Size φ0.1～φ6

HLS2000

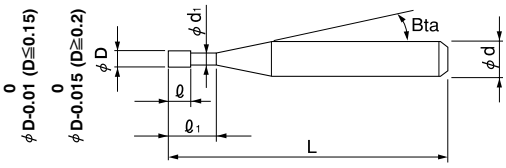
Super MG | HARD MAX | 30° | Flatland | Shank Dia 0/-0.005

Material Applications（☆ Highly Recommended ◎ Recommended ○ Suggested）

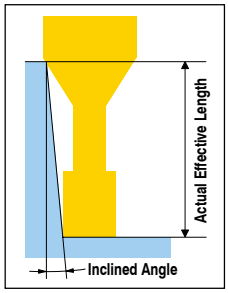
Work Material														
Carbon Steels S45C S55C	Alloy Steels SK / SCM SUS	Prehardened Steels NAK HPM	Hardened Steels ～55HRC	Hardened Steels ～60HRC	Hardened Steels ～70HRC	Cast Iron	Aluminum Alloys	Graphite	Copper	Plastics	Glass Filled Plastics	Titanium Alloys	Heat Resistant Alloys	Cemented Carbide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

Features

HARDMAX offers outstanding heat resistance and low friction properties for deep milling on Hardened Steels.
High Accuracy: Diameter Tolerance: 0/-0.01 (D≦0.15)、0/-0.015 (D≧0.2)
Longer tool life with HARDMAX.
Refer to page 146 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.



Total 184 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	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 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 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

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	Price (¥)	Effective Length by Inclined Angles				
									30'	1°	1° 30'	2°	3°
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
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

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	Price (¥)	Effective Length by Inclined Angles				
									30'	1°	1° 30'	2°	3°
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 2010-200		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
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

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	Price (¥)	Effective Length by Inclined Angles				
									30'	1°	1° 30'	2°	3°
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
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	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)			HARDENED STEELS SKD / SKT(45～55HRC)			HARDENED STEELS SKD / SKH(55～60HRC)			Side Milling
Model Number	Outside Diameter (mm)	Effective Length (mm)	L/D	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial 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	3	30,000	30	0.003~0.005	30,000	15	0.002~0.005	30,000	16	0.001~0.004	—	—	—	—	—	—	0.035
		0.5	5	28,000	28	0.002~0.005	28,000	14	0.002~0.004	28,000	14	0.001~0.003	—	—	—	—	—	—	0.030
20015	**0.15**	0.5	3.3	30,000	90	0.004~0.007	30,000	80	0.003~0.006	30,000	70	0.003~0.005	30,000	50	0.003~0.004	—	—	—	0.070
		0.75	5	28,700	90	0.003~0.007	28,700	80	0.002~0.006	28,700	70	0.002~0.005	28,700	50	0.002~0.004	—	—	—	0.032
		1	6.7	27,300	80	0.002~0.006	27,300	70	0.001~0.005	27,300	60	0.001~0.004	27,300	40	0.001~0.003	—	—	—	0.015
2002	**0.2**	0.5	2.5	56,000	340	0.005~0.009	56,000	310	0.005~0.008	56,000	270	0.004~0.006	44,800	180	0.003~0.004	15,000	10	0.001~0.002	0.160
		1	5	50,900	290	0.005~0.009	50,900	260	0.005~0.008	50,900	230	0.004~0.006	40,800	160	0.003~0.004	—	—	—	0.020
		1.5	7.5	48,200	250	0.003~0.005	48,200	230	0.003~0.005	48,200	200	0.002~0.004	38,500	140	0.002~0.003	—	—	—	0.006
2003	**0.3**	1	3.3	60,000	560	0.009~0.015	60,000	500	0.008~0.013	60,000	440	0.006~0.01	52,100	330	0.004~0.007	14,600	14	0.003~0.004	0.101
		1.5	5	50,800	460	0.008~0.013	50,800	410	0.007~0.011	50,800	360	0.005~0.009	42,700	260	0.004~0.006	14,600	13	0.003~0.004	0.057
		2	6.7	41,500	350	0.006~0.01	41,500	320	0.005~0.009	41,500	280	0.004~0.007	33,200	190	0.003~0.005	14,600	12	0.002~0.003	0.013
		2.5	8.3	36,700	300	0.004~0.005	36,700	270	0.004~0.006	36,700	240	0.003~0.005	29,400	160	0.002~0.004	14,600	11	0.001~0.002	0.009
		3	10	31,900	240	0.002~0.004	31,900	220	0.002~0.003	31,900	190	0.001~0.002	25,500	130	0.001~0.002	14,600	10	0.001	0.004
		4	13.3	26,200	170	0.001~0.002	26,200	160	0.001~0.002	26,200	140	0.001	20,900	100	0.001	14,600	9	0.001	0.003
		6	20	20,400	100	0.001	20,400	90	0.001	20,400	80	0.001	16,300	60	0.001	—	—	—	—
		9	30	15,700	30	0.001	15,700	30	0.001	15,700	30	0.001	12,500	20	0.001	—	—	—	—
2004	**0.4**	1.5	3.8	52,700	660	0.011~0.016	57,700	640	0.009~0.015	48,100	470	0.007~0.012	38,500	320	0.004~0.008	14,300	17	0.003~0.004	0.054
		2	5	50,000	610	0.009~0.014	53,000	580	0.008~0.013	44,600	430	0.006~0.01	35,700	290	0.004~0.007	14,300	17	0.003~0.004	0.040
		2.5	6.3	47,300	560	0.007~0.012	48,300	520	0.007~0.011	41,100	390	0.005~0.008	32,900	260	0.004~0.006	14,300	17	0.003~0.004	0.026
		3	7.5	44,500	510	0.005~0.009	43,600	450	0.005~0.008	37,500	340	0.004~0.006	30,000	230	0.003~0.005	14,300	16	0.002~0.003	0.012
		3.5	8.8	42,800	480	0.005~0.008	40,800	410	0.004~0.009	35,300	310	0.004~0.005	28,300	210	0.003~0.004	14,300	16	0.002~0.003	0.009
		4	10	41,000	440	0.004~0.006	38,000	360	0.003~0.005	33,100	280	0.003~0.004	26,500	190	0.002~0.003	14,300	15	0.001~0.002	0.005
		5	12.5	38,500	380	0.003~0.004	34,200	300	0.002~0.004	30,100	240	0.002~0.003	24,100	160	0.001~0.002	14,300	14	0.001	0.003
		8	20	33,700	260	0.001~0.002	27,300	190	0.001~0.002	24,600	150	0.001~0.002	19,700	100	0.001	14,300	11	0.001	0.001
		12	30	30,000	140	0.001	22,500	100	0.001	20,700	80	0.001	16,500	60	0.001	—	—	—	—
2005	**0.5**	1.5	3	63,100	1,020	0.019~0.029	61,000	870	0.017~0.027	46,500	610	0.013~0.02	37,300	410	0.009~0.015	14,000	20	0.004~0.008	0.139
		2	4	56,800	900	0.015~0.025	54,000	760	0.014~0.023	40,600	510	0.011~0.018	32,500	350	0.008~0.013	14,000	20	0.004~0.007	0.098
		2.5	5	50,500	780	0.011~0.021	47,000	650	0.011~0.019	34,700	410	0.009~0.016	27,700	290	0.007~0.011	14,000	20	0.004~0.006	0.057
		3	6	44,200	660	0.007~0.016	39,900	530	0.008~0.015	32,200	370	0.007~0.011	25,700	260	0.005~0.009	14,000	19	0.004~0.005	0.016
		4	8	40,600	580	0.008~0.013	36,100	460	0.007~0.012	29,700	330	0.006~0.009	23,700	230	0.004~0.007	14,000	18	0.003~0.004	0.012
		5	10	37,000	500	0.006~0.01	32,300	390	0.006~0.009	27,200	290	0.005~0.007	21,700	200	0.003~0.005	14,000	17	0.002~0.003	0.008
		6	12	33,400	420	0.004~0.007	28,500	320	0.004~0.006	24,700	250	0.003~0.005	19,700	170	0.002~0.003	14,000	16	0.001~0.002	0.004
		8	16	29,100	320	0.002~0.003	24,100	240	0.002~0.003	21,600	190	0.001~0.002	17,300	130	0.001~0.002	14,000	14	0.001	0.002
		10	20	26,100	250	0.001~0.002	21,200	180	0.001~0.002	19,600	150	0.001	15,600	100	0.001	14,000	12	0.001	0.001
		15	30	21,500	120	0.001	16,700	80	0.001	16,300	70	0.001	13,000	50	0.001	—	—	—	—
2006	**0.6**	2	3.3	63,600	1,240	0.023~0.038	53,300	930	0.02~0.034	39,100	600	0.016~0.026	31,300	410	0.011~0.019	12,000	23	0.006~0.01	0.203
		3	5	52,500	990	0.018~0.03	44,000	740	0.016~0.026	33,500	500	0.013~0.02	26,800	340	0.009~0.015	12,000	22	0.005~0.008	0.114
		4	6.7	41,300	740	0.012~0.021	34,700	550	0.011~0.018	27,900	390	0.009~0.014	22,300	270	0.006~0.01	12,000	21	0.003~0.005	0.025
		5	8.3	36,700	630	0.01~0.017	30,900	470	0.009~0.014	25,500	340	0.007~0.011	20,400	240	0.005~0.008	12,000	20	0.003~0.004	0.017
		6	10	32,100	520	0.007~0.012	27,000	390	0.006~0.01	23,000	290	0.005~0.008	18,400	200	0.003~0.006	12,000	19	0.002~0.003	0.008
		7	11.7	29,500	460	0.006~0.01	24,800	350	0.005~0.008	21,500	260	0.004~0.007	17,200	180	0.003~0.005	12,000	18	0.002~0.003	0.006
		8	13.3	26,800	390	0.004~0.007	22,600	300	0.004~0.006	20,000	230	0.003~0.005	16,000	160	0.002~0.003	12,000	17	0.001~0.002	0.003
		10	16.7	23,400	300	0.002~0.004	19,700	230	0.002~0.004	17,900	180	0.002~0.003	14,300	130	0.001~0.002	12,000	15	0.001	0.002
		12	20	20,900	240	0.002~0.003	17,600	180	0.001~0.002	16,400	150	0.001~0.002	13,100	100	0.001	12,000	13	0.001	0.001
		18	30	16,200	100	0.001	13,700	80	0.001	13,500	70	0.001	10,800	50	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)			HARDENED STEELS SKD / SKT(45～55HRC)			HARDENED STEELS SKD / SKH(55～60HRC)			Side Milling
Model Number	Outside Diameter (mm)	Effective Length (mm)	L / D	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)
2007	0.7	2	2.9	59,800	1,380	0.03～0.05	50,200	1,040	0.027～0.045	36,100	660	0.021～0.035	28,800	430	0.015～0.025	10,000	24	0.01～0.015	0.375
		4	5.7	38,900	840	0.017～0.029	32,700	630	0.015～0.026	25,800	440	0.012～0.02	20,600	290	0.009～0.014	10,000	22	0.006～0.009	0.047
		6	8.6	30,200	600	0.01～0.017	25,400	450	0.009～0.015	21,200	330	0.007～0.012	16,900	230	0.005～0.008	10,000	20	0.003～0.005	0.014
		8	11.4	25,300	460	0.006～0.01	21,300	350	0.005～0.009	18,400	260	0.004～0.007	14,700	190	0.003～0.005	10,000	18	0.002～0.003	0.006
		10	14.3	22,000	360	0.004～0.006	18,500	270	0.003～0.005	16,500	220	0.003～0.004	13,200	160	0.002～0.003	10,000	16	0.001～0.002	0.003
2008	0.8	3	3.8	41,200	1,050	0.033～0.053	34,500	790	0.029～0.049	26,200	530	0.023～0.038	21,000	370	0.016～0.027	8,000	21	0.012～0.016	0.108
		4	5	37,100	930	0.027～0.044	31,100	700	0.024～0.04	24,100	480	0.019～0.031	19,300	330	0.013～0.022	8,000	20	0.01～0.013	0.080
		5	6.3	33,000	810	0.021～0.035	27,700	610	0.019～0.031	22,000	430	0.015～0.024	17,600	290	0.01～0.017	8,000	19	0.008～0.01	0.052
		6	7.5	28,800	680	0.015～0.025	24,200	510	0.013～0.022	19,800	370	0.01～0.017	15,800	250	0.007～0.012	8,000	18	0.005～0.007	0.024
		8	10	24,100	520	0.009～0.015	20,300	390	0.008～0.013	17,200	300	0.006～0.01	13,800	200	0.004～0.007	8,000	16	0.003～0.004	0.010
		10	12.5	21,000	420	0.006～0.009	17,700	320	0.005～0.008	15,500	240	0.004～0.007	12,400	170	0.003～0.005	8,000	14	0.002～0.003	0.005
		12	15	18,700	340	0.004～0.006	15,800	260	0.003～0.006	14,100	200	0.003～0.004	11,300	140	0.002～0.003	8,000	12	0.001～0.002	0.003
		16	20	15,600	230	0.002～0.003	13,200	180	0.002～0.003	12,300	150	0.001～0.002	9,800	100	0.001～0.002	—	—	—	0.001
		24	30	12,100	100	0.001～0.002	10,300	80	0.001～0.002	10,100	70	0.001	8,100	50	0.001	—	—	—	—
2009	0.9	4	4.4	35,600	1,100	0.033～0.054	29,500	820	0.029～0.049	22,500	550	0.023～0.038	18,000	380	0.016～0.027	7,200	20	0.01～0.014	0.128
		6	6.7	27,600	790	0.019～0.032	23,000	590	0.017～0.029	18,500	420	0.013～0.022	14,800	290	0.01～0.016	7,200	18	0.007～0.009	0.038
		8	8.9	23,000	600	0.012～0.02	19,300	450	0.011～0.018	16,100	330	0.008～0.014	12,900	230	0.006～0.01	7,200	16	0.004～0.006	0.016
		10	11.1	20,000	470	0.008～0.013	16,800	360	0.007～0.012	14,500	270	0.005～0.009	11,600	190	0.004～0.006	7,200	14	0.002～0.003	0.008
		15	16.7	15,500	270	0.003～0.006	13,100	200	0.003～0.005	11,900	160	0.002～0.004	9,500	120	0.002～0.003	—	—	—	0.002
2010	1	3	3	37,900	1,340	0.048～0.067	31,500	990	0.043～0.072	23,400	650	0.034～0.057	18,700	440	0.024～0.039	6,500	15	0.011～0.016	0.263
		4	4	34,100	1,170	0.04～0.067	28,400	870	0.036～0.06	21,500	580	0.028～0.047	17,200	400	0.02～0.033	6,500	15	0.01～0.015	0.195
		5	5	30,300	1,000	0.032～0.053	25,300	750	0.029～0.048	19,600	510	0.022～0.037	15,700	360	0.016～0.027	6,500	15	0.009～0.014	0.0127
		6	6	26,500	850	0.023～0.039	22,100	630	0.021～0.035	17,600	440	0.016～0.027	14,100	310	0.012～0.02	6,500	14	0.007～0.012	0.058
		7	7	24,300	760	0.019～0.032	20,400	560	0.017～0.029	16,500	400	0.013～0.022	13,200	280	0.01～0.016	6,500	14	0.006～0.009	0.041
		8	8	22,100	660	0.014～0.024	18,600	490	0.013～0.022	15,300	360	0.01～0.017	12,300	250	0.007～0.012	6,500	13	0.004～0.006	0.024
		9	9	20,700	600	0.012～0.02	17,400	450	0.011～0.018	14,600	330	0.009～0.014	11,700	230	0.006～0.01	6,500	13	0.004～0.005	0.019
		10	10	19,200	530	0.01～0.016	16,200	400	0.009～0.014	13,800	300	0.007～0.011	11,000	210	0.005～0.008	6,500	12	0.003～0.004	0.013
		12	12	17,200	440	0.007～0.011	14,500	330	0.006～0.01	12,600	250	0.005～0.008	10,100	170	0.003～0.006	6,500	11	0.002～0.003	0.007
		14	14	15,600	360	0.005～0.008	13,200	270	0.004～0.007	11,700	210	0.003～0.006	9,400	150	0.002～0.004	6,500	10	0.001～0.002	0.005
		16	16	14,300	300	0.004～0.006	12,100	230	0.003～0.006	11,000	180	0.003～0.004	8,800	130	0.002～0.003	—	—	—	0.003
		20	20	12,500	200	0.003～0.005	10,600	160	0.003～0.004	9,800	130	0.002～0.003	7,900	90	0.001～0.002	—	—	—	0.002
		25	25	10,800	120	0.003～0.004	9,200	90	0.002～0.004	8,800	80	0.002～0.003	7,100	50	0.001～0.002	—	—	—	0.001
		30	30	9,700	50	0.002～0.003	8,200	40	0.002～0.003	8,100	30	0.001～0.002	6,500	30	0.001～0.002	—	—	—	—
2012	1.2	4	3.3	28,900	1,180	0.05～0.085	24,100	870	0.047～0.077	18,300	580	0.036～0.059	14,500	400	0.026～0.042	9,600	34	0.015～0.026	0.189
		6	5	24,800	970	0.037～0.062	20,700	720	0.034～0.056	16,100	490	0.026～0.043	12,800	340	0.019～0.031	9,600	22	0.011～0.019	0.120
		8	6.7	20,700	760	0.024～0.039	17,300	570	0.021～0.035	13,900	400	0.016～0.027	11,100	280	0.012～0.02	9,600	10	0.007～0.012	0.051
		10	8.3	18,000	620	0.016～0.026	15,100	470	0.014～0.023	12,400	340	0.011～0.018	9,900	230	0.008～0.013	—	—	—	0.026
		12	10	16,100	520	0.011～0.018	13,500	390	0.01～0.016	11,400	290	0.008～0.013	9,100	200	0.005～0.009	—	—	—	0.015
		16	13.3	13,400	380	0.006～0.01	11,300	290	0.005～0.009	9,800	220	0.004～0.007	7,900	150	0.003～0.005	—	—	—	0.006
		20	16.7	11,700	280	0.004～0.007	9,900	210	0.004～0.006	8,800	170	0.003～0.005	7,000	120	0.002～0.003	—	—	—	0.003
2014	1.4	6	4.3	23,300	1,070	0.052～0.086	19,400	800	0.047～0.078	14,800	540	0.036～0.061	11,900	370	0.026～0.043	9,600	44	0.015～0.026	0.222
		8	5.7	19,500	850	0.035～0.059	16,300	640	0.032～0.053	12,900	440	0.025～0.041	10,300	310	0.018～0.029	9,600	18	0.01～0.017	0.094
		10	7.1	16,900	710	0.025～0.041	14,200	530	0.022～0.037	11,500	380	0.017～0.029	9,200	260	0.012～0.021	—	—	—	0.048
		12	8.6	15,100	600	0.018～0.03	12,700	450	0.016～0.027	10,500	330	0.013～0.021	8,400	230	0.009～0.015	—	—	—	0.028
		14	10	13,700	510	0.013～0.022	11,500	390	0.012～0.02	9,700	290	0.009～0.016	7,800	200	0.007～0.011	—	—	—	0.018
		16	11.4	12,600	450	0.01～0.017	10,600	340	0.009～0.015	9,100	250	0.007～0.012	7,300	180	0.005～0.009	—	—	—	0.012
		22	15.7	10,300	300	0.006～0.009	8,700	230	0.005～0.008	7,800	180	0.004～0.006	6,200	120	0.003～0.005	—	—	—	0.005

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)			HARDENED STEELS SKD / SKT(45～55HRC)			HARDENED STEELS SKD / SKH(55～60HRC)			Side Milling
Model Number	Outside Diameter (mm)	Effective Length (mm)	L/D	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)
2015	1.5	4	2.7	26,600	1,340	0.073~0.12	22,100	1,000	0.065~0.109	16,300	640	0.051~0.084	13,000	440	0.036~0.06	9,600	95	0.02~0.036	0.462
		6	4	22,800	1,120	0.057~0.094	19,000	840	0.051~0.085	14,400	550	0.04~0.066	11,500	380	0.028~0.047	9,600	60	0.016~0.028	0.293
		8	5.3	19,000	900	0.041~0.068	15,900	670	0.037~0.061	12,500	460	0.029~0.048	10,000	320	0.02~0.034	9,600	25	0.012~0.02	0.124
		10	6.7	16,600	750	0.03~0.05	13,800	560	0.027~0.045	11,200	390	0.021~0.035	8,900	270	0.015~0.025	9,600	13	0.009~0.015	0.063
		12	8	14,800	630	0.023~0.038	12,400	470	0.02~0.034	10,200	340	0.016~0.026	8,200	240	0.011~0.019	—	—	—	0.037
		14	9.3	13,400	550	0.017~0.029	11,200	410	0.016~0.026	9,500	300	0.012~0.02	7,600	210	0.009~0.014	—	—	—	0.023
		16	10.7	12,300	480	0.013~0.022	10,300	360	0.012~0.02	8,900	270	0.009~0.016	7,100	190	0.007~0.011	—	—	—	0.015
		18	12	11,500	420	0.011~0.018	9,600	310	0.01~0.016	8,400	240	0.007~0.012	6,700	170	0.005~0.009	—	—	—	0.011
		20	13.3	10,700	370	0.009~0.014	9,000	280	0.008~0.013	7,900	220	0.006~0.01	6,300	150	0.004~0.007	—	—	—	0.008
		25	16.7	9,300	270	0.005~0.009	7,800	200	0.005~0.008	7,100	160	0.004~0.006	5,700	110	0.003~0.005	—	—	—	0.004
		30	20	8,300	200	0.004~0.007	7,000	150	0.004~0.006	6,500	120	0.003~0.005	5,200	90	0.002~0.003	—	—	—	0.002
		35	23.3	7,600	140	0.003~0.005	6,400	110	0.003~0.005	6,000	90	0.002~0.004	4,800	60	0.002~0.003	—	—	—	0.001
		40	26.7	7,000	90	0.003~0.005	5,800	70	0.003~0.004	5,600	60	0.002~0.003	4,500	40	0.001~0.002	—	—	—	0.001
		45	30	6,500	50	0.003~0.005	5,400	40	0.003~0.004	5,300	40	0.002~0.003	4,300	30	0.001~0.002	—	—	—	0.001
2016	1.6	6	3.8	22,200	1,170	0.065~0.108	18,500	870	0.058~0.097	13,800	570	0.045~0.076	11,100	400	0.032~0.054	9,600	73	0.019~0.032	0.379
		8	5	18,500	940	0.047~0.079	15,500	700	0.042~0.071	12,000	480	0.033~0.055	9,600	330	0.024~0.039	9,600	31	0.014~0.023	0.160
		10	6.3	16,100	780	0.035~0.058	13,500	580	0.032~0.053	10,800	410	0.025~0.041	8,600	280	0.018~0.029	9,600	15	0.01~0.017	0.082
		12	7.5	14,400	670	0.027~0.044	12,000	500	0.024~0.04	9,800	360	0.019~0.031	7,900	250	0.013~0.022	—	—	—	0.047
		14	8.8	13,000	580	0.02~0.034	10,900	430	0.018~0.031	9,100	320	0.014~0.024	7,300	220	0.01~0.017	—	—	—	0.030
		16	10	12,000	510	0.016~0.027	10,000	380	0.014~0.024	8,500	280	0.011~0.019	6,800	200	0.008~0.013	—	—	—	0.020
		18	11.3	11,100	450	0.013~0.022	9,300	340	0.012~0.019	8,000	260	0.009~0.015	6,400	180	0.006~0.011	—	—	—	0.014
		20	12.5	10,400	400	0.011~0.018	8,700	300	0.01~0.016	7,600	230	0.007~0.012	6,100	160	0.005~0.009	—	—	—	0.010
		26	16.3	8,800	280	0.007~0.011	7,400	210	0.006~0.01	6,700	170	0.005~0.008	5,300	120	0.003~0.005	—	—	—	0.005
2018	1.8	6	3.3	21,000	1,270	0.061~0.102	17,800	950	0.055~0.092	12,800	600	0.043~0.071	10,200	410	0.031~0.051	9,600	137	0.018~0.031	0.608
		8	4.4	17,700	1,020	0.05~0.083	14,900	760	0.045~0.075	11,100	500	0.035~0.058	8,900	350	0.025~0.042	9,600	58	0.015~0.025	0.256
		10	5.6	15,400	860	0.041~0.068	12,900	640	0.037~0.061	9,900	430	0.029~0.048	7,900	300	0.02~0.034	9,600	29	0.012~0.02	0.131
		12	6.7	13,800	740	0.033~0.055	11,500	550	0.03~0.05	9,100	380	0.023~0.039	7,200	260	0.017~0.028	9,600	17	0.01~0.017	0.076
		14	7.8	12,500	640	0.027~0.045	10,500	480	0.024~0.041	8,400	340	0.019~0.032	6,700	230	0.014~0.023	9,600	10	0.008~0.014	0.048
		16	8.9	11,500	570	0.022~0.037	9,600	420	0.02~0.033	7,800	300	0.016~0.026	6,300	210	0.011~0.019	—	—	—	0.032
		18	10	10,700	500	0.018~0.03	8,900	380	0.016~0.027	7,400	280	0.013~0.021	5,900	190	0.009~0.015	—	—	—	0.023
		20	11.1	10,000	450	0.015~0.025	8,400	340	0.013~0.022	7,000	250	0.01~0.017	5,600	170	0.007~0.012	—	—	—	0.016
		25	13.9	8,700	350	0.009~0.015	7,300	260	0.008~0.014	6,300	200	0.006~0.011	5,000	140	0.005~0.008	—	—	—	0.008
2020	2	6	3	20,300	1,350	0.064~0.107	17,400	1,030	0.058~0.097	12,500	650	0.045~0.075	10,000	450	0.032~0.054	9,600	211	0.019~0.032	0.926
		8	4	17,000	1,090	0.054~0.089	14,500	830	0.048~0.081	10,800	540	0.038~0.063	8,700	380	0.027~0.045	9,600	89	0.016~0.027	0.391
		10	5	14,800	920	0.045~0.075	12,600	700	0.04~0.067	9,700	470	0.031~0.052	7,800	330	0.022~0.037	9,600	45	0.013~0.022	0.200
		12	6	13,200	790	0.037~0.062	11,200	600	0.034~0.056	8,900	420	0.026~0.044	7,100	290	0.019~0.031	9,600	56	0.011~0.019	0.116
		14	7	12,000	700	0.031~0.052	10,200	530	0.028~0.047	8,200	370	0.022~0.036	6,600	260	0.016~0.026	9,600	16	0.009~0.016	0.073
		16	8	11,100	620	0.026~0.044	9,400	470	0.024~0.039	7,700	340	0.018~0.03	6,100	230	0.013~0.022	9,600	11	0.007~0.013	0.049
		18	9	10,300	550	0.022~0.036	8,700	420	0.02~0.033	7,200	310	0.015~0.026	5,800	210	0.011~0.018	—	—	—	0.034
		20	10	9,600	500	0.018~0.031	8,100	380	0.016~0.027	6,900	280	0.013~0.021	5,500	190	0.009~0.015	—	—	—	0.025
		25	12.5	8,400	390	0.012~0.02	7,100	290	0.011~0.018	6,200	230	0.008~0.014	4,900	160	0.006~0.01	—	—	—	0.013
		30	15	7,500	310	0.008~0.013	6,300	230	0.007~0.012	5,600	180	0.005~0.009	4,500	130	0.004~0.006	—	—	—	0.007
		35	17.5	6,800	250	0.005~0.008	5,700	190	0.005~0.008	5,200	150	0.004~0.006	4,200	100	0.003~0.004	—	—	—	0.005
		40	20	6,300	200	0.003~0.006	5,200	150	0.003~0.005	4,900	120	0.002~0.004	3,900	80	0.002~0.003	—	—	—	0.003
		50	25	5,400	110	0.001~0.002	4,500	90	0.001~0.002	4,400	70	0.001~0.002	3,500	50	0.001	—	—	—	0.002
		60	30	4,900	50	0.001	4,000	40	0.001	4,000	30	0.001	3,200	30	0.001	—	—	—	0.001

Milling Conditions for HLS（2 Flutes）

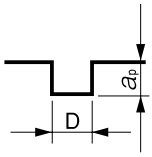
WORK MATERIAL				CARBON STEELS S45C / S50C(～225HB)			ALLOY STEELS SK / SCM / SUS(225～325HB)			PREHARDENED STEELS HARDENED STEELS NAK / SKD(30～45HRC)			HARDENED STEELS SKD / SKT(45～55HRC)			HARDENED STEELS SKD / SKH(55～60HRC)			Side Milling
Model Number	Outside Diameter (mm)	Effective Length (mm)	L/D	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)
2025	2.5	8	3.2	15,000	1,340	0.077~0.129	12,800	1,020	0.069~0.116	9,600	670	0.054~0.09	7,700	460	0.039~0.064	9,600	227	0.023~0.038	0.954
		10	4	13,100	1,140	0.068~0.113	11,100	860	0.061~0.102	8,600	590	0.048~0.079	6,900	400	0.034~0.057	9,600	116	0.02~0.034	0.488
		12	4.8	11,800	1,000	0.06~0.099	10,000	750	0.054~0.089	7,900	520	0.042~0.07	6,300	360	0.03~0.05	9,600	67	0.018~0.03	0.283
		14	5.6	10,700	880	0.052~0.087	9,100	660	0.047~0.078	7,300	470	0.036~0.061	5,800	320	0.026~0.043	9,600	42	0.015~0.026	0.178
		16	6.4	9,900	790	0.045~0.075	8,400	590	0.04~0.067	6,800	430	0.031~0.052	5,500	290	0.022~0.037	9,600	28	0.013~0.022	0.119
		18	7.2	9,200	710	0.039~0.064	7,800	540	0.035~0.058	6,500	390	0.027~0.045	5,200	270	0.019~0.032	9,600	20	0.011~0.019	0.084
		20	8	8,700	650	0.033~0.055	7,300	490	0.03~0.05	6,100	360	0.023~0.039	4,900	250	0.017~0.028	9,600	14	0.01~0.017	0.061
		25	10	7,600	520	0.022~0.036	6,400	390	0.019~0.032	5,500	300	0.015~0.025	4,400	210	0.011~0.018	—	—	—	0.031
		30	12	6,800	430	0.014~0.023	5,700	320	0.012~0.02	5,000	250	0.01~0.016	4,000	170	0.007~0.011	—	—	—	0.018
		40	16	5,700	290	0.005~0.008	4,800	220	0.004~0.007	4,400	170	0.003~0.006	3,500	120	0.002~0.004	—	—	—	0.008
		50	20	5,000	190	0.001~0.002	4,200	140	0.001~0.002	3,900	120	0.001~0.002	3,100	80	0.001	—	—	—	0.004
2030	3	8	2.7	13,200	1,470	0.103~0.172	10,900	1,080	0.093~0.155	8,000	700	0.072~0.12	6,400	480	0.052~0.086	8,000	435	0.031~0.052	1.978
		10	3.3	11,600	1,270	0.092~0.153	9,600	930	0.083~0.138	7,200	620	0.064~0.107	5,800	430	0.046~0.076	8,000	222	0.027~0.046	1.013
		12	4	10,500	1,110	0.081~0.136	8,700	830	0.073~0.122	6,700	560	0.057~0.095	5,300	380	0.041~0.068	8,000	128	0.024~0.041	0.586
		14	4.7	9,600	1,000	0.072~0.12	8,000	740	0.065~0.108	6,200	510	0.051~0.084	5,000	350	0.036~0.06	8,000	81	0.021~0.036	0.369
		16	5.3	8,900	900	0.064~0.107	7,400	670	0.058~0.096	5,900	470	0.045~0.075	4,700	320	0.032~0.053	8,000	54	0.019~0.032	0.247
		18	6	8,300	820	0.057~0.094	7,000	610	0.051~0.085	5,600	430	0.04~0.066	4,500	300	0.028~0.047	8,000	38	0.016~0.028	0.174
		20	6.7	7,800	750	0.05~0.083	6,600	560	0.045~0.075	5,300	400	0.035~0.058	4,300	280	0.025~0.042	8,000	27	0.015~0.025	0.127
		25	8.3	6,900	620	0.036~0.06	5,800	460	0.032~0.054	4,800	340	0.025~0.042	3,900	230	0.018~0.03	8,000	14	0.01~0.018	0.065
		30	10	6,200	520	0.026~0.043	5,200	390	0.023~0.039	4,500	290	0.018~0.03	3,600	200	0.013~0.022	8,000	10	0.007~0.013	0.038
		35	11.7	5,700	440	0.018~0.031	4,800	330	0.016~0.027	4,200	250	0.013~0.021	3,300	170	0.009~0.015	—	—	—	0.024
		40	13.3	5,300	370	0.013~0.021	4,500	280	0.012~0.019	3,900	220	0.009~0.015	3,100	150	0.006~0.011	—	—	—	0.016
		50	16.7	4,700	270	0.006~0.01	3,900	200	0.005~0.009	3,600	160	0.004~0.007	2,800	110	0.003~0.005	—	—	—	0.008
2040	4	12	3	8,500	1,280	0.112~0.187	7,100	950	0.101~0.168	5,100	600	0.078~0.131	4,100	410	0.056~0.093	6,000	388	0.033~0.056	1.852
		16	4	7,200	1,050	0.093~0.155	6,000	770	0.084~0.139	4,400	510	0.065~0.108	3,600	350	0.046~0.077	6,000	164	0.027~0.046	0.781
		20	5	6,300	880	0.077~0.128	5,200	650	0.069~0.115	4,000	440	0.054~0.09	3,200	300	0.038~0.064	6,000	84	0.022~0.038	0.400
		25	6.3	5,600	750	0.061~0.101	4,600	540	0.055~0.091	3,600	380	0.042~0.071	2,900	260	0.03~0.051	6,000	43	0.018~0.031	0.205
		30	7.5	5,000	630	0.048~0.08	4,100	460	0.043~0.072	3,300	330	0.033~0.056	2,600	230	0.024~0.04	6,000	24	0.014~0.024	0.119
		35	8.8	4,600	540	0.038~0.063	3,800	400	0.034~0.057	3,100	290	0.026~0.044	2,500	200	0.019~0.031	6,000	15	0.011~0.019	0.075
		40	10	4,200	470	0.03~0.049	3,500	350	0.027~0.044	2,900	250	0.021~0.035	2,300	180	0.015~0.025	6,000	10	0.009~0.015	0.050
		45	11.3	3,900	410	0.023~0.039	3,300	300	0.021~0.035	2,700	230	0.016~0.027	2,200	160	0.012~0.019	—	—	—	0.035
		50	12.5	3,700	360	0.018~0.031	3,100	270	0.016~0.027	2,600	200	0.013~0.021	2,100	140	0.009~0.015	—	—	—	0.026
		60	15	3,300	280	0.011~0.019	2,800	210	0.01~0.017	2,400	160	0.008~0.013	1,900	110	0.006~0.009	—	—	—	0.015
2050	5	16	3.2	6,000	1,140	0.127~0.212	5,100	860	0.114~0.191	3,500	520	0.089~0.148	2,800	360	0.064~0.106	4,800	457	0.038~0.064	1.907
		20	4	5,300	980	0.121~0.202	4,400	730	0.109~0.182	3,100	440	0.085~0.142	2,500	310	0.061~0.101	4,800	234	0.036~0.061	0.977
		25	5	4,600	820	0.109~0.182	3,800	600	0.099~0.164	2,800	390	0.077~0.128	2,200	270	0.055~0.091	4,800	120	0.033~0.055	0.500
		30	6	4,200	710	0.094~0.157	3,400	510	0.085~0.141	2,500	340	0.066~0.11	2,000	230	0.047~0.078	4,800	69	0.028~0.047	0.289
		35	7	3,800	620	0.077~0.128	3,100	450	0.069~0.115	2,300	300	0.054~0.09	1,900	210	0.038~0.064	4,800	43	0.022~0.038	0.182
		40	8	3,500	540	0.06~0.099	2,800	390	0.054~0.089	2,200	270	0.042~0.07	1,700	180	0.03~0.05	4,800	29	0.018~0.03	0.122
		50	10	3,100	430	0.031~0.052	2,400	300	0.028~0.047	1,900	210	0.022~0.036	1,500	150	0.016~0.026	4,800	15	0.009~0.016	0.063
		60	12	2,800	350	0.013~0.022	2,100	240	0.012~0.02	1,800	170	0.009~0.015	1,400	120	0.007~0.011	4,800	10	0.004~0.007	0.036
2060	6	20	3.3	4,200	960	0.126~0.211	3,800	780	0.114~0.19	2,600	470	0.088~0.147	2,100	330	0.063~0.105	4,000	607	0.037~0.063	2.025
		30	5	3,400	730	0.109~0.182	2,800	540	0.099~0.164	2,000	340	0.077~0.128	1,600	240	0.055~0.091	4,000	180	0.033~0.055	0.600
		40	6.7	3,000	600	0.083~0.138	2,300	410	0.074~0.124	1,700	260	0.058~0.096	1,300	170	0.041~0.069	4,000	75	0.024~0.041	0.253
		50	8.3	2,600	480	0.054~0.09	1,900	310	0.049~0.081	1,500	220	0.038~0.063	1,200	160	0.027~0.045	4,000	38	0.016~0.027	0.130
		60	10	2,400	410	0.031~0.052	1,700	260	0.028~0.047	1,300	170	0.022~0.036	1,000	120	0.016~0.026	4,000	22	0.009~0.016	0.075

Milling Conditions for HLS（2 Flutes）

Slotting

a_p : Axial Depth（mm）

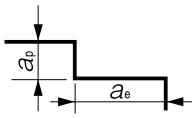
D : Outside Diamater（mm）



Side Milling

a_p : Axial Depth（mm）

a_e : Radial Depth（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.