

UNION TOOL

Tungsten Carbide End Mills UNIMAX Series

Vol.2
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HMGCOAT 4 Flutes Long Neck Radius End Mills

Add 67

Total 143 Models

HGLRS

4 Flutes For Hard Materials



UNION TOOL CO.

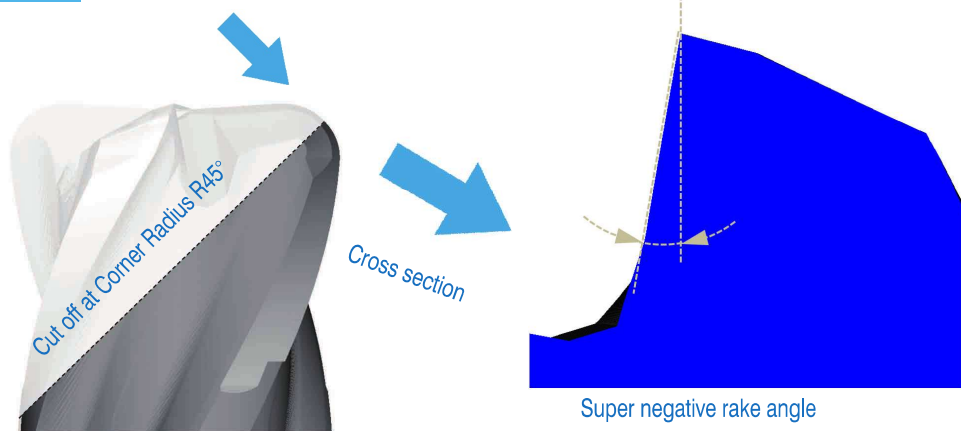
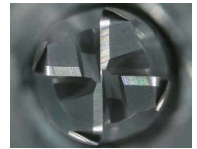
4 Flute Long Neck Radius for Hard Materials

HGLRS



Feature 1
Long tool life

Super negative rake angle is best suited for 60-70 HRC as it greatly reduces the cutting resistance.

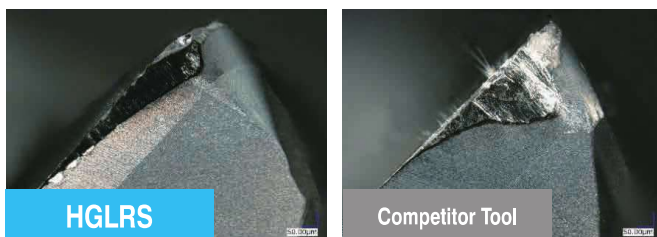


Wear width comparison

HGLRS $\varnothing 3 \times \text{CR}0.3 \times \text{Effective Length } 16$

HAP72 (69HRC)

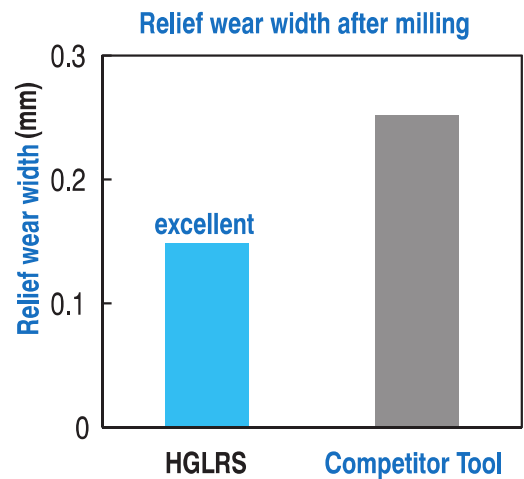
New generation super hard materials ensure high efficiency milling and long tool life.



HGLRS

Competitor Tool

| | |
|-----------------------|-----------------------------------|
| 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 |



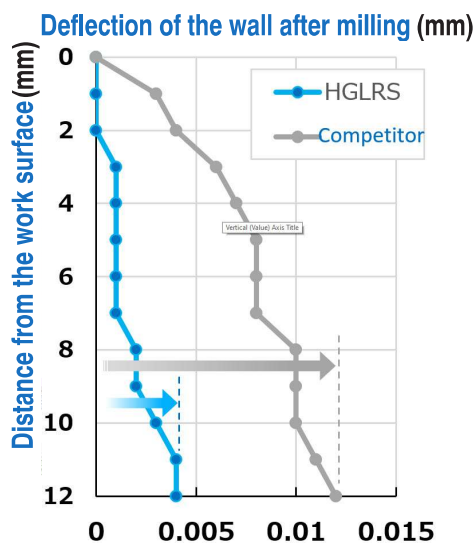
Feature 2
Milling accuracy

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

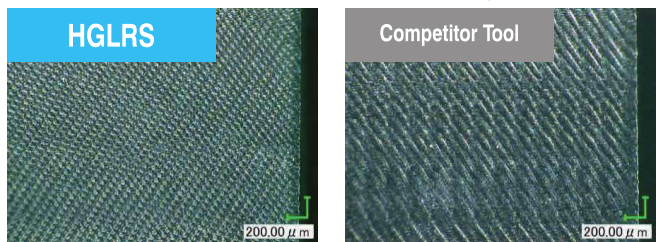
Dimensional accuracy comparison
HGLRS $\varnothing 3 \times CR0.3 \times$ **Effective Length** 16

HAP72 (69HRC)

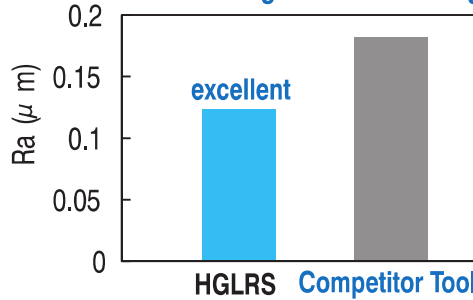
Smaller dimensional change and better milling accuracy with HGLRS



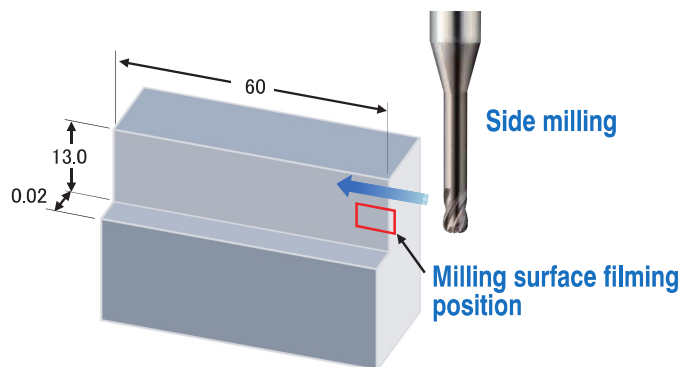
Surface condition after milling



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 |



Unit (mm)

Feature 3
High precision

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

HMGCOAT 4 Flute Long Neck Radius End Mills for Hard Materials



Size ϕ 1~ ϕ 6

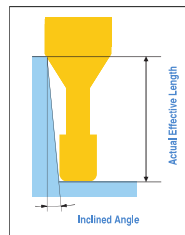
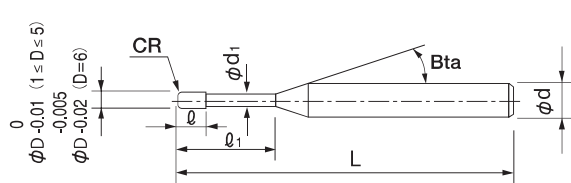
HGLRS



Additional 67 Models

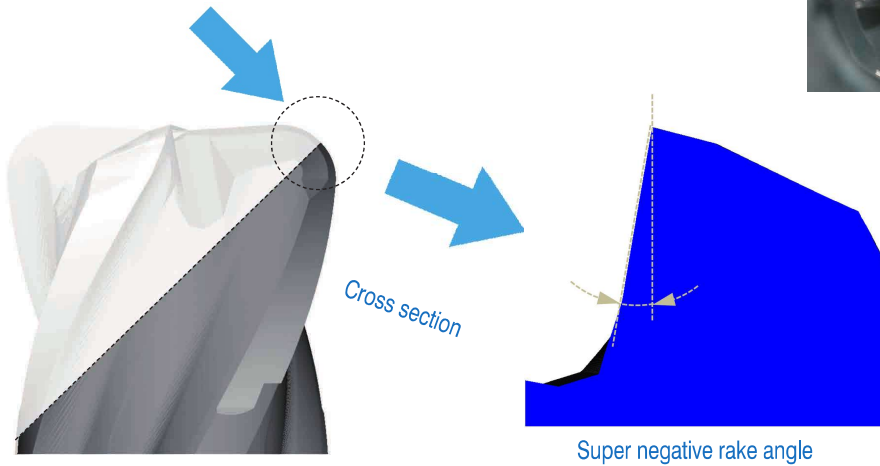
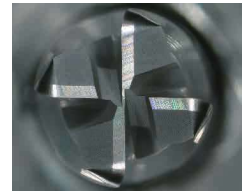
Material Applications (☆ Highly Recommended ◎ Recommended ○ Suggested)

| 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.

◆ Super negative rake angle is best suited for 60-70 HRC as it greatly reduces the cutting resistance.



◆ High Precision Diameter Tolerance / Radius Accuracy / Shank Diameter Tolerance

HLRS Tolerance

Unit (mm)

| Outside Diameter | Diameter Tolerance | R Radius Accuracy | Shank Diameter Tolerance |
|-------------------|--------------------|-------------------|--------------------------|
| $1 \leq D \leq 5$ | 0/-0.015 | ± 0.005 | 0/-0.005 |
| D=6 | -0.005/-0.02 | | |

HGLRS Tolerance

Unit (mm)

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

HMGCOAT 4 Flute Long Neck Radius End Mills for Hard Materials

Total 143 models

Unit (mm)

| Model Number | Outside Diameter ϕD | Corner Radius CR | Effective Length ℓ_1 | Length of Cut ℓ | Neck Diameter ϕ | | | ϕd | Suggested Retail Price ¥ | Effective Length by Inclined Angles | | | | | | | | | | | | | | | | |
|----------------------|---------------------------|------------------|---------------------------|----------------------|----------------------|-------|------|----------|--------------------------|-------------------------------------|------|-------|-------|------|------|------|------|-------|------|------|-------|------|------|------|------|------|
| | | | | | | | | | | 30° | 1° | 1°30' | 2° | 3° | | | | | | | | | | | | |
| ※ HGLRS 4010-002-020 | 1 | RO.02 | 2 | 0.8 | 0.98 | | | 50 | 4 | 7,400 | 2.58 | 2.76 | 2.92 | 3.06 | 3.33 | | | | | | | | | | | |
| ※ HGLRS 4010-002-030 | | | 3 | | | | | | | | 3.65 | 3.87 | 4.06 | 4.23 | 4.57 | | | | | | | | | | | |
| ※ HGLRS 4010-002-040 | | | 4 | | | | | | | | 4.71 | 4.97 | 5.18 | 5.38 | 5.81 | | | | | | | | | | | |
| ※ HGLRS 4010-002-050 | | | 5 | | | | | | | | 5.77 | 6.05 | 6.29 | 6.53 | 7.06 | | | | | | | | | | | |
| ※ HGLRS 4010-005-020 | | RO.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 4010-01-020 | | RO.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 4010-02-020 | | RO.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 4015-005-030 | | 1.5 | RO.05 | | | | | | | | 3 | 1.2 | 1.48 | | | 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 4015-01-030 | RO.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 4015-02-030 | RO.2 | | 3 | 50 | 4 | 7,900 | 3.12 | 3.22 | 3.33 | 3.45 | 3.72 | | | | | | | | | | | | | | | |
| 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 4015-03-030 | RO.3 | | 3 | 50 | 4 | 7,900 | 3.12 | 3.22 | 3.32 | 3.44 | 3.70 | | | | | | | | | | | | | | | |
| ※ 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 4015-05-040 | RO.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 | | | | | | | | | | | | | | | |

Additional model

HMGCOAT 4 Flute Long Neck Radius End Mills for Hard Materials

| Model Number | Outside Diameter ϕD | Corner Radius CR | Effective Length ℓ_1 | Length of Cut ℓ | Neck Diameter ϕd_1 | Shank Taper Angle β | Overall Length L | Shank Diameter ϕd | Suggested Retail Price ¥ | Effective Length by Inclined Angles | | | | |
|----------------------|---------------------------|------------------|---------------------------|----------------------|--------------------------|---------------------------|------------------|-------------------------|--------------------------|-------------------------------------|-------|-------|-------|-------|
| | | | | | | | | | | 30° | 1° | 1°30' | 2° | 3° |
| ※ HGLRS 4020-002-040 | 2 | RO.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 | | RO.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 |
| ※ HGLRS 4020-01-040 | | RO.1 | 4 | | | | 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 4020-02-040 | | RO.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 4020-03-040 | | RO.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 4020-05-040 | | RO.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 4030-005-040 | 3 | RO.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 |

Additional model

HMGC0AT 4 Flute Long Neck Radius End Mills for Hard Materials

| Model Number | Outside Diameter ϕD | Corner Radius CR | Effective Length ℓ_1 | Length of Cut ℓ | Neck Diameter ϕd_1 | Shank Taper Angle β | Overall Length L | Shank Diameter ϕd | Suggested Retail Price ¥ | Effective Length by Inclined Angles | | | | |
|---------------------|---------------------------|------------------|---------------------------|----------------------|--------------------------|---------------------------|------------------|-------------------------|--------------------------|-------------------------------------|-------|-------|-------|-------|
| | | | | | | | | | | 30° | 1° | 1°30' | 2° | 3° |
| ※ HGLRS 4030-01-040 | 3 | RO.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 4030-02-040 | | RO.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 4030-03-040 | | RO.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 4030-05-040 | | RO.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 4030-10-060 | 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 | | | | |

Additional model

HMGC0AT 4 Flute Long Neck Radius End Mills for Hard Materials

| Model Number | Outside Diameter ϕD | Corner Radius CR | Effective Length ℓ_1 | Length of Cut ℓ | Neck Diameter ϕd_1 | Shank Taper Angle β | Overall Length L | Shank Diameter ϕd | Suggested Retail Price ¥ | Effective Length by Inclined Angles | | | | |
|----------------------|---------------------------|------------------|---------------------------|----------------------|--------------------------|---------------------------|------------------|-------------------------|--------------------------|-------------------------------------|-----------------|-----------------|-----------------|-----------------|
| | | | | | | | | | | 30° | 1° | 1°30' | 2° | 3° |
| ※ HGLRS 4040-005-080 | 4 | RO.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 | | RO.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 4040-02-080 | | RO.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 4040-03-080 | | RO.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 4040-05-080 | | RO.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 4040-10-080 | 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 4060-01-120 | 6 | RO.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 | | RO.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 |

Additional model

HMGCAT 4 Flute Long Neck Radius End Mills for Hard Materials

| Model Number | Outside Diameter ϕD | Corner Radius CR | Effective Length ℓ_1 | Length of Cut ℓ | Neck Diameter ϕd_1 | Shank Taper Angle β | Overall Length L | Shank Diameter ϕd | Suggested Retail Price ¥ | Effective Length by Inclined Angles | | | | |
|---------------------|---------------------------|------------------|---------------------------|----------------------|--------------------------|---------------------------|------------------|-------------------------|--------------------------|-------------------------------------|-----------------|-----------------|-----------------|-----------------|
| | | | | | | | | | | 30° | 1° | 1°30' | 2° | 3° |
| ※ HGLRS 4060-03-120 | 6 | R0.3 | 12 | 4.8 | 5.77 | — | 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 |

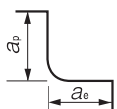
Additional model

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 |
| | | R0.1 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 |
| 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 |
| | | R0.1 R0.2 R0.3 R0.5 | 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 |
| 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 |
| | | R0.2 R0.3 R0.5 | 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 |
| | | | 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 |

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) | | |
| 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 | | |
| | | 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 | | |
| | | R0.2 R0.3 R0.5 R1 | 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 | 0.04 | 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 | | |
| | | 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 | | |
| R0.2 R0.3 R0.5 R1 | 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 | | |
| | 16 | | | 6,600 | 1,330 | 0.07 | 1 | 5,700 | 1,030 | 0.04 | 1.52 | 5,600 | 1,000 | 0.05 | 0.91 | 5,400 | 970 | 0.04 | 0.88 | | |
| | 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 | | |
| 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 | 3,500 | 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 | 3,100 | 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 | 2,600 | 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 | | |
| | | | 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 | | |
| | | R0.2 R0.3 R0.5 R1 | 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 | | |
| | | | 20 | 3,500 | 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 | | |
| | | | 24 | 3,100 | 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 | 2,600 | 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 UNIMAX 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 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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