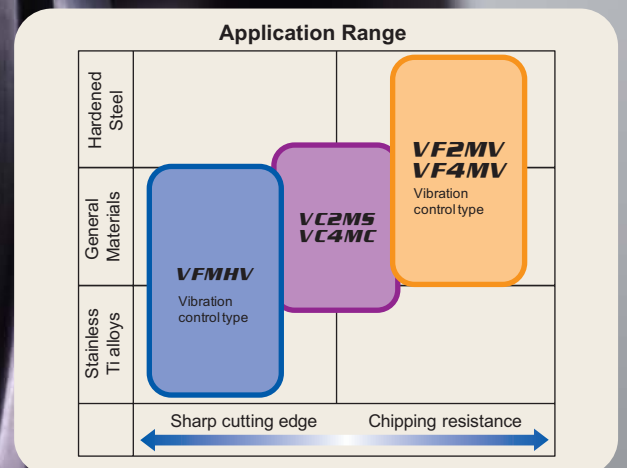


## Prevention of vibration with irregular helix flutes.

- High rigidity cross-section flute and anti-vibration features offers superior chipping resistance.
- Use of Impact Miracle coating with superior heat resistance allows excellent performance when machining hardened materials.



# IMPACT MIRACLE END MILL

## VF2MV

2 flute, Medium cut length, Irregular helix flutes

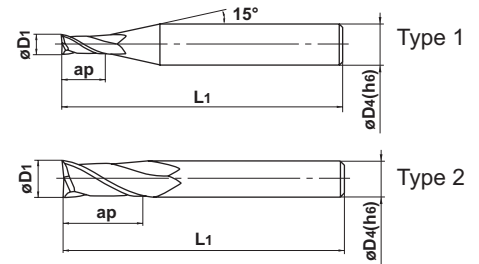


0 - -0.020



4 ≤ D4 ≤ 6 0 - -0.008

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	◎				



- An irregular helix 2 flute square end mill suitable 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 Flute N	Stock	Type
VF2MVD0050	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) W.Nr. 1.2344(H13)			Hardened Steel (45-55HRC) W.Nr. 1.2344(H13)			Hardened Steel (55HRC-)		
	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) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is very low, then vibration can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.
- 2) When slotting, reduce the revolutions by 20 - 50% and the feed rate by 40 - 60%.
- 3) For austenitic stainless steels, titanium and heat-resistant alloys, VF2MV is recommended.

# VF4MV

4 flute, Medium cut length, Irregular helix flutes



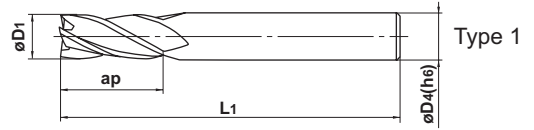
D1 ≤ 12 0 - -0.020  
D1 > 12 0 - -0.030



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

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
○	◎	◎	◎				

\* For austenitic stainless steels, titanium and heat-resistant alloys, the VF4MVH is recommended.



- An irregular helix 4 flute square end mill suitable for high-speed machining of hardened steel.

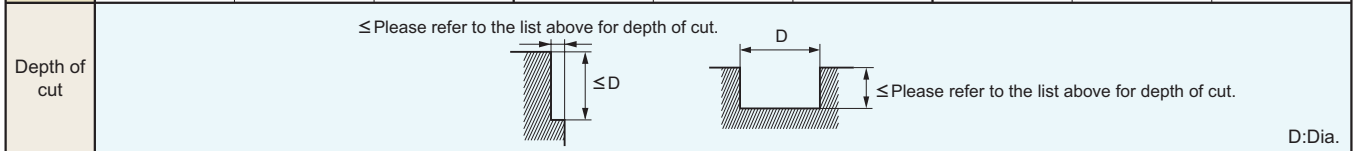
Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flute N	Stock	Type
VF4MVD0600	6	15	50	6	4	●	1
D0800	8	20	60	8	4	●	1
D1000	10	25	70	10	4	●	1
D1200	12	30	90	12	4	●	1
D1600	16	40	100	16	4	●	1
D2000	20	50	110	20	4	●	1

● : Inventory maintained.

## Recommended Cutting Conditions

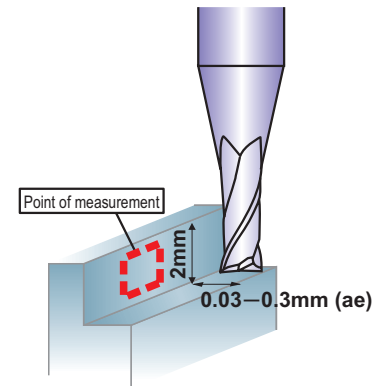
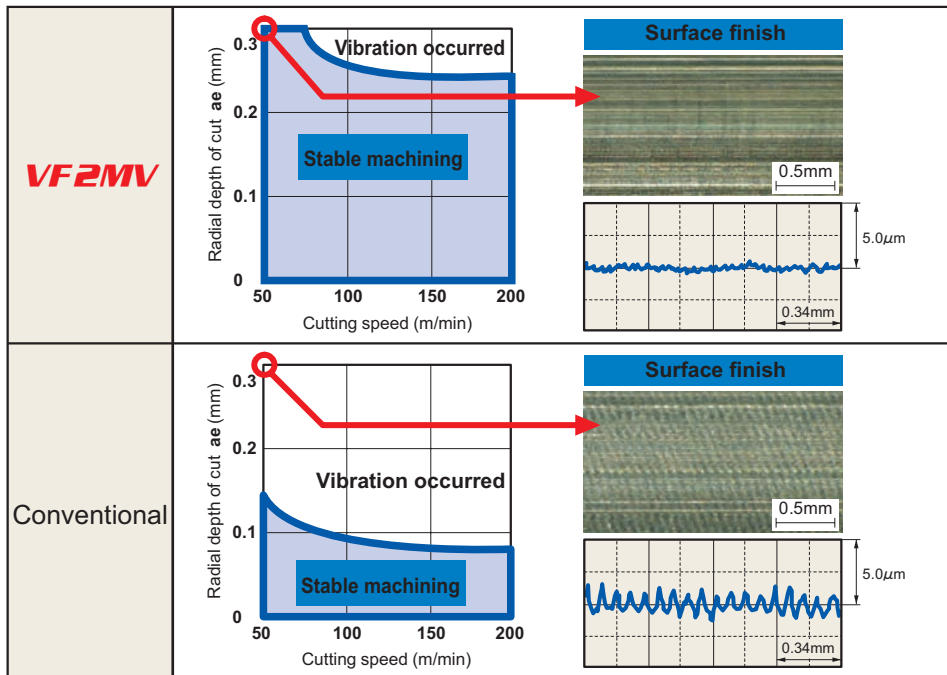
Work material	Carbon Steel, Alloy Steel, Tool Steel Pre-hardened Steel (-45HRC) W.Nr. 1.2344(H13)			Hardened Steel (45-55HRC) W.Nr. 1.2344(H13)			Hardened Steel (55HRC-)		
	Dia. (mm)	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)
6	10000	2100	0.60	7000	1400	0.30	2700	320	0.20
8	8000	1500	0.80	5600	1100	0.40	2000	240	0.20
10	6400	1400	1.00	4500	950	0.50	1600	210	0.30
12	5400	1200	1.00	3800	860	0.50	1300	160	0.30
16	2400	550	3.00	1200	280	0.80	1000	130	0.30
20	1900	480	4.00	1000	240	1.00	800	100	0.30



- 1) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is very low, then vibration can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.
- 2) When slotting, reduce the revolutions by 20 - 50% and the feed rate by 40 - 60%.
- 3) For austenitic stainless steels, titanium and heat-resistant alloys, VF4MVH is recommended.

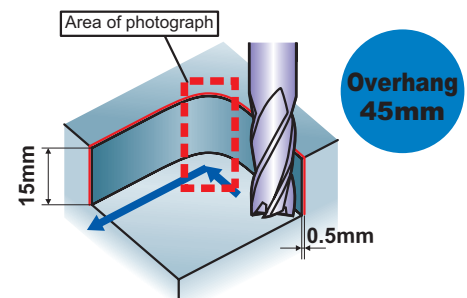
## Cutting Performance

- Excellent anti-vibration features allows stable machining over a wider application area compared to conventional 2 flute end mill.



End mill	VF2MVD0200 (ø2)
Workpiece	W.Nr. 1.2344 (52HRC)
Feed rate	50-200m/min (0.02mm/tooth)
Machining method	Down cut , Air blow

- The VF4MV delivers excellent vibration resistance when machining hardened steel.



Machining of pocket shaped corners with right angle tool paths

End mill	VF4MVD1000 (ø10)
Workpiece	W.Nr. 1.2344 (52HRC)
Revolution	2500min <sup>-1</sup> (188m/min)
Feed rate	600mm/min (0.06mm/tooth)
Machining method	Down cut , Air blow



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