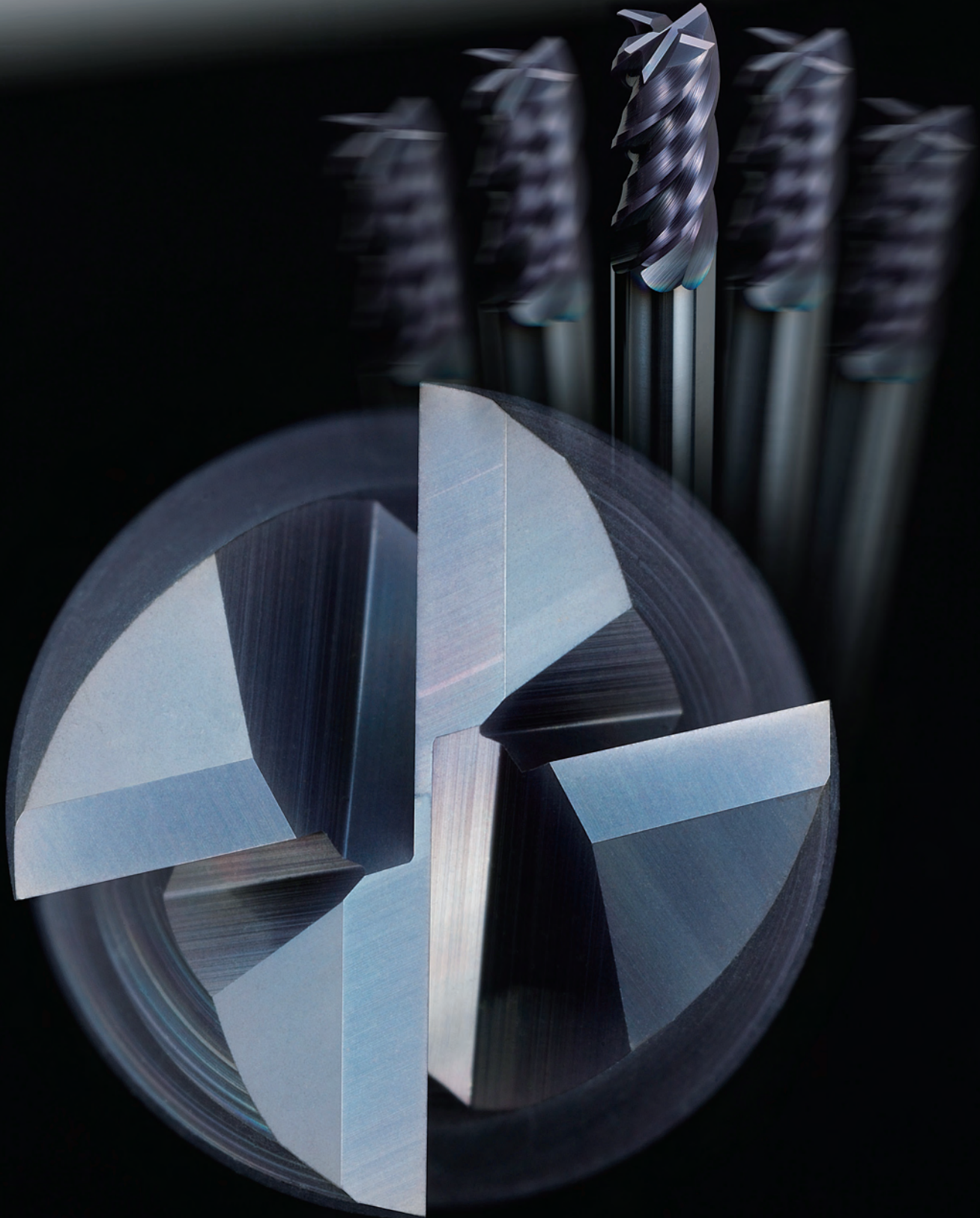


Prevention of vibration with irregular helix flutes.

Excellent vibration resistance for the machining of difficult-to-cut materials and applications with long overhangs.
High efficiency machining!



IMPACT MIRACLE End Mill Series

VFMHV

IMPACT MIRACLE vibration control end mill

Features

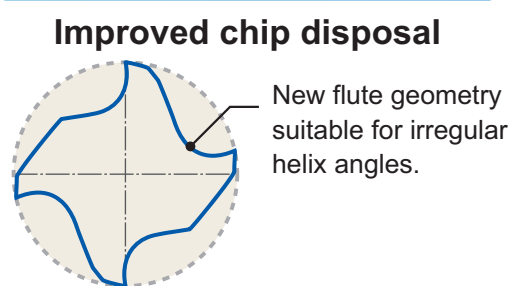
- In comparison with conventional end mills, the use of irregular helix flutes assists in preventing vibrations.
- Suitable for machining difficult-to-cut materials (stainless steel, titanium alloy).
- Stable machining even with long overhangs.
- Uses highly heat resistant Impact Miracle coating.
- Also suitable for machining hardened steels.

Geometry

Irregular Helix Flutes

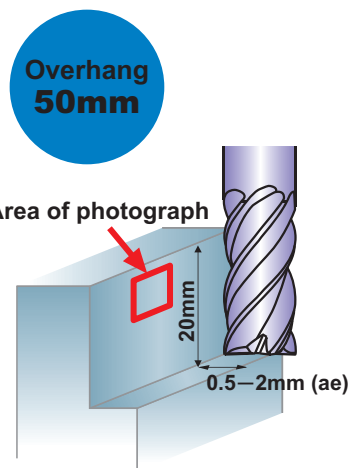
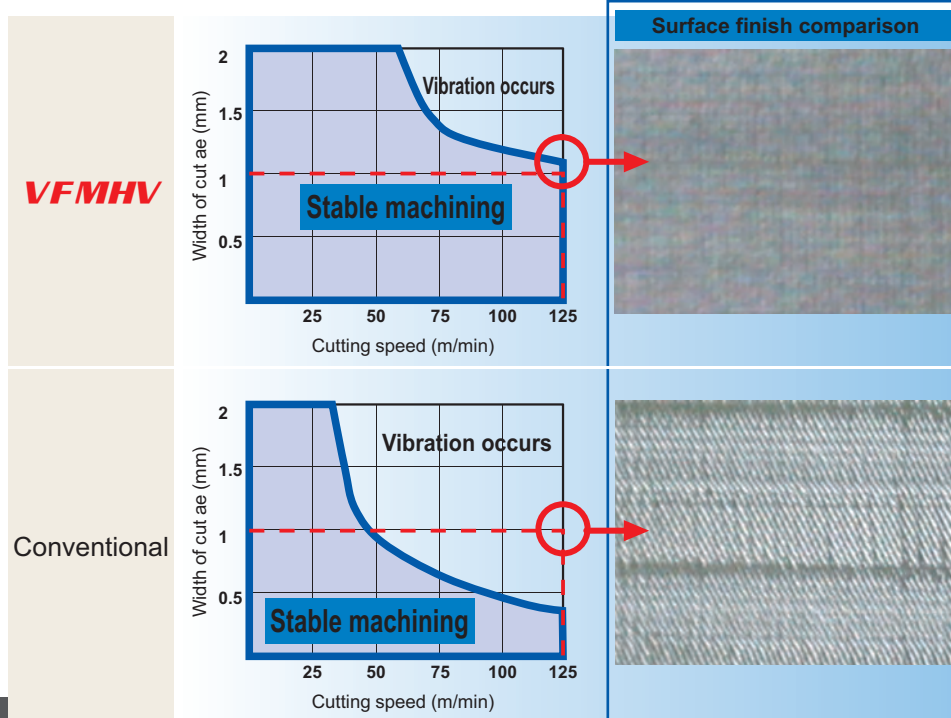


Special Flute Geometry



Vibration resistance comparison when machining titanium alloy

VFMHV reduces vibration even with an overhang of 5D and achieves superior surface finishes.



End mill	VFMHV $\phi 10$
Workpiece	Ti-6Al-4V
Revolution	800-4,000min ⁻¹
Feed rate	160-800mm/min (0.05mm/tooth)
Coolant	Water soluble coolant

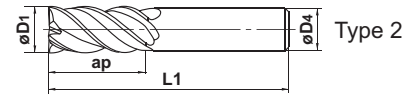
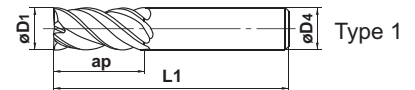
IMPACT MIRACLE END MILL

VFMHV

IMPACT MIRACLE vibration control end mill



$D1 \leq 12$ 0 - -0.020
 $12 < D1$ 0 - -0.030



- Impact Miracle end mills with irregular helix flutes ensures stable machining on difficult-to-cut materials and with long overhangs.

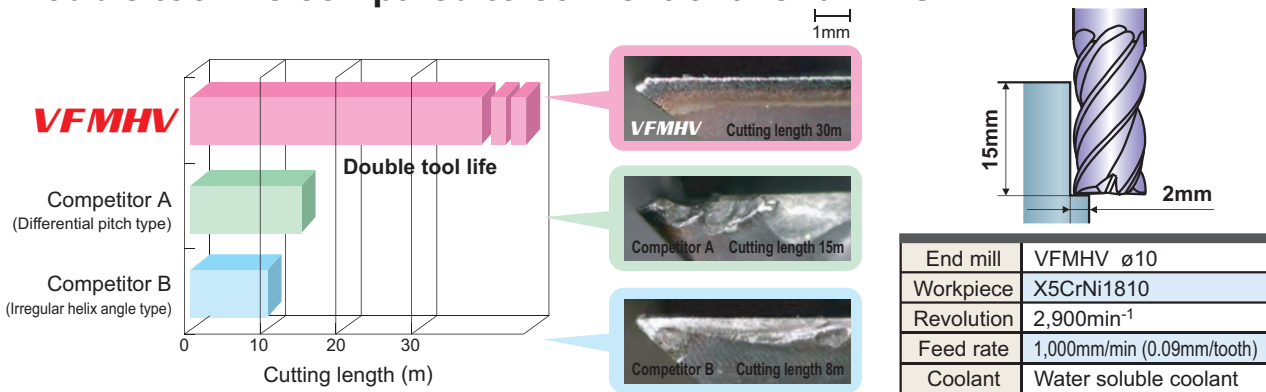
Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flute N	Stock	Type
VFMHVD0600	6	13	50	6	4	●	1
D0600A070	6	13	70	6	4	●	1
D0800	8	19	60	8	4	●	1
D0800A080	8	19	80	8	4	●	1
D1000	10	22	70	10	4	●	1
D1000A100	10	22	100	10	4	●	1
D1100	11	26	100	10	4	●	2
D1200	12	26	75	12	4	●	1
D1200A110	12	26	110	12	4	●	1
D1300	13	26	110	12	4	●	2
D1600	16	35	90	16	4	●	1
D2000	20	45	110	20	4	●	1

● : Inventory maintained.

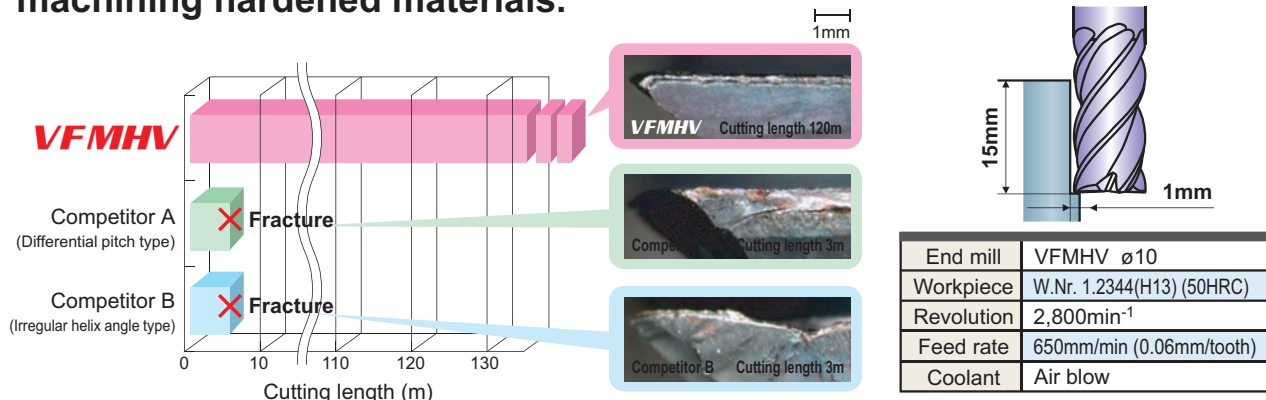
Tool life comparison when machining stainless steel

Double tool life compared to conventional end mills



Tool life comparison when machining hardened materials

Use of Impact Miracle coating allows superior tool life even when machining hardened materials.



IMPACT MIRACLE END MILL

VFMHV

IMPACT MIRACLE vibration control end mill

Side Milling

Work material	Carbon Steel, Alloy Steel (-30HRC) Ck55, 070M55 Cast Iron GG25		Alloy Steel, Tool Steel Pre-hardened Steel (30-45HRC) W.Nr. 1.2344(H13)		Austenitic Stainless Steel X5CrNi1810, X5CrNiMo17122 Titanium Alloy Ti-6Al-4V		Hardened Steel (45-55HRC) W.Nr. 1.2344(H13)		Heat Resistant Alloys Inconel	
	Dia. (mm)	Revolution (min ⁻¹)	Feed rate (mm/min)	Revolution (min ⁻¹)	Feed rate (mm/min)	Revolution (min ⁻¹)	Feed rate (mm/min)	Revolution (min ⁻¹)	Feed rate (mm/min)	Revolution (min ⁻¹)
6	8,000	2,240	8,000	2,240	5,300	1,060	3,700	440	2,100	250
8	6,000	1,680	6,000	1,680	4,000	960	2,800	450	1,600	260
10	4,800	1,440	4,800	1,440	3,200	770	2,200	440	1,300	210
11	4,400	1,350	4,400	1,350	3,000	760	2,100	400	1,200	180
12	4,000	1,200	4,000	1,200	2,700	760	1,900	380	1,100	140
13	3,700	1,200	3,700	1,200	2,500	700	1,700	360	1,000	130
16	3,000	1,140	3,000	1,140	2,000	560	1,400	340	800	110
20	2,400	860	2,400	860	1,600	510	1,100	350	600	100

Depth of cut	Carbon Steel, Alloy Steel (-30HRC) Ck55, 070M55 Cast Iron GG25		Alloy Steel, Tool Steel Pre-hardened Steel (30-45HRC) W.Nr. 1.2344(H13)		Austenitic Stainless Steel X5CrNi1810, X5CrNiMo17122 Titanium Alloy Ti-6Al-4V		Hardened Steel (45-55HRC) W.Nr. 1.2344(H13)		Heat Resistant Alloys Inconel	
	Dia. (mm)	Revolution (min ⁻¹)	Feed rate (mm/min)	Revolution (min ⁻¹)	Feed rate (mm/min)	Revolution (min ⁻¹)	Feed rate (mm/min)	Revolution (min ⁻¹)	Feed rate (mm/min)	Revolution (min ⁻¹)

D:Dia.

Slotting

Work material	Carbon Steel, Alloy Steel (-30HRC) Ck55, 070M55 Cast Iron GG25		Alloy Steel, Tool Steel Pre-hardened Steel (30-45HRC) W.Nr. 1.2344(H13)		Austenitic Stainless Steel X5CrNi1810, X5CrNiMo17122 Titanium Alloy Ti-6Al-4V		Hardened Steel (45-55HRC) W.Nr. 1.2344(H13)		Heat Resistant Alloys Inconel	
	Dia. (mm)	Revolution (min ⁻¹)	Feed rate (mm/min)	Revolution (min ⁻¹)	Feed rate (mm/min)	Revolution (min ⁻¹)	Feed rate (mm/min)	Revolution (min ⁻¹)	Feed rate (mm/min)	Revolution (min ⁻¹)
6	6,400	1,280	3,700	740	3,700	440	1,600	190	1,300	160
8	4,800	1,150	2,800	670	2,800	340	1,200	190	1,000	120
10	3,800	910	2,200	530	2,200	350	1,000	160	800	130
11	3,500	900	2,100	530	2,100	330	900	160	700	120
12	3,200	900	1,900	530	1,900	300	800	160	700	110
13	3,000	800	1,700	500	1,700	290	700	140	600	100
16	2,400	670	1,400	390	1,400	280	600	120	500	80
20	1,900	610	1,100	350	1,100	260	500	120	400	60

Depth of cut	Carbon Steel, Alloy Steel (-30HRC) Ck55, 070M55 Cast Iron GG25		Alloy Steel, Tool Steel Pre-hardened Steel (30-45HRC) W.Nr. 1.2344(H13)		Austenitic Stainless Steel X5CrNi1810, X5CrNiMo17122 Titanium Alloy Ti-6Al-4V		Hardened Steel (45-55HRC) W.Nr. 1.2344(H13)		Heat Resistant Alloys Inconel	
	Dia. (mm)	Revolution (min ⁻¹)	Feed rate (mm/min)	Revolution (min ⁻¹)	Feed rate (mm/min)	Revolution (min ⁻¹)	Feed rate (mm/min)	Revolution (min ⁻¹)	Feed rate (mm/min)	Revolution (min ⁻¹)

D:Dia.

- 1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective. When cutting heat-resistant alloys, the use of non water-soluble cutting fluid is recommended.
- 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
- 3) 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.
- 4) For side milling, climb cutting is recommended.

MITSUBISHI
MITSUBISHI MATERIALS

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