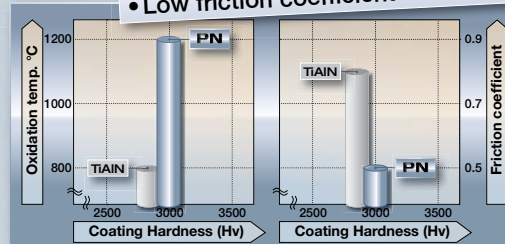


# GO-Line-PaNacea Square Solid Carbide End Mills



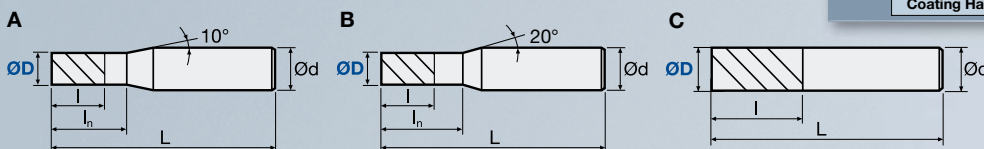
### Features PaNacea Coating

- High adhesion & wear resistance
- Low friction coefficient



## HGOS-2-PN | HGOS-4-PN | GO-Line PaNacea Square

<b>V max</b> High Speed	<b>▽</b> Roughing	<b>▽▽</b> Semi Finishing	<b>▽▽▽</b> Finishing	<b>HRC</b> 52	<b>No. of Teeth</b> 2	<b>No. of Teeth</b> 4
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<b>Carbide</b> Micro Grain	<b>PN</b> PaNacea Coating	<b>Rake Angle</b> Positive
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D 0.2-0.9	0 / 0.015 mm
D 1-20	0 / -0.02 mm
ød	h5
Helix angle	30°

Pointed Cutting Edge 90°  
Exakte 90°-Schneide



ID Code	Item Code	Z	ØD	l	l <sub>n</sub>	L	ød	Type
EL066	HGOS-2002-PN	2	0.2	0.4	0.6	40	4	A
EL067	HGOS-2003-PN		0.3	0.6	0.9			
EL068	HGOS-2004-PN		0.4	0.8	1.1			
EL069	HGOS-2005-PN		0.5	1	1.3			
EL070	HGOS-2006-PN		0.6	1.2	1.5			
EL071	HGOS-2007-PN		0.7	1.4	1.7			
EL072	HGOS-2008-PN		0.8	1.6	1.9			
EL073	HGOS-2009-PN		0.9	1.8	2.1			
EL074	HGOS-2010-PN		1	2	2.5			
EL075	HGOS-2015-PN		1.5	3	3.5			
EL076	HGOS-2020-PN		2	6	7			
EL077	HGOS-2025-PN		2.5	8	9			
EL078	HGOS-2030-PN		3	10	11			
EL079	HGOS-2035-PN		3.5	11	12			
EL080	HGOS-2040-PN		4	13	14			
EL081	HGOS-2045-PN		4.5	16	17			
EL082	HGOS-2050-PN		5	19	20			
EL083	HGOS-2055-PN		5.5	22	-			
EL084	HGOS-2060-PN		6	26	-			
EL085	HGOS-2070-PN		7	35	-			
EL086	HGOS-2080-PN	8	40	-				
EL087	HGOS-2090-PN	9	40	-				
EL088	HGOS-2100-PN	10	40	-				
EL089	HGOS-2120-PN	12	40	-				
EL090	HGOS-2160-PN	16	40	-				
EL091	HGOS-2200-PN	20	40	-				
EL092	HGOS-4010-PN	4	1	2.5	3	40	4	A
EL093	HGOS-4015-PN		1.5	4	4.5			
EL118	HGOS-4020-PN		2	6	7			
EL119	HGOS-4025-PN		2.5	8	9			
EL120	HGOS-4030-PN		3	10	11			
EL121	HGOS-4040-PN		4	12	13			
EL122	HGOS-4050-PN		5	15	16			
EL123	HGOS-4060-PN		6	20	-			
EL124	HGOS-4080-PN		8	25	-			
EL125	HGOS-4100-PN		10	30	-			
EL126	HGOS-4120-PN		12	35	-			
EL127	HGOS-4160-PN		16	40	-			
EL128	HGOS-4200-PN		20	40	-			

HGOS-2-PN



		ØD 0.2		ØD 0.3		ØD 0.4		ØD 0.5		ØD 0.6		ØD 0.7	
		Side	Slotting	Side	Slotting	Side	Slotting	Side	Slotting	Side	Slotting	Side	Slotting
		I Copper, Aluminium		II Carbon steel, Alloy steel Cast iron (180~250HB)		III Stainless steel (20~40HRC)		IV Alloy steel, Tool steel (25~35HRC)		V Alloy steel, Tool steel (35~45HRC)		VI Hardened Steel Tool Steels (hot&cold) (45~52HRC)	
I	$V_e$ (m/min)	38	38	57	57	75	75	94	94	113	113	132	132
	$n$ (min <sup>-1</sup> )	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
	$f_z$ (mm/tooth)	0.006	0.004	0.008	0.005	0.010	0.006	0.012	0.007	0.013	0.008	0.014	0.009
	$V_f$ (mm/min)	720	430	970	580	1,200	720	1,380	830	1,550	930	1,720	1,030
	$a_p$ (mm)	0.26	0.10	0.39	0.15	0.52	0.20	0.65	0.25	0.78	0.30	0.91	0.35
	$a_e$ (mm)	0.02	0.20	0.03	0.30	0.04	0.40	0.05	0.50	0.06	0.60	0.07	0.70
II	$V_e$ (m/min)	38	38	57	57	75	75	94	94	113	100	132	100
	$n$ (min <sup>-1</sup> )	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	53,100	60,000	45,500
	$f_z$ (mm/tooth)	0.006	0.004	0.008	0.005	0.010	0.006	0.012	0.007	0.013	0.008	0.014	0.009
	$V_f$ (mm/min)	720	430	970	580	1,200	720	1,380	830	1,550	820	1,720	780
	$a_p$ (mm)	0.26	0.10	0.39	0.15	0.52	0.20	0.65	0.25	0.78	0.30	0.91	0.35
	$a_e$ (mm)	0.02	0.20	0.03	0.30	0.04	0.40	0.05	0.50	0.06	0.60	0.07	0.70
III	$V_e$ (m/min)	38	38	57	45	70	45	70	45	70	45	70	45
	$n$ (min <sup>-1</sup> )	60,000	60,000	60,000	47,700	55,700	35,800	44,600	28,600	37,100	23,900	31,800	20,500
	$f_z$ (mm/tooth)	0.005	0.003	0.007	0.004	0.009	0.005	0.010	0.006	0.012	0.007	0.013	0.008
	$V_f$ (mm/min)	650	390	870	420	1,000	390	920	360	860	330	820	320
	$a_p$ (mm)	0.20	0.10	0.30	0.15	0.40	0.20	0.50	0.25	0.60	0.30	0.70	0.35
	$a_e$ (mm)	0.02	0.20	0.03	0.30	0.04	0.40	0.05	0.50	0.06	0.60	0.07	0.70
IV	$V_e$ (m/min)	38	38	57	57	75	75	94	80	100	80	100	80
	$n$ (min <sup>-1</sup> )	60,000	60,000	60,000	60,000	60,000	60,000	60,000	50,900	53,100	42,400	45,500	36,400
	$f_z$ (mm/tooth)	0.005	0.003	0.007	0.004	0.009	0.005	0.010	0.006	0.012	0.007	0.013	0.008
	$V_f$ (mm/min)	650	390	870	520	1,080	650	1,240	630	1,230	590	1,180	560
	$a_p$ (mm)	0.20	0.10	0.30	0.15	0.40	0.20	0.50	0.25	0.60	0.30	0.70	0.35
	$a_e$ (mm)	0.01	0.20	0.02	0.30	0.03	0.40	0.04	0.50	0.04	0.60	0.05	0.70
V	$V_e$ (m/min)	38	38	57	57	75	60	75	60	75	60	75	60
	$n$ (min <sup>-1</sup> )	60,000	60,000	60,000	60,000	59,700	47,700	47,700	38,200	39,800	31,800	34,100	27,300
	$f_z$ (mm/tooth)	0.005	0.003	0.006	0.004	0.008	0.005	0.009	0.006	0.010	0.006	0.011	0.007
	$V_f$ (mm/min)	580	350	780	470	960	460	880	420	820	390	780	380
	$a_p$ (mm)	0.20	0.06	0.30	0.09	0.40	0.12	0.50	0.15	0.60	0.18	0.70	0.21
	$a_e$ (mm)	0.01	0.20	0.02	0.30	0.02	0.40	0.03	0.50	0.03	0.60	0.04	0.70
VI	$V_e$ (m/min)	38	38	57	50	60	50	60	50	60	50	60	50
	$n$ (min <sup>-1</sup> )	60,000	60,000	60,000	53,100	47,700	39,800	38,200	31,800	31,800	26,500	27,300	22,700
	$f_z$ (mm/tooth)	0.004	0.003	0.006	0.003	0.007	0.004	0.008	0.005	0.009	0.005	0.010	0.006
	$V_f$ (mm/min)	500	300	680	360	670	330	620	310	570	290	550	270
	$a_p$ (mm)	0.20	0.04	0.30	0.06	0.40	0.08	0.50	0.10	0.60	0.12	0.70	0.14
	$a_e$ (mm)	0.01	0.20	0.02	0.30	0.02	0.40	0.03	0.50	0.03	0.60	0.04	0.70

HGOS-2-PN



		ØD 3.5		ØD 4		ØD 4.5		ØD 5		ØD 5.5		ØD 6	
		Side	Slotting	Side	Slotting	Side	Slotting	Side	Slotting	Side	Slotting	Side	Slotting
		I Copper, Aluminium		II Carbon steel, Alloy steel Cast iron (180~250HB)		III Stainless steel (20~40HRC)		IV Alloy steel, Tool steel (25~35HRC)		V Alloy steel, Tool steel (35~45HRC)		VI Hardened Steel Tool Steels (hot&cold) (45~52HRC)	
I	$V_e$ (m/min)	180	140	180	140	180	140	180	140	180	140	180	140
	$n$ (min <sup>-1</sup> )	16,400	12,700	14,300	11,100	12,700	9,900	11,500	8,900	10,400	8,100	9,500	7,400
	$f_z$ (mm/tooth)	0.044	0.026	0.050	0.030	0.054	0.033	0.059	0.035	0.063	0.038	0.067	0.040
	$V_f$ (mm/min)	1,440	670	1,430	670	1,380	650	1,360	630	1,320	610	1,280	600
	$a_p$ (mm)	4.55	1.75	5.20	2.00	5.85	2.25	6.50	2.50	7.15	2.75	7.80	3.00
	$a_e$ (mm)	0.35	3.50	0.40	4.00	0.45	4.50	0.50	5.00	0.55	5.50	0.60	6.00
II	$V_e$ (m/min)	140	100	140	100	140	100	140	100	140	100	140	100
	$n$ (min <sup>-1</sup> )	12,700	9,100	11,100	8,000	9,900	7,100	8,900	6,400	8,100	5,800	7,400	5,300
	$f_z$ (mm/tooth)	0.044	0.026	0.050	0.030	0.054	0.033	0.059	0.035	0.063	0.038	0.067	0.040
	$V_f$ (mm/min)	1,110	480	1,110	480	1,080	460	1,050	450	1,020	440	990	430
	$a_p$ (mm)	4.55	1.75	5.20	2.00	5.85	2.25	6.50	2.50	7.15	2.75	7.80	3.00
	$a_e$ (mm)	0.35	3.50	0.40	4.00	0.45	4.50	0.50	5.00	0.55	5.50	0.60	6.00
III	$V_e$ (m/min)	70	45	70	45	70	45	70	45	70	45	70	45
	$n$ (min <sup>-1</sup> )	6,400	4,100	5,600	3,600	5,000	3,200	4,500	2,900	4,100	2,600	3,700	2,400
	$f_z$ (mm/tooth)	0.039	0.024	0.045	0.027	0.049	0.029	0.053	0.032	0.057	0.034	0.060	0.036
	$V_f$ (mm/min)	500	190	500	190	490	190	480	180	470	180	450	170
	$a_p$ (mm)	3.50	1.75	4.00	2.00	4.50	2.25	5.00	2.50	5.50	2.75	6.00	3.00
	$a_e$ (mm)	0.35	3.50	0.40	4.00	0.45	4.50	0.50	5.00	0.55	5.50	0.60	6.00
IV	$V_e$ (m/min)	100	80	100	80	100	80	100	80	100	80	100	80
	$n$ (min <sup>-1</sup> )	9,100	7,300	8,000	6,400	7,100	5,700	6,400	5,100	5,800	4,600	5,300	4,200
	$f_z$ (mm/tooth)	0.039	0.024	0.045	0.027	0.049	0.029	0.053	0.032	0.057	0.034	0.060	0.036
	$V_f$ (mm/min)	720	340	720	350	700	340	680	320	660	310	640	300
	$a_p$ (mm)	3.50	1.75	4.00	2.00	4.50	2.25	5.00	2.50	5.50	2.75	6.00	3.00
	$a_e$ (mm)	0.25	3.50	0.28	4.00	0.32	4.50	0.35	5.00	0.39	5.50	0.42	6.00
V	$V_e$ (m/min)	75	60	75	60	75	60	75	60	75	60	75	60
	$n$ (min <sup>-1</sup> )	6,800	5,500	6,000	4,800	5,300	4,200	4,800	3,800	4,300	3,500	4,000	3,200
	$f_z$ (mm/tooth)	0.035	0.021	0.040	0.024	0.044	0.026	0.047	0.028	0.051	0.030	0.054	0.032
	$V_f$ (mm/min)	480	230	480	230	460	220	450	220	440	210	430	210
	$a_p$ (mm)	3.50	1.05	4.00	1.20	4.50	1.35	5.00	1.50	5.50	1.65	6.00	1.80
	$a_e$ (mm)	0.18	3.50	0.20	4.00	0.23	4.50	0.25	5.00	0.28	5.50	0.30	6.00
VI	$V_e$ (m/min)	60	50	60	50	60	50	60	50	60	50	60	50
	$n$ (min <sup>-1</sup> )	5,500	4,500	4,800	4,000	4,200	3,500	3,800	3,200	3,500	2,900	3,200	2,700
	$f_z$ (mm/tooth)	0.031	0.018	0.035	0.021	0.038	0.023	0.041	0.025	0.044	0.027	0.047	0.028
	$V_f$ (mm/min)	340	170	340	170	320	160	310	160	310	150	300	150
	$a_p$ (mm)	3.50	0.70	4.00	0.80	4.50	0.90	5.00	1.00	5.50	1.10	6.00	1.20
	$a_e$ (mm)	0.18	3.50	0.20	4.00	0.23	4.50	0.25	5.00	0.28	5.50	0.30	6.00

ØD0.8		ØD0.9		ØD1		ØD1.5		ØD2		ØD2.5		ØD3	
Side	Slotting	Side	Slotting	Side	Slotting	Side	Slotting	Side	Slotting	Side	Slotting	Side	Slotting
151	140	170	140	180	140	180	140	180	140	180	140	180	140
60,000	55,700	60,000	49,500	57,300	44,600	38,200	29,700	28,600	22,300	22,900	17,800	19,100	14,900
0.015	0.009	0.016	0.010	0.016	0.010	0.022	0.013	0.026	0.016	0.032	0.019	0.038	0.023
1,820	1,020	1,910	950	1,830	860	1,680	790	1,490	700	1,470	680	1,440	680
1.04	0.40	1.17	0.45	1.30	0.50	1.95	0.75	2.60	1.00	3.25	1.25	3.90	1.50
0.08	0.80	0.09	0.90	0.10	1.00	0.15	1.50	0.20	2.00	0.25	2.50	0.30	3.00
140	100	140	100	140	100	140	100	140	100	140	100	140	100
55,700	39,800	49,500	35,400	44,600	31,800	29,700	21,200	22,300	15,900	17,800	12,700	14,900	10,600
0.015	0.009	0.016	0.010	0.016	0.010	0.022	0.013	0.026	0.016	0.032	0.019	0.038	0.023
1,690	730	1,580	680	1,430	610	1,310	560	1,160	500	1,140	490	1,130	480
1.04	0.40	1.17	0.45	1.30	0.50	1.95	0.75	2.60	1.00	3.25	1.25	3.90	1.50
0.08	0.80	0.09	0.90	0.10	1.00	0.15	1.50	0.20	2.00	0.25	2.50	0.30	3.00
70	45	70	45	70	45	70	45	70	45	70	45	70	45
27,900	17,900	24,800	15,900	22,300	14,300	14,900	9,500	11,100	7,200	8,900	5,700	7,400	4,800
0.014	0.008	0.014	0.009	0.014	0.009	0.020	0.012	0.023	0.014	0.029	0.017	0.034	0.020
760	290	710	270	640	250	590	230	520	200	510	200	500	200
0.80	0.40	0.90	0.45	1.00	0.50	1.50	0.75	2.00	1.00	2.50	1.25	3.00	1.50
0.08	0.80	0.09	0.90	0.10	1.00	0.15	1.50	0.20	2.00	0.25	2.50	0.30	3.00
100	80	100	80	100	80	100	80	100	80	100	80	100	80
39,800	31,800	35,400	28,300	31,800	25,500	21,200	17,000	15,900	12,700	12,700	10,200	10,600	8,500
0.014	0.008	0.014	0.009	0.014	0.009	0.020	0.012	0.023	0.014	0.029	0.017	0.034	0.020
1,090	520	1,020	490	920	440	840	400	740	360	730	350	720	350
0.80	0.40	0.90	0.45	1.00	0.50	1.50	0.75	2.00	1.00	2.50	1.25	3.00	1.50
0.06	0.80	0.06	0.90	0.07	1.00	0.11	1.50	0.14	2.00	0.18	2.50	0.21	3.00
75	60	75	60	75	60	75	60	75	60	75	60	75	60
29,800	23,900	26,500	21,200	23,900	19,100	15,900	12,700	11,900	9,500	9,500	7,600	8,000	6,400
0.012	0.007	0.013	0.008	0.013	0.008	0.018	0.011	0.021	0.012	0.026	0.015	0.030	0.018
720	350	680	320	610	290	560	270	500	240	490	230	480	230
0.80	0.24	0.90	0.27	1.00	0.30	1.50	0.45	2.00	0.60	2.50	0.75	3.00	0.90
0.04	0.80	0.05	0.90	0.05	1.00	0.08	1.50	0.10	2.00	0.13	2.50	0.15	3.00
60	50	60	50	60	50	60	50	60	50	60	50	60	50
23,900	19,900	21,200	17,700	19,100	15,900	12,700	10,600	9,500	8,000	7,600	6,400	6,400	5,300
0.011	0.006	0.011	0.007	0.011	0.007	0.015	0.009	0.018	0.011	0.022	0.013	0.026	0.016
510	250	470	240	430	210	390	200	350	170	340	170	340	170
0.80	0.16	0.90	0.18	1.00	0.20	1.50	0.30	2.00	0.40	2.50	0.50	3.00	0.60
0.04	0.80	0.05	0.90	0.05	1.00	0.08	1.50	0.10	2.00	0.13	2.50	0.15	3.00

ØD7		ØD8		ØD9		ØD10		ØD12		ØD16		ØD20	
Side	Slotting	Side	Slotting	Side	Slotting	Side	Slotting	Side	Slotting	Side	Slotting	Side	Slotting
180	140	180	140	180	140	180	140	180	140	180	140	180	140
8,200	6,400	7,200	5,600	6,400	5,000	5,700	4,500	4,800	3,700	3,600	2,800	2,900	2,200
0.076	0.046	0.085	0.051	0.093	0.056	0.100	0.060	0.120	0.072	0.152	0.091	0.180	0.108
1,250	590	1,220	570	1,190	560	1,140	540	1,150	530	1,090	510	1,040	480
9.10	3.50	10.40	4.00	11.70	4.50	13.00	5.00	15.60	6.00	20.80	8.00	26.00	10.00
0.70	7.00	0.80	8.00	0.90	9.00	1.00	10.00	1.20	12.00	1.60	16.00	2.00	20.00
140	100	140	100	140	100	140	100	140	100	140	100	140	100
6,400	4,500	5,600	4,000	5,000	3,500	4,500	3,200	3,700	2,700	2,800	2,000	2,200	1,600
0.076	0.046	0.085	0.051	0.093	0.056	0.100	0.060	0.120	0.072	0.152	0.091	0.180	0.108
980	410	950	410	930	390	900	380	890	390	850	360	790	350
9.10	3.50	10.40	4.00	11.70	4.50	13.00	5.00	15.60	6.00	20.80	8.00	26.00	10.00
0.70	7.00	0.80	8.00	0.90	9.00	1.00	10.00	1.20	12.00	1.60	16.00	2.00	20.00
70	45	70	45	70	45	70	45	70	45	70	45	70	45
3,200	2,000	2,800	1,800	2,500	1,600	2,200	1,400	1,900	1,200	1,400	900	1,100	700
0.069	0.041	0.076	0.046	0.083	0.050	0.090	0.054	0.108	0.065	0.137	0.082	0.162	0.097
440	160	430	160	420	160	400	150	410	160	380	150	360	140
7.00	3.50	8.00	4.00	9.00	4.50	10.00	5.00	12.00	6.00	16.00	8.00	20.00	10.00
0.70	7.00	0.80	8.00	0.90	9.00	1.00	10.00	1.20	12.00	1.60	16.00	2.00	20.00
100	80	100	80	100	80	100	80	100	80	100	80	100	80
4,500	3,600	4,000	3,200	3,500	2,800	3,200	2,500	2,700	2,100	2,000	1,600	1,600	1,300
0.069	0.041	0.076	0.046	0.083	0.050	0.090	0.054	0.108	0.065	0.137	0.082	0.162	0.097
620	300	610	290	580	280	580	270	580	270	550	260	520	250
7.00	3.50	8.00	4.00	9.00	4.50	10.00	5.00	12.00	6.00	16.00	8.00	20.00	10.00
0.49	7.00	0.56	8.00	0.63	9.00	0.70	10.00	0.84	12.00	1.12	16.00	1.40	20.00
75	60	75	60	75	60	75	60	75	60	75	60	75	60
3,400	2,700	3,000	2,400	2,700	2,100	2,400	1,900	2,000	1,600	1,500	1,200	1,200	1,000
0.061	0.037	0.068	0.041	0.074	0.044	0.080	0.048	0.096	0.058	0.122	0.073	0.144	0.086
420	200	410	200	400	190	380	180	380	180	360	180	350	170
7.00	2.10	8.00	2.40	9.00	2.70	10.00	3.00	12.00	3.60	16.00	4.80	20.00	6.00
0.35	7.00	0.40	8.00	0.45	9.00	0.50	10.00	0.60	12.00	0.80	16.00	1.00	20.00
60	50	60	50	60	50	60	50	60	50	60	50	60	50
2,700	2,300	2,400	2,000	2,100	1,800	1,900	1,600	1,600	1,300	1,200	1,000	1,000	800
0.053	0.032	0.059	0.036	0.065	0.039	0.070	0.042	0.084	0.050	0.106	0.064	0.126	0.076
290	150	280	140	270	140	270	130	270	130	260	130	250	120
7.00	1.40	8.00	1.60	9.00	1.80	10.00	2.00	12.00	2.40	16.00	3.20	20.00	4.00
0.35	7.00	0.40	8.00	0.45	9.00	0.50	10.00	0.60	12.00	0.80	16.00	1.00	20.00

**HGOS-4-PN** | Recommended Cutting Conditions

**HGOS-4-PN**

		ØD1		ØD1.5		ØD2		ØD2.5		ØD3		ØD4		ØD5		
		Side	Slotting	Side	Slotting	Side	Slotting	Side	Slotting	Side	Slotting	Side	Slotting	Side	Slotting	
I	Copper, Aluminium	V <sub>c</sub> (m/min)	180	140	180	140	180	140	180	140	180	140	180	140	180	140
		n (min <sup>-1</sup> )	57,300	44,600	38,200	29,700	28,600	22,300	22,900	17,800	19,100	14,900	14,300	11,100	11,500	8,900
		f <sub>z</sub> (mm/tooth)	0.013	0.006	0.018	0.009	0.021	0.010	0.026	0.013	0.030	0.015	0.040	0.020	0.047	0.024
		V <sub>f</sub> (mm/min)	2,930	1,140	2,700	1,050	2,380	930	2,340	910	2,310	900	2,290	890	2,170	840
		a <sub>p</sub> (mm)	1.30	0.50	1.95	0.75	2.60	1.00	3.25	1.25	3.90	1.50	5.20	2.00	6.50	2.50
		a <sub>e</sub> (mm)	0.10	1.00	0.15	1.50	0.20	2.00	0.25	2.50	0.30	3.00	0.40	4.00	0.50	5.00
II	Carbon steel, Alloy steel Cast iron (180~250HB)	V <sub>c</sub> (m/min)	140	100	140	100	140	100	140	100	140	100	140	100	140	100
		n (min <sup>-1</sup> )	44,600	31,800	29,700	21,200	22,300	15,900	17,800	12,700	14,900	10,600	11,100	8,000	8,900	6,400
		f <sub>z</sub> (mm/tooth)	0.013	0.006	0.018	0.009	0.021	0.010	0.026	0.013	0.030	0.015	0.040	0.020	0.047	0.024
		V <sub>f</sub> (mm/min)	2,280	810	2,100	750	1,860	660	1,820	650	1,800	640	1,780	640	1,680	600
		a <sub>p</sub> (mm)	1.30	0.50	1.95	0.75	2.60	1.00	3.25	1.25	3.90	1.50	5.20	2.00	6.50	2.50
		a <sub>e</sub> (mm)	0.10	1.00	0.15	1.50	0.20	2.00	0.25	2.50	0.30	3.00	0.40	4.00	0.50	5.00
III	Stainless steel (20~40HRC)	V <sub>c</sub> (m/min)	70	45	70	45	70	45	70	45	70	45	70	45	70	45
		n (min <sup>-1</sup> )	22,300	14,300	14,900	9,500	11,100	7,200	8,900	5,700	7,400	4,800	5,600	3,600	4,500	2,900
		f <sub>z</sub> (mm/tooth)	0.012	0.006	0.016	0.008	0.019	0.009	0.023	0.012	0.027	0.014	0.036	0.018	0.042	0.021
		V <sub>f</sub> (mm/min)	1,030	330	950	300	830	270	820	260	810	260	810	260	760	250
		a <sub>p</sub> (mm)	1.00	0.50	1.50	0.75	2.00	1.00	2.50	1.25	3.00	1.50	4.00	2.00	5.00	2.50
		a <sub>e</sub> (mm)	0.10	1.00	0.15	1.50	0.20	2.00	0.25	2.50	0.30	3.00	0.40	4.00	0.50	5.00
IV	Alloy steel, Tool steel (25~35HRC)	V <sub>c</sub> (m/min)	100	80	100	80	100	80	100	80	100	80	100	80	100	80
		n (min <sup>-1</sup> )	31,800	25,500	21,200	17,000	15,900	12,700	12,700	10,200	10,600	8,500	8,000	6,400	6,400	5,100
		f <sub>z</sub> (mm/tooth)	0.012	0.006	0.016	0.008	0.019	0.009	0.023	0.012	0.027	0.014	0.036	0.018	0.042	0.021
		V <sub>f</sub> (mm/min)	1,470	590	1,350	540	1,190	480	1,170	470	1,150	460	1,150	460	1,090	430
		a <sub>p</sub> (mm)	1.00	0.50	1.50	0.75	2.00	1.00	2.50	1.25	3.00	1.50	4.00	2.00	5.00	2.50
		a <sub>e</sub> (mm)	0.07	1.00	0.11	1.50	0.14	2.00	0.18	2.50	0.21	3.00	0.28	4.00	0.35	5.00
V	Alloy steel, Tool steel (35~45HRC)	V <sub>c</sub> (m/min)	75	60	75	60	75	60	75	60	75	60	75	60	75	60
		n (min <sup>-1</sup> )	23,900	19,100	15,900	12,700	11,900	9,500	9,500	7,600	8,000	6,400	6,000	4,800	4,800	3,800
		f <sub>z</sub> (mm/tooth)	0.010	0.005	0.014	0.007	0.017	0.008	0.020	0.010	0.024	0.012	0.032	0.016	0.038	0.019
		V <sub>f</sub> (mm/min)	980	390	900	360	790	320	780	310	770	310	770	310	720	290
		a <sub>p</sub> (mm)	1.00	0.30	1.50	0.45	2.00	0.60	2.50	0.75	3.00	0.90	4.00	1.20	5.00	1.50
		a <sub>e</sub> (mm)	0.05	1.00	0.08	1.50	0.10	2.00	0.13	2.50	0.15	3.00	0.20	4.00	0.25	5.00
VI	Hardened Steel Tool Steels (hot&cold) (45~52HRC)	V <sub>c</sub> (m/min)	60	50	60	50	60	50	60	50	60	50	60	50	60	50
		n (min <sup>-1</sup> )	19,100	15,900	12,700	10,600	9,500	8,000	7,600	6,400	6,400	5,300	4,800	4,000	3,800	3,200
		f <sub>z</sub> (mm/tooth)	0.009	0.004	0.012	0.006	0.015	0.007	0.018	0.009	0.021	0.011	0.028	0.014	0.033	0.017
		V <sub>f</sub> (mm/min)	680	280	630	260	550	230	540	230	540	220	540	220	500	210
		a <sub>p</sub> (mm)	1.00	0.20	1.50	0.30	2.00	0.40	2.50	0.50	3.00	0.60	4.00	0.80	5.00	1.00
		a <sub>e</sub> (mm)	0.05	1.00	0.08	1.50	0.10	2.00	0.13	2.50	0.15	3.00	0.20	4.00	0.25	5.00

**HGOS-4-PN**

		ØD6		ØD8		ØD10		ØD12		ØD16		ØD20		
		Side	Slotting	Side	Slotting	Side	Slotting	Side	Slotting	Side	Slotting	Side	Slotting	
I	Copper, Aluminium	V <sub>c</sub> (m/min)	180	140	180	140	180	140	180	140	180	140	180	140
		n (min <sup>-1</sup> )	9,500	7,400	7,200	5,600	5,700	4,500	4,800	3,700	3,600	2,800	2,900	2,200
		f <sub>z</sub> (mm/tooth)	0.054	0.027	0.068	0.034	0.080	0.040	0.096	0.048	0.122	0.061	0.144	0.072
		V <sub>f</sub> (mm/min)	2,040	800	1,950	760	1,820	720	1,840	710	1,750	680	1,670	630
		a <sub>p</sub> (mm)	7.80	3.00	10.40	4.00	13.00	5.00	15.60	6.00	20.80	8.00	26.00	10.00
		a <sub>e</sub> (mm)	0.60	6.00	0.80	8.00	1.00	10.00	1.20	12.00	1.60	16.00	2.00	20.00
II	Carbon steel, Alloy steel Cast iron (180~250HB)	V <sub>c</sub> (m/min)	140	100	140	100	140	100	140	100	140	100	140	100
		n (min <sup>-1</sup> )	7,400	5,300	5,600	4,000	4,500	3,200	3,700	2,700	2,800	2,000	2,200	1,600
		f <sub>z</sub> (mm/tooth)	0.054	0.027	0.068	0.034	0.080	0.040	0.096	0.048	0.122	0.061	0.144	0.072
		V <sub>f</sub> (mm/min)	1,590	570	1,520	540	1,440	510	1,420	520	1,360	490	1,270	460
		a <sub>p</sub> (mm)	7.80	3.00	10.40	4.00	13.00	5.00	15.60	6.00	20.80	8.00	26.00	10.00
		a <sub>e</sub> (mm)	0.60	6.00	0.80	8.00	1.00	10.00	1.20	12.00	1.60	16.00	2.00	20.00
III	Stainless steel (20~40HRC)	V <sub>c</sub> (m/min)	70	45	70	45	70	45	70	45	70	45	70	45
		n (min <sup>-1</sup> )	3,700	2,400	2,800	1,800	2,200	1,400	1,900	1,200	1,400	900	1,100	700
		f <sub>z</sub> (mm/tooth)	0.048	0.024	0.061	0.031	0.072	0.036	0.086	0.043	0.109	0.055	0.130	0.065
		V <sub>f</sub> (mm/min)	720	230	680	220	630	200	660	210	610	200	570	180
		a <sub>p</sub> (mm)	6.00	3.00	8.00	4.00	10.00	5.00	12.00	6.00	16.00	8.00	20.00	10.00
		a <sub>e</sub> (mm)	0.60	6.00	0.80	8.00	1.00	10.00	1.20	12.00	1.60	16.00	2.00	20.00
IV	Alloy steel, Tool steel (25~35HRC)	V <sub>c</sub> (m/min)	100	80	100	80	100	80	100	80	100	80	100	80
		n (min <sup>-1</sup> )	5,300	4,200	4,000	3,200	3,200	2,500	2,700	2,100	2,000	1,600	1,600	1,300
		f <sub>z</sub> (mm/tooth)	0.048	0.024	0.061	0.031	0.072	0.036	0.086	0.043	0.109	0.055	0.130	0.065
		V <sub>f</sub> (mm/min)	1,030	410	980	390	920	360	930	360	880	350	830	340
		a <sub>p</sub> (mm)	6.00	3.00	8.00	4.00	10.00	5.00	12.00	6.00	16.00	8.00	20.00	10.00
		a <sub>e</sub> (mm)	0.42	6.00	0.56	8.00	0.70	10.00	0.84	12.00	1.12	16.00	1.40	20.00
V	Alloy steel, Tool steel (35~45HRC)	V <sub>c</sub> (m/min)	75	60	75	60	75	60	75	60	75	60	75	60
		n (min <sup>-1</sup> )	4,000	3,200	3,000	2,400	2,400	1,900	2,000	1,600	1,500	1,200	1,200	1,000
		f <sub>z</sub> (mm/tooth)	0.043	0.022	0.054	0.027	0.064	0.032	0.077	0.038	0.097	0.049	0.115	0.058
		V <sub>f</sub> (mm/min)	690	280	650	260	610	240	610	250	580	230	550	230
		a <sub>p</sub> (mm)	6.00	1.80	8.00	2.40	10.00	3.00	12.00	3.60	16.00	4.80	20.00	6.00
		a <sub>e</sub> (mm)	0.30	6.00	0.40	8.00	0.50	10.00	0.60	12.00	0.80	16.00	1.00	20.00
VI	Hardened Steel Tool Steels (hot&cold) (45~52HRC)	V <sub>c</sub> (m/min)	60	50	60	50	60	50	60	50	60	50	60	50
		n (min <sup>-1</sup> )	3,200	2,700	2,400	2,000	1,900	1,600	1,600	1,300	1,200	1,000	1,000	800
		f <sub>z</sub> (mm/tooth)	0.038	0.019	0.047	0.024	0.056	0.028	0.067	0.034	0.085	0.043	0.101	0.050
		V <sub>f</sub> (mm/min)	480	200	460	190	430	180	430	170	410	170	400	160
		a <sub>p</sub> (mm)	6.00	1.20	8.00	1.60	10.00	2.00	12.00	2.40	16.00	3.20	20.00	4.00
		a <sub>e</sub> (mm)	0.30	6.00	0.40	8.00	0.50	10.00	0.60	12.00	0.80	16.00	1.00	20.00