

4 Flutes HARDMAX



Size  $\phi 1 \sim \phi 6$

# HLS4000

Super MG

HARD MAX

30°

Flatland

Shank Dia 0/-0.005

Back Taper Geometry

Variable Pitch

Material Applications (★ Highly Recommended ● Recommended ○ Suggested)

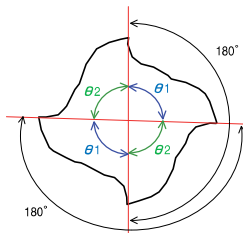
Work Material																	
Carbon Steels S45C S55C	Alloy Steels SK / SCM SUS	Prehardened Steels NAK HPM	Hardened Steels					Cast Iron	Aluminum Alloys	Graphite	Copper	Plastics	Glass Filled Plastics	Titanium Alloys	Heat Resistant Alloys	Cemented Carbide	Hard Brittle (Non-Metallic) Materials
			~ 50HRC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

## Features

Feature1 : Variable pitch

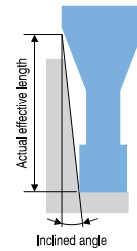
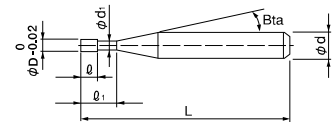
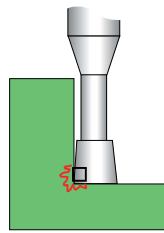
$\theta 1 > \theta 2$  : The unequal division reduces chattering and tip damage.

$\theta 1 + \theta 2 = 180^\circ$  : Easy to measure diameter.



Feature2 : Back taper geometry

Back taper geometry reduces cutting force.



Feature3 : HARDMAX coating with high level of heat resistance, durability and lubrication.  
 Feature4 : Improved new 4 flute design offers improved chip evacuation and achieves high feed and milling precision.

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.

Refer to page 242 for 2 flute HLS.

Total 84 models

Unit (mm)

Model Number	Outside Diameter $\phi D$	Effective Length $\ell_1$	Length of Cut $\ell$	Neck Diameter $\phi d_1$	Shank Taper Angle Bta	Overall Length L	Shank Diameter $\phi d$	Suggested Retail Price ¥	Effective Length by Inclined Angles				
									30'	1°	1° 30'	2°	3°
HLS 4010-040	1	4	1	0.95	16°	50	4	4,800	4.66	4.93	5.15	5.34	5.74
HLS 4010-060		6				50	4	4,800	6.78	7.10	7.36	7.62	8.19
HLS 4010-080		8				50	4	4,800	8.88	9.25	9.56	9.90	10.64
HLS 4010-100		10				50	4	4,800	10.97	11.38	11.76	12.17	13.09
HLS 4010-120		12				50	4	4,800	13.06	13.51	13.97	14.45	15.53
HLS 4010-160	16	60	4	7,680	17.20	17.77	18.37	19.01	20.43				
HLS 4012-060	1.2	6	1.2	1.14	16°	50	4	4,800	6.18	6.38	6.60	6.83	7.34
HLS 4012-080		8				50	4	4,800	8.24	8.51	8.80	9.11	9.79
HLS 4012-100		10				50	4	4,800	10.31	10.64	11.00	11.38	12.24
HLS 4012-120		12				50	4	4,800	12.37	12.77	13.20	13.66	14.68
HLS 4012-160		16				60	4	6,720	16.49	17.03	17.60	18.22	19.58

- φ3mm Shark V Series
- UDC-PCD Series
- CBN Series
- Square
- Long Neck Square
- Radius
- Long Neck Radius
- Taper Neck Radius
- Ball / Long Shank Ball
- Long Neck Ball
- Taper Neck Ball
- Taper
- Barrel
- Spiral V Cutter
- Drill
- Technical Data

Unit (mm)

Model Number	Outside Diameter $\phi D$	Effective Length $l_1$	Length of Cut $l$	Neck Diameter $\phi d_1$	Shank Taper Angle $\beta$	Overall Length L	Shank Diameter $\phi d$	Suggested Retail Price ¥	Effective Length by Inclined Angles				
									30'	1°	1° 30'	2°	3°
HLS 4014-060	1.4	6	1.4	1.34	16°	50	4	4,800	6.18	6.38	6.60	6.83	7.34
HLS 4014-080		8				50	4	4,800	8.24	8.51	8.80	9.11	9.79
HLS 4014-100		10				50	4	4,800	10.31	10.64	11.00	11.38	12.24
HLS 4014-120		12				50	4	4,800	12.37	12.77	13.20	13.66	14.68
HLS 4014-140		14				60	4	4,800	14.43	14.90	15.40	15.94	17.13
HLS 4014-160		16				60	4	6,720	16.49	17.03	17.60	18.22	19.58
HLS 4014-220		22				60	4	8,640	22.68	23.42	24.21	25.05	No Interference
HLS 4015-060		1.5				6	1.5	1.44	16°	50	4	4,800	6.18
HLS 4015-080	8		50	4	4,800	8.24				8.51	8.80	9.11	9.79
HLS 4015-100	10		50	4	4,800	10.31				10.64	11.00	11.38	12.24
HLS 4015-120	12		50	4	4,800	12.37				12.77	13.20	13.66	14.68
HLS 4015-140	14		60	4	4,800	14.43				14.90	15.40	15.94	17.13
HLS 4015-160	16		60	4	4,800	16.49				17.03	17.60	18.22	19.58
HLS 4015-180	18		60	4	4,800	18.56				19.16	19.80	20.49	22.03
HLS 4015-200	20		60	4	4,800	20.62				21.29	22.00	22.77	No Interference
HLS 4016-060	1.6	6	1.6	1.51	16°	50	4	4,800	6.22	6.42	6.64	6.87	7.39
HLS 4016-080		8				50	4	4,800	8.28	8.55	8.84	9.15	9.83
HLS 4016-100		10				50	4	4,800	10.34	10.68	11.04	11.42	12.28
HLS 4016-120		12				50	4	4,800	12.40	12.81	13.24	13.70	14.73
HLS 4016-140		14				60	4	4,800	14.47	14.94	15.44	15.98	17.17
HLS 4016-160		16				60	4	4,800	16.53	17.07	17.64	18.26	19.62
HLS 4016-180		18				60	4	4,800	18.59	19.20	19.84	20.53	22.07
HLS 4016-200		20				60	4	4,800	20.66	21.33	22.04	22.81	No Interference
HLS 4016-260		26				60	4	11,040	26.84	27.72	28.65	29.64	No Interference
HLS 4018-060		1.8				6	1.8	1.71	16°	50	4	4,800	6.22
HLS 4018-080	8		50	4	4,800	8.28				8.55	8.84	9.15	9.83
HLS 4018-100	10		50	4	4,800	10.34				10.68	11.04	11.42	12.28
HLS 4018-120	12		50	4	4,800	12.40				12.81	13.24	13.70	14.73
HLS 4018-140	14		60	4	4,800	14.47				14.94	15.44	15.98	17.17
HLS 4018-160	16		60	4	4,800	16.53				17.07	17.64	18.26	19.62
HLS 4018-180	18		60	4	4,800	18.59				19.20	19.84	20.53	No Interference
HLS 4018-200	20		60	4	4,800	20.66				21.33	22.04	22.81	No Interference
HLS 4018-250	25		70	4	6,720	25.81				26.65	27.55	28.50	No Interference
HLS 4020-060	2		6	2	1.91	16°				50	4	4,800	6.22
HLS 4020-080		8	50				4	4,800	8.28	8.55	8.84	9.15	9.83
HLS 4020-100		10	50				4	4,800	10.34	10.68	11.04	11.42	12.28
HLS 4020-120		12	50				4	4,800	12.40	12.81	13.24	13.70	14.73
HLS 4020-140		14	60				4	4,800	14.47	14.94	15.44	15.98	17.17
HLS 4020-160		16	60				4	4,800	16.53	17.07	17.64	18.26	No Interference
HLS 4020-180		18	60				4	4,800	18.59	19.20	19.84	20.53	No Interference
HLS 4020-200		20	60				4	4,800	20.66	21.33	22.04	22.81	No Interference
HLS 4020-250		25	70				4	5,280	25.81	26.65	27.55	28.50	No Interference
HLS 4020-300		30	70				4	6,720	30.97	31.97	33.05	No Interference	No Interference

4 Flutes

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  - Long Neck Square
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Unit (mm)

Model Number	Outside Diameter $\phi D$	Effective Length $\ell_1$	Length of Cut $\ell$	Neck Diameter $\phi d_1$	Shank Taper Angle $\beta$	Overall Length L	Shank Diameter $\phi d$	Suggested Retail Price ¥	Effective Length by Inclined Angles				
									30'	1°	1° 30'	2°	3°
HLS 4025-080	2.5	8	2.5	2.41	16°	50	4	4,800	8.28	8.55	8.84	9.15	9.83
HLS 4025-120		12				50	4	4,800	12.40	12.81	13.24	13.70	No Interference
HLS 4025-160		16				60	4	4,800	16.53	17.07	17.64	18.26	No Interference
HLS 4025-200		20				60	4	4,800	20.66	21.33	22.04	No Interference	No Interference
HLS 4025-250		25				70	4	4,800	25.81	26.65	27.55	No Interference	No Interference
HLS 4025-300		30				70	4	5,280	30.97	31.97	No Interference	No Interference	No Interference
HLS 4030-080	3	8	3	2.92	16°	50	6	6,720	8.28	8.55	8.84	9.15	9.83
HLS 4030-120		12				50	6	6,720	12.40	12.81	13.24	13.70	14.73
HLS 4030-160		16				60	6	6,720	16.53	17.07	17.64	18.26	19.62
HLS 4030-200		20				60	6	6,720	20.66	21.33	22.04	22.81	24.52
HLS 4030-250		25				70	6	6,720	25.81	26.65	27.55	28.50	No Interference
HLS 4030-300		30				70	6	8,640	30.97	31.97	33.05	34.20	No Interference
HLS 4030-400	40	80	6	8,640	41.28	42.62	44.05	No Interference	No Interference				
HLS 4040-120	4	12	4	3.82	16°	50	6	7,560	12.58	12.99	13.43	13.90	14.94
HLS 4040-160		16				60	6	7,560	16.71	17.25	17.83	18.45	No Interference
HLS 4040-200		20				60	6	7,560	20.84	21.51	22.24	23.01	No Interference
HLS 4040-250		25				70	6	7,560	25.99	26.84	27.74	28.70	No Interference
HLS 4040-300		30				70	6	7,560	31.15	32.16	33.24	No Interference	No Interference
HLS 4040-350		35				80	6	7,560	36.31	37.48	No Interference	No Interference	No Interference
HLS 4040-400	40	90	6	9,600	41.46	42.81	No Interference	No Interference	No Interference				
HLS 4040-450	45	90	6	11,520	46.62	48.13	No Interference	No Interference	No Interference				
HLS 4040-500	50	100	6	14,520	51.78	53.46	No Interference	No Interference	No Interference				
HLS 4050-160	5	16	5	4.82	16°	60	6	9,600	16.78	17.25	18.02	No Interference	No Interference
HLS 4050-250		25				70	6	9,600	25.99	26.84	No Interference	No Interference	No Interference
HLS 4050-350		35				80	6	9,600	36.31	No Interference	No Interference	No Interference	No Interference
HLS 4050-500		50				110	6	14,520	51.78	No Interference	No Interference	No Interference	No Interference
HLS 4060-200	6	20	6	5.82	—	80	6	9,600	No Interference	No Interference	No Interference	No Interference	No Interference
HLS 4060-300		30				90	6	9,600	No Interference	No Interference	No Interference	No Interference	No Interference
HLS 4060-400		40				100	6	11,520	No Interference	No Interference	No Interference	No Interference	No Interference
HLS 4060-500		50				110	6	14,520	No Interference	No Interference	No Interference	No Interference	No Interference

- $\phi 3$ mm Shank V Series
- UDC-PCD Series
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- Square
- Long Neck Square
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- Long Neck Radius
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## Circle Pocket Milling Example

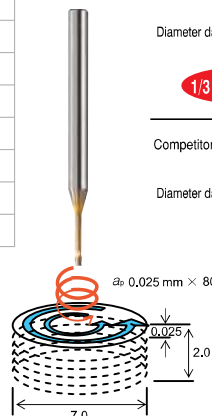
SKD11 (60HRC)

Tool: HLS  $\phi 1.5 \times E L10$  mm

Spindle Speed	7,000 min <sup>-1</sup>
Feed Rate	230 mm/min
$a_p$	0.025 mm
$a_e$	1.2 mm
Coolant	Air blow (Nozzle)
Overhang Length	18 mm
Pocket Size	$\phi 7 \times 2$ mm
Cycle Time	17 min



SKD11 (60HRC)



HLS 4 Flutes  $\phi 1.5 \times 10$

Diameter damage: 0.091 mm

1/3 and under!



Competitor: 4 Flutes  $\phi 1.5 \times 10$

Diameter damage: 0.296 mm



## Milling Conditions for HLS (4 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 / STAVAX (45~55HRC)				HARDENED STEELS SKD / SKH (55~60HRC)			
Model Number	Outside Diameter (mm)	Effective Length (mm)	Spindle Speed (min <sup>-1</sup> )	Feed Rate (mm/min)	a <sub>p</sub> Axial Depth (mm)	a <sub>e</sub> Radial Depth (mm)	Spindle Speed (min <sup>-1</sup> )	Feed Rate (mm/min)	a <sub>p</sub> Axial Depth (mm)	a <sub>e</sub> Radial Depth (mm)	Spindle Speed (min <sup>-1</sup> )	Feed Rate (mm/min)	a <sub>p</sub> Axial Depth (mm)	a <sub>e</sub> Radial Depth (mm)	Spindle Speed (min <sup>-1</sup> )	Feed Rate (mm/min)	a <sub>p</sub> Axial Depth (mm)	a <sub>e</sub> Radial Depth (mm)	Spindle Speed (min <sup>-1</sup> )	Feed Rate (mm/min)	a <sub>p</sub> Axial Depth (mm)	a <sub>e</sub> Radial Depth (mm)
4010	1	4	24,700	1,180	0.04	0.351	21,000	950	0.036	0.332	21,500	660	0.028	0.312	17,200	470	0.02	0.293	10,100	240	0.01	0.195
		6	22,800	1,060	0.024	0.104	19,400	840	0.021	0.099	16,400	590	0.016	0.093	13,100	420	0.012	0.087	9,400	210	0.007	0.058
		8	20,900	950	0.021	0.043	17,800	740	0.018	0.041	14,600	500	0.014	0.038	11,700	360	0.01	0.036	8,700	190	0.006	0.024
		10	19,100	840	0.018	0.023	16,200	630	0.015	0.022	13,000	450	0.013	0.021	10,400	320	0.009	0.02	8,100	160	0.005	0.013
		12	17,300	730	0.015	0.013	14,700	530	0.013	0.012	11,300	380	0.011	0.011	9,000	270	0.008	0.011	7,400	130	0.004	0.007
		16	13,500	500	0.009	0.005	11,500	320	0.008	0.005	11,000	220	0.007	0.005	8,800	160	0.005	0.005	6,000	80	0.003	0.003
4012	1.2	6	21,400	1,290	0.04	0.216	18,200	1,020	0.034	0.204	15,400	710	0.027	0.192	12,300	510	0.019	0.18	8,900	260	0.011	0.12
		8	19,700	1,160	0.035	0.092	16,700	890	0.03	0.087	13,800	620	0.024	0.082	11,000	440	0.017	0.077	8,200	230	0.01	0.051
		10	17,900	1,020	0.03	0.047	15,200	770	0.026	0.044	12,100	530	0.021	0.042	9,700	380	0.015	0.039	7,600	200	0.009	0.026
		12	16,200	880	0.025	0.027	13,800	640	0.021	0.026	10,500	450	0.018	0.024	8,400	320	0.013	0.023	6,900	160	0.007	0.015
16	12,600	610	0.015	0.011	10,700	330	0.013	0.01	9,900	270	0.007	0.01	7,900	190	0.005	0.009	5,600	100	0.005	0.006		
4014	1.4	6	20,200	1,440	0.068	0.4	17,200	1,140	0.058	0.377	14,500	800	0.046	0.355	11,600	570	0.033	0.333	8,400	290	0.019	0.222
		8	19,000	1,290	0.06	0.169	16,200	900	0.051	0.16	13,000	690	0.041	0.15	10,400	490	0.029	0.141	7,800	260	0.017	0.094
		10	17,000	1,140	0.051	0.086	14,500	860	0.043	0.082	11,500	600	0.036	0.077	9,200	430	0.026	0.072	7,100	220	0.014	0.048
		12	15,300	990	0.043	0.05	13,000	710	0.036	0.048	10,000	500	0.03	0.045	8,000	360	0.022	0.042	6,500	180	0.012	0.028
		14	13,700	840	0.034	0.032	11,600	570	0.029	0.031	9,800	410	0.025	0.029	7,800	290	0.018	0.027	5,900	140	0.01	0.018
		16	11,900	680	0.026	0.022	10,100	350	0.022	0.02	9,100	310	0.02	0.019	7,300	220	0.014	0.018	5,300	110	0.008	0.012
		22	9,000	340	0.013	0.009	6,000	230	0.011	0.009	7,800	170	0.01	0.008	6,200	120	0.007	0.008	3,500	50	0.001	0.005
4015	1.5	6	19,800	1,520	0.08	0.527	16,800	1,200	0.068	0.498	14,300	840	0.054	0.469	11,400	600	0.039	0.44	8,200	310	0.022	0.293
		8	18,200	1,360	0.07	0.223	15,500	930	0.06	0.211	12,800	730	0.048	0.198	10,200	520	0.034	0.186	7,600	270	0.02	0.124
		10	16,600	1,200	0.06	0.113	14,100	900	0.051	0.107	11,300	630	0.042	0.101	9,000	450	0.03	0.095	7,000	230	0.017	0.063
		12	15,000	1,040	0.05	0.067	12,800	720	0.043	0.063	9,800	530	0.036	0.059	7,800	380	0.026	0.056	6,400	190	0.014	0.037
		14	13,400	880	0.04	0.041	11,400	600	0.034	0.039	9,500	420	0.03	0.037	7,600	300	0.021	0.035	5,800	150	0.012	0.023
		16	11,700	720	0.03	0.027	9,900	370	0.026	0.026	8,900	320	0.024	0.024	7,100	230	0.017	0.023	5,200	120	0.009	0.015
		18	10,100	560	0.02	0.02	9,600	310	0.017	0.019	8,400	240	0.017	0.018	6,700	170	0.012	0.017	4,600	80	0.007	0.011
		20	8,500	400	0.01	0.014	9,000	280	0.011	0.014	7,900	210	0.011	0.013	6,300	150	0.008	0.012	4,000	40	0.004	0.008
4016	1.6	6	19,200	1,670	0.08	0.682	15,100	1,320	0.068	0.644	13,900	920	0.054	0.606	11,100	660	0.039	0.569	8,000	340	0.022	0.379
		8	17,000	1,500	0.07	0.288	15,000	950	0.06	0.272	12,400	800	0.048	0.256	9,900	570	0.034	0.24	7,400	300	0.02	0.16
		10	16,100	1,320	0.06	0.148	12,700	930	0.051	0.139	10,900	700	0.042	0.131	8,700	500	0.03	0.123	6,800	250	0.017	0.082
		12	14,500	1,140	0.05	0.085	11,500	750	0.043	0.08	9,500	590	0.036	0.075	7,600	420	0.026	0.071	6,200	210	0.014	0.047
		14	13,000	970	0.04	0.054	10,300	660	0.034	0.051	9,100	460	0.03	0.048	7,300	330	0.021	0.045	5,600	170	0.012	0.03
		16	11,400	790	0.03	0.036	9,500	380	0.02	0.034	8,500	350	0.024	0.032	6,800	250	0.017	0.03	5,000	130	0.009	0.02
		18	9,800	620	0.02	0.025	9,300	340	0.017	0.024	8,000	250	0.017	0.022	6,400	180	0.012	0.021	4,500	80	0.007	0.014
		20	8,200	440	0.011	0.018	8,700	300	0.011	0.017	7,600	220	0.011	0.016	6,100	160	0.008	0.015	3,900	40	0.004	0.01
		26	8,000	300	0.007	0.009	7,400	210	0.006	0.009	6,600	170	0.006	0.008	5,300	120	0.004	0.008	2,400	20	0.002	0.005
4018	1.8	6	18,500	1,820	0.08	1.094	14,900	1,440	0.068	1.034	13,300	1,010	0.054	0.973	10,600	720	0.039	0.912	7,600	370	0.022	0.608
		8	16,900	1,630	0.07	0.461	14,600	980	0.06	0.435	11,900	870	0.048	0.41	9,500	620	0.034	0.384	7,100	320	0.02	0.256
		10	15,400	1,440	0.06	0.236	12,500	950	0.051	0.223	10,500	760	0.042	0.21	8,400	540	0.03	0.197	6,500	280	0.017	0.131
		12	13,900	1,250	0.05	0.137	11,000	770	0.043	0.129	9,100	640	0.036	0.122	7,300	460	0.026	0.114	6,000	230	0.014	0.076
		14	12,400	1,060	0.04	0.086	9,500	720	0.034	0.082	8,400	500	0.03	0.077	6,700	360	0.021	0.072	5,400	180	0.012	0.048
		16	10,900	860	0.03	0.058	9,000	450	0.026	0.054	7,900	390	0.024	0.051	6,300	280	0.017	0.048	4,800	140	0.009	0.032
		18	9,400	670	0.02	0.041	8,700	380	0.017	0.039	7,400	270	0.017	0.037	5,900	190	0.012	0.035	4,300	100	0.007	0.023
		20	7,900	480	0.015	0.029	8,400	340	0.013	0.027	7,000	240	0.011	0.026	5,600	170	0.008	0.024	3,700	50	0.004	0.016
25	7,800	350	0.01	0.014	7,300	260	0.008	0.014	6,300	200	0.007	0.013	5,000	140	0.005	0.012	2,400	20	0.002	0.008		

4 Flutes

Ø3mm Shank  
V Series

UDC-PCD  
Series

CBN  
Series

Square  
Long Neck  
Square

Radius

Long Neck  
Radius

Taper Neck  
Radius

Ball / Long  
Shank Ball

Long Neck  
Ball

Taper Neck  
Ball

Taper

Barrel

Spiral  
V Cutter

Drill

Technical Data

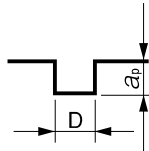
Milling Conditions for HLS (4 Flutes)

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 / STAVAX (45~55HRC)				HARDENED STEELS SKD / SKH (55~60HRC)				
Model Number	Outside Diameter (mm)	Effective Length (mm)	Spindle Speed (min <sup>-1</sup> )	Feed Rate (mm/min)	a <sub>p</sub> Axial Depth (mm)	a <sub>e</sub> Radial Depth (mm)	Spindle Speed (min <sup>-1</sup> )	Feed Rate (mm/min)	a <sub>p</sub> Axial Depth (mm)	a <sub>e</sub> Radial Depth (mm)	Spindle Speed (min <sup>-1</sup> )	Feed Rate (mm/min)	a <sub>p</sub> Axial Depth (mm)	a <sub>e</sub> Radial Depth (mm)	Spindle Speed (min <sup>-1</sup> )	Feed Rate (mm/min)	a <sub>p</sub> Axial Depth (mm)	a <sub>e</sub> Radial Depth (mm)	Spindle Speed (min <sup>-1</sup> )	Feed Rate (mm/min)	a <sub>p</sub> Axial Depth (mm)	a <sub>e</sub> Radial Depth (mm)
4020	2	6	17,900	1,980	0.08	1.667	14,500	1,560	0.068	1.574	12,900	1,090	0.054	1.482	10,300	780	0.039	1.389	7,400	400	0.022	0.926
		8	16,400	1,770	0.07	0.704	14,200	1,000	0.06	0.665	11,500	950	0.048	0.626	9,200	680	0.034	0.587	6,800	350	0.02	0.391
		10	14,900	1,560	0.06	0.36	12,000	980	0.051	0.34	10,100	830	0.042	0.32	8,100	590	0.03	0.3	6,300	300	0.017	0.2
		12	13,500	1,350	0.05	0.209	10,500	790	0.043	0.197	8,800	690	0.036	0.186	7,000	490	0.026	0.174	5,800	250	0.014	0.116
		14	12,000	1,140	0.04	0.131	9,400	780	0.034	0.124	8,300	550	0.03	0.117	6,600	390	0.021	0.11	5,200	200	0.012	0.073
		16	10,600	940	0.03	0.088	9,000	500	0.026	0.083	7,600	420	0.024	0.078	6,100	300	0.017	0.074	4,700	160	0.009	0.049
		18	9,100	730	0.022	0.061	8,700	420	0.02	0.058	7,300	290	0.017	0.054	5,800	210	0.012	0.051	4,100	100	0.007	0.034
		20	7,700	520	0.018	0.045	8,100	380	0.016	0.043	6,900	270	0.013	0.04	5,500	190	0.009	0.038	3,600	50	0.004	0.025
		25	7,500	390	0.012	0.023	7,100	290	0.011	0.022	6,100	220	0.008	0.021	4,900	160	0.006	0.02	2,400	20	0.002	0.013
30	7,000	310	0.008	0.013	6,300	230	0.007	0.012	5,600	180	0.006	0.011	4,500	130	0.004	0.011	2,400	10	0.001	0.007		
4025	2.5	8				12,800	1,020	0.081	1.622	9,600	980	0.055	1.526	7,700	700	0.039	1.431	6,200	370	0.023	0.954	
		12				10,000	810	0.056	0.481	7,900	700	0.042	0.453	6,300	500	0.03	0.425	5,600	350	0.018	0.283	
		16				8,400	590	0.04	0.202	6,900	450	0.031	0.19	5,500	320	0.022	0.179	4,400	320	0.013	0.119	
		20				7,300	490	0.03	0.104	6,500	420	0.024	0.098	5,200	300	0.017	0.092	3,500	290	0.01	0.061	
		25				6,400	390	0.019	0.053	6,000	380	0.015	0.05	4,800	270	0.011	0.047	2,400	250	0.005	0.031	
		30				5,700	320	0.012	0.031	4,400	350	0.01	0.029	3,500	250	0.007	0.027	2,300	220	0.003	0.018	
4030	3	8				10,900	1,080	0.093	2.361	7,400	1,010	0.073	2.222	5,900	720	0.052	2.084	5,900	440	0.031	1.389	
		12				8,700	830	0.073	0.996	7,000	730	0.057	0.938	5,600	520	0.041	0.879	5,000	400	0.024	0.586	
		16				7,400	670	0.058	0.42	6,600	520	0.045	0.395	5,300	370	0.032	0.371	4,000	370	0.019	0.247	
		20				6,600	560	0.045	0.216	6,100	490	0.035	0.203	4,900	350	0.025	0.191	3,400	340	0.015	0.127	
		25				5,800	460	0.032	0.111	5,600	450	0.025	0.14	4,500	320	0.018	0.098	2,400	290	0.011	0.065	
		30				5,200	390	0.023	0.065	4,300	410	0.02	0.061	3,400	290	0.014	0.057	2,300	250	0.009	0.038	
		40				4,500	280	0.012	0.027	4,100	320	0.014	0.026	3,300	230	0.01	0.024	2,000	170	0.006	0.016	
4040	4	12				7,100	950	0.101	3.148	5,100	740	0.101	2.963	4,100	530	0.072	2.778	4,100	460	0.043	1.852	
		16				6,000	770	0.084	1.328	4,900	600	0.092	1.25	3,900	430	0.066	1.172	3,700	420	0.04	0.781	
		20				5,200	650	0.069	0.68	4,500	560	0.084	0.64	3,600	400	0.06	0.6	3,300	380	0.036	0.4	
		25				4,600	540	0.055	0.349	4,100	520	0.076	0.328	3,300	370	0.054	0.308	2,400	340	0.032	0.205	
		30				4,100	460	0.043	0.202	3,800	460	0.059	0.19	3,000	330	0.042	0.179	2,300	290	0.027	0.119	
		35				3,800	400	0.034	0.128	3,400	420	0.05	0.12	2,700	300	0.036	0.113	2,200	240	0.023	0.075	
		40				3,500	350	0.027	0.085	3,000	380	0.042	0.08	2,400	270	0.03	0.075	1,900	190	0.018	0.05	
		45				3,300	300	0.021	0.06	2,600	320	0.025	0.056	2,100	230	0.018	0.053	1,800	140	0.014	0.035	
4050	5	16				5,100	860	0.128	3.242	4,100	670	0.108	3.051	3,300	480	0.077	2.861	3,300	480	0.048	1.907	
		25				3,800	600	0.102	0.85	3,600	570	0.088	0.8	2,900	410	0.063	0.75	2,400	380	0.037	0.5	
		35				3,100	450	0.077	0.309	2,900	480	0.059	0.291	2,300	340	0.042	0.273	2,000	270	0.026	0.182	
		50				2,400	300	0.034	0.107	2,000	320	0.022	0.101	1,600	230	0.016	0.095	1,500	110	0.01	0.063	
4060	6	20				3,800	780	0.17	3.443	3,300	700	0.139	3.24	2,600	500	0.099	3.038	3,300	610	0.06	2.025	
		30				2,800	540	0.128	1.02	2,800	590	0.101	0.96	2,200	420	0.072	0.9	2,200	360	0.045	0.6	
		40				2,300	410	0.085	0.43	2,100	460	0.063	0.405	1,700	330	0.045	0.38	1,700	240	0.03	0.253	
		50				1,900	310	0.049	0.221	1,600	350	0.038	0.208	1,300	250	0.027	0.195	1,300	120	0.015	0.13	

- φ3mm Shank V Series
- UDC-PCD Series
- CBN Series
- Square
- Long Neck Square
- Radius
- Long Neck Radius
- Taper Neck Radius
- Ball / Long Shank Ball
- Long Neck Ball
- Taper Neck Ball
- Taper
- Barrel
- Spiral V Cutter
- Drill
- Technical Data

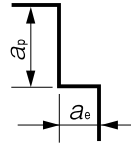
## Milling Conditions for HLS (4 Flutes)

Slotting



D : Outside Diameter (mm)

Side Milling



**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.

4 Flutes

φ3mm Shank  
V Series

UDC-PCD  
Series

CBN  
Series

Square  
Long Neck  
Square

Radius

Radius  
Long Neck  
Radius  
Taper Neck  
Radius

Ball / Long  
Shank Ball  
Long Neck  
Ball  
Taper Neck  
Ball

Taper  
Taper

Barrel

Spiral  
V Cutter

Drill

Technical Data