

Impact Miracle roughing end mill series

VF-SFPR VF-MFPR

For general, hardened steels through to difficult-to-cut materials.

**Impact Miracle roughing end mills with
superior fracture resistance now available!**



IMPACT MIRACLE end mill series

VF-SFPR

Roughing type, short cut length, 3-4 flute

VF-MFPR

Roughing type, medium cut length, 4 flute

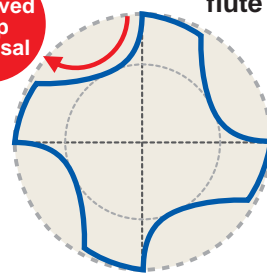
Features

- New cutting edge geometry design improves fracture resistance and ensures higher efficiency machining and longer tool life when machining difficult-to-cut materials.
- Cross sectional geometry for improved chip disposal and a 30° helix angle contributes to a massive reduction of the cutting resistance.
- Impact Miracle coating with good heat resistance offers excellent machining performance over a wide range of materials from general steel, hardened steel through to difficult-to-cut materials.

Properties of Impact Miracle coating

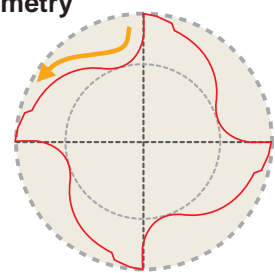
	IMPACT MIRACLE	(Al,Ti,Si)N	(Al,Ti)N
Hardness	3700HV	3200HV	2800HV
Adhesion	100N	80N	80N
Oxidation temperature	1300°C	1100°C	840°C
Coefficient of friction	0.48	0.53	0.58

Improved chip disposal



Impact Miracle roughing end mill

Cross sectional flute geometry



General-purpose geometry

- Short and middle cut length types are available.

VF-SFPR

Roughing type, short cut length, 3-4 flute



ø3-ø20mm

15 different sizes available.

VF-MFPR

Roughing type, medium cut length, 4 flute

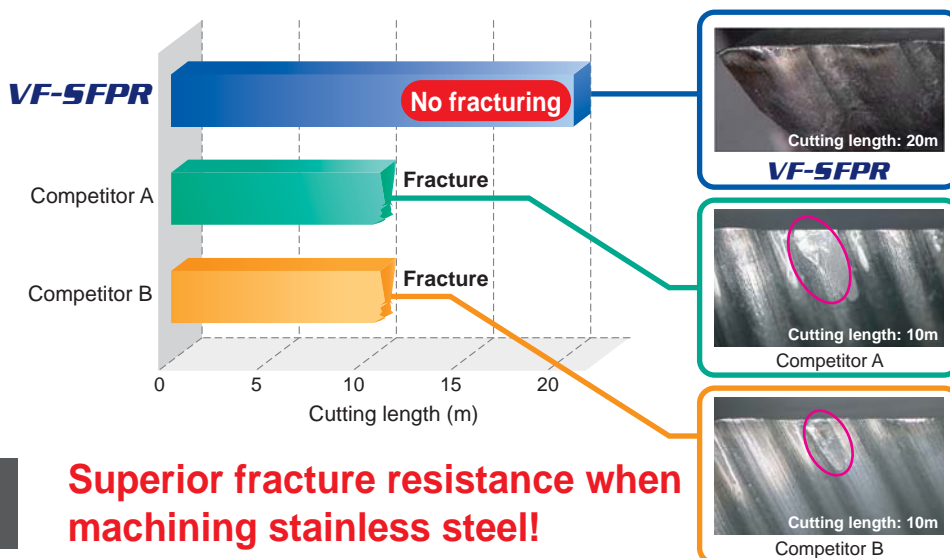


ø5-ø20mm

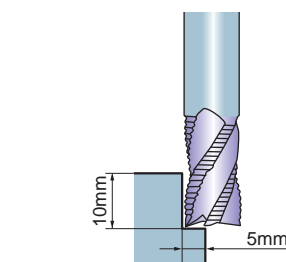
9 different sizes available.

Cutting Performance

Cutting performance comparison (Tool diameter 10mm)



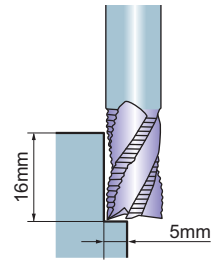
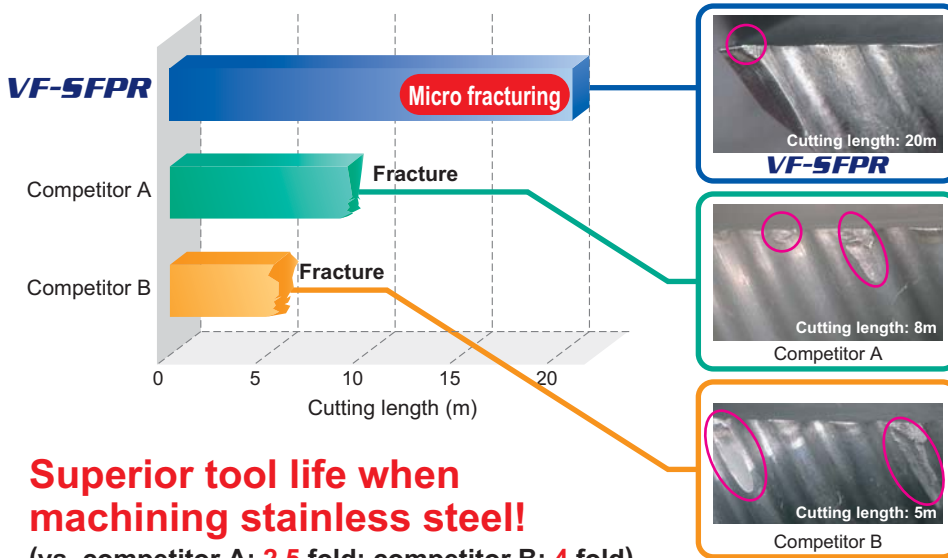
Superior fracture resistance when machining stainless steel!



End mill	VF-SFPR ø10
Work material	JIS SUS304
Revolution	1900min ⁻¹ (60m/min)
Feed rate	400mm/min (0.21mm/rev)
Cutting method	Climb cut, Emulsion

Cutting Performance

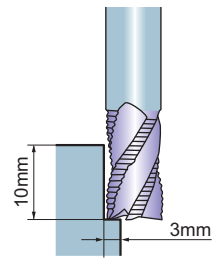
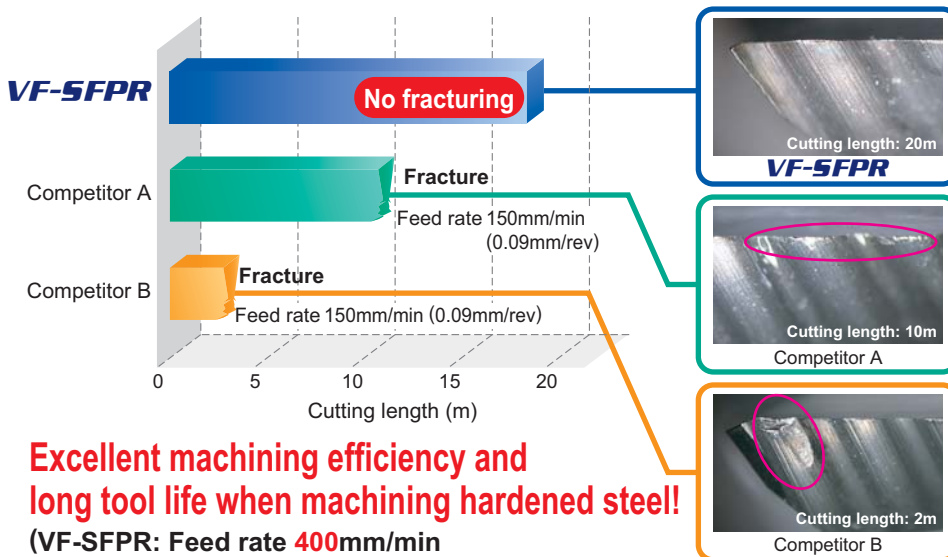
Cutting performance comparison (Tool diameter 16mm)



End mill	VF-SFPR ϕ 16
Work material	JIS SUS304
Revolution	1200min ⁻¹ (60m/min)
Feed rate	320mm/min (0.27mm/rev)
Cutting method	Climb cut, Emulsion

Superior tool life when machining stainless steel!
 (vs. competitor A: 2.5 fold; competitor B: 4 fold)

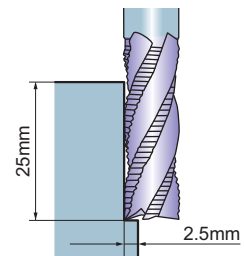
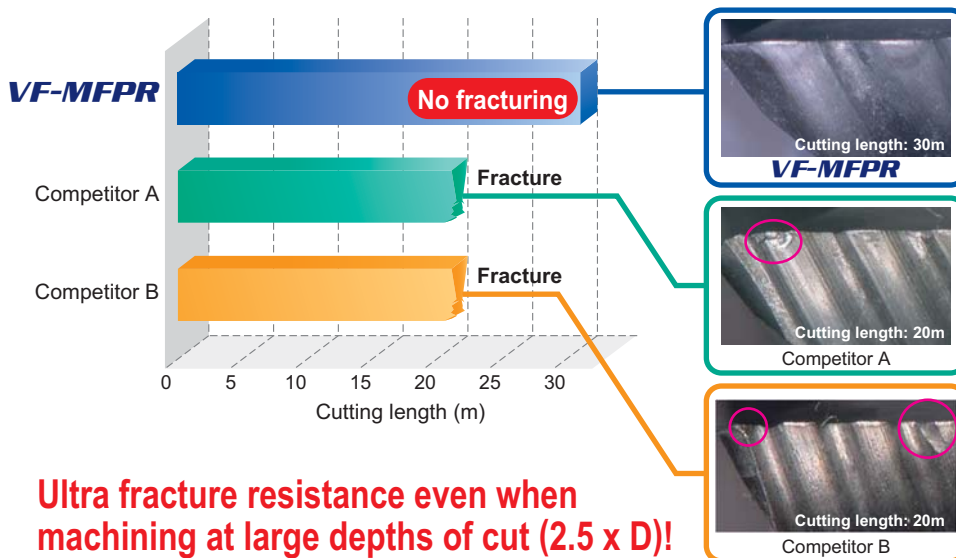
Cutting performance comparison (Tool diameter 10mm)



End mill	VF-SFPR ϕ 10
Work material	JIS SKD61 (52HRC)
Revolution	1600min ⁻¹ (50m/min)
Feed rate	400mm/min (0.25mm/rev)
Cutting method	Climb cut, Air blow

Excellent machining efficiency and long tool life when machining hardened steel!
 (VF-SFPR: Feed rate 400mm/min
 Competitor A, B: Feed rate 150mm/min)

Cutting performance comparison (Tool diameter 10mm)



End mill	VF-MFPR ϕ 10
Work material	JIS SUS304
Revolution	1300mm/min (41m/min)
Feed rate	180mm/min (0.14mm/rev)
Cutting method	Climb cut, Emulsion

Ultra fracture resistance even when machining at large depths of cut (2.5 x D)!

IMPACT MIRACLE END MILL

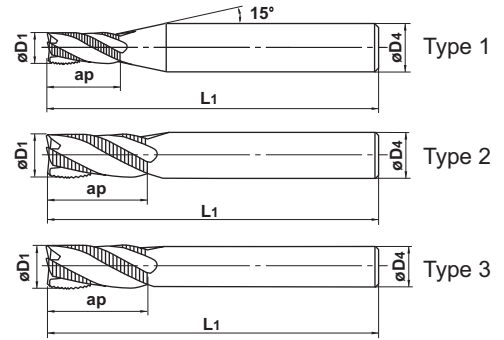
VF-SFPR

Roughing type, short cut length, 3-4 flute



$D_1 < 8$

$8 \leq D_1$



● Impact Miracle roughing end mill for a wide range of work materials from general steel through to hardened steel and difficult-to-cut materials.

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
VFSFPRD0300	3	6	50	6	3	●	1
D0400	4	8	50	6	3	●	1
D0500	5	10	50	6	3	●	1
D0600	6	12	50	6	3	●	2
D0700	7	17	60	8	3	●	1
D0800	8	17	60	8	4	●	2
D0900	9	22	70	10	4	●	1
D1000S08	10	22	90	8	4	●	3
D1000	10	22	70	10	4	●	2
D1200S10	12	27	100	10	4	●	3
D1200	12	27	75	12	4	●	2
D1400	14	27	75	12	4	●	3
D1600	16	33	90	16	4	●	2
D1800	18	33	90	16	4	●	3
D2000	20	38	100	20	4	●	2

VF-SFPR

Roughing type, short cut length, 3-4 flute

Side milling

Work material	Carbon steel, Alloy steel (-30HRC) JIS SS400, JIS S50C, JIS SCM Cast iron JIS FC250		Alloy steel, Tool steel Pre-hardened steel (30-45HRC) JIS SKD61, NAK		Austenitic stainless steel JIS SUS304, JIS SUS316 Titanium alloy		Hardened steel (45-55HRC) JIS SKD61		Heat resistant alloy Inconel etc.		
	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)	Feed rate (mm/min)
3	16,000	960	13,000	640	6,400	260	5,300	320	4,200	70	
4	12,000	960	9,500	640	4,800	260	4,000	320	3,200	70	
5	9,500	960	7,600	640	3,800	260	3,200	320	2,500	70	
6	8,000	960	6,400	680	3,200	290	2,700	340	2,100	75	
8	6,000	1,050	4,800	760	2,400	340	2,000	400	1,600	95	
10	4,800	1,050	3,800	760	1,900	340	1,600	400	1,300	105	
12	4,000	960	3,200	700	1,600	320	1,300	400	1,100	110	
16	3,000	840	2,400	620	1,200	300	1,000	360	800	110	
20	2,400	760	1,900	560	1,000	300	800	320	600	100	
Depth of cut											

D: Dia.

Slotting

Work material	Carbon steel, Alloy steel (-30HRC) JIS SS400, JIS S50C, JIS SCM Cast iron JIS FC250		Alloy steel, Tool steel Pre-hardened steel (30-45HRC) JIS SKD61, NAK		Austenitic stainless steel JIS SUS304, JIS SUS316 Titanium alloy		Hardened steel (45-55HRC) JIS SKD61		Heat resistant alloy Inconel etc.		
	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)	Feed rate (mm/min)
3	13,000	720	11,000	480	4,800	190	3,200	190	2,100	25	
4	9,500	720	8,000	480	3,600	190	2,400	190	1,600	25	
5	7,600	720	6,400	480	3,200	190	1,900	190	1,300	25	
6	6,400	720	5,300	480	2,700	200	1,600	200	1,100	30	
8	4,800	800	4,000	520	2,000	220	1,200	220	800	35	
10	3,800	800	3,200	520	1,600	220	1,000	220	600	35	
12	3,200	750	2,700	520	1,300	210	800	210	500	40	
16	2,400	620	2,000	450	1,000	180	600	180	400	45	
20	1,900	540	1,600	400	800	160	500	160	300	40	
Depth of cut											

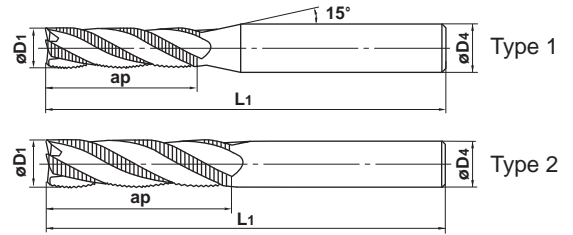
D: Dia.

- 1) When machining austenitic stainless steels, titanium and heat resistant alloys, the use of coolant 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 workpiece installation is very low, or chattering is generated, please reduce the revolution and feed rate proportionately, or set a smaller depth of cut.
- 4) Climb cutting is recommended for side milling.

IMPACT MIRACLE END MILL

VF-MFPR

Roughing type, medium cut length, 4 flute



- Impact Miracle roughing end mill suitable for the machining of deep walled components.

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
VFMFPRD0500	5	15	60	6	4	●	1
D0600	6	17	60	6	4	●	2
D0700	7	22	75	8	4	●	1
D0800	8	28	75	8	4	●	2
D0900	9	28	100	10	4	●	1
D1000	10	34	100	10	4	●	2
D1200	12	40	110	12	4	●	2
D1600	16	48	125	16	4	●	2
D2000	20	57	140	20	4	●	2

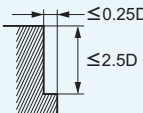
VF-MFPR

Roughing type, medium cut length, 4 flute

Side milling

Work material	Carbon steel, Alloy steel (-30HRC) JIS SS400, JIS S50C, JIS SCM Cast iron JIS FC250		Alloy steel, Tool steel Pre-hardened steel (30-45HRC) JIS SKD61, NAK		Austenitic stainless steel JIS SUS304, JIS SUS316 Titanium alloy		Hardened steel (45-55HRC) JIS SKD61		Heat resistant alloy Inconel etc.	
	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)
5	3,800	360	3,200	290	2,500	150	2,500	150	1,900	50
6	3,200	360	2,700	290	2,100	160	2,100	160	1,600	60
8	2,400	450	2,000	360	1,600	160	1,600	160	1,200	70
10	1,900	450	1,600	360	1,300	180	1,300	180	1,000	75
12	1,600	400	1,300	320	1,100	180	1,100	180	800	80
16	1,200	360	1,000	290	800	160	800	160	600	80
20	1,000	340	800	270	600	150	600	150	500	80

Depth of cut



D: Dia.

- 1) When machining austenitic stainless steels, titanium and heat resistant alloys, the use of coolant is recommended.
- 2) If the rigidity of the machine or the workpiece installation is very low, or chattering is generated, please reduce the revolution and feed rate proportionately, or set a smaller depth of cut.
- 3) Climb cutting is recommended.

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.

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(Tools specifications subject to change without notice.)