

IMPACT MIRACLE Square End Mill Series

## ***VF-2MD VF-4MD***

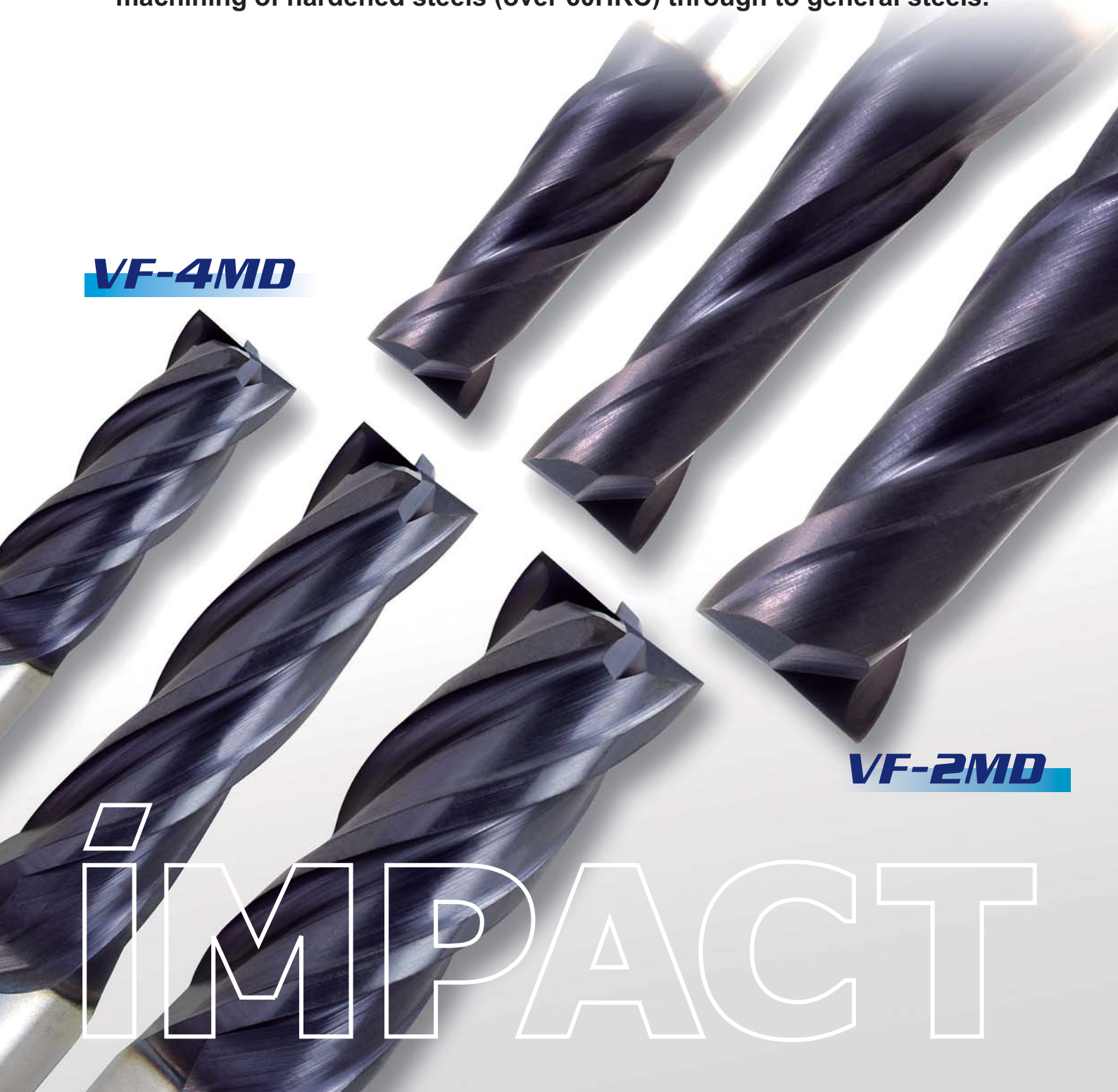
# General-purpose 2 and 4 flute IMPACT MIRACLE end mills now available!

■ IMPACT MIRACLE coating with high heat resistance is used to enable the machining of hardened steels (over 60HRC) through to general steels.

***VF-4MD***

***VF-2MD***

# IMPACT



# IMPACT MIRACLE END MILL

## VF-2MD

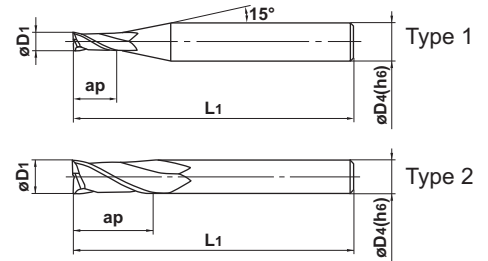
Medium cut length, 2 flute



0 - -0.020



4 ≤ D4 ≤ 6 0 - -0.008



Helix angle

Gash land

D1 < 3

D1 ≥ 3

● 2 flute slot drill for high-speed machining of hardened steel.

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
VF2MDD0050	0.5	1.3	40	4	2	●	1
D0100	1	2.5	40	4	2	●	1
D0150	1.5	3.8	40	4	2	●	1
D0200	2	5	40	4	2	●	1
D0250	2.5	6.3	40	4	2	●	1
D0300	3	7.5	50	6	2	●	1
D0400	4	10	50	6	2	●	1
D0500	5	12.5	50	6	2	●	1
D0600	6	15	50	6	2	●	2

● : Inventory maintained.

### Recommended Cutting Conditions

Work Material	Carbon Steel, Alloy Steel, Tool Steel Pre-hardened Steel (-45HRC) JIS SKD61, NAK			Hardened steel (45-55HRC) JIS SKD61, STAVAX			Hardened steel (55HRC-) JIS SKD11, HSS		
	Dia. (mm)	Revolution (min <sup>-1</sup> )	Feed Rate (mm/min)	Depth of Cut (mm)	Revolution (min <sup>-1</sup> )	Feed Rate (mm/min)	Depth of Cut (mm)	Revolution (min <sup>-1</sup> )	Feed Rate (mm/min)
0.5	40000	1000	0.015	40000	960	0.015	30000	600	0.01
1	40000	2000	0.06	32000	1600	0.06	16000	550	0.05
1.5	40000	3000	0.12	32000	1900	0.08	10600	500	0.08
2	30000	3000	0.18	24000	1900	0.10	8100	400	0.1
2.5	24000	2600	0.25	19000	1600	0.13	6400	350	0.13
3	20000	2300	0.30	16000	1400	0.15	5400	300	0.15
4	15000	2000	0.40	12000	1200	0.20	4000	240	0.2
5	12000	1600	0.50	9000	900	0.25	3200	190	0.2
6	10000	1400	0.60	7000	700	0.30	2700	160	0.2

≤ Please refer to the list above for depth of cut.

≤ Please refer to the list above for depth of cut.

D: Dia.

- 1) If the rigidity of the machine or the workpiece installation is very low, or chattering is generated, please reduce the revolution and the feed rate proportionately.
- 2) When slotting with end mills with  $\phi 3$  or larger, reduce the revolution to 50-70% and the feed rate to 40-60%.
- 3) When drilling, reduce the feed rate by 70%.
- 4) Drilling is not recommended for workpieces of 55HRC or above.

# VF-4MD

Medium cut length, 4 flute



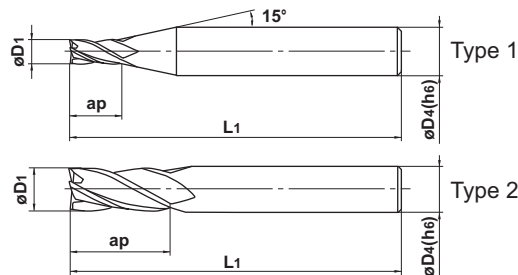
D1 ≤ 12 0 - -0.020  
D1 > 12 0 - -0.030



4 ≤ D4 ≤ 6 0 - -0.008  
8 ≤ D4 ≤ 10 0 - -0.009  
12 ≤ D4 ≤ 16 0 - -0.011  
D4 = 20 0 - -0.013



Helix angle Gash land



● 4 flute end mill for high-speed machining of hardened steel.

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
VF4MDD0100	1	2.5	40	4	4	●	1
D0150	1.5	3.8	40	4	4	●	1
D0200	2	5	40	4	4	●	1
D0250	2.5	6.3	40	4	4	●	1
D0300	3	7.5	50	6	4	●	1
D0400	4	10	50	6	4	●	1
D0500	5	12.5	50	6	4	●	1
D0600	6	15	50	6	4	●	2
D0800	8	20	60	8	4	●	2
D1000	10	25	70	10	4	●	2
D1200	12	30	90	12	4	●	2
D1600	16	40	100	16	4	●	2
D2000	20	50	110	20	4	●	2

● : Inventory maintained.

## Recommended Cutting Conditions

Work Material	Carbon Steel, Alloy Steel, Tool Steel Pre-hardened Steel (-45HRC) JIS SKD61, NAK			Hardened steel (45-55HRC) JIS SKD61, STAVAX			Hardened steel (55HRC-) JIS SKD11, HSS		
	Dia. (mm)	Revolution (min <sup>-1</sup> )	Feed Rate (mm/min)	Depth of Cut (mm)	Revolution (min <sup>-1</sup> )	Feed Rate (mm/min)	Depth of Cut (mm)	Revolution (min <sup>-1</sup> )	Feed Rate (mm/min)
<b>1</b>	40000	3000	0.06	32000	2400	0.06	16000	710	0.05
<b>1.5</b>	40000	4500	0.12	32000	3600	0.08	10600	650	0.08
<b>2</b>	30000	4500	0.18	24000	3600	0.10	8100	520	0.10
<b>2.5</b>	24000	3900	0.25	19000	3000	0.13	6400	450	0.13
<b>3</b>	20000	3500	0.30	16000	2700	0.15	5400	390	0.15
<b>4</b>	15000	3000	0.40	12000	2400	0.20	4000	450	0.20
<b>5</b>	12000	2400	0.50	9000	1800	0.25	3200	380	0.20
<b>6</b>	10000	2100	0.60	7000	1400	0.30	2700	320	0.20
<b>8</b>	8000	1500	0.80	5600	1100	0.40	2000	240	0.20
<b>10</b>	6400	1400	1.00	4500	950	0.50	1600	210	0.30
<b>12</b>	5400	1200	1.00	3800	860	0.50	1300	160	0.30
<b>16</b>	2400	550	3.00	1200	280	0.80	1000	130	0.30
<b>20</b>	1900	480	4.00	1000	240	1.00	800	100	0.30

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D: Dia.

- 1) If the rigidity of the machine or the workpiece installation is very low, or chattering is generated, please reduce the revolution and the feed rate proportionately.
- 2) When slotting with end mills with  $\phi 3$  or larger, reduce the revolution to 50-70% and the feed rate to 40-60%.

# IMPACT MIRACLE END MILL

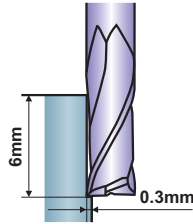
## ● Shoulder milling of hardened steel

In comparison with conventional end mills, VF-2MD shows much higher fracture resistance.

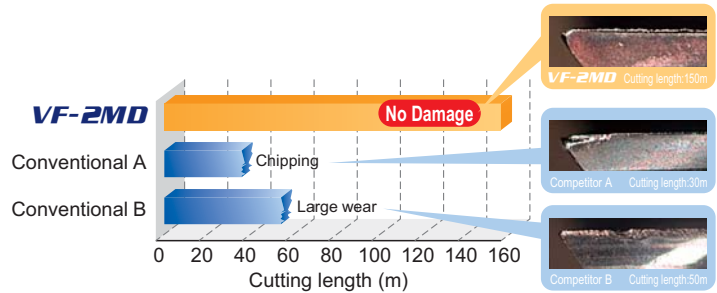


**VF-2MD**

<Cutting Mode>



<Cutting performance>



End mill	VF2MDD0600
Workpiece	JIS SKD61 (52HRC)
Revolution	7000min <sup>-1</sup> (130m/min)
Feed rate	980mm/min (0.07mm/tooth)
Machining method	Down cut, Air blow

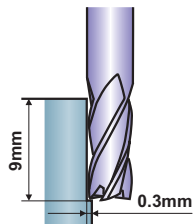
## ● Cutting resistance comparison

In comparison with a conventional 6 flute end mill for hardened steel, VF-4MD achieves lower cutting resistance.

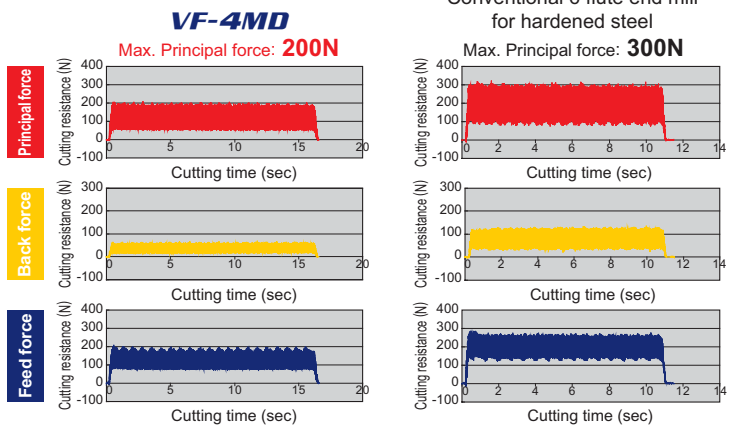


**VF-4MD**

<Cutting Mode>



<Cutting performance>



End mill	VF4MDD0600
Workpiece	JIS SKD61 (52HRC)
Revolution	1800min <sup>-1</sup> (34m/min)
Feed rate	VF-4MD : 300mm/min (0.04mm/tooth) Conventional 6 flute end mill : 450mm/min (0.04mm/tooth)
Machining method	Down cut, Air blow

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 using rotating tools, please make a trial run to check run-out, vibration and abnormal sounds etc.

**MITSUBISHI MATERIALS CORPORATION**



JSA-2522  
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(Seal of Place)

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(Tools specifications subject to change without notice.)