

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

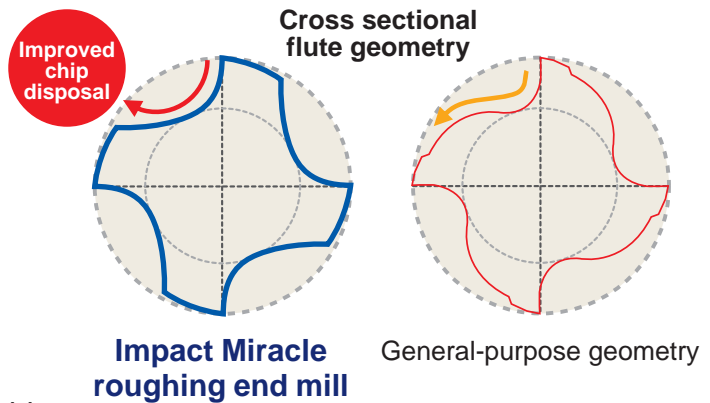
Roughing type, medium cut length, 4 flute

### 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



- 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

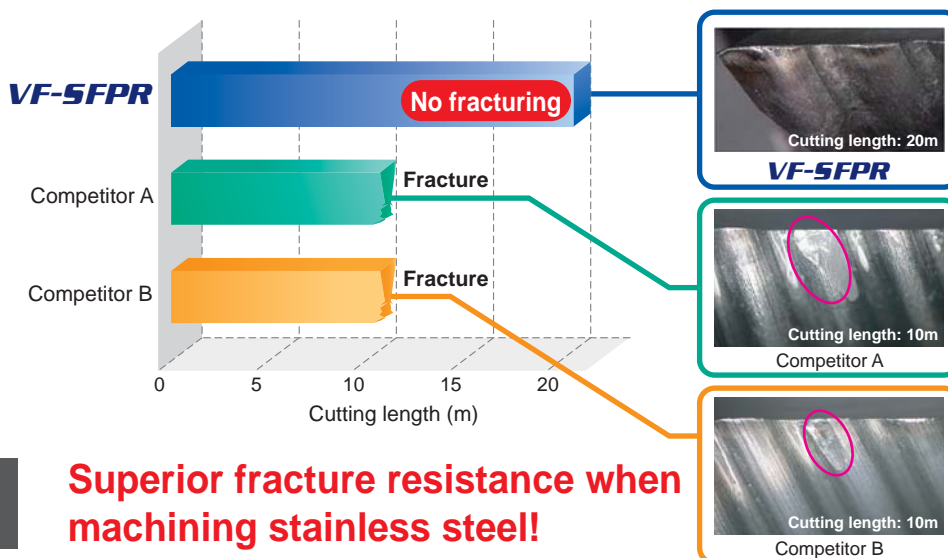


ø5-ø20mm

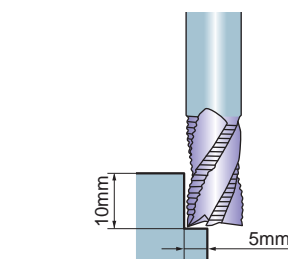
9 different sizes available.

### Cutting Performance

#### Cutting performance comparison (Tool diameter 10mm)



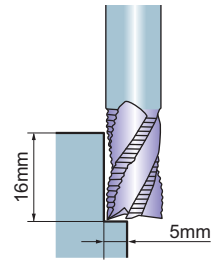
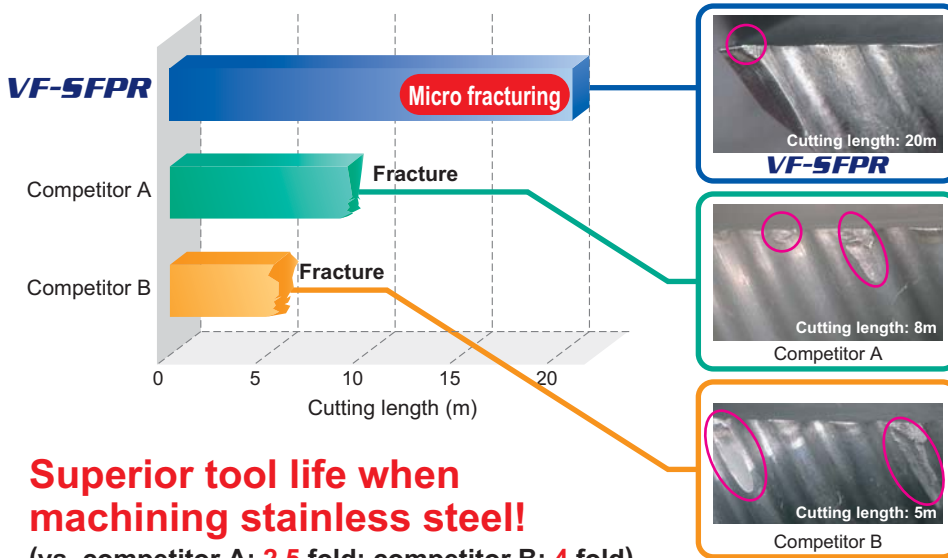
**Superior fracture resistance when machining stainless steel!**



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

# Cutting Performance

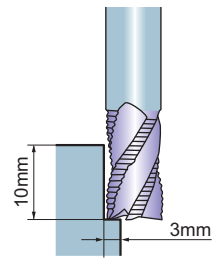
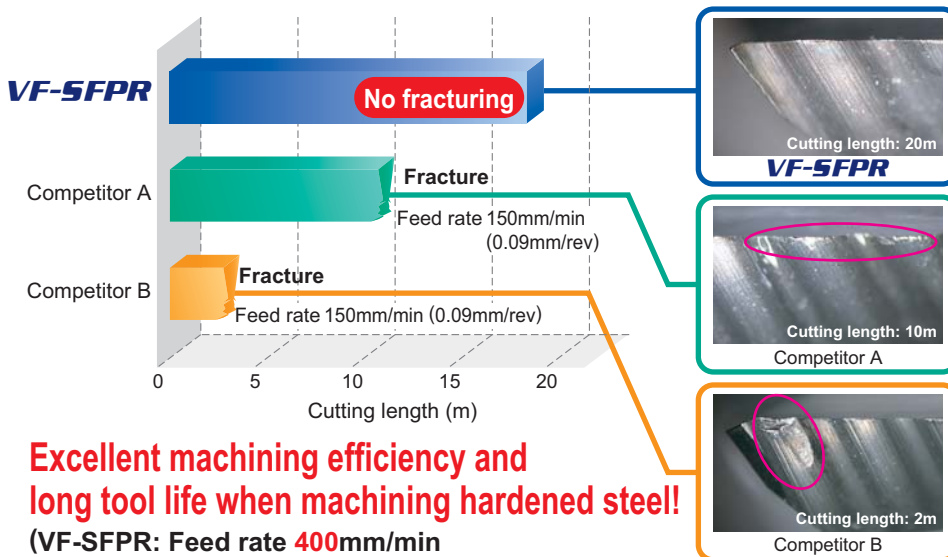
## Cutting performance comparison (Tool diameter 16mm)



End mill	VF-SFPR $\phi$ 16
Work material	JIS SUS304
Revolution	1200min <sup>-1</sup> (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)

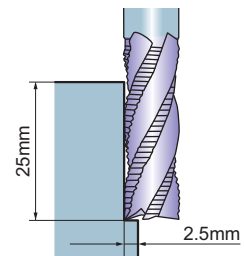
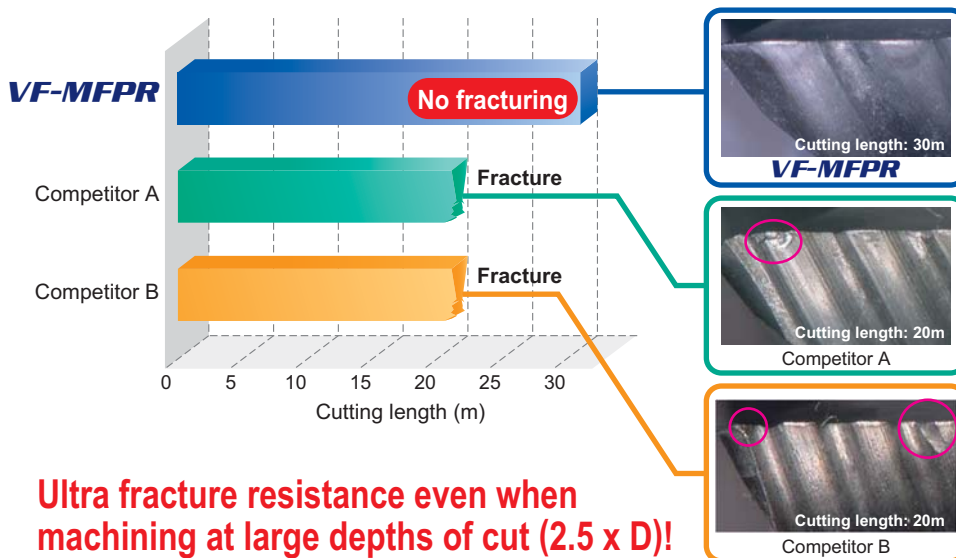
## Cutting performance comparison (Tool diameter 10mm)



End mill	VF-SFPR $\phi$ 10
Work material	JIS SKD61 (52HRC)
Revolution	1600min <sup>-1</sup> (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 $\phi$ 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

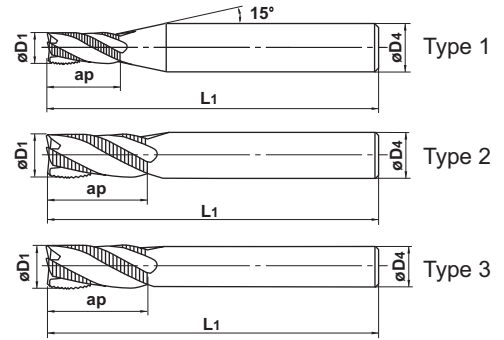
## VF-SFPR

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 <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> )	Feed rate (mm/min)	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)
<b>3</b>	16,000	960	13,000	640	6,400	260	5,300	320	4,200	70	
<b>4</b>	12,000	960	9,500	640	4,800	260	4,000	320	3,200	70	
<b>5</b>	9,500	960	7,600	640	3,800	260	3,200	320	2,500	70	
<b>6</b>	8,000	960	6,400	680	3,200	290	2,700	340	2,100	75	
<b>8</b>	6,000	1,050	4,800	760	2,400	340	2,000	400	1,600	95	
<b>10</b>	4,800	1,050	3,800	760	1,900	340	1,600	400	1,300	105	
<b>12</b>	4,000	960	3,200	700	1,600	320	1,300	400	1,100	110	
<b>16</b>	3,000	840	2,400	620	1,200	300	1,000	360	800	110	
<b>20</b>	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 <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> )	Feed rate (mm/min)	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)
<b>3</b>	13,000	720	11,000	480	4,800	190	3,200	190	2,100	25	
<b>4</b>	9,500	720	8,000	480	3,600	190	2,400	190	1,600	25	
<b>5</b>	7,600	720	6,400	480	3,200	190	1,900	190	1,300	25	
<b>6</b>	6,400	720	5,300	480	2,700	200	1,600	200	1,100	30	
<b>8</b>	4,800	800	4,000	520	2,000	220	1,200	220	800	35	
<b>10</b>	3,800	800	3,200	520	1,600	220	1,000	220	600	35	
<b>12</b>	3,200	750	2,700	520	1,300	210	800	210	500	40	
<b>16</b>	2,400	620	2,000	450	1,000	180	600	180	400	45	
<b>20</b>	1,900	540	1,600	400	800	160	500	160	300	40	
Depth of cut											

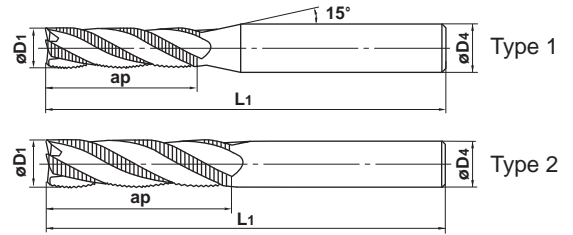
D: Dia.

- 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 <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> )	Feed rate (mm/min)	Revolution (min <sup>-1</sup> )
<b>5</b>	3,800	360	3,200	290	2,500	150	2,500	150	1,900	50
<b>6</b>	3,200	360	2,700	290	2,100	160	2,100	160	1,600	60
<b>8</b>	2,400	450	2,000	360	1,600	160	1,600	160	1,200	70
<b>10</b>	1,900	450	1,600	360	1,300	180	1,300	180	1,000	75
<b>12</b>	1,600	400	1,300	320	1,100	180	1,100	180	800	80
<b>16</b>	1,200	360	1,000	290	800	160	800	160	600	80
<b>20</b>	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.)