

MIRACLE HIGH PRECISION BALL NOSE END MILLS

**MIRACLE NOVA**

Radius  
tolerance

**$\pm 0.005\text{mm}$**

Diameter  
tolerance

**0 - -0.01 mm**

Shank  
tolerance

**h5**

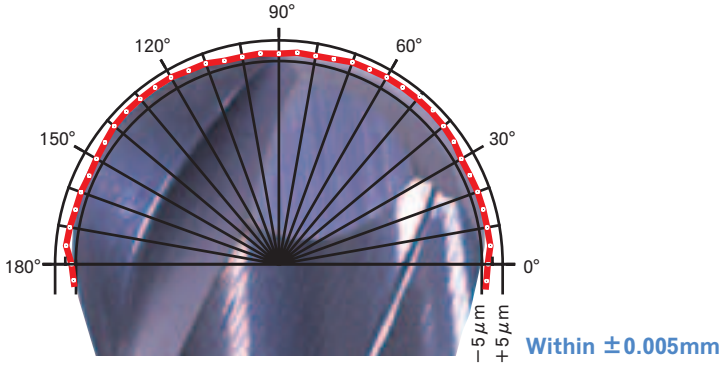


# MIRACLE NOVA

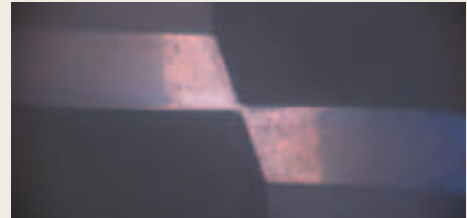
Adapting new design for high precision and enhanced Miracle coating, a great reduction in the finishing process of mould has been realized.

## High Precision

"MIRACLE NOVA" possesses the radius tolerance of  $\pm 0.005\text{mm}$ , the diameter tolerance of  $0 - 0.01\text{mm}$  and the shank tolerance of h5.



End cutting edge



Short center edge improve precisions, cutting edge, and chip disposability.

## Newly developed

"MIRACLE NOVA" employs "newly developed MIRACLE COATING" boasting high resistance to heat and adhesion.

### ■ Features of new coating

	MIRACLE NOVA	(Al,Ti)N
Hardness (HV)	<b>3,100</b>	2,800
Oxidation temperature (°C)	<b>1,100</b>	800
Adhesion (N) <sup>1)</sup>	<b>100</b>	80
Friction coefficient <sup>2)</sup> (800°C)	<b>0.42</b>	0.53

1) Adhesion : Measured at the critical load of scratch test  
2) Coefficient of friction : Measured at ball-on-disc method  
Counter gear : SKD61 (52HRC)

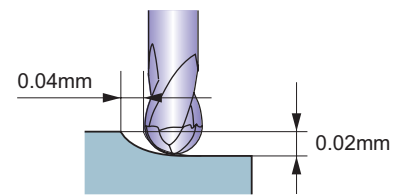
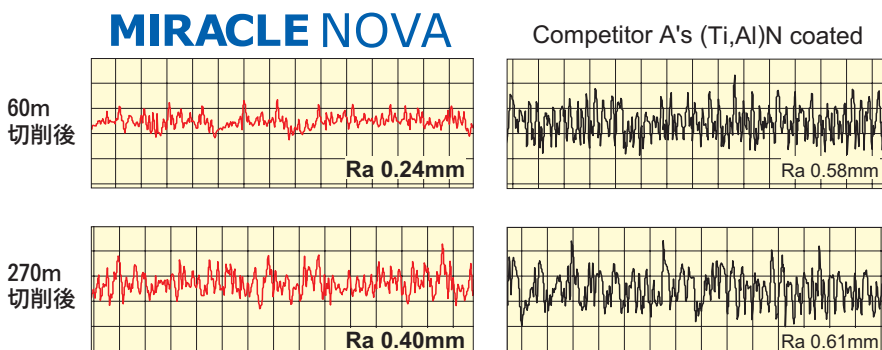
### ■ Smooth wear pattern

	MIRACLE NOVA	(Al,Ti)N
Wear		
Model picture		

SKD61 (52HRC), Cutting length 20m

## Ideal surface finish !

"MIRACLE NOVA" attaches greater importance to the edge design to produce ideal surface finish.



End mill	VC-2PSB R0.4
Work material	SKD61 (52HRC)
Revolution	18,000mm <sup>-1</sup>
Feed rate	1,500mm/min
Cutting method	Climb cut, Air blow

## VC-2PSB MIRACLE NOVA

Expand



±0.005



0 - -0.01 Shank Tolerance h5

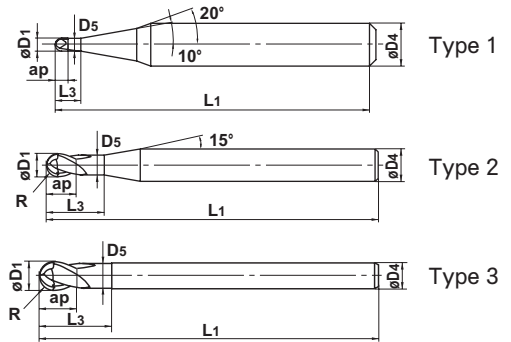
High Precision, Short, Ball Nose, 2 flute



R < 0.5

0.5 ≤ R

- MIRACLE NOVA possesses the radius tolerance of ±0.005mm, diameter tolerance of 0 - -0.01mm and the shank tolerance of h5.



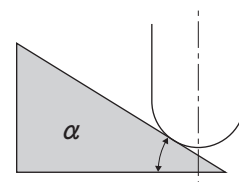
Unit : mm

Order Number	Radius of ball nose R	Dia. D <sub>1</sub>	Length of Cut ap	Neck Length L <sub>3</sub>	Neck Dia. D <sub>5</sub>	Overall Length L <sub>1</sub>	Shank Dia. D <sub>4</sub>	No. of Flute N	Stock	Type
Expand VC2PSBR0010	0.1	0.2	0.2	0.5	0.17	50	6	2	●	1
Expand VC2PSBR0015	0.15	0.3	0.3	0.8	0.27	50	6	2	●	1
Expand VC2PSBR0020	0.2	0.4	0.4	1	0.36	50	6	2	●	1
Expand VC2PSBR0025	0.25	0.5	0.5	1.3	0.46	50	6	2	●	1
Expand VC2PSBR0030	0.3	0.6	0.6	1.5	0.56	50	6	2	●	1
Expand VC2PSBR0035	0.35	0.7	0.7	1.8	0.66	50	6	2	●	1
Expand VC2PSBR0040	0.4	0.8	0.8	2	0.76	50	6	2	●	1
Expand VC2PSBR0045	0.45	0.9	0.9	2.3	0.86	50	6	2	●	1
VC2PSBR0050	0.5	1	1.5	2.5	0.94	50	6	2	●	2
Expand VC2PSBR0060	0.6	1.2	1.8	3	1.14	50	6	2	●	2
Expand VC2PSBR0070	0.7	1.4	2.1	3.5	1.34	50	6	2	●	2
VC2PSBR0075	0.75	1.5	2.3	3.8	1.44	50	6	2	●	2
Expand VC2PSBR0080	0.8	1.6	2.4	4	1.54	50	6	2	●	2
Expand VC2PSBR0090	0.9	1.8	2.7	4.5	1.74	50	6	2	●	2
VC2PSBR0100	1	2	3	5	1.90	50	6	2	●	2
VC2PSBR0150	1.5	3	4.5	7.5	2.90	70	6	2	●	2
VC2PSBR0200	2	4	6	10	3.90	70	6	2	●	2
VC2PSBR0250	2.5	5	7.5	12.5	4.90	80	6	2	●	2
VC2PSBR0300	3	6	9	15	5.85	80	6	2	●	3
VC2PSBR0400	4	8	12	20	7.85	90	8	2	●	3
VC2PSBR0500	5	10	15	25	9.70	100	10	2	●	3
VC2PSBR0600	6	12	18	30	11.70	110	12	2	●	3

**VC-2PSB** MIRACLE NOVA

High Precision, Short, Ball Nose, 2 flute

Work material	Alloy steel, Tool steel, Pre-hardened steel (-45HRC) AISI H13, AISI D2, NAK				Hardened steel (45-55HRC) AISI H13			
	$\alpha \leq 15^\circ$		$\alpha > 15^\circ$		$\alpha \leq 15^\circ$		$\alpha > 15^\circ$	
	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>R0.1</b>	40,000	350	40,000	260	40,000	300	40,000	230
<b>R0.15</b>	40,000	480	40,000	360	40,000	400	40,000	300
<b>R0.2</b>	40,000	600	40,000	450	40,000	500	40,000	380
<b>R0.25</b>	40,000	800	40,000	600	40,000	680	40,000	510
<b>R0.3</b>	40,000	1,000	40,000	750	40,000	850	40,000	640
<b>R0.35</b>	40,000	1,300	40,000	900	40,000	1,000	37,000	690
<b>R0.4</b>	40,000	1,500	40,000	1,100	40,000	1,300	35,000	850
<b>R0.45</b>	40,000	1,800	38,000	1,200	38,000	1,400	32,000	880
<b>R0.5</b>	40,000	2,000	35,000	1,300	35,000	1,500	30,000	900
<b>R0.75</b>	40,000	2,200	30,000	1,300	30,000	1,500	25,000	900
<b>R1</b>	35,000	2,400	25,000	1,400	25,000	1,500	20,000	900
<b>R1.5</b>	30,000	2,500	23,000	1,400	20,000	1,500	15,000	900
<b>R2</b>	25,000	2,600	20,000	1,500	17,000	1,500	13,000	900
<b>R2.5</b>	23,000	2,600	17,000	1,500	15,000	1,500	11,000	900
<b>R3</b>	20,000	2,600	15,000	1,500	13,000	1,500	10,000	900
<b>R4</b>	15,000	2,700	11,000	1,500	10,000	1,500	7,500	900
<b>R5</b>	12,000	2,700	9,000	1,500	8,000	1,500	6,000	900
<b>R6</b>	10,000	2,500	7,500	1,400	6,600	1,400	5,000	800



- 1)  $\alpha$  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**



JQA-2522  
JQA-EM0941

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