

UNION TOOL

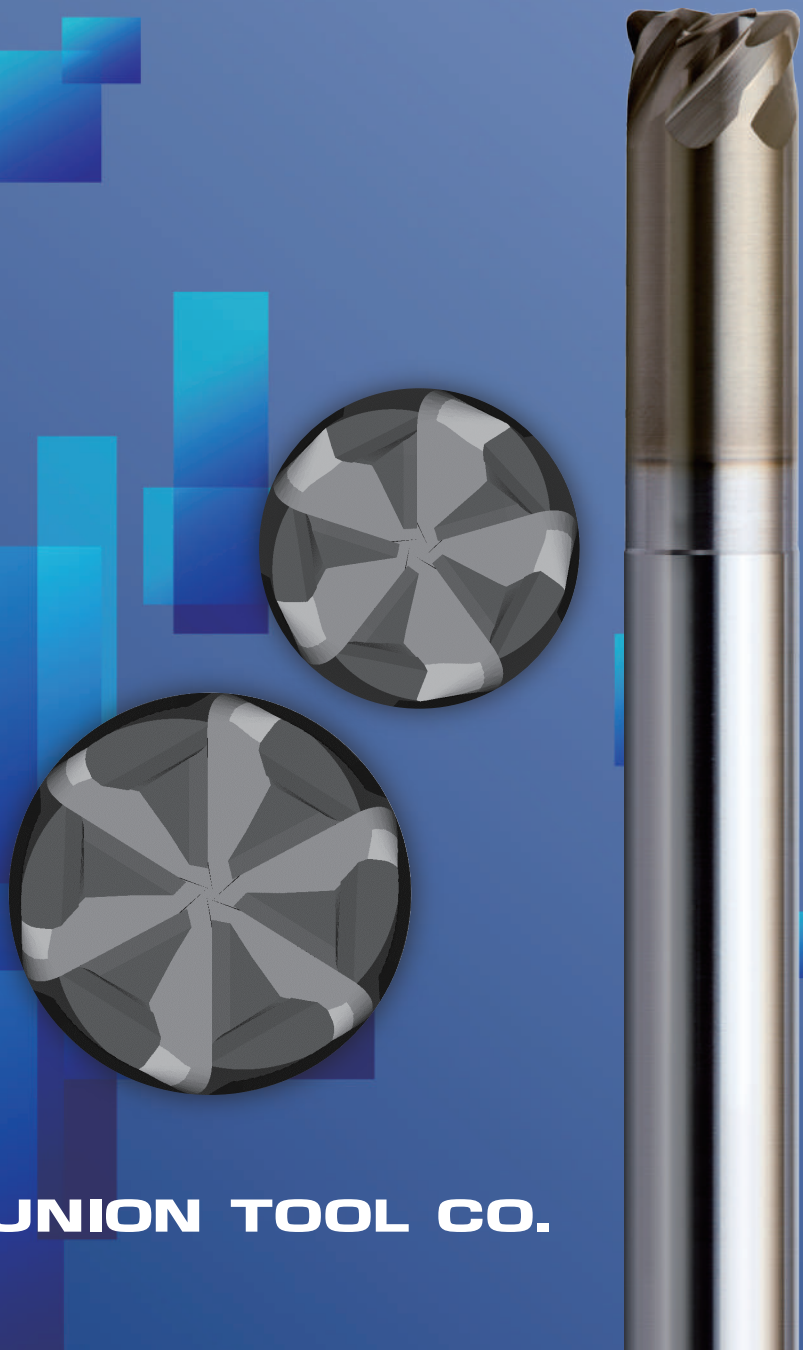
Tungsten Carbide End Mills UNIMAX Series

NEW
Published July 2022

HMGCOAT 5 Flutes / 6 Flutes Highly Efficient Long Neck Radius End Mills

HGRRS

5 Flutes / 6 Flutes For Hard Materials



UNION TOOL CO.

HMGCOAT 5 Flute / 6 Flute Highly Efficient Long Neck Radius End Mills for Hard Materials



Size $\phi 2 \sim \phi 12$

HGRRS

Super MG

HMG COAT

45°

R

± 0.003

± 0.005

Shank Dia 0/-0.004

Shank Dia 0/-0.005

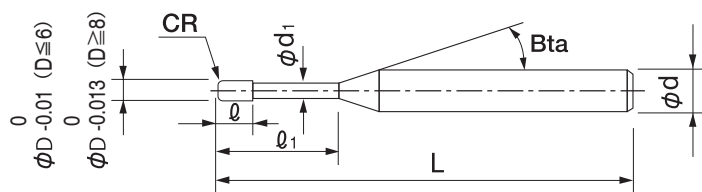
Back Taper Geometry

Variable Pitch

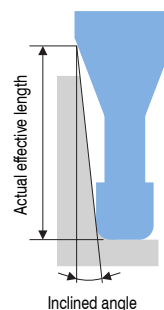
NEW

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
			~ 55HRC	~ 60HRC	~ 70HRC										
		○	◎	☆	◎										



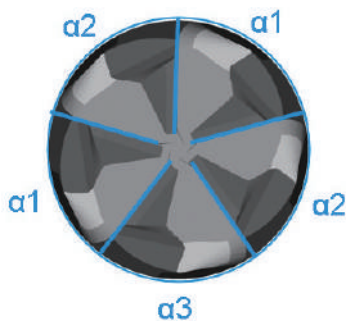
The shank taper angle shown is not an exact value and to avoid contact with the work piece, we recommend the user controls the precise value of this angle. Shank taper angle should not make contact with the work piece.



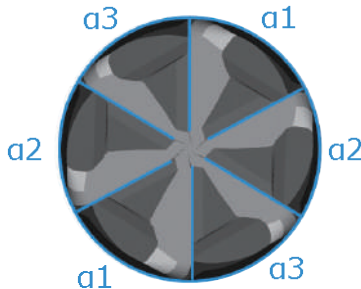
High efficiency

Multi-flutes, variable pitch and a short length of cut are some of the features that are very suitable for bottom surface milling.

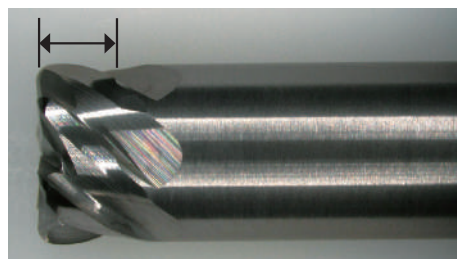
5 Flutes
 $\phi 2 \sim \phi 4$



6 Flutes
 $\phi 6 \sim \phi 12$



Short length of cut for high rigidity



High precision

Outside Diameter	Diameter Tolerance	Radius Accuracy
$\phi 2 \sim 6$	0/-0.01	± 0.003
$\phi 8 \sim 12$	0/-0.013	± 0.005

HMGOAT 5 Flute / 6 Flute Highly Efficient Long Neck Radius End Mills for Hard Materials

Total 19 models

Unit (mm)

Model Number	Outside Diameter ϕD	Corner Radius CR	Effective Length ℓ_1	Length of Cut ℓ	Neck Diameter ϕd_1	Shank Taper Angle $B\alpha$	Overall Length L	Shank Diameter ϕd	Number of Flutes	Series
HGRRS 5020-05-06	2	R0.5	6	1	1.95	16°	50	4	5	HGRRS
HGRRS 5030-08-09	3	R0.8	9	1.5	2.95	16°	60	4	5	HGRRS
HGRRS 5040-05-12	4	R0.5	12	2	3.95	—	60	4	5	HGRRS
HGRRS 5040-05-12-6						16°	60	6		HGRRS
HGRRS 5040-10-12		—				60	4	HGRRS		
HGRRS 5040-10-12-6		16°				60	6	HGRRS		
HGRRS 6060-03-18	6	R0.3	18	2.5	5.95	—	60	6	6	HGRRS
HGRRS 6060-05-18		R0.5					60	6		HGRRS
HGRRS 6060-10-18		R1					60	6		HGRRS
HGRRS 6060-15-18		R1.5					60	6		HGRRS
HGRRS 6080-05-24	8	R0.5	24	3.4	7.87	—	70	8	6	HGRRS
HGRRS 6080-10-24		R1					70	8		HGRRS
HGRRS 6080-20-24		R2					70	8		HGRRS
HGRRS 6100-05-30	10	R0.5	30	4.2	9.87	—	80	10	6	HGRRS
HGRRS 6100-10-30		R1					80	10		HGRRS
HGRRS 6100-20-30		R2					80	10		HGRRS
HGRRS 6120-05-36	12	R0.5	36	5	11.87	—	90	12	6	HGRRS
HGRRS 6120-10-36		R1					90	12		HGRRS
HGRRS 6120-20-36		R2					90	12		HGRRS

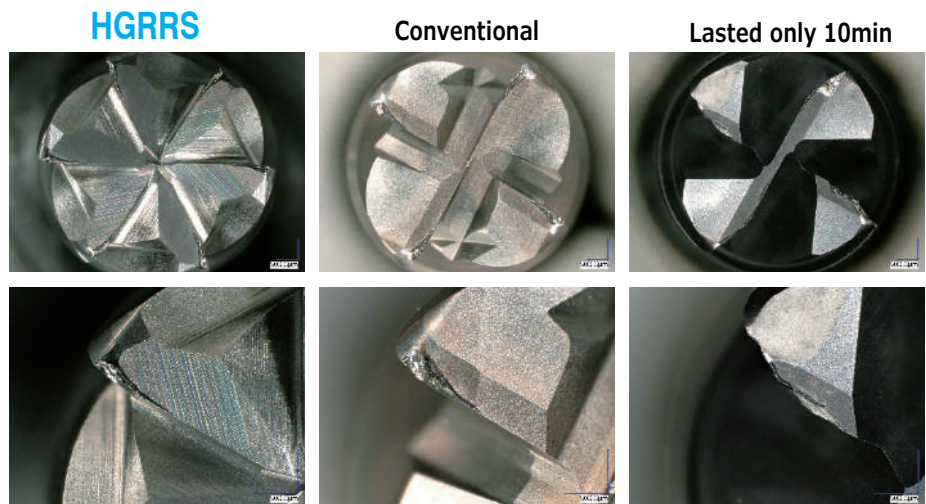
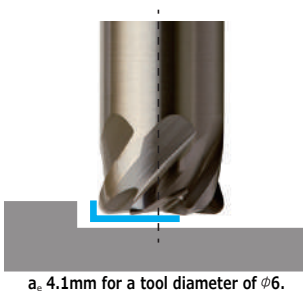
Flat surface milling example

HGRRS $\phi 6 \times CR0.5 \times EL18$

SKD11 (60HRC)

Stable milling and wear resistance are achievable even when using high efficiency milling conditions !

Spindle Speed	3,000 min ⁻¹
Feed Rate	6,800 mm/min
a_p Axial Depth	0.08 mm
a_e Radial Depth	4.1 mm
Work Size	100 × 200 × 2.4 mm
Cycle Time	30 min



Relief wear width (mm)

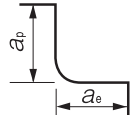
HGRRS	Conventional	Competitor
0.16	0.296	Chipping

HGRRS 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)	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)
5020-05-06	2	R0.5	10,000	2,700	0.07	0.8	8,000	2,000	0.05	0.8	2,640	2,500	0.05	0.6	2,400	2,270	0.05	0.56
5030-08-09	3	R0.8	8,500	4,000	0.1	1.3	5,500	3,000	0.05	1.3	1,980	1,980	0.05	0.9	1,800	1,800	0.05	0.78
5040-05-12	4	R0.5	7,500	5,000	0.11	1.8	4,300	4,000	0.06	1.8	1,540	1,650	0.06	1.2	1,400	1,500	0.06	1.1
5040-05-12-6			7,500	5,000	0.11	1.8	4,300	4,000	0.06	1.8	1,540	1,650	0.06	1.2	1,400	1,500	0.06	1.1
5040-10-12		R1	7,500	5,000	0.11	1.8	4,300	4,000	0.06	1.8	1,540	1,650	0.06	1.2	1,400	1,500	0.06	1.1
5040-10-12-6			7,500	5,000	0.11	1.8	4,300	4,000	0.06	1.8	1,540	1,650	0.06	1.2	1,400	1,500	0.06	1.1
6060-03-18	6	R0.3	6,000	7,800	0.12	4.1	3,000	6,800	0.08	4.1	1,100	1,760	0.08	1.9	1,000	1,600	0.08	1.7
6060-05-18		R0.5	6,000	7,800	0.12	4.1	3,000	6,800	0.08	4.1	1,100	1,760	0.08	1.9	1,000	1,600	0.08	1.7
6060-10-18		R1	6,000	7,800	0.12	3.6	3,000	6,800	0.08	3.6	1,100	1,760	0.08	1.9	1,000	1,600	0.08	1.7
6060-15-18		R1.5	6,000	7,800	0.12	2.7	3,000	6,800	0.08	2.7	1,100	1,760	0.08	1.9	1,000	1,600	0.08	1.7
6080-05-24	8	R0.5	4,800	6,600	0.12	3.6	2,000	6,300	0.08	3.6	830	1,760	0.08	2.2	750	1,600	0.08	2
6080-10-24		R1	4,800	6,600	0.12	3.6	2,000	6,300	0.08	3.6	830	1,760	0.08	2.2	750	1,600	0.08	2
6080-20-24		R2	4,800	6,600	0.2	3.6	2,000	6,300	0.08	3.6	830	1,760	0.08	2.2	750	1,600	0.08	2
6100-05-30	10	R0.5	4,300	6,200	0.11	5.4	1,500	5,800	0.08	5.4	620	1,820	0.08	2.5	560	1,650	0.08	2.3
6100-10-30		R1	4,300	6,200	0.11	5.4	1,500	5,800	0.08	5.4	620	1,820	0.08	2.5	560	1,650	0.08	2.3
6100-20-30		R2	4,300	6,200	0.2	5.4	1,500	5,800	0.08	5.4	620	1,820	0.08	2.5	560	1,650	0.08	2.3
6120-05-36	12	R0.5	4,000	6,000	0.1	7.38	1,000	5,200	0.08	7.38	360	1,910	0.08	3.3	330	1,740	0.08	3
6120-10-36		R1	4,000	6,000	0.1	7.38	1,000	5,200	0.08	7.38	360	1,910	0.08	3.3	330	1,740	0.08	3
6120-20-36		R2	4,000	6,000	0.2	7.38	1,000	5,200	0.08	7.38	360	1,910	0.08	3.3	330	1,740	0.08	3

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 UNIMAX Tungsten Carbide 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.
- Do not use flammable cutting oils.

Advisory for regrinding UNIMAX Tungsten Carbide End Mills

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

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<https://www.uniontool.co.jp>

Price & Specifications are subject to change without notice.

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