

3 flute taper neck ball nose end mill for hardened materials

VF-3XB

The latest advantage for deep machining!

Taper neck ball nose end mill
for high efficiency deep milling.



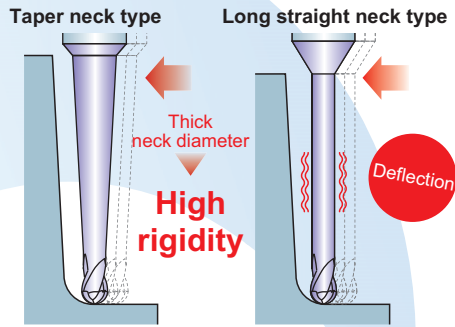
IMPACT MIRACLE End Mill Series

VF-3XB



1 [High rigidity] taper neck type

- Taper neck prevents vibration during deep milling applications.
- High efficiency machining for depths up to and over 20D.
- 89 sizes and lengths in total covering R0.4–R2.5.



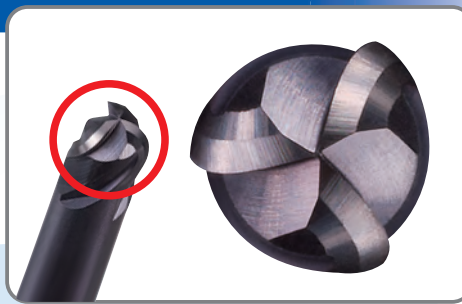
2 [Long tool life] IMPACT MIRACLE coating

- IMPACT MIRACLE coating suitable for materials ranging from general steels and pre-hardened steels, through to high hardened steels over 60 HRC.

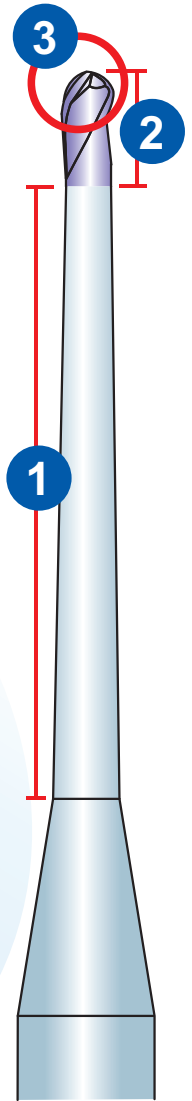
| | IMPACT MIRACLE | (Al,Ti,Si)N | (Al,Ti)N |
|-----------------------|----------------|-------------|----------|
| Hardness | 3700HV | 3200HV | 2800HV |
| Adhesion | 100N | 80N | 80N |
| Oxidation temperature | 1300°C | 1100°C | 840°C |
| Friction coefficient | 0.48 | 0.53 | 0.58 |

3 [High efficiency] 3 flute geometry

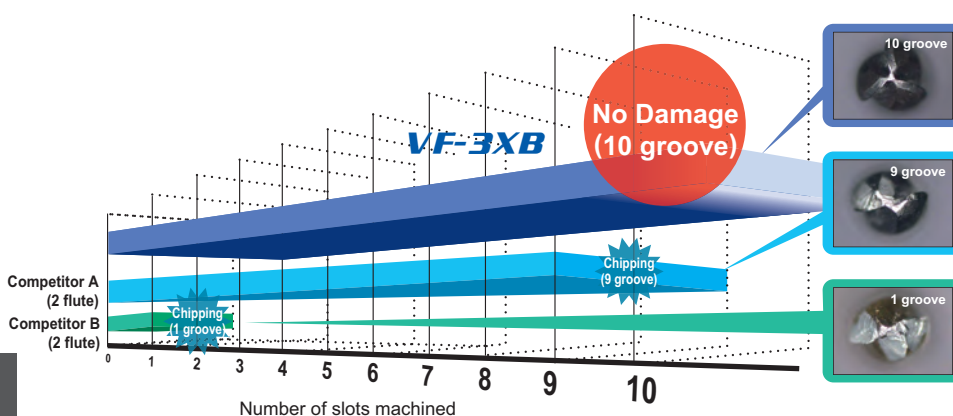
- VF3XB type reduced the cutting load compared to a conventional 2 flute end mill and helped control vibration to achieve higher efficiency!
- Newly developed negative cutting edge shape and 3 flute geometry for high feed machining.



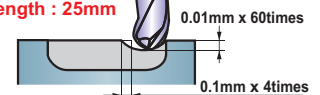
3 flute geometry



Comparison with conventional 2 flute end mill, VF-3XB shows high fracture resistance.

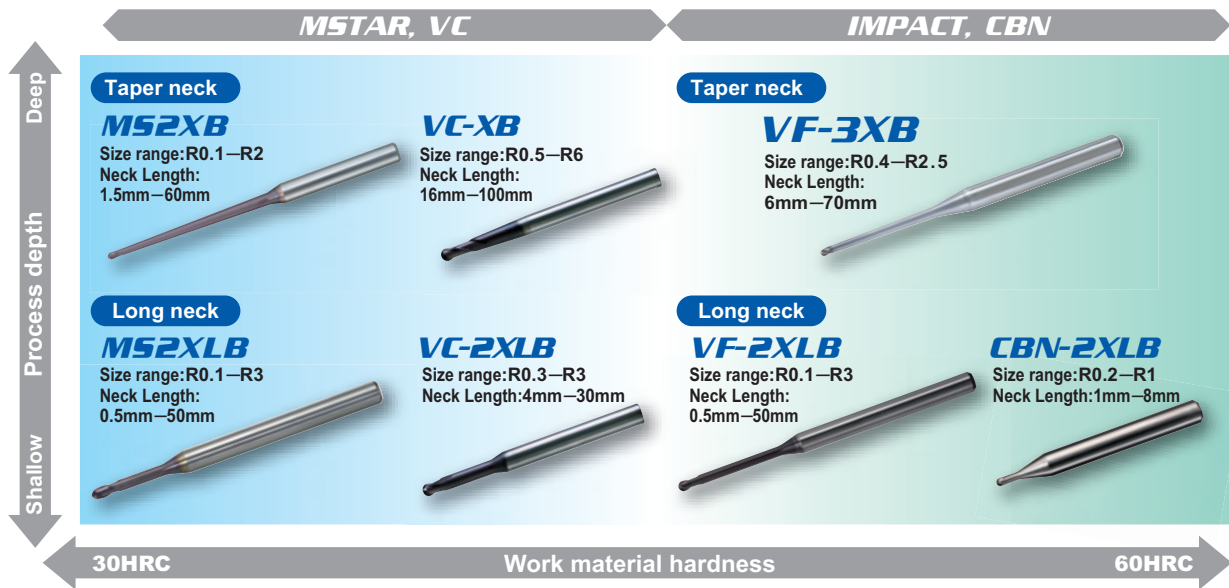


Neck Length : 25mm



| | |
|----------------|-------------------------------------|
| End mill | VF-3XB R0.5 x 1.5° x 25 |
| Work material | SKD61(52HRC) |
| Revolution | 13,000min ⁻¹ (40.8m/min) |
| Feed rate | 1,500mm/min (0.038mm/t) |
| Cutting method | Air blow |

Tool selection chart

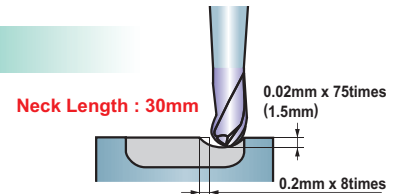
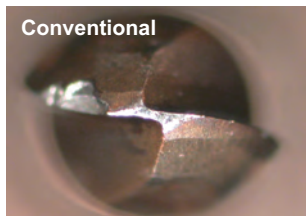


Long neck ball end mill : For all forms of machining including deep walls.
 Taper neck ball end mill : High efficiency machining for depths over 10D.

Hardened steel machining, feed rate increased by a factor of 1.6

Previous feed rate : 1600mm/min

VF3XB : 2600mm/min

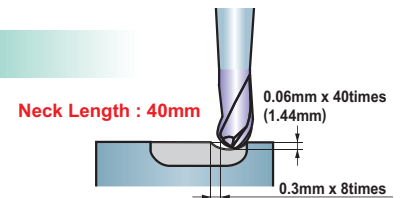
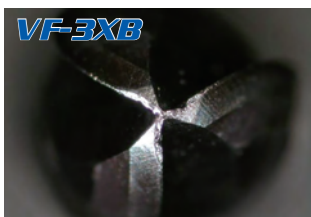


| | |
|----------------|------------------------------------|
| End mill | VF-3XB R1 x 0.9° x 30 |
| Work material | SKD61(52HRC) |
| Revolution | 16,000min ⁻¹ (100m/min) |
| Feed rate | 2,600mm/min (0.054mm/t) |
| Cutting method | Coolant mist |

Feed rate increased by 50%

Previous feed rate : 2500mm/min

VF3XB : 3400mm/min

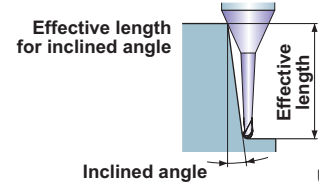
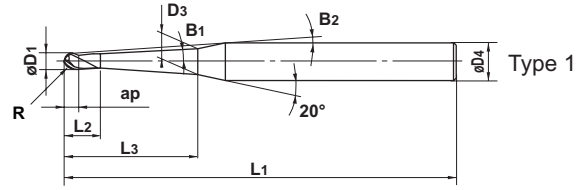


| | |
|----------------|------------------------------------|
| End mill | VF-3XB 1.5R x 0.9° x 40 |
| Work material | SKD61(52HRC) |
| Revolution | 14,000min ⁻¹ (131m/min) |
| Feed rate | 3,400mm/min (0.08mm/t) |
| Cutting method | Coolant mist |

IMPACT MIRACLE END MILL

VF-3XB

Ball nose end mill, 3 flute, Taper neck, For hardened materials



● 3 flute ball end mill, high rigidity taper neck type.

Inclined angle Unit : mm

| Order Number | Radius of Ball Nose | Dia. | Taper Angle One Side | Length of Cut | Neck Length | Length of Straight Neck | Cutting Edge to Shank Angle | Neck Dia. | Overall Length | Shank Dia. | No. of Flutes | Stock | Type | Effective length for inclined angle | | | |
|---------------------|---------------------|------|----------------------|---------------|-------------|-------------------------|-----------------------------|-----------|----------------|------------|---------------|-------|------|-------------------------------------|------|------|-----------------|
| | R | D1 | B1 | ap | L3 | L2 | B2 | D3 | L1 | D4 | N | | | 30° | 1° | 2° | 3° |
| VF3XBR0040T0024L006 | 0.4 | 0.8 | 0.4 | 0.5 | 6 | 1.5 | 8.9° | 0.82 | 60 | 4 | 3 | ● | 1 | 6.3 | 6.6 | 6.9 | 7.3 |
| R0040T0024L008 | 0.4 | 0.8 | 0.4 | 0.5 | 8 | 1.5 | 7.5° | 0.85 | 60 | 4 | 3 | ● | 1 | 8.4 | 8.6 | 9.1 | 9.5 |
| R0040T0024L012 | 0.4 | 0.8 | 0.4 | 0.5 | 12 | 1.5 | 5.7° | 0.91 | 60 | 4 | 3 | ● | 1 | 12.4 | 12.7 | 13.4 | 14.1 |
| R0040T0054L008 | 0.4 | 0.8 | 0.9 | 0.5 | 8 | 1.5 | 7.6° | 0.96 | 60 | 4 | 3 | ● | 1 | — | 8.4 | 8.9 | 9.3 |
| R0040T0054L012 | 0.4 | 0.8 | 0.9 | 0.5 | 12 | 1.5 | 5.8° | 1.09 | 60 | 4 | 3 | ● | 1 | — | 12.4 | 13.1 | 13.8 |
| R0040T0054L016 | 0.4 | 0.8 | 0.9 | 0.5 | 16 | 1.5 | 4.7° | 1.22 | 60 | 4 | 3 | ● | 1 | — | 16.5 | 17.3 | 18.3 |
| R0050T0024L008 | 0.5 | 1 | 0.4 | 0.8 | 8 | 2.3 | 9.6° | 1.02 | 60 | 6 | 3 | ● | 1 | 8.5 | 8.8 | 9.3 | 9.8 |
| R0050T0024L010 | 0.5 | 1 | 0.4 | 0.8 | 10 | 2.3 | 8.5° | 1.05 | 60 | 6 | 3 | ● | 1 | 10.5 | 10.9 | 11.4 | 12.1 |
| R0050T0024L012 | 0.5 | 1 | 0.4 | 0.8 | 12 | 2.3 | 7.6° | 1.08 | 60 | 6 | 3 | ● | 1 | 12.6 | 13.0 | 13.6 | 14.4 |
| R0050T0024L016 | 0.5 | 1 | 0.4 | 0.8 | 16 | 2.3 | 6.3° | 1.13 | 70 | 6 | 3 | ● | 1 | 16.6 | 17.1 | 18.0 | 18.9 |
| R0050T0024L020 | 0.5 | 1 | 0.4 | 0.8 | 20 | 2.3 | 5.4° | 1.19 | 70 | 6 | 3 | ● | 1 | 20.6 | 21.2 | 22.3 | 23.5 |
| R0050T0024L025 | 0.5 | 1 | 0.4 | 0.8 | 25 | 2.3 | 4.6° | 1.26 | 70 | 6 | 3 | ● | 1 | 25.7 | 26.3 | 27.7 | 29.3 |
| R0050T0024L030 | 0.5 | 1 | 0.4 | 0.8 | 30 | 2.3 | 4.0° | 1.33 | 80 | 6 | 3 | ● | 1 | 30.7 | 31.5 | 33.1 | 35.0 |
| R0050T0024L035 | 0.5 | 1 | 0.4 | 0.8 | 35 | 2.3 | 3.5° | 1.40 | 80 | 6 | 3 | ● | 1 | 35.7 | 36.6 | 38.6 | 40.7 |
| R0050T0054L008 | 0.5 | 1 | 0.9 | 0.8 | 8 | 2.3 | 9.7° | 1.12 | 60 | 6 | 3 | ● | 1 | — | 8.6 | 9.1 | 9.6 |
| R0050T0054L012 | 0.5 | 1 | 0.9 | 0.8 | 12 | 2.3 | 7.7° | 1.24 | 60 | 6 | 3 | ● | 1 | — | 12.6 | 13.3 | 14.1 |
| R0050T0054L016 | 0.5 | 1 | 0.9 | 0.8 | 16 | 2.3 | 6.4° | 1.37 | 70 | 6 | 3 | ● | 1 | — | 16.7 | 17.6 | 18.5 |
| R0050T0054L020 | 0.5 | 1 | 0.9 | 0.8 | 20 | 2.3 | 5.5° | 1.50 | 70 | 6 | 3 | ● | 1 | — | 20.7 | 21.8 | 23.0 |
| R0050T0054L025 | 0.5 | 1 | 0.9 | 0.8 | 25 | 2.3 | 4.7° | 1.65 | 70 | 6 | 3 | ● | 1 | — | 25.7 | 27.1 | 28.6 |
| R0050T0054L030 | 0.5 | 1 | 0.9 | 0.8 | 30 | 2.3 | 4.0° | 1.81 | 80 | 6 | 3 | ● | 1 | — | 30.8 | 32.4 | 34.2 |
| R0050T0054L035 | 0.5 | 1 | 0.9 | 0.8 | 35 | 2.3 | 3.6° | 1.97 | 80 | 6 | 3 | ● | 1 | — | 35.8 | 37.7 | 39.8 |
| R0050T0054L040 | 0.5 | 1 | 0.9 | 0.8 | 40 | 2.3 | 3.2° | 2.12 | 80 | 6 | 3 | ● | 1 | — | 40.8 | 43.0 | 45.4 |
| R0050T0054L050 | 0.5 | 1 | 0.9 | 0.8 | 50 | 2.3 | 2.7° | 2.44 | 110 | 6 | 3 | ● | 1 | — | 50.9 | 53.6 | No interference |
| R0050T0054L060 | 0.5 | 1 | 0.9 | 0.8 | 60 | 2.3 | 2.3° | 2.75 | 110 | 6 | 3 | ● | 1 | — | 60.9 | 64.1 | No interference |
| R0050T0054L070 | 0.5 | 1 | 0.9 | 0.8 | 70 | 2.3 | 2.0° | 3.07 | 110 | 6 | 3 | ● | 1 | — | 71.0 | 74.7 | No interference |
| R0050T0130L012 | 0.5 | 1 | 1.5 | 0.8 | 12 | 2.3 | 7.9° | 1.45 | 60 | 6 | 3 | ● | 1 | — | — | 13.0 | 13.7 |
| R0050T0130L016 | 0.5 | 1 | 1.5 | 0.8 | 16 | 2.3 | 6.5° | 1.66 | 70 | 6 | 3 | ● | 1 | — | — | 17.1 | 18.0 |
| R0050T0130L020 | 0.5 | 1 | 1.5 | 0.8 | 20 | 2.3 | 5.6° | 1.87 | 70 | 6 | 3 | ● | 1 | — | — | 21.2 | 22.4 |
| R0050T0130L025 | 0.5 | 1 | 1.5 | 0.8 | 25 | 2.3 | 4.8° | 2.13 | 70 | 6 | 3 | ● | 1 | — | — | 26.3 | 27.8 |
| R0050T0130L030 | 0.5 | 1 | 1.5 | 0.8 | 30 | 2.3 | 4.1° | 2.39 | 80 | 6 | 3 | ● | 1 | — | — | 31.5 | 33.2 |
| R0050T0130L035 | 0.5 | 1 | 1.5 | 0.8 | 35 | 2.3 | 3.7° | 2.65 | 80 | 6 | 3 | ● | 1 | — | — | 36.6 | 38.6 |
| R0075T0024L010 | 0.75 | 1.5 | 0.4 | 1.3 | 10 | 2.8 | 8.1° | 1.54 | 60 | 6 | 3 | ● | 1 | 10.6 | 10.9 | 11.4 | 12.0 |
| R0075T0024L015 | 0.75 | 1.5 | 0.4 | 1.3 | 15 | 2.8 | 6.2° | 1.61 | 60 | 6 | 3 | ● | 1 | 15.6 | 16.0 | 16.9 | 17.8 |
| R0075T0024L020 | 0.75 | 1.5 | 0.4 | 1.3 | 20 | 2.8 | 5.0° | 1.68 | 70 | 6 | 3 | ● | 1 | 20.6 | 21.2 | 22.3 | 23.5 |
| R0075T0024L030 | 0.75 | 1.5 | 0.4 | 1.3 | 30 | 2.8 | 3.7° | 1.82 | 80 | 6 | 3 | ● | 1 | 30.7 | 31.5 | 33.1 | 35.0 |
| R0075T0054L015 | 0.75 | 1.5 | 0.9 | 1.3 | 15 | 2.8 | 6.3° | 1.82 | 60 | 6 | 3 | ● | 1 | — | 15.7 | 16.5 | 17.4 |
| R0075T0054L020 | 0.75 | 1.5 | 0.9 | 1.3 | 20 | 2.8 | 5.1° | 1.98 | 70 | 6 | 3 | ● | 1 | — | 20.7 | 21.8 | 23.0 |
| R0075T0054L030 | 0.75 | 1.5 | 0.9 | 1.3 | 30 | 2.8 | 3.7° | 2.29 | 80 | 6 | 3 | ● | 1 | — | 30.8 | 32.4 | 34.2 |

| Order Number | Radius of Ball Nose | Dia. | Taper Angle One Side | Length of Cut | Neck Length | Length of Straight Neck | Cutting Edge to Shank Angle | Neck Dia. | Overall Length | Shank Dia. | No. of Flutes | Stock | Type | Effective length for inclined angle | | | |
|---------------------|---------------------|------|----------------------|---------------|-------------|-------------------------|-----------------------------|-----------|----------------|------------|---------------|-------|------|-------------------------------------|------|-----------------|-----------------|
| | R | D1 | B1 | ap | L3 | L2 | B2 | D3 | L1 | D4 | N | | | 30° | 1° | 2° | 3° |
| VF3XBR0075T0054L040 | 0.75 | 1.5 | 0.9 | 1.3 | 40 | 2.8 | 3.0° | 2.61 | 80 | 6 | 3 | ● | 1 | — | 40.8 | 43.0 | 45.3 |
| R0075T0130L015 | 0.75 | 1.5 | 1.5 | 1.3 | 15 | 2.8 | 6.4° | 2.08 | 60 | 6 | 3 | ● | 1 | — | — | 16.1 | 17.0 |
| R0075T0130L020 | 0.75 | 1.5 | 1.5 | 1.3 | 20 | 2.8 | 5.2° | 2.34 | 70 | 6 | 3 | ● | 1 | — | — | 21.2 | 22.4 |
| R0075T0130L030 | 0.75 | 1.5 | 1.5 | 1.3 | 30 | 2.8 | 3.8° | 2.86 | 80 | 6 | 3 | ● | 1 | — | — | 31.5 | 33.2 |
| R0100T0024L016 | 1 | 2 | 0.4 | 1.6 | 16 | 3.6 | 5.5° | 2.07 | 70 | 6 | 3 | ● | 1 | 16.7 | 17.1 | 18.0 | 19.0 |
| R0100T0024L020 | 1 | 2 | 0.4 | 1.6 | 20 | 3.6 | 4.6° | 2.13 | 70 | 6 | 3 | ● | 1 | 20.7 | 21.3 | 22.3 | 23.5 |
| R0100T0024L025 | 1 | 2 | 0.4 | 1.6 | 25 | 3.6 | 3.9° | 2.20 | 70 | 6 | 3 | ● | 1 | 25.8 | 26.4 | 27.8 | 29.3 |
| R0100T0024L030 | 1 | 2 | 0.4 | 1.6 | 30 | 3.6 | 3.4° | 2.27 | 80 | 6 | 3 | ● | 1 | 30.8 | 31.6 | 33.2 | 35.0 |
| R0100T0024L035 | 1 | 2 | 0.4 | 1.6 | 35 | 3.6 | 2.9° | 2.34 | 80 | 6 | 3 | ● | 1 | 35.8 | 36.7 | 38.6 | No interference |
| R0100T0024L040 | 1 | 2 | 0.4 | 1.6 | 40 | 3.6 | 2.6° | 2.41 | 80 | 6 | 3 | ● | 1 | 40.8 | 41.9 | 44.0 | No interference |
| R0100T0054L020 | 1 | 2 | 0.9 | 1.6 | 20 | 3.6 | 4.7° | 2.42 | 70 | 6 | 3 | ● | 1 | — | 20.8 | 21.9 | 23.0 |
| R0100T0054L025 | 1 | 2 | 0.9 | 1.6 | 25 | 3.6 | 4.0° | 2.57 | 70 | 6 | 3 | ● | 1 | — | 25.8 | 27.2 | 28.6 |
| R0100T0054L030 | 1 | 2 | 0.9 | 1.6 | 30 | 3.6 | 3.4° | 2.73 | 80 | 6 | 3 | ● | 1 | — | 30.9 | 32.5 | 34.2 |
| R0100T0054L035 | 1 | 2 | 0.9 | 1.6 | 35 | 3.6 | 3.0° | 2.89 | 80 | 6 | 3 | ● | 1 | — | 35.9 | 37.7 | 39.8 |
| R0100T0054L040 | 1 | 2 | 0.9 | 1.6 | 40 | 3.6 | 2.7° | 3.04 | 80 | 6 | 3 | ● | 1 | — | 40.9 | 43.0 | No interference |
| R0100T0054L050 | 1 | 2 | 0.9 | 1.6 | 50 | 3.6 | 2.2° | 3.36 | 110 | 6 | 3 | ● | 1 | — | 51.0 | 53.6 | No interference |
| R0100T0054L060 | 1 | 2 | 0.9 | 1.6 | 60 | 3.6 | 1.9° | 3.67 | 110 | 6 | 3 | ● | 1 | — | 61.0 | No interference | No interference |
| R0100T0054L070 | 1 | 2 | 0.9 | 1.6 | 70 | 3.6 | 1.6° | 3.99 | 110 | 6 | 3 | ● | 1 | — | 71.1 | No interference | No interference |
| R0100T0130L025 | 1 | 2 | 1.5 | 1.6 | 25 | 3.6 | 4.1° | 3.02 | 70 | 6 | 3 | ● | 1 | — | — | 26.4 | 27.9 |
| R0100T0130L030 | 1 | 2 | 1.5 | 1.6 | 30 | 3.6 | 3.5° | 3.28 | 80 | 6 | 3 | ● | 1 | — | — | 31.6 | 33.3 |
| R0100T0130L035 | 1 | 2 | 1.5 | 1.6 | 35 | 3.6 | 3.1° | 3.54 | 80 | 6 | 3 | ● | 1 | — | — | 36.7 | 38.7 |
| R0100T0130L040 | 1 | 2 | 1.5 | 1.6 | 40 | 3.6 | 2.7° | 3.81 | 80 | 6 | 3 | ● | 1 | — | — | 41.8 | No interference |
| R0125T0054L020 | 1.25 | 2.5 | 0.9 | 2 | 20 | 4.5 | 4.3° | 2.89 | 60 | 6 | 3 | ● | 1 | — | 20.8 | 21.9 | 23.1 |
| R0125T0054L030 | 1.25 | 2.5 | 0.9 | 2 | 30 | 4.5 | 3.1° | 3.20 | 80 | 6 | 3 | ● | 1 | — | 30.9 | 32.5 | 34.2 |
| R0125T0054L040 | 1.25 | 2.5 | 0.9 | 2 | 40 | 4.5 | 2.4° | 3.52 | 80 | 6 | 3 | ● | 1 | — | 40.9 | 43.1 | No interference |
| R0125T0130L020 | 1.25 | 2.5 | 1.5 | 2 | 20 | 4.5 | 4.4° | 3.21 | 60 | 6 | 3 | ● | 1 | — | — | 21.4 | 22.5 |
| R0125T0130L030 | 1.25 | 2.5 | 1.5 | 2 | 30 | 4.5 | 3.1° | 3.74 | 80 | 6 | 3 | ● | 1 | — | — | 31.6 | 33.3 |
| R0125T0130L040 | 1.25 | 2.5 | 1.5 | 2 | 40 | 4.5 | 2.5° | 4.26 | 80 | 6 | 3 | ● | 1 | — | — | 41.9 | No interference |
| R0150T0024L020 | 1.5 | 3 | 0.4 | 2 | 20 | 5 | 3.8° | 3.11 | 60 | 6 | 3 | ● | 1 | 20.7 | 21.3 | 22.3 | 23.5 |
| R0150T0024L025 | 1.5 | 3 | 0.4 | 2 | 25 | 5 | 3.1° | 3.18 | 80 | 6 | 3 | ● | 1 | 25.8 | 26.4 | 27.7 | 29.2 |
| R0150T0024L030 | 1.5 | 3 | 0.4 | 2 | 30 | 5 | 2.7° | 3.25 | 80 | 6 | 3 | ● | 1 | 30.8 | 31.6 | 33.2 | No interference |
| R0150T0024L040 | 1.5 | 3 | 0.4 | 2 | 40 | 5 | 2.1° | 3.39 | 80 | 6 | 3 | ● | 1 | 40.9 | 41.9 | 44.0 | No interference |
| R0150T0024L050 | 1.5 | 3 | 0.4 | 2 | 50 | 5 | 1.7° | 3.53 | 100 | 6 | 3 | ● | 1 | 50.9 | 52.2 | No interference | No interference |
| R0150T0054L020 | 1.5 | 3 | 0.9 | 2 | 20 | 5 | 3.8° | 3.37 | 60 | 6 | 3 | ● | 1 | — | 20.9 | 21.9 | 23.0 |
| R0150T0054L030 | 1.5 | 3 | 0.9 | 2 | 30 | 5 | 2.7° | 3.69 | 80 | 6 | 3 | ● | 1 | — | 30.9 | 32.5 | No interference |
| R0150T0054L040 | 1.5 | 3 | 0.9 | 2 | 40 | 5 | 2.1° | 4.00 | 80 | 6 | 3 | ● | 1 | — | 41.0 | 43.1 | No interference |
| R0150T0054L050 | 1.5 | 3 | 0.9 | 2 | 50 | 5 | 1.7° | 4.31 | 100 | 6 | 3 | ● | 1 | — | 51.0 | No interference | No interference |
| R0150T0054L060 | 1.5 | 3 | 0.9 | 2 | 60 | 5 | 2.3° | 4.63 | 110 | 8 | 3 | ● | 1 | — | 61.1 | 64.2 | No interference |
| R0150T0054L070 | 1.5 | 3 | 0.9 | 2 | 70 | 5 | 2.0° | 4.94 | 120 | 8 | 3 | ● | 1 | — | 71.1 | 74.8 | No interference |
| R0150T0130L040 | 1.5 | 3 | 1.5 | 2 | 40 | 5 | 2.2° | 4.73 | 80 | 6 | 3 | ● | 1 | — | — | 41.9 | No interference |
| R0150T0130L050 | 1.5 | 3 | 1.5 | 2 | 50 | 5 | 2.8° | 5.26 | 110 | 8 | 3 | ● | 1 | — | — | 52.2 | No interference |
| R0150T0130L060 | 1.5 | 3 | 1.5 | 2 | 60 | 5 | 2.4° | 5.78 | 110 | 8 | 3 | ● | 1 | — | — | 62.4 | No interference |
| R0150T0130L070 | 1.5 | 3 | 1.5 | 2 | 70 | 5 | 2.1° | 6.30 | 120 | 8 | 3 | ● | 1 | — | — | 72.7 | No interference |
| R0200T0054L030 | 2 | 4 | 0.9 | 3 | 30 | 6 | 3.5° | 4.65 | 90 | 8 | 3 | ● | 1 | — | 30.9 | 32.5 | 34.2 |
| R0200T0054L040 | 2 | 4 | 0.9 | 3 | 40 | 6 | 2.7° | 4.97 | 90 | 8 | 3 | ● | 1 | — | 41.0 | 43.0 | No interference |
| R0200T0054L050 | 2 | 4 | 0.9 | 3 | 50 | 6 | 2.2° | 5.28 | 110 | 8 | 3 | ● | 1 | — | 51.0 | 53.6 | No interference |
| R0200T0054L060 | 2 | 4 | 0.9 | 3 | 60 | 6 | 1.9° | 5.60 | 110 | 8 | 3 | ● | 1 | — | 61.1 | No interference | No interference |
| R0250T0054L035 | 2.5 | 5 | 0.9 | 3.5 | 35 | 6.5 | 2.4° | 5.80 | 90 | 8 | 3 | ● | 1 | — | 35.9 | 37.7 | No interference |
| R0250T0054L040 | 2.5 | 5 | 0.9 | 3.5 | 40 | 6.5 | 2.2° | 5.95 | 90 | 8 | 3 | ● | 1 | — | 41.0 | 43.0 | No interference |
| R0250T0054L050 | 2.5 | 5 | 0.9 | 3.5 | 50 | 6.5 | 1.8° | 6.27 | 110 | 8 | 3 | ● | 1 | — | 51.0 | No interference | No interference |
| R0250T0054L060 | 2.5 | 5 | 0.9 | 3.5 | 60 | 6.5 | 1.5° | 6.58 | 110 | 8 | 3 | ● | 1 | — | 61.1 | No interference | No interference |

IMPACT MIRACLE END MILL

VF-3XB

Ball nose end mill, 3 flute, Taper neck, For hardened materials

| Work material | | | Carbon steel, Alloy steel (-30HRC) AISI 1055 | | | Alloy steel, Pre-hardened steel (30-45HRC) NAK | | | Hardened steel (45-55HRC) AISI H13, STAVAX | | | Hardened steel (55-62HRC) AISI D2 | | |
|---------------|-------------------------|---------------------|--|-----------------------|----------------------|--|-----------------------|----------------------|--|-----------------------|----------------------|---|-----------------------|----------------------|
| R (mm) | Taper angle one side | Neck length (mm) | Revolution (min ⁻¹) | Feed rate (mm/min) | Depth of cut (mm) | Revolution (min ⁻¹) | Feed rate (mm/min) | Depth of cut (mm) | Revolution (min ⁻¹) | Feed rate (mm/min) | Depth of cut (mm) | Revolution (min ⁻¹) | Feed rate (mm/min) | Depth of cut (mm) |
| R0.4 | 0.4° | 6 | 34,000 | 2,700 | 0.03 | 31,000 | 2,200 | 0.025 | 24,000 | 1,700 | 0.02 | 19,000 | 1,400 | 0.015 |
| | | 8 | 31,000 | 2,100 | 0.02 | 29,000 | 1,700 | 0.02 | 22,000 | 1,300 | 0.015 | 18,000 | 1,000 | 0.01 |
| | | 12 | 28,000 | 2,000 | 0.015 | 26,000 | 1,600 | 0.01 | 20,000 | 1,200 | 0.01 | 16,000 | 960 | 0.007 |
| | 0.9° | 8 | 31,000 | 2,200 | 0.02 | 29,000 | 1,800 | 0.02 | 22,000 | 1,400 | 0.015 | 18,000 | 1,100 | 0.01 |
| | | 12 | 28,000 | 2,100 | 0.015 | 26,000 | 1,700 | 0.01 | 20,000 | 1,300 | 0.01 | 16,000 | 1,000 | 0.007 |
| | | 16 | 25,000 | 1,100 | 0.01 | 23,000 | 910 | 0.01 | 18,000 | 700 | 0.008 | 14,000 | 560 | 0.006 |
| R0.5 | 0.4° | 8 | 27,000 | 2,700 | 0.04 | 25,000 | 2,200 | 0.04 | 19,000 | 1,700 | 0.03 | 15,000 | 1,400 | 0.02 |
| | | 10 | 24,000 | 2,200 | 0.03 | 22,000 | 1,800 | 0.025 | 17,000 | 1,400 | 0.02 | 14,000 | 1,100 | 0.015 |
| | | 12 | 24,000 | 2,200 | 0.03 | 22,000 | 1,800 | 0.025 | 17,000 | 1,400 | 0.02 | 14,000 | 1,100 | 0.015 |
| | | 16 | 22,000 | 2,100 | 0.03 | 21,000 | 1,700 | 0.025 | 16,000 | 1,300 | 0.02 | 13,000 | 1,000 | 0.015 |
| | | 20 | 20,000 | 1,400 | 0.015 | 18,000 | 1,200 | 0.01 | 14,000 | 900 | 0.01 | 11,000 | 720 | 0.007 |
| | | 25 | 18,000 | 1,300 | 0.015 | 17,000 | 1,000 | 0.01 | 13,000 | 800 | 0.009 | 10,000 | 640 | 0.006 |
| | | 30 | 15,000 | 960 | 0.01 | 14,000 | 780 | 0.01 | 11,000 | 600 | 0.008 | 8,800 | 480 | 0.006 |
| | | 35 | 14,000 | 800 | 0.008 | 13,000 | 650 | 0.007 | 10,000 | 500 | 0.006 | 8,000 | 400 | 0.004 |
| | 0.9° | 8 | 27,000 | 2,900 | 0.04 | 25,000 | 2,300 | 0.04 | 19,000 | 1,800 | 0.03 | 15,000 | 1,400 | 0.02 |
| | | 12 | 24,000 | 2,400 | 0.03 | 22,000 | 2,000 | 0.025 | 17,000 | 1,500 | 0.02 | 14,000 | 1,200 | 0.015 |
| | | 16 | 22,000 | 2,200 | 0.03 | 21,000 | 1,800 | 0.025 | 16,000 | 1,400 | 0.02 | 13,000 | 1,100 | 0.015 |
| | | 20 | 20,000 | 1,600 | 0.015 | 18,000 | 1,300 | 0.01 | 14,000 | 1,000 | 0.01 | 11,000 | 800 | 0.007 |
| | | 25 | 18,000 | 1,400 | 0.015 | 17,000 | 1,200 | 0.01 | 13,000 | 900 | 0.009 | 10,000 | 720 | 0.006 |
| | | 30 | 15,000 | 1,100 | 0.01 | 14,000 | 910 | 0.009 | 11,000 | 700 | 0.008 | 8,800 | 560 | 0.006 |
| | | 35 | 14,000 | 960 | 0.008 | 13,000 | 780 | 0.007 | 10,000 | 600 | 0.006 | 8,000 | 480 | 0.004 |
| | | 40 | 11,000 | 800 | 0.007 | 11,000 | 650 | 0.006 | 8,000 | 500 | 0.005 | 6,400 | 400 | 0.003 |
| | | 50 | 8,400 | 610 | 0.006 | 7,800 | 490 | 0.005 | 6,000 | 380 | 0.004 | 4,800 | 300 | 0.003 |
| | | 60 | 7,000 | 510 | 0.004 | 6,500 | 400 | 0.004 | 5,000 | 320 | 0.003 | 4,000 | 260 | 0.002 |
| | 70 | 7,000 | 480 | 0.003 | 6,500 | 390 | 0.002 | 5,000 | 300 | 0.002 | 4,000 | 240 | 0.001 | |
| | 1.5° | 12 | 24,000 | 2,600 | 0.03 | 22,000 | 2,100 | 0.025 | 17,000 | 1,600 | 0.02 | 14,000 | 1,300 | 0.015 |
| | | 16 | 22,000 | 2,400 | 0.03 | 21,000 | 2,000 | 0.025 | 16,000 | 1,500 | 0.02 | 13,000 | 1,200 | 0.015 |
| | | 20 | 20,000 | 1,800 | 0.015 | 18,000 | 1,400 | 0.01 | 14,000 | 1,100 | 0.01 | 11,000 | 880 | 0.007 |
| | | 25 | 18,000 | 1,600 | 0.015 | 17,000 | 1,300 | 0.01 | 13,000 | 1,000 | 0.009 | 11,000 | 800 | 0.006 |
| | | 30 | 15,000 | 1,300 | 0.01 | 14,000 | 1,000 | 0.01 | 11,000 | 800 | 0.008 | 8,800 | 640 | 0.006 |
| 35 | | 14,000 | 1,100 | 0.008 | 13,000 | 910 | 0.007 | 10,000 | 700 | 0.006 | 8,000 | 560 | 0.004 | |
| R0.75 | 0.4° | 10 | 18,000 | 2,700 | 0.06 | 17,000 | 2,200 | 0.05 | 13,000 | 1,700 | 0.04 | 10,000 | 1,400 | 0.03 |
| | | 15 | 17,000 | 2,200 | 0.04 | 16,000 | 1,800 | 0.04 | 12,000 | 1,400 | 0.03 | 9,600 | 1,100 | 0.02 |
| | | 20 | 17,000 | 2,100 | 0.03 | 16,000 | 1,700 | 0.025 | 12,000 | 1,300 | 0.02 | 9,600 | 1,000 | 0.015 |
| | | 30 | 14,000 | 1,600 | 0.015 | 13,000 | 1,300 | 0.01 | 10,000 | 1,000 | 0.01 | 8,000 | 800 | 0.007 |
| | 0.9° | 15 | 17,000 | 2,400 | 0.04 | 16,000 | 2,000 | 0.04 | 12,000 | 1,500 | 0.03 | 9,600 | 1,200 | 0.02 |
| | | 20 | 17,000 | 2,200 | 0.03 | 16,000 | 1,800 | 0.025 | 12,000 | 1,400 | 0.02 | 9,600 | 1,100 | 0.015 |
| | | 30 | 14,000 | 1,800 | 0.015 | 13,000 | 1,400 | 0.01 | 10,000 | 1,100 | 0.01 | 8,000 | 880 | 0.007 |
| | | 40 | 13,000 | 1,300 | 0.01 | 12,000 | 1,000 | 0.01 | 9,000 | 800 | 0.008 | 7,200 | 640 | 0.006 |
| | 1.5° | 15 | 17,000 | 2,600 | 0.04 | 16,000 | 2,100 | 0.04 | 12,000 | 1,600 | 0.03 | 9,600 | 1,300 | 0.02 |
| | | 20 | 17,000 | 2,400 | 0.03 | 16,000 | 2,000 | 0.025 | 12,000 | 1,500 | 0.02 | 9,600 | 1,200 | 0.015 |
| | | 30 | 14,000 | 2,000 | 0.015 | 13,000 | 1,600 | 0.01 | 10,000 | 1,200 | 0.01 | 8,000 | 960 | 0.007 |
| | | 30 | 14,000 | 2,000 | 0.015 | 13,000 | 1,600 | 0.01 | 10,000 | 1,200 | 0.01 | 8,000 | 960 | 0.007 |

| Work material | | | Carbon steel, Alloy steel (-30HRC) AISI 1055 | | | Alloy steel, Pre-hardened steel (30-45HRC) NAK | | | Hardened steel (45-55HRC) AISI H13, STAVAX | | | Hardened steel (55-62HRC) AISI D2 | | | |
|---------------|-------------------------|---------------------|--|-----------------------|----------------------|--|-----------------------|----------------------|--|-----------------------|----------------------|---|-----------------------|----------------------|-------|
| R (mm) | Taper angle one side | Neck length (mm) | Revolution (min ⁻¹) | Feed rate (mm/min) | Depth of cut (mm) | Revolution (min ⁻¹) | Feed rate (mm/min) | Depth of cut (mm) | Revolution (min ⁻¹) | Feed rate (mm/min) | Depth of cut (mm) | Revolution (min ⁻¹) | Feed rate (mm/min) | Depth of cut (mm) | |
| R1 | 0.4° | 16 | 15,000 | 3,200 | 0.07 | 14,000 | 2,600 | 0.06 | 11,000 | 2,000 | 0.05 | 8,800 | 1,600 | 0.03 | |
| | | 20 | 14,000 | 2,400 | 0.06 | 13,000 | 2,000 | 0.05 | 10,000 | 1,500 | 0.04 | 8,000 | 1,200 | 0.03 | |
| | | 25 | 14,000 | 2,100 | 0.04 | 13,000 | 1,700 | 0.04 | 10,000 | 1,300 | 0.03 | 8,000 | 1,000 | 0.02 | |
| | | 30 | 13,000 | 1,800 | 0.03 | 12,000 | 1,400 | 0.03 | 9,000 | 1,100 | 0.025 | 7,200 | 880 | 0.02 | |
| | | 35 | 13,000 | 1,600 | 0.03 | 12,000 | 1,300 | 0.025 | 9,000 | 1,000 | 0.02 | 7,200 | 800 | 0.015 | |
| | | 40 | 12,000 | 1,400 | 0.015 | 11,000 | 1,200 | 0.01 | 8,500 | 900 | 0.01 | 6,800 | 720 | 0.007 | |
| | 0.9° | 20 | 14,000 | 2,600 | 0.06 | 13,000 | 2,100 | 0.05 | 10,000 | 1,600 | 0.04 | 8,000 | 1,300 | 0.03 | |
| | | 25 | 14,000 | 2,200 | 0.05 | 13,000 | 1,800 | 0.04 | 10,000 | 1,400 | 0.03 | 8,000 | 1,100 | 0.025 | |
| | | 30 | 13,000 | 1,900 | 0.04 | 12,000 | 1,600 | 0.04 | 9,000 | 1,200 | 0.03 | 7,200 | 960 | 0.02 | |
| | | 35 | 13,000 | 1,800 | 0.04 | 12,000 | 1,400 | 0.03 | 9,000 | 1,100 | 0.025 | 7,200 | 880 | 0.02 | |
| | | 40 | 12,000 | 1,600 | 0.03 | 11,000 | 1,300 | 0.025 | 8,500 | 1,000 | 0.02 | 6,800 | 800 | 0.015 | |
| | | 50 | 11,000 | 1,400 | 0.015 | 10,000 | 1,200 | 0.01 | 8,000 | 900 | 0.01 | 6,400 | 720 | 0.007 | |
| | 1.5° | 60 | 9,800 | 1,100 | 0.007 | 9,100 | 910 | 0.006 | 7,000 | 700 | 0.005 | 5,600 | 560 | 0.003 | |
| | | 70 | 8,400 | 960 | 0.004 | 7,800 | 780 | 0.004 | 6,000 | 600 | 0.003 | 4,800 | 480 | 0.002 | |
| | | 25 | 14,000 | 2,400 | 0.05 | 13,000 | 2,000 | 0.04 | 10,000 | 1,500 | 0.03 | 8,000 | 1,200 | 0.025 | |
| | | 30 | 12,600 | 2,100 | 0.04 | 12,000 | 1,700 | 0.04 | 9,000 | 1,300 | 0.03 | 7,200 | 1,000 | 0.02 | |
| | R1.25 | 0.9° | 35 | 13,000 | 1,900 | 0.04 | 12,000 | 1,600 | 0.03 | 9,000 | 1,200 | 0.025 | 7,200 | 960 | 0.02 |
| | | | 40 | 12,000 | 1,800 | 0.03 | 11,000 | 1,400 | 0.025 | 8,500 | 1,100 | 0.02 | 6,800 | 880 | 0.015 |
| 20 | | | 13,000 | 2,900 | 0.06 | 12,000 | 2,300 | 0.05 | 9,000 | 1,800 | 0.04 | 7,200 | 1,400 | 0.03 | |
| 1.5° | 30 | 12,000 | 2,700 | 0.05 | 11,050 | 2,200 | 0.04 | 8,500 | 1,700 | 0.03 | 6,800 | 1,400 | 0.025 | | |
| | 40 | 11,000 | 2,400 | 0.04 | 9,800 | 2,000 | 0.04 | 7,500 | 1,500 | 0.03 | 6,000 | 1,200 | 0.02 | | |
| | 20 | 13,000 | 3,000 | 0.06 | 12,000 | 2,500 | 0.05 | 9,000 | 1,900 | 0.04 | 7,200 | 1,500 | 0.03 | | |
| R1.5 | 0.4° | 40 | 11,000 | 2,400 | 0.06 | 10,000 | 2,000 | 0.05 | 8,000 | 1,500 | 0.04 | 6,400 | 1,200 | 0.03 | |
| | | 50 | 11,000 | 2,000 | 0.04 | 9,800 | 1,600 | 0.04 | 7,500 | 1,200 | 0.03 | 6,000 | 960 | 0.02 | |
| | | 20 | 12,000 | 3,700 | 0.13 | 11,000 | 3,000 | 0.1 | 8,500 | 2,300 | 0.09 | 6,800 | 1,800 | 0.06 | |
| | | 30 | 11,000 | 2,900 | 0.07 | 10,000 | 2,300 | 0.06 | 8,000 | 1,800 | 0.05 | 6,400 | 1,400 | 0.03 | |
| | 0.9° | 40 | 11,000 | 2,400 | 0.06 | 10,000 | 2,000 | 0.05 | 8,000 | 1,500 | 0.04 | 6,400 | 1,200 | 0.03 | |
| | | 50 | 11,000 | 2,000 | 0.04 | 9,800 | 1,600 | 0.04 | 7,500 | 1,200 | 0.03 | 6,000 | 960 | 0.02 | |
| | | 20 | 12,000 | 3,800 | 0.13 | 11,000 | 3,100 | 0.1 | 8,500 | 2,400 | 0.09 | 6,800 | 1,900 | 0.06 | |
| | | 30 | 11,000 | 3,000 | 0.07 | 10,000 | 2,500 | 0.06 | 8,000 | 1,900 | 0.05 | 6,400 | 1,500 | 0.03 | |
| | | 40 | 11,000 | 2,600 | 0.06 | 10,000 | 2,100 | 0.05 | 8,000 | 1,600 | 0.04 | 6,400 | 1,300 | 0.03 | |
| | | 50 | 11,000 | 2,100 | 0.04 | 9,800 | 1,700 | 0.04 | 7,500 | 1,300 | 0.03 | 6,000 | 1,000 | 0.02 | |
| | 1.5° | 60 | 9,800 | 2,000 | 0.03 | 9,100 | 1,600 | 0.025 | 7,000 | 1,200 | 0.02 | 5,600 | 960 | 0.015 | |
| | | 70 | 9,800 | 1,800 | 0.015 | 9,100 | 1,400 | 0.01 | 7,000 | 1,100 | 0.01 | 5,600 | 880 | 0.007 | |
| | | 50 | 11,000 | 2,200 | 0.04 | 9,800 | 1,800 | 0.04 | 7,500 | 1,400 | 0.03 | 6,000 | 1,100 | 0.02 | |
| | | 60 | 9,800 | 2,100 | 0.03 | 9,100 | 1,700 | 0.025 | 7,000 | 1,300 | 0.02 | 5,600 | 1,000 | 0.015 | |
| | R2 | 0.9° | 70 | 9,800 | 2,000 | 0.015 | 9,100 | 1,600 | 0.01 | 7,000 | 1,200 | 0.01 | 5,600 | 960 | 0.007 |
| 30 | | | 10,000 | 3,200 | 0.3 | 9,400 | 2,600 | 0.25 | 7,200 | 2,000 | 0.2 | 5,800 | 1,600 | 0.15 | |
| 40 | | | 9,500 | 2,400 | 0.15 | 8,800 | 2,000 | 0.12 | 6,800 | 1,500 | 0.1 | 5,400 | 1,200 | 0.07 | |
| 50 | | | 9,500 | 2,100 | 0.1 | 8,800 | 1,700 | 0.1 | 6,800 | 1,300 | 0.08 | 5,400 | 1,000 | 0.06 | |
| R2.5 | 0.9° | 60 | 9,000 | 1,900 | 0.07 | 8,300 | 1,600 | 0.06 | 6,400 | 1,200 | 0.05 | 5,100 | 960 | 0.03 | |
| | | 35 | 8,000 | 3,500 | 0.3 | 7,400 | 2,900 | 0.25 | 5,700 | 2,200 | 0.2 | 4,600 | 1,800 | 0.15 | |
| | | 40 | 8,000 | 3,200 | 0.2 | 7,400 | 2,600 | 0.18 | 5,700 | 2,000 | 0.15 | 4,600 | 1,600 | 0.1 | |
| | | 60 | 7,600 | 2,400 | 0.15 | 7,000 | 2,000 | 0.12 | 5,400 | 1,500 | 0.1 | 4,300 | 1,200 | 0.07 | |

- 1) The above table shows depth of cut. Please control the pick feed (ae) according to machining conditions, up to a maximum of R x 1.5.
- 2) It is recommend to use high accuracy type machines and holders wherever possible.
- 3) Please reduce the depth of cut if chattering and noise are generated and reduce the feed rate proportionately.

IMPACT MIRACLE END MILL

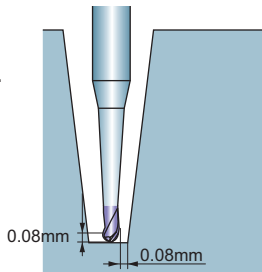
Tool : **VF-3XB** : STAVAX (Copy turning)

- 1) 30% increase in efficiency!
- 2) Surface finish improved and longer tool life.

<Geometry>



<Depth of cut> Machining the bottom of the slot.



<Result>



| | |
|----------------|-----------------------------------|
| End mill | VF-3XB R1 x 1.5° x 25 |
| Work material | STAVAX (40HRC) |
| Revolution | 12,000min ⁻¹ (75m/min) |
| Feed rate | 850mm/min (0.024mm/t) |
| Cutting method | Climb cut, Oil |

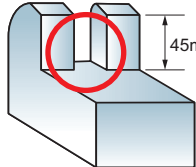
Tool : **VF-3XB** : SKD61 (Rib processing)

Conventional end mill : damage at the cutting edge
VF3XB: damage was reduced.

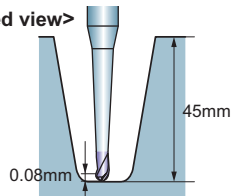
<Geometry>



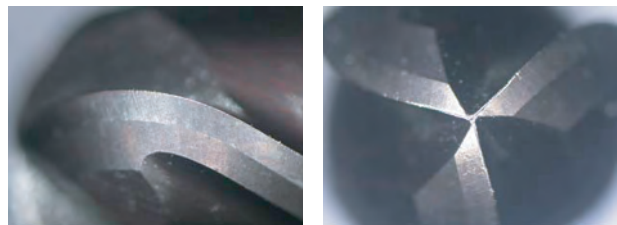
<Depth of cut>



<Enlarged view>



<Result>



| | |
|----------------|---|
| End mill | VF-3XB R2 x 0.9° x 40 |
| Work material | SKD61 (45HRC) |
| Revolution | 10,000min ⁻¹ (MAX 125m/min) |
| Feed rate | Roughing 2,000mm/min (0.067mm/t), Finishing 720mm/min (0.024mm/t) |
| Cutting method | Emulsion |



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