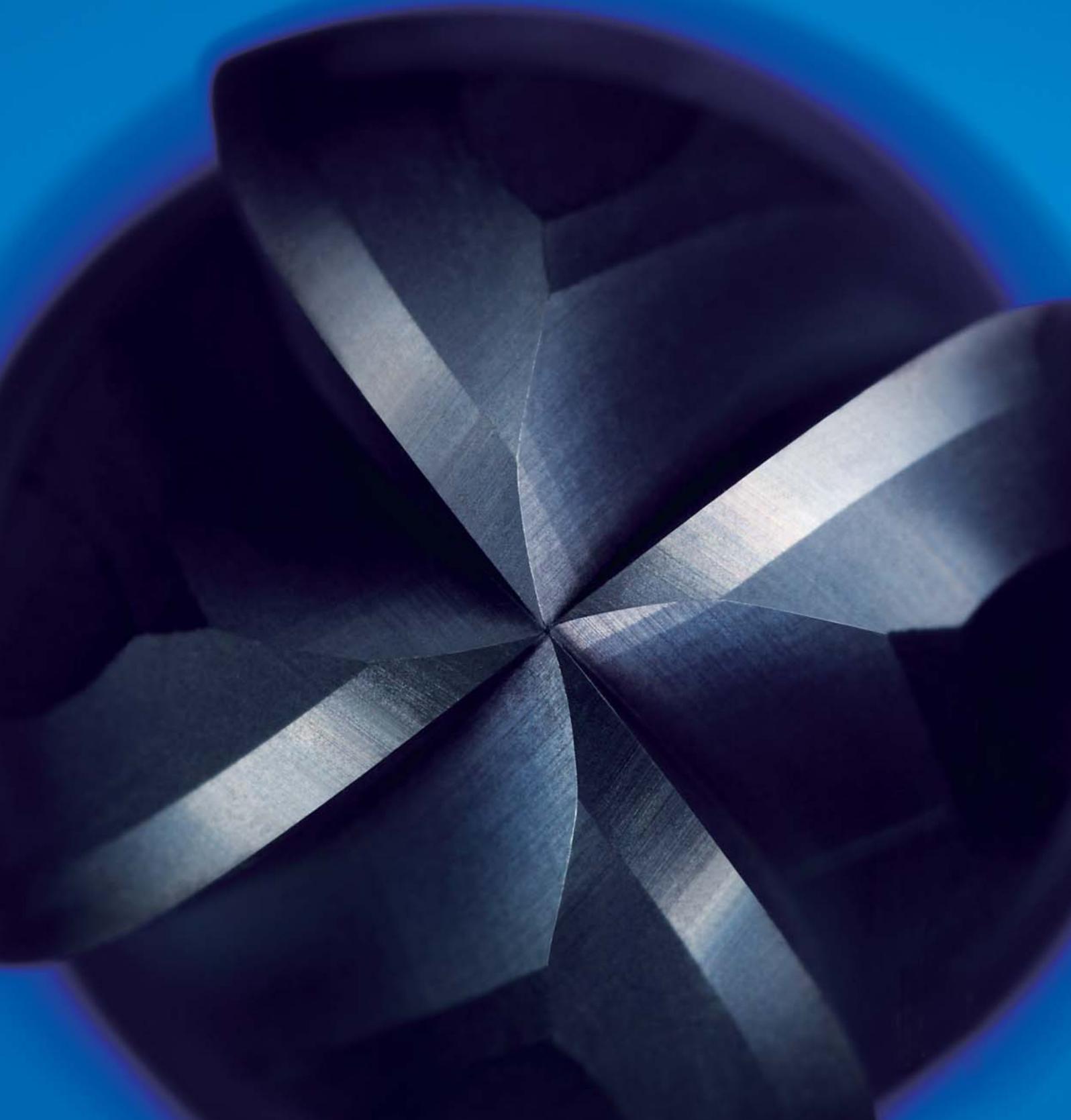


4 flute Impact Miracle ball nose end mill (M)

VF-4MB

Ideal for high efficiency machining of moulds!

Unique 4 flute ball nose geometry offers precision and high efficiency machining!



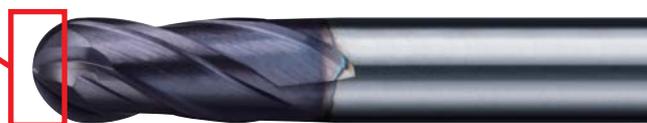
IMPACT MIRACLE end mill series

4 flute Impact Miracle ball nose end mill (M)

VF-4MB

Features

- The unique 4 flute geometry that has a full cutting edge to the centre of the ball nose allows higher efficiency, higher feed machining.



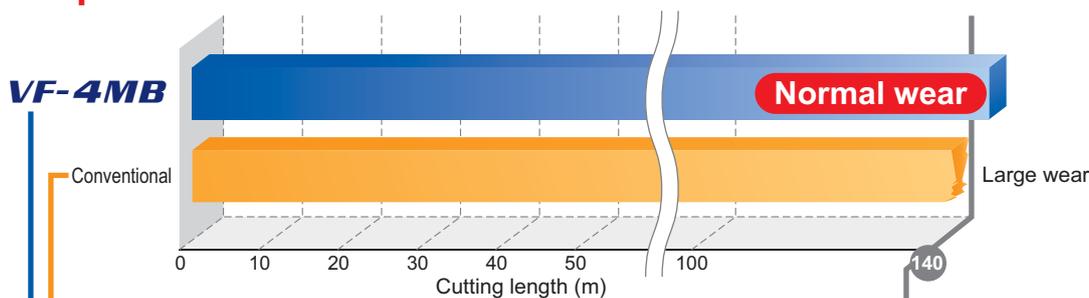
- Impact Miracle coating with superior heat resistance is used, enabling the machining of materials from hardened steels over 60HRC through to pre-hardened and general steels.

	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

Cutting Performance

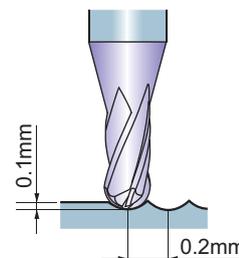
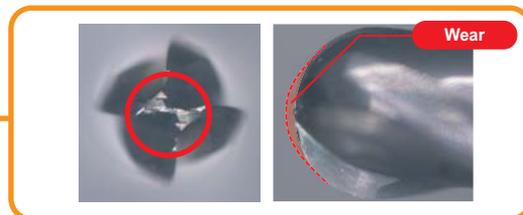
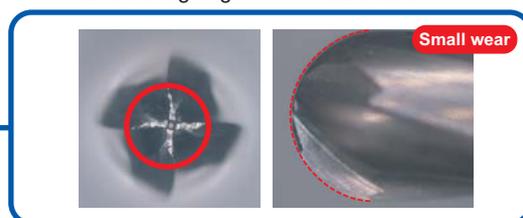
Wear resistance comparison

VF-4MB delivers higher wear resistance and longer tool life in comparison to conventional end mills.



Cutting length: 140m

End cutting edge Rake face

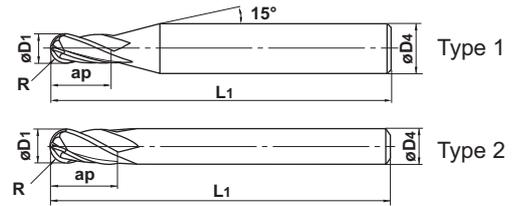


End mill	VF4MBR0100(R1)
Work material	JIS SKD11 (60HRC)
Revolution	28,000min ⁻¹ (176m/min)
Feed rate	2,200mm/min (0.02mm/tooth)
Cutting method	Down cut, Air blow

IMPACT MIRACLE END MILL

VF-4MB

Ball nose, Medium cut length, 4 flute



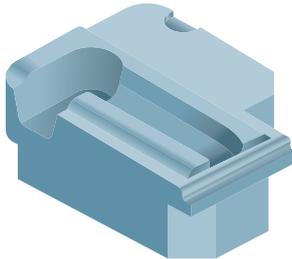
- 4 flute ball nose end mill for high-speed machining of hardened steel.

Unit : mm

Order Number	Radius of ball nose R	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
VF4MBR0050	0.5	1	2.5	50	6	4	●	1
R0100	1	2	6	60	6	4	●	1
R0150	1.5	3	8	70	6	4	●	1
R0200	2	4	8	70	6	4	●	1
R0250	2.5	5	12	80	6	4	●	1
R0300	3	6	12	80	6	4	●	2
R0400	4	8	14	90	8	4	●	2
R0500	5	10	18	100	10	4	●	2
R0600	6	12	22	110	12	4	●	2

- : Inventory maintained.

Application Examples

Tool	Conventional (2 flute, R3)	VF4MBR0300 (4 flute, R3)
Workpiece	JIS SKD11 (62HRC) Work size: 50x80x60 (mm) 	
Cutting Conditions	Revolution (mm ⁻¹)	8,000
	Cutting Speed (m/min)	150
	Radial depth of cut (mm)	0.1
	Axial depth of cut (mm)	0.1
	Feed Rate (mm/min)	1,600
	Feed per Tooth (mm/tooth)	0.100
Machining time	45 min	30 min
Results	<ul style="list-style-type: none"> • In comparison with the conventional 2 flute end mill, higher efficiency (30% machining time reduction) was achieved even when machining hardened steel with lower feeds. • Higher surface finishes were achieved. 	

IMPACT MIRACLE END MILL

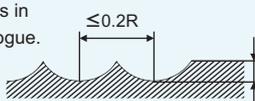
VF-4MB

Ball nose, Medium cut length, 4 flute

Work material	Hardened steel (-55HRC) NAK, JIS SKD11, JIS SKD61					Hardened steel (55-62HRC) JIS SKD11, JIS SUS420					Hardened steel (62-70HRC) JIS SKS, JIS SKH				
	$\alpha \leq 15^\circ$		$\alpha > 15^\circ$		Depth of cut (mm)	$\alpha \leq 15^\circ$		$\alpha > 15^\circ$		Depth of cut (mm)	$\alpha \leq 15^\circ$		$\alpha > 15^\circ$		Depth of cut (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)	Revolution (min ⁻¹)	Feed rate (mm/min)	
R0.5	40,000	8,000	40,000	3,800	0.06	40,000	5,600	40,000	3,100	0.05	40,000	4,700	32,000	1,700	0.03
R1	40,000	9,600	40,000	5,600	0.11	40,000	8,000	28,000	3,100	0.10	24,000	5,000	16,000	1,200	0.06
R1.5	40,000	12,000	32,000	5,600	0.13	32,000	7,700	19,000	2,900	0.12	16,000	4,200	11,000	1,100	0.07
R2	32,000	11,000	24,000	4,700	0.15	24,000	6,200	14,000	2,500	0.13	12,000	3,100	8,000	1,000	0.08
R2.5	25,000	9,000	19,000	3,800	0.20	19,000	5,300	12,000	2,200	0.15	9,600	2,700	6,000	780	0.08
R3	21,000	8,400	15,000	3,400	0.25	16,000	4,800	9,600	2,000	0.20	8,000	2,300	5,000	780	0.09
R4	16,000	6,400	12,000	2,600	0.30	12,000	3,600	7,200	1,600	0.20	6,000	1,900	4,000	620	0.09
R5	13,000	5,200	9,600	2,200	0.50	10,000	3,200	5,800	1,300	0.20	4,800	1,500	3,000	550	0.10
R6	9,000	3,600	7,200	1,700	0.50	7,000	2,200	4,300	940	0.30	3,600	1,100	2,200	400	0.10

Depth of cut

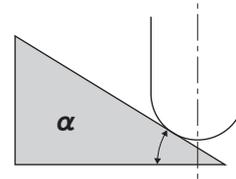
Please select a pick feed based on the required surface finishes in reference to "Pitch Selection of Pick Feed" in the general catalogue.



\leq Please refer to the list above for depth of cut.

R: Radius

- 1) If the rigidity of the machine or the workpiece installation is very low, or chattering and noise are generated, please reduce the revolution and the feed rate proportionately.
- 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
When high machining accuracy is needed, we recommend lowering the feed rate.
- 3) α is the inclination of machining surface.



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.)