Size R0.05～R6

CSEB

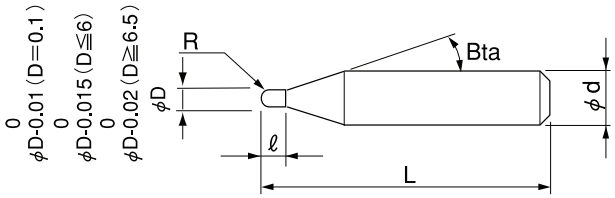
Super MG | UT COAT | Shank Dia 0/-0.005

Material Applications（☆ Highly Recommended ◎ Recommended ○ Suggested）

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

Features

The robust geometry offers durability when roughing, yet gives excellent surface quality for finishing.
The multi-layered UTCOAT resists wear though improved hardness, durability and coating adhesion to the tool.
Broad application range from raw materials to Hardened Steels (55HRC).



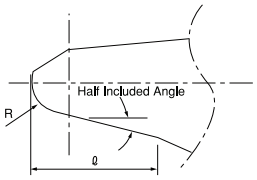
The shank taper angle shown is not an exact value and to avoid contact with the work piece, we recommend the user controls the precise value of this angle. Shank taper angle should not make contact with the work piece.

Radius of Ball Nose	Diameter Tolerance	Ballend Radius Tolerance	Helix Angle	Number of Flutes
R0.05	0/-0.01	R ±0.002	0°	2 Flutes *
R0.1 ～ R3	0/-0.015	R ±0.005	30°	
R3.25 ～ R6	0/-0.02	R ±0.007		

* Only CSEB1001-0020-6 has single flute.
R accuracy and diameter tolerance is same as R0.1.

ATTENTION

CSEB1001-0020-6 is a tapered ball end mill with single tapered flute of 10°(See the figure on right).



Total 77 models

Unit（mm）

Model Number	Radius of Ball Nose R	Length of Cut ℓ	Shank Taper Angle Bta	Overall Length L	Shank Diameter φd	Price ¥
CSEB 1001-0020-6	R0.05	0.2	11°	50	6	13,320
CSEB 2001-0010	R0.05	0.1	11°	50	4	12,120
CSEB 2002-0020-6	R0.1	0.2	11°	50	6	9,840
CSEB 2002-0030		0.3	11°	50	4	8,520
CSEB 2003-0030	R0.15	0.3	11°	50	4	6,960
CSEB 2003-0030-6		0.3	11°	50	6	8,400
CSEB 2003-0045		0.45	11°	50	4	6,960
CSEB 2004-0040	R0.2	0.4	11°	50	4	4,680
CSEB 2004-0040-6		0.4	11°	50	6	6,120
CSEB 2004-0060		0.6	11°	50	4	4,680
CSEB 2005-0050	R0.25	0.5	11°	50	4	4,320
CSEB 2005-0050-6		0.5	11°	50	6	5,760
CSEB 2005-0075		0.75	11°	50	4	4,320
CSEB 2006-0060	R0.3	0.6	11°	50	4	4,200
CSEB 2006-0060-6		0.6	11°	50	6	5,520
CSEB 2006-0090		0.9	11°	50	4	4,200
CSEB 2007-0100	R0.35	1	11°	50	4	8,000
CSEB 2008-0080	R0.4	0.8	11°	50	4	4,200
CSEB 2008-0080-6		0.8	11°	50	6	5,520
CSEB 2008-0120		1.2	11°	50	4	4,200

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Unit（mm）

Model Number	Radius of Ball Nose R	Length of Cut ℓ	Shank Taper Angle Bta	Overall Length L	Shank Diameter φd	Price ¥
CSEB 2009-0130	R0.45	1.3	11°	50	4	8,000
CSEB 2010-0100	R0.5	1	11°	50	4	3,840
CSEB 2010-0100-6		1	11°	50	6	5,160
CSEB 2010-0150		1.5	11°	50	4	3,840
CSEB 2010-0250		2.5	11°	50	4	3,840
CSEB 2011-0160	R0.55	1.6	11°	50	4	9,280
CSEB 2012-0180	R0.6	1.8	11°	50	4	5,400
CSEB 2013-0190	R0.65	1.9	11°	50	4	9,280
CSEB 2014-0210	R0.7	2.1	11°	50	4	5,400
CSEB 2015-0150	R0.75	1.5	11°	50	4	4,680
CSEB 2015-0150-6		1.5	11°	50	6	6,000
CSEB 2015-0200		2	11°	50	4	4,680
CSEB 2015-0225		2.25	11°	50	4	4,680
CSEB 2015-0400		4	11°	50	4	4,680
CSEB 2016-0240	R0.8	2.4	11°	50	4	5,400
CSEB 2017-0250	R0.85	2.5	11°	50	4	9,280
CSEB 2018-0270	R0.9	2.7	11°	50	4	8,000
CSEB 2019-0280	R0.95	2.8	11°	50	4	9,280
CSEB 2020-0200	R1	2	11°	50	4	3,480
CSEB 2020-0200-6		2	11°	60	6	4,680
CSEB 2020-0300		3	11°	60	4	3,480
CSEB 2020-0600		6	11°	60	4	3,480
CSEB 2025-0250	R1.25	2.5	11°	50	4	5,950
CSEB 2025-0250-6		2.5	11°	60	6	7,200
CSEB 2025-0375		3.75	11°	50	4	5,950
CSEB 2025-0600		6	11°	60	4	5,950
CSEB 2030-0300	R1.5	3	11°	50	6	4,200
CSEB 2030-0450		4.5	11°	70	6	4,200
CSEB 2030-0800		8	11°	70	6	4,200
CSEB 2035-0520	R1.75	5.2	11°	70	6	7,800
CSEB 2040-0400	R2	4	11°	50	6	4,800
CSEB 2040-0600		6	11°	70	6	4,800
CSEB 2040-0800		8	11°	70	6	4,800
CSEB 2045-0670	R2.25	6.7	11°	70	6	10,610
CSEB 2050-0500	R2.5	5	11°	50	6	5,710
CSEB 2050-0750		7.5	11°	80	6	5,760
CSEB 2050-0800		8	11°	80	6	5,760
CSEB 2050-1200		12	11°	80	6	5,760
CSEB 2055-0820	R2.75	8.2	11°	80	6	11,660
CSEB 2060-0600	R3	6	—	50	6	5,940
CSEB 2060-0900		9	—	80	6	6,000
CSEB 2060-1200		12	—	80	6	6,000
CSEB 2065-0970	R3.25	9.7	11°	90	8	13,200
CSEB 2070-1050	R3.5	10.5	11°	90	8	10,560
CSEB 2075-1120	R3.75	11.2	11°	90	8	13,200
CSEB 2080-0800	R4	8	—	60	8	9,270
CSEB 2080-1200		12	—	90	8	9,360
CSEB 2080-1400		14	—	90	8	9,360
CSEB 2085-1270	R4.25	12.7	11°	100	10	14,630
CSEB 2090-1350	R4.5	13.5	11°	100	10	14,630
CSEB 2100-1000	R5	10	—	70	10	12,110
CSEB 2100-1500		15	—	100	10	12,240
CSEB 2100-1800		18	—	100	10	12,240
CSEB 2110-1650	R5.5	16.5	11°	110	12	24,420
CSEB 2120-1200	R6	12	—	75	12	20,580
CSEB 2120-1800		18	—	110	12	20,790
CSEB 2120-2200		22	—	110	12	20,790

Milling Conditions for CSEB

WORK MATERIAL			COPPER / ALUMINUM ALLOYS				CARBON STEELS / ALLOY STEELS S45C / S50C / SK / SCM (~325HB)				PREHARDENED STEELS NAK80 / STAVAX / HPM38 (30~45HRC)				HARDENED STEELS STAVAX / HPM38 / SKD61 (45~55HRC)			
Model Number	Radius of Ball Nose (mm)	Length of Cut (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)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)
1001-0020-6	R0.05	0.2	30,000	30	0.002 or smaller	0.02	30,000	30	0.002 or smaller	0.02	30,000	30	0.002 or smaller	0.02	30,000	30	0.002 or smaller	0.02
2001-0010		0.1	30,000	200	0.004 or smaller	0.04	30,000	200	0.004 or smaller	0.04	30,000	200	0.004 or smaller	0.04	30,000	200	0.004 or smaller	0.04
2002-0020-6	R0.1	0.2	60,000	350	0.008	0.024	60,000	350	0.008	0.016	60,000	300	0.008	0.024	60,000	300	0.006	0.018
2002-0030		0.3	60,000	350	0.008	0.024	60,000	350	0.008	0.016	60,000	300	0.008	0.024	60,000	300	0.006	0.018
2003-0030(-6)	R0.15	0.3	43,000	500	0.012	0.036	43,000	500	0.012	0.024	54,000	450	0.012	0.036	43,000	450	0.008	0.024
2003-0045		0.45	43,000	500	0.012	0.036	43,000	500	0.012	0.024	54,000	450	0.012	0.036	43,000	450	0.008	0.024
2004-0040(-6)	R0.2	0.4	35,000	1,200	0.03	0.09	35,000	1,200	0.02	0.04	50,000	650	0.025	0.075	35,000	650	0.015	0.045
2004-0060		0.6	35,000	1,200	0.03	0.09	35,000	1,200	0.02	0.04	50,000	650	0.025	0.075	35,000	650	0.015	0.045
2005-0050(-6)	R0.25	0.5	34,000	1,300	0.035	0.105	34,000	1,300	0.03	0.06	45,000	900	0.03	0.09	32,000	900	0.02	0.06
2005-0075		0.75	34,000	1,300	0.035	0.105	34,000	1,300	0.03	0.06	45,000	900	0.03	0.09	32,000	900	0.02	0.06
2006-0060(-6)	R0.3	0.6	33,000	1,500	0.05	0.15	33,000	1,500	0.04	0.08	40,000	1,300	0.045	0.09	30,000	1,300	0.04	0.06
2006-0090		0.9	33,000	1,500	0.05	0.15	33,000	1,500	0.04	0.08	40,000	1,300	0.045	0.09	30,000	1,300	0.04	0.06
2007-0100	R0.35	1	32,000	1,800	0.07	0.21	32,000	1,600	0.05	0.1	38,000	1,600	0.06	0.12	28,000	1,600	0.05	0.075
2008-0080(-6)	R0.4	0.8	30,000	2,200	0.1	0.3	30,000	1,800	0.06	0.12	35,000	1,800	0.07	0.14	25,000	1,700	0.07	0.1
2008-0120		1.2	30,000	2,200	0.1	0.3	30,000	1,800	0.06	0.12	35,000	1,800	0.07	0.14	25,000	1,700	0.07	0.1
2009-0130	R0.45	1.3	30,000	2,100	0.11	0.33	30,000	1,600	0.07	0.14	33,000	1,700	0.08	0.16	24,000	1,600	0.08	0.12
2010-0100(-6)	R0.5	1	30,000	2,000	0.12	0.36	30,000	1,600	0.08	0.16	30,000	1,600	0.09	0.18	22,000	1,600	0.09	0.13
2010-0150		1.5	30,000	2,000	0.12	0.36	30,000	1,600	0.08	0.16	30,000	1,500	0.09	0.18	22,000	1,600	0.09	0.13
2010-0250		2.5	30,000	1,700	0.09	0.27	24,000	1,400	0.06	0.12	30,000	1,300	0.075	0.15	21,500	1,300	0.075	0.1
2011-0160	R0.55	1.6	30,000	2,000	0.12	0.36	30,000	1,600	0.08	0.16	30,000	1,600	0.09	0.18	20,000	1,600	0.09	0.13
2012-0180	R0.6	1.8	30,000	2,000	0.13	0.39	30,000	1,600	0.09	0.18	30,000	1,600	0.1	0.2	18,000	1,600	0.1	0.15
2013-0190	R0.65	1.9	30,000	2,000	0.13	0.39	30,000	1,600	0.09	0.18	30,000	1,700	0.1	0.2	18,000	1,500	0.1	0.15
2014-0210	R0.7	2.1	30,000	2,000	0.14	0.42	30,000	1,500	0.1	0.2	30,000	1,700	0.11	0.2	18,000	1,500	0.11	0.16
2015-0150(-6)	R0.75	1.5	30,000	2,000	0.15	0.45	30,000	1,600	0.12	0.24	30,000	1,700	0.12	0.24	18,000	1,500	0.12	0.18
2015-0200		2	30,000	2,000	0.15	0.45	30,000	1,600	0.12	0.24	30,000	1,700	0.12	0.24	18,000	1,500	0.12	0.18
2015-0225		2.25	30,000	2,000	0.15	0.45	30,000	1,600	0.12	0.24	30,000	1,700	0.12	0.24	18,000	1,500	0.12	0.18
2015-0400		4	30,000	1,800	0.12	0.36	23,000	1,200	0.08	0.16	30,000	1,400	0.1	0.2	15,000	1,200	0.09	0.13
2016-0240	R0.8	2.4	30,000	2,000	0.16	0.48	30,000	1,600	0.12	0.24	30,000	1,800	0.12	0.36	18,000	1,400	0.1	0.2
2017-0250	R0.85	2.5	30,000	2,000	0.17	0.51	30,000	1,700	0.14	0.28	30,000	1,800	0.14	0.42	18,000	1,400	0.12	0.24
2018-0270	R0.9	2.7	30,000	2,000	0.18	0.54	30,000	1,800	0.16	0.32	30,000	1,900	0.16	0.48	16,000	1,300	0.14	0.28
2019-0280	R0.95	2.8	30,000	2,000	0.19	0.57	30,000	1,900	0.18	0.36	30,000	1,900	0.18	0.54	16,000	1,300	0.16	0.32
2020-0200(-6)	R1	2	30,000	2,000	0.2	0.6	30,000	2,000	0.21	0.42	30,000	2,000	0.2	0.6	16,000	1,300	0.17	0.5
2020-0300		3	30,000	2,000	0.2	0.6	30,000	2,000	0.21	0.42	30,000	2,000	0.2	0.6	16,000	1,300	0.17	0.5
2020-0600		6	30,000	2,000	0.2	0.6	30,000	2,000	0.14	0.42	30,000	2,000	0.13	0.45	10,800	850	0.1	0.4

Milling Conditions for CSEB

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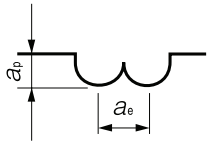
Model Number	Radius of Ball Nose (mm)	Length of Cut (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)
2025-0250(-6)		2.5	27,000	2,300	0.28	0.75	27,000	2,300	0.25	0.5	27,000	2,300	0.25	0.75	13,000	1,100	0.21	0.63
2025-0375	**R1.25**	3.75	27,000	2,300	0.28	0.75	27,000	2,300	0.25	0.5	27,000	2,300	0.25	0.75	13,000	1,100	0.21	0.63
2025-0600		6	25,000	2,100	0.26	0.67	25,000	2,100	0.23	0.46	24,000	2,000	0.2	0.65	11,000	930	0.14	0.44
2030-0300		3	24,000	2,500	0.32	0.9	24,000	2,500	0.32	0.9	24,000	2,500	0.3	0.9	14,000	1,400	0.25	0.76
2030-0450	**R1.5**	4.5	24,000	2,500	0.32	0.9	24,000	2,500	0.32	0.9	24,000	2,500	0.3	0.9	14,000	1,400	0.25	0.76
2030-0800		8	22,000	2,300	0.28	0.7	22,000	2,300	0.28	0.7	20,000	2,000	0.2	0.65	10,700	1,000	0.18	0.54
2035-0520	**R1.75**	5.2	24,000	2,700	0.35	1	24,000	2,700	0.35	1	21,000	2,400	0.35	1	12,000	1,700	0.3	0.9
2040-0400		4	24,000	2,900	0.4	1.2	24,000	2,900	0.4	1.2	18,000	2,400	0.4	1.2	11,000	2,000	0.34	1
2040-0600	**R2**	6	24,000	2,900	0.4	1.2	24,000	2,900	0.4	1.2	18,000	2,400	0.4	1.2	11,000	2,000	0.34	1
2040-0800		8	24,000	2,900	0.4	1.2	24,000	2,900	0.4	1.2	18,000	2,400	0.4	1.2	11,000	2,000	0.34	1
2045-0670	**R2.25**	6.7	21,000	3,000	0.45	1.3	21,000	3,000	0.45	1.3	16,000	2,400	0.42	1.2	10,000	1,900	0.38	1.1
2050-0500		5	18,000	3,000	0.5	1.5	18,000	3,000	0.5	1.5	13,000	2,400	0.45	1.4	9,000	1,800	0.42	1.2
2050-0750	**R2.5**	7.5	18,000	3,000	0.5	1.5	18,000	3,000	0.5	1.5	13,000	2,400	0.45	1.4	9,000	1,800	0.42	1.2
2050-0800		8	18,000	3,000	0.5	1.5	18,000	3,000	0.5	1.5	13,000	2,400	0.45	1.4	9,000	1,800	0.42	1.2
2050-1200		12	18,000	3,000	0.5	1.5	18,000	3,000	0.5	1.5	13,000	2,400	0.45	1.4	9,000	1,800	0.42	1.2
2055-0820	**R2.75**	8.2	17,000	3,000	0.55	1.6	17,000	3,000	0.55	1.6	12,000	2,400	0.5	1.5	8,500	1,800	0.45	1.3
2060-0600		6	16,000	3,100	0.6	1.8	16,000	3,100	0.6	1.8	11,000	2,310	0.55	1.7	7,500	1,800	0.5	1.5
2060-0900	**R3**	9	16,000	3,100	0.6	1.8	16,000	3,100	0.6	1.8	11,000	2,310	0.55	1.7	7,500	1,800	0.5	1.5
2060-1200		12	16,000	3,100	0.6	1.8	16,000	3,100	0.6	1.8	11,000	2,310	0.55	1.7	7,500	1,800	0.5	1.5
2065-0970	**R3.25**	9.7	15,000	3,100	0.65	1.95	15,000	3,100	0.65	1.95	10,000	2,200	0.59	1.8	7,000	1,800	0.54	1.6
2070-1050	**R3.5**	10.5	14,000	3,200	0.7	2.1	14,000	3,200	0.7	2.1	9,000	2,100	0.63	1.9	6,500	1,800	0.57	1.7
2075-1120	**R3.75**	11.2	13,000	3,300	0.75	2.25	13,000	3,300	0.75	2.25	8,200	2,000	0.67	2	6,000	1,800	0.6	1.8
2080-0800		8	12,000	3,300	0.8	2.4	12,000	3,300	0.8	2.4	7,400	1,900	0.72	2.2	5,700	1,800	0.65	2
2080-1200	**R4**	12	12,000	3,300	0.8	2.4	12,000	3,300	0.8	2.4	7,400	1,900	0.72	2.2	5,700	1,800	0.65	2
2080-1400		14	12,000	3,300	0.8	2.4	12,000	3,300	0.8	2.4	7,400	1,900	0.72	2.2	5,700	1,800	0.65	2
2085-1270	**R4.25**	12.7	12,000	3,300	0.85	2.55	12,000	3,300	0.85	2.55	6,800	1,800	0.75	2.3	5,400	1,700	0.7	2.1
2090-1350	**R4.5**	13.5	11,000	3,400	0.9	2.7	11,000	3,400	0.9	2.7	6,300	1,700	0.8	2.4	5,100	1,600	0.75	2.2
2100-1000		10	10,000	3,500	1	3	10,000	3,500	1	3	5,200	1,650	0.9	2.7	4,600	1,500	0.85	2.5
2100-1500	**R5**	15	10,000	3,500	1	3	10,000	3,500	1	3	5,200	1,650	0.9	2.7	4,600	1,500	0.85	2.5
2100-1800		18	10,000	3,500	1	3	10,000	3,500	1	3	5,200	1,650	0.9	2.7	4,600	1,500	0.85	2.5
2110-1650	**R5.5**	16.5	9,000	3,400	1.1	3.3	9,000	3,400	1.1	3.3	4,700	1,500	1	3	4,200	1,350	0.9	2.7
2120-1200		12	8,400	3,300	1.2	3.6	8,400	3,300	1.2	3.6	4,300	1,350	1.1	3.2	3,800	1,250	1	3
2120-1800	**R6**	18	8,400	3,300	1.2	3.6	8,400	3,300	1.2	3.6	4,300	1,350	1.1	3.2	3,800	1,250	1	3
2120-2200		22	8,400	3,300	1.2	3.6	8,400	3,300	1.2	3.6	4,300	1,350	1.1	3.2	3,800	1,250	1	3

Note:
- Decrease the feed rate more than 50% from the milling parameters when slot milling.
- Decrease both spindle speed and feed rate proportionally when the milling parameters exceed the machine's maximum spindle speed, or when burr and red-hot occur.
- Recommend oil coolant for Stainless Steels and Heat Resistant Steels.
- Recommend wet coolant for Copper.

*** Refer to page 427 for tool geometry.**



a_p : Axial Depth (mm)
a_e : Radial Depth (mm) = P_f

Milling Example: STAVAX (52HRC) Roughing

◆Contribution of Helix Ball & Small Relief CSEB 2010-0150

CSEB

Competitor

Tool Overhang: 15 mm	Spindle Speed: 30,000 min^{-1}
Feed Ratre: 666 mm/min	Axial Depth: 0.05 mm
Radial Depth: 0.21 mm	Coolant: Air Blow (Nozzle)
Cycle Time: 30 min	Pocket Size: 20 × 20 × 0.5 mm

Milling Example: STAVAX (30HRC) Roughing

◆Contribution of Helix Ball & Small Relief CSEB 2060-0900

CSEB

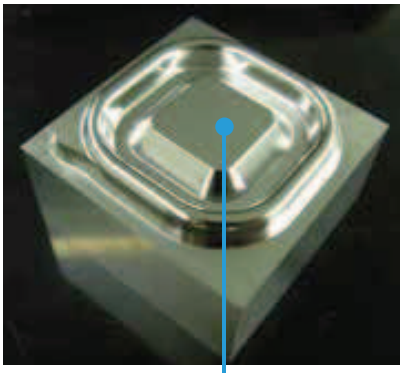
Competitor

Tool Overhang: 23 mm	Spindle Speed: 16,000 min^{-1}
Feed Ratre: 3,380 mm/min	Axial Depth: 0.6 mm
Radial Depth: 1.8 mm	Coolant: Water Soluble (Nozzle)
Cycle Time: 120 min	Milling Shape: Tapered Circle x 40 pockets
Pocket Size: R12 mm (top) x 17 mm depth (Pocket tapered angle: 10°)	

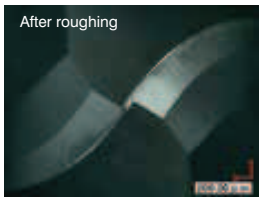
* Refer to page 427 for tool geometry.

Milling Example: HPM38 (53HRC) Plastic Mold

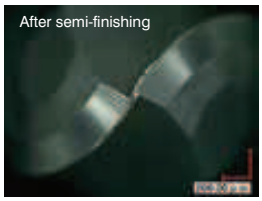
◆Optimized Ball Tip Effect



CSEB 2040-0600

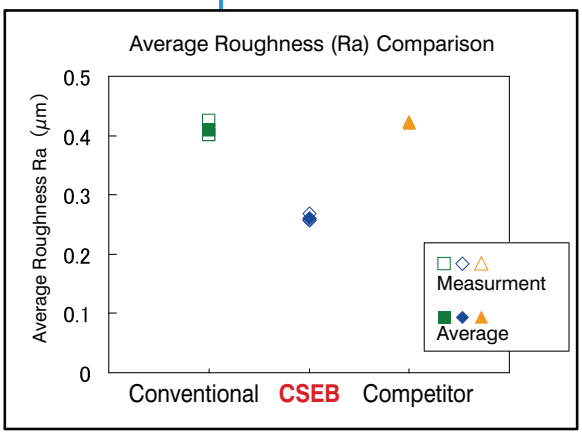


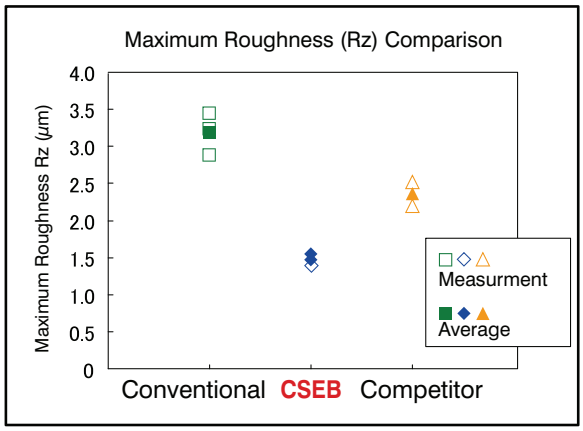
CSEB 2020-0300



CSEB 2010-0150

Work Size
50 mm × 50 mm × 30 mm





Optimized ball tip, combined with the smooth surface and small relief, offers outstanding a nano-smooth surface on finishing.

No	Process	Tool (Radius of Ball Nose × Length of Cut)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	Axial Depth a_p (mm)	Radial Depth a_e (mm)	Overhang (mm)	Cycle Time (min)	Coolant
1	Roughing	CSEB2040-0600 (R2×6)	11,000	2,000	0.34	1	15	0:31:21	Air Blow
2	Semi-finishing	CSEB2020-0300 (R1×3)	16,000	1,300	0.17	0.5	13	0:03:10	Air Blow
3	Semi-finishing	CSEB2020-0300 (R1×3)	16,000	1,300	0.1	0.1	13	0:16:47	Air Blow
4	Semi-finishing	CSEB2020-0300 (R1×3)	16,000	1,300	0.01	0.1	13	0:37:00	Oil Mist
5	Finishing	CSEB2010-0150 (R0.5×1.5)	22,000	1,300	0.04	0.18	12	0:05:06	Oil Mist
6	Finishing	CSEB2010-0150 (R0.5×1.5)	22,000	700	0.05	0.05	12	0:59:36	Oil Mist
7	Finishing	CSEB2010-0150 (R0.5×1.5)	22,000	700	0.01	0.05	12	0:30:43	Oil Mist