

ITEM PAGE STRUCTURE

Product Name ①

Item Code ②

Working Material ③

Icons ④

Product specification ⑤

Product Image ⑥

Product diagram ⑦

Depth of cut ⑧

Recommended cutting condition ⑨

QBM

Micro Diameter / Ball Nose / for

| Order No. | Radius R | Flute Length L1 | O.A.L. L2 | Shank Dia D2 |
|-----------|----------|-----------------|-----------|--------------|
| QBM 0024 | R0.1 | 0.4 | 50 | 4 |
| QBM 0034 | R0.15 | 0.6 | 50 | 4 |
| QBM 0044 | R0.2 | 0.8 | 50 | 4 |
| QBM 0054 | R0.25 | 1.0 | 50 | 4 |
| QBM 0064 | R0.3 | 1.2 | 50 | 4 |
| QBM 0074 | R0.35 | 1.4 | 50 | 4 |
| QBM 0084 | R0.4 | 1.6 | 50 | 4 |
| QBM 0094 | R0.45 | 1.8 | 50 | 4 |
| QBM 0124 | R0.6 | 2.4 | 50 | 4 |
| QBM 0144 | R0.7 | 2.8 | 50 | 4 |
| QBM 0164 | R0.8 | 3.2 | 50 | 4 |
| QBM 0184 | R0.9 | 3.6 | 50 | 4 |

Depth of cut

Recommended cutting condition for QBM

| MATERIAL | Carbon Steels - Alloy Steels S45C, FC, PCD, SCM, S50C, S65C... | | Alloy Steels - Tool Steels SC1, SNCM, SKD11, SKD11, HAKO... | | Hardened Steels SKH11 | |
|----------|---|---------------|--|---------------|--------------------------|---------------|
| | HARDNESS ~HRC30 | | HARDNESS ~HRC50 | | HARDNESS ~HRC60 | |
| RADIUS | SPEED (m/min) | FEED (mm/min) | SPEED (m/min) | FEED (mm/min) | SPEED (m/min) | FEED (mm/min) |
| R0.1 | 32000 | 500 - 600 | 32000 | 100 - 500 | 25000 | 300 - 400 |
| R0.15 | 32000 | 500 - 600 | 32000 | 400 - 500 | 25000 | 300 - 400 |
| R0.2 | 32000 | 500 - 600 | 32000 | 400 - 500 | 25000 | 300 - 400 |
| R0.25 | 32000 | 600 - 700 | 32000 | 500 - 600 | 25000 | 400 - 500 |
| R0.3 | 32000 | 600 - 700 | 32000 | 500 - 600 | 25000 | 400 - 500 |
| R0.35 | 32000 | 700 - 800 | 32000 | 600 - 700 | 25000 | 500 - 600 |
| R0.4 | 32000 | 900 - 1000 | 32000 | 800 - 900 | 25000 | 600 - 700 |
| R0.45 | 32000 | 1000 - 1100 | 32000 | 900 - 1000 | 25000 | 600 - 700 |

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THE SYSTEM CODE INTRODUCES

| | | | |
|-----|------------------|-------------------------------------|-----|
| V | V70 | Hardened Steels HRC70 series | 14 |
| Q | MAGIC CUT | Magic cutting series | 18 |
| S | SUPER MILL | HSC & HHC series | 45 |
| E | EFFICIENCY MILLS | Efficiency end mills series | 85 |
| I | I.pro | Titanium & Stainless cutting series | 113 |
| D | D MILL | Aluminum & Copper cutting series | 124 |
| G | G.pro | Graphite cutting series | 138 |
| DT | DEN.pro | Dental end mills | 147 |
| COM | COM.pro | CFRP machining series | 154 |
| EX | MAGIC SHANK | Magic shank series | 157 |
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| CR | CR | Carbide reamers series | 185 |

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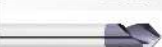










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TOLERANCE

Square End Mills (mm)

| Flute Dia. | Dia. Tolerance |
|------------|----------------|
| 1.0 | 0~-0.015 |
| 1.5 | 0~-0.015 |
| 2.0 | 0~-0.015 |
| 2.5 | 0~-0.015 |
| 3.0 | 0~-0.015 |
| 4.0 | 0~-0.015 |
| 5.0 | 0~-0.015 |
| 6.0 | 0~-0.015 |
| 8.0 | 0~-0.020 |
| 10.0 | 0~-0.020 |
| 12.0 | 0~-0.020 |
| 16.0 | 0~-0.020 |
| 20.0 | 0~-0.020 |

Ball Nose End Mills (mm)

| Flute Dia. | R Tolerance |
|------------|-------------|
| R0.5 | ±0.01 |
| R1 | ±0.01 |
| R1.5 | ±0.01 |
| R2 | ±0.01 |
| R2.5 | ±0.01 |
| R3 | ±0.01 |
| R4 | ±0.01 |
| R5 | ±0.01 |
| R6 | ±0.01 |
| R8 | ±0.02 |
| R10 | ±0.02 |

Corner Radius End Mills (mm)

| Flute Dia. | R Tolerance |
|------------|-------------|
| 1.0 | ±0.01 |
| 2.0 | ±0.01 |
| 3.0 | ±0.01 |
| 4.0 | ±0.01 |
| 6.0 | ±0.01 |
| 8.0 | ±0.01 |
| 10.0 | ±0.01 |
| 12.0 | ±0.01 |
| 16.0 | ±0.015 |





























































Shank (mm)

| Shank Dia. (h6) | Shank Tolerance |
|-----------------|-----------------|
| ø 3 | 0~-0.008 |
| ø 4 | 0~-0.008 |
| ø 6 | 0~-0.008 |
| ø 8 | 0~-0.009 |
| ø 10 | 0~-0.009 |
| ø 12 | 0~-0.011 |
| ø 16 | 0~-0.011 |
| ø 20 | 0~-0.013 |

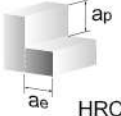
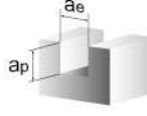

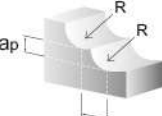
Recommended Cutting Instructions

1. In order to enhance processing efficiency and extend life of cutters, please use the balanced chucks with high rigidity and high accuracy.
2. Make overhang enough for processing. If it's necessary to extend the milling cutter, please be sure to reduce spindle speed and feed speed.
3. If there's abnormal sound or vibration during processing, please adjust cutting data to prevent cutters from being influenced or broken.
4. Please choose correct cutting oil to maximize efficiency.
5. The result of cutting data depends on working materials, machines, work clips, programming and etc. Cutting data are for reference. You may increase cutting data starting from 50%.




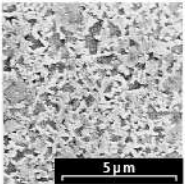
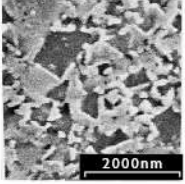
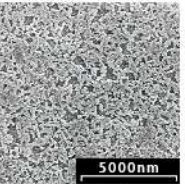
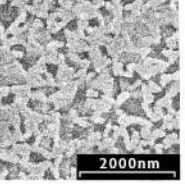
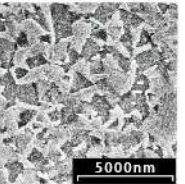
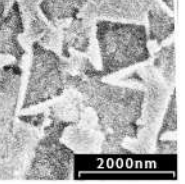
ICONS

| | |
|--|--|
| Flutes |       |
| Helix Angle (0°, 5°, 7°, 25°, 30°, 35°, 45°, 55°, 40°/43°) |          |
| Work Material Hardness (40, 55, 60, 65, 70) |      |
| Coating |              |
| Roughing Pitch |   |
| Corner Radius (0.1, 0.2, 0.3, 0.5, 1, 1.5, 2) |  |
| Tip Angle (60°, 90°, 120°) |    |
| Applications |             |
| Statistics For Drills |          Drills Type Drills Type Drills Type DIN Code DIN Code Shank Diameter Tolerance Cutting Flute Tolerance Helix Angle Tip Angle |

DEPTH OF CUT

| SIDE MILLING | SLOTTING | RADIUS | PROFILING |
|--|--|---|--|
|  HRC45 ↓ D1 6mm ↓ ap=1.5D ae=0.02D D1 6mm ↑ ap=1.5D ae=0.05D |  HRC45 ↓ ap 0.2D ae=D1 |  HRC45 ↓ ap 0.04R ae 0.06R |  HRC45 ↓ ap 0.02R ae 0.02R |

SOLID CARBIDE

| QMG  | | | SMG  | | | MG  | | |
|---|------------------------|----------|---|------------------------|----------|---|------------------------|----------|
| ISO-Classification | | K10-K30 | ISO-Classification | | K40-K50 | ISO-Classification | | K40-K50 |
| Diameter | (mm) | 1.2-32.2 | Diameter | (mm) | 1.2-42.2 | Diameter | (mm) | 1.2-42.2 |
| Co | (%) | 9.0 | Co | (%) | 12.0 | Co | (%) | 10.0 |
| W/C+cr ₃ c ₂ +vc | (%) | 91.0 | W/C+cr ₃ c ₂ +vc | (%) | 88.0 | W/C+cr ₃ c ₂ +vc | (%) | 90.0 |
| Density | (g/cm ³) | 14.40 | Density | (g/cm ³) | 14.05 | Density | (g/cm ³) | 14.5 |
| HV ₃₀ | (kg/mm ²) | 1920 | HV ₃₀ | (kg/mm ²) | 1680 | HV ₃₀ | (kg/mm ²) | 1610 |
| HRA | (ISO3738) | 93.9 | HRA | (ISO3738) | 92.5 | HRA | (ISO3738) | 92.3 |
| K _{IC} | (MNm ^{-3/2}) | 9.3 | K _{IC} | (MNm ^{-3/2}) | 10.0 | K _{IC} | (MNm ^{-3/2}) | 10.5 |
| TRS | (N/mm ²) | > 4000 | TRS | (N/mm ²) | > 4000 | TRS | (N/mm ²) | > 4000 |
| | A | 02 | | A | 02 | | A | 02 |
| Porosity | B | 00 | Porosity | B | 00 | Porosity | B | 00 |
| | C | 00 | | C | 00 | | C | 00 |
| WC-grain size | (μm) | 0.2-0.5 | WC-grain size | (μm) | 0.5 | WC-grain size | (μm) | 0.6 |
|   | | |   | | |   | | |
| Co % | 9 | | Co % | 12 | | Co % | 10 | |
| WC incl. Doping (%) | 89.83 | | WC incl. Doping (%) | 88 | | WC incl. Doping (%) | 90 | |
| Tungsten Carbide α | ø0.2μm | | Tungsten Carbide α | ø0.4μm | | Tungsten Carbide α | ø0.6μm | |

WORK MATERIAL

| ISO | (H) | (P) | (K) | (M) | (S) | (N) |
|----------|----------------|--|-----------|-----------------|------------------------|----------------|
| MATERIAL | Hardened steel | Low alloy steel | Cast iron | Stainless steel | High temp. alloys | Aluminum alloy |
| | | High alloy steel, cast steel, tool steel | | | Titanium and Ti alloys | Copper alloys |
| | | | | | | Non-metallic |
| | | | | | | |

HARD COATING PROPERTIES

| Coating Type | Symbol Color | Nanohardness(GPa) | Thickness (μm) | Friction Coefficient | Max usage Temp(°C) | Coating Temp(°C) |
|--------------|-----------------|-------------------|----------------|----------------------|--------------------|------------------|
| TIALN | BLACK | 30 | 1 - 4 | 0.4 | 800 | 450 ↑ |
| AlTiN | BLACK | 38 | 1 - 4 | 0.6 | 900 | 450 ↑ |
| nACoB | BLUE | 45 | 1 - 4 | 0.45 | 1200 | 400 ↑ |
| HELICA | COPPER | 30 | 1 - 4 | 0.25 | 1000 | 480 ↑ |
| CrN | METAL-SILVER | 18 | 1 - 7 | 0.4 | 700 | 200 - 400 |
| DLC | BLACK | 20 | 1 - 3 | 0.15 | 400 | 150 - 250 |
| G100 | BURGUNDY-VIOLET | 33 | 1 - 4 | 0.3 | 500 | |
| G300 | SOFT GOLD | 35 | 1 - 4 | 0.4 | 800 | |
| i8 | GOLD-BRASS | 47 | 1 - 4 | 0.45 | 900 | |
| Aldura | BLACK | 32 | 1 - 4 | 0.35 | 1100 | |
| G-plus | WHITE GOLD | | 1 - 4 | 0.25 | 550 | |
| i-plus | COPPER | | 1 - 3 | 0.3 | 1200 | |



COATING APPLICATIONS

| Coating Type | Symbol Color | Introduce coating on different materials |
|--------------|-----------------|--|
| TIALN | BLACK | General steel for wet cutting (HRC35-45) |
| AlTiN | BLACK | High Hard steel for Dry cutting (HRC45-65) |
| nACoB | BLUE | High Hard steel for Dry cutting (HRC55-65) |
| HELICA | COPPER | General steel, Cast iron, with special flute design and work on Stainless steel(EX: SEPS) |
| CrN | METAL-SILVER | Copper Alloy |
| DLC | BLACK | Aluminum Alloy |
| G100 | BURGUNDY-VIOLET | General steel for wet cutting (HRC35-45) |
| G300 | SOFT GOLD | Tough material, ex: Titanium Alloy, Nickel Alloy, Stainless steel and Heat-resistant alloy |
| i8 | GOLD-BRASS | High Hard steel for Dry and wet cutting(HRC55-65) |
| Aldura | BLACK | High Hard steel for Dry cutting (HRC55-65) |
| Diamond | BLACK GRAY | Graphite, Zirconium Oxide |
| G-plus | WHITE GOLD | Tough material, ex: Titanium Alloy, Nickel Alloy, Stainless steel and Heat-resistant alloy |
| i-plus | COPPER | High Hard steel for Dry and wet cutting(HRC70) |

