Size φ0.1～φ6

HLS2000

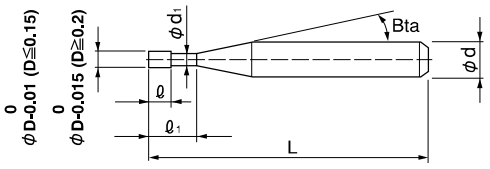
Super MG | HARD MAX | 30° | Flatland | Shank Dia 0/-0.005

Material Applications（★ Highly Recommended ● Recommended ○ Suggested）

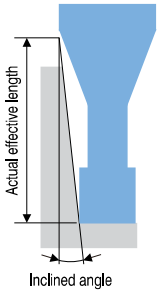
Work Material																
Carbon Steels	Alloy Steels	Prehardened Steels	Hardened Steels					Cast Iron	Aluminum Alloys	Graphite	Copper	Plastics	Glass Filled Plastics	Titanium Alloys	Heat Resistant Alloys	Cemented Carbide	Hard Brittle (Non-Metallic) Materials
S45C S55C	SK / SCM SUS	NAK HPM	～50HRC	～55HRC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

Features

HARDMAX coating and optimized tool design control tool chipping.
Longer tool life with deep rib milling on hard materials.
High Accuracy: Diameter Tolerance: 0/-0.01 (D≦0.15), 0/-0.015 (D≧0.2)
Refer to page 288 for 4 flute HLS.

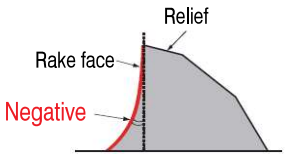


The shank taper angle shown is not an exact value and to avoid contact with the work piece, we recommend the user controls the precise value of this angle. Shank taper angle should not make contact with the work piece.



C-CER Cutting edge

HLS Cutting edge



Total 189 models

Unit（mm）

Model Number	Outside Diameter φD	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°
HLS 2001-003	0.1	0.3	0.1	0.088	11°	45	4	11,160	0.33	0.36	0.38	0.40	0.45
HLS 2001-005		0.5				45	4	12,240	0.54	0.58	0.61	0.64	0.69
HLS 2001-0075		0.75				45	4	13,560	0.80	0.85	0.90	0.95	1.07
HLS 2001-010		1				45	4	15,240	1.07	1.12	1.18	1.25	1.41
HLS 20015-005	0.15	0.5	0.15	0.128	11°	45	4	11,400	0.58	0.61	0.63	0.66	0.71
HLS 20015-0075		0.75				45	4	12,600	0.84	0.88	0.91	0.94	1.02
HLS 20015-010		1				45	4	12,600	1.10	1.14	1.18	1.23	1.32
HLS 2002-005	0.2	0.5	0.3	0.18	16°	45	4	7,320	0.65	0.70	0.74	0.78	0.85
HLS 2002-010		1				45	4	7,920	1.18	1.25	1.31	1.36	1.45
HLS 2002-015		1.5				45	4	9,600	1.67	1.76	1.84	1.90	2.01
HLS 2002-020		2				45	4	10,800	2.23	2.33	2.41	2.49	2.68
HLS 2002-030		3				45	4	11,160	3.27	3.39	3.51	3.63	3.91

Next Page ➡

Unit (mm)

Model Number	Outside Diameter φD	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°
HLS 2003-010	0.3	1	0.4	0.28	16°	45	4	6,480	1.22	1.30	1.37	1.43	1.55
HLS 2003-015		1.5				45	4	6,480	1.71	1.82	1.91	1.98	2.12
HLS 2003-020		2				45	4	7,920	2.24	2.36	2.46	2.55	2.70
HLS 2003-025		2.5				45	4	8,280	2.77	2.91	3.02	3.11	3.27
HLS 2003-030		3				45	4	8,280	3.30	3.45	3.56	3.66	3.83
HLS 2003-040		4				45	4	9,480	4.35	4.51	4.64	4.75	4.94
HLS 2003-060		6				45	4	10,560	6.43	6.63	6.78	6.91	7.12
HLS 2003-090		9				45	4	11,160	9.53	9.76	9.94	10.09	10.32
HLS 2004-015	0.4	1.5	0.6	0.38	16°	45	4	4,680	1.77	1.91	2.03	2.13	2.31
HLS 2004-020		2				45	4	4,680	2.31	2.47	2.60	2.71	2.91
HLS 2004-025		2.5				45	4	4,680	2.85	3.02	3.16	3.28	3.49
HLS 2004-030		3				45	4	4,680	3.38	3.57	3.72	3.85	4.07
HLS 2004-035		3.5				45	4	4,680	3.91	4.11	4.27	4.41	4.64
HLS 2004-040		4				45	4	4,680	4.44	4.65	4.82	4.96	5.21
HLS 2004-050		5				45	4	4,680	5.49	5.73	5.91	6.06	6.33
HLS 2004-080		8				45	4	10,200	8.63	8.91	9.13	9.31	9.62
HLS 2004-120		12				45	4	11,160	12.77	13.10	13.36	13.57	13.91
HLS 2005-015	0.5	1.5	0.7	0.48	16°	45	4	3,360	1.83	1.99	2.13	2.25	2.48
HLS 2005-020		2				45	4	3,360	2.37	2.56	2.71	2.85	3.09
HLS 2005-025		2.5				45	4	3,360	2.92	3.12	3.29	3.43	3.69
HLS 2005-030		3				45	4	3,360	3.45	3.68	3.85	4.01	4.28
HLS 2005-040		4				45	4	3,360	4.52	4.77	4.97	5.14	5.44
HLS 2005-050		5				45	4	3,360	5.58	5.86	6.08	6.26	6.58
HLS 2005-060		6				45	4	3,360	6.64	6.94	7.17	7.37	7.71
HLS 2005-080		8				45	4	5,640	8.74	9.07	9.33	9.56	9.93
HLS 2005-100		10				50	4	5,640	10.82	11.19	11.48	11.72	12.12
HLS 2005-150		15				50	4	7,200	16.00	16.44	16.78	17.05	17.50
HLS 2006-020	0.6	2	0.9	0.58	16°	45	4	3,600	2.39	2.62	2.80	2.96	3.24
HLS 2006-030		3				45	4	3,600	3.49	3.75	3.96	4.14	4.32
HLS 2006-040		4				45	4	3,600	4.57	4.86	5.09	5.29	5.69
HLS 2006-050		5				45	4	3,600	5.64	5.96	6.21	6.43	6.92
HLS 2006-060		6				45	4	3,600	6.70	7.05	7.32	7.57	8.14
HLS 2006-070		7				45	4	4,560	7.76	8.13	8.42	8.71	9.36
HLS 2006-080		8				45	4	5,880	8.81	9.20	9.52	9.85	10.59
HLS 2006-100		10				45	4	6,720	10.91	11.34	11.72	12.13	13.04
HLS 2006-120		12				50	4	7,560	13.00	13.47	13.92	14.40	15.48
HLS 2006-180		18				50	4	9,120	19.23	19.85	20.52	21.24	22.82

Next Page ➡

2 Flutes HARDMAX

Unit (mm)

Model Number	Outside Diameter φD	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°
HLS 2007-020	0.7	2	1	0.68	16°	45	4	4,080	2.39	2.62	2.80	2.96	3.24
HLS 2007-040		4				45	4	4,080	4.57	4.86	5.09	5.29	5.69
HLS 2007-060		6				45	4	4,080	6.70	7.05	7.32	7.57	8.14
HLS 2007-080		8				45	4	6,600	8.81	9.20	9.52	9.85	10.59
HLS 2007-100		10				50	4	7,520	10.91	11.34	11.72	12.13	13.04
HLS 2008-030	0.8	3	1.2	0.78	16°	45	4	3,960	3.49	3.75	3.96	4.14	4.32
HLS 2008-040		4				45	4	3,960	4.57	4.86	5.09	5.29	5.69
HLS 2008-050		5				45	4	3,960	5.64	5.96	6.21	6.43	6.92
HLS 2008-060		6				45	4	3,960	6.70	7.05	7.32	7.57	8.14
HLS 2008-080		8				45	4	3,960	8.81	9.20	9.52	9.85	10.59
HLS 2008-100		10				50	4	5,880	10.91	11.34	11.72	12.13	13.04
HLS 2008-120		12				50	4	6,600	13.00	13.47	13.92	14.40	15.48
HLS 2008-160		16				50	4	7,560	17.16	17.73	18.32	18.96	20.38
HLS 2008-240		24				60	4	9,240	25.42	26.24	27.13	28.07	30.17
HLS 2009-040	0.9	4	1.3	0.88	16°	45	4	4,560	4.57	4.86	5.09	5.29	5.69
HLS 2009-060		6				45	4	4,560	6.70	7.05	7.32	7.57	8.14
HLS 2009-080		8				45	4	4,560	8.81	9.20	9.52	9.85	10.59
HLS 2009-100		10				45	4	4,560	10.91	11.34	11.72	12.13	13.04
HLS 2009-150		15				50	4	6,790	16.12	16.66	17.22	17.82	19.15
HLS 2010-030	1	3	1.5	0.95	16°	45	4	3,600	3.62	3.85	4.04	4.21	4.54
HLS 2010-040		4				45	4	3,600	4.69	4.95	5.16	5.36	5.76
HLS 2010-050		5				45	4	3,600	5.75	6.04	6.27	6.49	6.98
HLS 2010-060		6				45	4	3,600	6.80	7.12	7.38	7.63	8.21
HLS 2010-070		7				45	4	3,600	7.85	8.19	8.48	8.77	9.43
HLS 2010-080		8				45	4	3,600	8.90	9.26	9.58	9.91	10.65
HLS 2010-090		9				45	4	3,600	9.95	10.33	10.68	11.05	11.88
HLS 2010-100		10				45	4	3,600	10.99	11.39	11.78	12.19	13.10
HLS 2010-120		12				45	4	3,600	13.07	13.52	13.98	14.47	15.55
HLS 2010-140		14				45	4	3,600	15.15	15.65	16.18	16.74	18.00
HLS 2010-160		16				50	4	5,880	17.22	17.78	18.38	19.02	20.44
HLS 2010-180		18				55	4	5,880	19.29	19.92	20.59	21.30	22.90
HLS 2010-200		20				55	4	5,880	21.35	22.04	22.78	23.57	25.34
HLS 2010-250		25				70	4	6,720	26.51	27.37	28.29	29.27	No Interference
HLS 2010-300		30				70	4	7,560	31.66	32.69	33.79	34.96	No Interference

Next Page ➡

Unit (mm)

Model Number	Outside Diameter φD	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°
HLS 2012-040	1.2	4	1.8	1.14	16°	45	4	3,840	4.13	4.27	4.41	4.57	4.91
HLS 2012-060		6				45	4	3,840	6.19	6.40	6.61	6.84	7.36
HLS 2012-080		8				45	4	3,840	8.26	8.52	8.81	9.12	9.80
HLS 2012-100		10				45	4	3,840	10.32	10.65	11.01	11.40	12.25
HLS 2012-120		12				45	4	3,840	12.38	12.78	13.21	13.67	14.70
HLS 2012-160		16				50	4	6,000	16.51	17.04	17.62	18.23	19.59
HLS 2012-200		20				60	4	6,000	20.63	21.30	22.02	22.78	24.49
HLS 2014-060	1.4	6	2.1	1.34	16°	45	4	3,960	6.19	6.40	6.61	6.84	7.36
HLS 2014-080		8				45	4	3,960	8.26	8.52	8.81	9.12	9.80
HLS 2014-100		10				45	4	3,960	10.32	10.65	11.01	11.40	12.25
HLS 2014-120		12				45	4	3,960	12.38	12.78	13.21	13.67	14.70
HLS 2014-140		14				45	4	3,960	14.44	14.91	15.42	15.95	17.15
HLS 2014-160		16				50	4	4,560	16.51	17.04	17.62	18.23	19.59
HLS 2014-220		22				55	4	6,120	22.69	23.43	24.22	25.06	No Interference
HLS 2015-040	1.5	4	2.3	1.44	16°	45	4	3,840	4.13	4.27	4.41	4.57	4.91
HLS 2015-060		6				45	4	3,840	6.19	6.40	6.61	6.84	7.36
HLS 2015-080		8				45	4	3,840	8.26	8.52	8.81	9.12	9.80
HLS 2015-100		10				45	4	3,840	10.32	10.65	11.01	11.40	12.25
HLS 2015-120		12				45	4	3,840	12.38	12.78	13.21	13.67	14.70
HLS 2015-140		14				50	4	3,960	14.44	14.91	15.42	15.95	17.15
HLS 2015-160		16				50	4	3,960	16.51	17.04	17.62	18.23	19.59
HLS 2015-180		18				55	4	3,960	18.57	19.17	19.82	20.51	22.04
HLS 2015-200		20				55	4	3,960	20.63	21.30	22.02	22.78	No Interference
HLS 2015-250		25				70	4	5,880	25.79	26.63	27.52	28.48	No Interference
HLS 2015-300		30				70	4	5,880	30.95	31.95	33.02	34.17	No Interference
HLS 2015-350		35				70	4	6,600	36.10	37.27	38.53	No Interference	No Interference
HLS 2015-400		40				80	4	7,440	41.26	42.60	44.03	No Interference	No Interference
HLS 2015-450		45				80	4	7,440	46.42	47.92	No Interference	No Interference	No Interference
HLS 2016-060	1.6	6	2.4	1.51	16°	45	4	3,960	6.23	6.43	6.65	6.88	7.40
HLS 2016-080		8				45	4	3,960	8.29	8.56	8.85	9.16	9.85
HLS 2016-100		10				45	4	3,960	10.35	10.69	11.05	11.43	12.29
HLS 2016-120		12				45	4	3,960	12.42	12.82	13.25	13.71	14.74
HLS 2016-140		14				50	4	3,960	14.48	14.95	15.45	15.99	17.19
HLS 2016-160		16				50	4	3,960	16.54	17.08	17.65	18.27	19.63
HLS 2016-180		18				55	4	3,960	18.60	19.21	19.85	20.54	22.08
HLS 2016-200		20				55	4	3,960	20.67	21.34	22.05	22.82	No Interference
HLS 2016-260		26				60	4	6,120	26.85	27.73	28.66	29.65	No Interference

Next Page ➡

2 Flutes HARDMAX

Unit (mm)

Model Number	Outside Diameter φD	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°
HLS 2018-060	1.8	6	2.7	1.71	16°	45	4	3,960	6.23	6.43	6.65	6.88	7.40
HLS 2018-080		8				45	4	3,960	8.29	8.56	8.85	9.16	9.85
HLS 2018-100		10				45	4	3,960	10.35	10.69	11.05	11.43	12.29
HLS 2018-120		12				45	4	3,960	12.42	12.82	13.25	13.71	14.74
HLS 2018-140		14				50	4	3,960	14.48	14.95	15.45	15.99	17.19
HLS 2018-160		16				50	4	3,960	16.54	17.08	17.65	18.27	19.63
HLS 2018-180		18				55	4	3,960	18.60	19.21	19.85	20.54	No Interference
HLS 2018-200		20				55	4	3,960	20.67	21.34	22.05	22.82	No Interference
HLS 2018-250		25				60	4	5,520	25.82	26.66	27.56	28.52	No Interference
HLS 2020-060	2	6	3	1.91	16°	45	4	3,840	6.23	6.43	6.65	6.88	7.40
HLS 2020-080		8				45	4	3,840	8.29	8.56	8.85	9.16	9.85
HLS 2020-100		10				45	4	3,840	10.35	10.69	11.05	11.44	12.29
HLS 2020-120		12				45	4	3,840	12.42	12.82	13.25	13.71	14.74
HLS 2020-140		14				50	4	3,840	14.48	14.95	15.45	15.99	17.19
HLS 2020-160		16				50	4	3,840	16.54	17.08	17.65	18.27	No Interference
HLS 2020-180		18				55	4	3,840	18.61	19.21	19.86	20.55	No Interference
HLS 2020-200		20				55	4	3,840	20.67	21.34	22.05	22.82	No Interference
HLS 2020-250		25				60	4	3,840	25.83	26.66	27.56	28.52	No Interference
HLS 2020-300		30				70	4	4,680	30.98	31.99	33.06	No Interference	No Interference
HLS 2020-350		35				80	4	5,640	36.14	37.31	38.56	No Interference	No Interference
HLS 2020-400		40				90	4	7,080	41.30	42.64	No Interference	No Interference	No Interference
HLS 2020-500		50				100	4	8,520	51.61	53.28	No Interference	No Interference	No Interference
HLS 2020-600		60				110	4	10,200	61.92	No Interference	No Interference	No Interference	No Interference
HLS 2025-080	2.5	8	3.7	2.41	16°	45	4	3,960	8.29	8.56	8.85	9.16	9.85
HLS 2025-100		10				45	4	3,960	10.35	10.69	11.05	11.44	12.29
HLS 2025-120		12				45	4	3,960	12.42	12.82	13.25	13.71	No Interference
HLS 2025-140		14				50	4	3,960	14.48	14.95	15.45	15.99	No Interference
HLS 2025-160		16				50	4	3,960	16.54	17.08	17.65	18.27	No Interference
HLS 2025-180		18				55	4	3,960	18.61	19.21	19.86	20.55	No Interference
HLS 2025-200		20				55	4	3,960	20.67	21.34	22.06	No Interference	No Interference
HLS 2025-250		25				60	4	4,320	25.83	26.66	27.56	No Interference	No Interference
HLS 2025-300		30				70	4	4,320	30.98	31.99	No Interference	No Interference	No Interference
HLS 2025-400		40				90	4	6,000	41.30	42.64	No Interference	No Interference	No Interference
HLS 2025-500		50				100	4	7,440	51.61	No Interference	No Interference	No Interference	No Interference

Next Page ➡

Unit (mm)

Model Number	Outside Diameter φD	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°
HLS 2030-080	3	8	4.5	2.92	16°	45	6	5,160	8.29	8.56	8.85	9.16	9.84
HLS 2030-100		10				45	6	5,160	10.35	10.69	11.05	11.43	12.29
HLS 2030-120		12				50	6	5,160	12.41	12.82	13.25	13.71	14.74
HLS 2030-140		14				50	6	5,160	14.48	14.95	15.45	15.99	17.18
HLS 2030-160		16				60	6	5,160	16.54	17.08	17.65	18.26	19.63
HLS 2030-180		18				60	6	5,160	18.60	19.21	19.85	20.54	22.08
HLS 2030-200		20				60	6	5,160	20.66	21.34	22.05	22.82	24.53
HLS 2030-250		25				70	6	5,160	25.82	26.66	27.56	28.51	No Interference
HLS 2030-300		30				80	6	6,120	30.98	31.98	33.06	34.21	No Interference
HLS 2030-350		35				80	6	6,360	36.14	37.31	38.56	39.90	No Interference
HLS 2030-400		40				90	6	6,360	41.29	42.63	44.06	No Interference	No Interference
HLS 2030-500		50				100	6	8,880	51.61	53.28	55.07	No Interference	No Interference
HLS 2040-120	4	12	6	3.82	16°	50	6	5,880	12.59	13.00	13.44	13.91	14.95
HLS 2040-160		16				60	6	5,880	16.72	17.26	17.84	18.46	No Interference
HLS 2040-200		20				60	6	5,880	20.84	21.52	22.24	23.02	No Interference
HLS 2040-250		25				70	6	5,880	26.00	26.85	27.75	28.71	No Interference
HLS 2040-300		30				70	6	5,880	31.16	32.17	33.25	No Interference	No Interference
HLS 2040-350		35				80	6	5,880	36.32	37.49	38.75	No Interference	No Interference
HLS 2040-400		40				90	6	7,440	41.47	42.82	No Interference	No Interference	No Interference
HLS 2040-450		45				90	6	9,000	46.63	48.14	No Interference	No Interference	No Interference
HLS 2040-500		50				100	6	11,040	51.79	53.47	No Interference	No Interference	No Interference
HLS 2040-600		60				110	6	13,680	62.10	No Interference	No Interference	No Interference	No Interference
HLS 2050-160	5	16	7.5	4.82	16°	60	6	7,440	16.72	17.26	17.84	No Interference	No Interference
HLS 2050-200		20				60	6	7,440	20.84	21.52	No Interference	No Interference	No Interference
HLS 2050-250		25				60	6	7,440	26.00	26.85	No Interference	No Interference	No Interference
HLS 2050-300		30				80	6	7,440	31.16	No Interference	No Interference	No Interference	No Interference
HLS 2050-350		35				80	6	7,440	36.32	No Interference	No Interference	No Interference	No Interference
HLS 2050-400		40				80	6	7,440	41.47	No Interference	No Interference	No Interference	No Interference
HLS 2050-500		50				110	6	11,760	51.79	No Interference	No Interference	No Interference	No Interference
HLS 2050-600		60				120	6	14,400	No Interference	No Interference	No Interference	No Interference	No Interference
HLS 2060-200	6	20	9	5.82	—	80	6	7,680	No Interference	No Interference	No Interference	No Interference	No Interference
HLS 2060-300		30				80	6	7,920	No Interference	No Interference	No Interference	No Interference	No Interference
HLS 2060-400		40				100	6	9,240	No Interference	No Interference	No Interference	No Interference	No Interference
HLS 2060-500		50				120	6	11,760	No Interference	No Interference	No Interference	No Interference	No Interference
HLS 2060-600		60				120	6	15,000	No Interference	No Interference	No Interference	No Interference	No Interference

Milling Conditions for HLS（2 Flutes）

WORK MATERIAL			CARBON STEELS S45C / S50C (~225HB)				ALLOY STEELS SK / SCM / SUS (225~325HB)				PREHARDENED STEELS HARDENED STEELS NAK / SKD(30~45HRC)			
Model Number	Outside Diameter (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	0.1	0.3	30,000	30	0.003~0.005	0.035	30,000	15	0.002~0.005	0.035	30,000	16	0.001~0.004	0.035
		0.5	28,000	28	0.002~0.005	0.03	28,000	14	0.002~0.004	0.03	28,000	14	0.001~0.003	0.03
		0.75	26,000	26	0.002~0.003	0.01	26,000	13	0.001~0.002	0.01	26,000	13	0.001~0.002	0.01
		1	24,000	24	0.002~0.003	0.005	24,000	12	0.001~0.002	0.005	24,000	12	0.001~0.002	0.005
20015	0.15	0.5	30,000	90	0.004~0.007	0.07	30,000	80	0.003~0.006	0.07	30,000	70	0.003~0.005	0.07
		0.75	28,700	90	0.003~0.007	0.032	28,700	80	0.002~0.006	0.032	28,700	70	0.002~0.005	0.032
		1	27,300	80	0.002~0.006	0.015	27,300	70	0.001~0.005	0.015	27,300	60	0.001~0.004	0.015
2002	0.2	0.5	56,000	340	0.005~0.009	0.13	56,000	310	0.005~0.008	0.13	56,000	270	0.004~0.006	0.13
		1	50,900	290	0.003~0.007	0.035	50,900	260	0.003~0.006	0.035	50,900	230	0.002~0.004	0.035
		1.5	48,200	250	0.003~0.004	0.012	48,200	230	0.002~0.003	0.012	48,200	200	0.001~0.002	0.012
		2	43,500	190	0.001~0.002	0.003	43,500	170	0.001~0.002	0.003	43,500	150	0.001~0.002	0.003
		3	41,300	160	0.001~0.001	0.002	41,300	145	0.001~0.001	0.002	41,300	130	0.001~0.001	0.002
2003	0.3	1	60,000	560	0.009~0.015	0.101	60,000	500	0.008~0.013	0.101	60,000	440	0.006~0.01	0.101
		1.5	50,800	460	0.008~0.013	0.05	50,800	410	0.007~0.011	0.05	50,800	360	0.005~0.009	0.05
		2	41,500	350	0.006~0.01	0.023	41,500	320	0.005~0.009	0.023	41,500	280	0.004~0.007	0.023
		2.5	36,700	300	0.004~0.005	0.012	36,700	270	0.004~0.006	0.012	36,700	240	0.003~0.005	0.012
		3	31,900	240	0.002~0.004	0.008	31,900	220	0.002~0.003	0.008	31,900	190	0.001~0.002	0.008
		4	26,200	170	0.001~0.002	0.003	26,200	160	0.001~0.002	0.003	26,200	140	0.001~0.001	0.003
		6	20,400	100	0.001~0.001	—	20,400	90	0.001~0.001	—	20,400	80	0.001~0.001	—
		9	15,700	30	0.001~0.001	—	15,700	30	0.001~0.001	—	15,700	30	0.001~0.001	—
2004	0.4	1.5	52,700	660	0.011~0.016	0.095	57,700	640	0.009~0.015	0.095	48,100	470	0.007~0.012	0.095
		2	50,000	610	0.009~0.014	0.052	53,000	580	0.008~0.013	0.052	44,600	430	0.006~0.01	0.052
		2.5	47,300	560	0.007~0.012	0.026	48,300	520	0.007~0.011	0.026	41,100	390	0.005~0.008	0.026
		3	44,500	510	0.005~0.009	0.018	43,600	450	0.005~0.008	0.018	37,500	340	0.004~0.006	0.018
		3.5	42,800	480	0.005~0.008	0.01	40,800	410	0.004~0.009	0.01	35,300	310	0.004~0.005	0.01
		4	41,000	440	0.004~0.006	0.008	38,000	360	0.003~0.005	0.008	33,100	280	0.003~0.004	0.008
		5	38,500	380	0.003~0.004	0.004	34,200	300	0.002~0.004	0.004	30,100	240	0.002~0.003	0.004
		8	33,700	260	0.001~0.002	0.001	27,300	190	0.001~0.002	0.001	24,600	150	0.001~0.002	0.001
		12	30,000	140	0.001~0.001	—	22,500	100	0.001~0.001	—	20,700	80	0.001~0.001	—
2005	0.5	1.5	63,100	1,020	0.019~0.029	0.139	61,000	870	0.017~0.027	0.139	46,500	610	0.013~0.02	0.139
		2	56,800	900	0.015~0.025	0.098	54,000	760	0.014~0.023	0.098	40,600	510	0.011~0.018	0.098
		2.5	50,500	780	0.011~0.021	0.057	47,000	650	0.011~0.019	0.057	34,700	410	0.009~0.016	0.057
		3	44,200	660	0.007~0.016	0.037	39,900	530	0.008~0.015	0.037	32,200	370	0.007~0.011	0.037
		4	40,600	580	0.008~0.013	0.016	36,100	460	0.007~0.012	0.016	29,700	330	0.006~0.009	0.016
		5	37,000	500	0.006~0.01	0.008	32,300	390	0.006~0.009	0.008	27,200	290	0.005~0.007	0.008
		6	33,400	420	0.004~0.007	0.005	28,500	320	0.004~0.006	0.005	24,700	250	0.003~0.005	0.005
		8	29,100	320	0.002~0.003	0.002	24,100	240	0.002~0.003	0.002	21,600	190	0.001~0.003	0.002
		10	26,100	250	0.001~0.002	0.001	21,200	180	0.001~0.002	0.001	19,600	150	0.001~0.002	0.001
		15	21,500	120	0.001~0.001	—	16,700	80	0.001~0.001	—	16,300	70	0.001~0.001	—
2006	0.6	2	63,600	1,240	0.023~0.038	0.18	53,300	930	0.02 ~0.034	0.18	39,100	600	0.016~0.026	0.18
		3	52,500	990	0.018~0.03	0.075	44,000	740	0.016~0.026	0.075	33,500	500	0.013~0.02	0.075
		4	41,300	740	0.012~0.021	0.03	34,700	550	0.011~0.018	0.03	27,900	390	0.009~0.014	0.03
		5	36,700	630	0.01 ~0.017	0.017	30,900	470	0.009~0.014	0.017	25,500	340	0.007~0.011	0.017
		6	32,100	520	0.007~0.012	0.01	27,000	390	0.006~0.01	0.01	23,000	290	0.005~0.008	0.01
		7	29,500	460	0.006~0.01	0.005	24,800	350	0.005~0.008	0.005	21,500	260	0.004~0.006	0.005
		8	26,800	390	0.004~0.007	0.004	22,600	300	0.004~0.006	0.004	20,000	230	0.003~0.005	0.004
		10	23,400	300	0.002~0.004	0.002	19,700	230	0.002~0.004	0.002	17,900	180	0.002~0.003	0.002
		12	20,900	240	0.002~0.003	0.001	17,600	180	0.002~0.002	0.001	16,400	150	0.001~0.002	0.001
		18	16,200	100	0.001~0.001	—	13,700	80	0.001~0.001	—	13,500	70	0.001~0.001	—

Milling Conditions for HLS（2 Flutes）

WORK MATERIAL			HARDENED STEELS SKD / SKT (45~55HRC)				HARDENED STEELS SKD / SKH (55~60HRC)			
Model Number	Outside Diameter (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)
2001	0.1	0.3	—	—	— ~ —	0.035	—	—	— ~ —	0.035
		0.5	—	—	— ~ —	0.03	—	—	— ~ —	0.03
		0.75	—	—	— ~ —	—	—	—	— ~ —	—
		1	—	—	— ~ —	—	—	—	— ~ —	—
20015	0.15	0.5	30,000	50	0.003~0.004	0.07	—	—	— ~ —	0.07
		0.75	28,700	50	0.002~0.004	0.032	—	—	— ~ —	0.032
		1	27,300	40	0.001~0.003	0.015	—	—	— ~ —	0.015
2002	0.2	0.5	44,800	180	0.003~0.004	0.13	15,000	10	0.001~0.002	0.13
		1	40,800	160	0.001~0.002	0.035	—	—	— ~ —	0.035
		1.5	38,500	140	0.001~0.001	0.012	—	—	— ~ —	0.012
		2	34,500	100	0.001~0.001	0.003	—	—	— ~ —	—
		3	32,600	80	0.001~0.001	0.002	—	—	— ~ —	—
2003	0.3	1	52,100	330	0.004~0.007	0.101	14,600	14	0.003~0.004	0.101
		1.5	42,700	260	0.004~0.006	0.05	14,600	13	0.003~0.004	0.05
		2	33,200	190	0.003~0.005	0.023	14,600	12	0.002~0.003	0.023
		2.5	29,400	160	0.002~0.004	0.012	14,600	11	0.001~0.002	0.012
		3	25,500	130	0.001~0.002	0.008	14,600	10	0.001~0.001	0.008
		4	20,900	100	0.001~0.001	0.003	14,600	9	0.001~0.001	0.003
		6	16,300	60	0.001~0.001	—	—	—	— ~ —	—
		9	12,500	20	0.001~0.001	—	—	—	— ~ —	—
2004	0.4	1.5	38,500	320	0.004~0.008	0.095	14,300	17	0.003~0.004	0.095
		2	35,700	290	0.004~0.007	0.052	14,300	17	0.003~0.004	0.052
		2.5	32,900	260	0.004~0.006	0.026	14,300	17	0.003~0.004	0.026
		3	30,000	230	0.003~0.005	0.018	14,300	16	0.002~0.003	0.018
		3.5	28,300	210	0.003~0.004	0.01	14,300	16	0.002~0.003	0.01
		4	26,500	190	0.002~0.003	0.008	14,300	15	0.001~0.002	0.008
		5	24,100	160	0.001~0.002	0.004	14,300	14	0.001~0.001	0.004
		8	19,700	100	0.001~0.001	0.001	14,300	11	0.001~0.001	0.001
		12	16,500	60	0.001~0.001	—	—	—	— ~ —	—
2005	0.5	1.5	37,300	410	0.009~0.015	0.139	14,000	20	0.004~0.008	0.139
		2	32,500	350	0.008~0.013	0.098	14,000	20	0.004~0.007	0.098
		2.5	27,700	290	0.007~0.011	0.057	14,000	20	0.004~0.006	0.057
		3	25,700	260	0.005~0.009	0.037	14,000	19	0.004~0.005	0.037
		4	23,700	230	0.004~0.007	0.016	14,000	18	0.003~0.004	0.016
		5	21,700	200	0.003~0.005	0.008	14,000	17	0.002~0.003	0.008
		6	19,700	170	0.002~0.003	0.005	14,000	16	0.001~0.002	0.005
		8	17,300	130	0.001~0.002	0.002	14,000	14	0.001~0.001	0.002
		10	15,600	100	0.001~0.001	0.001	14,000	12	0.001~0.001	0.001
		15	13,000	50	0.001~0.001	—	—	—	— ~ —	—
2006	0.6	2	31,300	410	0.011~0.019	0.18	12,000	23	0.006~0.01	0.18
		3	26,800	340	0.009~0.015	0.075	12,000	22	0.005~0.008	0.075
		4	22,300	270	0.006~0.01	0.03	12,000	21	0.003~0.005	0.03
		5	20,400	240	0.005~0.008	0.017	12,000	20	0.003~0.004	0.017
		6	18,400	200	0.003~0.006	0.01	12,000	19	0.002~0.003	0.01
		7	17,200	180	0.003~0.005	0.005	12,000	18	0.002~0.003	0.005
		8	16,000	160	0.002~0.003	0.004	12,000	17	0.001~0.002	0.004
		10	14,300	130	0.001~0.002	0.002	12,000	15	0.001~0.001	0.002
		12	13,100	100	0.001~0.001	0.001	12,000	13	0.001~0.001	0.001
		18	10,800	50	0.001~0.001	—	—	—	— ~ —	—

Milling Conditions for HLS（2 Flutes）

WORK MATERIAL			CARBON STEELS S45C / S50C (~225HB)				ALLOY STEELS SK / SCM / SUS (225~325HB)				PREHARDENED STEELS HARDENED STEELS NAK / SKD(30~45HRC)			
Model Number	Outside Diameter (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)
2007	0.7	2	59,800	1,380	0.03 ~0.05	0.165	50,200	1,040	0.027~0.045	0.165	36,100	660	0.021~0.035	0.165
		4	38,900	840	0.017~0.029	0.047	32,700	630	0.015~0.026	0.047	25,800	440	0.012~0.02	0.047
		6	30,200	600	0.01 ~0.017	0.014	25,400	450	0.009~0.015	0.014	21,200	330	0.007~0.012	0.014
		8	25,300	460	0.006~0.01	0.006	21,300	350	0.005~0.009	0.006	18,400	260	0.004~0.007	0.006
		10	22,000	360	0.004~0.006	0.004	18,500	270	0.003~0.005	0.004	16,500	220	0.003~0.005	0.004
2008	0.8	3	41,200	1,050	0.033~0.053	0.15	34,500	790	0.029~0.049	0.15	26,200	530	0.023~0.038	0.15
		4	37,100	930	0.027~0.044	0.08	31,100	700	0.024~0.04	0.08	24,100	480	0.019~0.031	0.08
		5	33,000	810	0.021~0.035	0.052	27,700	610	0.019~0.031	0.052	22,000	430	0.015~0.024	0.052
		6	28,800	680	0.015~0.025	0.024	24,200	510	0.013~0.022	0.024	19,800	370	0.01 ~0.017	0.024
		8	24,100	520	0.009~0.015	0.01	20,300	390	0.008~0.013	0.01	17,200	300	0.006~0.01	0.01
		10	21,000	420	0.006~0.009	0.005	17,700	320	0.005~0.008	0.005	15,500	240	0.004~0.007	0.005
		12	18,700	340	0.004~0.006	0.003	15,800	260	0.003~0.006	0.003	14,100	200	0.003~0.004	0.003
		16	15,600	230	0.002~0.003	0.001	13,200	180	0.002~0.003	0.001	12,300	150	0.002~0.002	0.001
		24	12,100	100	0.001~0.002	—	10,300	80	0.001~0.002	—	10,100	70	0.001~0.001	—
2009	0.9	4	35,600	1,100	0.033~0.054	0.128	29,500	820	0.029~0.049	0.128	22,500	550	0.023~0.038	0.128
		6	27,600	790	0.019~0.032	0.038	23,000	590	0.017~0.029	0.038	18,500	420	0.013~0.022	0.038
		8	23,000	600	0.012~0.02	0.016	19,300	450	0.011~0.018	0.016	16,100	330	0.008~0.014	0.016
		10	20,000	470	0.008~0.013	0.008	16,800	360	0.007~0.012	0.008	14,500	270	0.005~0.009	0.008
		15	15,500	270	0.003~0.006	0.002	13,100	200	0.003~0.005	0.002	11,900	160	0.002~0.004	0.002
2010	1	3	37,900	1,340	0.048~0.067	0.263	31,500	990	0.043~0.072	0.263	23,400	650	0.034~0.057	0.263
		4	34,100	1,170	0.04 ~0.067	0.195	28,400	870	0.036~0.06	0.195	21,500	580	0.028~0.047	0.195
		5	30,300	1,000	0.032~0.053	0.127	25,300	750	0.029~0.048	0.127	19,600	510	0.022~0.037	0.127
		6	26,500	850	0.023~0.039	0.058	22,100	630	0.021~0.035	0.058	17,600	440	0.016~0.027	0.058
		7	24,300	760	0.019~0.032	0.041	20,400	560	0.017~0.029	0.041	16,500	400	0.013~0.022	0.041
		8	22,100	660	0.014~0.024	0.024	18,600	490	0.013~0.022	0.024	15,300	360	0.01 ~0.017	0.024
		9	20,700	600	0.012~0.02	0.019	17,400	450	0.011~0.018	0.019	14,600	330	0.009~0.014	0.019
		10	19,200	530	0.01 ~0.016	0.013	16,200	400	0.009~0.014	0.013	13,800	300	0.007~0.011	0.013
		12	17,200	440	0.007~0.011	0.007	14,500	330	0.006~0.01	0.007	12,600	250	0.005~0.008	0.007
		14	15,600	360	0.005~0.008	0.005	13,200	270	0.004~0.007	0.005	11,700	210	0.003~0.006	0.005
		16	14,300	300	0.004~0.006	0.003	12,100	230	0.003~0.006	0.003	11,000	180	0.003~0.005	0.003
		18	13,400	250	0.003~0.005	0.002	11,350	190	0.002~0.004	0.002	10,400	150	0.002~0.004	0.002
		20	12,500	200	0.002~0.004	0.002	10,600	160	0.002~0.003	0.002	9,800	130	0.002~0.003	0.002
		25	10,800	120	0.002~0.003	0.001	9,200	100	0.001~0.002	0.001	8,800	80	0.001~0.002	0.001
		30	9,700	80	0.001~0.002	—	8,200	60	0.001~0.002	—	8,100	50	0.001~0.002	—
2012	1.2	4	28,900	1,180	0.05 ~0.085	0.23	24,100	870	0.047~0.077	0.23	18,300	580	0.036~0.059	0.23
		6	24,800	970	0.037~0.062	0.12	20,700	720	0.034~0.056	0.12	16,100	490	0.026~0.043	0.12
		8	20,700	760	0.024~0.039	0.051	17,300	570	0.021~0.035	0.051	13,900	400	0.016~0.027	0.051
		10	18,000	620	0.016~0.026	0.026	15,100	470	0.014~0.023	0.026	12,400	340	0.011~0.018	0.026
		12	16,100	520	0.011~0.018	0.015	13,500	390	0.01 ~0.016	0.015	11,400	290	0.008~0.013	0.015
		16	13,400	380	0.006~0.01	0.006	11,300	290	0.005~0.009	0.006	9,800	220	0.004~0.007	0.006
		20	11,700	280	0.004~0.007	0.003	9,900	210	0.004~0.006	0.003	8,800	170	0.003~0.005	0.003
2014	1.4	6	23,300	1,070	0.052~0.086	0.222	19,400	800	0.047~0.078	0.222	14,800	540	0.036~0.061	0.222
		8	19,500	850	0.035~0.059	0.094	16,300	640	0.032~0.053	0.094	12,900	440	0.025~0.041	0.094
		10	16,900	710	0.025~0.041	0.048	14,200	530	0.022~0.037	0.048	11,500	380	0.017~0.029	0.048
		12	15,100	600	0.018~0.03	0.028	12,700	450	0.016~0.027	0.028	10,500	330	0.013~0.021	0.028
		14	13,700	510	0.013~0.022	0.018	11,500	390	0.012~0.02	0.018	9,700	290	0.009~0.016	0.018
		16	12,600	450	0.01 ~0.017	0.012	10,600	340	0.009~0.015	0.012	9,100	250	0.007~0.012	0.012
		22	10,300	300	0.006~0.009	0.004	8,700	230	0.005~0.008	0.004	7,800	180	0.004~0.006	0.004

Milling Conditions for HLS（2 Flutes）

WORK MATERIAL			HARDENED STEELS SKD / SKT (45~55HRC)				HARDENED STEELS SKD / SKH (55~60HRC)			
Model Number	Outside Diameter (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)
2007	0.7	2	28,800	430	0.015~0.025	0.165	10,000	24	0.01 ~0.015	0.165
		4	20,600	290	0.009~0.014	0.047	10,000	22	0.006~0.009	0.047
		6	16,900	230	0.005~0.008	0.014	10,000	20	0.003~0.005	0.014
		8	14,700	190	0.003~0.005	0.006	10,000	18	0.002~0.003	0.006
		10	13,200	160	0.002~0.003	0.004	10,000	13	0.001~0.002	0.004
2008	0.8	3	21,000	370	0.016~0.027	0.15	8,000	21	0.012~0.016	0.15
		4	19,300	330	0.013~0.022	0.08	8,000	20	0.01 ~0.013	0.08
		5	17,600	290	0.01 ~0.017	0.052	8,000	19	0.008~0.01	0.052
		6	15,800	250	0.007~0.012	0.024	8,000	18	0.005~0.007	0.024
		8	13,800	200	0.004~0.007	0.01	8,000	16	0.003~0.004	0.01
		10	12,400	170	0.003~0.005	0.005	8,000	14	0.002~0.003	0.005
		12	11,300	140	0.002~0.003	0.003	8,000	12	0.001~0.002	0.003
		16	9,800	100	0.001~0.002	0.001	—	—	— ~ —	0.001
		24	8,100	50	0.001~0.001	—	—	—	— ~ —	—
2009	0.9	4	18,000	380	0.016~0.027	0.128	7,200	20	0.01 ~0.014	0.128
		6	14,800	290	0.01 ~0.016	0.038	7,200	18	0.007~0.009	0.038
		8	12,900	230	0.006~0.01	0.016	7,200	16	0.004~0.006	0.016
		10	11,600	190	0.004~0.006	0.008	7,200	14	0.002~0.003	0.008
		15	9,500	120	0.002~0.003	0.002	—	—	— ~ —	0.002
2010	1	3	18,700	440	0.024~0.039	0.263	6,500	15	0.011~0.016	0.263
		4	17,200	400	0.02 ~0.033	0.195	6,500	15	0.01 ~0.015	0.195
		5	15,700	360	0.016~0.027	0.127	6,500	15	0.009~0.014	0.127
		6	14,100	310	0.012~0.02	0.058	6,500	14	0.007~0.012	0.058
		7	13,200	280	0.01 ~0.016	0.041	6,500	14	0.006~0.009	0.041
		8	12,300	250	0.007~0.012	0.024	6,500	13	0.004~0.006	0.024
		9	11,700	230	0.006~0.01	0.019	6,500	13	0.004~0.005	0.019
		10	11,000	210	0.005~0.008	0.013	6,500	12	0.003~0.004	0.013
		12	10,100	170	0.003~0.006	0.007	6,500	11	0.002~0.003	0.007
		14	9,400	150	0.002~0.004	0.005	6,500	10	0.001~0.002	0.005
		16	8,800	130	0.002~0.003	0.003	—	—	— ~ —	0.003
		18	8,350	110	0.001~0.002	0.002	—	—	— ~ —	0.002
		20	7,900	90	0.001~0.002	0.002	—	—	— ~ —	0.002
		25	7,100	60	0.001~0.001	0.001	—	—	— ~ —	0.001
		30	6,500	40	0.001~0.001	—	—	—	— ~ —	—
2012	1.2	4	14,500	400	0.026~0.042	0.23	9,600	34	0.015~0.026	0.23
		6	12,800	340	0.019~0.031	0.12	9,600	22	0.011~0.019	0.12
		8	11,100	280	0.012~0.02	0.051	9,600	10	0.007~0.012	0.051
		10	9,900	230	0.008~0.013	0.026	—	—	— ~ —	0.026
		12	9,100	200	0.005~0.009	0.015	—	—	— ~ —	0.015
		16	7,900	150	0.003~0.005	0.006	—	—	— ~ —	0.006
		20	7,000	120	0.002~0.003	0.003	—	—	— ~ —	0.003
2014	1.4	6	11,900	370	0.026~0.043	0.222	9,600	44	0.015~0.026	0.222
		8	10,300	310	0.018~0.029	0.094	9,600	18	0.01 ~0.017	0.094
		10	9,200	260	0.012~0.021	0.048	—	—	— ~ —	0.048
		12	8,400	230	0.009~0.015	0.028	—	—	— ~ —	0.028
		14	7,800	200	0.007~0.011	0.018	—	—	— ~ —	0.018
		16	7,300	180	0.005~0.009	0.012	—	—	— ~ —	0.012
		22	6,200	120	0.003~0.005	0.004	—	—	— ~ —	0.004

Milling Conditions for HLS（2 Flutes）

WORK MATERIAL			CARBON STEELS S45C / S50C (~225HB)				ALLOY STEELS SK / SCM / SUS (225~325HB)				PREHARDENED STEELS HARDENED STEELS NAK / SKD(30~45HRC)			
Model Number	Outside Diameter (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)
2015	1.5	4	26,600	1,340	0.073~0.12	0.462	22,100	1,000	0.065~0.109	0.462	16,300	640	0.051~0.084	0.462
		6	22,800	1,120	0.057~0.094	0.293	19,000	840	0.051~0.085	0.293	14,400	550	0.04 ~0.066	0.293
		8	19,000	900	0.041~0.068	0.124	15,900	670	0.037~0.061	0.124	12,500	460	0.029~0.048	0.124
		10	16,600	750	0.03 ~0.05	0.063	13,800	560	0.027~0.045	0.063	11,200	390	0.021~0.035	0.063
		12	14,800	630	0.023~0.038	0.037	12,400	470	0.02 ~0.034	0.037	10,200	340	0.016~0.026	0.037
		14	13,400	550	0.017~0.029	0.023	11,200	410	0.016~0.026	0.023	9,500	300	0.012~0.02	0.023
		16	12,300	480	0.013~0.022	0.015	10,300	360	0.012~0.02	0.015	8,900	270	0.009~0.016	0.015
		18	11,500	420	0.011~0.018	0.011	9,600	310	0.01 ~0.016	0.011	8,400	240	0.007~0.012	0.011
		20	10,700	370	0.009~0.014	0.008	9,000	280	0.008~0.013	0.008	7,900	220	0.006~0.01	0.008
		25	9,300	270	0.005~0.009	0.004	7,800	200	0.005~0.008	0.004	7,100	160	0.004~0.006	0.004
		30	8,300	200	0.004~0.007	0.002	7,000	150	0.004~0.006	0.002	6,500	120	0.003~0.005	0.002
		35	7,600	140	0.003~0.004	0.001	6,400	110	0.003~0.004	0.001	6,000	90	0.002~0.003	0.001
		40	7,000	90	0.002~0.003	0.001	5,800	70	0.002~0.003	0.001	5,600	60	0.002~0.002	0.001
		45	6,500	60	0.002~0.003	0.001	5,400	50	0.002~0.002	0.001	5,300	40	0.001~0.002	0.001
2016	1.6	6	22,200	1,170	0.065~0.108	0.379	18,500	870	0.058~0.097	0.379	13,800	570	0.045~0.076	0.379
		8	18,500	940	0.047~0.079	0.16	15,500	700	0.042~0.071	0.16	12,000	480	0.033~0.055	0.16
		10	16,100	780	0.035~0.058	0.082	13,500	580	0.032~0.053	0.082	10,800	410	0.025~0.041	0.082
		12	14,400	670	0.027~0.044	0.047	12,000	500	0.024~0.04	0.047	9,800	360	0.019~0.031	0.047
		14	13,000	580	0.02 ~0.034	0.03	10,900	430	0.018~0.031	0.03	9,100	320	0.014~0.024	0.03
		16	12,000	510	0.016~0.027	0.02	10,000	380	0.014~0.024	0.02	8,500	280	0.011~0.019	0.02
		18	11,100	450	0.013~0.022	0.014	9,300	340	0.012~0.019	0.014	8,000	260	0.009~0.015	0.014
		20	10,400	400	0.011~0.018	0.01	8,700	300	0.01 ~0.016	0.01	7,600	230	0.007~0.012	0.01
		26	8,800	280	0.007~0.011	0.005	7,400	210	0.006~0.01	0.005	6,700	170	0.005~0.008	0.005
2018	1.8	6	21,000	1,270	0.061~0.102	0.608	17,800	950	0.055~0.092	0.608	12,800	600	0.043~0.071	0.608
		8	17,700	1,020	0.05 ~0.083	0.256	14,900	760	0.045~0.075	0.256	11,100	500	0.035~0.058	0.256
		10	15,400	860	0.041~0.068	0.131	12,900	640	0.037~0.061	0.131	9,900	430	0.029~0.048	0.131
		12	13,800	740	0.033~0.055	0.076	11,500	550	0.03 ~0.05	0.076	9,100	380	0.023~0.039	0.076
		14	12,500	640	0.027~0.045	0.048	10,500	480	0.024~0.041	0.048	8,400	340	0.019~0.032	0.048
		16	11,500	570	0.022~0.037	0.032	9,600	420	0.02 ~0.033	0.032	7,800	300	0.016~0.026	0.032
		18	10,700	500	0.018~0.03	0.023	8,900	380	0.016~0.027	0.023	7,400	280	0.013~0.021	0.023
		20	10,000	450	0.015~0.025	0.016	8,400	340	0.013~0.022	0.016	7,000	250	0.01 ~0.017	0.016
		25	8,700	350	0.009~0.015	0.008	7,300	260	0.008~0.014	0.008	6,300	200	0.006~0.011	0.008
2020	2	6	20,300	1,350	0.064~0.107	0.926	17,400	1,030	0.058~0.097	0.926	12,500	650	0.045~0.075	0.926
		8	17,000	1,090	0.054~0.089	0.391	14,500	830	0.048~0.081	0.391	10,800	540	0.038~0.063	0.391
		10	14,800	920	0.045~0.075	0.2	12,600	700	0.04 ~0.067	0.2	9,700	470	0.031~0.052	0.2
		12	13,200	790	0.037~0.062	0.116	11,200	600	0.034~0.056	0.116	8,900	420	0.026~0.044	0.116
		14	12,000	700	0.031~0.052	0.073	10,200	530	0.028~0.047	0.073	8,200	370	0.022~0.036	0.073
		16	11,100	620	0.026~0.044	0.049	9,400	470	0.024~0.039	0.049	7,700	340	0.018~0.03	0.049
		18	10,300	550	0.022~0.036	0.034	8,700	420	0.02 ~0.033	0.034	7,200	310	0.015~0.026	0.034
		20	9,600	500	0.018~0.031	0.025	8,100	380	0.016~0.027	0.025	6,900	280	0.013~0.021	0.025
		25	8,400	390	0.012~0.02	0.013	7,100	290	0.011~0.018	0.013	6,200	230	0.008~0.014	0.013
		30	7,500	310	0.008~0.013	0.007	6,300	230	0.007~0.012	0.007	5,600	180	0.005~0.009	0.007
		35	6,800	250	0.005~0.008	0.005	5,700	190	0.005~0.008	0.005	5,200	150	0.004~0.006	0.005
		40	6,300	200	0.003~0.006	0.003	5,200	150	0.003~0.005	0.003	4,900	120	0.002~0.004	0.003
		50	5,400	110	0.003~0.004	0.002	4,500	90	0.002~0.002	0.002	4,400	70	0.002~0.002	0.002
		60	4,900	50	0.002~0.003	0.002	4,000	40	0.002~0.002	0.002	4,000	30	0.002~0.002	0.002

Milling Conditions for HLS（2 Flutes）

WORK MATERIAL			HARDENED STEELS SKD / SKT (45~55HRC)				HARDENED STEELS SKD / SKH (55~60HRC)			
Model Number	Outside Diameter (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)
2015	1.5	4	13,000	440	0.036~0.06	0.462	9,600	95	0.02 ~0.036	0.462
		6	11,500	380	0.028~0.047	0.293	9,600	60	0.016~0.028	0.293
		8	10,000	320	0.02 ~0.034	0.124	9,600	25	0.012~0.02	0.124
		10	8,900	270	0.015~0.025	0.063	9,600	13	0.009~0.015	0.063
		12	8,200	240	0.011~0.019	0.037	—	—	— ~ —	0.037
		14	7,600	210	0.009~0.014	0.023	—	—	— ~ —	0.023
		16	7,100	190	0.007~0.011	0.015	—	—	— ~ —	0.015
		18	6,700	170	0.005~0.009	0.011	—	—	— ~ —	0.011
		20	6,300	150	0.004~0.007	0.008	—	—	— ~ —	0.008
		25	5,700	110	0.003~0.005	0.004	—	—	— ~ —	0.004
		30	5,200	90	0.002~0.003	0.002	—	—	— ~ —	0.002
		35	4,800	60	0.002~0.002	0.001	—	—	— ~ —	0.001
		40	4,500	40	0.001~0.002	0.001	—	—	— ~ —	0.001
		45	4,300	30	0.001~0.001	0.001	—	—	— ~ —	0.001
2016	1.6	6	11,100	400	0.032~0.054	0.379	9,600	73	0.019~0.032	0.379
		8	9,600	330	0.024~0.039	0.16	9,600	31	0.014~0.023	0.16
		10	8,600	280	0.018~0.029	0.082	9,600	15	0.01 ~0.017	0.082
		12	7,900	250	0.013~0.022	0.047	—	—	— ~ —	0.047
		14	7,300	220	0.01 ~0.017	0.03	—	—	— ~ —	0.03
		16	6,800	200	0.008~0.013	0.02	—	—	— ~ —	0.02
		18	6,400	180	0.006~0.011	0.014	—	—	— ~ —	0.014
		20	6,100	160	0.005~0.009	0.01	—	—	— ~ —	0.01
		26	5,300	120	0.003~0.005	0.005	—	—	— ~ —	0.005
2018	1.8	6	10,200	410	0.031~0.051	0.608	9,600	137	0.018~0.031	0.608
		8	8,900	350	0.025~0.042	0.256	9,600	58	0.015~0.025	0.256
		10	7,900	300	0.02 ~0.034	0.131	9,600	29	0.012~0.02	0.131
		12	7,200	260	0.017~0.028	0.076	9,600	17	0.01 ~0.017	0.076
		14	6,700	230	0.014~0.023	0.048	9,600	10	0.008~0.014	0.048
		16	6,300	210	0.011~0.019	0.032	—	—	— ~ —	0.032
		18	5,900	190	0.009~0.015	0.023	—	—	— ~ —	0.023
		20	5,600	170	0.007~0.012	0.016	—	—	— ~ —	0.016
		25	5,000	140	0.005~0.008	0.008	—	—	— ~ —	0.008
2020	2	6	10,000	450	0.032~0.054	0.926	9,600	211	0.019~0.032	0.926
		8	8,700	380	0.027~0.045	0.391	9,600	89	0.016~0.027	0.391
		10	7,800	330	0.022~0.037	0.2	9,600	45	0.013~0.022	0.2
		12	7,100	290	0.019~0.031	0.116	9,600	28	0.011~0.019	0.116
		14	6,600	260	0.016~0.026	0.073	9,600	16	0.009~0.016	0.073
		16	6,100	230	0.013~0.022	0.049	9,600	11	0.007~0.013	0.049
		18	5,800	210	0.011~0.018	0.034	—	—	— ~ —	0.034
		20	5,500	190	0.009~0.015	0.025	—	—	— ~ —	0.025
		25	4,900	160	0.006~0.01	0.013	—	—	— ~ —	0.013
		30	4,500	130	0.004~0.006	0.007	—	—	— ~ —	0.007
		35	4,200	100	0.003~0.004	0.005	—	—	— ~ —	0.005
		40	3,900	80	0.002~0.003	0.003	—	—	— ~ —	0.003
		50	3,500	50	0.001~0.001	0.002	—	—	— ~ —	0.002
		60	3,200	30	0.001~0.001	0.002	—	—	— ~ —	0.002

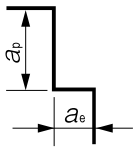
Milling Conditions for HLS（2 Flutes）

WORK MATERIAL			CARBON STEELS S45C / S50C (~225HB)				ALLOY STEELS SK / SCM / SUS (225~325HB)				PREHARDENED STEELS HARDENED STEELS NAK / SKD(30~45HRC)			
Model Number	Outside Diameter (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)
2025	2.5	8	15,000	1,340	0.077~0.129	0.954	12,800	1,020	0.069~0.116	0.954	9,600	670	0.054~0.09	0.954
		10	13,100	1,140	0.068~0.113	0.488	11,100	860	0.061~0.102	0.488	8,600	590	0.048~0.079	0.488
		12	11,800	1,000	0.06 ~0.099	0.283	10,000	750	0.054~0.089	0.283	7,900	520	0.042~0.07	0.283
		14	10,700	880	0.052~0.087	0.178	9,100	660	0.047~0.078	0.178	7,300	470	0.036~0.061	0.178
		16	9,900	790	0.045~0.075	0.119	8,400	590	0.04 ~0.067	0.119	6,800	430	0.031~0.052	0.119
		18	9,200	710	0.039~0.064	0.084	7,800	540	0.035~0.058	0.084	6,500	390	0.027~0.045	0.084
		20	8,700	650	0.033~0.055	0.061	7,300	490	0.03 ~0.05	0.061	6,100	360	0.023~0.039	0.061
		25	7,600	520	0.022~0.036	0.031	6,400	390	0.019~0.032	0.031	5,500	300	0.015~0.025	0.031
		30	6,800	430	0.014~0.023	0.018	5,700	320	0.012~0.02	0.018	5,000	250	0.01 ~0.016	0.018
		40	5,700	290	0.005~0.008	0.008	4,800	220	0.004~0.007	0.008	4,400	170	0.003~0.006	0.008
		50	5,000	190	0.003~0.004	0.004	4,200	140	0.002~0.004	0.004	3,900	120	0.002~0.003	0.004
2030	3	8	13,200	1,470	0.103~0.172	1.978	10,900	1,080	0.093~0.155	1.978	8,000	700	0.072~0.12	1.978
		10	11,600	1,270	0.092~0.153	1.013	9,600	930	0.083~0.138	1.013	7,200	620	0.064~0.107	1.013
		12	10,500	1,110	0.081~0.136	0.586	8,700	830	0.073~0.122	0.586	6,700	560	0.057~0.095	0.586
		14	9,600	1,000	0.072~0.12	0.369	8,000	740	0.065~0.108	0.369	6,200	510	0.051~0.084	0.369
		16	8,900	900	0.064~0.107	0.247	7,400	670	0.058~0.096	0.247	5,900	470	0.045~0.075	0.247
		18	8,300	820	0.057~0.094	0.174	7,000	610	0.051~0.085	0.174	5,600	430	0.04 ~0.066	0.174
		20	7,800	750	0.05 ~0.083	0.127	6,600	560	0.045~0.075	0.127	5,300	400	0.035~0.058	0.127
		25	6,900	620	0.036~0.06	0.065	5,800	460	0.032~0.054	0.065	4,800	340	0.025~0.042	0.065
		30	6,200	520	0.026~0.043	0.038	5,200	390	0.023~0.039	0.038	4,500	290	0.018~0.03	0.038
		35	5,700	440	0.018~0.031	0.024	4,800	330	0.016~0.027	0.024	4,200	250	0.013~0.021	0.024
		40	5,300	370	0.013~0.021	0.016	4,500	280	0.012~0.019	0.016	3,900	220	0.009~0.015	0.016
		50	4,700	270	0.006~0.01	0.008	3,900	200	0.005~0.009	0.008	3,600	160	0.004~0.007	0.008
2040	4	12	8,500	1,280	0.112~0.187	1.852	7,100	950	0.101~0.168	1.852	5,100	600	0.078~0.131	1.852
		16	7,200	1,050	0.093~0.155	0.781	6,000	770	0.084~0.139	0.781	4,400	510	0.065~0.108	0.781
		20	6,300	880	0.077~0.128	0.4	5,200	650	0.069~0.115	0.4	4,000	440	0.054~0.09	0.4
		25	5,600	750	0.061~0.101	0.205	4,600	540	0.055~0.091	0.205	3,600	380	0.042~0.071	0.205
		30	5,000	630	0.048~0.08	0.119	4,100	460	0.043~0.072	0.119	3,300	330	0.033~0.056	0.119
		35	4,600	540	0.038~0.063	0.075	3,800	400	0.034~0.057	0.075	3,100	290	0.026~0.044	0.075
		40	4,200	470	0.03 ~0.049	0.05	3,500	350	0.027~0.044	0.05	2,900	250	0.021~0.035	0.05
		45	3,900	410	0.023~0.039	0.035	3,300	300	0.021~0.035	0.035	2,700	230	0.016~0.027	0.035
		50	3,700	360	0.018~0.031	0.026	3,100	270	0.016~0.027	0.026	2,600	200	0.013~0.021	0.026
		60	3,300	280	0.011~0.019	0.015	2,800	210	0.01 ~0.017	0.015	2,400	160	0.008~0.013	0.015
2050	5	16	6,000	1,140	0.127~0.212	1.907	5,100	860	0.114~0.191	1.907	3,500	520	0.089~0.148	1.907
		20	5,300	980	0.121~0.202	0.977	4,400	730	0.109~0.182	0.977	3,100	440	0.085~0.142	0.977
		25	4,600	820	0.109~0.182	0.5	3,800	600	0.099~0.164	0.5	2,800	390	0.077~0.128	0.5
		30	4,200	710	0.094~0.157	0.289	3,400	510	0.085~0.141	0.289	2,500	340	0.066~0.11	0.289
		35	3,800	620	0.077~0.128	0.182	3,100	450	0.069~0.115	0.182	2,300	300	0.054~0.09	0.182
		40	3,500	540	0.06 ~0.099	0.122	2,800	390	0.054~0.089	0.122	2,200	270	0.042~0.07	0.122
		50	3,100	430	0.031~0.052	0.063	2,400	300	0.028~0.047	0.063	1,900	210	0.022~0.036	0.063
		60	2,800	350	0.02 ~0.035	0.035	2,100	240	0.02 ~0.033	0.035	1,800	170	0.019~0.031	0.035
2060	6	20	4,200	960	0.126~0.211	2.025	3,800	780	0.114~0.19	2.025	2,600	470	0.088~0.147	2.025
		30	3,400	730	0.109~0.182	0.6	2,800	540	0.099~0.164	0.6	2,000	340	0.077~0.128	0.6
		40	3,000	600	0.083~0.138	0.253	2,300	410	0.074~0.124	0.253	1,700	260	0.058~0.096	0.253
		50	2,600	480	0.054~0.09	0.13	1,900	310	0.049~0.081	0.13	1,500	220	0.038~0.063	0.13
		60	2,400	410	0.031~0.052	0.075	1,700	260	0.028~0.047	0.075	1,300	170	0.022~0.036	0.075

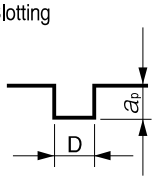
Milling Conditions for HLS（2 Flutes）

WORK MATERIAL			HARDENED STEELS SKD / SKT (45~55HRC)				HARDENED STEELS SKD / SKH (55~60HRC)			
Model Number	Outside Diameter (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)
2025	2.5	8	7,700	460	0.039~0.064	0.954	9,600	227	0.023~0.038	0.954
		10	6,900	400	0.034~0.057	0.488	9,600	116	0.02 ~0.034	0.488
		12	6,300	360	0.03 ~0.05	0.283	9,600	67	0.018~0.03	0.283
		14	5,800	320	0.026~0.043	0.178	9,600	42	0.015~0.026	0.178
		16	5,500	290	0.022~0.037	0.119	9,600	28	0.013~0.022	0.119
		18	5,200	270	0.019~0.032	0.084	9,600	20	0.011~0.019	0.084
		20	4,900	250	0.017~0.028	0.061	9,600	14	0.01 ~0.017	0.061
		25	4,400	210	0.011~0.018	0.031	—	—	— ~ —	0.031
		30	4,000	170	0.007~0.011	0.018	—	—	— ~ —	0.018
		40	3,500	120	0.002~0.004	0.008	—	—	— ~ —	0.008
		50	3,100	80	0.002~0.002	0.004	—	—	— ~ —	0.004
2030	3	8	6,400	480	0.052~0.086	1.978	8,000	435	0.031~0.052	1.978
		10	5,800	430	0.046~0.076	1.013	8,000	222	0.027~0.046	1.013
		12	5,300	380	0.041~0.068	0.586	8,000	128	0.024~0.041	0.586
		14	5,000	350	0.036~0.06	0.369	8,000	81	0.021~0.036	0.369
		16	4,700	320	0.032~0.053	0.247	8,000	54	0.019~0.032	0.247
		18	4,500	300	0.028~0.047	0.174	8,000	38	0.016~0.028	0.174
		20	4,300	280	0.025~0.042	0.127	8,000	27	0.015~0.025	0.127
		25	3,900	230	0.018~0.03	0.065	8,000	14	0.01 ~0.018	0.065
		30	3,600	200	0.013~0.022	0.038	8,000	10	0.007~0.013	0.038
		35	3,300	170	0.009~0.015	0.024	—	—	— ~ —	0.024
		40	3,100	150	0.006~0.011	0.016	—	—	— ~ —	0.016
		50	2,800	110	0.003~0.005	0.008	—	—	— ~ —	0.008
2040	4	12	4,100	410	0.056~0.093	1.852	6,000	388	0.033~0.056	1.852
		16	3,600	350	0.046~0.077	0.781	6,000	164	0.027~0.046	0.781
		20	3,200	300	0.038~0.064	0.4	6,000	84	0.022~0.038	0.4
		25	2,900	260	0.03 ~0.051	0.205	6,000	43	0.018~0.031	0.205
		30	2,600	230	0.024~0.04	0.119	6,000	24	0.014~0.024	0.119
		35	2,500	200	0.019~0.031	0.075	6,000	15	0.011~0.019	0.075
		40	2,300	180	0.015~0.025	0.05	6,000	10	0.009~0.015	0.05
		45	2,200	160	0.012~0.019	0.035	—	—	— ~ —	0.035
		50	2,100	140	0.009~0.015	0.026	—	—	— ~ —	0.026
		60	1,900	110	0.006~0.009	0.015	—	—	— ~ —	0.015
2050	5	16	2,800	360	0.064~0.106	1.907	4,800	457	0.038~0.064	1.907
		20	2,500	310	0.061~0.101	0.977	4,800	234	0.036~0.061	0.977
		25	2,200	270	0.055~0.091	0.5	4,800	120	0.033~0.055	0.5
		30	2,000	230	0.047~0.078	0.289	4,800	69	0.028~0.047	0.289
		35	1,900	210	0.038~0.064	0.182	4,800	43	0.022~0.038	0.182
		40	1,700	180	0.03 ~0.05	0.122	4,800	29	0.018~0.03	0.122
		50	1,500	150	0.016~0.026	0.063	4,800	15	0.009~0.016	0.063
		60	1,400	120	0.007~0.011	0.035	4,800	10	0.004~0.007	0.035
2060	6	20	2,100	330	0.063~0.105	2.025	4,000	607	0.037~0.063	2.025
		30	1,600	240	0.055~0.091	0.6	4,000	180	0.033~0.055	0.6
		40	1,300	170	0.041~0.069	0.253	4,000	75	0.024~0.041	0.253
		50	1,200	160	0.027~0.045	0.13	4,000	38	0.016~0.027	0.13
		60	1,000	120	0.016~0.026	0.075	4,000	22	0.009~0.016	0.075

Side Milling



Slotting



D：Outside Diameter（mm）

Note:
- Recommend using a non-contact measuring device to avoid damaging the precision tip point.
- Decrease both spindle speed and feed rate proportionally when the milling parameters exceed the machine's maximum spindle speed.
- Every coolant offers stable milling.
- Recommend oil coolant for Stainless Steels and Heat Resistant Alloys.
- Recommend wet coolant for Copper.