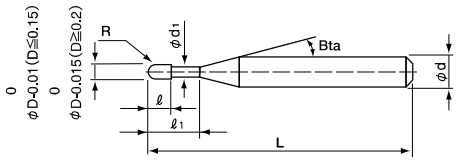
Size **R0.05～R3**

CSELB

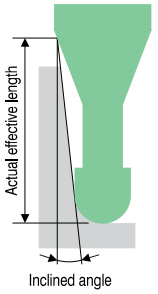
Super MG | UT COAT | Shank Dia 0/-0.005 | Back Taper Geometry

Material Applications（★ Highly Recommended ● Recommended ○ Suggested）

Work Material																
Carbon Steels S45C S55C	Alloy Steels SK / SCM SUS	Prehardened Steels NAK HPM	Hardened Steels ～50HRC	Hardened Steels ～55HRC	Hardened Steels ～60HRC	Hardened Steels ～65HRC	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
●	●	●	●	●				○	●		●			○	○		



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.

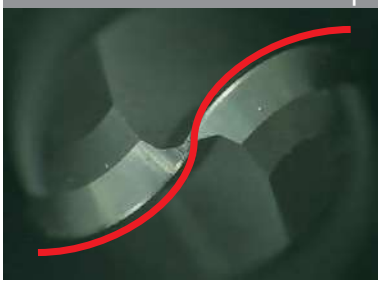


Radius of Ball Nose	Diameter Tolerance	Ball Radius Accuracy	Helix Angle
R0.05～R0.075	0/-0.01	±0.002	0°
R0.1～R3	0/-0.015	±0.005	30°

3 features of CSELB

Reduce cutting resistance and prioritize surface quality.
Recommended for milling on hardened steels (55HRC) - sticky materials, materials that prone to chatter marks.

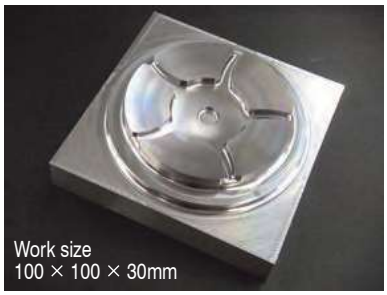
Less resistance on curved surface shape



Small relief surface

Tip design with excellent cutting performance

Wheel shape PX5 (30HRC)



Coolant: Water soluble

Tool

2 flute ball
CSEB (P432)

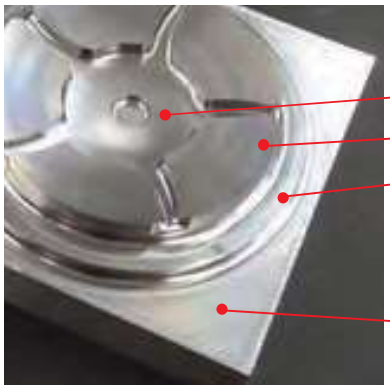
2 flute long neck ball
CSELB

4 flute highly efficient radius
CRRS (P390)

No	Process	Tool	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p (mm)	a_e (mm)	Allowance (mm)	Cycle Time (h:m:s)
1	Roughing	CSEB R3	11,000	2,300	0.55	1.7	0.1	0:56:56
2		CSELB R2 × EL12	18,000	2,400	0.4	1.2	0.03	0:00:43
3	Semi-finishing	CSELB R2 × EL12	18,000	3,000	0.18	–	0.03	0:13:08
4					0.2	–	0.03	0:01:54
5					–	0.12	0.03	0:18:57
6		CSELB R1 × EL8	30,000	2,000	0.1	0.1	0.03	0:17:26

No	Process	Tool	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p (mm)	a_e (mm)	Allowance (mm)	Cycle Time (h:m:s)
7	Finishing	CRRS ϕ 6 × CR1	8,000	1,000	0.05	1	0	0:14:00
8		CSELB R1 × EL8	30,000	2,000	0.04	–	–	2:31:37
9					0.04	–	–	0:16:16
10					–	0.03	–	0:59:37
11					0.04	0.04	–	0:02:11
							Total	5:52:45

Measurement of finishing roughness



CSELB Long neck ball R1 × EL8

Canter	Ra 0.396
Radius	Ra 0.421
Side	Ra 0.118

CRRS 4 flute highly efficient radius ϕ6 × CR1

Flat surface	Ra 0.091

Finishing with CSEB/CSELB offers uniform milling surface.

Total 325 models

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°
CSELB 2001-002	R0.05	0.2	0.08	0.095	11°	45	4	11,630	0.22	0.24	0.26	0.28	0.31
CSELB 2001-003		0.3				45	4	11,630	0.33	0.35	0.38	0.40	0.45
CSELB 2001-005		0.5				45	4	12,540	0.54	0.58	0.61	0.64	0.72
CSELB 20015-003	R0.075	0.3	0.12	0.135	11°	45	4	13,450	0.36	0.38	0.40	0.42	0.48
CSELB 20015-005		0.5				45	4	14,250	0.58	0.60	0.63	0.67	0.75
CSELB 20015-010		1				45	4	14,820	1.10	1.15	1.21	1.28	1.43
CSELB 2002-003	R0.1	0.3	0.16	0.19	11°	45	4	8,090	0.40	0.42	0.44	0.46	0.52
CSELB 2002-005		0.5				45	4	8,090	0.61	0.64	0.67	0.71	0.79
CSELB 2002-005-6		0.5				50	6	11,290	0.61	0.64	0.67	0.71	0.79
CSELB 2002-0075		0.75				45	4	8,090	0.87	0.92	0.96	1.01	1.13
CSELB 2002-010		1				45	4	8,090	1.14	1.19	1.25	1.32	1.48
CSELB 2002-010-6		1				50	6	11,290	1.14	1.19	1.25	1.32	1.48
CSELB 2002-0125		1.25				45	4	8,780	1.39	1.45	1.53	1.61	1.80
CSELB 2002-015		1.5				45	4	8,780	1.65	1.73	1.81	1.91	2.14
CSELB 2002-015-6		1.5				50	6	12,250	1.65	1.73	1.81	1.91	2.14
CSELB 2002-0175		1.75				45	4	9,690	1.91	2.00	2.10	2.22	2.49
CSELB 2002-020		2				45	4	9,690	2.17	2.28	2.39	2.52	2.83
CSELB 2002-020-6		2				50	6	13,520	2.17	2.28	2.39	2.52	2.83
CSELB 2002-0225		2.25				45	4	10,600	2.43	2.55	2.68	2.83	3.17
CSELB 2002-025		2.5				45	4	10,600	2.69	2.83	2.97	3.13	3.51
CSELB 2002-030		3				45	4	11,400	3.22	3.37	3.55	3.74	4.20
CSELB 2003-005	R0.15	0.5	0.24	0.29	11°	45	4	7,980	0.61	0.64	0.67	0.70	0.77
CSELB 2003-006		0.6				45	4	7,980	0.71	0.75	0.78	0.82	0.91
CSELB 2003-0075		0.75				45	4	7,980	0.87	0.91	0.95	1.00	1.12
CSELB 2003-010		1				45	4	7,980	1.13	1.19	1.24	1.31	1.46
CSELB 2003-010-6		1				50	6	10,830	1.13	1.19	1.24	1.31	1.46
CSELB 2003-0125		1.25				45	4	8,550	1.38	1.45	1.52	1.60	1.78
CSELB 2003-015		1.5				45	4	8,550	1.64	1.72	1.81	1.90	2.12
CSELB 2003-015-6		1.5				50	6	11,860	1.64	1.72	1.81	1.90	2.12
CSELB 2003-0175		1.75				45	4	8,550	1.91	2.00	2.10	2.21	2.47
CSELB 2003-020		2				45	4	8,550	2.17	2.27	2.38	2.51	2.81
CSELB 2003-020-6		2				50	6	11,860	2.17	2.27	2.38	2.51	2.81
CSELB 2003-0225		2.25				45	4	8,780	2.43	2.55	2.67	2.82	3.15
CSELB 2003-025		2.5				45	4	8,780	2.69	2.82	2.96	3.12	3.49
CSELB 2003-030		3				45	4	8,780	3.22	3.37	3.54	3.73	4.18
CSELB 2003-040		4				45	4	9,120	4.26	4.47	4.70	4.95	5.55
CSELB 2003-050		5				45	4	10,260	5.31	5.57	5.85	6.17	6.92

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°
CSELB 2004-005		0.5				45	4	5,470	0.61	0.63	0.66	0.69	0.76
CSELB 2004-0075		0.75				45	4	5,470	0.87	0.91	0.95	0.99	1.10
CSELB 2004-010		1				45	4	5,470	1.13	1.18	1.24	1.30	1.44
CSELB 2004-010-6		1				50	6	7,980	1.13	1.18	1.24	1.30	1.44
CSELB 2004-0125		1.25				45	4	5,590	1.38	1.44	1.51	1.59	1.76
CSELB 2004-015		1.5				45	4	5,590	1.64	1.72	1.80	1.89	2.11
CSELB 2004-015-6		1.5				50	6	8,090	1.64	1.72	1.80	1.89	2.11
CSELB 2004-0175		1.75				45	4	5,700	1.90	1.99	2.09	2.19	2.45
CSELB 2004-020		2				45	4	5,700	2.17	2.27	2.38	2.50	2.79
CSELB 2004-020-6		2				50	6	8,320	2.17	2.27	2.38	2.50	2.79
CSELB 2004-0225	R0.2	2.25	0.32	0.39	11°	45	4	5,930	2.43	2.54	2.67	2.80	3.13
CSELB 2004-025		2.5				45	4	5,930	2.69	2.82	2.95	3.11	3.48
CSELB 2004-025-6		2.5				50	6	8,550	2.69	2.82	2.95	3.11	3.48
CSELB 2004-030		3				45	4	6,270	3.21	3.36	3.53	3.72	4.16
CSELB 2004-030-6		3				50	6	9,120	3.21	3.36	3.53	3.72	4.16
CSELB 2004-035		3.5				45	4	6,840	3.74	3.91	4.11	4.33	4.85
CSELB 2004-040		4				45	4	6,840	4.26	4.46	4.69	4.94	5.53
CSELB 2004-040-6		4				50	6	9,300	4.26	4.46	4.69	4.94	5.53
CSELB 2004-045		4.5				45	4	7,180	4.78	5.01	5.27	5.55	6.21
CSELB 2004-050		5				45	4	7,180	5.31	5.56	5.84	6.16	6.90
CSELB 2004-060		6				45	4	8,320	6.35	6.66	7.00	7.38	8.27
CSELB 2005-010		1				45	4	5,470	1.13	1.17	1.23	1.28	1.42
CSELB 2005-0125		1.25				45	4	5,470	1.38	1.43	1.50	1.57	1.74
CSELB 2005-015		1.5				45	4	5,470	1.64	1.71	1.79	1.88	2.09
CSELB 2005-015-6		1.5				50	6	7,980	1.64	1.71	1.79	1.88	2.09
CSELB 2005-0175		1.75				45	4	5,470	1.90	1.98	2.08	2.18	2.43
CSELB 2005-020		2				45	4	5,470	2.16	2.26	2.37	2.49	2.77
CSELB 2005-020-6		2				50	6	7,980	2.16	2.26	2.37	2.49	2.77
CSELB 2005-0225		2.25				45	4	5,470	2.42	2.53	2.65	2.79	3.11
CSELB 2005-025		2.5				45	4	5,470	2.68	2.81	2.94	3.10	3.45
CSELB 2005-025-6		2.5				50	6	7,980	2.68	2.81	2.94	3.10	3.45
CSELB 2005-030		3				45	4	5,470	3.21	3.36	3.52	3.70	4.14
CSELB 2005-030-6	R0.25	3	0.4	0.49	11°	50	6	7,980	3.21	3.36	3.52	3.70	4.14
CSELB 2005-035		3.5				45	4	5,470	3.73	3.91	4.10	4.31	4.82
CSELB 2005-040		4				45	4	5,470	4.25	4.46	4.68	4.92	5.51
CSELB 2005-040-6		4				50	6	7,980	4.25	4.46	4.68	4.92	5.51
CSELB 2005-045		4.5				45	4	5,590	4.78	5.00	5.26	5.53	6.19
CSELB 2005-050		5				45	4	5,590	5.30	5.55	5.83	6.14	6.88
CSELB 2005-055		5.5				45	4	5,700	5.83	6.10	6.41	6.75	7.56
CSELB 2005-060		6				45	4	5,700	6.35	6.65	6.99	7.36	8.25
CSELB 2005-070		7				45	4	6,840	7.40	7.75	8.14	8.58	9.62
CSELB 2005-080		8				45	4	6,840	8.44	8.85	9.30	9.80	10.99
CSELB 2005-090		9				45	4	7,980	9.49	9.95	10.46	11.02	12.35
CSELB 2005-100		10				50	4	8,500	10.54	11.05	11.61	12.24	13.72

Next Page ➡

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°
CSELB 2006-010		1				45	4	4,670	1.12	1.17	1.22	1.27	1.40
CSELB 2006-0125		1.25				45	4	4,220	1.37	1.43	1.49	1.56	1.73
CSELB 2006-015		1.5				45	4	4,220	1.63	1.70	1.78	1.87	2.07
CSELB 2006-015-6		1.5				50	6	6,380	1.63	1.70	1.78	1.87	2.07
CSELB 2006-0175		1.75				45	4	4,220	1.90	1.98	2.07	2.17	2.41
CSELB 2006-020		2				45	4	4,220	2.16	2.25	2.36	2.48	2.75
CSELB 2006-020-6		2				50	6	6,380	2.16	2.25	2.36	2.48	2.75
CSELB 2006-0225		2.25				45	4	4,330	2.42	2.53	2.65	2.78	3.09
CSELB 2006-025		2.5				45	4	4,330	2.68	2.80	2.94	3.08	3.44
CSELB 2006-025-6		2.5				50	6	6,380	2.68	2.80	2.94	3.08	3.44
CSELB 2006-030		3				45	4	4,330	3.21	3.35	3.51	3.69	4.12
CSELB 2006-030-6		3				50	6	6,500	3.21	3.35	3.51	3.69	4.12
CSELB 2006-035		3.5				45	4	4,450	3.73	3.90	4.09	4.30	4.81
CSELB 2006-040		4				45	4	4,450	4.25	4.45	4.67	4.91	5.49
CSELB 2006-040-6	R0.3	4	0.48	0.59	11°	50	6	6,730	4.25	4.45	4.67	4.91	5.49
CSELB 2006-045		4.5				45	4	4,450	4.78	5.00	5.25	5.52	6.18
CSELB 2006-050		5				45	4	4,450	5.30	5.55	5.83	6.13	6.86
CSELB 2006-050-6		5				50	6	6,730	5.30	5.55	5.83	6.13	6.86
CSELB 2006-055		5.5				45	4	4,450	5.82	6.10	6.40	6.74	7.54
CSELB 2006-060		6				45	4	4,450	6.35	6.65	6.98	7.35	8.23
CSELB 2006-060-6		6				50	6	6,730	6.35	6.65	6.98	7.35	8.23
CSELB 2006-065		6.5				45	4	5,020	6.87	7.20	7.56	7.96	8.91
CSELB 2006-070		7				45	4	5,020	7.39	7.75	8.14	8.57	9.60
CSELB 2006-080		8				45	4	5,930	8.44	8.85	9.29	9.79	10.97
CSELB 2006-080-6		8				50	6	8,550	8.44	8.85	9.29	9.79	10.97
CSELB 2006-090		9				45	4	6,270	9.49	9.94	10.45	11.01	12.34
CSELB 2006-100		10				50	4	6,040	10.53	11.04	11.60	12.23	13.71
CSELB 2006-100-6		10				50	6	9,120	10.53	11.04	11.60	12.23	13.71
CSELB 2006-120		12				50	4	6,840	12.63	13.24	13.92	14.66	16.44
CSELB 2007-020		2				45	4	4,220	2.16	2.25	2.35	2.46	2.73
CSELB 2007-040	R0.35	4	0.56	0.69	11°	45	4	4,450	4.25	4.45	4.66	4.90	5.47
CSELB 2007-060		6				45	4	4,450	6.34	6.64	6.97	7.34	8.21
CSELB 2007-080		8				45	4	4,450	8.44	8.84	9.28	9.78	10.95
CSELB 2008-020		2				45	4	4,220	2.15	2.24	2.34	2.45	2.72
CSELB 2008-020-6		2				50	6	6,380	2.15	2.24	2.34	2.45	2.72
CSELB 2008-030		3				45	4	4,450	3.20	3.34	3.50	3.67	4.09
CSELB 2008-030-6		3				50	6	6,730	3.20	3.34	3.50	3.67	4.09
CSELB 2008-040		4				45	4	4,450	4.25	4.44	4.65	4.89	5.45
CSELB 2008-040-6		4				50	6	6,730	4.25	4.44	4.65	4.89	5.45
CSELB 2008-050		5				45	4	4,450	5.29	5.54	5.81	6.11	6.82
CSELB 2008-060		6				45	4	4,450	6.34	6.64	6.97	7.33	8.19
CSELB 2008-060-6	R0.4	6	0.64	0.79	11°	50	6	6,730	6.34	6.64	6.97	7.33	8.19
CSELB 2008-070		7				45	4	4,450	7.39	7.74	8.12	8.55	9.56
CSELB 2008-080		8				45	4	4,450	8.44	8.84	9.28	9.77	10.93
CSELB 2008-080-6		8				50	6	6,730	8.44	8.84	9.28	9.77	10.93
CSELB 2008-090		9				45	4	5,930	9.48	9.93	10.43	10.99	12.30
CSELB 2008-100		10				50	4	5,930	10.53	11.03	11.59	12.21	13.67
CSELB 2008-100-6		10				50	6	8,550	10.53	11.03	11.59	12.21	13.67
CSELB 2008-120		12				45	4	7,300	12.62	13.23	13.90	14.64	16.41
CSELB 2008-160		16				50	4	9,990	16.81	17.62	18.52	19.52	21.88

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°
CSELB 2009-020		2				45	4	4,220	2.15	2.24	2.34	2.44	2.70
CSELB 2009-040		4				45	4	4,450	4.25	4.44	4.65	4.88	5.44
CSELB 2009-060		6				45	4	4,450	6.34	6.63	6.96	7.32	8.17
CSELB 2009-080		8				45	4	4,450	8.43	8.83	9.27	9.76	10.91
CSELB 2009-100	R0.45	10	0.72	0.89	11°	45	4	5,930	10.53	11.03	11.58	12.19	13.65
CSELB 2009-120		12				45	4	7,300	12.62	13.23	13.89	14.63	16.39
CSELB 2009-140		14				50	4	8,460	14.72	15.42	16.20	17.07	19.13
CSELB 2009-160		16				50	4	9,990	16.81	17.62	18.51	19.51	21.87
CSELB 2009-180		18				55	4	9,990	18.90	19.82	20.83	21.95	24.60
CSELB 2010-020		2				45	4	3,530	2.17	2.25	2.35	2.45	2.70
CSELB 2010-025		2.5				45	4	3,530	2.69	2.80	2.92	3.06	3.39
CSELB 2010-030		3				45	4	3,530	3.21	3.35	3.50	3.67	4.07
CSELB 2010-030-6		3				50	6	5,590	3.21	3.35	3.50	3.67	4.07
CSELB 2010-040		4				45	4	3,990	4.26	4.45	4.66	4.89	5.44
CSELB 2010-040-6		4				50	6	6,160	4.26	4.45	4.66	4.89	5.44
CSELB 2010-050		5				45	4	3,990	5.31	5.55	5.81	6.11	6.81
CSELB 2010-050-6		5				50	6	6,160	5.31	5.55	5.81	6.11	6.81
CSELB 2010-060		6				45	4	4,330	6.35	6.65	6.97	7.33	8.18
CSELB 2010-060-6		6				50	6	6,500	6.35	6.65	6.97	7.33	8.18
CSELB 2010-070		7				45	4	4,330	7.40	7.74	8.12	8.55	9.55
CSELB 2010-070-6		7				50	6	6,500	7.40	7.74	8.12	8.55	9.55
CSELB 2010-080		8				45	4	4,330	8.45	8.84	9.28	9.76	10.92
CSELB 2010-080-6	R0.5	8	0.8	0.98	11°	50	6	6,500	8.45	8.84	9.28	9.76	10.92
CSELB 2010-090		9				45	4	4,330	9.49	9.94	10.44	10.98	12.29
CSELB 2010-100		10				45	4	4,330	10.54	11.04	11.59	12.20	13.65
CSELB 2010-100-6		10				50	6	6,500	10.54	11.04	11.59	12.20	13.65
CSELB 2010-120		12				45	4	4,330	12.64	13.24	13.90	14.64	16.39
CSELB 2010-120-6		12				50	6	6,500	12.64	13.24	13.90	14.64	16.39
CSELB 2010-140		14				50	4	5,020	14.73	15.43	16.21	17.08	19.13
CSELB 2010-140-6		14				60	6	7,070	14.73	15.43	16.21	17.08	19.13
CSELB 2010-160		16				50	4	5,930	16.82	17.63	18.53	19.52	21.87
CSELB 2010-160-6		16				60	6	8,550	16.82	17.63	18.53	19.52	21.87
CSELB 2010-180		18				55	4	5,930	18.92	19.83	20.84	21.95	24.61
CSELB 2010-200		20				55	4	7,180	21.01	22.03	23.15	24.39	27.35
CSELB 2010-200-6		20				70	6	10,150	21.01	22.03	23.15	24.39	27.35
CSELB 2010-220-6		22				70	6	10,600	23.11	24.22	25.46	26.83	30.08
CSELB 2012-025		2.5				45	4	5,360	2.58	2.68	2.80	2.92	3.22
CSELB 2012-040		4				45	4	5,360	4.15	4.33	4.53	4.75	5.27
CSELB 2012-060		6				45	4	5,810	6.25	6.53	6.84	7.19	8.01
CSELB 2012-060-6		6				50	6	8,270	6.25	6.53	6.84	7.19	8.01
CSELB 2012-080		8				45	4	5,810	8.34	8.73	9.15	9.63	10.75
CSELB 2012-080-6		8				50	6	8,270	8.34	8.73	9.15	9.63	10.75
CSELB 2012-100		10				45	4	5,810	10.44	10.92	11.46	12.06	13.49
CSELB 2012-100-6	R0.6	10	0.96	1.19	11°	50	6	8,270	10.44	10.92	11.46	12.06	13.49
CSELB 2012-120		12				45	4	5,810	12.53	13.12	13.78	14.50	16.23
CSELB 2012-120-6		12				50	6	8,270	12.53	13.12	13.78	14.50	16.23
CSELB 2012-140		14				50	4	6,270	14.62	15.32	16.09	16.94	18.96
CSELB 2012-160		16				50	4	6,840	16.72	17.52	18.40	19.38	21.70
CSELB 2012-160-6		16				60	6	9,410	16.72	17.52	18.40	19.38	21.70
CSELB 2012-180		18				55	4	7,410	18.81	19.71	20.71	21.82	24.44
CSELB 2012-200		20				60	4	7,410	20.91	21.91	23.02	24.25	27.18

Next Page ➡

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°
CSELB 2014-060	R0.7	6	1.12	1.37	11°	45	4	5,020	6.30	6.58	6.89	7.23	8.04
CSELB 2014-080		8				45	4	5,020	8.39	8.77	9.20	9.67	10.78
CSELB 2014-120		12				45	4	5,020	12.58	13.17	13.82	14.54	16.26
CSELB 2014-160		16				50	4	5,020	16.77	17.56	18.44	19.42	21.74
CSELB 2015-030	R0.75	3	1.2	1.47	11°	45	4	4,100	3.15	3.28	3.41	3.56	3.92
CSELB 2015-040		4				45	4	4,100	4.20	4.37	4.57	4.78	5.29
CSELB 2015-060		6				45	4	4,100	6.29	6.57	6.88	7.22	8.03
CSELB 2015-060-6		6				50	6	6,610	6.29	6.57	6.88	7.22	8.03
CSELB 2015-080		8				45	4	4,330	8.39	8.77	9.19	9.66	10.77
CSELB 2015-080-6		8				50	6	6,610	8.39	8.77	9.19	9.66	10.77
CSELB 2015-100		10				45	4	4,670	10.48	10.97	11.50	12.09	13.50
CSELB 2015-100-6		10				50	6	6,610	10.48	10.97	11.50	12.09	13.50
CSELB 2015-120		12				45	4	5,020	12.58	13.16	13.81	14.53	16.24
CSELB 2015-120-6		12				50	6	7,520	12.58	13.16	13.81	14.53	16.24
CSELB 2015-140		14				50	4	5,020	14.67	15.36	16.12	16.97	18.98
CSELB 2015-160		16				50	4	5,020	16.76	17.56	18.43	19.41	21.72
CSELB 2015-160-6		16				60	6	7,520	16.76	17.56	18.43	19.41	21.72
CSELB 2015-180		18				55	4	5,020	18.86	19.76	20.75	21.85	24.46
CSELB 2015-200		20				55	4	5,020	20.95	21.95	23.06	24.28	No Interference
CSELB 2015-200-6		20				60	6	7,520	20.95	21.95	23.06	24.28	27.19
CSELB 2015-220		22				55	4	5,020	23.05	24.15	25.37	26.72	No Interference
CSELB 2015-250		25				65	4	7,000	26.19	27.45	28.84	30.38	No Interference
CSELB 2015-300		30				70	4	8,210	31.42	32.94	34.61	36.47	No Interference
CSELB 2016-040	R0.8	4	1.28	1.58	11°	45	4	5,700	4.17	4.34	4.53	4.74	5.24
CSELB 2016-080		8				45	4	5,810	8.36	8.74	9.15	9.61	10.71
CSELB 2016-120		12				45	4	5,810	12.55	13.13	13.77	14.49	16.19
CSELB 2016-160		16				50	4	5,810	16.74	17.53	18.40	19.37	21.66
CSELB 2016-200		20				55	4	5,810	20.92	21.92	23.02	24.24	No Interference
CSELB 2018-040	R0.9	4	1.44	1.78	11°	45	4	4,750	4.17	4.33	4.51	4.72	5.20
CSELB 2018-060		6				45	4	4,750	6.26	6.53	6.83	7.15	7.94
CSELB 2018-080		8				45	4	5,020	8.35	8.73	9.14	9.59	10.68
CSELB 2018-100		10				45	4	5,020	10.45	10.92	11.45	12.03	13.41
CSELB 2018-120		12				45	4	5,020	12.54	13.12	13.76	14.47	16.15
CSELB 2018-160		16				50	4	5,020	16.73	17.52	18.38	19.34	21.63
CSELB 2018-180		18				55	4	5,020	18.82	19.71	20.69	21.78	No Interference
CSELB 2018-200		20				55	4	5,020	20.92	21.91	23.00	24.22	No Interference
CSELB 2018-220		22				60	4	6,870	23.01	24.11	25.32	26.66	No Interference
CSELB 2018-250		25				65	4	7,000	26.15	27.40	28.78	30.32	No Interference
CSELB 2018-300		30				70	4	7,930	31.39	32.90	34.56	No Interference	No Interference

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°
CSELB 2020-030	R1	3	1.6	1.98	11°	45	4	3,530	3.11	3.22	3.34	3.48	3.79
CSELB 2020-040		4				45	4	3,530	4.16	4.32	4.50	4.70	5.16
CSELB 2020-040-6		4				50	6	5,590	4.16	4.32	4.50	4.70	5.16
CSELB 2020-060		6				45	4	3,990	6.26	6.52	6.81	7.13	7.90
CSELB 2020-060-6		6				50	6	6,040	6.26	6.52	6.81	7.13	7.90
CSELB 2020-080		8				45	4	4,330	8.35	8.72	9.12	9.57	10.64
CSELB 2020-080-6		8				50	6	6,500	8.35	8.72	9.12	9.57	10.64
CSELB 2020-100		10				45	4	4,330	10.44	10.91	11.43	12.01	13.38
CSELB 2020-100-6		10				50	6	6,500	10.44	10.91	11.43	12.01	13.38
CSELB 2020-120		12				45	4	4,330	12.54	13.11	13.74	14.45	16.12
CSELB 2020-120-6		12				50	6	6,500	12.54	13.11	13.74	14.45	16.12
CSELB 2020-130		13				45	4	4,330	13.59	14.21	14.90	15.67	17.49
CSELB 2020-140		14				50	4	4,330	14.63	15.31	16.06	16.89	18.85
CSELB 2020-160		16				50	4	4,330	16.73	17.51	18.37	19.32	No Interference
CSELB 2020-160-6		16				60	6	6,500	16.73	17.51	18.37	19.32	21.59
CSELB 2020-180		18				55	4	4,330	18.82	19.70	20.68	21.76	No Interference
CSELB 2020-200		20				55	4	4,330	20.91	21.90	22.99	24.20	No Interference
CSELB 2020-200-6		20				70	6	6,500	20.91	21.90	22.99	24.20	27.07
CSELB 2020-220		22				60	4	5,930	23.01	24.10	25.30	26.64	No Interference
CSELB 2020-250		25				65	4	6,040	26.15	27.39	28.77	No Interference	No Interference
CSELB 2020-250-6		25				80	6	8,550	26.15	27.39	28.77	30.29	33.92
CSELB 2020-270		27				65	4	6,040	28.24	29.59	31.08	No Interference	No Interference
CSELB 2020-300		30				70	4	6,840	31.38	32.89	34.55	No Interference	No Interference
CSELB 2020-300-6		30				80	6	9,690	31.38	32.89	34.55	36.39	No Interference
CSELB 2020-320		32				70	4	6,840	33.48	35.08	36.86	No Interference	No Interference
CSELB 2020-350		35				80	4	9,350	36.62	38.38	No Interference	No Interference	No Interference
CSELB 2020-350-6		35				80	6	12,650	36.62	38.38	40.32	42.48	No Interference
CSELB 2020-400		40				80	4	9,350	41.85	43.87	No Interference	No Interference	No Interference
CSELB 2020-400-6		40				90	6	12,650	41.85	43.87	46.10	48.58	No Interference
CSELB 2025-060	R1.25	6	2	2.45	11°	45	4	4,670	6.33	6.58	6.86	7.17	7.92
CSELB 2025-080		8				45	4	4,700	8.42	8.78	9.17	9.61	10.66
CSELB 2025-100		10				45	4	4,900	10.51	10.97	11.48	12.05	13.39
CSELB 2025-150		15				50	4	5,810	15.75	16.47	17.26	18.14	No Interference
CSELB 2025-200		20				55	4	6,840	20.98	21.96	23.04	No Interference	No Interference
CSELB 2025-250		25				65	4	7,300	26.22	27.45	28.82	No Interference	No Interference
CSELB 2025-300		30				70	4	7,300	31.45	32.95	No Interference	No Interference	No Interference
CSELB 2025-350		35				70	4	8,440	36.69	38.44	No Interference	No Interference	No Interference
CSELB 2030-060	R1.5	6	2.4	2.95	11°	60	6	4,330	6.31	6.55	6.82	7.12	7.83
CSELB 2030-060-3		6			—	60	3	3,990	No Interference	No Interference	No Interference	No Interference	No Interference
CSELB 2030-060-4		6			11°	60	4	3,990	6.31	6.55	6.82	7.12	7.83
CSELB 2030-080		8				60	6	4,330	8.41	8.75	9.13	9.56	10.57
CSELB 2030-100		10				60	6	5,020	10.50	10.95	11.44	12.00	13.30
CSELB 2030-120		12				60	6	5,240	12.60	13.15	13.76	14.43	16.04
CSELB 2030-140		14				60	6	5,810	14.69	15.34	16.07	16.87	18.78
CSELB 2030-150		15				60	6	5,700	15.74	16.44	17.22	18.09	20.15
CSELB 2030-160		16				60	6	5,810	16.78	17.54	18.38	19.31	21.52
CSELB 2030-180		18				60	6	5,810	18.88	19.74	20.69	21.75	24.26
CSELB 2030-200		20				70	6	5,590	20.97	21.94	23.00	24.19	27.00
CSELB 2030-220		22				70	6	5,590	23.07	24.13	25.31	26.62	29.73
CSELB 2030-250		25				70	6	5,590	26.21	27.43	28.78	30.28	No Interference
CSELB 2030-270		27				70	6	5,590	28.30	29.63	31.09	32.72	No Interference
CSELB 2030-300		30				70	6	6,380	31.44	32.92	34.56	36.38	No Interference
CSELB 2030-320		32				80	6	8,090	33.54	35.12	36.87	38.81	No Interference
CSELB 2030-350		35				80	6	8,090	36.68	38.42	40.34	42.47	No Interference
CSELB 2030-400		40				80	6	10,030	41.91	43.91	46.12	No Interference	No Interference

Next Page ➡

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°
CSELB 2035-100	R1.75	10	2.8	3.45	11°	60	6	6,380	10.49	10.93	11.41	11.94	13.21
CSELB 2035-150		15				60	6	6,380	15.72	16.42	17.19	18.04	20.06
CSELB 2035-200		20				65	6	6,840	20.96	21.91	22.96	24.13	No Interference
CSELB 2035-250		25				70	6	6,840	26.19	27.40	28.74	30.23	No Interference
CSELB 2035-300		30				70	6	7,300	31.43	32.90	34.52	36.32	No Interference
CSELB 2035-400		40				90	6	9,690	41.90	43.88	46.08	No Interference	No Interference
CSELB 2035-450		45				90	6	10,600	47.13	49.38	No Interference	No Interference	No Interference
CSELB 2040-080	R2	8	3.2	3.95	11°	70	6	4,450	8.38	8.70	9.06	9.45	10.39
CSELB 2040-080-4		8			—	70	4	4,180	No Interference	No Interference	No Interference	No Interference	No Interference
CSELB 2040-100		10			11°	70	6	4,450	10.48	10.90	11.37	11.89	13.12
CSELB 2040-120		12				70	6	5,810	12.57	13.10	13.68	14.33	15.86
CSELB 2040-140		14				70	6	5,810	14.67	15.30	15.99	16.76	18.60
CSELB 2040-150		15				70	6	5,810	15.71	16.39	17.15	17.98	19.97
CSELB 2040-160		16				70	6	5,810	16.76	17.49	18.30	19.20	No Interference
CSELB 2040-180		18				70	6	5,810	18.85	19.69	20.61	21.64	No Interference
CSELB 2040-200		20				70	6	5,810	20.95	21.89	22.93	24.08	No Interference
CSELB 2040-220		22				70	6	5,810	23.04	24.08	25.24	26.52	No Interference
CSELB 2040-250		25				70	6	5,810	26.18	27.38	28.70	30.17	No Interference
CSELB 2040-270		27				70	6	5,810	28.28	29.58	31.01	No Interference	No Interference
CSELB 2040-300		30				70	6	5,810	31.42	32.87	34.48	No Interference	No Interference
CSELB 2040-320		32				80	6	6,730	33.51	35.07	36.79	No Interference	No Interference
CSELB 2040-350		35				80	6	6,730	36.65	38.37	40.26	No Interference	No Interference
CSELB 2040-400		40				90	6	7,520	41.89	43.86	No Interference	No Interference	No Interference
CSELB 2040-450		45				90	6	9,690	47.12	49.35	No Interference	No Interference	No Interference
CSELB 2040-500		50				100	6	10,370	52.36	54.85	No Interference	No Interference	No Interference
CSELB 2040-600		60				120	6	10,580	62.83	No Interference	No Interference	No Interference	No Interference
CSELB 2050-100	R2.5	10	4	4.95	11°	70	6	6,840	10.45	10.85	11.29	11.78	No Interference
CSELB 2050-150		15				70	6	9,690	15.69	16.35	17.07	No Interference	No Interference
CSELB 2050-200		20				70	6	9,690	20.92	21.84	No Interference	No Interference	No Interference
CSELB 2050-250		25				70	6	9,690	26.16	27.33	No Interference	No Interference	No Interference
CSELB 2050-300		30				80	6	10,370	31.39	No Interference	No Interference	No Interference	No Interference
CSELB 2050-350		35				80	6	10,370	36.63	No Interference	No Interference	No Interference	No Interference
CSELB 2050-400		40				90	6	13,110	41.86	No Interference	No Interference	No Interference	No Interference
CSELB 2050-450		45				100	6	13,680	47.10	No Interference	No Interference	No Interference	No Interference
CSELB 2050-500		50				100	6	14,820	52.33	No Interference	No Interference	No Interference	No Interference
CSELB 2060-100	R3	10	4.8	5.95	—	80	6	7,300	No Interference	No Interference	No Interference	No Interference	No Interference
CSELB 2060-150		15				80	6	7,300	No Interference	No Interference	No Interference	No Interference	No Interference
CSELB 2060-180		18				80	6	7,300	No Interference	No Interference	No Interference	No Interference	No Interference
CSELB 2060-200		20				80	6	7,300	No Interference	No Interference	No Interference	No Interference	No Interference
CSELB 2060-220		22				80	6	7,300	No Interference	No Interference	No Interference	No Interference	No Interference
CSELB 2060-250		25				80	6	7,300	No Interference	No Interference	No Interference	No Interference	No Interference
CSELB 2060-270		27				80	6	7,300	No Interference	No Interference	No Interference	No Interference	No Interference
CSELB 2060-300		30				80	6	7,520	No Interference	No Interference	No Interference	No Interference	No Interference
CSELB 2060-320		32				80	6	7,520	No Interference	No Interference	No Interference	No Interference	No Interference
CSELB 2060-350		35				80	6	7,750	No Interference	No Interference	No Interference	No Interference	No Interference
CSELB 2060-400		40				90	6	8,210	No Interference	No Interference	No Interference	No Interference	No Interference
CSELB 2060-450		45				100	6	8,780	No Interference	No Interference	No Interference	No Interference	No Interference
CSELB 2060-500		50				120	6	8,890	No Interference	No Interference	No Interference	No Interference	No Interference
CSELB 2060-600		60				120	6	9,420	No Interference	No Interference	No Interference	No Interference	No Interference

Milling Conditions for CSELB

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)	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)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)
2001-002		0.2	54,000	85	0.004	0.004	54,000	85	0.004	0.004	48,000	55	0.002	0.002	48,000	55	0.002	0.002
2001-003	**R0.05**	0.3	54,000	85	0.004	0.004	54,000	85	0.004	0.004	48,000	55	0.002	0.002	48,000	55	0.002	0.002
2001-005		0.5	54,000	75	0.004	0.004	54,000	75	0.004	0.004	48,000	35	0.002	0.002	48,000	35	0.002	0.002
20015-003		0.3	54,000	160	0.007	0.009	54,000	160	0.007	0.009	48,000	90	0.004	0.004	48,000	90	0.004	0.004
20015-005	**R0.075**	0.5	54,000	140	0.007	0.009	54,000	140	0.007	0.009	48,000	60	0.004	0.004	48,000	60	0.004	0.004
20015-010		1	54,000	100	0.003	0.005	54,000	100	0.003	0.005	48,000	60	0.001	0.002	48,000	60	0.001	0.002
2002-003		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
2002-005		0.5	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
2002-0075		0.75	60,000	300	0.007	0.021	60,000	320	0.007	0.015	60,000	300	0.007	0.021	60,000	270	0.005	0.015
2002-010		1	60,000	250	0.006	0.018	60,000	250	0.005	0.015	60,000	250	0.006	0.018	60,000	220	0.005	0.015
2002-0125		1.25	54,000	225	0.005	0.016	54,000	215	0.004	0.013	60,000	225	0.005	0.016	54,000	195	0.004	0.013
2002-015	**R0.1**	1.5	48,000	200	0.005	0.015	48,000	180	0.004	0.012	60,000	200	0.005	0.015	48,000	170	0.004	0.012
2002-0175		1.75	48,000	175	0.004	0.012	48,000	165	0.003	0.01	60,000	175	0.004	0.012	48,000	145	0.003	0.009
2002-020		2	48,000	150	0.003	0.009	48,000	150	0.003	0.009	60,000	150	0.003	0.009	48,000	120	0.003	0.007
2002-0225		2.25	44,000	125	0.003	0.007	44,000	125	0.003	0.007	53,000	125	0.002	0.007	44,000	110	0.002	0.005
2002-025		2.5	40,000	100	0.003	0.006	40,000	100	0.003	0.006	46,000	100	0.002	0.006	40,000	100	0.002	0.004
2002-030		3	33,000	50	0.002	0.003	33,000	50	0.002	0.003	33,000	50	0.002	0.003	33,000	50	0.002	0.002
2003-005		0.5	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
2003-006		0.6	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
2003-0075		0.75	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
2003-010		1	43,000	450	0.01	0.03	43,000	450	0.008	0.024	54,000	400	0.01	0.03	43,000	400	0.007	0.021
2003-0125		1.25	43,000	425	0.009	0.027	43,000	425	0.007	0.022	54,000	400	0.009	0.027	43,000	400	0.006	0.019
2003-015		1.5	43,000	400	0.008	0.024	43,000	400	0.007	0.021	54,000	400	0.008	0.024	43,000	400	0.006	0.018
2003-0175	**R0.15**	1.75	41,500	350	0.007	0.021	41,500	350	0.006	0.019	52,000	350	0.007	0.022	41,500	350	0.005	0.016
2003-020		2	40,000	300	0.006	0.018	40,000	300	0.006	0.018	50,000	300	0.007	0.021	40,000	300	0.005	0.015
2003-0225		2.25	40,000	275	0.005	0.016	40,000	275	0.005	0.016	48,000	275	0.006	0.018	40,000	275	0.004	0.013
2003-025		2.5	40,000	250	0.005	0.015	40,000	250	0.005	0.015	46,000	250	0.005	0.015	40,000	250	0.004	0.012
2003-030		3	38,000	200	0.004	0.012	38,000	200	0.004	0.012	42,000	200	0.004	0.012	38,000	200	0.004	0.008
2003-040		4	35,000	100	0.003	0.009	35,000	100	0.003	0.009	35,000	100	0.003	0.009	32,000	100	0.003	0.005
2003-050		5	26,000	60	0.003	0.004	26,000	60	0.003	0.004	26,000	60	0.003	0.004	26,000	60	0.003	0.003
2004-005		0.5	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
2004-0075		0.75	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
2004-010		1	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
2004-0125		1.25	35,000	1,050	0.025	0.075	35,000	1,050	0.018	0.036	50,000	600	0.022	0.067	35,000	575	0.013	0.04
2004-015		1.5	35,000	900	0.02	0.06	35,000	900	0.016	0.033	50,000	550	0.02	0.06	35,000	500	0.012	0.036
2004-0175		1.75	35,000	750	0.017	0.052	35,000	750	0.013	0.033	50,000	525	0.017	0.052	35,000	450	0.011	0.033
2004-020		2	35,000	600	0.015	0.045	35,000	600	0.011	0.033	50,000	500	0.015	0.045	35,000	400	0.01	0.03
2004-0225	**R0.2**	2.25	35,000	525	0.013	0.04	35,000	525	0.01	0.031	48,000	475	0.013	0.04	35,000	380	0.01	0.027
2004-025		2.5	35,000	450	0.012	0.036	35,000	450	0.01	0.03	46,000	450	0.012	0.036	35,000	360	0.01	0.025
2004-030		3	35,000	400	0.01	0.03	35,000	400	0.008	0.024	42,000	400	0.01	0.03	35,000	330	0.007	0.021
2004-035		3.5	35,000	350	0.007	0.02	35,000	350	0.006	0.018	38,000	350	0.007	0.021	35,000	300	0.007	0.018
2004-040		4	35,000	300	0.005	0.015	35,000	300	0.005	0.015	35,000	300	0.005	0.015	35,000	250	0.005	0.015
2004-045		4.5	32,000	230	0.004	0.012	32,000	230	0.004	0.012	32,000	230	0.004	0.012	32,000	200	0.004	0.01
2004-050		5	30,000	160	0.003	0.01	30,000	160	0.003	0.01	30,000	160	0.003	0.01	30,000	150	0.003	0.008
2004-060		6	23,000	90	0.003	0.005	23,000	90	0.003	0.005	23,000	90	0.003	0.005	23,000	80	0.003	0.004

Milling Conditions for CSELB

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)	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)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)
2005-010	R0.25	1	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
2005-0125		1.25	34,000	1,150	0.032	0.097	34,000	1,150	0.027	0.055	45,000	850	0.027	0.082	32,000	850	0.019	0.057
2005-015		1.5	34,000	1,000	0.03	0.09	34,000	1,000	0.025	0.05	45,000	800	0.025	0.075	32,000	800	0.018	0.054
2005-0175		1.75	34,000	900	0.027	0.082	34,000	900	0.024	0.048	45,000	750	0.023	0.07	32,000	750	0.017	0.051
2005-020		2	34,000	800	0.025	0.075	34,000	800	0.023	0.046	45,000	700	0.022	0.066	32,000	700	0.016	0.048
2005-0225		2.25	34,000	750	0.022	0.067	34,000	750	0.019	0.045	45,000	650	0.02	0.06	32,000	650	0.015	0.046
2005-025		2.5	34,000	700	0.02	0.06	34,000	700	0.015	0.045	45,000	600	0.018	0.054	32,000	600	0.015	0.045
2005-030		3	32,000	550	0.016	0.048	32,000	550	0.012	0.036	41,000	550	0.014	0.042	31,000	500	0.012	0.036
2005-035		3.5	32,000	500	0.014	0.042	32,000	500	0.011	0.033	38,000	500	0.012	0.036	30,500	450	0.01	0.03
2005-040		4	31,000	450	0.012	0.036	31,000	450	0.01	0.03	35,000	450	0.01	0.03	30,000	390	0.01	0.03
2005-045		4.5	30,000	390	0.01	0.03	30,000	390	0.008	0.024	32,000	390	0.008	0.024	29,500	350	0.008	0.024
2005-050		5	29,000	340	0.007	0.021	29,000	340	0.007	0.021	29,000	340	0.006	0.018	29,000	300	0.006	0.018
2005-055		5.5	26,000	280	0.007	0.021	26,000	280	0.007	0.021	26,000	280	0.006	0.018	26,000	250	0.006	0.018
2005-060		6	24,000	220	0.006	0.018	24,000	220	0.006	0.018	24,000	220	0.005	0.015	24,000	200	0.005	0.015
2005-070		7	21,000	180	0.005	0.015	21,000	180	0.005	0.015	21,000	180	0.004	0.012	21,000	160	0.004	0.012
2005-080		8	19,000	130	0.004	0.012	19,000	130	0.004	0.012	19,000	130	0.003	0.009	19,000	110	0.003	0.009
2005-090		9	18,000	120	0.003	0.009	18,000	120	0.003	0.009	18,000	120	0.002	0.008	18,000	100	0.002	0.008
2005-100		10	17,000	100	0.003	0.009	17,000	100	0.003	0.009	17,000	100	0.002	0.006	17,000	80	0.002	0.006
2006-010	R0.3	1	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
2006-0125		1.25	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
2006-015		1.5	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
2006-0175		1.75	33,000	1,450	0.047	0.142	33,000	1,450	0.038	0.076	40,000	1,250	0.045	0.09	30,000	1,250	0.038	0.057
2006-020		2	33,000	1,400	0.045	0.135	33,000	1,400	0.036	0.072	40,000	1,200	0.045	0.09	30,000	1,200	0.036	0.054
2006-0225		2.25	33,000	1,250	0.042	0.127	33,000	1,300	0.034	0.069	40,000	1,100	0.042	0.085	30,000	1,150	0.034	0.053
2006-025		2.5	33,000	1,100	0.04	0.12	33,000	1,200	0.033	0.066	40,000	1,000	0.04	0.08	30,000	1,100	0.033	0.053
2006-030		3	33,000	900	0.035	0.105	33,000	900	0.025	0.066	40,000	800	0.03	0.075	30,000	900	0.026	0.052
2006-035		3.5	32,000	900	0.03	0.09	32,000	800	0.022	0.066	38,000	650	0.025	0.075	28,000	720	0.02	0.06
2006-040		4	31,000	700	0.027	0.081	31,000	700	0.02	0.06	35,000	560	0.022	0.066	28,000	600	0.018	0.054
2006-045		4.5	29,000	500	0.024	0.072	29,000	550	0.017	0.051	32,000	500	0.018	0.054	26,000	500	0.015	0.045
2006-050		5	29,000	440	0.018	0.054	29,000	440	0.015	0.045	29,000	440	0.015	0.045	26,000	440	0.012	0.036
2006-055		5.5	26,000	410	0.016	0.048	26,000	410	0.014	0.042	26,000	410	0.014	0.042	25,000	410	0.01	0.03
2006-060		6	24,000	380	0.012	0.036	24,000	380	0.012	0.036	24,000	380	0.01	0.03	24,000	380	0.008	0.024
2006-065		6.5	22,000	340	0.011	0.033	22,000	340	0.011	0.033	22,000	340	0.009	0.027	22,000	340	0.007	0.021
2006-070		7	21,000	310	0.01	0.03	21,000	310	0.01	0.03	21,000	310	0.008	0.024	21,000	310	0.006	0.018
2006-080		8	18,000	240	0.008	0.024	18,000	240	0.008	0.024	18,000	240	0.006	0.018	18,000	240	0.005	0.015
2006-090		9	16,000	180	0.007	0.021	16,000	180	0.007	0.021	16,000	180	0.005	0.015	16,000	180	0.004	0.012
2006-100		10	15,000	160	0.006	0.018	15,000	160	0.006	0.018	15,000	160	0.004	0.012	15,000	160	0.003	0.01
2006-120		12	14,000	150	0.005	0.015	14,000	150	0.005	0.015	14,000	150	0.003	0.009	14,000	150	0.002	0.008
2007-020	R0.35	2	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
2007-040		4	32,000	1,000	0.05	0.15	32,000	900	0.03	0.09	34,000	800	0.04	0.12	28,000	800	0.03	0.06
2007-060		6	26,000	550	0.022	0.066	26,000	550	0.018	0.054	26,000	500	0.018	0.054	23,000	500	0.014	0.042
2007-080		8	19,000	340	0.012	0.036	19,000	340	0.012	0.036	19,000	320	0.01	0.03	19,000	320	0.008	0.024

Milling Conditions for CSELB

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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)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)
2008-020		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
2008-030		3	30,000	1,700	0.08	0.24	30,000	1,600	0.05	0.1	35,000	1,600	0.06	0.12	25,000	1,500	0.06	0.09
2008-040		4	30,000	1,400	0.07	0.21	30,000	1,300	0.04	0.1	35,000	1,300	0.05	0.12	25,000	1,200	0.045	0.09
2008-050		5	30,000	1,100	0.06	0.18	30,000	1,100	0.035	0.1	30,000	1,100	0.04	0.12	25,000	1,000	0.04	0.08
2008-060		6	27,000	900	0.04	0.12	27,000	900	0.025	0.075	27,000	800	0.03	0.09	23,000	800	0.023	0.069
2008-070	**R0.4**	7	24,000	700	0.025	0.075	24,000	700	0.022	0.066	24,000	600	0.02	0.06	21,000	600	0.015	0.045
2008-080		8	19,000	450	0.02	0.06	19,000	450	0.02	0.06	19,000	450	0.015	0.045	19,000	450	0.01	0.03
2008-090		9	18,000	400	0.016	0.048	18,000	400	0.016	0.048	18,000	360	0.013	0.039	18,000	360	0.009	0.027
2008-100		10	15,000	350	0.012	0.036	15,000	350	0.012	0.036	15,000	300	0.01	0.03	15,000	300	0.007	0.021
2008-120		12	14,000	300	0.01	0.03	14,000	300	0.01	0.03	14,000	240	0.006	0.018	14,000	240	0.006	0.018
2008-160		16	13,500	240	0.006	0.018	13,500	240	0.006	0.018	13,500	190	0.003	0.01	13,500	190	0.003	0.01
2009-020		2	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
2009-040		4	30,000	1,600	0.08	0.24	30,000	1,500	0.055	0.12	33,000	1,400	0.06	0.14	24,000	1,300	0.05	0.1
2009-060		6	27,000	1,100	0.06	0.18	27,000	1,100	0.035	0.1	27,000	850	0.04	0.12	22,000	800	0.034	0.1
2009-080		8	22,000	710	0.03	0.09	22,000	700	0.023	0.069	22,000	560	0.021	0.063	18,500	550	0.017	0.051
2009-100	**R0.45**	10	18,000	500	0.02	0.06	18,000	500	0.018	0.054	18,000	430	0.015	0.045	18,000	430	0.01	0.03
2009-120		12	16,000	420	0.015	0.045	16,000	420	0.015	0.045	16,000	350	0.009	0.027	16,000	350	0.007	0.021
2009-140		14	14,000	380	0.012	0.042	14,000	380	0.012	0.042	14,000	280	0.006	0.018	14,000	280	0.006	0.018
2009-160		16	13,500	360	0.01	0.04	13,500	360	0.01	0.04	13,500	200	0.004	0.016	13,500	200	0.004	0.016
2009-180		18	13,000	340	0.006	0.024	13,000	340	0.006	0.024	13,000	120	0.003	0.012	13,000	120	0.003	0.012
2010-020		2	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
2010-025		2.5	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
2010-030		3	30,000	1,800	0.11	0.33	24,000	1,600	0.07	0.14	30,000	1,500	0.08	0.16	21,500	1,400	0.08	0.12
2010-040		4	30,000	1,700	0.09	0.27	24,000	1,500	0.065	0.13	30,000	1,300	0.075	0.15	21,500	1,300	0.075	0.1
2010-050		5	30,000	1,600	0.08	0.24	24,000	1,400	0.06	0.12	30,000	1,200	0.07	0.14	21,500	1,200	0.06	0.09
2010-060		6	30,000	1,400	0.06	0.18	18,000	1,200	0.04	0.12	30,000	1,100	0.06	0.12	21,500	1,100	0.05	0.1
2010-070		7	27,000	1,200	0.05	0.15	17,000	1,000	0.03	0.09	24,000	800	0.04	0.12	20,000	900	0.03	0.09
2010-080	**R0.5**	8	24,000	1,000	0.04	0.12	16,500	900	0.027	0.081	18,500	620	0.035	0.1	18,500	580	0.025	0.1
2010-090		9	22,000	720	0.035	0.11	15,500	700	0.02	0.08	16,500	550	0.025	0.1	16,500	500	0.02	0.08
2010-100		10	20,000	650	0.03	0.09	15,000	500	0.018	0.072	14,800	490	0.02	0.08	14,800	430	0.015	0.06
2010-120		12	18,000	600	0.02	0.08	15,000	500	0.016	0.064	13,400	380	0.01	0.05	13,400	380	0.008	0.04
2010-140		14	16,000	530	0.015	0.06	14,000	460	0.015	0.06	12,000	350	0.008	0.04	12,000	350	0.006	0.03
2010-160		16	14,000	460	0.014	0.056	14,000	460	0.014	0.056	10,500	250	0.005	0.025	10,500	250	0.005	0.025
2010-180		18	13,500	440	0.012	0.06	13,500	440	0.012	0.06	9,500	200	0.004	0.02	9,500	200	0.004	0.02
2010-200		20	13,000	430	0.008	0.04	13,000	430	0.008	0.04	9,000	150	0.003	0.015	9,000	150	0.003	0.015
2010-220		22	12,000	380	0.007	0.035	12,000	380	0.007	0.035	8,500	120	0.002	0.01	8,500	120	0.002	0.01
2012-025		2.5	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
2012-040		4	30,000	1,800	0.12	0.36	20,000	1,500	0.08	0.16	30,000	1,400	0.09	0.18	18,000	1,400	0.09	0.13
2012-060		6	30,000	1,600	0.09	0.27	20,000	1,200	0.07	0.14	30,000	1,100	0.08	0.16	18,000	1,100	0.08	0.12
2012-080		8	25,000	1,200	0.06	0.18	15,000	900	0.05	0.12	20,000	800	0.06	0.15	16,500	750	0.05	0.11
2012-100	**R0.6**	10	20,000	900	0.05	0.15	13,500	650	0.035	0.11	16,000	640	0.045	0.12	15,500	550	0.03	0.09
2012-120		12	16,500	600	0.035	0.12	12,500	480	0.025	0.1	12,000	440	0.03	0.12	12,500	430	0.018	0.072
2012-140		14	14,500	520	0.025	0.1	12,500	480	0.022	0.088	11,000	400	0.015	0.06	11,500	370	0.014	0.056
2012-160		16	13,000	470	0.018	0.072	11,500	440	0.018	0.072	10,000	350	0.01	0.05	10,000	350	0.01	0.05
2012-180		18	12,000	460	0.014	0.07	11,250	440	0.014	0.07	9,500	260	0.008	0.04	9,500	260	0.007	0.035
2012-200		20	11,000	440	0.013	0.065	11,000	440	0.013	0.065	9,000	220	0.006	0.03	9,000	220	0.005	0.025

Milling Conditions for CSELB

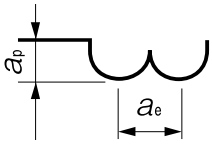
WORK MATERIAL			COPPER / ALUMINUM ALLOYS				CARBON STEELS / ALLOY STEELS S45C / S50C / SK / SCM (~325HB)				PREHARDENED STEELS NAK80 / STAVAX / HPM38 (30~45HRC)				HARDENED STEELS STAVAX / HPM38 / SKD61 (45~55HRC)			
Model Number	Radius of Ball Nose (mm)	Effective Length (mm)	Spindle Speed (min^{-1})	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)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)
2014-060	**R0.7**	6	30,000	1,700	0.11	0.33	23,000	1,500	0.08	0.16	30,000	1,300	0.09	0.18	16,000	1,200	0.09	0.13
2014-080		8	30,000	1,400	0.09	0.27	17,000	1,000	0.06	0.15	30,000	1,000	0.07	0.17	15,000	900	0.06	0.12
2014-120		12	17,000	900	0.06	0.18	13,000	600	0.04	0.12	13,000	580	0.045	0.14	12,500	550	0.03	0.1
2014-160		16	12,500	540	0.028	0.12	11,000	500	0.024	0.1	9,500	380	0.016	0.08	9,500	380	0.015	0.06
2015-030	**R0.75**	3	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
2015-040		4	30,000	1,800	0.14	0.42	30,000	1,500	0.11	0.22	30,000	1,600	0.11	0.22	18,000	1,400	0.11	0.17
2015-060		6	30,000	1,800	0.12	0.36	23,000	1,300	0.1	0.2	30,000	1,400	0.1	0.2	15,000	1,200	0.1	0.16
2015-080		8	30,000	1,600	0.11	0.33	18,000	1,100	0.08	0.16	30,000	1,200	0.08	0.2	14,000	1,000	0.08	0.16
2015-100		10	23,000	1,200	0.09	0.27	15,000	850	0.06	0.15	23,500	900	0.06	0.18	14,000	700	0.05	0.15
2015-120		12	16,000	900	0.07	0.21	13,000	600	0.05	0.15	13,000	650	0.05	0.15	13,000	550	0.03	0.12
2015-140		14	14,500	700	0.05	0.19	10,500	550	0.04	0.12	10,500	500	0.04	0.12	10,500	470	0.025	0.1
2015-160		16	13,000	650	0.04	0.16	10,000	550	0.03	0.12	8,850	400	0.03	0.12	8,850	390	0.02	0.08
2015-180		18	12,000	580	0.03	0.15	10,000	510	0.025	0.1	8,500	350	0.018	0.09	8,500	360	0.014	0.07
2015-200		20	10,500	530	0.02	0.1	9,200	470	0.02	0.1	8,000	320	0.012	0.06	8,000	320	0.012	0.06
2015-220		22	10,000	500	0.015	0.075	9,000	460	0.015	0.075	7,500	270	0.01	0.05	7,500	270	0.008	0.04
2015-250		25	9,000	440	0.014	0.07	8,750	440	0.014	0.07	7,250	250	0.008	0.04	7,250	250	0.006	0.03
2015-300		30	8,500	420	0.012	0.06	8,500	420	0.012	0.06	7,000	130	0.006	0.03	7,000	130	0.004	0.02
2016-040	**R0.8**	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
2016-080		8	30,000	1,700	0.15	0.45	15,000	1,100	0.1	0.2	30,000	1,500	0.12	0.24	13,500	1,000	0.08	0.24
2016-120		12	23,000	1,200	0.1	0.3	11,000	700	0.06	0.18	18,000	1,000	0.06	0.18	12,500	650	0.04	0.16
2016-160		16	15,000	800	0.05	0.2	10,000	530	0.034	0.13	10,000	530	0.035	0.14	9,000	420	0.02	0.1
2016-200		20	11,000	580	0.034	0.17	9,400	490	0.025	0.12	8,500	400	0.018	0.09	7,800	380	0.014	0.07
2018-040	**R0.9**	4	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
2018-060		6	30,000	1,800	0.18	0.52	24,000	1,500	0.15	0.29	30,000	1,700	0.16	0.4	14,000	1,200	0.13	0.27
2018-080		8	30,000	1,800	0.17	0.5	18,000	1,200	0.13	0.26	30,000	1,700	0.16	0.32	12,000	1,000	0.11	0.26
2018-100		10	30,000	1,800	0.16	0.48	15,000	1,100	0.11	0.23	24,000	1,400	0.12	0.28	12,000	900	0.09	0.23
2018-120		12	24,000	1,450	0.12	0.36	13,000	1,000	0.08	0.2	18,000	1,100	0.09	0.23	12,000	750	0.07	0.21
2018-160		16	15,000	900	0.07	0.3	12,000	750	0.05	0.18	15,000	750	0.04	0.14	9,500	480	0.025	0.11
2018-180		18	13,000	800	0.06	0.24	11,000	650	0.04	0.16	11,000	600	0.035	0.14	8,800	440	0.02	0.1
2018-200		20	11,500	650	0.05	0.2	9,500	600	0.03	0.15	8,500	450	0.025	0.11	8,300	420	0.018	0.08
2018-220		22	10,000	590	0.035	0.18	8,500	550	0.03	0.14	8,000	400	0.02	0.1	7,800	400	0.015	0.075
2018-250		25	8,000	500	0.035	0.17	8,000	480	0.025	0.12	7,000	350	0.018	0.09	7,000	350	0.012	0.06
2018-300		30	7,500	450	0.025	0.13	7,500	420	0.02	0.08	6,500	280	0.014	0.07	6,500	280	0.008	0.04

Milling Conditions for CSELB

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)	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)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)
2020-030	R1	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
2020-040		4	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
2020-060		6	30,000	2,000	0.2	0.6	30,000	2,000	0.21	0.42	30,000	2,000	0.2	0.6	14,000	1,100	0.15	0.4
2020-080		8	30,000	2,000	0.2	0.6	30,000	2,000	0.18	0.36	30,000	2,000	0.16	0.56	12,000	950	0.12	0.4
2020-100		10	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
2020-120		12	30,000	2,000	0.18	0.54	30,000	2,000	0.12	0.36	30,000	2,000	0.1	0.35	10,800	850	0.08	0.32
2020-130		13	26,000	1,700	0.17	0.52	26,000	1,700	0.11	0.34	25,000	1,600	0.09	0.3	10,800	850	0.07	0.28
2020-140		14	22,000	1,450	0.15	0.5	22,000	1,450	0.11	0.33	20,000	1,300	0.08	0.24	10,800	850	0.06	0.24
2020-160		16	15,000	1,000	0.1	0.4	15,000	1,000	0.07	0.28	10,800	700	0.06	0.18	10,800	600	0.03	0.15
2020-180		18	13,500	900	0.08	0.32	13,500	900	0.06	0.24	9,700	600	0.05	0.15	9,700	520	0.025	0.12
2020-200		20	12,000	800	0.07	0.28	12,000	800	0.05	0.2	8,650	500	0.04	0.16	8,650	450	0.02	0.1
2020-220		22	10,500	700	0.05	0.25	10,500	700	0.04	0.2	8,200	470	0.03	0.12	8,200	440	0.018	0.09
2020-250		25	9,000	600	0.04	0.2	9,000	600	0.035	0.17	7,800	440	0.025	0.1	7,800	440	0.016	0.08
2020-270		27	8,000	530	0.037	0.18	8,000	530	0.032	0.16	7,400	390	0.022	0.09	7,400	390	0.013	0.06
2020-300		30	7,000	470	0.035	0.17	7,000	470	0.03	0.15	7,000	350	0.02	0.08	7,000	350	0.01	0.05
2020-320		32	6,750	450	0.032	0.16	6,750	450	0.027	0.13	6,550	300	0.017	0.07	6,550	300	0.009	0.04
2020-350		35	6,500	430	0.03	0.15	6,500	430	0.025	0.12	6,150	250	0.015	0.06	6,150	250	0.008	0.04
2020-400		40	6,500	430	0.02	0.1	6,500	430	0.02	0.1	5,250	150	0.01	0.05	5,250	150	0.006	0.03
2025-060	R1.25	6	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
2025-080		8	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
2025-100		10	25,000	2,100	0.26	0.67	25,000	2,100	0.23	0.46	24,000	2,200	0.2	0.65	11,000	930	0.14	0.44
2025-150		15	22,000	1,950	0.23	0.59	22,000	1,950	0.15	0.45	20,000	1,600	0.13	0.42	9,000	720	0.08	0.32
2025-200		20	11,000	1,150	0.14	0.38	11,000	1,150	0.1	0.3	8,000	600	0.06	0.24	7,600	470	0.04	0.12
2025-250		25	8,300	1,000	0.09	0.27	8,300	1,000	0.06	0.24	6,200	450	0.045	0.18	5,800	400	0.03	0.1
2025-300		30	7,000	700	0.06	0.24	7,000	700	0.05	0.2	5,000	380	0.03	0.12	4,800	360	0.022	0.088
2025-350		35	5,500	530	0.04	0.2	5,500	530	0.035	0.17	4,200	300	0.025	0.1	4,200	270	0.015	0.06
2030-060	R1.5	6	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
2030-080		8	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
2030-100		10	22,000	2,300	0.28	0.8	22,000	2,300	0.28	0.8	24,000	2,500	0.25	0.75	13,000	1,200	0.25	0.76
2030-120		12	22,000	2,300	0.28	0.7	22,000	2,300	0.28	0.7	20,000	2,100	0.2	0.65	10,700	1,000	0.18	0.54
2030-140		14	20,000	2,100	0.24	0.6	20,000	2,100	0.24	0.6	18,000	1,850	0.18	0.5	9,400	800	0.16	0.48
2030-150		15	20,000	2,100	0.24	0.6	20,000	2,100	0.24	0.6	17,000	1,750	0.17	0.5	9,200	750	0.14	0.42
2030-160		16	20,000	2,100	0.24	0.6	20,000	2,100	0.24	0.6	16,000	1,650	0.16	0.5	9,000	700	0.14	0.42
2030-180		18	17,000	1,950	0.22	0.5	17,000	1,950	0.22	0.5	13,500	1,300	0.14	0.43	8,000	650	0.12	0.36
2030-200		20	14,000	1,800	0.2	0.45	14,000	1,800	0.2	0.45	11,000	1,000	0.12	0.36	7,000	600	0.1	0.3
2030-220		22	11,000	1,500	0.18	0.38	11,000	1,500	0.18	0.38	8,700	750	0.1	0.3	6,300	490	0.08	0.24
2030-250		25	8,000	1,250	0.16	0.32	8,000	1,250	0.16	0.32	6,400	510	0.08	0.24	5,600	390	0.06	0.18
2030-270		27	7,000	1,100	0.13	0.31	7,000	1,100	0.13	0.31	5,500	480	0.06	0.22	4,700	380	0.05	0.15
2030-300		30	6,000	1,000	0.1	0.3	6,000	1,000	0.1	0.3	4,600	450	0.05	0.2	3,900	370	0.04	0.12
2030-320		32	5,700	900	0.085	0.29	5,700	900	0.085	0.29	3,900	380	0.045	0.18	3,400	320	0.035	0.11
2030-350		35	5,500	800	0.07	0.28	5,500	800	0.07	0.28	3,300	320	0.04	0.16	2,900	270	0.03	0.1
2030-400		40	4,500	700	0.05	0.25	4,500	700	0.05	0.25	2,700	240	0.03	0.12	2,300	210	0.02	0.08

Milling Conditions for CSELB

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)	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)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)
2035-100	R1.75	10	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
2035-150		15	20,000	2,200	0.29	0.8	20,000	2,200	0.29	0.8	17,000	2,000	0.25	0.7	9,100	1,000	0.19	0.57
2035-200		20	15,000	1,800	0.24	0.6	15,000	1,800	0.24	0.6	12,000	1,450	0.14	0.45	6,800	600	0.13	0.39
2035-250		25	10,000	1,600	0.2	0.47	10,000	1,600	0.2	0.47	8,500	950	0.12	0.34	6,000	540	0.09	0.27
2035-300		30	6,900	1,200	0.18	0.36	6,900	1,200	0.18	0.36	5,500	480	0.09	0.24	4,800	380	0.06	0.18
2035-400		40	4,500	780	0.07	0.3	4,500	780	0.07	0.3	3,000	310	0.04	0.18	2,800	260	0.035	0.11
2035-450		45	3,900	680	0.06	0.26	3,900	680	0.06	0.26	2,300	240	0.03	0.14	2,000	200	0.025	0.1
2040-080	R2	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
2040-100		10	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
2040-120		12	24,000	2,900	0.4	1.2	24,000	2,900	0.4	1.2	18,000	2,400	0.4	1.2	9,700	1,500	0.28	0.85
2040-140		14	21,000	2,630	0.35	1.1	21,000	2,630	0.35	1.1	15,000	2,150	0.3	1.1	9,700	1,200	0.28	0.8
2040-150		15	19,000	2,350	0.32	1	19,000	2,350	0.32	1	15,000	2,150	0.3	1	8,800	1,100	0.24	0.7
2040-160		16	18,000	2,250	0.3	1	18,000	2,250	0.3	1	15,000	2,150	0.3	0.9	8,000	1,000	0.2	0.6
2040-180		18	16,500	2,050	0.3	0.95	16,500	2,050	0.3	0.95	13,500	1,950	0.25	0.8	7,500	850	0.17	0.5
2040-200		20	15,000	1,900	0.3	0.9	15,000	1,900	0.3	0.9	12,000	1,750	0.2	0.7	7,000	750	0.15	0.45
2040-220		22	13,500	1,700	0.27	0.8	13,500	1,700	0.27	0.8	10,500	1,500	0.17	0.6	6,500	650	0.13	0.4
2040-250		25	12,000	1,550	0.25	0.7	12,000	1,550	0.25	0.7	9,000	1,300	0.15	0.5	6,000	560	0.12	0.36
2040-270		27	9,500	1,450	0.22	0.6	9,500	1,450	0.22	0.6	8,000	1,050	0.12	0.4	5,500	510	0.1	0.28
2040-300		30	7,000	1,400	0.2	0.5	7,000	1,400	0.2	0.5	7,000	850	0.1	0.3	5,000	460	0.08	0.2
2040-320		32	6,500	1,300	0.2	0.45	6,500	1,300	0.2	0.45	5,900	650	0.1	0.27	4,500	410	0.075	0.18
2040-350		35	6,000	1,200	0.2	0.4	6,000	1,200	0.2	0.4	4,800	450	0.1	0.25	4,000	370	0.07	0.17
2040-400		40	4,000	1,000	0.11	0.33	4,000	1,000	0.11	0.33	3,450	400	0.06	0.24	2,900	270	0.06	0.15
2040-450		45	3,800	760	0.08	0.32	3,800	760	0.08	0.32	2,700	300	0.05	0.2	2,300	240	0.04	0.12
2040-500		50	3,400	680	0.07	0.28	3,400	680	0.07	0.28	2,000	240	0.04	0.16	1,700	190	0.03	0.12
2040-600		60	3,000	600	0.05	0.2	3,000	600	0.05	0.2	1,800	220	0.03	0.12	1,600	170	0.02	0.08
2050-100	R2.5	10	18,000	3,000	0.5	1.5	18,000	3,000	0.5	1.5	13,750	2,400	0.45	1.4	8,800	1,800	0.42	1.2
2050-150		15	18,000	3,000	0.5	1.5	18,000	3,000	0.5	1.5	13,750	2,400	0.45	1.4	7,800	1,300	0.34	1
2050-200		20	14,000	2,600	0.37	1.2	15,600	2,600	0.37	1.2	12,000	1,800	0.36	1.1	6,300	830	0.27	0.75
2050-250		25	12,000	2,000	0.33	1.1	12,000	2,000	0.33	1.1	9,600	1,350	0.25	1	5,700	750	0.25	0.67
2050-300		30	9,600	1,800	0.31	0.9	9,600	1,800	0.31	0.9	8,400	1,100	0.23	0.8	5,000	650	0.2	0.5
2050-350		35	8,400	1,700	0.3	0.75	8,400	1,700	0.3	0.75	7,200	850	0.2	0.6	4,400	530	0.16	0.33
2050-400		40	5,500	1,500	0.25	0.5	4,800	1,500	0.25	0.5	3,800	440	0.13	0.35	3,300	390	0.09	0.22
2050-450		45	4,000	1,200	0.2	0.42	4,000	1,200	0.2	0.42	3,300	400	0.11	0.3	2,800	330	0.08	0.18
2050-500		50	3,200	1,000	0.16	0.37	3,200	1,000	0.16	0.37	2,750	350	0.08	0.27	2,350	270	0.07	0.15
2060-100	R3	10	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
2060-150		15	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
2060-180		18	16,000	3,100	0.6	1.8	16,000	3,100	0.6	1.8	11,000	2,310	0.55	1.7	7,000	1,500	0.45	1.45
2060-200		20	16,000	3,100	0.6	1.8	16,000	3,100	0.6	1.8	11,000	2,310	0.55	1.7	6,500	1,300	0.4	1.4
2060-220		22	14,500	2,850	0.52	1.6	14,500	2,850	0.52	1.6	10,500	2,050	0.47	1.5	5,900	1,050	0.36	1.1
2060-250		25	13,000	2,600	0.45	1.5	13,000	2,600	0.45	1.5	10,000	1,800	0.4	1.3	5,300	840	0.32	0.9
2060-270		27	11,500	2,350	0.42	1.4	11,500	2,350	0.42	1.4	9,000	1,550	0.35	1.2	5,000	790	0.31	0.85
2060-300		30	10,000	2,100	0.4	1.3	10,000	2,100	0.4	1.3	8,000	1,350	0.3	1.1	4,700	750	0.3	0.8
2060-320		32	9,000	1,950	0.39	1.2	9,000	1,950	0.39	1.2	7,500	1,200	0.28	1	4,400	710	0.27	0.7
2060-350		35	8,000	1,800	0.38	1.1	8,000	1,800	0.38	1.1	7,000	1,100	0.26	0.9	4,200	670	0.25	0.6
2060-400		40	7,000	1,800	0.36	0.9	7,000	1,800	0.36	0.9	6,000	900	0.23	0.75	3,700	550	0.2	0.4
2060-450		45	5,800	1,700	0.33	0.75	5,800	1,700	0.33	0.75	4,600	670	0.19	0.6	3,200	470	0.15	0.3
2060-500		50	4,000	1,500	0.3	0.6	4,000	1,500	0.3	0.6	3,200	450	0.15	0.4	2,800	400	0.1	0.2
2060-600		60	2,700	1,000	0.21	0.42	2,700	1,000	0.21	0.42	2,300	320	0.1	0.3	1,950	270	0.08	0.16



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 machines maximum speed, or when the tool is chattering and heats up to a red color.
・Recommend oil coolant for Stainless Steels and Heat Resistant Alloys.
・Recommend wet coolant for Copper.