

CBN end mill series

Expansion

CBN end mill series, the ultimate choice for finish machining molds.

■ Long neck corner radius type now included.



CBN end mill series

CBN2XLB

2 flute CBN long neck ball nose slot drill

CBN2XLRB NEW

2 flute CBN long neck radius end mill

CBN end mill series, the ultimate choice for finish machining of molds.

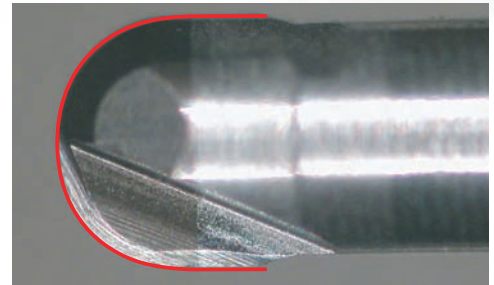
The realization of excellent performance when milling hardened steel over 65HRC.

Feature 1 High precision geometry with good fracture resistance

- CBN material with good fracture resistance enables the machining of 70HRC hardened steel.
- 2 variations, long neck ball nose and long neck radius types available.

Long neck ball nose type

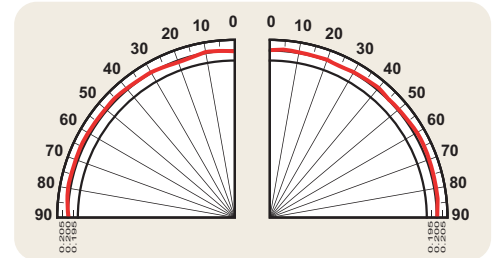
- Cutting edge geometry that offers excellent chip disposal enables long, stable operations.
- Excellent performance over a wide array of machining applications due to the precision of the seamless cutting edge geometry.
Radius tolerance $\pm 5\mu\text{m}$, diameter tolerance 0~-10 μm .



Long neck radius type

- Capable of a large pick feed for high efficiency finishing of flat faces.
- High precision design with radius tolerance of $\pm 5\mu\text{m}$

Inspection Report CBN2XLRB $\phi 2 \times 0.2R$



Feature 2 An original manufacturing method allows a wide variety of neck lengths

<p>Conventional technology</p>	<p>Interface</p>	<p>(Inserted brazed method)</p> <p>The neck is inserted into the shank and brazed.</p> <p>➔ Low bonding strength</p> <p>It's impossible to increase the neck length.</p>
<p>CBN2XLB</p>	<p>Interface</p> <p>Interface-metal</p> <p>Diffused layer</p>	<p>[Diffusion Bonding] (PAT.P)</p> <p>Newly developed method of joining.</p> <p>➔ Bonding strength is the same as the carbide material.</p> <p>* Example: R1 neck length of 5mm extended to 20mm. (.039" R neck length .196" extend to .787")</p>

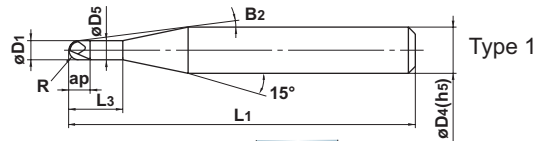
CBN END MILLS

CBN2XLB

Ball nose, Short cut length, 2 flute, Long neck

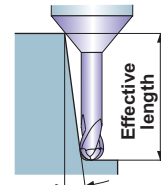


Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
○	◎	◎	◎				



● Solid CBN ball nose. A wide variation of neck lengths available.

Effective length for inclined angle



Inclined angle

Unit : mm

Order Number	Radius of Ball Nose R	Dia. D1	Length of Cut ap	Neck Length L3	Neck Dia. D5	Cutting Edge to Shank Angle B2	Overall Length L1	Shank Dia. D4	No. of Flutes	Stock	Type	Effective length for inclined angle			
												30°	1°	2°	3°
CBN2XLBR0020N010S04	0.2	0.4	0.3	1	0.36	13.4°	51	4	2	★	1	1	1	1.1	1.2
R0020N010S06	0.2	0.4	0.3	1	0.36	13.9°	51	6	2	★	1	1	1	1.1	1.2
R0020N016S04	0.2	0.4	0.3	1.6	0.36	12.4°	51	4	2	★	1	1.6	1.7	1.8	2
R0020N016S06	0.2	0.4	0.3	1.6	0.36	13.3°	51	6	2	★	1	1.6	1.7	1.8	2
R0030N009S06	0.3	0.6	0.4	0.9	0.56	14.1°	62	6	2	★	1	0.9	0.9	1.0	1.1
R0030N015S04	0.3	0.6	0.5	1.5	0.56	12.6°	51	4	2	★	1	1.5	1.6	1.7	1.8
R0030N015S06	0.3	0.6	0.5	1.5	0.56	13.4°	51	6	2	★	1	1.5	1.6	1.7	1.8
R0030N024S04	0.3	0.6	0.5	2.4	0.56	11.3°	51	4	2	★	1	2.5	2.6	2.7	2.9
R0030N024S06	0.3	0.6	0.5	2.4	0.56	12.5°	51	6	2	★	1	2.5	2.6	2.7	2.9
* R0040N010S06	0.4	0.8	0.5	1	0.76	14.1°	62	6	2	★	1	1	1	1.1	1.2
R0040N020S04	0.4	0.8	0.6	2	0.76	11.8°	51	4	2	★	1	2	2.1	2.3	2.4
R0040N020S06	0.4	0.8	0.6	2	0.76	12.9°	51	6	2	★	1	2	2.1	2.3	2.4
R0040N032S04	0.4	0.8	0.6	3.2	0.76	10.3°	51	4	2	★	1	3.3	3.4	3.6	3.9
R0040N032S06	0.4	0.8	0.6	3.2	0.76	11.7°	51	6	2	★	1	3.3	3.4	3.6	3.9
* R0050N011S06	0.5	1	0.6	1.1	0.94	14.1°	62	6	2	★	1	1.1	1.1	1.2	1.2
R0050N025S04	0.5	1	0.8	2.5	0.94	11°	51	4	2	★	1	2.6	2.7	2.8	3
R0050N025S06	0.5	1	0.8	2.5	0.94	12.3°	51	6	2	●	1	2.6	2.7	2.8	3
R0050N040S04	0.5	1	0.8	4	0.94	9.3°	51	4	2	★	1	4.1	4.3	4.6	4.9
R0050N040S06	0.5	1	0.8	4	0.94	11°	51	6	2	●	1	4.1	4.3	4.6	4.9
R0075N038S04	0.75	1.5	1.1	3.8	1.44	9.1°	52	4	2	★	1	3.9	4.1	4.3	4.6
R0075N038S06	0.75	1.5	1.1	3.8	1.44	11°	52	6	2	★	1	3.9	4.1	4.3	4.6
R0075N060S04	0.75	1.5	1.1	6	1.44	7.1°	52	4	2	★	1	6.2	6.4	6.8	7.3
R0075N060S06	0.75	1.5	1.1	6	1.44	9.3°	52	6	2	★	1	6.2	6.4	6.8	7.3
R0100N017S06	1	2	1.2	1.7	1.9	13.6°	62	6	2	★	1	1.7	1.7	1.8	1.9
R0100N050S04	1	2	1.5	5	1.9	7.3°	52	4	2	★	1	5.1	5.3	5.6	6
R0100N050S06	1	2	1.5	5	1.9	9.8°	52	6	2	★	1	5.1	5.3	5.6	6
R0100N080S04	1	2	1.5	8	1.9	5.3°	52	4	2	★	1	8.2	8.5	9	9.7
R0100N080S06	1	2	1.5	8	1.9	7.9°	52	6	2	★	1	8.2	8.5	9	9.7

* Short edge and neck lengths for high rigidity.

● : Inventory maintained.

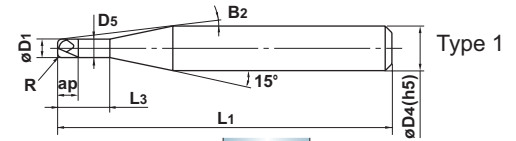
★ : Inventory maintained in Japan.

CBN2XLRB NEW

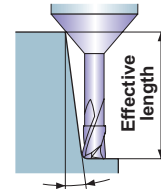
Corner radius, Short cut length, 2 flute, Long neck



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
○	◎	◎	◎				



Effective length for inclined angle



Inclined angle

Unit : mm

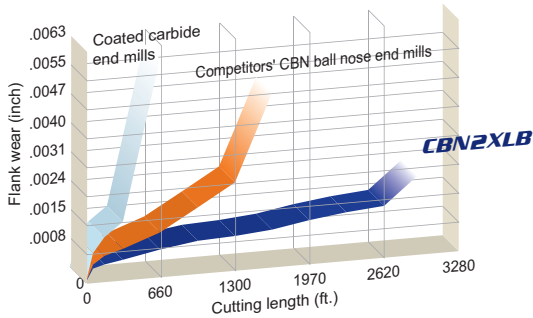
● CBN long neck radius end mill. A wide variation of neck lengths available.

Order Number	Corner Radius R	Dia. D1	Length of Cut ap	Neck Length L3	Neck Dia. D5	Cutting Edge to Shank Angle B2	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type	Effective length for inclined angle			
												30°	1°	2°	3°
CBN2XLRBD0050R005N02	0.05	0.5	0.3	2	0.46	11.6°	51	4	2	★	1	2.1	2.1	2.3	2.5
D0050R005N03	0.05	0.5	0.3	3	0.46	10.4°	51	4	2	★	1	3.1	3.2	3.5	3.7
D0050R010N02	0.1	0.5	0.3	2	0.46	11.7°	51	4	2	★	1	2.1	2.1	2.3	2.5
D0050R010N03	0.1	0.5	0.3	3	0.46	10.5°	51	4	2	★	1	3.1	3.2	3.4	3.7
D0100R005N03	0.05	1	0.6	3	0.94	9.7°	51	4	2	★	1	3.2	3.4	3.7	4
D0100R005N05	0.05	1	0.6	5	0.94	7.9°	51	4	2	★	1	5.3	5.6	6	6.5
D0100R010N03	0.1	1	0.6	3	0.94	9.7°	51	4	2	★	1	3.2	3.4	3.6	4
D0100R010N05	0.1	1	0.6	5	0.94	8°	51	4	2	★	1	5.3	5.6	6	6.5
D0100R020N03	0.2	1	0.6	3	0.94	9.8°	51	4	2	★	1	3.2	3.4	3.5	4
D0100R020N05	0.2	1	0.6	5	0.94	8°	51	4	2	★	1	5.3	5.6	6	6.5
D0100R030N03	0.3	1	0.6	3	0.94	9.9°	51	4	2	★	1	3.2	3.4	3.4	4
D0100R030N05	0.3	1	0.6	5	0.94	8.1°	51	4	2	★	1	5.3	5.6	6	6.5
D0150R010N05	0.1	1.5	0.9	5	1.44	7.3°	52	4	2	★	1	5.3	5.6	6	6.5
D0150R010N08	0.1	1.5	0.9	8	1.44	5.6°	52	4	2	★	1	8.5	8.8	9.5	10.2
D0150R020N05	0.2	1.5	0.9	5	1.44	7.3°	52	4	2	★	1	5.3	5.6	6	6.5
D0150R020N08	0.2	1.5	0.9	8	1.44	5.6°	52	4	2	★	1	8.5	8.8	9.5	10.2
D0150R030N05	0.3	1.5	0.9	5	1.44	7.4°	52	4	2	★	1	5.3	5.6	6	6.5
D0150R030N08	0.3	1.5	0.9	8	1.44	5.7°	52	4	2	★	1	8.5	8.8	9.5	10.2
D0200R010N06	0.1	2	1.2	6	1.9	5.9°	52	4	2	★	1	6.3	6.6	7.1	7.6
D0200R010N10	0.1	2	1.2	10	1.9	4.2°	52	4	2	★	1	10.5	10.9	11.7	12.6
D0200R020N06	0.2	2	1.2	6	1.9	5.9°	52	4	2	★	1	6.3	6.6	7.1	7.6
D0200R020N10	0.2	2	1.2	10	1.9	4.2°	52	4	2	★	1	10.5	10.9	11.7	12.6
D0200R030N06	0.3	2	1.2	6	1.9	6°	52	4	2	★	1	6.3	6.6	7	7.6
D0200R030N10	0.3	2	1.2	10	1.9	4.2°	52	4	2	★	1	10.5	10.8	11.6	12.6
D0200R050N06	0.5	2	1.2	6	1.9	6.1°	52	4	2	★	1	6.3	6.5	7	7.5
D0200R050N10	0.5	2	1.2	10	1.9	4.3°	52	4	2	★	1	10.5	10.8	11.6	12.5

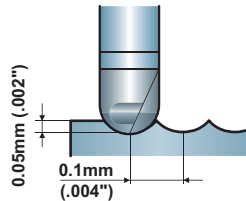
Cutting Performance

Finishing of high hardness materials

Long tool life when machining high hardness steel.



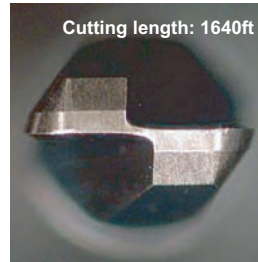
End mill	CBN2XLB R0100N050S06 (1Rx5x6)
Work material	AISI D2 (60HRC)
Revolution	20000min ⁻¹ (130 SFM)
Feed rate	1700mm/min (67 IPM)
Cutting method	Climb cut, Mist blow



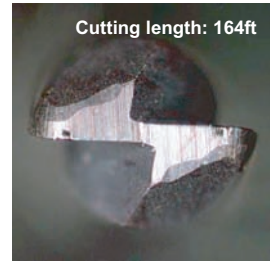
Finishing of high hardness materials

10 times longer tool life than coated carbide end mills.
A reduction of the time needed for polishing operations.

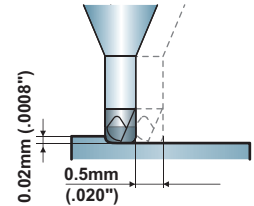
CBN2XLRB



Coated carbide radius end mill

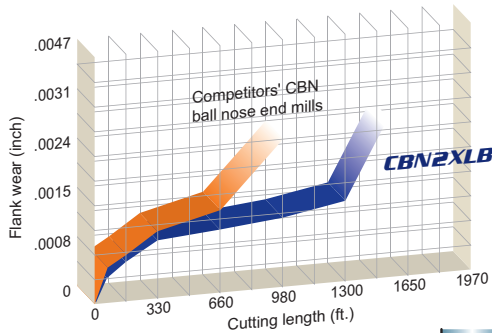


End mill	CBN2XLRBD0150R030N05 (0.3Rx1.5x5)
Work material	AISI 420 (52HRC)
Revolution	32000min ⁻¹ (490 SFM)
Feed rate	1200mm/min (47 IPM)
Cutting method	Climb cut, Air blow

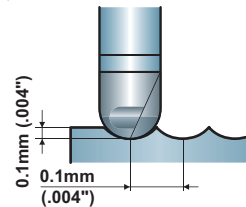


High hardness materials machining (Depth of cut .004")

Excellent wear resistance under high-intensity conditions



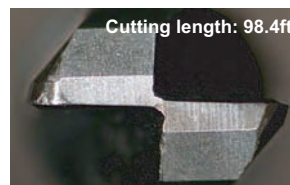
End mill	CBN2XLB R0100N050S06 (1Rx5x6)
Work material	AISI D2 (60HRC)
Revolution	20000min ⁻¹ (180 SFM)
Feed rate	1700mm/min (67 IPM)
Cutting method	Climb cut, Mist blow



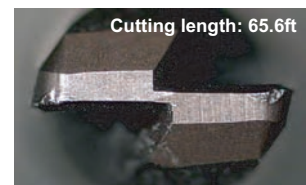
Slotting

Wear resistance increased by 50% when slotting hardened steel.

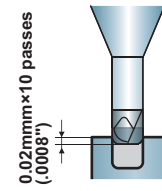
CBN2XLRB



Conventional CBN radius end mill



End mill	CBN2XLRBD0200R0300N06 (0.3Rx2x6)
Work material	AISI D2 (60HRC)
Revolution	40000min ⁻¹ (820 SFM)
Feed rate	1000mm/min (39 IPM)
Cutting method	Mist blow



CBN END MILLS

CBN2XLB

Ball nose, Short cut length, 2 flute, Long neck

Work material	Hardened steel (-55HRC) AISI P21, AISI H13, AISI 420 etc.					Hardened steel (55-62HRC) AISI D2, AISI W1, AISI M2 etc.					Hardened steel (62-70HRC) AISI W1, AISI M2 Powder metallurgy high speed steel etc.				
	R (mm)	Revolution (min ⁻¹)	Table feed (mm/min) (IPM)		Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min ⁻¹)	Table feed (mm/min) (IPM)		Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min ⁻¹)	Table feed (mm/min) (IPM)		Depth of cut ap (mm)
R0.2	50000	1500	59.1	0.006	0.01	50000	1200	47.2	0.006	0.01	50000	1200	47.2	0.004	0.008
R0.3	50000	2000	78.7	0.01	0.02	50000	1500	59.1	0.01	0.02	50000	1500	59.1	0.008	0.015
R0.4	50000	3000	118.1	0.02	0.05	50000	2000	78.7	0.02	0.04	50000	2000	78.7	0.015	0.03
R0.5	50000	3000	118.1	0.03	0.06	50000	2000	78.7	0.03	0.05	50000	2000	78.7	0.02	0.03
R0.75	50000	3500	137.8	0.04	0.08	50000	2500	98.4	0.03	0.06	50000	2500	98.4	0.02	0.04
R1	50000	4000	157.5	0.05	0.1	50000	3000	118.1	0.04	0.07	50000	3000	118.1	0.03	0.05

The diagram illustrates the maximum cutting conditions for a ball nose end mill. It shows a cross-section of the tool cutting into a workpiece. The maximum axial depth of cut is labeled as 'ae (MAX.)' and the maximum radial depth of cut is labeled as 'ap (MAX.)'.

- 1) The above table shows maximum cutting conditions. Please control the pick feed (ae) according to the surface finish required.
- 2) Oil mist coolant is recommended.
- 3) If the spindle speed is insufficient, the revolution and the feed rate should be reduced proportionately.

CBN2XLRB

Corner radius, Short cut length, 2 flute, Long neck

Work material	Hardened steel (-55HRC) AISI P21, AISI H13, AISI 420 etc.					Hardened steel (55-62HRC) AISI D2, AISI W1, AISI M2 etc.					Hardened steel (62-70HRC) AISI W1, AISI M2 Powder metallurgy high speed steel etc.				
	Dia. (mm)	Revolution (min ⁻¹)	Table feed (mm/min) (IPM)		Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min ⁻¹)	Table feed (mm/min) (IPM)		Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min ⁻¹)	Table feed (mm/min) (IPM)		Depth of cut ap (mm)
0.5	50000	750	29.5	0.01	0.2	50000	600	23.6	0.01	0.1	40000	400	15.7	0.005	0.06
1	38000	1100	43.3	0.02	0.3	38000	760	29.9	0.01	0.2	25000	400	15.7	0.01	0.1
1.5	25000	900	35.4	0.03	0.5	25000	700	27.6	0.02	0.4	17000	340	13.4	0.02	0.2
2	20000	800	31.5	0.04	0.7	20000	600	23.6	0.03	0.6	12000	300	11.8	0.02	0.3

The diagram illustrates the maximum cutting conditions for a corner radius end mill. It shows a cross-section of the tool cutting into a workpiece. The axial depth of cut is labeled as 'ae' and the radial depth of cut is labeled as 'ap'.

- 1) The above table shows maximum cutting conditions.
- 2) Oil mist coolant is recommended
- 3) If the spindle speed is insufficient, the revolution and the feed rate should be reduced proportionately.

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.

MITSUBISHI MATERIALS CORPORATION

MITSUBISHI MATERIALS U.S.A. CORPORATION

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(Tools specifications subject to change without notice.)

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