

MIRACLE 3 FLUTES BALL NOSE END MILLS

VC-3MB VC-3LB

High precision, high efficient milling



MIRACLE BALL NOSE END MILL SERIES

VC-3MB VC-3LB

Feature 1

Highly efficient milling is achieved by unique 3-flute shape.

Excellent chip disposal and sharp cutting edge have been achieved by use of unique 3-flute shape. Peerless efficiency milling is possible.



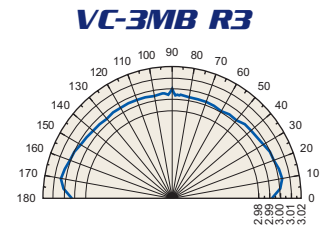
Feature 2

High precision shape realizes milling from roughing to finishing.

High efficiency, high precision milling is achieved by close R tolerance.

High accuracy

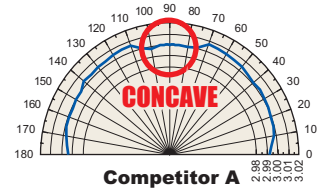
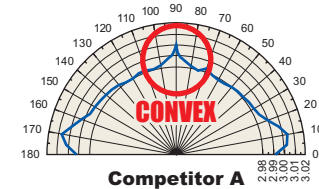
Superior good R accuracy in all cutting edge is achieved by original top-center design (PAT.pending).



Feature 3

Long shank type for deep milling.

Long shank type is available in addition to the medium-cutting-length type. High precision machining is possible in deep milling.

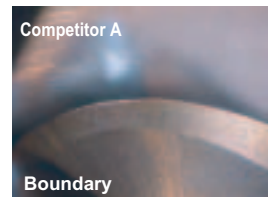
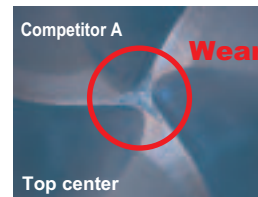
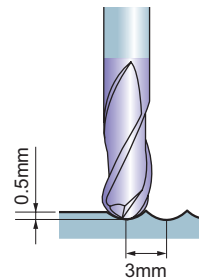


Machining example

Example 1

High efficient milling with long tool life.

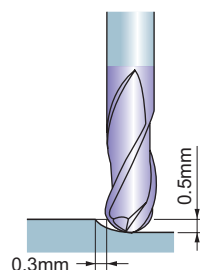
End mill	VC-3MB R3
Work material	SKD61(50HRC)
Revolution	10,000min ⁻¹
Cutting speed	104m/min
Feed rate	4,000mm/min (0.13mm/tooth)
Cutting method	Climb cut, Air blow



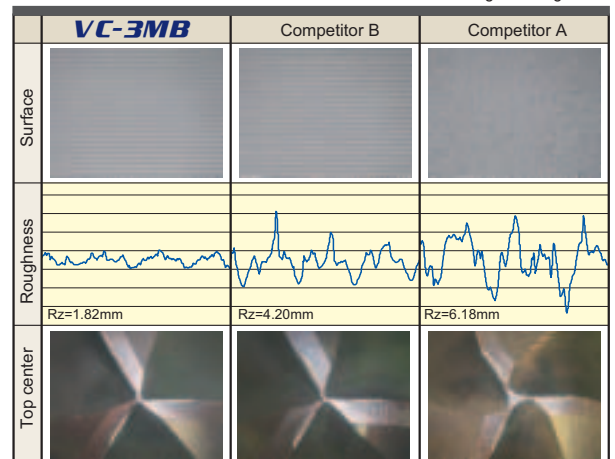
Example 2

Fine finish with highly accurate and efficient milling.

End mill	VC-3MB R3
Work material	PX5
Revolution	20,000min ⁻¹
Cutting speed	135m/min
Feed rate	6,000mm/min (0.1mm/tooth)
Cutting method	Climb cut, Air blow



Rz : Maximum height of roughness



After cutting 700m

VC-3MB

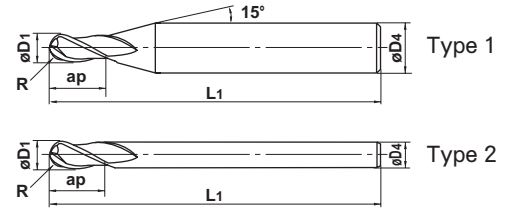
Ball Nose, Medium, 3 flute



$R \leq 6 \pm 0.01$
 $8 \leq R \pm 0.02$



$D_1 < 4 \quad 0 \text{ --- } -0.02$
 $4 \leq D_1 < 6 \quad 0 \text{ --- } -0.038$
 $6 \leq D_1 \quad 0 \text{ --- } -0.038$



● High efficient milling is achieved by original 3 fluted shapes.

Unit : mm

Order Number	Radius of ball nose R	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flute N	Stock	Type
VC3MBR0100	1	2	6	60	6	3	●	1
VC3MBR0150	1.5	3	8	70	6	3	●	1
VC3MBR0200	2	4	8	70	6	3	●	1
VC3MBR0250	2.5	5	12	80	6	3	●	1
VC3MBR0300	3	6	12	80	6	3	●	2
VC3MBR0400	4	8	14	90	8	3	●	2
VC3MBR0500	5	10	18	100	10	3	●	2
VC3MBR0600	6	12	22	110	12	3	●	2
VC3MBR0800	8	16	30	140	16	3	●	2
VC3MBR1000	10	20	38	160	20	3	●	2

VC-3LB

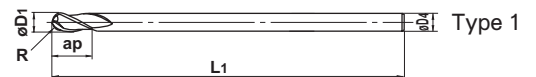
Ball Nose, Long, 3 flute



$R \leq 6 \pm 0.01$
 $8 \leq R \pm 0.02$



$D_1 < 6 \quad 0 \text{ --- } -0.028$
 $6 \leq D_1 \quad 0 \text{ --- } -0.038$



● It is a long shank type of VC-3MB.

Unit : mm

Order Number	Radius of ball nose R	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flute N	Stock	Type
VC3LBR0200	2	4	8	120	4	3	●	1
VC3LBR0300	3	6	12	140	6	3	●	1
VC3LBR0400	4	8	14	150	8	3	●	1
VC3LBR0500	5	10	18	180	10	3	●	1
VC3LBR0600	6	12	22	200	12	3	●	1
VC3LBR0800	8	16	30	230	16	3	●	1
VC3LBR1000	10	20	38	250	20	3	●	1

VC-3MB

Ball Nose, Medium, 3 flute

Roughing

Work material	Alloy steel, Tool steel, Pre-hardened steel (-45HRC) SCM, AISI H13, AISI D2 etc.				Hardened steel (45-55HRC) AISI H13 etc.			
	$\alpha \leq 15^\circ$		$\alpha > 15^\circ$		$\alpha \leq 15^\circ$		$\alpha > 15^\circ$	
R (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)
R1	32,000	3,000	25,000	1,170	18,000	1,440	16,000	640
R2	18,500	3,700	14,500	1,460	11,000	1,760	9,200	740
R3	13,000	4,000	10,000	1,500	7,700	1,920	6,400	800
R4	10,000	5,000	8,000	2,000	6,000	2,300	4,800	920
R5	8,000	5,000	6,500	2,000	4,800	2,200	3,800	870
R6	6,600	4,600	5,300	1,800	4,000	2,100	3,200	840
R8	5,000	4,000	4,000	1,600	3,000	1,700	2,400	680
R10	4,000	3,600	3,200	1,440	2,400	1,400	1,900	550

Depth of cut

Finishing

Work material	Alloy steel, Tool steel, Pre-hardened steel (-45HRC) SCM, AISI H13, AISI D2 etc.				Hardened steel (45-55HRC) AISI H13 etc.			
	$\alpha \leq 15^\circ$		$\alpha > 15^\circ$		$\alpha \leq 15^\circ$		$\alpha > 15^\circ$	
R (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)
R1	32,000	3,200	32,000	1,500	25,000	2,000	20,000	800
R2	25,500	5,000	20,000	2,000	17,000	2,700	13,000	1,000
R3	20,000	6,100	15,000	2,200	13,000	3,200	10,000	1,200
R4	15,000	7,500	11,000	2,700	10,000	3,800	7,500	1,400
R5	12,000	7,500	9,000	2,700	8,000	3,700	6,000	1,400
R6	10,000	7,000	7,500	2,500	6,600	3,500	5,000	1,300
R8	7,500	6,000	5,600	2,200	5,000	2,800	3,700	1,000
R10	6,000	5,400	4,500	2,000	4,000	2,300	3,000	900

Depth of cut

- 1) α is the inclination of machining surface.
- 2) Please use VC-2SB or VC-4MB for work materials of 55 HRC or above.
- 3) If the rigidity of the machine or the work material installation is very low, or chattering and noise are generated, please reduce the revolution and the feed rate proportionately. When high machining accuracy is especially needed, we recommend lowering feed rate.
- 4) Cutting condition may be considerably different due to the overhang (milling depth), depth of cut, and machine tools. Please see the above table as a standard.
- 5) VC-2MDB is recommended when using an end mill with a long overhang, in deep slotting with low rigidity or high hardness material milling.
- 6) If the depth of cut is shallow, the revolution and feed rate can be increased.

MITSUBISHI MATERIALS KOBE TOOLS



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JQA-EM0941

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