

UNION TOOL

Tungsten Carbide End Mills UNIMAX Series

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HMGCOAT 4 Flutes Long Neck Radius End Mills

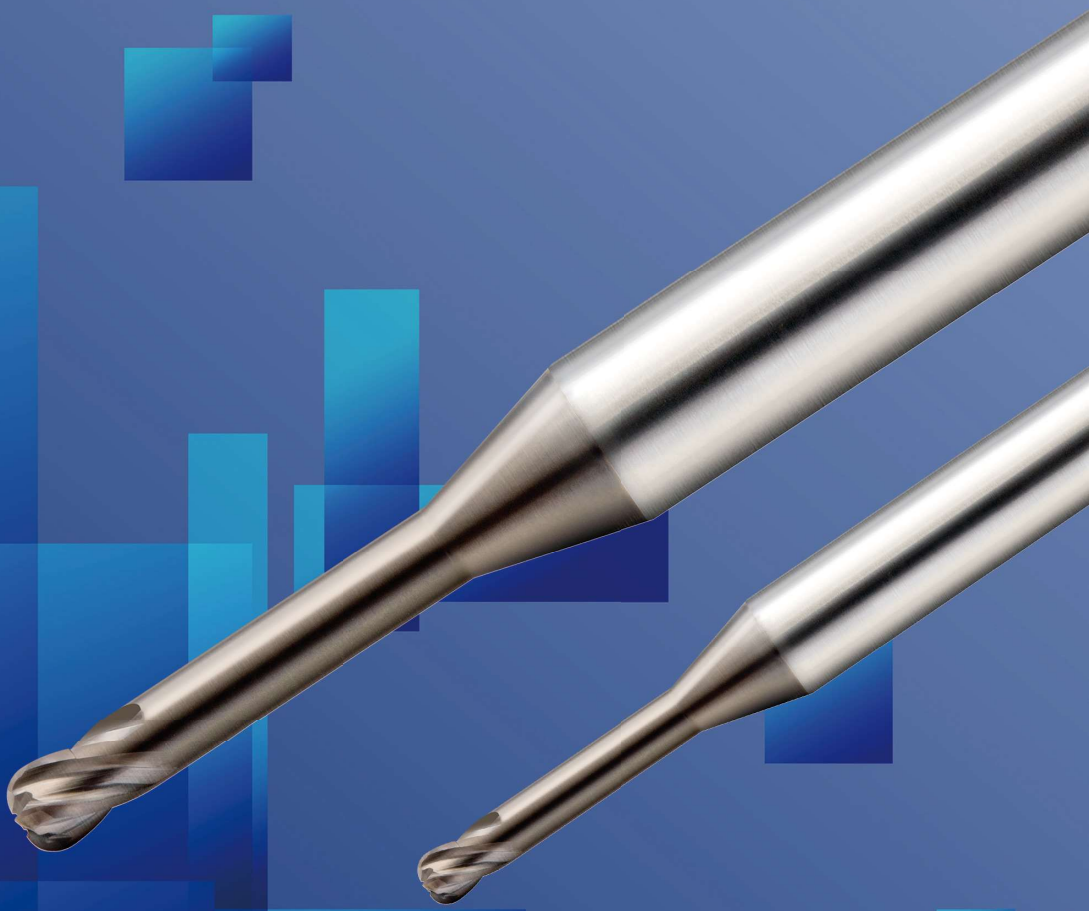
Add 46

Total 230 Models

HGLRS

4 Flutes For Hard Materials
~70 HRC

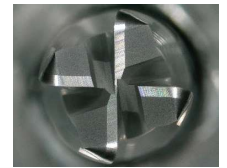
Diameter sized from $\varnothing 1$ to $\varnothing 4$ with the long effective length added.



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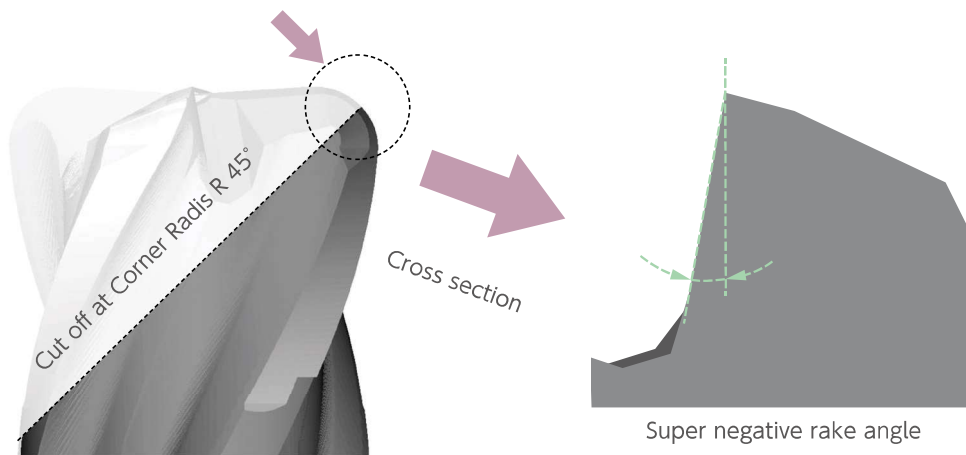
4 Flute Long Neck Radius for Hard Materials

HGLRS



Feature 1
Long tool life

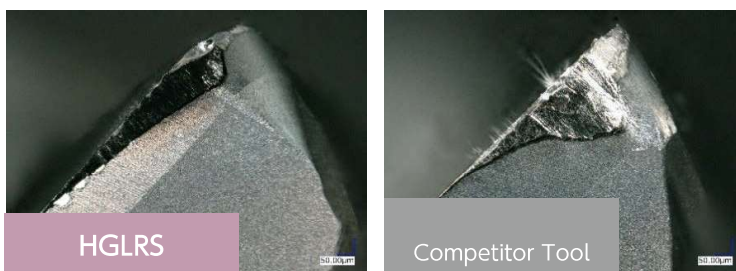
Super negative rake angle allows the tool to withstand cutting resistance. Best suited for 60-70 HRC.



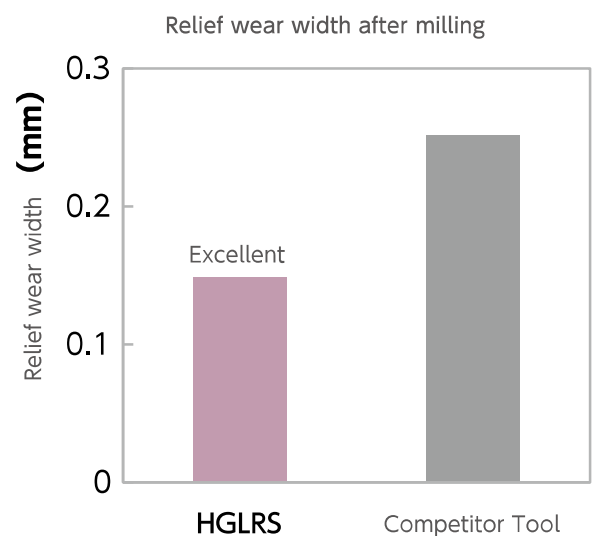
Wear width comparison
HGLRS Ø3 × CR0.3 × EL16

HAP72 (69 HRC)

High efficiency milling and long tool life achieved even on new generation super hard materials.



Spindle Speed	7,000 min ⁻¹
Feed Rate	900 mm/min
a_p Axial Depth	0.03 mm
a_e Radial Depth	0.6 mm
Coolant	Air Blow
Milling Shape	(10 × 10 × 5 mm) Square Pocket
Cycle Time	68 min



Feature 2 Milling accuracy

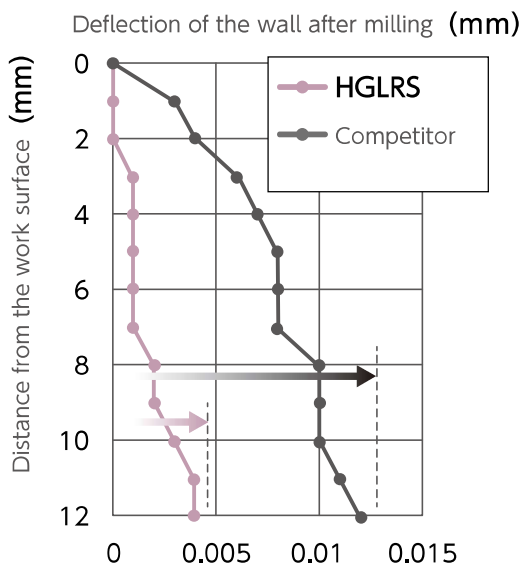
Improved milling accuracy and surface quality as a result of the strong back taper geometry.

Dimensional accuracy comparison
HGLRS $\varnothing 3 \times \text{CR0.3} \times \text{EL16}$

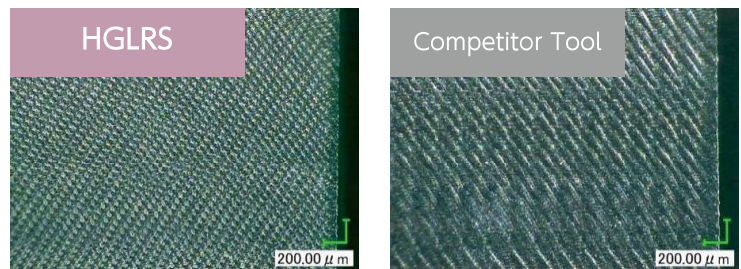
HAP72 (69 HRC)

HGLRS

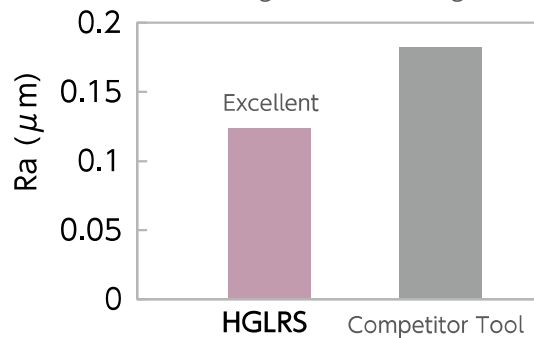
Smaller dimensional change and better milling accuracy with HGLRS



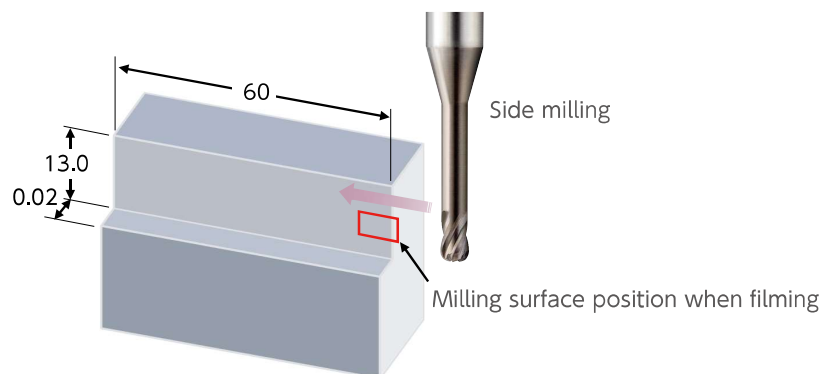
Surface condition after milling



Surface roughness after milling (Ra)



Spindle Speed	7,000 min^{-1}
Feed Rate	1,800 mm/min
a_p Axial Depth	0.03 mm
a_e Radial Depth	0.02 mm
Coolant	Air Blow
Cycle Time	15 min



Feature 3 High precision

Unit (mm)			
Outside Diameter	Diameter Tolerance	R Radius Accuracy	Shank Diameter Tolerance
$0.2 \leq D \leq 0.8$	0/-0.008	± 0.003	0/-0.004 (h4)
$1 \leq D \leq 5$	0/-0.01		
D=6	-0.005/-0.02		

HGLRS

Additional
46 models



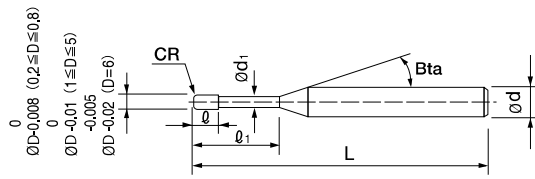
HMGC0AT 4 Flute Long Neck Radius End Mills for Hard Materials

Ø0.2~Ø6

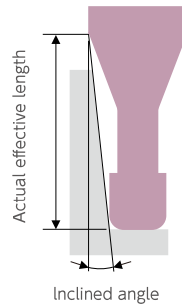


Material Applications (★ Highly Recommended ● Recommended ○ Suggested)

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
			~50 HRC	~55 HRC	~60 HRC	~65 HRC	~70 HRC										
		○	●	●	●	★	★										



The shank taper angle shown is not an exact value.

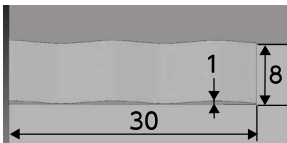


Slotting, Side milling, Bottom milling
HGLRS Ø2 × CR0.2 × EL10

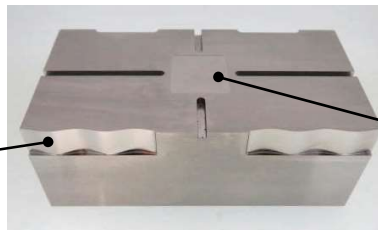
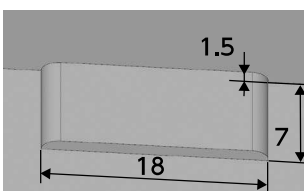
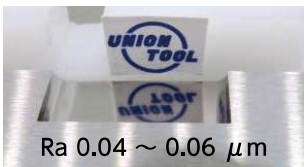
HAP72 (68 HRC)

Side finishing

■ Waved finishing
n=7,200 Vf=780
a_p=0.02 a_e=0.2



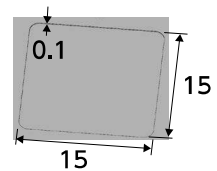
■ Half pocket finishing
n=7,200 Vf=780
a_p=0.02 a_e=0.2



Work size
80 x 40 x 30 mm

Bottom finishing

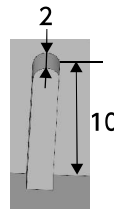
■ n=7,200 Vf=780
a_p=0.02 a_e=0.2



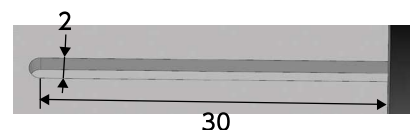
Coolant: Oil mist

Slotting

■ n=7,200 Vf=390
a_p=0.04
Slot width: 2 mm



■ n=7,200 Vf=390
a_p=0.02



Total 230 models

Unit (mm)

Model Number	Outside Diameter $\varnothing D$	Corner Radius CR	Effective Length l_1	Length of Cut l	Neck Diameter $\varnothing d_1$	Shank Taper Angle Bta	Overall Length L	Shank Diameter $\varnothing d$	Suggested Retail Price ¥	Effective Length by Inclined Angles				
										30°	1°	1°30'	2°	3°
HGLRS 4002-002-005	0.2	R0.02	0.5	0.12	0.185	16°	50	4	14,100	0.61	0.64	0.67	0.70	0.76
HGLRS 4002-002-010			1				50	4	14,100	1.13	1.18	1.23	1.28	1.38
HGLRS 4002-002-020			2				50	4	14,100	2.17	2.25	2.34	2.43	2.63
HGLRS 4002-005-005		R0.05	0.5				50	4	14,100	0.60	0.64	0.67	0.70	0.75
HGLRS 4002-005-010			1				50	4	14,100	1.13	1.18	1.22	1.27	1.37
HGLRS 4002-005-020			2				50	4	14,100	2.17	2.25	2.33	2.42	2.62
HGLRS 4003-002-005	0.3	R0.02	0.5	0.18	0.285	16°	50	4	14,100	0.63	0.66	0.69	0.72	0.78
HGLRS 4003-002-010			1				50	4	14,100	1.15	1.20	1.24	1.29	1.40
HGLRS 4003-002-015			1.5				50	4	14,100	1.66	1.72	1.79	1.85	2.01
HGLRS 4003-002-020			2				50	4	14,100	2.18	2.26	2.34	2.43	2.63
HGLRS 4003-005-005		R0.05	0.5				50	4	14,100	0.63	0.66	0.68	0.71	0.77
HGLRS 4003-005-010			1				50	4	14,100	1.15	1.20	1.24	1.29	1.39
HGLRS 4003-005-020			2				50	4	14,100	2.18	2.26	2.34	2.43	2.62
HGLRS 4004-002-010	0.4	R0.02	1	0.24	0.385	16°	50	4	9,050	1.15	1.20	1.24	1.29	1.40
HGLRS 4004-002-020			2				50	4	9,050	2.18	2.26	2.34	2.43	2.63
HGLRS 4004-005-010		R0.05	1				50	4	9,050	1.15	1.20	1.24	1.29	1.39
HGLRS 4004-005-020			2				50	4	9,050	2.18	2.26	2.34	2.43	2.62
HGLRS 4004-01-010		R0.1	1				50	4	9,050	1.15	1.19	1.23	1.28	1.38
HGLRS 4004-01-020			2				50	4	9,050	2.18	2.25	2.33	2.42	2.61
HGLRS 4005-002-010	0.5	R0.02	1	0.3	0.485	16°	50	4	7,370	1.15	1.20	1.24	1.29	1.40
HGLRS 4005-002-020			2				50	4	7,370	2.18	2.26	2.34	2.43	2.63
HGLRS 4005-002-030			3				50	4	7,370	3.21	3.33	3.45	3.58	3.87
HGLRS 4005-005-010		R0.05	1				50	4	7,370	1.15	1.20	1.24	1.29	1.39
HGLRS 4005-005-020			2				50	4	7,370	2.18	2.26	2.34	2.43	2.62
HGLRS 4005-005-030			3				50	4	7,370	3.21	3.33	3.45	3.58	3.87
HGLRS 4005-01-010		R0.1	1				50	4	7,370	1.15	1.19	1.23	1.28	1.38
HGLRS 4005-01-020			2				50	4	7,370	2.18	2.25	2.33	2.42	2.61
HGLRS 4005-01-030			3				50	4	7,370	3.21	3.32	3.44	3.57	3.85
HGLRS 4006-005-020	0.6	R0.05	2	0.36	0.585	16°	50	4	7,370	2.18	2.26	2.34	2.43	2.62
HGLRS 4006-005-040			4				50	4	7,370	4.25	4.40	4.55	4.72	5.11
HGLRS 4006-01-020		R0.1	2				50	4	7,370	2.18	2.25	2.33	2.42	2.61
HGLRS 4006-01-040			4				50	4	7,370	4.25	4.39	4.55	4.72	5.10

HMGCOAT 4 Flute Long Neck Radius End Mills for Hard Materials

Model Number	Outside Diameter ØD	Corner Radius CR	Effective Length ℓ ₁	Length of Cut ℓ	Neck Diameter Ød ₁	Shank Taper Angle Bta	Overall Length L	Shank Diameter Ød	Suggested Retail Price ¥	Effective Length by Inclined Angles				
										30°	1°	1°30'	2°	3°
HGLRS 4008-005-020	0.8	R0.05	2	0.48	0.78	16°	50	4	8,100	2.54	2.72	2.89	3.03	3.30
HGLRS 4008-005-040			4				50	4	8,400	4.68	4.94	5.16	5.35	5.79
HGLRS 4008-005-060			6				50	4	8,400	6.80	7.11	7.37	7.65	8.27
HGLRS 4008-01-020		R0.1	2				50	4	8,100	2.54	2.72	2.88	3.02	3.29
HGLRS 4008-01-040			4				50	4	8,400	4.68	4.93	5.15	5.34	5.77
HGLRS 4008-01-060			6				50	4	8,400	6.79	7.11	7.37	7.64	8.26
HGLRS 4008-02-020		R0.2	2				50	4	8,100	2.53	2.70	2.86	3.00	3.26
HGLRS 4008-02-040			4				50	4	8,400	4.67	4.92	5.14	5.33	5.75
HGLRS 4008-02-060			6				50	4	8,400	6.78	7.10	7.36	7.63	8.24
HGLRS 4010-002-020	1	R0.02	2	0.8	0.98	16°	50	4	7,400	2.58	2.76	2.92	3.06	3.33
HGLRS 4010-002-030			3				50	4	7,400	3.65	3.87	4.06	4.23	4.57
HGLRS 4010-002-040			4				50	4	7,400	4.71	4.97	5.18	5.38	5.81
HGLRS 4010-002-050			5				50	4	8,100	5.77	6.05	6.29	6.53	7.06
HGLRS 4010-005-020		R0.05	2				50	4	7,400	2.58	2.76	2.91	3.06	3.32
HGLRS 4010-005-030			3				50	4	7,400	3.65	3.87	4.05	4.22	4.56
HGLRS 4010-005-040			4				50	4	7,400	4.71	4.96	5.18	5.37	5.81
HGLRS 4010-005-050			5				50	4	8,100	5.77	6.05	6.29	6.52	7.05
※ HGLRS 4010-005-060			6				50	4	8,100	6.82	7.13	7.39	7.64	8.21
※ HGLRS 4010-005-080			8				50	4	8,100	8.92	9.27	9.59	9.92	10.66
※ HGLRS 4010-005-100		10	50				4	8,100	11.01	11.41	11.79	12.20	13.11	
HGLRS 4010-01-020		R0.1	2				50	4	7,400	2.58	2.75	2.90	3.05	3.31
HGLRS 4010-01-030			3				50	4	7,400	3.65	3.86	4.05	4.21	4.55
HGLRS 4010-01-040			4				50	4	7,400	4.71	4.96	5.17	5.36	5.80
HGLRS 4010-01-050			5				50	4	8,100	5.77	6.05	6.28	6.51	7.04
※ HGLRS 4010-01-060			6				50	4	8,100	6.82	7.13	7.38	7.64	8.20
※ HGLRS 4010-01-080			8				50	4	8,100	8.92	9.27	9.58	9.91	10.65
※ HGLRS 4010-01-100		10	50				4	8,100	11.00	11.40	11.78	12.19	13.10	
HGLRS 4010-02-020	R0.2	2	50	4	7,400	2.57	2.74	2.89	3.03	3.29				
HGLRS 4010-02-030		3	50	4	7,400	3.64	3.85	4.03	4.20	4.53				
HGLRS 4010-02-040		4	50	4	7,400	4.70	4.95	5.16	5.35	5.77				
HGLRS 4010-02-050		5	50	4	8,100	5.76	6.04	6.27	6.50	7.02				
※ HGLRS 4010-02-060		6	50	4	8,100	6.81	7.12	7.37	7.62	8.18				
※ HGLRS 4010-02-080		8	50	4	8,100	8.91	9.26	9.57	9.90	10.63				
※ HGLRS 4010-02-100		10	50	4	8,100	11.00	11.40	11.77	12.18	13.07				

※ Additional model

HMGCOAT 4 Flute Long Neck Radius End Mills for Hard Materials

Model Number	Outside Diameter ∅D	Corner Radius CR	Effective Length ℓ ₁	Length of Cut ℓ	Neck Diameter ∅d ₁	Shank Taper Angle Bta	Overall Length L	Shank Diameter ∅d	Suggested Retail Price ¥	Effective Length by Inclined Angles				
										30°	1°	1°30'	2°	3°
HGLRS 4015-005-030	1.5	R0.05	3	1.2	1.48	16°	50	4	7,900	3.12	3.23	3.35	3.48	3.76
HGLRS 4015-005-040			4				50	4	7,900	4.16	4.30	4.46	4.63	5.00
HGLRS 4015-005-060			6				50	4	7,900	6.22	6.44	6.67	6.92	7.49
HGLRS 4015-005-080			8				50	4	8,200	8.29	8.58	8.89	9.22	9.97
※ HGLRS 4015-005-100			10				50	4	8,200	10.33	10.67	11.02	11.41	12.26
HGLRS 4015-01-030		R0.1	3				50	4	7,900	3.12	3.23	3.34	3.47	3.75
HGLRS 4015-01-040			4				50	4	7,900	4.16	4.30	4.45	4.62	4.99
HGLRS 4015-01-060			6				50	4	7,900	6.22	6.44	6.67	6.92	7.48
HGLRS 4015-01-080			8				50	4	8,200	8.29	8.58	8.89	9.22	9.96
※ HGLRS 4015-01-100			10				50	4	8,200	10.33	10.66	11.02	11.40	12.25
※ HGLRS 4015-01-120			12				50	4	8,200	12.39	12.79	13.22	13.68	14.69
HGLRS 4015-02-030			R0.2				3	50	4	7,900	3.12	3.22	3.33	3.45
HGLRS 4015-02-040		4					50	4	7,900	4.15	4.29	4.44	4.60	4.97
HGLRS 4015-02-060		6					50	4	7,900	6.22	6.43	6.66	6.90	7.45
HGLRS 4015-02-080		8					50	4	8,200	8.29	8.57	8.87	9.20	9.94
※ HGLRS 4015-02-100		10					50	4	8,200	10.33	10.66	11.01	11.39	12.23
※ HGLRS 4015-02-120		12					50	4	8,200	12.39	12.79	13.21	13.66	14.67
HGLRS 4015-03-030		R0.3					3	50	4	7,900	3.12	3.22	3.32	3.44
HGLRS 4015-03-040			4				50	4	7,900	4.15	4.28	4.43	4.59	4.94
HGLRS 4015-03-060			6				50	4	7,900	6.22	6.42	6.65	6.89	7.43
HGLRS 4015-03-080	8		50	4	8,200	8.28	8.56	8.86	9.19	9.91				
※ HGLRS 4015-03-100	10		50	4	8,200	10.32	10.65	11.00	11.37	12.20				
※ HGLRS 4015-03-120	12		50	4	8,200	12.39	12.78	13.20	13.65	14.65				
HGLRS 4015-05-040	R0.5	4	50	4	7,900	4.14	4.27	4.41	4.56	4.89				
HGLRS 4015-05-060		6	50	4	7,900	6.21	6.41	6.63	6.86	7.38				
HGLRS 4015-05-080		8	50	4	8,200	8.28	8.55	8.84	9.16	9.87				
※ HGLRS 4015-05-100		10	50	4	8,200	10.32	10.64	10.98	11.34	12.16				
※ HGLRS 4015-05-120		12	50	4	8,200	12.38	12.77	13.18	13.62	14.61				
HGLRS 4020-002-040	2	R0.02	4	1.6	1.96	16°	50	4	7,900	4.20	4.34	4.50	4.67	5.05
HGLRS 4020-002-060			6				50	4	7,900	6.26	6.48	6.72	6.97	7.54
HGLRS 4020-002-080			8				50	4	8,200	8.33	8.62	8.94	9.27	10.03
HGLRS 4020-002-100			10				50	4	8,200	10.40	10.76	11.15	11.57	12.51
HGLRS 4020-005-040		R0.05	4				50	4	7,900	4.20	4.34	4.50	4.67	5.05
HGLRS 4020-005-060			6				50	4	7,900	6.26	6.48	6.72	6.97	7.53
HGLRS 4020-005-080			8				50	4	8,200	8.33	8.62	8.93	9.27	10.02
HGLRS 4020-005-100			10				50	4	8,200	10.40	10.76	11.15	11.57	12.51

※ Additional model

HMGCOAT 4 Flute Long Neck Radius End Mills for Hard Materials

Model Number	Outside Diameter ∅D	Corner Radius CR	Effective Length ℓ ₁	Length of Cut ℓ	Neck Diameter ∅d ₁	Shank Taper Angle Bta	Overall Length L	Shank Diameter ∅d	Suggested Retail Price ¥	Effective Length by Inclined Angles					
										30°	1°	1°30'	2°	3°	
HGLRS 4020-01-040	2	R0.1	4	1.6	1.96	16°	50	4	7,900	4.19	4.34	4.49	4.66	5.04	
HGLRS 4020-01-060			6				50	4	7,900	6.26	6.48	6.71	6.96	7.52	
HGLRS 4020-01-080			8				50	4	8,200	8.33	8.62	8.93	9.26	10.01	
HGLRS 4020-01-100			10				50	4	8,200	10.40	10.76	11.14	11.56	12.49	
※ HGLRS 4020-01-120			12				50	4	8,200	12.43	12.83	13.26	13.72	14.74	
※ HGLRS 4020-01-160			16				60	4	8,200	16.55	17.09	17.66	18.27	No Interference	
※ HGLRS 4020-01-200			20				60	4	8,200	20.68	21.35	22.06	22.83	No Interference	
HGLRS 4020-02-040			R0.2				4	50	4	7,900	4.19	4.33	4.48	4.65	5.01
HGLRS 4020-02-060							6	50	4	7,900	6.26	6.47	6.70	6.95	7.50
HGLRS 4020-02-080							8	50	4	8,200	8.33	8.61	8.92	9.25	9.98
HGLRS 4020-02-100		10					50	4	8,200	10.39	10.75	11.13	11.54	12.47	
※ HGLRS 4020-02-120		12					50	4	8,200	12.43	12.82	13.25	13.70	14.72	
※ HGLRS 4020-02-160		16					60	4	8,200	16.55	17.08	17.65	18.26	19.61	
※ HGLRS 4020-02-200		20					60	4	8,200	20.68	21.34	22.05	22.81	No Interference	
HGLRS 4020-03-040		R0.3					4	50	4	7,900	4.19	4.32	4.47	4.63	4.99
HGLRS 4020-03-060							6	50	4	7,900	6.25	6.46	6.69	6.93	7.47
HGLRS 4020-03-080							8	50	4	8,200	8.32	8.60	8.91	9.23	9.96
HGLRS 4020-03-100			10				50	4	8,200	10.39	10.74	11.12	11.53	12.45	
※ HGLRS 4020-03-120			12				50	4	8,200	12.42	12.82	13.24	13.69	14.69	
※ HGLRS 4020-03-160			16				60	4	8,200	16.55	17.08	17.64	18.24	19.59	
※ HGLRS 4020-03-200	20		60	4	8,200	20.67	21.34	22.04	22.80	No Interference					
HGLRS 4020-05-040	R0.5		4	50	4	7,900	4.18	4.31	4.45	4.60	4.94				
HGLRS 4020-05-060			6	50	4	7,900	6.25	6.45	6.67	6.90	7.43				
HGLRS 4020-05-080			8	50	4	8,200	8.32	8.59	8.88	9.20	9.91				
HGLRS 4020-05-100		10	50	4	8,200	10.38	10.73	11.10	11.50	12.40					
※ HGLRS 4020-05-120		12	50	4	8,200	12.42	12.80	13.22	13.66	14.65					
※ HGLRS 4020-05-160		16	60	4	8,200	16.54	17.06	17.62	18.22	19.54					
※ HGLRS 4020-05-200		20	60	4	8,200	20.67	21.32	22.02	22.77	No Interference					
HGLRS 4030-005-040		3	R0.05	4	2.4	2.87	16°	50	6	7,100	4.39	4.54	4.70	4.88	5.28
HGLRS 4030-005-060	6			50				6	7,100	6.45	6.68	6.92	7.18	7.76	
HGLRS 4030-005-080	8			50				6	7,100	8.52	8.82	9.14	9.48	10.25	
HGLRS 4030-005-100	10			50				6	7,100	10.59	10.96	11.35	11.78	12.74	
HGLRS 4030-005-120	12			50				6	8,600	12.66	13.10	13.57	14.08	15.22	
HGLRS 4030-005-160	16			60				6	10,600	16.79	17.38	18.00	18.68	20.19	
※ HGLRS 4030-005-200	20			60				6	10,600	20.86	21.54	22.26	23.03	24.75	

※ Additional model

HMGCOAT 4 Flute Long Neck Radius End Mills for Hard Materials

Model Number	Outside Diameter ∅D	Corner Radius CR	Effective Length ℓ ₁	Length of Cut ℓ	Neck Diameter ∅d ₁	Shank Taper Angle Bta	Overall Length L	Shank Diameter ∅d	Suggested Retail Price ¥	Effective Length by Inclined Angles					
										30°	1°	1°30'	2°	3°	
HGLRS 4030-01-040	3	R0.1	4	2.4	2.87	16°	50	6	7,100	4.38	4.54	4.70	4.87	5.27	
HGLRS 4030-01-060			6				50	6	7,100	6.45	6.68	6.92	7.17	7.75	
HGLRS 4030-01-080			8				50	6	7,100	8.52	8.81	9.13	9.47	10.24	
HGLRS 4030-01-100			10				50	6	7,100	10.59	10.95	11.35	11.77	12.72	
HGLRS 4030-01-120			12				50	6	8,600	12.65	13.09	13.56	14.07	15.21	
HGLRS 4030-01-160			16				60	6	10,600	16.79	17.37	18.00	18.67	20.18	
※ HGLRS 4030-01-200			20				60	6	10,600	20.86	21.53	22.25	23.02	24.74	
HGLRS 4030-02-040			R0.2				4	50	6	7,100	4.38	4.53	4.69	4.86	5.24
HGLRS 4030-02-060							6	50	6	7,100	6.45	6.67	6.90	7.16	7.73
HGLRS 4030-02-080							8	50	6	7,100	8.52	8.81	9.12	9.46	10.21
HGLRS 4030-02-100		10					50	6	7,100	10.58	10.95	11.34	11.76	12.70	
HGLRS 4030-02-120		12					50	6	8,600	12.65	13.09	13.55	14.06	15.19	
HGLRS 4030-02-160		16					60	6	10,600	16.79	17.37	17.99	18.66	20.16	
※ HGLRS 4030-02-200		20					60	6	10,600	20.85	21.53	22.24	23.01	24.72	
HGLRS 4030-03-040		R0.3					4	50	6	7,100	4.38	4.52	4.68	4.84	5.22
HGLRS 4030-03-060							6	50	6	7,100	6.45	6.66	6.89	7.14	7.70
HGLRS 4030-03-080							8	50	6	7,100	8.51	8.80	9.11	9.44	10.19
HGLRS 4030-03-100			10				50	6	7,100	10.58	10.94	11.33	11.74	12.68	
HGLRS 4030-03-120			12				50	6	8,600	12.65	13.08	13.54	14.04	15.16	
HGLRS 4030-03-160			16				60	6	10,600	16.78	17.36	17.98	18.64	20.14	
※ HGLRS 4030-03-200	20		60	6	10,600	20.85	21.52	22.23	23.00	24.69					
HGLRS 4030-05-040	R0.5		4	50	6	7,100	4.37	4.51	4.66	4.81	5.17				
HGLRS 4030-05-060			6	50	6	7,100	6.44	6.65	6.87	7.11	7.66				
HGLRS 4030-05-080			8	50	6	7,100	8.51	8.79	9.09	9.41	10.14				
HGLRS 4030-05-100		10	50	6	7,100	10.57	10.93	11.31	11.71	12.63					
HGLRS 4030-05-120		12	50	6	8,600	12.64	13.07	13.52	14.01	15.12					
HGLRS 4030-05-160		16	60	6	10,600	16.78	17.34	17.96	18.61	20.09					
※ HGLRS 4030-05-200		20	60	6	10,600	20.84	21.51	22.21	22.97	24.65					
HGLRS 4030-10-060		R1	6	50	6	7,100	6.42	6.61	6.81	7.04	7.53				
HGLRS 4030-10-080			8	50	6	7,100	8.49	8.75	9.03	9.34	10.02				
HGLRS 4030-10-100			10	50	6	7,100	10.55	10.89	11.25	11.64	12.51				
HGLRS 4030-10-120	12		50	6	8,600	12.62	13.03	13.46	13.94	14.99					
HGLRS 4030-10-160	16		60	6	10,600	16.75	17.31	17.90	18.53	19.97					
※ HGLRS 4030-10-200	20		60	6	10,600	20.83	21.47	22.16	22.90	24.54					

※ Additional model

HMGCOAT 4 Flute Long Neck Radius End Mills for Hard Materials

Model Number	Outside Diameter ØD	Corner Radius CR	Effective Length ℓ ₁	Length of Cut ℓ	Neck Diameter Ød ₁	Shank Taper Angle Bta	Overall Length L	Shank Diameter Ød	Suggested Retail Price ¥	Effective Length by Inclined Angles					
										30°	1°	1°30'	2°	3°	
HGLRS 4040-005-080	4	R0.05	8	3.2	3.77	16°	60	6	10,600	8.71	9.02	9.34	9.69	10.48	
HGLRS 4040-005-120			12				60	6	10,600	12.85	13.29	13.78	14.29	15.45	
HGLRS 4040-005-160			16				60	6	10,600	16.98	17.57	18.21	18.89	No Interference	
HGLRS 4040-005-200			20				70	6	11,800	21.12	21.85	22.64	23.49	No Interference	
HGLRS 4040-01-080			R0.1				8	60	6	10,600	8.71	9.01	9.34	9.68	10.47
HGLRS 4040-01-120							12	60	6	10,600	12.85	13.29	13.77	14.28	15.44
HGLRS 4040-01-160		16					60	6	10,600	16.98	17.57	18.20	18.88	No Interference	
HGLRS 4040-01-200		20					70	6	11,800	21.11	21.85	22.64	23.48	No Interference	
※ HGLRS 4040-01-240		24					70	6	11,800	25.16	25.98	26.84	27.77	No Interference	
※ HGLRS 4040-01-300		30					70	6	11,800	31.35	32.36	33.45	No Interference	No Interference	
HGLRS 4040-02-080		R0.2	8				60	6	10,600	8.71	9.01	9.33	9.67	10.44	
HGLRS 4040-02-120			12				60	6	10,600	12.84	13.28	13.76	14.27	15.42	
HGLRS 4040-02-160			16				60	6	10,600	16.98	17.56	18.19	18.87	No Interference	
HGLRS 4040-02-200			20				70	6	11,800	21.11	21.84	22.63	23.47	No Interference	
※ HGLRS 4040-02-240			24				70	6	11,800	25.16	25.97	26.83	27.76	No Interference	
※ HGLRS 4040-02-300			30				70	6	11,800	31.35	32.36	33.44	No Interference	No Interference	
HGLRS 4040-03-080		R0.3	8				60	6	10,600	8.70	9.00	9.32	9.66	10.42	
HGLRS 4040-03-120			12				60	6	10,600	12.84	13.28	13.75	14.25	15.39	
HGLRS 4040-03-160			16				60	6	10,600	16.97	17.56	18.18	18.85	No Interference	
HGLRS 4040-03-200			20				70	6	11,800	21.11	21.83	22.61	23.45	No Interference	
※ HGLRS 4040-03-240			24				70	6	11,800	25.15	25.96	26.82	27.75	No Interference	
※ HGLRS 4040-03-300			30				70	6	11,800	31.34	32.35	33.43	No Interference	No Interference	
HGLRS 4040-05-080		R0.5	8				60	6	10,600	8.70	8.98	9.29	9.63	10.37	
HGLRS 4040-05-120			12				60	6	10,600	12.83	13.26	13.73	14.23	15.35	
HGLRS 4040-05-160			16				60	6	10,600	16.97	17.54	18.16	18.82	No Interference	
HGLRS 4040-05-200			20				70	6	11,800	21.10	21.82	22.59	23.42	No Interference	
※ HGLRS 4040-05-240			24				70	6	11,800	25.15	25.95	26.80	27.72	No Interference	
※ HGLRS 4040-05-300			30				70	6	11,800	31.34	32.34	33.41	No Interference	No Interference	
HGLRS 4040-10-080		R1	8				60	6	10,600	8.68	8.95	9.24	9.55	10.25	
HGLRS 4040-10-120			12				60	6	10,600	12.81	13.23	13.67	14.15	15.22	
HGLRS 4040-10-160	16		60	6	10,600	16.95	17.50	18.10	18.75	20.19					
HGLRS 4040-10-200	20		70	6	11,800	21.08	21.78	22.54	23.35	No Interference					
※ HGLRS 4040-10-240	24		70	6	11,800	25.13	25.91	26.75	27.65	No Interference					
※ HGLRS 4040-10-300	30		70	6	11,800	31.32	32.30	33.35	No Interference	No Interference					

※ Additional model

HMGCOAT 4 Flute Long Neck Radius End Mills for Hard Materials

Model Number	Outside Diameter ØD	Corner Radius CR	Effective Length ℓ ₁	Length of Cut ℓ	Neck Diameter Ød ₁	Shank Taper Angle Bta	Overall Length L	Shank Diameter Ød	Suggested Retail Price ¥	Effective Length by Inclined Angles				
										30°	1°	1° 30'	2°	3°
HGLRS 4060-01-120	6	R0.1	12	4.8	5.77	—	60	6	15,400	No Interference	No Interference	No Interference	No Interference	No Interference
HGLRS 4060-01-160			16				60	6	15,400	No Interference	No Interference	No Interference	No Interference	No Interference
HGLRS 4060-01-200			20				70	6	15,400	No Interference	No Interference	No Interference	No Interference	No Interference
HGLRS 4060-01-240			24				70	6	15,400	No Interference	No Interference	No Interference	No Interference	No Interference
HGLRS 4060-01-300			30				100	6	18,000	No Interference	No Interference	No Interference	No Interference	No Interference
HGLRS 4060-02-120		R0.2	12				60	6	15,400	No Interference	No Interference	No Interference	No Interference	No Interference
HGLRS 4060-02-160			16				60	6	15,400	No Interference	No Interference	No Interference	No Interference	No Interference
HGLRS 4060-02-200			20				70	6	15,400	No Interference	No Interference	No Interference	No Interference	No Interference
HGLRS 4060-02-240			24				70	6	15,400	No Interference	No Interference	No Interference	No Interference	No Interference
HGLRS 4060-02-300			30				100	6	18,000	No Interference	No Interference	No Interference	No Interference	No Interference
HGLRS 4060-03-120		R0.3	12				60	6	15,400	No Interference	No Interference	No Interference	No Interference	No Interference
HGLRS 4060-03-160			16				60	6	15,400	No Interference	No Interference	No Interference	No Interference	No Interference
HGLRS 4060-03-200			20				70	6	15,400	No Interference	No Interference	No Interference	No Interference	No Interference
HGLRS 4060-03-240			24				70	6	15,400	No Interference	No Interference	No Interference	No Interference	No Interference
HGLRS 4060-03-300			30				100	6	18,000	No Interference	No Interference	No Interference	No Interference	No Interference
HGLRS 4060-05-120		R0.5	12				60	6	15,400	No Interference	No Interference	No Interference	No Interference	No Interference
HGLRS 4060-05-160			16				60	6	15,400	No Interference	No Interference	No Interference	No Interference	No Interference
HGLRS 4060-05-200			20				70	6	15,400	No Interference	No Interference	No Interference	No Interference	No Interference
HGLRS 4060-05-240			24				70	6	15,400	No Interference	No Interference	No Interference	No Interference	No Interference
HGLRS 4060-05-300			30				100	6	18,000	No Interference	No Interference	No Interference	No Interference	No Interference
HGLRS 4060-10-120	R1	12	60	6	15,400	No Interference	No Interference	No Interference	No Interference	No Interference				
HGLRS 4060-10-160		16	60	6	15,400	No Interference	No Interference	No Interference	No Interference	No Interference				
HGLRS 4060-10-200		20	70	6	15,400	No Interference	No Interference	No Interference	No Interference	No Interference				
HGLRS 4060-10-240		24	70	6	15,400	No Interference	No Interference	No Interference	No Interference	No Interference				
HGLRS 4060-10-300		30	100	6	18,000	No Interference	No Interference	No Interference	No Interference	No Interference				

HGLRS Milling Conditions

WORK MATERIAL				PREHARDENED STEELS / HARDENED STEELS NAK / STAVAX (~55HRC)				HARDENED STEELS SKD11 (55~62HRC)				HARDENED STEELS HAP10 (62~66HRC)				HARDENED STEELS HAP72 (66~70HRC)				
Model Number	Outside Diameter (mm)	Corner Radius (mm)	Effective Length (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)	a _e Radial Depth (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)	a _e Radial Depth (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)	a _e Radial Depth (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)	a _e Radial Depth (mm)	
4002	0.2	R0.02	0.5	27,000	500	0.004	0.05	27,000	260	0.003	0.02	27,000	280	0.003	0.01	27,000	250	0.003	0.01	
			1	27,000	390	0.004	0.05	27,000	170	0.003	0.02	27,000	210	0.003	0.01	27,000	190	0.003	0.01	
			2	27,000	80	0.004	0.05	27,000	25	0.003	0.02	27,000	30	0.003	0.01	27,000	25	0.003	0.01	
		R0.05	0.5	27,000	590	0.004	0.05	27,000	260	0.003	0.02	27,000	280	0.003	0.01	27,000	250	0.003	0.01	
			1	27,000	450	0.004	0.05	27,000	170	0.003	0.02	27,000	210	0.003	0.01	27,000	190	0.003	0.01	
			2	27,000	80	0.004	0.05	27,000	25	0.003	0.02	27,000	30	0.003	0.01	27,000	25	0.003	0.01	
4003	0.3	R0.02	0.5	25,500	600	0.008	0.09	25,500	460	0.003	0.04	25,500	480	0.003	0.03	25,000	440	0.003	0.03	
			1	25,500	480	0.008	0.09	25,500	440	0.003	0.04	25,500	460	0.003	0.03	25,000	420	0.003	0.03	
			1.5	25,500	360	0.008	0.09	25,500	280	0.003	0.04	25,500	300	0.003	0.03	25,000	270	0.003	0.03	
		R0.05	2	25,500	240	0.008	0.09	25,500	200	0.003	0.04	25,500	220	0.003	0.03	25,000	200	0.003	0.03	
			0.5	25,500	700	0.008	0.09	25,500	460	0.003	0.04	25,500	480	0.004	0.03	25,000	440	0.004	0.03	
			1	25,500	560	0.008	0.09	25,500	440	0.003	0.04	25,500	460	0.004	0.03	25,000	420	0.004	0.03	
4004	0.4	R0.02	2	25,500	270	0.008	0.09	25,500	200	0.003	0.04	25,500	220	0.004	0.03	25,000	200	0.004	0.03	
			1	23,000	720	0.01	0.13	18,300	700	0.004	0.07	20,500	720	0.003	0.05	20,000	650	0.003	0.05	
			2	20,500	540	0.01	0.13	16,100	420	0.004	0.07	18,000	440	0.003	0.05	17,500	400	0.003	0.05	
		R0.05	1	23,000	840	0.015	0.13	18,300	700	0.004	0.07	20,500	720	0.004	0.05	20,000	650	0.004	0.05	
			2	20,500	630	0.015	0.13	16,100	420	0.006	0.07	18,000	440	0.004	0.05	17,500	400	0.004	0.05	
			1	23,000	840	0.015	0.13	18,300	700	0.006	0.07	20,500	720	0.007	0.05	20,000	650	0.007	0.05	
R0.1	2	20,500	630	0.015	0.13	16,100	420	0.006	0.07	18,000	440	0.007	0.05	17,500	400	0.007	0.05			
	4005	0.5	R0.02	1	22,500	920	0.01	0.17	17,900	880	0.006	0.09	20,000	900	0.004	0.07	19,500	820	0.004	0.07
				2	20,000	830	0.01	0.17	15,700	660	0.006	0.09	17,500	680	0.004	0.07	17,000	620	0.004	0.07
3				18,000	730	0.01	0.17	13,900	530	0.006	0.09	15,500	550	0.004	0.07	15,000	500	0.004	0.07	
R0.05	1		22,500	1,080	0.017	0.17	17,900	880	0.009	0.09	20,000	900	0.007	0.07	19,500	820	0.007	0.07		
	2		20,000	970	0.017	0.17	15,700	660	0.009	0.09	17,500	680	0.007	0.07	17,000	620	0.007	0.07		
	3		18,000	850	0.017	0.17	13,900	530	0.009	0.09	15,500	550	0.007	0.07	15,000	500	0.007	0.07		
R0.1	1	22,500	1,080	0.017	0.17	17,900	880	0.009	0.09	20,000	900	0.007	0.07	19,500	820	0.007	0.07			
	2	20,000	970	0.017	0.17	15,700	660	0.009	0.09	17,500	680	0.007	0.07	17,000	620	0.007	0.07			
	3	18,000	850	0.017	0.17	13,900	530	0.009	0.09	15,500	550	0.007	0.07	15,000	500	0.007	0.07			
4006	0.6	R0.05	2	21,500	1,050	0.021	0.2	17,000	710	0.015	0.12	19,000	730	0.007	0.1	18,500	660	0.007	0.1	
			4	17,000	730	0.021	0.2	13,000	310	0.015	0.12	14,500	330	0.007	0.1	14,000	300	0.007	0.1	
		R0.1	2	21,500	1,050	0.021	0.2	17,000	710	0.015	0.12	19,000	730	0.007	0.1	18,500	660	0.007	0.1	
			4	17,000	730	0.021	0.2	13,000	310	0.015	0.12	14,500	330	0.007	0.1	14,000	300	0.007	0.1	
4008	0.8	R0.05	2	20,500	1,330	0.028	0.26	15,700	830	0.02	0.16	17,500	850	0.01	0.15	15,500	770	0.01	0.15	
			4	16,500	1,020	0.028	0.26	12,500	530	0.02	0.16	14,000	550	0.01	0.15	13,500	500	0.01	0.15	
			6	14,000	840	0.028	0.26	10,300	420	0.02	0.16	11,500	440	0.01	0.15	11,000	400	0.01	0.15	
		R0.1	2	20,500	1,330	0.028	0.26	15,700	830	0.02	0.16	17,500	850	0.01	0.15	15,500	770	0.01	0.15	
			4	16,500	1,020	0.028	0.26	12,500	640	0.02	0.16	14,000	660	0.01	0.15	13,500	600	0.01	0.15	
			6	14,000	840	0.028	0.26	10,300	420	0.02	0.16	11,500	440	0.01	0.15	11,000	400	0.01	0.15	
		R0.2	2	20,500	1,330	0.028	0.26	15,700	830	0.02	0.16	17,500	850	0.015	0.15	15,500	770	0.015	0.15	
			4	16,500	1,020	0.028	0.26	12,500	640	0.02	0.16	14,000	660	0.015	0.15	13,500	600	0.015	0.15	
			6	14,000	840	0.028	0.26	10,300	420	0.02	0.16	11,500	440	0.015	0.15	11,000	400	0.015	0.15	

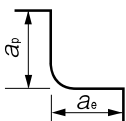
HGLRS Milling Conditions

WORK MATERIAL				PREHARDENED STEELS / HARDENED STEELS NAK / STAVAX (~55HRC)				HARDENED STEELS SKD11 (55~62HRC)				HARDENED STEELS HAP10 (62~66HRC)				HARDENED STEELS HAP72 (66~70HRC)					
Model Number	Outside Diameter (mm)	Corner Radius (mm)	Effective Length (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)	a _e Radial Depth (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)	a _e Radial Depth (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)	a _e Radial Depth (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)	a _e Radial Depth (mm)		
4010	1	R0.02	2	15,300	1,200	0.004	0.027	10,300	710	0.003	0.003	8,900	800	0.003	0.003	8,600	780	0.003	0.003		
			3	13,200	1,150	0.004	0.027	9,400	680	0.003	0.003	8,500	770	0.003	0.003	8,300	750	0.003	0.003		
			4	12,000	1,070	0.003	0.024	8,500	640	0.003	0.003	8,100	730	0.003	0.003	7,900	710	0.003	0.003		
			5	11,000	960	0.003	0.023	7,800	570	0.003	0.003	7,700	700	0.003	0.003	7,500	680	0.003	0.003		
		R0.05	2	15,300	1,200	0.01	0.068	10,300	710	0.005	0.006	8,900	800	0.004	0.004	8,600	780	0.004	0.004		
			3	13,200	1,150	0.009	0.068	9,400	680	0.004	0.005	8,500	770	0.004	0.003	8,300	750	0.004	0.003		
			4	12,000	1,070	0.008	0.061	8,500	640	0.004	0.005	8,100	730	0.004	0.003	7,900	710	0.004	0.003		
			5	11,000	960	0.007	0.058	7,800	570	0.003	0.004	7,700	700	0.003	0.003	7,500	680	0.003	0.003		
			6	9,800	860	0.006	0.055	7,400	550	0.003	0.003	7,300	670	0.003	0.003	7,100	650	0.003	0.003		
			8	8,500	720	0.004	0.049	6,600	510	0.003	0.003	6,500	610	0.003	0.003	6,300	590	0.003	0.003		
			10	7,600	510	0.003	0.043	5,800	470	0.003	0.003	5,700	550	0.003	0.003	5,500	530	0.003	0.003		
		R0.1	2	15,300	1,200	0.019	0.135	10,300	710	0.009	0.067	8,900	800	0.009	0.067	8,600	780	0.009	0.065		
			3	13,200	1,150	0.019	0.135	9,400	680	0.009	0.062	8,500	770	0.009	0.062	8,300	750	0.009	0.06		
			4	12,000	1,070	0.014	0.12	8,500	640	0.004	0.057	8,100	730	0.004	0.057	7,900	710	0.004	0.055		
			5	11,000	960	0.014	0.115	7,800	570	0.004	0.052	7,700	700	0.004	0.052	7,500	680	0.004	0.05		
			6	9,800	860	0.008	0.105	7,400	550	0.004	0.047	7,300	670	0.004	0.047	7,100	650	0.004	0.045		
			8	8,500	720	0.006	0.08	6,600	510	0.004	0.037	6,500	610	0.004	0.037	6,300	590	0.004	0.035		
			10	7,600	510	0.004	0.05	5,800	470	0.004	0.027	5,700	550	0.004	0.027	5,500	530	0.004	0.025		
		R0.2	2	15,300	1,200	0.04	0.27	10,300	710	0.03	0.27	8,900	800	0.02	0.27	8,600	780	0.02	0.26		
			3	13,200	1,150	0.04	0.27	9,400	680	0.03	0.27	8,500	770	0.02	0.25	8,300	750	0.02	0.24		
			4	12,000	1,070	0.03	0.24	8,500	640	0.02	0.24	8,100	730	0.01	0.23	7,900	710	0.01	0.22		
			5	11,000	960	0.03	0.23	7,800	570	0.01	0.14	7,700	700	0.01	0.21	7,500	680	0.01	0.2		
			6	9,800	860	0.016	0.21	7,400	550	0.01	0.13	7,300	670	0.01	0.19	7,100	650	0.01	0.18		
			8	8,500	720	0.012	0.16	6,600	510	0.01	0.1	6,500	610	0.01	0.15	6,300	590	0.01	0.14		
			10	7,600	510	0.009	0.1	5,800	470	0.01	0.073	5,700	550	0.01	0.11	5,500	530	0.01	0.1		
		4015	1.5	R0.05	3	14,800	1,330	0.013	0.135	8,900	760	0.005	0.007	8,800	870	0.005	0.006	8,500	840	0.005	0.006
					4	13,200	1,280	0.011	0.124	8,600	740	0.005	0.007	8,500	840	0.005	0.005	8,300	820	0.005	0.005
					6	10,600	1,210	0.01	0.111	8,100	690	0.004	0.006	8,000	790	0.004	0.005	7,800	770	0.004	0.005
					8	9,300	1,020	0.008	0.087	7,900	690	0.004	0.006	7,700	780	0.004	0.004	7,500	760	0.004	0.004
					10	8,500	870	0.006	0.063	7,700	690	0.004	0.005	7,400	770	0.004	0.003	7,200	750	0.004	0.003
R0.1	3			14,800	1,330	0.024	0.27	8,900	760	0.009	0.153	8,800	870	0.009	0.102	8,500	840	0.009	0.1		
	4			13,200	1,280	0.019	0.25	8,600	740	0.009	0.145	8,500	840	0.009	0.097	8,300	820	0.009	0.095		
	6			10,600	1,210	0.019	0.225	8,100	690	0.009	0.13	8,000	790	0.009	0.087	7,800	770	0.009	0.085		
	8			9,300	1,020	0.014	0.175	7,600	650	0.009	0.115	7,500	740	0.009	0.077	7,300	720	0.009	0.075		
	10			8,500	870	0.014	0.158	7,100	610	0.007	0.089	7,000	690	0.007	0.06	6,800	670	0.007	0.06		
	12			7,800	780	0.012	0.149	6,600	570	0.006	0.067	6,500	640	0.006	0.045	6,300	620	0.006	0.045		
R0.2	3			14,800	1,330	0.05	0.54	8,900	760	0.02	0.66	8,800	870	0.02	0.41	8,500	840	0.02	0.4		
	4			13,200	1,280	0.04	0.5	8,600	740	0.02	0.62	8,500	840	0.02	0.39	8,300	820	0.02	0.38		
	6			10,600	1,210	0.04	0.45	8,100	690	0.02	0.56	8,000	790	0.02	0.35	7,800	770	0.02	0.34		
	8			9,300	1,020	0.03	0.35	7,600	650	0.02	0.52	7,500	740	0.02	0.31	7,300	720	0.02	0.3		
	10	8,500	870	0.029	0.316	7,100	610	0.017	0.403	7,000	690	0.017	0.24	6,800	670	0.017	0.24				
R0.3	12	7,800	780	0.026	0.297	6,600	570	0.014	0.302	6,500	640	0.014	0.18	6,300	620	0.014	0.18				
R0.5																					

HGLRS Milling Conditions

WORK MATERIAL				PREHARDENED STEELS / HARDENED STEELS NAK / STAVAX (~55HRC)				HARDENED STEELS SKD11 (55~62HRC)				HARDENED STEELS HAP10 (62~66HRC)				HARDENED STEELS HAP72 (66~70HRC)					
Model Number	Outside Diameter (mm)	Corner Radius (mm)	Effective Length (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)	a _e Radial Depth (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)	a _e Radial Depth (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)	a _e Radial Depth (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)	a _e Radial Depth (mm)		
4020	2	R0.02	4	14,300	1,460	0.01	0.118	8,600	860	0.003	0.003	8,500	930	0.003	0.003	8,300	900	0.003	0.003		
			6	12,000	1,200	0.006	0.109	8,300	830	0.003	0.003	8,100	890	0.003	0.003	7,900	860	0.003	0.003		
			8	10,400	1,100	0.006	0.1	7,900	790	0.003	0.003	7,800	840	0.003	0.003	7,600	820	0.003	0.003		
			10	9,300	1,020	0.005	0.086	7,500	750	0.003	0.003	7,400	800	0.003	0.003	7,200	780	0.003	0.003		
		R0.05	4	14,300	1,460	0.016	0.24	8,600	860	0.007	0.01	8,500	930	0.007	0.007	8,300	900	0.007	0.007		
			6	12,000	1,200	0.015	0.219	8,300	830	0.006	0.009	8,100	890	0.006	0.007	7,900	860	0.006	0.007		
			8	10,400	1,100	0.014	0.197	7,900	790	0.006	0.008	7,800	840	0.006	0.006	7,600	820	0.006	0.006		
			10	9,300	1,020	0.012	0.165	7,500	750	0.005	0.008	7,400	800	0.005	0.006	7,200	780	0.005	0.006		
		R0.1	4	14,300	1,460	0.033	0.405	8,600	860	0.013	0.18	8,500	930	0.013	0.134	8,300	900	0.013	0.13		
			6	12,000	1,200	0.03	0.365	8,300	830	0.012	0.166	8,100	890	0.012	0.124	7,900	860	0.012	0.12		
			8	10,400	1,100	0.028	0.324	7,900	790	0.011	0.152	7,800	840	0.011	0.113	7,600	820	0.011	0.11		
			10	9,300	1,020	0.024	0.263	7,500	750	0.01	0.138	7,400	800	0.01	0.103	7,200	780	0.01	0.1		
			12	8,500	960	0.023	0.203	7,100	710	0.009	0.125	7,000	760	0.009	0.093	6,800	740	0.009	0.09		
			16	7,300	700	0.02	0.158	6,300	630	0.007	0.098	6,200	680	0.007	0.073	6,000	660	0.007	0.07		
			20	6,600	650	0.013	0.1	5,500	550	0.005	0.071	5,400	600	0.005	0.053	5,200	580	0.005	0.05		
		R0.2	4	14,300	1,460	0.07	0.81	8,600	860	0.03	0.9	8,500	930	0.03	0.54	8,300	900	0.03	0.52		
			6	12,000	1,200	0.06	0.73	8,300	830	0.02	0.83	8,100	890	0.02	0.49	7,900	860	0.02	0.48		
		R0.3	8	10,400	1,100	0.06	0.65	7,900	790	0.02	0.76	7,800	840	0.02	0.45	7,600	820	0.02	0.44		
			10	9,300	1,020	0.05	0.53	7,500	750	0.02	0.69	7,400	800	0.02	0.41	7,200	780	0.02	0.4		
		R0.5	12	8,500	960	0.045	0.405	7,100	710	0.019	0.623	7,000	760	0.019	0.37	6,800	740	0.019	0.36		
			16	7,300	700	0.04	0.315	6,300	630	0.017	0.488	6,200	680	0.017	0.29	6,000	660	0.017	0.28		
		20	6,600	650	0.025	0.2	5,500	550	0.015	0.353	5,400	600	0.015	0.21	5,200	580	0.015	0.2			
		4030	3	R0.05	4	14,000	2,640	0.02	0.18	8,900	1,140	0.011	0.013	8,700	1,110	0.011	0.012	8,400	1,080	0.011	0.012
					6	13,300	2,500	0.019	0.18	8,600	1,110	0.01	0.012	8,400	1,080	0.01	0.011	8,200	1,050	0.01	0.011
					8	11,800	2,200	0.018	0.175	8,400	1,080	0.01	0.012	8,100	1,050	0.01	0.011	7,900	1,020	0.01	0.011
					10	10,500	2,090	0.015	0.175	8,100	1,050	0.009	0.011	7,900	1,020	0.009	0.01	7,700	990	0.009	0.01
					12	10,000	1,950	0.013	0.168	7,900	1,010	0.009	0.01	7,700	990	0.009	0.01	7,500	960	0.009	0.009
					16	8,800	1,600	0.01	0.158	7,400	950	0.008	0.01	7,200	930	0.008	0.009	7,000	900	0.008	0.008
20	7,900				1,490	0.007	0.148	6,900	890	0.007	0.009	6,700	870	0.007	0.008	6,500	840	0.007	0.007		
R0.1	4			14,000	2,640	0.04	0.36	8,900	1,140	0.021	0.291	8,700	1,110	0.022	0.216	8,400	1,080	0.021	0.21		
	6			13,300	2,500	0.038	0.36	8,600	1,110	0.02	0.277	8,400	1,080	0.021	0.206	8,200	1,050	0.02	0.2		
	8			11,800	2,200	0.035	0.35	8,400	1,080	0.019	0.263	8,100	1,050	0.02	0.196	7,900	1,020	0.019	0.19		
	10			10,500	2,090	0.03	0.35	8,100	1,050	0.018	0.249	7,900	1,020	0.019	0.185	7,700	990	0.018	0.18		
	12			10,000	1,950	0.026	0.335	7,900	1,010	0.017	0.235	7,700	990	0.018	0.175	7,500	960	0.017	0.17		
	16			8,800	1,600	0.02	0.315	7,400	950	0.015	0.208	7,200	930	0.015	0.155	7,000	900	0.015	0.15		
	20			7,900	1,490	0.014	0.295	6,900	890	0.013	0.181	6,700	870	0.013	0.135	6,500	840	0.013	0.13		
R0.2	4			14,000	2,640	0.08	0.72	8,900	1,140	0.04	1.45	8,700	1,110	0.04	0.87	8,400	1,080	0.04	0.84		
	6			13,300	2,500	0.08	0.72	8,600	1,110	0.04	1.38	8,400	1,080	0.04	0.82	8,200	1,050	0.04	0.8		
	8			11,800	2,200	0.07	0.7	8,400	1,080	0.04	1.31	8,100	1,050	0.04	0.78	7,900	1,020	0.04	0.76		
	10			10,500	2,090	0.06	0.7	8,100	1,050	0.04	1.25	7,900	1,020	0.04	0.74	7,700	990	0.04	0.72		
	12			10,000	1,950	0.05	0.67	7,900	1,010	0.03	1.18	7,700	990	0.03	0.7	7,500	960	0.03	0.68		
	16			8,800	1,600	0.04	0.63	7,400	950	0.03	1	7,200	930	0.03	0.62	7,000	900	0.03	0.6		
R1	20	7,900	1,490	0.036	0.58	6,900	890	0.03	0.82	6,700	870	0.03	0.54	6,500	840	0.03	0.52				

WORK MATERIAL				PREHARDENED STEELS / HARDENED STEELS NAK / STAVAX (~55HRC)				HARDENED STEELS SKD11 (55~62HRC)				HARDENED STEELS HAP10 (62~66HRC)				HARDENED STEELS HAP72 (66~70HRC)					
Model Number	Outside Diameter (mm)	Corner Radius (mm)	Effective Length (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)	a _e Radial Depth (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)	a _e Radial Depth (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)	a _e Radial Depth (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)	a _e Radial Depth (mm)		
4040	4	R0.05	8	8,500	1,420	0.026	0.338	6,200	1,130	0.013	0.016	6,100	1,090	0.013	0.015	5,900	1,060	0.013	0.014		
			12	7,600	1,390	0.023	0.288	5,900	1,080	0.012	0.014	5,800	1,040	0.012	0.014	5,600	1,010	0.012	0.013		
			16	6,600	1,330	0.018	0.25	5,700	1,030	0.011	0.013	5,600	1,000	0.011	0.013	5,400	970	0.011	0.012		
			20	5,800	1,260	0.015	0.225	5,400	980	0.01	0.012	5,300	950	0.01	0.011	5,100	920	0.01	0.011		
		R0.1	8	8,500	1,420	0.052	0.675	6,200	1,130	0.026	0.36	6,100	1,090	0.027	0.268	5,900	1,060	0.026	0.26		
			12	7,600	1,390	0.046	0.575	5,900	1,080	0.024	0.332	5,800	1,040	0.025	0.247	5,600	1,010	0.024	0.24		
			16	6,600	1,330	0.036	0.5	5,700	1,030	0.022	0.304	5,600	1,000	0.023	0.227	5,400	970	0.022	0.22		
			20	5,800	1,260	0.03	0.45	5,400	980	0.02	0.277	5,300	950	0.021	0.206	5,100	920	0.02	0.2		
			24	5,200	1,120	0.024	0.4	5,100	930	0.018	0.25	5,000	900	0.019	0.185	4,800	870	0.018	0.18		
			30	4,800	910	0.015	0.325	4,700	860	0.015	0.21	4,600	830	0.016	0.154	4,400	800	0.015	0.15		
		R0.2	8	8,500	1,420	0.1	1.35	6,200	1,130	0.05	1.8	6,100	1,090	0.05	1.07	5,900	1,060	0.05	1.04		
			12	7,600	1,390	0.09	1.15	5,900	1,080	0.05	1.66	5,800	1,040	0.05	0.99	5,600	1,010	0.05	0.96		
		R0.3	16	6,600	1,330	0.07	1	5,700	1,030	0.04	1.52	5,600	1,000	0.04	0.91	5,400	970	0.04	0.88		
		R0.5	20	5,800	1,260	0.06	0.9	5,400	980	0.04	1.38	5,300	950	0.04	0.82	5,100	920	0.04	0.8		
		R1	24	5,200	1,120	0.047	0.8	5,100	930	0.035	1.24	5,000	900	0.035	0.73	4,800	870	0.035	0.72		
			30	4,800	910	0.03	0.65	4,700	860	0.03	1.03	4,600	830	0.03	0.61	4,400	800	0.03	0.6		
		4060	6	R0.1	12	4,700	1,360	0.1	0.675	3,900	1,180	0.033	0.676	3,800	1,150	0.033	0.502	3,700	1,120	0.033	0.488
					16	4,000	1,150	0.095	0.665	3,800	1,150	0.031	0.641	3,700	1,110	0.032	0.476	3,600	1,080	0.031	0.463
					20	3,800	1,000	0.09	0.655	3,700	1,120	0.029	0.607	3,600	1,080	0.03	0.451	3,500	1,050	0.029	0.438
					24	3,700	860	0.085	0.645	3,600	1,080	0.028	0.572	3,500	1,050	0.028	0.425	3,400	1,020	0.028	0.413
30	3,500				740	0.079	0.63	3,400	1,030	0.025	0.52	3,300	1,000	0.026	0.386	3,200	970	0.025	0.375		
R0.2	12			4,700	1,360	0.2	1.35	3,900	1,180	0.07	3.38	3,800	1,150	0.07	2	3,700	1,120	0.07	1.95		
	16			4,000	1,150	0.19	1.33	3,800	1,150	0.06	3.21	3,700	1,110	0.06	1.9	3,600	1,080	0.06	1.85		
R0.3	20			3,800	1,000	0.18	1.31	3,700	1,120	0.06	3	3,600	1,080	0.06	1.8	3,500	1,050	0.06	1.75		
R0.5	24			3,700	860	0.17	1.29	3,600	1,080	0.06	2.86	3,500	1,050	0.06	1.7	3,400	1,020	0.06	1.65		
	30			3,500	740	0.16	1.26	3,400	1,030	0.05	2.6	3,300	1,000	0.05	1.55	3,200	970	0.05	1.5		



Note:

- Decrease the feed rate more than 50% from the milling parameters when slot milling.
- Decrease both spindle speed and feed rate proportionally when the milling parameters exceed the machine's maximum spindle speed, or when chattering and red-hot occur.
- Every coolant offers stable milling.



Advisory for Safe Use of End Mills

Correct application and operation is strongly advised to avoid clogging, abrasion, etc, that could cause serious accidents or injuries. Ignition or sparks generated during milling could lead to fire or extreme damage to the work piece. End Mills are made with very sharp cutting edges and must be handled with extra care.

- Never touch the cutting edge with your bare hands, as this could cause serious injury. Special caution is required when opening the package.
- Dropping the tool could cause breakage or flying debris, leading to serious injury.
- During milling, unexpected impact or shock on the tool could cause breakage or flying debris. Ensure to use protective items such as safety glasses and a face guard.
- For best results, fine parameter adjustment may be required, depending on the materials; milling shape and strategy; machine rigidity and spindle capability.
- Use a machine that has high rigidity and generates a low level of vibration. Recommend setting the runout control value at 5µm or below for the small diameter tools $\phi 1$ or below.
- Do not use flammable cutting oils.

Advisory for Regrinding End Mills

- Never regrind the tool without wearing safety glasses and a face guard.

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Price & Specifications are subject to change without notice.

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