

CBN

CBN 3-Flute Long Neck Ball End Mill

SSPB320 *New*

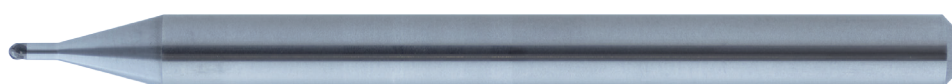


3-Flute ball end mill realizes high efficient and high precision machining

CBN 3-Flute Long Neck Ball End Mill

SSPB320 New

R0.1 ~ R0.5 Total 24 sizes



Cutting edge shape

Features

High efficiency

Realizing long tool life and high-efficient machining that reduce total costs

Tool life of SSPB320 is approximately twice in terms of cutting length compares to conventional products. It realizes to reduce the number of tools used.

Furthermore, machining time is approximately 60% shorter than conventional 2-flute products.



■ Cost comparison with conventional 2-flute ball end mills

R0.5 × Under neck length 2.5



Machining example

※Machine charge fee: JPY 5,000/h

Tool	SSPB320 (3-flute)	Conventional
Tool Q'ty [pcs]	1	2
Tool cost	¥ 39,600/pc	¥ 26,400/pc
Machining time [min]	240	360
※Machine charge fee	¥ 20,000	¥ 30,000
Machining cost	¥ 59,600	¥ 82,800

28% cost reduction
compares with 2-flute ball end mills

■ Tool life comparison with conventional 2-flute ball end mills

R0.5 × Under neck length 2.5

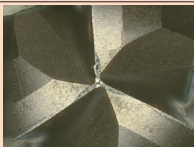
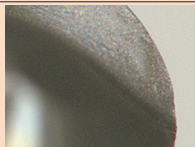
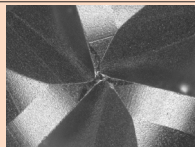

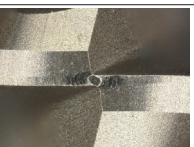

Work material : HAP40 (64HRC)

Coolant : Oil mist

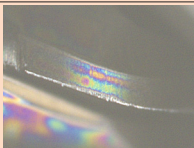


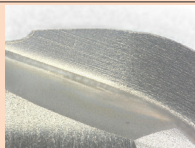
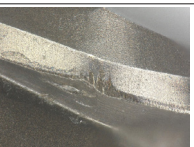
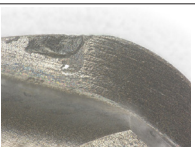
Tool	SSPB320 (3-flute)	Conventional
Spindle speed [min ⁻¹]	40,000	
Feed [mm/min]	1,500	1,000
Depth of cut (ap×ae) [mm]	0.02 × 0.02	
Stock allowance [mm]	0.01	

※Feed per tooth : 0.0125 mm/tooth

Tool wear condition after machining on **bottom surface**

Near the center of the ball	Tool	After machining 46m		After machining 92m	
	SSPB320 R0.5 × 2.5	Machining time : 28 min		Machining time : 56 min	
					
		Tool wear width 0.018 mm	R retreat amount 0.002 mm	Tool wear width 0.024 mm	R retreat amount 0.005 mm
	Conventional R0.5 × 2.5	Machining time : 40 min		After machining 46m in cutting distance, the conventional 2-flute end mill reached to its tool life.	
					
		Tool wear width 0.043 mm	R retreat amount 0.006 mm		

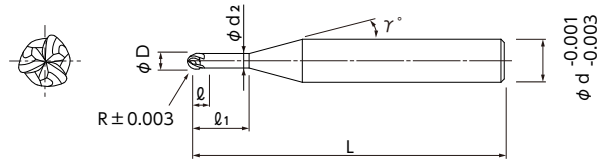
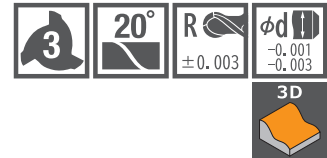
Tool wear condition after machining on **side surface**

Peripheral	Tool	After machining 180m		After machining 360m	
	SSPB320 R0.5 × 2.5	Machining time : 2 hr		Machining time : 4 hr	
					
		Tool wear width 0.018 mm	R retreat amount 0.002 mm	Tool wear width 0.020 mm	R retreat amount 0.005 mm
	Conventional R0.5 × 2.5	Machining time : 3 hr		After machining 180m in cutting distance, the conventional 2-flute end mill reached to its tool life	
					
		Tool wear width 0.088 mm	R retreat amount 0.009 mm		

CBN 3-Flute Long Neck Ball End Mill

Total 24 sizes

3-flute ball end mill realizes high efficient and high precision machining



- Adopt spiral ball shape to improve sharpness of cutting edge.
- 3-flute shape from R0.1 enables high efficiency machining even with small diameter.
- Strong back taper shape reduces cutting load and chattering.

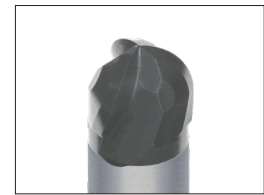


The product label indicates the actual outer diameter in 1μm increments, furthermore, the ball radius is shown as 1/2 of the actual outer diameter, which supports high-precision machining.

Work Material

Hardened Steel H

~70HRC



Cutting edge shape

◆ Release in May, 2025.

Unit [Size : mm]

Code No.	Radius (R)	Under Neck Length (ℓ ₁)	Length of Cut (ℓ ₂)	Dia. (D)	Neck Dia. (d ₂)	Neck Taper Angle (γ)	Shank Dia. (d)	Overall Length (L)
◆ 01-00508-01003	R0.1	0.3	0.15	0.2	0.19	15°	4	50
◆ 01-00508-01004		0.4	0.15	0.2	0.19	15°	4	50
◆ 01-00508-01005		0.5	0.15	0.2	0.19	15°	4	50
◆ 01-00508-01006		0.6	0.15	0.2	0.19	15°	4	50
◆ 01-00508-01503	R0.15	0.3	0.23	0.3	0.28	15°	4	50
◆ 01-00508-01505		0.5	0.23	0.3	0.28	15°	4	50
◆ 01-00508-01507		0.75	0.23	0.3	0.28	15°	4	50
◆ 01-00508-01509		0.9	0.23	0.3	0.28	15°	4	50
◆ 01-00508-02005	R0.2	0.5	0.3	0.4	0.37	15°	4	50
◆ 01-00508-02007		0.75	0.3	0.4	0.37	15°	4	50
◆ 01-00508-02010		1	0.3	0.4	0.37	15°	4	50
◆ 01-00508-02012		1.2	0.3	0.4	0.37	15°	4	50
◆ 01-00508-02505	R0.25	0.5	0.38	0.5	0.46	15°	4	49
◆ 01-00508-02510		1	0.38	0.5	0.46	15°	4	50
◆ 01-00508-02515		1.5	0.38	0.5	0.46	15°	4	50
◆ 01-00508-03007	R0.3	0.75	0.5	0.6	0.56	15°	4	49
◆ 01-00508-03010		1	0.5	0.6	0.56	15°	4	50
◆ 01-00508-03012		1.2	0.5	0.6	0.56	15°	4	50
◆ 01-00508-03015		1.5	0.5	0.6	0.56	15°	4	50
◆ 01-00508-04020	R0.4	2	0.6	0.8	0.76	15°	4	50
◆ 01-00508-05010	R0.5	1	0.7	1	0.95	15°	4	49
◆ 01-00508-05020		2	0.7	1	0.95	15°	4	50
◆ 01-00508-05025		2.5	0.7	1	0.95	15°	4	50
◆ 01-00508-05030		3	0.7	1	0.95	15°	4	50

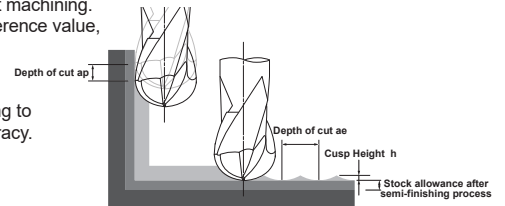
How to Order

When you order, indicate SSPB320 (R)×(ℓ₁).

(γ) is reference value.

Recommended Conditions

Work Material			Hardened Steels SKD61・STAVAX (~52HRC)				Hardened Steels SKD11・ELMAX (~62HRC)				High Speed Steels SKH・HAP (~68HRC)			
Radius	Under Neck Length	L/D	Spindle Speed	Feed	Depth of Cut	Stock before using this tool	Spindle Speed	Feed	Depth of Cut	Stock before using this tool	Spindle Speed	Feed	Depth of Cut	Stock before using this tool
			min ⁻¹	mm/min	a _p mm or a _e mm	mm	min ⁻¹	mm/min	a _p mm or a _e mm	mm	min ⁻¹	mm/min	a _p mm or a _e mm	mm
0.1	0.3	1.5	40,000	900	0.005	0.002	40,000	670	0.005	0.002	40,000	450	0.003	0.002
	0.4	2	40,000	850	0.005	0.002	40,000	620	0.005	0.002	40,000	420	0.003	0.002
	0.5	2.5	40,000	800	0.005	0.002	40,000	580	0.005	0.002	40,000	390	0.003	0.002
	0.6	3	40,000	750	0.005	0.002	40,000	520	0.005	0.002	40,000	360	0.003	0.002
0.15	0.3	1	40,000	1,200	0.005	0.003	40,000	900	0.005	0.003	40,000	670	0.003	0.003
	0.5	1.7	40,000	1,100	0.005	0.003	40,000	800	0.005	0.003	40,000	600	0.003	0.003
	0.75	2.5	40,000	1,000	0.005	0.003	40,000	750	0.005	0.003	40,000	550	0.003	0.003
	0.9	3	40,000	900	0.005	0.003	40,000	600	0.005	0.003	40,000	450	0.003	0.003
0.2	0.5	1.3	40,000	1,800	0.005	0.004	40,000	1,350	0.005	0.004	40,000	900	0.005	0.004
	0.75	1.9	40,000	1,700	0.005	0.004	40,000	1,250	0.005	0.004	40,000	820	0.005	0.004
	1	2.5	40,000	1,500	0.005	0.004	40,000	1,200	0.005	0.004	40,000	750	0.005	0.004
	1.2	3	40,000	1,400	0.005	0.004	40,000	1,000	0.005	0.004	40,000	650	0.005	0.004
0.25	0.5	1	40,000	1,900	0.01	0.005	40,000	1,500	0.01	0.005	40,000	1,100	0.005	0.005
	1	2	40,000	1,800	0.01	0.005	40,000	1,400	0.01	0.005	40,000	1,000	0.005	0.005
	1.5	3	40,000	1,600	0.01	0.005	40,000	1,300	0.01	0.005	40,000	800	0.005	0.005
0.3	0.75	1.3	40,000	2,600	0.01	0.007	40,000	2,400	0.01	0.007	40,000	1,700	0.005	0.007
	1	1.7	40,000	2,500	0.01	0.007	40,000	2,200	0.01	0.007	40,000	1,600	0.005	0.007
	1.2	2	40,000	2,400	0.01	0.007	40,000	2,000	0.01	0.007	40,000	1,400	0.005	0.007
	1.5	2.5	40,000	2,200	0.01	0.007	40,000	1,700	0.01	0.007	40,000	1,100	0.005	0.007
0.4	2	2.5	40,000	2,300	0.01	0.008	40,000	1,800	0.01	0.008	40,000	1,200	0.005	0.008
0.5	1	1	40,000	3,400	0.02	0.01	40,000	3,000	0.02	0.01	40,000	1,800	0.01	0.01
	2	2	40,000	3,000	0.02	0.01	40,000	2,700	0.02	0.01	40,000	1,700	0.01	0.01
	2.5	2.5	40,000	2,600	0.02	0.01	40,000	2,200	0.02	0.01	40,000	1,500	0.01	0.01
	3	3	40,000	2,400	0.02	0.01	40,000	2,000	0.02	0.01	40,000	1,400	0.01	0.01
Notes			<p>※1 Depth of Cut: a_p=Axial Depth of Cut / a_e=Radial Depth of Cut.</p> <p>※2 Depth of Cut shows the reference value for semi-finishing and finishing. Adjust milling conditions depending on the rigidity of the machine, work shape and requested accuracy.</p> <p>※3 Recommend to apply helical or ramping for approaching into axial direction.</p> <p>※4 Be careful to obtain uniform stock amount on cutting surface before using this tool.</p> <p>※5 In case of chattering etc., please adjust milling conditions if necessary.</p> <p>※6 If the cutting load is high at corners, etc., set the milling conditions and tool path carefully to reduce the cutting load.</p> <p>※7 Increase both spindle speed and feed at the same rate for high efficient machining.</p> <p>※8 If the maximum spindle speed of the machine tool is lower than the reference value, please reduce the spindle speed and feed rate in the same proportion.</p> <p>※9 Minimize a possible tool overhang length.</p> <p>※10 We recommend using oil mist coolant.</p> <p>※11 The stock allowance for this tool is a guideline, please adjust it according to the machining condition of the previous process and the required accuracy.</p>											



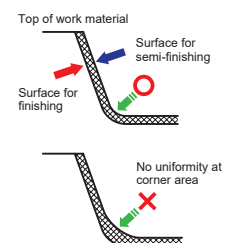
Points in Use

Advice on Cutting Environment

- Minimize the deflection of cutting edge.
- To understand the nature of the expansion of the main spindle and machine posture transformation, and take measures against them.

Advice on Finishing Allowance (stock amount)

- When using small CBN End Mill, **uniform finishing allowance (stock amount) is important.**
- When tool is used on roughing and semi-finishing and it has a big abrasion, finishing allowance (stock amount) on semi-finishing and finishing is increasing and it affects tool life and cutting accuracy. **Therefore, it is important to get uniform stock amount in the pre-stage cutting.**



Machining case

Composite press mold YXR7 (64HRC)

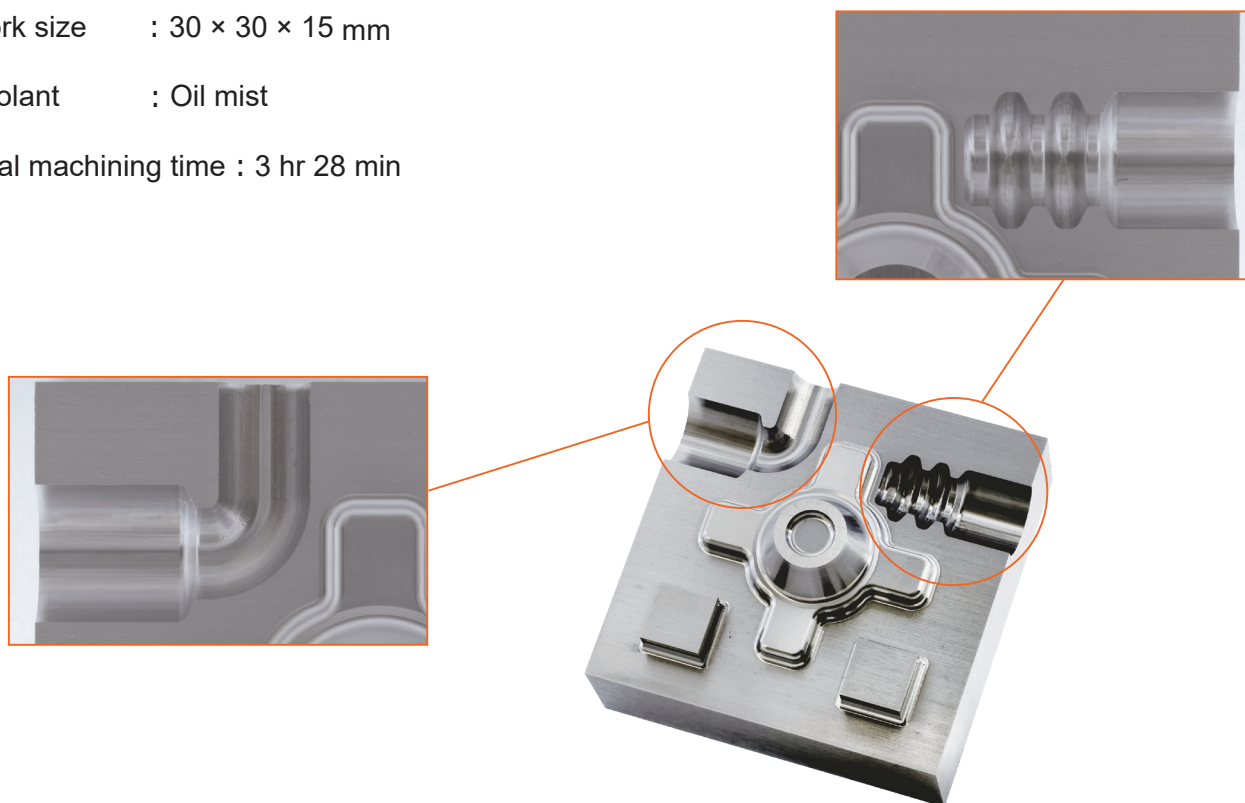
By using multi-flute tools, high efficient machining is realized with stable surface quality
Long tool life with minimal tool wear even when machining on difficult-to-cut materials

Work material : YXR7 (64HRC)

Work size : 30 × 30 × 15 mm

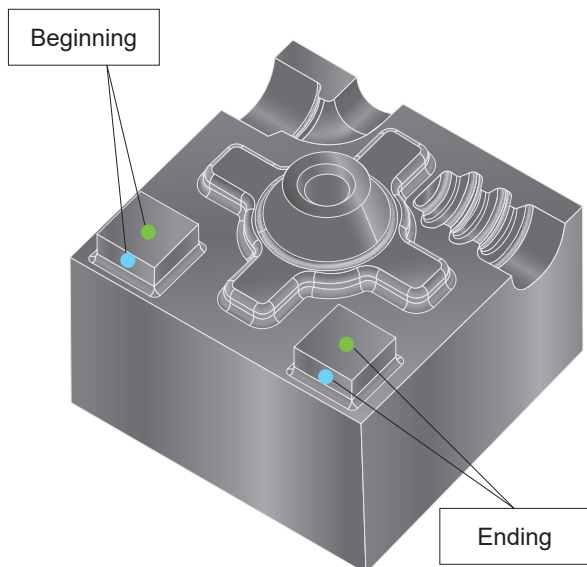
Coolant : Oil mist

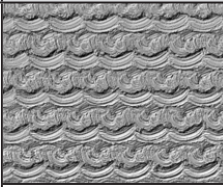
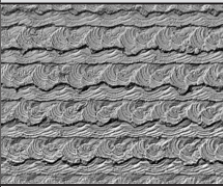
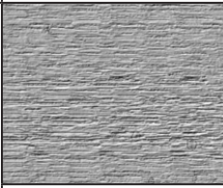
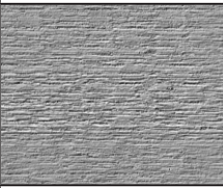
Total machining time : 3 hr 28 min



Process	Roughing	Semi-finishing	Stock removal	Semi-finishing	Finishing
Tool	MRBSH330 R1 × 3		MRBSH330 R0.5 × 2.5	MRBSH330 R0.5 × 2.5	SSPB320 R0.5 × 2.5
Spindle speed [min ⁻¹]	20,000		25,000		40,000
Feed [mm/min]	3,000	2,000	1,000	2,000	1,500
Depth of cut [mm] ap × ae	0.22 × 0.3	pf : 0.1	pf : 0.07	pf : 0.05	pf : 0.02
Stock [mm]	0.03			0.01	-
Machining time	53 min	9 min	25 min	32 min	1 hr 29 min

Surface Roughness



Measuring position	Beginning	Ending
Flat (0°)		
	Ra 0.604 μm	Ra 0.797 μm
Side (90°)		
	Ra 0.133 μm	Ra 0.164 μm

Tool wear

Process	Roughing+Semi-finishing	Stock removal	Semi-finishing	Finishing
Tool	MRBSH330 R1 × 3	MRBSH330 R0.5 × 2.5	MRBSH330 R0.5 × 2.5	SSPB320 R0.5 × 2.5
Rake side				
Peripheral cutting edge				
Near the center of the ball				

NS TOOL CO.,LTD.

www.ns-tool.com

6F., Sumitomo Fudosan Oimachi Ekimae Bldg.,
1-28-1 Oi, Shinagawa-ku, Tokyo 140-0014, Japan
TEL. +81-3-3774-2459 FAX. +81-3-3774-2460

NS TOOL USA, INC.

us.ns-tool.com

2265 Building # 3, Star CT.,
Rochester Hills, MI 48309, USA
TEL. +1-248-829-1960



Attention on Safety

- 1) When removing tools from cases, be careful of getting-out of tools and don't touch directly the cutting edges.
- 2) Never touch the cutting edges directly with bare hand.
- 3) Use safety covers and eye protection, as tools may be broken.
- 4) Use holders, etc. that match the tools and nature of the machining operations.
The tool should be firmly attached to the holder to prevent shaking.
- 5) The work materials clamp firmly.
- 6) Make sure of dimensions of tools and work pieces before starting operation.
- 7) It is necessary to adjust conditions according to the dimensions of work materials and the machine.
- 8) Select a cutting fluid appropriate to the particular usage. Using water-insoluble fluid could lead to fires due to sparks generated during machining or heat caused by breakage.
Ensure that you take proper fire-prevention measures.
- 9) If abnormal sound, etc. occurs during machining, stop the machine immediately.
- 10) Don't modify tools.

