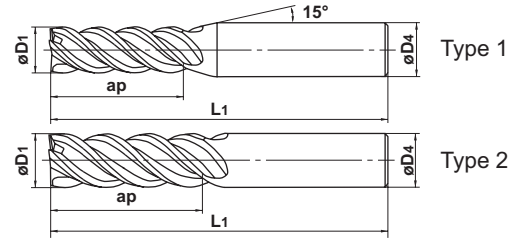
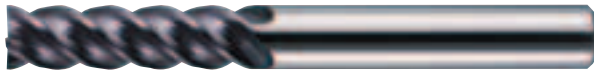
# MSTAR END MILL

## MSJHD NEW

High power, Semi long cut length, 4 flute



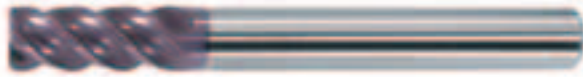
$D_1 \leq 12$  0 - -0.02  
 $12 < D_1$  0 - -0.03



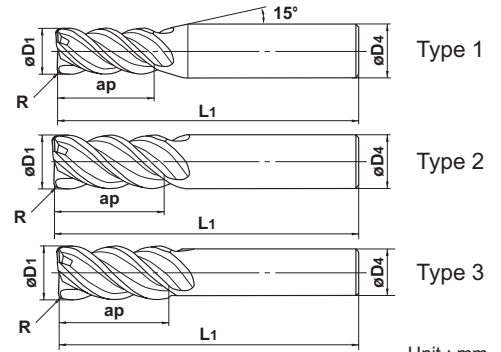
- Semi long cut length suitable for deep wall machining and adopted a new flute geometry and high helix.

Unit : mm

Order Number	Dia. <b>D1</b>	Length of Cut <b>ap</b>	Overall Length <b>L1</b>	Shank Dia. <b>D4</b>	No. of Flutes <b>N</b>	Stock	Type
<b>MSJHDD0200</b>	2	8	60	6	4	●	1
<b>D0250</b>	2.5	10	60	6	4	●	1
<b>D0300</b>	3	12	60	6	4	●	1
<b>D0350</b>	3.5	14	60	6	4	●	1
<b>D0400</b>	4	16	60	6	4	●	1
<b>D0450</b>	4.5	18	60	6	4	●	1
<b>D0500</b>	5	20	60	6	4	●	1
<b>D0600</b>	6	24	60	6	4	●	2
<b>D0700</b>	7	25	80	8	4	●	1
<b>D0800</b>	8	28	80	8	4	●	2
<b>D0900</b>	9	32	90	10	4	●	1
<b>D1000</b>	10	35	90	10	4	●	2
<b>D1100</b>	11	35	100	12	4	●	1
<b>D1200</b>	12	36	100	12	4	●	2
<b>D1400</b>	14	42	110	16	4	●	1
<b>D1500</b>	15	45	110	16	4	●	1
<b>D1600</b>	16	48	125	16	4	●	2
<b>D2000</b>	20	55	140	20	4	●	2



- Radius end mill which adopted a new flute geometry and high helix.



Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	Corner R R	No. of Flutes N	Stock	Type
MSMHDRBD0200R020	2	4	45	4	0.2	4	●	1
D0200R030	2	4	45	4	0.3	4	●	1
D0300R020	3	8	45	6	0.2	4	●	1
D0300R030	3	8	45	6	0.3	4	●	1
D0300R050	3	8	45	6	0.5	4	●	1
D0400R020	4	11	45	6	0.2	4	●	1
D0400R030	4	11	45	6	0.3	4	●	1
D0400R050	4	11	45	6	0.5	4	●	1
D0500R020	5	13	50	6	0.2	4	●	1
D0500R030	5	13	50	6	0.3	4	●	1
D0500R050	5	13	50	6	0.5	4	●	1
D0500R100	5	13	50	6	1	4	●	1
D0600R030	6	13	50	6	0.3	4	●	2
D0600R050	6	13	50	6	0.5	4	●	2
D0600R100	6	13	50	6	1	4	●	2
D0800R030	8	19	60	8	0.3	4	●	2
D0800R050	8	19	60	8	0.5	4	●	2
D0800R100	8	19	60	8	1	4	●	2
D0800R150	8	19	60	8	1.5	4	●	2
D1000R030	10	22	70	10	0.3	4	●	2
D1000R050	10	22	70	10	0.5	4	●	2
D1000R100	10	22	70	10	1	4	●	2
D1000R150	10	22	70	10	1.5	4	●	2
D1000R200	10	22	70	10	2	4	●	2
D1200R050S10	12	26	75	10	0.5	4	●	3
D1200R100S10	12	26	75	10	1	4	●	3
D1200R150S10	12	26	75	10	1.5	4	●	3
D1200R200S10	12	26	75	10	2	4	●	3
D1200R300S10	12	26	75	10	3	4	●	3
D1200R050	12	26	75	12	0.5	4	●	2
D1200R100	12	26	75	12	1	4	●	2
D1200R150	12	26	75	12	1.5	4	●	2
D1200R200	12	26	75	12	2	4	●	2
D1200R300	12	26	75	12	3	4	●	2
D1600R100	16	35	90	16	1	4	●	2
D1600R150	16	35	90	16	1.5	4	●	2
D1600R200	16	35	90	16	2	4	●	2
D1600R300	16	35	90	16	3	4	●	2

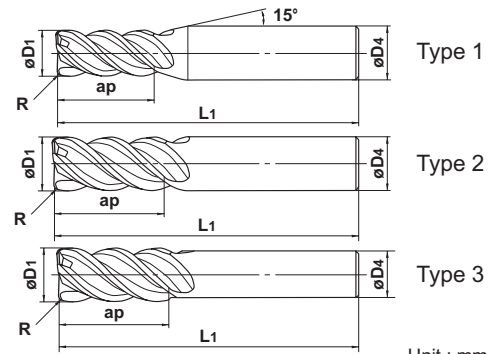
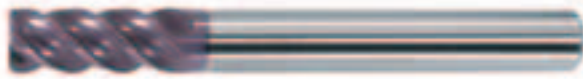
# MSTAR END MILL

## MSMHDRB NEW

Corner radius end mill, High power, Medium cut length, 4 flute



$D_1 \leq 12$  0 - -0.02  
 $12 < D_1$  0 - -0.03



Unit : mm

- Radius end mill which adopted a new flute geometry and high helix.

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	Corner R R	No. of Flutes N	Stock	Type
<b>MSMHDRBD1800R100</b>	18	40	100	16	1	4	●	3
<b>D1800R150</b>	18	40	100	16	1.5	4	●	3
<b>D1800R200</b>	18	40	100	16	2	4	●	3
<b>D1800R300</b>	18	40	100	16	3	4	●	3
<b>D2000R100</b>	20	45	110	20	1	4	●	2
<b>D2000R150</b>	20	45	110	20	1.5	4	●	2
<b>D2000R200</b>	20	45	110	20	2	4	●	2
<b>D2000R300</b>	20	45	110	20	3	4	●	2



# MSSH D

High power, Short cut length, 4 flute

# MSMHD

High power, Medium cut length, 4 flute

## Side milling

Work material	Carbon steel, Alloy steel (-30HRC) SS400, S50C, SCM Cast iron FC250		Alloy steel, Tool steel Pre-hardened steel (30-45HRC) SKD61, NAK		Austenitic stainless steel SUS304, SU316		Hardened steel (45-55HRC) SKD61	
	Dia. (mm)	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Revolution (min <sup>-1</sup> )
2	15,000	550	10,000	340	10,000	320	6,400	160
3	11,000	800	7,400	500	7,400	480	4,800	250
4	8,000	900	5,600	540	5,600	520	3,600	270
5	6,400	1,000	4,500	600	4,500	580	2,900	300
6	5,800	1,100	3,700	640	3,700	600	2,400	320
8	4,400	1,100	2,800	660	2,800	600	1,800	330
10	3,500	1,000	2,200	640	2,200	560	1,400	320
12	2,900	1,000	1,900	640	1,900	530	1,200	320
16	2,200	800	1,400	500	1,400	450	900	250
20	1,800	750	1,100	460	1,100	440	720	230
25	1,400	600	900	400	900	380	570	200

Depth of cut	Carbon steel, Alloy steel (-30HRC) SS400, S50C, SCM Cast iron FC250		Alloy steel, Tool steel Pre-hardened steel (30-45HRC) SKD61, NAK		Austenitic stainless steel SUS304, SU316		Hardened steel (45-55HRC) SKD61	

D:Dia.

## Slotting

Work material	Carbon steel, Alloy steel (-30HRC) SS400, S50C, SCM Cast iron FC250		Alloy steel, Tool steel Pre-hardened steel (30-45HRC) SKD61, NAK		Austenitic stainless steel SUS304, SU316		Hardened steel (45-55HRC) SKD61	
	Dia. (mm)	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Revolution (min <sup>-1</sup> )
2	12,000	400	7,000	200	7,000	100	4,200	80
3	9,000	600	5,300	300	5,300	150	3,200	130
4	7,200	720	4,000	360	4,000	180	2,400	140
5	5,800	720	3,200	360	3,200	180	1,900	150
6	5,000	800	2,700	400	2,700	200	1,600	160
8	3,700	800	2,000	400	2,000	200	1,200	170
10	3,000	720	1,600	360	1,600	180	960	160
12	2,500	720	1,300	360	1,300	180	800	160
16	2,000	600	1,000	280	1,000	150	600	130
20	1,600	540	800	250	800	130	480	120
25	1,300	480	640	220	640	120	380	100

Depth of cut	Carbon steel, Alloy steel (-30HRC) SS400, S50C, SCM Cast iron FC250		Alloy steel, Tool steel Pre-hardened steel (30-45HRC) SKD61, NAK		Austenitic stainless steel SUS304, SU316		Hardened steel (45-55HRC) SKD61	

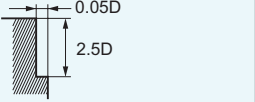
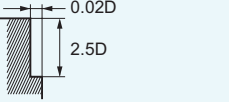
D:Dia.

- 1) When cutting austenitic steels, the use of water-soluble fluid is recommended.
- 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
- 3) If the rigidity of the machine or the work material installation is very low, or chattering is generated, please reduce the revolution and feed rate proportionately, or set a smaller depth of cut.
- 4) For side milling, climb cutting is recommended.

### Side milling

Work material	Carbon steel, Alloy steel (-30HRC) SS400, S50C, SCM Cast iron FC250		Alloy steel, Tool steel Pre-hardened steel (30-45HRC) SKD61, NAK		Austenitic stainless steel SUS304, SU316		Hardened steel (45-55HRC) SKD61	
	Dia. (mm)	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Revolution (min <sup>-1</sup> )
<b>2</b>	11,000	370	7,000	230	7,000	210	5,000	100
<b>3</b>	8,000	550	5,100	320	5,100	300	3,800	190
<b>4</b>	6,200	620	4,000	350	4,000	340	3,000	210
<b>5</b>	5,000	670	3,200	370	3,200	360	2,400	220
<b>6</b>	4,200	750	2,600	400	2,600	390	2,000	220
<b>8</b>	3,200	780	2,000	420	2,000	400	1,500	230
<b>10</b>	2,500	690	1,600	410	1,600	380	1,200	210
<b>12</b>	2,100	670	1,300	380	1,300	340	1,000	190
<b>16</b>	1,600	570	1,000	320	1,000	280	750	170
<b>20</b>	1,200	470	800	290	800	260	600	150

Depth of cut		

D: Dia.

- 1) When cutting austenitic stainless steels and wear resistant alloys, the use of non-water-soluble cutting fluid is especially effective.
- 2) If the rigidity of the machine or the work piece installation is very low, or chattering and noise are generated, please reduce the revolution, and feed rate proportionately.  
In addition, if the work pieces have bad surface finish, there is a possibility that chattering and noise are generated.
- 3) Climb cutting is recommended.

## Side milling

Work material	Carbon steel, Alloy steel (-30HRC) SS400, S50C, SCM Cast iron FC250		Alloy steel, Tool steel Pre-hardened steel (30-45HRC) SKD61, NAK		Austenitic stainless steel SUS304, SU316		Hardened steel (45-55HRC) SKD61	
	Dia. (mm)	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Revolution (min <sup>-1</sup> )
<b>2</b>	15,000	550	10,000	340	10,000	320	6,400	160
<b>3</b>	11,000	800	7,400	500	7,400	480	4,800	250
<b>4</b>	8,000	900	5,600	540	5,600	520	3,600	270
<b>5</b>	6,400	1,000	4,500	600	4,500	580	2,900	300
<b>6</b>	5,900	1,100	3,700	640	3,700	600	2,400	320
<b>8</b>	4,400	1,100	2,800	660	2,800	600	1,800	330
<b>10</b>	3,500	1,000	2,300	640	2,300	560	1,400	320
<b>12</b>	2,900	1,000	1,900	640	1,900	530	1,200	320
<b>16</b>	2,200	800	1,400	500	1,400	450	900	250
<b>18</b>	2,000	800	1,250	480	1,250	450	800	240
<b>20</b>	1,800	750	1,100	460	1,100	440	720	230

Depth of cut	Carbon steel, Alloy steel (-30HRC) SS400, S50C, SCM Cast iron FC250		Alloy steel, Tool steel Pre-hardened steel (30-45HRC) SKD61, NAK		Austenitic stainless steel SUS304, SU316		Hardened steel (45-55HRC) SKD61	

D:Dia.

## Slotting

Work material	Carbon steel, Alloy steel (-30HRC) SS400, S50C, SCM Cast iron FC250		Alloy steel, Tool steel Pre-hardened steel (30-45HRC) SKD61, NAK		Austenitic stainless steel SUS304, SU316		Hardened steel (45-55HRC) SKD61	
	Dia. (mm)	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Revolution (min <sup>-1</sup> )
<b>2</b>	12,000	400	7,000	200	7,000	100	4,200	80
<b>3</b>	9,000	600	5,300	300	5,300	150	3,200	130
<b>4</b>	7,200	720	4,000	360	4,000	180	2,400	140
<b>5</b>	5,800	720	3,200	360	3,200	180	1,900	150
<b>6</b>	5,000	800	2,700	400	2,700	200	1,600	160
<b>8</b>	3,700	800	2,000	400	2,000	200	1,200	170
<b>10</b>	3,000	720	1,600	360	1,600	180	960	160
<b>12</b>	2,500	600	1,300	290	1,300	150	800	140
<b>16</b>	2,000	480	1,000	230	1,000	120	600	110
<b>18</b>	1,800	460	900	210	900	110	550	110
<b>20</b>	1,600	430	800	200	800	100	480	100

Depth of cut	Carbon steel, Alloy steel (-30HRC) SS400, S50C, SCM Cast iron FC250		Alloy steel, Tool steel Pre-hardened steel (30-45HRC) SKD61, NAK		Austenitic stainless steel SUS304, SU316		Hardened steel (45-55HRC) SKD61	

D:Dia.

- 1) When cutting austenitic stainless steels and wear resistant alloys, the use of non-water-soluble cutting fluid is especially effective.
- 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
- 3) If the rigidity of the machine or the work material installation is very low, or chattering is generated, please reduce the revolution and feed rate proportionately, or set a smaller depth of cut.
- 4) For side milling, climb cutting is recommended.

**三菱 MITSUBISHI MATERIALS KOBE TOOLS**



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