Size **R0.05～R2**

CBN-LBF

CBN | 0° | R ±0.003 (R0.05～R1.5) | R ±0.005 (R2) | Shank Dia 0/-0.004 | Back Taper Geometry

Additional 6 models

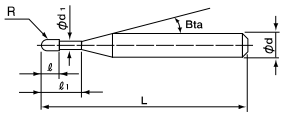
Material Applications（★ Highly Recommended ● Recommended ○ Suggested）

Work Material															
Carbon Steels S45C S55C	Alloy Steels SK / SCM SUS	Prehardened Steels NAK HPM	Hardened Steels ～50HRC	～55HRC	～60HRC	～65HRC	～70HRC	Cast Iron	Aluminum Alloys	Graphite	Copper	Plastics	Glass Filled Plastics	Titanium Alloys	Heat Resistant Alloys	Cemented Carbide	Hard Brittle (Non-Metallic) Materials
		○	●	●	●	●	●										

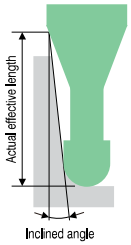
Label Sample

＃001 ϕD0.600 R+0.003/0.000

Diameter and Ball Radius accuracy measurments are printed on the label to support High Precision milling.



The shank taper angle shown is not an exact value and to avoid contact with the work piece, we recommend the user controls the precise value of this angle. Shank taper angle should not make contact with the work piece.



Features

For long tool life
Various lineup from R0.05 to R2.

Tool center line

Non helix angle design ensures high rigidity.

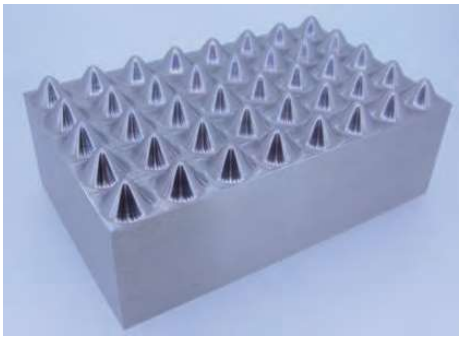
Reflector mold finishing
2 Flutes CBN-LBF R0.15 × EL0.9

SKD11（60HRC）

No.	Tool	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p (mm)	a_e (mm)	Cycle Time (h:m:s)
1	HSB R1.5	15,000	800	0.06	0.06	0:25:37
2	HSB R0.5	20,000	500	0.025	0.025	1:11:53
3	HSB R0.25	25,000	350	0.02	0.02	0:34:29
4	HSB R0.15	30,000	300	0.015	0.015	0:30:55
5	CBN-LBF R0.15 × EL0.9	30,000	300	0.008	0.008	3:48:13
					Total	6:31:07

Convex shaped finishing
2 Flutes　CBN-LBF/CBN-LBSF　R0.3 × EL1.5

STAVAX (52HRC)

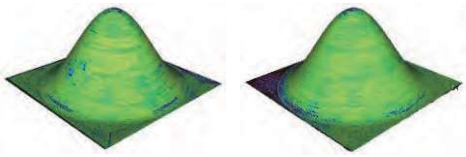


Work Size : 80 × 50 × 30 mm
Coolant : Oil mist

Process	Finishing
Milling Method	Contour spiral milling
Spindle Speed	30,000 min^{-1}
Feed Rate	800 mm/min
Cusp Height	0.0001 mm
a_e	0.015 mm
Cycle Time	9:48 h:m

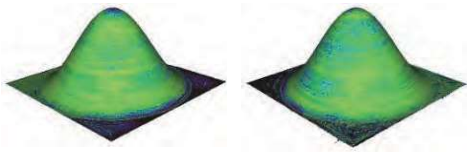
Work piece dimensional error after milling

For long tool life **CBN-LBF**

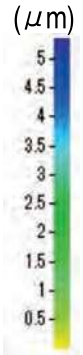


The 1st ridge　The 40th ridge

For super surface finish **CBN-LBSF**



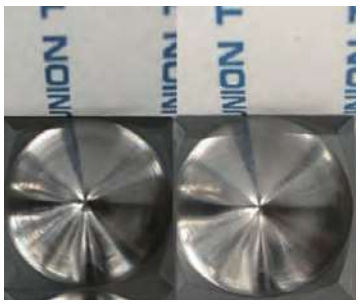
The 1st ridge　The 40th ridge



Both types are able to mill for a long time while maintaining accuracy.
Milling time 1 ridge : 12 min 30 sec, 40 ridges : 8 h 20 min,

Milling surface comparison

For long tool life **CBN-LBF**



The 1st ridge　The 40th ridge

CBN-LBF for high efficiency milling and long tool life.

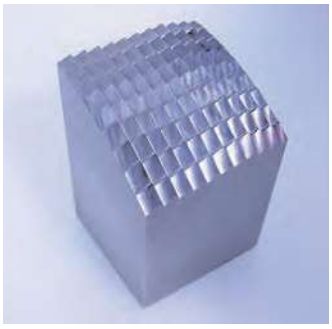
For super surface finish **CBN-LBSF**

The 1st ridge　The 40th ridge

CBN-LBSF offers shiny milling surfaces.

Reflector mold finishing
2 Flutes CBN-LBF R0.4 × EL2

STAVAX (52HRC)



CBN-LBF
Milling video of reflector mold for finishing

No	Process	Tool	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p (mm)	a_e (mm)	Cycle Time (h:m:s)
1	Roughing	HRRS φ6 × CR1 × EL18	3,500	2,500	0.2	2	0:18:00
2	Semi-roughing	HRRS φ6 × CR1 × EL18	9,000	2,500	0.05	0.1	0:13:35
3	Semi-roughing	HRRS φ2 × CR0.3 × EL6	3,500	1,000	0.04	1	0:33:55
4	Semi-finishing	HSB R1.5	12,000	2,500	0.02	0.07	0:12:24
5	Semi-finishing	HSB R0.75	7,000	1,000	0.04	0.07	0:20:50
6	Semi-finishing	HSB R0.75	7,000	700	0.05	0.05	0:18:08
7	Semi-finishing	HSB R0.5	8,000	500	0.02	0.03	0:23:24
8	Semi-finishing	HSB R0.5	15,000	1,200	0.02	0.03	1:30:33
9	Finishing	CBN-LBF R0.4 × EL2	26,000	800	0.01	0.004	10:12:54
						Total	14:03:43

Total 64 models

*Shank taper angle Bta is only for reference.

Unit (mm)

Model Number	Radius of Ball Nose R	Effective Length ℓ_1	Length of Cut ℓ	Neck Diameter ϕd_1	Shank Taper Angle Bta	Overall Length L	Shank Diameter ϕd	Suggested Retail Price ¥	Effective Length by Inclined Angles				
									30′	1°	1°30′	2°	3°
CBN-LBF 2001-003	R0.05	0.3	0.08	0.09	15°	50	4	42,400	0.30	0.30	0.30	0.30	0.33
CBN-LBF 2001-005		0.5				50	4	44,100	0.50	0.50	0.51	0.53	0.57
CBN-LBF 20015-0045	R0.075	0.45	0.15	0.14	15°	50	4	42,400	0.45	0.45	0.46	0.48	0.51
CBN-LBF 20015-0075		0.75				50	4	44,100	0.75	0.76	0.78	0.81	0.88
CBN-LBF 2002-003	R0.1	0.3	0.16	0.19	15°	50	4	28,800	0.30	0.30	0.30	0.30	0.32
CBN-LBF 2002-006		0.6				50	4	31,700	0.60	0.60	0.62	0.64	0.69
CBN-LBF 2002-010		1				50	4	33,300	1.00	1.03	1.06	1.10	1.19
CBN-LBF 2003-005	R0.15	0.5	0.24	0.28	15°	50	4	28,800	0.51	0.53	0.54	0.56	0.60
CBN-LBF 2003-0075		0.75				50	4	28,800	0.77	0.79	0.82	0.85	0.91
CBN-LBF 2003-009		0.9				50	4	31,700	0.91	0.94	0.96	1.00	1.06
CBN-LBF 2003-015		1.5				50	4	33,300	1.53	1.58	1.63	1.68	1.80
CBN-LBF 2004-005	R0.2	0.5	0.32	0.38	15°	50	4	27,700	0.51	0.52	0.54	0.55	0.58
CBN-LBF 2004-0075		0.75				50	4	27,700	0.77	0.79	0.81	0.84	0.90
CBN-LBF 2004-010		1				50	4	27,700	1.03	1.06	1.09	1.13	1.21
CBN-LBF 2004-012		1.2				50	4	28,800	1.22	1.25	1.29	1.33	1.42
CBN-LBF 2004-020		2				50	4	30,600	2.04	2.10	2.17	2.24	2.40
CBN-LBF 2004-030		3				50	4	33,300	3.07	3.17	3.27	3.38	3.62
CBN-LBF 2005-010	R0.25	1	0.4	0.48	15°	50	4	27,700	1.02	1.05	1.08	1.12	1.19
CBN-LBF 2005-015		1.5				50	4	28,800	1.53	1.57	1.62	1.66	1.78
CBN-LBF 2005-025		2.5				50	4	30,600	2.56	2.63	2.72	2.80	3.00
CBN-LBF 2005-035		3.5				50	4	32,200	3.59	3.70	3.82	3.94	4.22

Next Page ➡

Unit (mm)

Model Number	Radius of Ball Nose R	Effective Length ℓ1	Length of Cut ℓ	Neck Diameter φd1	Shank Taper Angle Bta	Overall Length L	Shank Diameter φd	Suggested Retail Price ¥	Effective Length by Inclined Angles				
									30′	1°	1°30′	2°	3°
CBN-LBF 2006-010	R0.3	1	0.48	0.58	15°	50	4	26,600	1.02	1.05	1.08	1.11	1.18
CBN-LBF 2006-015		1.5				50	4	26,600	1.52	1.57	1.61	1.66	1.76
CBN-LBF 2006-030		3				50	4	28,400	3.07	3.16	3.26	3.37	3.60
CBN-LBF 2006-040		4				50	4	28,400	4.10	4.23	4.36	4.50	4.82
CBN-LBF 2006-050		5				50	4	28,800	5.13	5.29	5.46	5.64	6.05
CBN-LBF 2006-060		6				50	4	31,600	6.17	6.36	6.56	6.78	7.27
CBN-LBF 2008-020	R0.4	2	0.6	0.78	15°	50	4	26,600	2.04	2.09	2.15	2.21	2.35
CBN-LBF 2008-040		4				50	4	28,400	4.10	4.22	4.35	4.49	4.80
CBN-LBF 2008-060		6				50	4	31,100	6.16	6.35	6.55	6.77	7.25
CBN-LBF 2010-015	R0.5	1.5	0.7	0.98	15°	50	4	26,600	1.53	1.57	1.61	1.66	1.76
CBN-LBF 2010-020		2				50	4	26,600	2.05	2.11	2.17	2.23	2.38
CBN-LBF 2010-025		2.5				50	4	26,600	2.56	2.63	2.70	2.78	2.96
CBN-LBF 2010-040		4				50	4	28,400	4.11	4.23	4.35	4.49	4.79
CBN-LBF 2010-050		5				50	4	28,400	5.14	5.29	5.45	5.63	6.02
CBN-LBF 2010-060		6				50	4	28,400	6.17	6.36	6.55	6.77	7.24
CBN-LBF 2010-080		8				50	4	28,800	8.23	8.49	8.76	9.04	9.69
CBN-LBF 2010-100		10				50	4	29,500	10.30	10.62	10.96	11.32	12.13
CBN-LBF 2012-024	R0.6	2.4	0.8	1.18	15°	50	4	27,700	2.46	2.53	2.60	2.68	2.85
CBN-LBF 2012-030		3				50	4	27,700	3.08	3.17	3.27	3.37	3.60
CBN-LBF 2012-060		6				50	4	32,200	6.18	6.38	6.59	6.82	7.33
CBN-LBF 2015-030	R0.75	3	0.9	1.46	15°	50	4	27,700	3.12	3.20	3.29	3.39	3.61
CBN-LBF 2015-040		4				50	4	27,700	4.15	4.27	4.40	4.54	4.85
CBN-LBF 2015-060		6				50	4	27,700	6.22	6.41	6.62	6.84	7.34
CBN-LBF 2015-080		8				50	4	30,600	8.28	8.55	8.83	9.14	9.83
CBN-LBF 2015-100		10				50	4	32,200	10.35	10.69	11.05	11.44	12.31
CBN-LBF 2015-120		12				50	4	32,200	12.42	12.83	13.27	13.74	14.80
CBN-LBF 2015-150		15				50	4	32,200	15.52	16.04	16.59	17.19	18.53
CBN-LBF 2020-040	R1	4	1.2	1.97	15°	50	4	27,700	4.12	4.23	4.35	4.48	4.77
CBN-LBF 2020-050		5				50	4	27,700	5.16	5.30	5.46	5.63	6.01
CBN-LBF 2020-060		6				50	4	27,700	6.19	6.37	6.57	6.78	7.26
CBN-LBF 2020-080		8				50	4	30,600	8.26	8.51	8.79	9.08	9.74
CBN-LBF 2020-100		10				50	4	30,600	10.32	10.65	11.00	11.38	12.23
CBN-LBF 2020-120		12				50	4	32,200	12.39	12.79	13.22	13.68	14.72
CBN-LBF 2020-140		14				50	4	32,700	14.46	14.93	15.44	15.98	17.20
CBN-LBF 2020-160		16				50	4	32,700	16.53	17.07	17.65	18.28	19.69
CBN-LBF 2020-180		18				50	4	32,700	18.59	19.21	19.87	20.58	No Interference
CBN-LBF 2020-200		20				50	4	32,700	20.66	21.35	22.09	22.88	No Interference
※ CBN-LBF 2030-040	R1.5	4	1.8	2.94	15°	50	6	29,260	4.16	4.26	4.36	4.47	4.72
※ CBN-LBF 2030-060		6				50	6	29,260	6.23	6.40	6.58	6.77	7.21
※ CBN-LBF 2030-080		8				50	6	29,260	8.30	8.54	8.79	9.07	9.70
※ CBN-LBF 2040-060	R2	6	2.4	3.95	15°	50	6	35,320	6.21	6.36	6.52	6.70	7.09
※ CBN-LBF 2040-080		8				50	6	35,320	8.28	8.50	8.74	9.00	9.57
※ CBN-LBF 2040-100		10				50	6	35,320	10.35	10.64	10.96	11.30	12.06

※Additional model

Milling Conditions for CBN-LBF

WORK MATERIAL			HEAT-TREATED STEELS / HARDENED STEELS STAVAX (~52HRC)				HARDENED STEELS SKD11 (~62HRC)				HARDENED STEELS HAP10 / HAP72 (~68HRC)			
Model Number	Radius of Ball Nose (mm)	Effective Length (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)
2001-003	**R0.05**	0.3	30,000	200	0.005	0.005	30,000	150	0.003	0.005	30,000	100	0.002	0.005
2001-005		0.5	30,000	150	0.003	0.005	30,000	120	0.003	0.005	30,000	90	0.002	0.005
20015-0045	**R0.075**	0.45	30,000	350	0.005	0.005	30,000	270	0.004	0.005	30,000	200	0.003	0.005
20015-0075		0.75	30,000	220	0.004	0.005	30,000	160	0.004	0.005	30,000	100	0.003	0.005
2002-003	**R0.1**	0.3	30,000	660	0.005	0.005	30,000	550	0.005	0.005	30,000	440	0.005	0.005
2002-006		0.6	30,000	500	0.005	0.005	30,000	400	0.005	0.005	30,000	300	0.005	0.005
2002-010		1	30,000	290	0.005	0.005	30,000	200	0.005	0.005	30,000	120	0.005	0.005
2003-005	**R0.15**	0.5	30,000	1,000	0.005	0.005	30,000	950	0.005	0.005	30,000	620	0.005	0.005
2003-0075		0.75	30,000	850	0.005	0.005	30,000	800	0.005	0.005	30,000	500	0.005	0.005
2003-009		0.9	30,000	760	0.005	0.005	30,000	600	0.005	0.005	30,000	430	0.005	0.005
2003-015		1.5	30,000	460	0.005	0.005	30,000	320	0.005	0.005	30,000	190	0.005	0.005
2004-005	**R0.2**	0.5	30,000	1,580	0.005	0.01	30,000	1,330	0.005	0.01	30,000	860	0.005	0.005
2004-0075		0.75	30,000	1,390	0.005	0.01	30,000	1,140	0.005	0.01	30,000	800	0.005	0.005
2004-010		1	30,000	1,200	0.005	0.01	30,000	950	0.005	0.01	30,000	730	0.005	0.005
2004-012		1.2	30,000	1,050	0.005	0.01	30,000	800	0.005	0.01	30,000	620	0.005	0.005
2004-020		2	30,000	600	0.005	0.01	30,000	450	0.005	0.01	30,000	330	0.005	0.005
2004-030		3	20,000	400	0.005	0.005	20,000	300	0.005	0.005	20,000	190	0.003	0.003
2005-010	**R0.25**	1	30,000	1,600	0.01	0.01	30,000	1,300	0.01	0.01	30,000	920	0.005	0.01
2005-015		1.5	30,000	1,300	0.01	0.01	30,000	1,000	0.01	0.01	30,000	760	0.005	0.01
2005-025		2.5	30,000	800	0.01	0.01	30,000	700	0.01	0.01	30,000	480	0.005	0.01
2005-035		3.5	22,000	550	0.01	0.01	22,000	500	0.005	0.01	22,000	330	0.005	0.005
2006-010	**R0.3**	1	30,000	2,400	0.02	0.03	30,000	1,900	0.02	0.03	30,000	1,080	0.01	0.02
2006-015		1.5	30,000	2,000	0.02	0.03	30,000	1,500	0.02	0.03	30,000	1,000	0.01	0.02
2006-030		3	26,000	1,100	0.02	0.02	26,000	900	0.02	0.02	26,000	760	0.01	0.01
2006-040		4	22,000	750	0.01	0.02	22,000	650	0.01	0.02	22,000	570	0.005	0.01
2006-050		5	18,000	550	0.01	0.01	18,000	450	0.01	0.01	18,000	410	0.005	0.005
2006-060		6	12,000	350	0.005	0.01	12,000	290	0.005	0.005	12,000	260	0.003	0.003
2008-020	**R0.4**	2	30,000	2,500	0.02	0.03	30,000	2,100	0.02	0.03	30,000	1,700	0.01	0.02
2008-040		4	25,000	1,500	0.02	0.02	25,000	1,350	0.02	0.02	25,000	1,200	0.01	0.01
2008-060		6	18,000	1,000	0.01	0.02	18,000	800	0.01	0.02	18,000	750	0.005	0.01
2010-015	**R0.5**	1.5	30,000	3,700	0.04	0.05	30,000	3,400	0.03	0.04	30,000	2,300	0.025	0.03
2010-020		2	30,000	3,500	0.04	0.04	30,000	3,200	0.03	0.04	30,000	2,200	0.02	0.03
2010-025		2.5	30,000	3,300	0.04	0.04	30,000	3,000	0.03	0.04	30,000	2,100	0.02	0.03
2010-040		4	27,000	2,700	0.03	0.04	27,000	2,300	0.03	0.03	27,000	1,800	0.02	0.02
2010-050		5	23,000	2,200	0.03	0.03	23,000	1,800	0.03	0.03	23,000	1,450	0.02	0.02
2010-060		6	20,000	1,900	0.02	0.03	20,000	1,500	0.02	0.03	20,000	1,200	0.01	0.02
2010-080		8	14,000	1,300	0.01	0.02	14,000	1,000	0.01	0.02	14,000	800	0.01	0.01
2010-100		10	9,000	800	0.01	0.02	9,000	600	0.01	0.01	9,000	490	0.005	0.005

Milling Conditions for CBN-LBF

WORK MATERIAL			HEAT-TREATED STEELS / HARDENED STEELS STAVAX (~52HRC)				HARDENED STEELS SKD11 (~62HRC)				HARDENED STEELS HAP10 / HAP72 (~68HRC)			
Model Number	Radius of Ball Nose (mm)	Effective Length (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)
2012-024	**R0.6**	2.4	30,000	3,000	0.05	0.05	29,500	2,550	0.035	0.04	29,000	2,100	0.02	0.03
2012-030		3	30,000	2,750	0.05	0.05	29,000	2,350	0.035	0.035	28,000	2,000	0.02	0.025
2012-060		6	23,500	2,000	0.03	0.03	23,500	1,650	0.025	0.025	23,500	1,300	0.02	0.02
2015-030	**R0.75**	3	30,000	3,000	0.07	0.07	28,500	2,550	0.045	0.05	27,000	2,100	0.02	0.03
2015-040		4	28,500	2,750	0.06	0.06	27,250	2,300	0.04	0.04	26,000	1,900	0.02	0.025
2015-060		6	26,000	2,200	0.04	0.045	25,500	1,900	0.03	0.03	25,000	1,650	0.02	0.02
2015-080		8	24,000	2,000	0.025	0.03	24,000	1,700	0.02	0.025	24,000	1,400	0.015	0.02
2015-100		10	16,000	1,300	0.02	0.02	16,000	1,100	0.015	0.018	16,000	900	0.01	0.015
2015-120		12	12,000	1,000	0.016	0.018	12,000	880	0.012	0.016	12,000	730	0.008	0.012
2015-150		15	6,000	600	0.01	0.015	6,000	550	0.008	0.012	6,000	490	0.005	0.008
2020-040	**R1**	4	30,000	3,000	0.1	0.1	27,000	2,550	0.06	0.065	24,000	2,100	0.02	0.03
2020-050		5	28,000	2,750	0.08	0.08	26,000	2,300	0.05	0.05	24,000	1,900	0.02	0.025
2020-060		6	27,000	2,500	0.05	0.06	25,500	2,050	0.035	0.04	24,000	1,650	0.015	0.025
2020-080		8	25,000	2,200	0.035	0.045	24,500	1,800	0.025	0.03	24,000	1,400	0.015	0.02
2020-100		10	24,000	2,000	0.02	0.03	24,000	1,600	0.015	0.025	24,000	1,200	0.01	0.02
2020-120		12	19,500	1,600	0.017	0.025	19,500	1,300	0.013	0.021	19,500	1,000	0.009	0.017
2020-140		14	15,000	1,250	0.015	0.02	15,000	1,050	0.012	0.018	15,000	850	0.008	0.015
2020-160		16	11,500	990	0.013	0.017	11,500	860	0.011	0.015	11,500	730	0.007	0.013
2020-180		18	8,000	740	0.012	0.013	8,000	670	0.009	0.013	8,000	610	0.006	0.012
2020-200		20	4,500	490	0.01	0.01	4,500	490	0.008	0.01	4,500	490	0.005	0.01
2030-040	**R1.5**	4	20,000	2,500	0.1	0.15	18,000	2,200	0.06	0.09	16,000	1,900	0.04	0.06
2030-060		6	20,000	2,500	0.1	0.15	18,000	2,200	0.06	0.09	16,000	1,900	0.04	0.06
2030-080		8	18,000	2,200	0.08	0.12	17,000	2,000	0.05	0.075	16,000	1,650	0.04	0.05
2040-060	**R2**	6	17,000	2,500	0.12	0.18	15,000	2,200	0.08	0.12	13,000	1,900	0.05	0.08
2040-080		8	17,000	2,500	0.12	0.18	15,000	2,200	0.08	0.12	13,000	1,900	0.05	0.08
2040-100		10	16,000	2,200	0.1	0.15	14,000	2,000	0.06	0.09	13,000	1,650	0.05	0.08

Note:
・Decrease both spindle speed and feed rate proportionally when the milling parameters exceed the machine's maximum spindle speed.
・Recommend oil mist to avoid tool damage.