

**MITSUBISHI**

**MITSUBISHI CARBIDE**

**B096E**

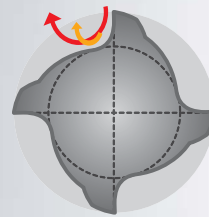
MSTAR 4 flute high power end mill

**MSMHD**

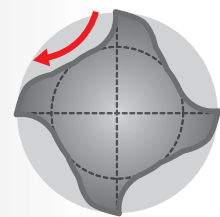
New addition to the **MSTAR** series.  
4 flute high power end mills now available.



■ A new flute geometry for slotting,  
for excellent chip disposability.

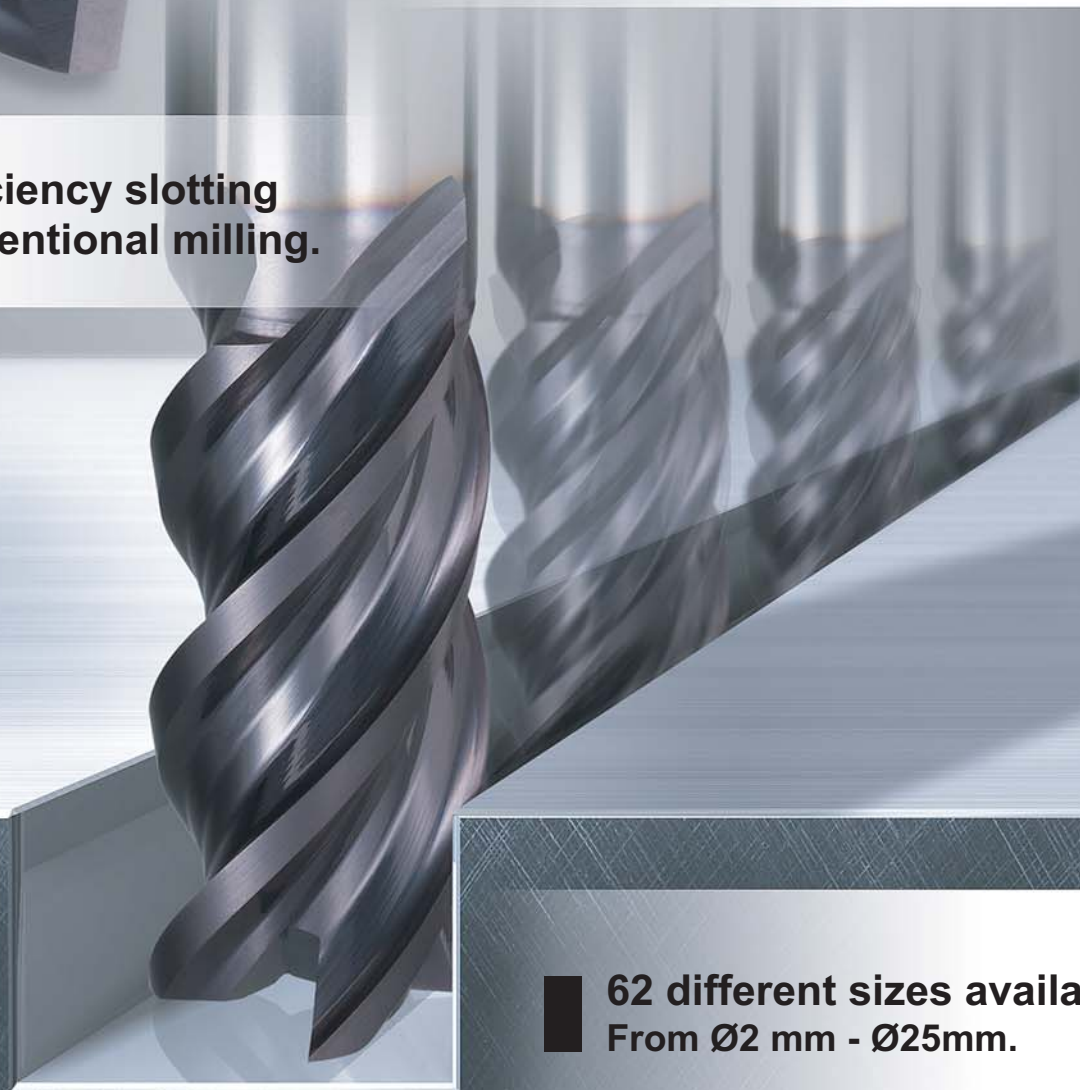


Conventional geometry



**MSMHD**

■ High efficiency slotting  
and conventional milling.



■ 62 different sizes available.  
From Ø2 mm - Ø25mm.

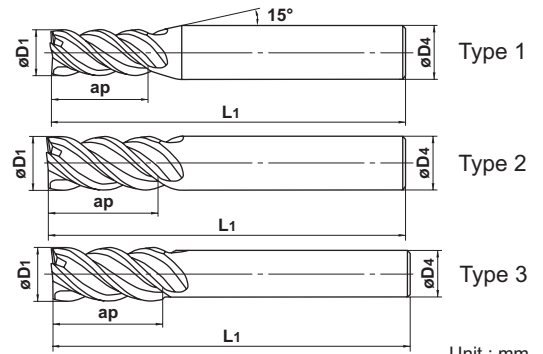
# MSTAR END MILL

## MSMHD

High power, Medium cut length, 4 flute



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



Unit : mm

● 4 flute high helix end mill for heavy duty milling

Order Number	Diameter	D1	ap	L1	D4	N	Stock	Type
MSMHDD0200	2	2	4	45	4	4	●	1
D0210	2.1	2.1	5	45	4	4	●	1
D0220	2.2	2.2	5	45	4	4	●	1
D0230	2.3	2.3	5	45	4	4	●	1
D0240	2.4	2.4	5	45	4	4	●	1
D0250	2.5	2.5	5	45	4	4	●	1
D0260	2.6	2.6	6	45	4	4	●	1
D0270	2.7	2.7	6	45	4	4	●	1
D0280	2.8	2.8	6	45	4	4	●	1
D0290	2.9	2.9	6	45	4	4	●	1
D0300	3	3	8	45	6	4	●	1
D0310	3.1	3.1	8	45	6	4	●	1
D0320	3.2	3.2	8	45	6	4	●	1
D0330	3.3	3.3	8	45	6	4	●	1
D0340	3.4	3.4	8	45	6	4	●	1
D0350	3.5	3.5	8	45	6	4	●	1
D0360	3.6	3.6	11	45	6	4	●	1
D0370	3.7	3.7	11	45	6	4	●	1
D0380	3.8	3.8	11	45	6	4	●	1
D0390	3.9	3.9	11	45	6	4	●	1
D0400	4	4	11	45	6	4	●	1
D0410	4.1	4.1	12	45	6	4	●	1
D0420	4.2	4.2	12	45	6	4	●	1
D0430	4.3	4.3	12	45	6	4	●	1
D0440	4.4	4.4	12	45	6	4	●	1
D0450	4.5	4.5	12	45	6	4	●	1
D0460	4.6	4.6	13	50	6	4	●	1
D0470	4.7	4.7	13	50	6	4	●	1
D0480	4.8	4.8	13	50	6	4	●	1
D0490	4.9	4.9	13	50	6	4	●	1
D0500	5	5	13	50	6	4	●	1
D0510	5.1	5.1	13	50	6	4	●	1
D0520	5.2	5.2	13	50	6	4	●	1
D0530	5.3	5.3	13	50	6	4	●	1
D0540	5.4	5.4	13	50	6	4	●	1
D0550	5.5	5.5	13	50	6	4	●	1
D0560	5.6	5.6	13	50	6	4	●	1
D0570	5.7	5.7	13	50	6	4	●	1

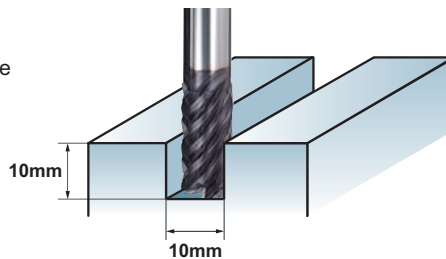
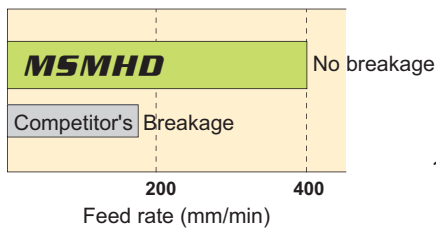
Unit : mm

Order Number	Diameter	D1	ap	L1	D4	N	Stock	Type
MSMHDD0580	5.8	5.8	13	50	6	4	●	1
D0590	5.9	5.9	13	50	6	4	●	1
D0600	6	6	13	50	6	4	●	2
D0650	6.5	6.5	16	60	8	4	●	1
D0700	7	7	19	60	8	4	●	1
D0750	7.5	7.5	19	60	8	4	●	1
D0800	8	8	19	60	8	4	●	2
D0850	8.5	8.5	19	70	10	4	●	1
D0900	9	9	22	70	10	4	●	1
D0950	9.5	9.5	22	70	10	4	●	1
D1000	10	10	22	70	10	4	●	2
D1100	11	11	26	75	12	4	●	1
D1200S10	12x10	12	26	75	10	4	●	3
D1200	12	12	26	75	12	4	●	2
D1300	13	13	26	75	12	4	●	3
D1400	14	14	30	90	16	4	●	1
D1500	15	15	35	90	16	4	●	1
D1600	16	16	35	90	16	4	●	2
D1700	17	17	35	100	16	4	●	3
D1800	18	18	40	100	16	4	●	3
D1900	19	19	40	110	20	4	●	1
D2000	20	20	45	110	20	4	●	2
D2200	22	22	50	125	20	4	●	3
D2500	25	25	55	125	25	4	●	2

## Machining Example

### Slotting

Newly designed geometry for excellent chip disposability during slotting.



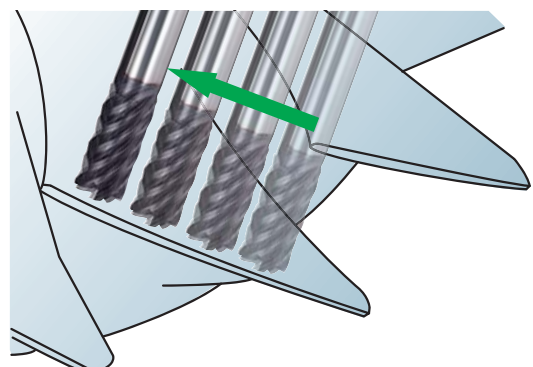
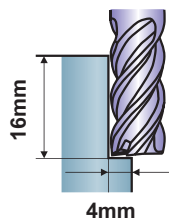
End mill	MSMHD φ10
Work material	Nickel based alloy
Revolution	1,600min <sup>-1</sup> (50m/min)
Feed rate	50—400mm/min
Cutting method	Slotting, Air blow

### Side milling of aircraft component

Higher efficiency than conventional end mills.

Feed rate: Increased x 1.7

End mill	MSMHD φ16	Competitor
Work material	Nickel based alloy	
Revolution	600min <sup>-1</sup> (30m/min)	360min <sup>-1</sup> (18m/min)
Feed rate	85mm/min (0.035mm/tooth)	50mm/min (0.035mm/tooth)
Cutting method	Climb cut, Emulsion	



## 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 304, 316		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	15000	550	10000	340	10000	320	6400	160
3	11000	800	7400	500	7400	480	4800	250
4	8000	900	5600	540	5600	520	3600	270
5	6400	1000	4500	600	4500	580	2900	300
6	5800	1100	3700	640	3700	600	2400	320
8	4400	1100	2800	660	2800	600	1800	330
10	3500	1000	2200	640	2200	560	1400	320
12	2900	1000	1900	640	1900	530	1200	320
16	2200	800	1400	500	1400	450	900	250
20	1800	750	1100	460	1100	440	720	230
25	1400	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 304, 316		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 304, 316		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	12000	400	7000	200	7000	100	4200	80
3	9000	600	5300	300	5300	150	3200	130
4	7200	720	4000	360	4000	180	2400	140
5	5800	720	3200	360	3200	180	1900	150
6	5000	800	2700	400	2700	200	1600	160
8	3700	800	2000	400	2000	200	1200	170
10	3000	720	1600	360	1600	180	960	160
12	2500	720	1300	360	1300	180	800	160
16	2000	600	1000	280	1000	150	600	130
20	1600	540	800	250	800	130	480	120
25	1300	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 304, 316		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.



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