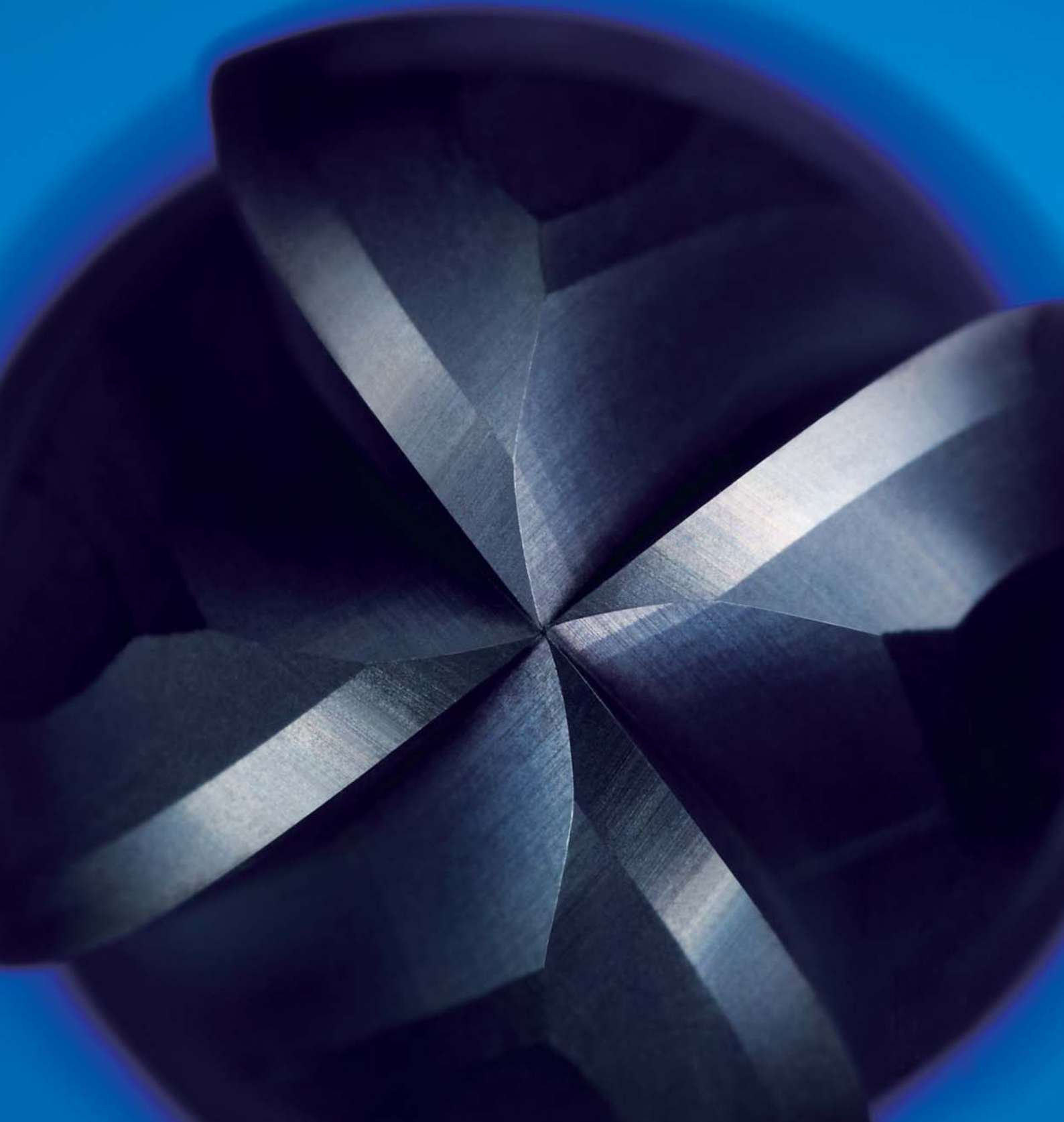


4 flute Impact Miracle ball nose end mill (M)

VF-4MB

Ideal for high efficiency machining of moulds!

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



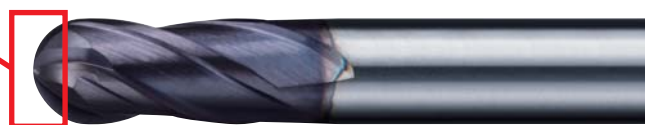
IMPACT MIRACLE end mill series

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.



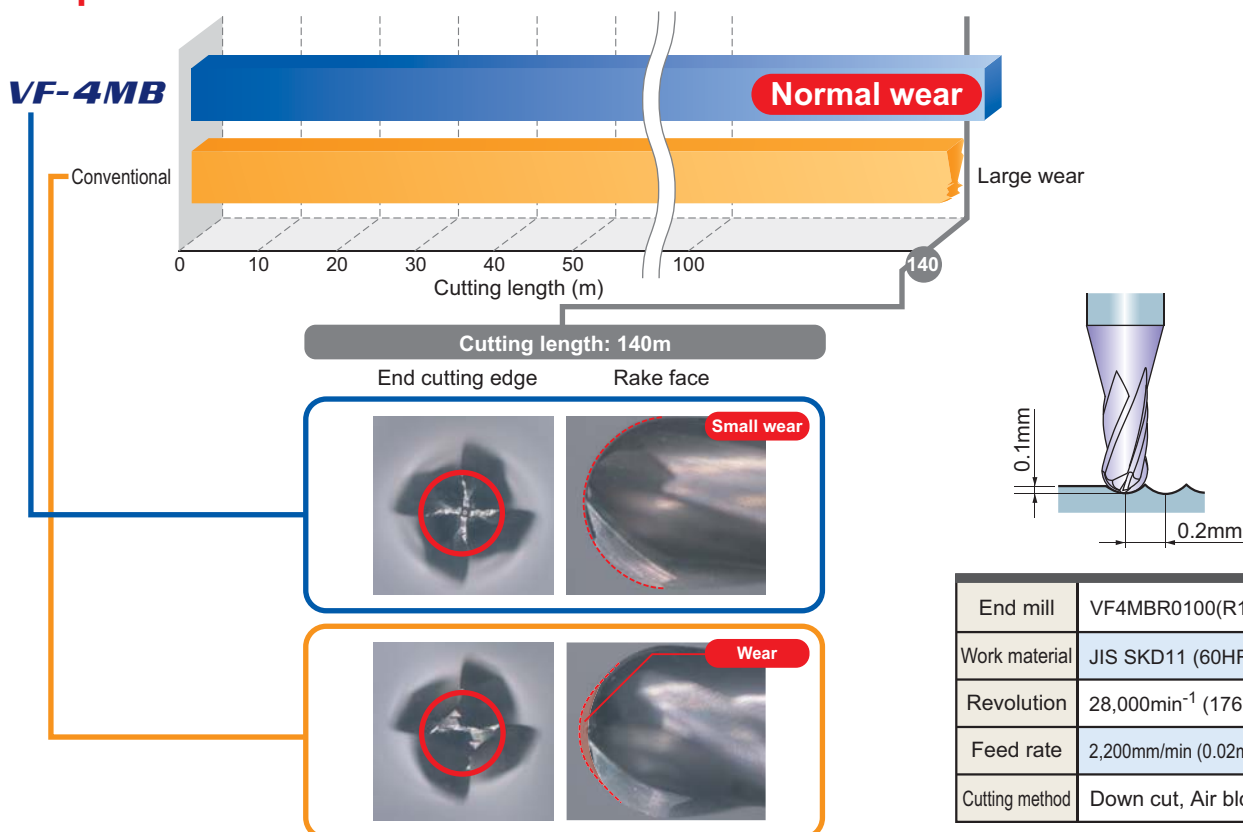
- Impact Miracle coating with superior heat resistance is used, enabling the machining of materials from hardened steels over 60HRC through to pre-hardened and general steels.

| | 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

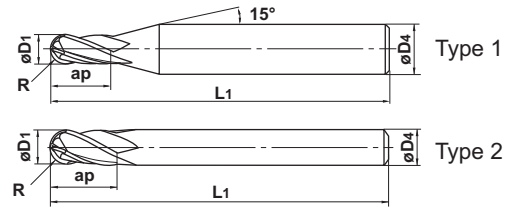
VF-4MB delivers higher wear resistance and longer tool life in comparison to conventional end mills.



IMPACT MIRACLE END MILL

VF-4MB

Ball nose, Medium cut length, 4 flute



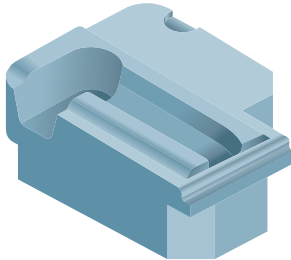
- 4 flute ball nose end mill for high-speed machining of hardened steel.

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

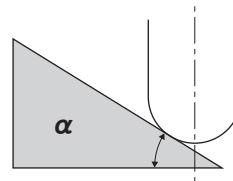
Ball nose, Medium cut length, 4 flute

| 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.

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.)