

PREMIUM ROTARY CUTTING TOOLS

RobbJack

RJ



APPLICATIONS GUIDE - 2017

ALUMINUM

TITANIUM, STEEL &
HIGH-TEMP ALLOYS

COMPOSITES

DIE/MOLD & HARDENED
MATERIALS

MINIATURES

MULTIPLE APPLICATIONS

SAWS

WOOD & PLASTICS

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CATALOG 10-16



| | |
|------------------------------------|------------|
| Aluminum | Green |
| Titanium, Steel & High-Temp Alloys | Orange |
| Composites & Plastics | Blue |
| Die/Mold & Hardened Materials | Grey |
| Miniatures | Light Blue |
| Multiple Applications | Purple |
| Saws | Red |
| Wood | Brown |

Alphabetical Tool Listing

Legend

| | |
|--|---|
| = Aluminum | = Miniatures |
| = Steel and High-Temp Alloys | = Multiple Applications |
| = Die Mold | = Saws |
| = Composites | = Wood & Plastics |

| Application Section | Tool Name | Brief Description | Page Numbers | Application Section | Tool Name | Brief Description | Page Numbers |
|---------------------|--------------------------|--|--------------|---------------------|--------------------------|---|--------------|
| | A1-201 | 2 Flute, Stub Ln. | 18 | | MTM-201 | Metric 2 Flute, Tuffy, Toroid | 84 |
| | A1-303 | 3 Flute, Std. Ln. | 20 | | MTS-401 | Metric 4 Flute, Tuffy, Stub Ln. | 107 |
| | AB | Arbors for Saws | 136 | | MXF-602, 802 | Metric 6/8 Flute, Std. Ln. | 49 |
| | ACH | Accuhold – End Mill Extension Holder | 97 119 | | MXG-402 | Metric 4 Flute, Std. Ln. | 46 |
| | B-203 | 2 Flute, Tuffy, Ball End Std. Ln. | 111 | | MXG-402BN | Metric 4 Flute, Ball End, Std. Ln. | 48 |
| | B-300 | 3 Flute, Tuffy, Ball End Stub Ln. | 58 | | NAB | Arbors for Saws | 136 |
| | B-330 | 3 Flute, Tuffy, Ball End Std. Ln. | 58 | | NR-204 | 2 Flute C-2, Std. Ln. | 114 |
| | B-333 | 3 Flute, Tuffy, Ball End Std. Ln. | 113 | | NR-303 | 3 Flute C-2, Std. Ln. | 115 |
| | B-440 | 4 Flute, Tuffy, Ball End Std. Ln. 40° Helix | 59 | | NR-404 | 4 Flute C-2, Std. Ln. | 116 |
| | C1-201, 301, 401 | 2, 3 & 4 Flute, C-2, Std. Ln. | 38 | | NS-401, 402, 403 | 4 Flute, Stub, Std., and Long Ln. | 44 |
| | C8/CD8 | 2 & 3 Flute Spiral Routers | 142 | | P810 | Diamond Coated, Std. Ln. Drills | 70 |
| | C8-201, 301 | 2 & 3 Flute, C-2, Stub Ln. | 105 142 | | PCD 118/20° | PCD-Tipped, Std. Ln., 8 Facet Drills | 69 |
| | C8-203, 303 | 2 & 3 Flute, C-2, Std. Ln. | 105 143 | | PCD 118° | PCD-Tipped, Std. Ln., 4 Facet Drills | 69 |
| | Caps | Extended & Replacement | 137 | | PCD 135/20° | PCD-Tipped, Std. Ln., 8 Facet Drills | 69 |
| | CE | Carbide Composite Router – 6/8 Flute | 75 | | PCD Elliptical | PCD-Tipped, Std. Ln. Drills | 69 |
| | CPCD-203 | Composite 2 Flute, Std. Ln. | 71 | | PCD CTT 118/62° | PCD-Tipped, Std. Ln., 8 Facet Drills | 68 |
| | CR | Compression Router – 4/6 Flute | 72 | | PCD W Point | PCD-Tipped, Std. Ln., Solid Tip | 68 |
| | DM-201 | 2 Flute, Ball End Extended Ln. | 80 | | PCD-201BN | 2 Flute, Ball End, Stub Ln. | 71 |
| | ET1, 2, 3, 4 | Engraving Tools | 118 146 | | PCD-203 | 2 Flute, Std. Ln. | 71 |
| | EX-204 | 2 Flute, Tuffy, Extra Ln. | 117 | | PM, PMD | 1 Flute, Tuffy | 145 40 |
| | EX-206 | 2 Flute, Tuffy, Extra Ln. Ext. Reach | 117 | | S1-201, 301, 401 | 2, 3 & 4 Flute, C-2, Stub Ln. | 36 |
| | F104 | Diamond Coated, Std. Ln. Drills | 70 | | SB-201, 301 | 2 & 3 Flute, Tuffy, Ball End, Stub Ln. | 110 112 |
| | Flanges | | 137 | | SR-2, SR-4 | 2 & 4 Flute, Tuffy, Std. Ln. | 92 97 |
| | FM | 2 & 3 Flute (Short to Long Reach) | 22 | | SR-2BN | 2 Flute, Ball End, Tuffy, Std. Ln. | 95 |
| | GTS | 1 Flute, Tuffy, Straight Flute | 74 145 | | SS-2, SS-4 | 2 & 4 Flute Tuffy, Stub Ln. | 90 96 |
| | HB | 2+2 Herringbone Routers | 144 | | SS-2BN | 2 Flute, Ball End, Stub Ln. | 94 |
| | HM | Multi-Flute Tuffy, | 85 | | ST-341 | 3 Flute, Super Tuffy, Stub Ln. | 52 |
| | MA1-201 | Metric 2 Flute, Stub Ln. | 18 | | ST-343 | 3 Flute, Super Tuffy, Std. Ln. | 53 |
| | MA1-303 | Metric 3 Flute, Std. Ln. | 20 | | ST-360 | 3 Flute, Super Tuffy, Std. Ln. | 60 |
| | MAH | Accuhold – Metric End Mill Extension Holder | 97 119 | | ST-430 | 4 Flute, Super Tuffy, Std. Ln. | 62 |
| | MB-203, 333 | Metric 2 & 3 Flute, Tuffy, Ball End Std. Ln. | 111 113 | | ST-434 | 4 Flute, Super Tuffy, Std. Ln. | 63 |
| | MB-440 | Metric 4 Flute, Tuffy, Ball End Std. Ln. 40° Helix | 59 | | ST-630 | 6 Flute, Super Tuffy, Std. Ln. | 61 |
| | MC1-201, 301 | Metric 2 & 3 Flute, C-2, Std. Ln. | 38 | | ST-646 | 6 Flute, Super Tuffy, Std. Ln. | 61 |
| | MCR | Metric 4/6 Flute, Compression Router | 72 | | Standard Saws | | 121 |
| | MCE | Metric 6/8 Flute, Carbide Composite Router | 73 | | STR-301, 401 | 3 & 4 Flute, Super Tuffy, Ruffer, Stub Ln. | 54 56 |
| | MCPCD | Drill Point, Composite, 2 Flute, Std. Ln. | 71 | | STR-303, 404 | 3 Flute, Super Tuffy, Ruffer, Std. Ln. | 55 57 |
| | MDM-201 | Metric 2 Flute, Tuffy, Ball End, Ext. Ln. | 81 | | T12-201 | 2 Flute, Tuffy, Stub Ln. | 103 |
| | Metric Saws | | 132 | | T12-203 | 2 Flute, Tuffy, Std. Ln. | 103 |
| | MFM | Metric 2 & 3 Flute (Short to Long Reach) | 30 | | T12-403 | 4 Flute, Tuffy, Stub Ln. | 104 |
| | MHM | Metric Multi-Flute, Tuffy | 85 | | T12-405 | 4 Flute, Tuffy, Std. Ln. | 104 |
| | MNR-204, 303, 404 | Metric 2, 3 & 4 Flute, C-2, Std. Ln. | 115 | | T6-200 | 2 Flute, Tuffy, Stub Ln. | 101 |
| | MPM Up Shear | Metric 1 Flute, Tuffy | 40 145 | | T6-202 | 2 Flute, Tuffy, Std. Ln. | 101 |
| | MS1-201 | Metric 2 Flute, C-2, Stub Ln. | 36 | | T6-400 | 4 Flute, Tuffy, Stub Ln. | 102 |
| | MSA | Arbors for Saws | 136 | | T6-402 | 4 Flute, Tuffy, Std. Ln. | 102 |
| | MSB-201, 301 | Metric 2 & 3 Flute, Tuffy, Ball End, Stub Ln. | 110 112 | | TL-303 | 3 Flute, Tuffy, Extra Ln. | 100 |
| | MSR-2, 4 | Metric 2 & 4 Flute, Std. Ln. | 93 97 | | TM-201 | 2 Flute, Tuffy, Toroid | 83 |
| | MSR-2BN | Metric 2 Flute, Ball End, Tuffy, Std. Ln. | 95 | | TR-303, 404, 606 | 3, 4, & 6 Flute, Tuffy, Std. Ln. | 108 |
| | MSS-2, 4 | Metric 2 & 4 Flute, Stub Ln. | 91 96 | | TS-201, 301, 401 | 2, 3, & 4 Flute, Tuffy, Stub Ln. | 106 |
| | MSS-2BN | Metric 2 Flute, Stub Ln. | 94 | | WD1-310 Dwn Shear | 3 Flute, Std. Ln. (10° Helix) | 41 |
| | MST-341 | Metric 3 Flute, Super Tuffy, Stub Ln. | 52 | | WU, WRD | Spiral Routers for Rough Cutting | 141 |
| | MST-360 | Metric 3 Flute, Super Tuffy, Std. Ln. | 60 | | WRU, WD, WTL | Precision Spiral Routers for CNC Production | 140 |
| | MST-430 | Metric 4 Flute, Super Tuffy, Std. Ln. | 62 | | WU1-310 Up Shear | 3 Flute, Std. Ln. (10° Helix) | 41 |
| | MST-434 | Metric 4 Flute, Super Tuffy, Std. Ln. | 63 | | XF-602, 802 | 6/8 Flute, Std. Ln. | 49 |
| | MST-646 | Metric 6 Flute, Super Tuffy, Std. Ln. | 61 | | XG-400 | 4 Flute, Stub Ln. | 46 |
| | MSTR-301 | Metric 3 Flute, Super Tuffy, Ruffer, Stub Ln. | 54 | | XG-402 | 4 Flute, Std. Ln. | 46 |
| | MSTR-303 | Metric 3 Flute, Super Tuffy, Ruffer, Std. Ln. | 55 | | XG-402BN | 4 Flute, Ball End, Std. Ln. | 48 |
| | MSTR-401 | Metric 4 Flute, Super Tuffy, Ruffer, Stub Ln. | 56 | | XG-500 | 5 Flute, Stub Ln. | 47 |
| | MSTR-404 | Metric 4 Flute, Super Tuffy, Ruffer, Std. Ln. | 57 | | XG-502 | 5 Flute, Std. Ln. | 47 |
| | MTL-303 | Metric 3 Flute, Tuffy, Extra Ln. | 100 | | | | |

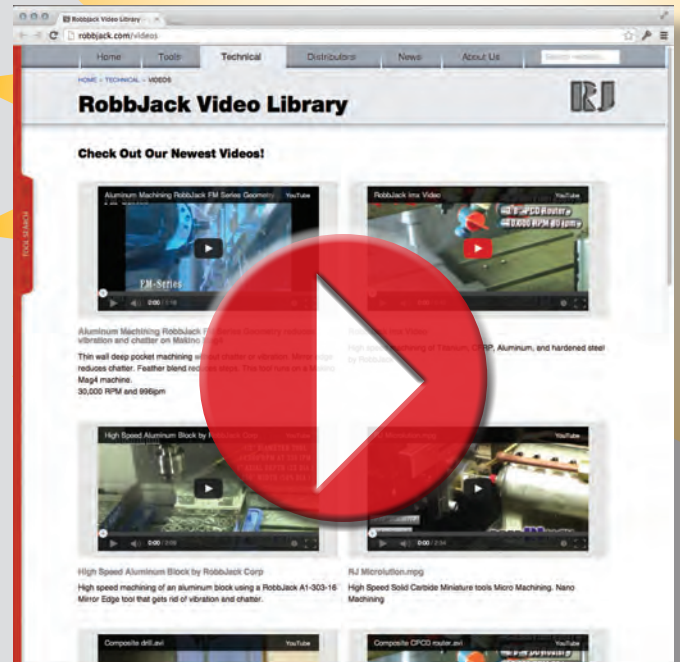
End Mill General Speeds & Feeds/Formulas

| Material | SFM Surface Feet/Minute | SMM Surface Meters/Minute | Chip Load per Tooth |
|---|-------------------------------|---------------------------------|------------------------|
| Aluminum / Non-Ferrous | | | |
| Ferrous | | | |
| 2024 | Max RPM | Max RPM | tool diameter x .0256 |
| 6061 (T1-T3) | Max RPM | Max RPM | tool diameter x .0128 |
| 6061 (T4-T6) | Max RPM | Max RPM | tool diameter x .0256 |
| 7075 | Max RPM | Max RPM | tool diameter x .0256 |
| Non-Ferrous | | | |
| Brass | 750 | 230 | tool diameter x .0128 |
| Copper | 600 | 190 | tool diameter x .0128 |
| Magnesium | Max RPM | Max RPM | tool diameter x .0256 |
| Titanium, Steel and High-Temp Alloys | | | |
| Titanium | | | |
| Commercially Pure | 350 | 100 | tool diameter x .0048 |
| 6AL-4V | 230 | 55 | tool diameter x .0048 |
| 6AL-6V | 180 | 35 | tool diameter x .004 |
| Steel | | | |
| 1018-1020 | 350 | 110 | tool diameter x .0064 |
| 4130 | 260 | 80 | tool diameter x .0032 |
| 4140 | 220 | 70 | tool diameter x .0032 |
| 4340 | 280 | 90 | tool diameter x .0032 |
| Tool Steel Annealed | | | |
| A2 | 350 | 110 | tool diameter x .0032 |
| D2 | 260 | 80 | tool diameter x .0032 |
| H13 | 230 | 70 | tool diameter x .0032 |
| P20 | 350 | 110 | tool diameter x .00496 |
| Stainless Steel | | | |
| 303 | 500 | 150 | tool diameter x .0048 |
| 304 | 225 | 70 | tool diameter x .0032 |
| 316 | 240 | 75 | tool diameter x .0032 |
| 15-5/17-4 PH | 200 | 60 | tool diameter x .0032 |
| 440C | 200 | 60 | tool diameter x .0032 |
| Inconel | | | |
| 625 / 718 | 100 | 30 | tool diameter x .0036 |
| Composites | | | |
| G10 Fiberglass/Polyester | 1000 | 300 | tool diameter x .0136 |
| Graphite | 1000 | 300 | tool diameter x .0256 |
| Graphite Fiber/Epoxy | 800 | 250 | tool diameter x .008 |
| Plastics | 1300 | 400 | tool diameter x .0256 |
| Die/Mold | | | |
| <i>See Die/Mold section</i> | | | |
| Other Material Applications | | | |
| Cast Iron | | | |
| Ductile Iron | 350 | 110 | tool diameter x .0096 |
| Gray Cast Iron | 500 | 150 | tool diameter x .0128 |

| INCH SIZES | | |
|---------------------------|---|---|
| Surface Feet per Minute | = | RPM × .262 × Tool Diameter |
| RPM | = | $\frac{\text{Surface Feet per Minute} \times 3.82}{\text{Tool Diameter}}$ |
| Feedrate (in/min.) | = | RPM × Chip Load per Tooth × Number of Flutes |
| in ³ /min | = | Width × Depth × Inches per Minute |
| Horsepower | = | 1.341 × kW |
| kW | = | .7457 × Horsepower |
| METRIC SIZES | | |
| Surface Meters per Minute | = | RPM × .00314 × Tool Diameter |
| RPM | = | $\frac{\text{Surface Meters per Minute} \times 318.057}{\text{Tool Diameter}}$ |
| Feedrate (mm/min.) | = | RPM × Chip Load per Tooth × Number of Flutes |
| cm ³ /min | = | $\frac{\text{Width (mm)} \times \text{Depth (mm)} \times \text{Feedrate (mm/min)}}{1000}$ |
| Horsepower | = | 1.341 × kW |
| kW | = | .7457 × Horsepower |



See RobbJack Videos at
www.robbjack.com/videos



Specific End Mill Speeds & Feeds



A1-201 SPEEDS & FEEDS

| Tool Diameter | Aluminum 6061-T6, 7075, 2024 | | Brass | | Copper | | Plastic | | Magnesium | |
|---------------|------------------------------|---------|-------|---------|--------|---------|---------|---------|-----------|---------|
| | RPM | CLPT | RPM | CLPT | RPM | CLPT | RPM | CLPT | RPM | CLPT |
| 1/8" | Max | 0.0032" | 22900 | 0.0016" | 18300 | 0.0016" | 39700 | 0.0032" | Max | 0.0032" |
| 3/16" | Max | 0.0048" | 15300 | 0.0024" | 12200 | 0.0024" | 26500 | 0.0048" | Max | 0.0048" |
| 1/4" | Max | 0.0064" | 11500 | 0.0032" | 9200 | 0.0032" | 19900 | 0.0064" | Max | 0.0064" |
| 5/16" | Max | 0.0080" | 9200 | 0.0040" | 7300 | 0.0040" | 15900 | 0.0080" | Max | 0.0080" |
| 3/8" | Max | 0.0096" | 7600 | 0.0048" | 6100 | 0.0048" | 13200 | 0.0096" | Max | 0.0096" |
| 1/2" | Max | 0.0128" | 5700 | 0.0064" | 4600 | 0.0064" | 9900 | 0.0128" | Max | 0.0128" |
| 5/8" | Max | 0.0160" | 4600 | 0.0080" | 3700 | 0.0080" | 7900 | 0.0160" | Max | 0.0160" |
| 3/4" | Max | 0.0192" | 3800 | 0.0096" | 3100 | 0.0096" | 6600 | 0.0192" | Max | 0.0192" |
| 1" | Max | 0.0256" | 2900 | 0.0128" | 2300 | 0.0128" | 5000 | 0.0256" | Max | 0.0256" |

Axial depth of cut up to 1 × diameter of the tool

MA1-201 SPEEDS & FEEDS METRIC

| Tool Diameter | Aluminum 6061-T6, 7075, 2024 | | Brass | | Copper | | Plastic | | Magnesium | |
|---------------|------------------------------|---------|-------|---------|--------|---------|---------|---------|-----------|---------|
| | RPM | CLPT | RPM | CLPT | RPM | CLPT | RPM | CLPT | RPM | CLPT |
| 3mm | Max | 0.077mm | 24300 | 0.038mm | 19400 | 0.038mm | 42000 | 0.077mm | Max | 0.077mm |
| 4mm | Max | 0.102mm | 18200 | 0.051mm | 14600 | 0.051mm | 31500 | 0.102mm | Max | 0.102mm |
| 5mm | Max | 0.128mm | 14600 | 0.064mm | 11600 | 0.064mm | 25200 | 0.128mm | Max | 0.128mm |
| 6mm | Max | 0.154mm | 12100 | 0.077mm | 9700 | 0.077mm | 21000 | 0.154mm | Max | 0.154mm |
| 8mm | Max | 0.205mm | 9100 | 0.102mm | 7300 | 0.102mm | 15800 | 0.205mm | Max | 0.205mm |
| 10mm | Max | 0.256mm | 7300 | 0.128mm | 5800 | 0.128mm | 12600 | 0.256mm | Max | 0.256mm |
| 12mm | Max | 0.307mm | 6100 | 0.154mm | 4900 | 0.154mm | 10500 | 0.307mm | Max | 0.307mm |
| 16mm | Max | 0.410mm | 4500 | 0.205mm | 3600 | 0.205mm | 7900 | 0.410mm | Max | 0.410mm |
| 20mm | Max | 0.512mm | 3600 | 0.256mm | 2900 | 0.256mm | 6300 | 0.512mm | Max | 0.512mm |

Axial depth of cut up to 1 × diameter of the tool



A1-303 SPEEDS & FEEDS

| Tool Diameter | Aluminum 6061-T6 | | Aluminum 6061-T3 | | Aluminum 7075 | | Aluminum 2024 | |
|---------------|------------------|---------|------------------|---------|---------------|---------|---------------|---------|
| | RPM | CLPT | RPM | CLPT | RPM | CLPT | RPM | CLPT |
| 1/8" | Max | 0.0020" | Max | 0.0018" | Max | 0.0020" | Max | 0.0020" |
| 3/16" | Max | 0.0030" | Max | 0.0026" | Max | 0.0030" | Max | 0.0030" |
| 1/4" | Max | 0.0040" | Max | 0.0035" | Max | 0.0040" | Max | 0.0040" |
| 5/16" | Max | 0.0050" | Max | 0.0044" | Max | 0.0050" | Max | 0.0050" |
| 3/8" | Max | 0.0060" | Max | 0.0053" | Max | 0.0060" | Max | 0.0060" |
| 1/2" | Max | 0.0080" | Max | 0.0070" | Max | 0.0080" | Max | 0.0080" |
| 5/8" | Max | 0.0100" | Max | 0.0088" | Max | 0.0100" | Max | 0.0100" |
| 3/4" | Max | 0.0120" | Max | 0.0105" | Max | 0.0120" | Max | 0.0120" |
| 1" | Max | 0.0160" | Max | 0.0140" | Max | 0.0160" | Max | 0.0160" |

Axial depth of cut up to 1.5 × diameter of the tool with 50% radial step over.

MA1-303 SPEEDS & FEEDS METRIC

| Tool Diameter | Aluminum 6061-T6 | | Aluminum 6061-T3 | | Aluminum 7075 | | Aluminum 2024 | |
|---------------|------------------|---------|------------------|---------|---------------|---------|---------------|---------|
| | RPM | CLPT | RPM | CLPT | RPM | CLPT | RPM | CLPT |
| 3mm | Max | 0.048mm | Max | 0.042mm | Max | 0.048mm | Max | 0.048mm |
| 4mm | Max | 0.064mm | Max | 0.056mm | Max | 0.064mm | Max | 0.064mm |
| 5mm | Max | 0.080mm | Max | 0.070mm | Max | 0.080mm | Max | 0.080mm |
| 6mm | Max | 0.096mm | Max | 0.084mm | Max | 0.096mm | Max | 0.096mm |
| 8mm | Max | 0.128mm | Max | 0.112mm | Max | 0.128mm | Max | 0.128mm |
| 10mm | Max | 0.160mm | Max | 0.140mm | Max | 0.160mm | Max | 0.160mm |
| 12mm | Max | 0.192mm | Max | 0.168mm | Max | 0.192mm | Max | 0.192mm |
| 16mm | Max | 0.256mm | Max | 0.224mm | Max | 0.256mm | Max | 0.256mm |
| 20mm | Max | 0.320mm | Max | 0.280mm | Max | 0.320mm | Max | 0.320mm |

Axial depth of cut up to 1.5 × diameter of the tool with 50% radial step over.

Specific End Mill Speeds & Feeds



FM SERIES SPEEDS & FEEDS

| Tool Dia. | Typical Z-Depth | Aluminum 6061-T6 | | Aluminum 6061-T3 | | Aluminum 7075 | | Aluminum 2024 | |
|-----------|-----------------|------------------|---------|------------------|---------|---------------|---------|---------------|---------|
| | | RPM | CLPT | RPM | CLPT | RPM | CLPT | RPM | CLPT |
| 1/4" | 0.1500" | Max | 0.0040" | Max | 0.0035" | Max | 0.0040" | Max | 0.0040" |
| 5/16" | 0.1500" | Max | 0.0050" | Max | 0.0044" | Max | 0.0050" | Max | 0.0050" |
| 3/8" | 0.1875" | Max | 0.0060" | Max | 0.0053" | Max | 0.0060" | Max | 0.0060" |
| 1/2" | 0.2000" | Max | 0.0080" | Max | 0.0070" | Max | 0.0080" | Max | 0.0080" |
| 5/8" | 0.2000" | Max | 0.0100" | Max | 0.0088" | Max | 0.0100" | Max | 0.0100" |
| 3/4" | 0.2500" | Max | 0.0120" | Max | 0.0105" | Max | 0.0120" | Max | 0.0120" |
| 1" | 0.2500" | Max | 0.0160" | Max | 0.0140" | Max | 0.0160" | Max | 0.0160" |

Z-Depth of cut per pass should be deeper than the corner radius to help reduce chatter

MFM SERIES SPEEDS & FEEDS **METRIC**

| Tool Dia. | Typical Z-Depth | Aluminum 6061-T6 | | Aluminum 6061-T3 | | Aluminum 7075 | | Aluminum 2024 | |
|-----------|-----------------|------------------|---------|------------------|---------|---------------|---------|---------------|---------|
| | | RPM | CLPT | RPM | CLPT | RPM | CLPT | RPM | CLPT |
| 6mm | 4mm | Max | 0.096mm | Max | 0.084mm | Max | 0.096mm | Max | 0.096mm |
| 8mm | 4mm | Max | 0.128mm | Max | 0.112mm | Max | 0.128mm | Max | 0.128mm |
| 10mm | 5mm | Max | 0.16mm | Max | 0.14mm | Max | 0.16mm | Max | 0.16mm |
| 12mm | 5mm | Max | 0.192mm | Max | 0.168mm | Max | 0.192mm | Max | 0.192mm |
| 16mm | 5mm | Max | 0.256mm | Max | 0.224mm | Max | 0.256mm | Max | 0.256mm |
| 20mm | 6.5mm | Max | 0.32mm | Max | 0.28mm | Max | 0.32mm | Max | 0.32mm |
| 25mm | 6.5mm | Max | 0.4mm | Max | 0.35mm | Max | 0.4mm | Max | 0.4mm |

Z-Depth of cut per pass should be deeper than the corner radius to help reduce chatter



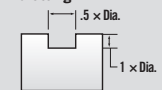
NS SERIES SPEEDS & FEEDS

| Material | Surface Footage | 3/16" | | 1/4" | | 5/16" | | 3/8" | | 1/2" | | 5/8" | | 3/4" | | 1" | |
|------------------------------|-----------------|-------|--------|------|--------|-------|--------|------|--------|------|--------|------|--------|------|--------|------|--------|
| | | RPM | in/min | RPM | in/min | RPM | in/min | RPM | in/min | RPM | in/min | RPM | in/min | RPM | in/min | RPM | in/min |
| CAST IRON | | | | | | | | | | | | | | | | | |
| Ductile | 400 | 8149 | 20 | 6112 | 20 | 4890 | 24 | 4075 | 28 | 3056 | 31 | 2445 | 28 | 2037 | 24 | 1528 | 21 |
| Gray | 525 | 10696 | 42 | 8022 | 42 | 6418 | 51 | 5348 | 58 | 4011 | 64 | 3209 | 58 | 2674 | 51 | 2006 | 45 |
| STEEL | | | | | | | | | | | | | | | | | |
| 1018/1020 | 500 | 10187 | 32 | 7640 | 32 | 6112 | 39 | 5093 | 44 | 3820 | 49 | 3056 | 44 | 2547 | 39 | 1910 | 34 |
| 4130 | 400 | 8149 | 20 | 6112 | 20 | 4890 | 24 | 4075 | 28 | 3056 | 31 | 2445 | 28 | 2037 | 24 | 1528 | 21 |
| 4140 | 400 | 8149 | 20 | 6112 | 20 | 4890 | 24 | 4075 | 28 | 3056 | 31 | 2445 | 28 | 2037 | 24 | 1528 | 21 |
| 4340 | 415 | 8455 | 21 | 6341 | 21 | 5073 | 25 | 4227 | 29 | 3171 | 32 | 2536 | 29 | 2114 | 25 | 1585 | 22 |
| TOOL STEEL (ANNEALED) | | | | | | | | | | | | | | | | | |
| A2 | 400 | 8149 | 17 | 6112 | 17 | 4890 | 22 | 4075 | 24 | 3056 | 27 | 2445 | 24 | 2037 | 22 | 1528 | 19 |
| D2 | 360 | 7334 | 16 | 5501 | 16 | 4401 | 19 | 3667 | 22 | 2750 | 24 | 2200 | 22 | 1834 | 19 | 1375 | 17 |
| H13 | 400 | 8149 | 17 | 6112 | 17 | 4890 | 22 | 4075 | 24 | 3056 | 27 | 2445 | 24 | 2037 | 22 | 1528 | 19 |
| P20 | 400 | 8149 | 23 | 6112 | 23 | 4890 | 28 | 4075 | 31 | 3056 | 35 | 2445 | 31 | 2037 | 28 | 1528 | 24 |

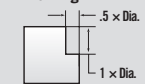
Speeds and feeds are based on applications with very rigid machine tools, toolholders, and fixturing. Speeds and feeds will vary dramatically depending on the application. Extreme forces can be generated and can cause damage, if not appropriate for the cutting conditions.

Helical interpolation or ramping should be used to enter pockets. For the highest material removal rates and longest tool life profile milling is preferred over slotting. (See diagrams below)

Slotting



Profiling



MNS SERIES SPEEDS & FEEDS **METRIC**

| Material | Surface Meters/min | 6mm | | 8mm | | 10mm | | 12mm | | 16mm | | 20mm | | 25mm | |
|------------------------------|--------------------|------|--------|------|--------|------|--------|------|--------|------|--------|------|--------|------|--------|
| | | RPM | mm/min | RPM | mm/min | RPM | mm/min | RPM | mm/min | RPM | mm/min | RPM | mm/min | RPM | mm/min |
| CAST IRON | | | | | | | | | | | | | | | |
| Ductile | 400 | 6475 | 505 | 4851 | 505 | 3881 | 621 | 3234 | 699 | 2426 | 776 | 1941 | 699 | 1552 | 543 |
| Gray | 525 | 8498 | 1060 | 6367 | 1060 | 5094 | 1304 | 4245 | 1467 | 3184 | 1630 | 2547 | 1467 | 2038 | 1141 |
| STEEL | | | | | | | | | | | | | | | |
| 1018/1020 | 500 | 8093 | 807 | 6064 | 807 | 4851 | 994 | 4043 | 1118 | 3032 | 1242 | 2426 | 1118 | 1941 | 869 |
| 4130 | 400 | 6475 | 505 | 4851 | 505 | 3881 | 621 | 3234 | 699 | 2426 | 776 | 1941 | 699 | 1552 | 543 |
| 4140 | 400 | 6475 | 505 | 4851 | 505 | 3881 | 621 | 3234 | 699 | 2426 | 776 | 1941 | 699 | 1552 | 543 |
| 4340 | 415 | 6717 | 523 | 5033 | 523 | 4027 | 644 | 3356 | 725 | 2517 | 805 | 2013 | 725 | 1611 | 564 |
| TOOL STEEL (ANNEALED) | | | | | | | | | | | | | | | |
| A2 | 400 | 6475 | 444 | 4851 | 444 | 3881 | 546 | 3234 | 615 | 2426 | 683 | 1941 | 615 | 1552 | 478 |
| D2 | 360 | 5827 | 400 | 4366 | 400 | 3493 | 492 | 2911 | 553 | 2183 | 615 | 1747 | 553 | 1397 | 430 |
| H13 | 400 | 6475 | 444 | 4851 | 444 | 3881 | 546 | 3234 | 615 | 2426 | 683 | 1941 | 615 | 1552 | 478 |
| P20 | 400 | 6475 | 575 | 4851 | 575 | 3881 | 708 | 3234 | 796 | 2426 | 885 | 1941 | 796 | 1552 | 619 |



XG-402 SPEEDS & FEEDS

| Material | Surface Feet | 1/4" | | 5/16" | | 3/8" | | 1/2" | | 5/8" | | 3/4" | | 1" | |
|------------------|--------------|------|--------|-------|--------|------|--------|------|--------|------|--------|------|--------|------|--------|
| | | RPM | in/min | RPM | in/min | RPM | in/min | RPM | in/min | RPM | in/min | RPM | in/min | RPM | in/min |
| CAST IRON | | | | | | | | | | | | | | | |
| Ductile | 400 | 6112 | 28 | 4890 | 34 | 4075 | 39 | 3056 | 43 | 2445 | 39 | 2037 | 34 | 1528 | 30 |
| Gray | 525 | 8022 | 42 | 6418 | 51 | 5348 | 58 | 4011 | 64 | 3209 | 58 | 2674 | 51 | 2006 | 45 |
| INCONEL | | | | | | | | | | | | | | | |
| 625/718 | 100 | 1528 | 4 | 1222 | 5 | 1019 | 6 | 764 | 7 | 611 | 6 | 509 | 5 | 382 | 5 |
| STEEL | | | | | | | | | | | | | | | |
| 1018/1020 | 500 | 7640 | 32 | 6112 | 39 | 5093 | 44 | 3820 | 49 | 3056 | 44 | 2547 | 39 | 1910 | 34 |
| 4130 | 400 | 6112 | 20 | 4890 | 24 | 4075 | 28 | 3056 | 31 | 2445 | 28 | 2037 | 24 | 1528 | 21 |
| 4140 | 400 | 6112 | 20 | 4890 | 24 | 4075 | 28 | 3056 | 31 | 2445 | 28 | 2037 | 24 | 1528 | 21 |
| 4340 | 415 | 6341 | 21 | 5073 | 25 | 4227 | 29 | 3171 | 32 | 2536 | 29 | 2114 | 25 | 1585 | 22 |

CONTINUED ON NEXT PAGE—

Specific End Mill Speeds & Feeds

—CONTINUED FROM PREVIOUS PAGE



XG-402 SPEEDS & FEEDS

| Material | Surface Feet | 1/4" | | 5/16" | | 3/8" | | 1/2" | | 5/8" | | 3/4" | | 1" | |
|------------------------------|--------------|------|--------|-------|--------|------|--------|------|--------|------|--------|------|--------|------|--------|
| | | RPM | in/min | RPM | in/min | RPM | in/min | RPM | in/min | RPM | in/min | RPM | in/min | RPM | in/min |
| STAINLESS STEEL | | | | | | | | | | | | | | | |
| 303 | 550 | 8404 | 31 | 6723 | 38 | 5603 | 43 | 4202 | 48 | 3362 | 43 | 2801 | 38 | 2101 | 34 |
| 304 | 400 | 6112 | 17 | 4890 | 22 | 4075 | 24 | 3056 | 27 | 2445 | 24 | 2037 | 22 | 1528 | 19 |
| 316 | 400 | 6112 | 17 | 4890 | 22 | 4075 | 24 | 3056 | 27 | 2445 | 24 | 2037 | 22 | 1528 | 19 |
| 15-5/17-4 | 300 | 4584 | 13 | 3667 | 16 | 3056 | 18 | 2292 | 20 | 1834 | 18 | 1528 | 16 | 1146 | 14 |
| 13-8 | 300 | 4584 | 13 | 3667 | 16 | 3056 | 18 | 2292 | 20 | 1834 | 18 | 1528 | 16 | 1146 | 14 |
| 440C | 300 | 4584 | 13 | 3667 | 16 | 3056 | 18 | 2292 | 20 | 1834 | 18 | 1528 | 16 | 1146 | 14 |
| TOOL STEEL (ANNEALED) | | | | | | | | | | | | | | | |
| A2 | 400 | 6112 | 17 | 4890 | 22 | 4075 | 24 | 3056 | 27 | 2445 | 24 | 2037 | 22 | 1528 | 19 |
| D2 | 360 | 5501 | 16 | 4401 | 19 | 3667 | 22 | 2750 | 24 | 2200 | 22 | 1834 | 19 | 1375 | 17 |
| H13 | 400 | 6112 | 17 | 4890 | 22 | 4075 | 24 | 3056 | 27 | 2445 | 24 | 2037 | 22 | 1528 | 19 |
| P20 | 400 | 6112 | 23 | 4890 | 28 | 4075 | 31 | 3056 | 35 | 2445 | 31 | 2037 | 28 | 1528 | 24 |
| TITANIUM | | | | | | | | | | | | | | | |
| Com. pure | 300 | 4584 | 17 | 3667 | 21 | 3056 | 24 | 2292 | 26 | 1834 | 24 | 1528 | 21 | 1146 | 18 |
| 6AL-4V | 200 | 3056 | 9 | 2445 | 11 | 2037 | 12 | 1528 | 13 | 1222 | 12 | 1019 | 11 | 764 | 9 |
| 6AL-6V | 175 | 2674 | 8 | 2139 | 9 | 1783 | 11 | 1337 | 12 | 1070 | 11 | 891 | 9 | 669 | 8 |

MXG-402 SPEEDS & FEEDS METRIC

| Material | Surface Meters | 6 mm | | 8 mm | | 10 mm | | 12 mm | | 16 mm | | 20 mm | |
|------------------------------|----------------|------|--------|------|--------|-------|--------|-------|--------|-------|--------|-------|--------|
| | | RPM | mm/min | RPM | mm/min | RPM | mm/min | RPM | mm/min | RPM | mm/min | RPM | mm/min |
| CAST IRON | | | | | | | | | | | | | |
| Ductile | 122 | 6475 | 706 | 4851 | 869 | 3881 | 978 | 3235 | 1087 | 2426 | 978 | 1941 | 869 |
| Gray | 160 | 8498 | 1060 | 6367 | 1304 | 5094 | 1467 | 4245 | 1630 | 3184 | 1467 | 2547 | 1304 |
| INCONEL | | | | | | | | | | | | | |
| 625/718 | 30 | 1619 | 108 | 1213 | 134 | 970 | 150 | 809 | 167 | 606 | 150 | 485 | 134 |
| STEEL | | | | | | | | | | | | | |
| 1018/1020 | 152 | 8093 | 807 | 6063 | 994 | 4851 | 1118 | 4043 | 1242 | 3032 | 1118 | 2426 | 994 |
| 4130 | 122 | 6475 | 505 | 4851 | 621 | 3881 | 699 | 3235 | 776 | 2426 | 699 | 1941 | 621 |
| 4140 | 122 | 6475 | 505 | 4851 | 621 | 3881 | 699 | 3235 | 776 | 2426 | 699 | 1941 | 621 |
| 4340 | 126 | 6717 | 523 | 5033 | 644 | 4027 | 725 | 3356 | 805 | 2517 | 725 | 2013 | 644 |
| STAINLESS STEEL | | | | | | | | | | | | | |
| 303 | 168 | 8903 | 791 | 6670 | 973 | 5337 | 1095 | 4448 | 1217 | 3335 | 1095 | 2668 | 973 |
| 304 | 122 | 6475 | 444 | 4851 | 546 | 3881 | 615 | 3235 | 683 | 2426 | 615 | 1941 | 546 |
| 316 | 122 | 6475 | 444 | 4851 | 546 | 3881 | 615 | 3235 | 683 | 2426 | 615 | 1941 | 546 |
| 15-5/17-4 | 91 | 4856 | 333 | 3638 | 410 | 2911 | 461 | 2426 | 512 | 1819 | 461 | 1455 | 410 |
| 13-8 | 91 | 4856 | 333 | 3638 | 410 | 2911 | 461 | 2426 | 512 | 1819 | 461 | 1455 | 410 |
| 440C | 91 | 4856 | 333 | 3638 | 410 | 2911 | 461 | 2426 | 512 | 1819 | 461 | 1455 | 410 |
| TOOL STEEL (ANNEALED) | | | | | | | | | | | | | |
| A2 | 122 | 6475 | 444 | 4851 | 546 | 3881 | 615 | 3235 | 683 | 2426 | 615 | 1941 | 546 |
| D2 | 110 | 5827 | 400 | 4366 | 492 | 3493 | 553 | 2911 | 615 | 2183 | 553 | 1747 | 492 |
| H13 | 122 | 6475 | 444 | 4851 | 546 | 3881 | 615 | 3235 | 683 | 2426 | 615 | 1941 | 546 |
| P20 | 122 | 6475 | 575 | 4851 | 708 | 3881 | 796 | 3235 | 885 | 2426 | 796 | 1941 | 708 |
| TITANIUM | | | | | | | | | | | | | |
| Com. pure | 91 | 4856 | 431 | 3638 | 531 | 2911 | 597 | 2426 | 664 | 1819 | 597 | 1455 | 531 |
| 6AL-4V | 61 | 3237 | 222 | 2425 | 273 | 1941 | 307 | 1617 | 342 | 1213 | 307 | 970 | 273 |
| 6AL-6V | 53 | 2833 | 194 | 2122 | 239 | 1698 | 269 | 1415 | 299 | 1061 | 269 | 849 | 239 |

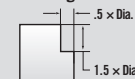
General Guidelines for XG-402 and MXG-402

• Speeds and feeds are based on applications with very rigid machine tools, toolholders, and fixturing. Speeds and feeds will vary dramatically depending on the application. Extreme forces can be generated and can cause damage, if not appropriate for the cutting conditions.

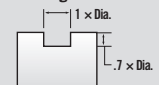
- Helical interpolation or ramping should be used to enter pockets.
- For the highest material removal rates and longest tool life profile milling is preferred over slotting (See diagrams at right).

- Use shrink fit or equivalent tool holder. If not, use flats to eliminate slippage in the tool holder!
- Climb milling is recommended.
- For ball end tools reduce feed rate by 10%.

Profiling



Slotting



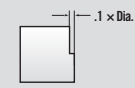
Specific End Mill Speeds & Feeds



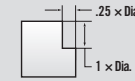
XG-502 AND XF SERIES SPEEDS & FEEDS

| Material | Surface Feet | 3/8" | | 1/2" | | 5/8" | | 3/4" | | 1" | |
|------------------------------|--------------|------|--------|------|--------|------|--------|------|--------|------|--------|
| | | RPM | in/min | RPM | in/min | RPM | in/min | RPM | in/min | RPM | in/min |
| CAST IRON | | | | | | | | | | | |
| Ductile | 400 | 4075 | 58 | 3056 | 64 | 2445 | 58 | 2037 | 68 | 1528 | 60 |
| Gray | 525 | 5348 | 86 | 4011 | 96 | 3209 | 86 | 2674 | 102 | 2006 | 90 |
| INCONEL | | | | | | | | | | | |
| 625/718 | 150 | 1528 | 12 | 1146 | 14 | 917 | 12 | 764 | 16 | 573 | 14 |
| STEEL | | | | | | | | | | | |
| 1018/1020 | 500 | 5093 | 62 | 3820 | 68 | 3056 | 62 | 2547 | 74 | 1910 | 32 |
| 4130 | 400 | 4075 | 42 | 3056 | 46 | 2445 | 42 | 2037 | 48 | 1528 | 42 |
| 4140 | 400 | 4075 | 42 | 3056 | 46 | 2445 | 42 | 2037 | 48 | 1528 | 42 |
| 4340 | 415 | 4227 | 42 | 3171 | 48 | 2536 | 42 | 2114 | 50 | 1585 | 44 |
| STAINLESS STEEL | | | | | | | | | | | |
| 303 | 550 | 5603 | 62 | 4202 | 68 | 3362 | 62 | 2801 | 72 | 2101 | 64 |
| 304 | 400 | 4075 | 36 | 3056 | 40 | 2445 | 36 | 2037 | 44 | 1528 | 38 |
| 316 | 400 | 4075 | 36 | 3056 | 40 | 2445 | 36 | 2037 | 44 | 1528 | 38 |
| 15-5/17-4 | 300 | 3056 | 28 | 2292 | 30 | 1834 | 28 | 1528 | 32 | 1146 | 28 |
| 13-8 | 300 | 3056 | 28 | 2292 | 30 | 1834 | 28 | 1528 | 32 | 1146 | 28 |
| 440C | 300 | 3056 | 28 | 2292 | 30 | 1834 | 28 | 1528 | 32 | 1146 | 28 |
| TOOL STEEL (ANNEALED) | | | | | | | | | | | |
| A2 | 400 | 4075 | 36 | 3056 | 40 | 2445 | 36 | 2037 | 44 | 1528 | 38 |
| D2 | 360 | 3667 | 32 | 2750 | 36 | 2200 | 32 | 1834 | 38 | 1375 | 34 |
| H13 | 400 | 4075 | 36 | 3056 | 40 | 2445 | 36 | 2037 | 44 | 1528 | 38 |
| P20 | 400 | 4075 | 44 | 3056 | 50 | 2445 | 44 | 2037 | 52 | 1528 | 46 |
| TITANIUM | | | | | | | | | | | |
| Com. pure | 300 | 3056 | 34 | 2292 | 38 | 1834 | 34 | 1528 | 40 | 1146 | 34 |
| 6AL-4V | 380 | 3871 | 42 | 2903 | 48 | 2323 | 42 | 1935 | 50 | 1452 | 44 |
| 6AL-6V | 175 | 1783 | 20 | 1337 | 22 | 1070 | 20 | 891 | 24 | 669 | 20 |

XF Finish Profiling



XG-502 Profiling



DM SERIES SPEEDS & FEEDS (Chipload per Tooth)

| Tool Number | Cutter Diameter | Steels 30-40 HRc | | Steels 40-50 HRc | | Steels 50-60 HRc | |
|-------------|-----------------|------------------|---------------|------------------|---------------|------------------|---------------|
| | | ROUGHING | FINISHING | ROUGHING | FINISHING | ROUGHING | FINISHING |
| DM-201-01 | 1/32" | 0.0006-0.0008 | 0.0005-0.0006 | 0.0005-0.0006 | 0.0004-0.0005 | 0.0004-0.0005 | 0.0003-0.0004 |
| DM-201-02 | 1/16" | 0.0013-0.0015 | 0.0010-0.0013 | 0.0010-0.0013 | 0.0008-0.0010 | 0.0008-0.0010 | 0.0005-0.0008 |
| DM-201-03 | 3/32" | 0.0019-0.0023 | 0.0015-0.0019 | 0.0015-0.0019 | 0.0011-0.0015 | 0.0011-0.0015 | 0.0008-0.0011 |
| DM-201-04 | 1/8" | 0.0025-0.0030 | 0.0020-0.0025 | 0.0020-0.0025 | 0.0015-0.0020 | 0.0015-0.0020 | 0.0010-0.0015 |
| DM-201-06 | 3/16" | 0.0038-0.0045 | 0.0030-0.0038 | 0.0030-0.0038 | 0.0023-0.0030 | 0.0023-0.0030 | 0.0015-0.0023 |
| DM-201-08 | 1/4" | 0.0050-0.0060 | 0.0040-0.0050 | 0.0040-0.0050 | 0.0030-0.0040 | 0.0030-0.0040 | 0.0020-0.0030 |
| DM-201-10 | 5/16" | 0.0063-0.0075 | 0.0050-0.0063 | 0.0050-0.0063 | 0.0038-0.0050 | 0.0038-0.0050 | 0.0025-0.0038 |
| DM-201-12 | 3/8" | 0.0075-0.0090 | 0.0060-0.0075 | 0.0060-0.0075 | 0.0045-0.0060 | 0.0045-0.0060 | 0.0030-0.0045 |
| DM-201-14 | 7/16" | 0.0088-0.0105 | 0.0070-0.0088 | 0.0070-0.0088 | 0.0053-0.0070 | 0.0053-0.0070 | 0.0035-0.0053 |
| DM-201-16 | 1/2" | 0.0100-0.0120 | 0.0080-0.0100 | 0.0080-0.0100 | 0.0060-0.0080 | 0.0060-0.0080 | 0.0040-0.0060 |



DM SERIES SPEEDS & FEEDS (Roughing & Semi-Finishing)

| Tool Number | Cutter Diameter | Rotations Per Minute (RPM) | | |
|-------------|-----------------|----------------------------|-----------------|-----------------|
| | | STEELS 30-40HRc | STEELS 40-50HRc | STEELS 50-60HRc |
| DM-201-01 | 1/32" | 20,000-40,000 | 20,000-40,000 | 20,000-40,000 |
| DM-201-02 | 1/16" | 20,000-40,000 | 20,000-40,000 | 20,000-36,000 |
| DM-201-03 | 3/32" | 20,000-32,000 | 20,000-32,000 | 16,000-24,000 |
| DM-201-04 | 1/8" | 15,000-24,000 | 18,000-24,000 | 12,000-18,000 |
| DM-201-06 | 3/16" | 10,000-16,000 | 12,000-16,000 | 8,100-12,000 |
| DM-201-08 | 1/4" | 7,600-12,000 | 9,100-12,000 | 6,100-9,100 |
| DM-201-10 | 5/16" | 6,000-9,700 | 7,300-9,700 | 4,800-7,300 |
| DM-201-12 | 3/8" | 5,000-8,100 | 6,100-8,100 | 4,000-6,100 |
| DM-201-14 | 7/16" | 4,300-6,900 | 5,200-6,900 | 3,400-5,200 |
| DM-201-16 | 1/2" | 3,800-6,100 | 4,500-6,100 | 3,000-4,500 |

DM Series Guidelines

- Special diameters and lengths are available on a make-to-order basis.
- Air or mist coolant on materials greater than 40 HRc.

Radial Step Over



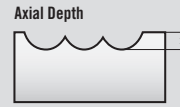
Roughing or Semi-Finishing 25%-40% of tool diameter
Radial Step Over for finishing depends on finish requirements.

Specific End Mill Speeds & Feeds



DM SERIES SPEEDS & FEEDS (Finishing)

| Tool Number | Cutter Diameter | Rotations Per Minute (RPM) | | |
|-------------|-----------------|----------------------------|-----------------|-----------------|
| | | STEELS 30-40Hrc | STEELS 40-50Hrc | STEELS 50-60Hrc |
| DM-201-01 | 1/32" | 20,000-40,000 | 20,000-40,000 | 20,000-40,000 |
| DM-201-02 | 1/16" | 20,000-40,000 | 20,000-40,000 | 20,000-36,000 |
| DM-201-03 | 3/32" | 20,000-32,000 | 20,000-32,000 | 16,000-24,000 |
| DM-201-04 | 1/8" | 15,000-24,000 | 18,000-24,000 | 12,000-18,000 |
| DM-201-06 | 3/16" | 10,000-16,000 | 12,000-16,000 | 8,100-12,000 |
| DM-201-08 | 1/4" | 7,600-12,000 | 9,100-12,000 | 6,100-9,100 |
| DM-201-10 | 5/16" | 6,000-9,700 | 7,300-9,700 | 4,800-7,300 |
| DM-201-12 | 3/8" | 5,000-8,100 | 6,100-8,100 | 4,000-6,100 |
| DM-201-14 | 7/16" | 4,300-6,900 | 5,200-6,900 | 3,400-5,200 |
| DM-201-16 | 1/2" | 3,800-6,100 | 4,500-6,100 | 3,000-4,500 |



30-40 Hrc Axial depth = 10% of tool diameter
 40-50 Hrc Axial depth = 5% of tool diameter
 50-60 Hrc Axial depth = 4% of tool diameter



TM SERIES SPEEDS & FEEDS (Semi-Finishing & Finishing)

| Tool Number | Cutter Diameter | Steels 30-40 Hrc | | Steels 40-50 Hrc | | Steels 50-60 Hrc | |
|-------------|-----------------|------------------|----------------|------------------|---------------|------------------|---------------|
| | | ROUGHING | FINISHING | ROUGHING | FINISHING | ROUGHING | FINISHING |
| TM-201-01 | 1/32" | 34,000-40,000 | 0.0001-0.00025 | 26,000-30,000 | 0.0001-0.0002 | 16,000-18,000 | 0.0001-0.0002 |
| TM-201-02 | 1/16" | 34,000-40,000 | 0.0003-0.0005 | 25000-30,000 | 0.0003-0.0005 | 16,000-18,000 | 0.0002-0.0004 |
| TM-201-03 | 3/32" | 22,000-26,000 | 0.0006-0.00075 | 16,000-19,000 | 0.0005-0.0007 | 10,000-12,000 | 0.0005-0.0006 |
| TM-201-04 | 1/8" | 17,000-20,000 | 0.0008-0.001 | 13,000-17,000 | 0.0007-0.0009 | 8,000-13,000 | 0.0006-0.0008 |
| TM-201-06 | 3/16" | 12,000-14,000 | 0.0011-0.0015 | 9,000-12,000 | 0.001-0.0014 | 5,300-9,000 | 0.0009-0.0012 |
| TM-201-08 | 1/4" | 9,000-10400 | 0.0015-0.002 | 7,000-9,000 | 0.0014-0.0018 | 4,000-6,600 | 0.0012-0.0016 |
| TM-201-10 | 5/16" | 7,200-8,300 | 0.0019-0.0025 | 5,500-7,200 | 0.0017-0.0023 | 3,200-5,400 | 0.0015-0.0020 |
| TM-201-12 | 3/8" | 6,000-6,900 | 0.0020-0.003 | 4,600-6,000 | 0.0018-0.0027 | 2,700-4,500 | 0.0016-0.0024 |
| TM-201-14 | 7/16" | 5,200-6,000 | 0.0023-0.0035 | 4,000-5,200 | 0.0021-0.0032 | 2,300-3,900 | 0.0019-0.0028 |
| TM-201-16 | 1/2" | 4,500-5,200 | 0.0025-0.004 | 3,500-4,500 | 0.0023-0.0036 | 2,100-3,500 | 0.0020-0.0032 |

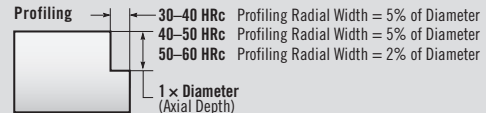
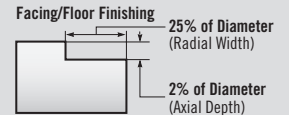
(Use maximum RPM if suggested RPM is higher than the machine's capabilities)

TM Series Guidelines

- Speeds and feeds are only general starting points and may vary depending on specific applications.
- Use Climb Milling for better finish and longer tool life.
- Air or mist coolant on materials greater than 40 HRC.
- Good machines, tool holders, and programming methods all help in extending tool life.
- The best way to engage into the material is by helical interpolation or entering from off the part.
- Use for tight areas like helical bores or tight corners. For large open areas use HM/MMH Series.

Additional Notes

- Special diameters, lengths, and corner radii are available on a make-to-order basis.
- Special draft angles (blend angle) or necked shanks for part clearance are available upon request and usually ship within the next business day.

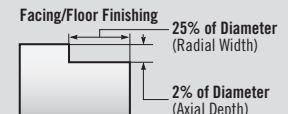
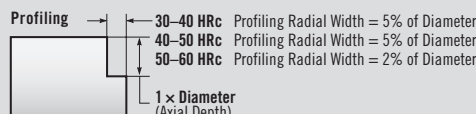


HM SERIES SPEEDS & FEEDS (Semi-Finishing & Finishing)

| Tool Number | Cutter Diameter | Steels 30-40 Hrc | | Steels 40-50 Hrc | | Steels 50-60 Hrc | |
|-------------|-----------------|------------------|---------------|------------------|---------------|------------------|---------------|
| | | RPM | CLPT | RPM | CLPT | RPM | CLPT |
| HM-402-04 | 1/8" | 17,000-20,000 | 0.0008-0.001 | 13,000-17,000 | 0.0007-0.0009 | 8,000-13,000 | 0.0006-0.0008 |
| HM-402-06 | 3/16" | 12,000-14,000 | 0.0011-0.0015 | 9,000-12,000 | 0.0010-0.0014 | 5,300-9,000 | 0.0009-0.0012 |
| HM-602-08 | 1/4" | 9,000-10,400 | 0.0015-0.002 | 7,000-9,000 | 0.0014-0.0018 | 4,000-6,600 | 0.0012-0.0016 |
| HM-602-10 | 5/16" | 7,200-8,300 | 0.0019-0.0025 | 5,500-7,200 | 0.0017-0.0023 | 3,200-5,400 | 0.0015-0.0020 |
| HM-602-12 | 3/8" | 6,000-6,900 | 0.0020-0.003 | 4,600-6,000 | 0.0018-0.0027 | 2,700-4,500 | 0.0016-0.0024 |
| HM-602-14 | 7/16" | 5,200-6,000 | 0.0023-0.0035 | 4,000-5,200 | 0.0021-0.0032 | 2,300-3,900 | 0.0019-0.0028 |
| HM-602-16 | 1/2" | 4,500-5,200 | 0.0025-0.004 | 3,500-4,500 | 0.0023-0.0036 | 2,100-3,500 | 0.0020-0.0032 |
| HM-602-20 | 5/8" | 3,600-4,150 | 0.0026-0.0042 | 2,800-3,600 | 0.0023-0.0038 | 1,600-2,750 | 0.0021-0.0034 |
| HM-802-24 | 3/4" | 3,000-3,500 | 0.0028-0.005 | 2,300-3,000 | 0.0025-0.0045 | 1,350-2,250 | 0.0023-0.0041 |
| HM-102-32 | 1" | 2,200-2,600 | 0.0030-0.006 | 1,700-2,200 | 0.0027-0.0054 | 1,000-1,700 | 0.0024-0.0049 |

HM Series Guidelines

- Speeds and feeds are only general starting points and may vary depending on specific applications.
- Use Climb Milling for better finish and longer tool life.
- Air or mist coolant on materials greater than 40 HRC.
- Good machines, tool holders, and programming methods all help in extending tool life.
- The best way to engage into the material is by helical interpolation or entering from off the part.
- Use for open areas of floors or walls. For tight areas like helical bores or tight corners use TM/MTM Series.



Speeds & Feeds

SAWS

| Material | Max Axial Depth/Pass (Times Thickness) | Teeth | Inch | | | | Metric | | | |
|---|---|--------|----------------------------|--------------------------------|------------------------------|-------------------------|------------------------------|------------------------------|------------------------------|-------------------------|
| | | | SFM Surface Feet/Minute | Chip Load per Tooth – Standard | | | SMM Surface Meters/Minute | Chip Load per Tooth – Metric | | |
| | | | | Saw Thickness .002"-.031" | Saw Thickness .031"-.100" | Saw Thickness >.100" | | Saw Thickness .05mm-1.0mm | Saw Thickness 1.0mm-3.0mm | Saw Thickness >3.0mm |
| Aluminum / Non-Ferrous | | | | | | | | | | |
| Ferrous | | | | | | | | | | |
| 2024 | 4 | Coarse | 3600 | .000234"/.000273" | .000273"/.00052" | 0.00052" | 1100 | .0059mm/.0069mm | .0069mm/.013mm | 0.013mm |
| 6061 (T1-T3) | 4 | Coarse | 3600 | .000234"/.000273" | .000273"/.00052" | 0.00052" | 1100 | .0059mm/.0069mm | .0069mm/.013mm | 0.013mm |
| 6061 (T4-T6) | 4 | Coarse | 3600 | .000234"/.000273" | .000273"/.00052" | 0.00052" | 1100 | .0059mm/.0069mm | .0069mm/.013mm | 0.013mm |
| 7075 | 4 | Coarse | 3600 | .000234"/.000273" | .000273"/.00052" | 0.00052" | 1100 | .0059mm/.0069mm | .0069mm/.013mm | 0.013mm |
| Non-Ferrous | | | | | | | | | | |
| Brass | 4 | Coarse | 750 | .000234"/.000273" | .000273"/.00052" | 0.00052" | 230 | .0059mm/.0069mm | .0069mm/.013mm | 0.013mm |
| Copper | 4 | Coarse | 600 | .000234"/.000273" | .000273"/.00052" | 0.00052" | 190 | .0059mm/.0069mm | .0069mm/.013mm | 0.013mm |
| Magnesium | 4 | Coarse | 3600 | .000234"/.000273" | .000273"/.00052" | 0.00052" | 1100 | .0059mm/.0069mm | .0069mm/.013mm | 0.013mm |
| Titanium, Steel and High-Temp Alloys | | | | | | | | | | |
| Titanium | | | | | | | | | | |
| Commercially Pure | 2 | Fine | 700 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 210 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| 6AL-4V | 2 | Fine | 350 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 105 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| 6AL-6V | 2 | Fine | 230 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 70 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| Steel | | | | | | | | | | |
| 1018-1020 | 4 | Fine | 350 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 110 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| 4130 | 2 | Fine | 260 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 80 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| 4140 | 2 | Fine | 220 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 70 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| 4340 | 2 | Fine | 280 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 90 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| Tool Steel Annealed | | | | | | | | | | |
| A2 | 2 | Fine | 350 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 110 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| D2 | 2 | Fine | 260 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 80 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| H13 | 2 | Fine | 230 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 70 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| P20 | 2 | Fine | 350 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 110 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| Stainless Steel | | | | | | | | | | |
| 303 | 2 | Fine | 500 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 150 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| 304 | 2 | Fine | 200 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 70 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| 316 | 2 | Fine | 240 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 75 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| 15-5/17-4 PH | 2 | Fine | 200 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 60 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| 440C | 2 | Fine | 200 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 60 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| Inconel | | | | | | | | | | |
| 625 / 718 | 2 | Fine | 100 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 30 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| Composites | | | | | | | | | | |
| G10 Fiberglass/Polyester | 4 | Coarse | 1000 | .000234"/.000273" | .000273"/.00052" | 0.00052" | 300 | .0059mm/.0069mm | .0069mm/.013mm | 0.013mm |
| Graphite | 4 | Coarse | 1000 | .000234"/.000273" | .000273"/.00052" | 0.00052" | 300 | .0059mm/.0069mm | .0069mm/.013mm | 0.013mm |
| Graphite Fiber/Epoxy | 4 | Coarse | 800 | .000234"/.000273" | .000273"/.00052" | 0.00052" | 250 | .0059mm/.0069mm | .0069mm/.013mm | 0.013mm |
| Other Material Applications | | | | | | | | | | |
| Cast Iron | | | | | | | | | | |
| Ductile Iron | 2 | Fine | 350 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 110 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| Gray Cast Iron | 2 | Fine | 500 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 150 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| Wood & Plastics | | | | | | | | | | |
| Wood | 4 | Coarse | 3600 | .000234"/.000273" | .000273"/.00052" | 0.00052" | 1100 | .0059mm/.0069mm | .0069mm/.013mm | 0.013mm |
| Plastics | 4 | Coarse | 1600 | .000234"/.000273" | .000273"/.00052" | 0.00052" | 400 | .0059mm/.0069mm | .0069mm/.013mm | 0.013mm |

Speeds & Feeds



ET SPEEDS & FEEDS

| Material | 5000 RPM | 7500 RPM | 10,000 RPM |
|---------------------------|----------|-----------|------------|
| | in/min | in/min | in/min |
| NON-FERROUS METALS | | | |
| Aluminum/Aluminum Alloys | 10 ipm | 15 ipm | 20 ipm |
| Brass/Bronze | 10 ipm | 15 ipm | 20 ipm |
| Copper/Copper Alloys | 10 ipm | 15 ipm | 20 ipm |
| Magnesium | 10 ipm | 15 ipm | 20 ipm |
| COMPOSITES | | | |
| G10 Fiberglass | 15 ipm | 22.5 ipm | 30 ipm |
| Graphite | 15 ipm | 22.5 ipm | 30 ipm |
| Carbon Fiber | 15 ipm | 22.5 ipm | 30 ipm |
| Plastics | 15 ipm | 22.5 ipm | 30 ipm |
| FERROUS METALS | | | |
| Cast Iron | 5 ipm | 7.5 ipm | 10 ipm |
| Steel, Low Carbon | 5 ipm | 7.5 ipm | 10 ipm |
| Steel, Medium Carbon | 7.5 ipm | 11.25 ipm | 15 ipm |
| Steel, Hardened | 2.5 ipm | 3.75 ipm | 5 ipm |
| Stainless Steel, Soft | 5 ipm | 7.5 ipm | 10 ipm |
| Stainless Steel, Hard | 2.5 ipm | 3.75 ipm | 5 ipm |
| Inconel | 4 ipm | 6 ipm | 8 ipm |
| Titanium, Soft | 5 ipm | 7.5 ipm | 10 ipm |
| Titanium, Hard | 2.5 ipm | 3.75 ipm | 5 ipm |



WOOD SERIES SPEEDS & FEEDS

| Material | RPM (1/4") | Feed Inches/Minute |
|---------------------------|---------------|-----------------------|
| Wood | | |
| Hardwoods | 18,000 | 180–250 |
| Softwoods | 18,000 | 180–250 |
| MDF | 18,000 | 150–250 |
| Laminated Materials | 18,000 | 150–250 |
| Plastics, Others | | |
| Solid Surface | 15,300 | 70–130 |
| Fiberglass | 15,300 | 80–150 |
| Phenolic | 15,300 | 80–150 |
| Aluminum (Soft) | 18,000 | 90–120 |
| Aluminum (Aircraft Grade) | 18,000 | 180–230 |
| Copper | 9,200 | 45–60 |
| Foam | 18,000 | 150–300 |
| Plastics (Soft) | 18,000 | 180–250 |
| Plastics (Hard) | 18,000 | 150–200 |

General Guidelines

- Select the shortest flute length possible for the application. Shorter flute length router tools offer better stability and increased feed rates.
- Select the largest diameter tool for the job. Increasing diameter by 10% provides 25% more strength.
- Adjust RPM and feed rate to reduce vibration. Vibration will cause poor finish and chip tools. Feed rates that are too slow can also cause vibration and poor tool life.
- Regular cleaning of tool holders and collets help ensure the tool's performance and life.
- Securing the part as rigidly as possible will improve finishes and tool life.

Visit RobbJack's New Website!



Dynamic Tool Search at www.robjack.com

TOOL SEARCH

1 Click Here for Tool Search!

Click on the Red Search Tab and Find the Exact Tool You're Looking For!

2 Make Your Selections Here!

Find a Tool by:
Tool Type
Your Specifications
Tool Characteristics
Materials
Application

3 See Search Results Here!

Make changes in your search criteria, see new results here immediately!

4 Click on a Tool Number

5 Complete Tool Description

Prices, available coatings, specifications, tolerances, features, speed and feeds, videos and much more!

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Speed & Feed Calculations now online at www.robjack.com/speedfeed



- ▶ Quick, easy calculations, both metric and standard
- ▶ End mill speeds and feeds
- ▶ Slitting saw speeds and feeds
- ▶ Troubleshooting
- ▶ Printable results
- ▶ Simultaneous tool recommendations



End Mill Modifications

Coolant Grooves



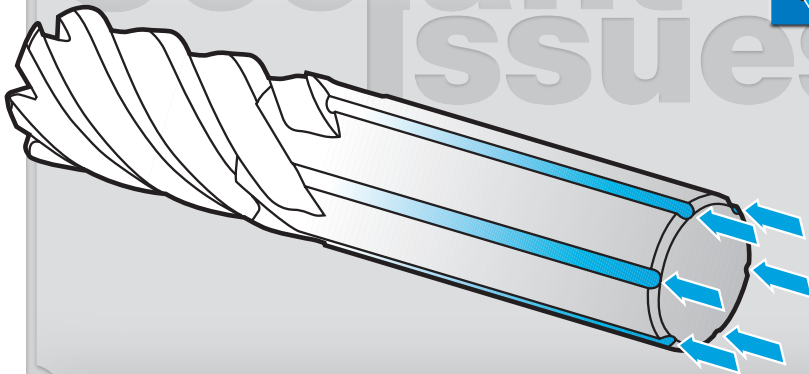
Coolant Grooves allow coolant to flow around the outside of the tool for through-spindle coolant applications. It is a lower-cost option to through-the-tool coolant holes.

To order a RobbJack tool with a **Coolant Grooves**, use the existing standard *Part Number*, and add **-CG**.

Example:

An A1-201-12 with coolant grooves is Part Number:

▶ **A1-201-12-CG**
See price sheet for pricing

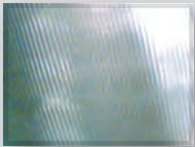


Chatter Problems?

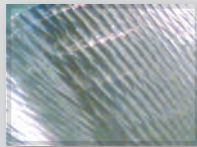


Mirror Edge™

Our edge preparation dampens vibration to help eliminate chatter.



Mirror Edge



Non-Mirror Edge

Applications

- Deep pocket and thin wall aluminum
- Long reaches more than 3:1 length-to-diameter ratio
- Plunging corners in titanium, steels, stainless, aluminum, etc.
- High end valves used with Feather Blend and T-Process

Must Use Coolant

Our patented Mirror Edge geometry helps to eliminate chatter. This geometry can be used in any application where chatter is a problem, usually for thin walls, valves, deep pockets or where the tool sticks out more than 3:1 length to diameter ratio.

To order RobbJack tools with **Mirror Edge**, use the existing standard *Part Number*, and add **-ME**.

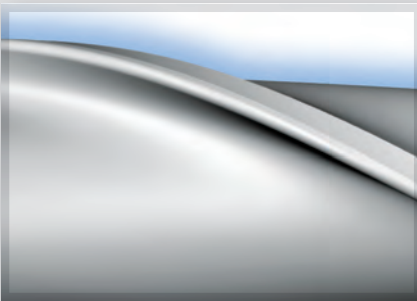
Example:

An A1-201-12 with Mirror Edge is Part Number:

▶ **A1-201-12-ME**
See price sheet for pricing

Chipping?

T-Process



T-Process is a honed edge we put on an end mill to help eliminate chipping.

Pros: T-Process strengthens the edge, helps eliminate chipping and gives a smooth edge.

Cons: T-Process will bring up a burr in certain materials, and it is not for materials that like a sharp edge, such as aluminum and plastics.

To order a RobbJack tool with a **T-Process**, use the existing standard *Part Number*, and add **-TP**.

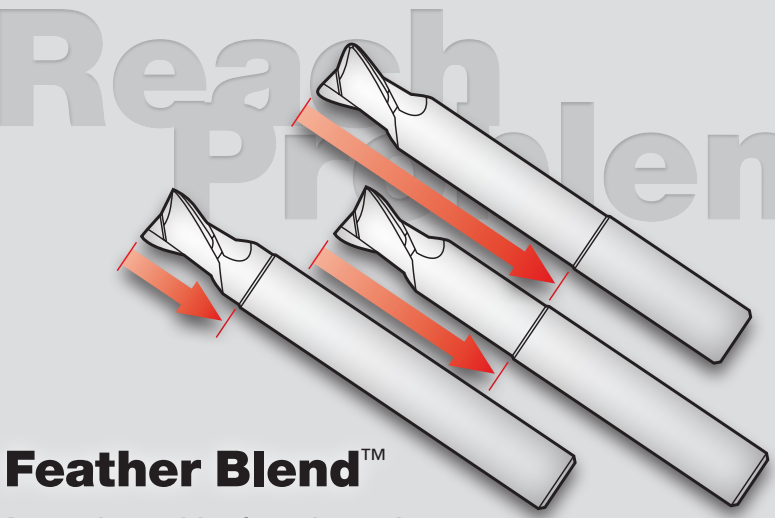
Example:

An XG-402-16 with a T-Process is Part Number:

▶ **XG-402-16-TP**
See price sheet for pricing



End Mill Modifications

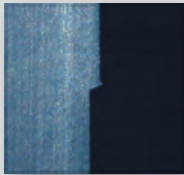


Feather Blend™

A smooth transition from the cutting diameter to the neck diameter.



Feather Blend



Standard Neck

Applications

- Any necked tool
- Eliminates swirl lines during plunging
- Eliminates stress risers in parts



Reach

Modify any standard tool with a neck to get the job done quickly.

A neck will increase rigidity, reduce tool deflection and last longer than a long length of cut tool. Necking can be added to most standard tools in 1–2 days.

To order a RobbJack tool with a **Reach**, use the existing standard *Part Number*, and add *-N* and the desired length from the end of the tool.

Example:

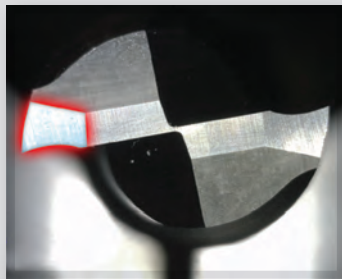
An A1-201-12 necked with 1.0" Reach is Part Number:

▶ **A1-201-12-N 1.0"**

See price sheet for pricing

A tool necked with Feather Blend has a reduction in the tool diameter after the cutting length so the tool can cut deeper than its cutting length. It features a smooth transition from the cutting diameter to the neck diameter. Feather Blend reduces staircase marks and stress risers in parts and helps maintain the strongest tool possible.

Wiper Flats



A Wiper Flat is a small flat on the end of the tool where there is no concavity. It is used to minimize swirl marks on the floor of parts.



Pros: A Wiper Flat gives better floor finishes.

Cons: Wiper Flats will increase surface contact, not for use on thin floors.

To order a RobbJack tool with a **Wiper Flats**, use the existing standard *Part Number*, and add *-WF*.

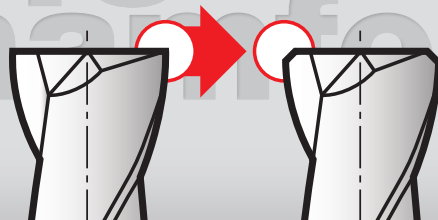
Example:

An A1-201-12 with wiper flats is Part Number:

▶ **A1-201-12-WF**

See price sheet for pricing

45° Chamfer



To order a RobbJack tool with a **45° Chamfer**, use the existing standard *Part Number*, add *-CH* and amount of *Chamfer*.

Example:

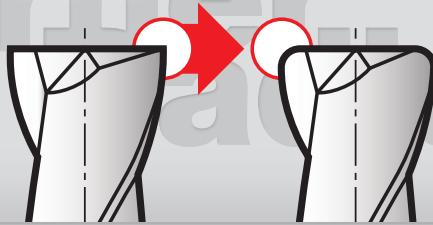
A1-201-12 with a .040" 45° chamfer is Part Number:

▶ **A1-201-12-CH .040"**

See price sheet for pricing

End Mill Modifications

Corner Radius



To order a RobbJack tool with a **Corner Radius**, use the existing standard *Part Number*, add **-CR** and desired *Radius Size*.

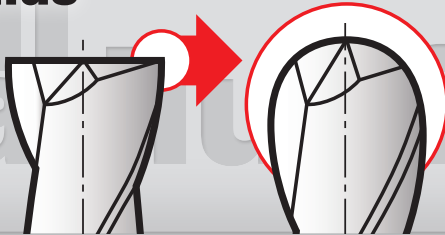
Example: An A1-201-12 with a .005 corner radius is Part Number:

▶ **A1-201-12-CR .005**

See price sheet for pricing

SPECIAL NOTE: 2 flutes under .050" call for pricing.
3 or more flutes under .080" call for pricing.

Full Radius



To order a RobbJack tool with a **Full Radius** (or Ball End), use the existing standard *Part Number*, and add **-BN**.

Example: An A1-201-12 with a Full Radius (Ball End) is Part Number:

▶ **A1-201-12-BN**

See price sheet for pricing

Weldon Flats



To order RobbJack tools with **Weldon Flats**, use the existing standard *Part Number*, and add **-FL**.

Example: An A1-201-12 with a Weldon Flat is Part Number:

▶ **A1-201-12-FL**

No Charge

Regrinding

Let RobbJack recondition your used cutting tools and get RobbJack quality grinds and specifications on tools with any brand name!

Wouldn't it be nice if resharpened tools performed as well as new? Let us regrind yours the way we do ours and it can happen. We will add our grinds and finishes to any tools, regardless of manufacturer. Our prices are competitive, our delivery is the best in the industry, and we do our own, in-house PVD coatings and re-coatings.

GO GREEN

Try RobbJack's in-house carbide recycling program.

Many times the tools we receive for regrinding are too badly damaged to justify reconditioning. For all tools that we determine fall into this category, we will either:

▶ *Return the tools to you marked "No Work Done" (NWD)*

OR...

▶ *Put the tools, as scrap, into our recycling program and send you a certificate for a 10% discount on your next regrinding order.*

We will offer you this choice every time we receive tools that we determine are NWD. We recycle scrap tools to carbide re-manufacturers, who crush the tools and use the recycled shards and powder to make shredders or non-critical carbide grades.

YOUR OWN COATING

Get state-of-the art coating technology without delivery hassles.

RobbJack owns and operates their PVD coating facility in Lincoln, CA under the tenets of ISO9000 certification. Our factory-trained technicians take the same special care with your tools as with ours, assuring you of the best PVD coatings available. We do this as part of our process, reducing or eliminating delays in delivery.

Download our **Regrinding Order Form** at www.robbjack.com/technical/regrindform to get started. Or email or call us!

Phone: (916) 645-6045
Toll-Free: (800) 527-8883
Fax: (916) 645-0146



sales@robbjack.com
sherry@robbjack.com

TOOLS FOR

Aluminum Applications



Aluminum Machining Without Chatter!

Scan this code to:

- Watch Videos
- Get Technical Info
- Get Tips and Tricks to Cut Thin Wall and Deep Pocket Parts
- And More...

Featured Tools:

FM-Series – 41 Hours vs. 1 Hour*

Page 22



Cycle Time Before FM

*Actual results from a major defense manufacturer in deep pocket/thin wall aluminum

VS.

Cycle Time After FM



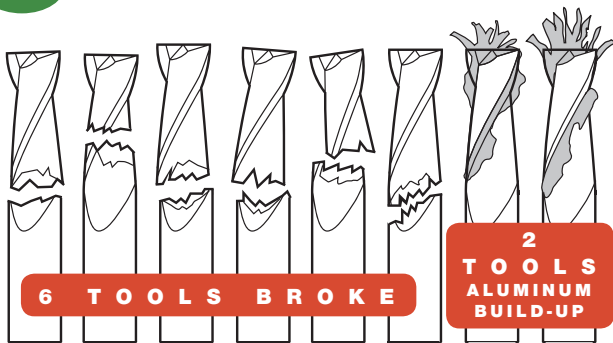
**MAX RPM!
MAX Feed Rate!
No Chatter!**

Eliminate Tool Pull Out!
1/4"-5/16" h5 Shank Tolerance
3/8"-1" h4 Shank Tolerance
Tightest in the Industry!



A1-303 – The **Only** Tool That Could Make the Part*

Page 20



8 Other High-Performance Tools (Tried and Failed)

*Automotive aluminum part: No chatter, superfast feed rates, very high production 450 ipm in an aluminum extrusion.

VS.
















1 RJ A1-303 Tool

**MAX RPM!
MAX Feed Rate!
No Chatter!**

**A1-303 Series:
Polished & Mirror Edge!**



Aluminum Applications Tools

| | | | |
|--|--|--|------------|
| A1 / MA1 201 | 2 Flute |  | 18 |
| A1 / MA1 303 | 3 Flute |  | 20 |
| FM / MFM 201/202/203/204/205 | 2 Flute (Short to Long Reach) |  | 22 |
| FM / MFM 301/302/303/304/305 | 3 Flute (Short to Long Reach) |  | 26 |
| S1 / MS1 201/301/401 | 2, 3 and 4 Flute |  | 36 |
| C1 / MC1 201/301/401 | 2, 3 and 4 Flute |  | 38 |
| PM / MPM / PMD Routers | 1 Flute Routers (See Composites & Plastics) |  | 40 |
| WU1 / WD1 310 | 3 Flute Up and Down Shear |  | 41 |
| SB / MSB 201 B / MB 203 | 2 Flute Ball End (See Multiple Applications) |  | 110 |
| C8 201/203/301/303 | 2 and 3 Flute on 1/4" Shank (See Multiple Applications) |  | 105 |
| NR / MNR 204/303/404 | 2, 3 and 4 Flute (See Multiple Applications) |  | 114 |
| PCD 203 Routers | 2 Flute PCD-Tipped Routers (See Composites & Plastics) |  | 71 |
| PCD-BN 201 Routers | 2 Flute PCD-Tipped Routers, Ball Nose (See Composites & Plastics) |  | 71 |
| MINIATURES | (See Miniatures Applications) |  | 89 |
| SAWS | (See Saws Applications) |  | 121 |

A1/MA1 2 Flute High Performance Tools for Aluminum

Characteristics

- Square End
- Corner Break
- 2 Flute
- 30° Helix

Applications

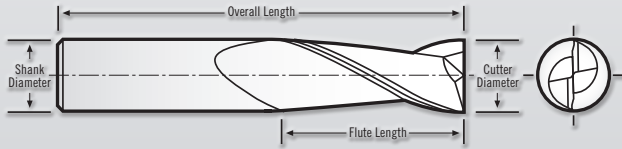
- Slotting
- Side Milling
- Helical Interpolation
- Ramping
- High Performance
- Roughing
- Semi-Finishing
- Finishing
- Dry
- Wet
- Cold Air
- Spray Mist

Materials

- Aluminum
- Copper
- Magnesium
- Plastics
- BRASS

Coatings

- Diamond-Like Carbon (DLC)



A1 Series Tolerances:

Cutting Dia. = $-.001/-0.0015$ "
 Shank Dia. = $-.0001/-0.0002$ "
 Flute Length = $+0.060/-0.000$ "
 OAL = $+/- .060$ "

MA1 Series Tolerances:

Cutting Dia. = $-0.025/-0.038$ mm
 Shank Dia. = $-0.002/-0.005$ mm
 Flute Length (<10D) = $+0.75/-0.000$ mm
 (>10D) = $+1.5/-0.000$ mm
 OAL = $+/-1.000$ mm



A1-201 2 Flute Stub Length



| Cutting Diameter | Shank Diameter | Flute Length | Corner Chamfer | Overall Length | Tool Number Uncoated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------|----------------------|------------------------|
| 1/8" | 1/8" | 3/16" | .005" | 1-1/2" | A1-201-04 | A1-201-04-DLC |
| 3/16" | 3/16" | 9/32" | .005" | 2" | A1-201-06 | A1-201-06-DLC |
| 1/4" | 1/4" | 3/8" | .005" | 2" | A1-201-08 | A1-201-08-DLC |
| 5/16" | 5/16" | 15/32" | .005" | 2-1/2" | A1-201-10 | A1-201-10-DLC |
| 3/8" | 3/8" | 9/16" | .010" | 2-1/2" | A1-201-12 | A1-201-12-DLC |
| 1/2" | 1/2" | 3/4" | .010" | 3" | A1-201-16 | A1-201-16-DLC |
| 5/8" | 5/8" | 15/16" | .010" | 3-1/2" | A1-201-20 | A1-201-20-DLC |
| 3/4" | 3/4" | 1-1/8" | .010" | 4" | A1-201-24 | A1-201-24-DLC |
| 1" | 1" | 1-1/2" | .015" | 4" | A1-201-32 | A1-201-32-DLC |



MA1-201 Metric 2 Flute Stub Length **METRIC**



| Cutting Diameter | Shank Diameter | Flute Length | Corner Chamfer | Overall Length | Tool Number Uncoated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------|----------------------|------------------------|
| 3mm | 3mm | 4.5mm | 0.12mm | 38mm | MA1-201-03 | MA1-201-03-DLC |
| 4mm | 4mm | 6mm | 0.12mm | 50mm | MA1-201-04 | MA1-201-04-DLC |
| 5mm | 5mm | 7.5mm | 0.12mm | 50mm | MA1-201-05 | MA1-201-05-DLC |
| 6mm | 6mm | 9mm | 0.12mm | 50mm | MA1-201-06 | MA1-201-06-DLC |
| 8mm | 8mm | 12mm | 0.25mm | 63mm | MA1-201-08 | MA1-201-08-DLC |
| 10mm | 10mm | 15mm | 0.25mm | 72mm | MA1-201-10 | MA1-201-10-DLC |
| 12mm | 12mm | 18mm | 0.25mm | 83mm | MA1-201-12 | MA1-201-12-DLC |
| 16mm | 16mm | 24mm | 0.25mm | 92mm | MA1-201-16 | MA1-201-16-DLC |
| 20mm | 20mm | 30mm | 0.3mm | 104mm | MA1-201-20 | MA1-201-20-DLC |

2 Flute High Performance Tools for Aluminum **A1/MA1**

A1-201 SPEEDS & FEEDS

| Tool Diameter | Aluminum 6061-T6, 7075, 2024 | | Brass | | Copper | | Plastic | | Magnesium | |
|---------------|------------------------------|---------|-------|---------|--------|---------|---------|---------|-----------|---------|
| | RPM | CLPT | RPM | CLPT | RPM | CLPT | RPM | CLPT | RPM | CLPT |
| 1/8" | Max | 0.0032" | 22900 | 0.0016" | 18300 | 0.0016" | 39700 | 0.0032" | Max | 0.0032" |
| 3/16" | Max | 0.0048" | 15300 | 0.0024" | 12200 | 0.0024" | 26500 | 0.0048" | Max | 0.0048" |
| 1/4" | Max | 0.0064" | 11500 | 0.0032" | 9200 | 0.0032" | 19900 | 0.0064" | Max | 0.0064" |
| 5/16" | Max | 0.0080" | 9200 | 0.0040" | 7300 | 0.0040" | 15900 | 0.0080" | Max | 0.0080" |
| 3/8" | Max | 0.0096" | 7600 | 0.0048" | 6100 | 0.0048" | 13200 | 0.0096" | Max | 0.0096" |
| 1/2" | Max | 0.0128" | 5700 | 0.0064" | 4600 | 0.0064" | 9900 | 0.0128" | Max | 0.0128" |
| 5/8" | Max | 0.0160" | 4600 | 0.0080" | 3700 | 0.0080" | 7900 | 0.0160" | Max | 0.0160" |
| 3/4" | Max | 0.0192" | 3800 | 0.0096" | 3100 | 0.0096" | 6600 | 0.0192" | Max | 0.0192" |
| 1" | Max | 0.0256" | 2900 | 0.0128" | 2300 | 0.0128" | 5000 | 0.0256" | Max | 0.0256" |

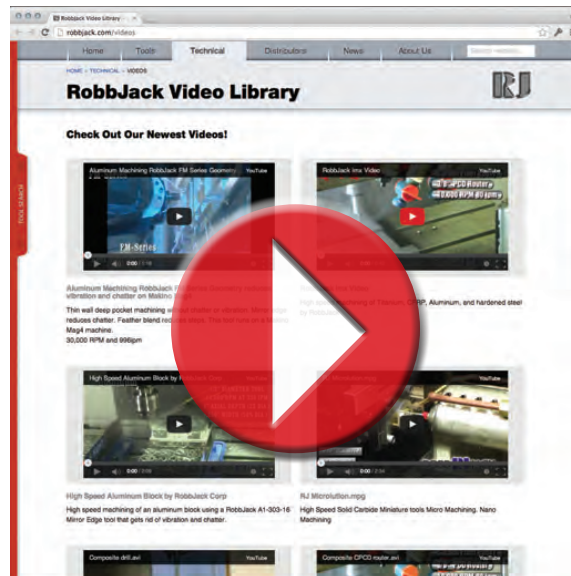
Axial depth of cut up to 1 x diameter of the tool

MA1-201 SPEEDS & FEEDS

| Tool Diameter | Aluminum 6061-T6, 7075, 2024 | | Brass | | Copper | | Plastic | | Magnesium | |
|---------------|------------------------------|---------|-------|---------|--------|---------|---------|---------|-----------|---------|
| | RPM | CLPT | RPM | CLPT | RPM | CLPT | RPM | CLPT | RPM | CLPT |
| 3mm | Max | 0.077mm | 24300 | 0.038mm | 19400 | 0.038mm | 42000 | 0.077mm | Max | 0.077mm |
| 4mm | Max | 0.102mm | 18200 | 0.051mm | 14600 | 0.051mm | 31500 | 0.102mm | Max | 0.102mm |
| 5mm | Max | 0.128mm | 14600 | 0.064mm | 11600 | 0.064mm | 25200 | 0.128mm | Max | 0.128mm |
| 6mm | Max | 0.154mm | 12100 | 0.077mm | 9700 | 0.077mm | 21000 | 0.154mm | Max | 0.154mm |
| 8mm | Max | 0.205mm | 9100 | 0.102mm | 7300 | 0.102mm | 15800 | 0.205mm | Max | 0.205mm |
| 10mm | Max | 0.256mm | 7300 | 0.128mm | 5800 | 0.128mm | 12600 | 0.256mm | Max | 0.256mm |
| 12mm | Max | 0.307mm | 6100 | 0.154mm | 4900 | 0.154mm | 10500 | 0.307mm | Max | 0.307mm |
| 16mm | Max | 0.410mm | 4500 | 0.205mm | 3600 | 0.205mm | 7900 | 0.410mm | Max | 0.410mm |
| 20mm | Max | 0.512mm | 3600 | 0.256mm | 2900 | 0.256mm | 6300 | 0.512mm | Max | 0.512mm |

Axial depth of cut up to 1 x diameter of the tool

See RobbJack Videos at www.robbjack.com/videos



A1/MA1 3 Flute High Performance Tools for Aluminum

Characteristics

- Square End
- Corner Break
- 3 Flute
- 35° Helix
- Mirror Edge
- Polished

Applications

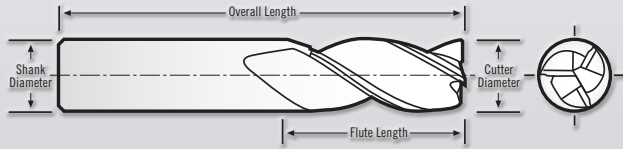
- Slotting
- Side Milling
- Helical Interpolation
- Ramping
- High Performance
- Roughing
- Semi-Finishing
- Finishing
- Wet

Materials

- Aluminum
- Copper
- Magnesium
- BRASS

Coatings

- Diamond-Like Carbon (DLC)



A1 Series Tolerances:

Cutting Dia. = $-.001/-0.0015$ "
 Shank Dia. = $-.0001/-0.0002$ "
 Flute Length = $+0.060/-0.000$ "
 OAL = $+/-0.060$ "

MA1 Series Tolerances:

Cutting Dia. = $-0.025/-0.038$ mm
 Shank Dia. = $-0.002/-0.005$ mm
 Flute Length (<10D) = $+0.750/-0.000$ mm
 (>10D) = $+1.500/-0.000$ mm
 OAL = $+/-1.000$ mm



A1-303 3 Flute Standard Length



| Cutting Diameter | Shank Diameter | Flute Length | Corner Chamfer | Overall Length | Tool Number Uncoated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------|----------------------|------------------------|
| 1/8" | 1/8" | 3/8" | .005" | 1-1/2" | A1-303-04 | A1-303-04-DLC |
| 3/16" | 3/16" | 9/16" | .005" | 2" | A1-303-06 | A1-303-06-DLC |
| 1/4" | 1/4" | 3/4" | .005" | 2-1/2" | A1-303-08 | A1-303-08-DLC |
| 5/16" | 5/16" | 7/8" | .005" | 2-1/2" | A1-303-10 | A1-303-10-DLC |
| 3/8" | 3/8" | 1" | .010" | 2-1/2" | A1-303-12 | A1-303-12-DLC |
| 1/2" | 1/2" | 1-1/8" | .010" | 3" | A1-303-16 | A1-303-16-DLC |
| 5/8" | 5/8" | 1-1/4" | .010" | 3-1/2" | A1-303-20 | A1-303-20-DLC |
| 3/4" | 3/4" | 1-5/8" | .010" | 4" | A1-303-24 | A1-303-24-DLC |
| 1" | 1" | 2" | .015" | 4" | A1-303-32 | A1-303-32-DLC |



MA1-303 Metric 3 Flute Standard Length **METRIC**



| Cutting Diameter | Shank Diameter | Flute Length | Corner Chamfer | Overall Length | Tool Number Uncoated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------|----------------------|------------------------|
| 3mm | 3mm | 8mm | 0.1mm | 38mm | MA1-303-03 | MA1-303-03-DLC |
| 4mm | 4mm | 12mm | 0.1mm | 50mm | MA1-303-04 | MA1-303-04-DLC |
| 5mm | 5mm | 14mm | 0.1mm | 50mm | MA1-303-05 | MA1-303-05-DLC |
| 6mm | 6mm | 15mm | 0.1mm | 63mm | MA1-303-06 | MA1-303-06-DLC |
| 8mm | 8mm | 20mm | 0.1mm | 63mm | MA1-303-08 | MA1-303-08-DLC |
| 10mm | 10mm | 22mm | 0.1mm | 72mm | MA1-303-10 | MA1-303-10-DLC |
| 12mm | 12mm | 26mm | 0.2mm | 83mm | MA1-303-12 | MA1-303-12-DLC |
| 16mm | 16mm | 33mm | 0.2mm | 92mm | MA1-303-16 | MA1-303-16-DLC |
| 20mm | 20mm | 42mm | 0.2mm | 104mm | MA1-303-20 | MA1-303-20-DLC |

3 Flute High Performance Tools for Aluminum **A1/MA1**

A1-303 SPEEDS & FEEDS

| Tool Diameter | Aluminum 6061-T6 | | Aluminum 6061-T3 | | Aluminum 7075 | | Aluminum 2024 | |
|---------------|------------------|---------|------------------|---------|---------------|---------|---------------|---------|
| | RPM | CLPT | RPM | CLPT | RPM | CLPT | RPM | CLPT |
| 1/8" | Max | 0.0020" | Max | 0.0018" | Max | 0.0020" | Max | 0.0020" |
| 3/16" | Max | 0.0030" | Max | 0.0026" | Max | 0.0030" | Max | 0.0030" |
| 1/4" | Max | 0.0040" | Max | 0.0035" | Max | 0.0040" | Max | 0.0040" |
| 5/16" | Max | 0.0050" | Max | 0.0044" | Max | 0.0050" | Max | 0.0050" |
| 3/8" | Max | 0.0060" | Max | 0.0053" | Max | 0.0060" | Max | 0.0060" |
| 1/2" | Max | 0.0080" | Max | 0.0070" | Max | 0.0080" | Max | 0.0080" |
| 5/8" | Max | 0.0100" | Max | 0.0088" | Max | 0.0100" | Max | 0.0100" |
| 3/4" | Max | 0.0120" | Max | 0.0105" | Max | 0.0120" | Max | 0.0120" |
| 1" | Max | 0.0160" | Max | 0.0140" | Max | 0.0160" | Max | 0.0160" |

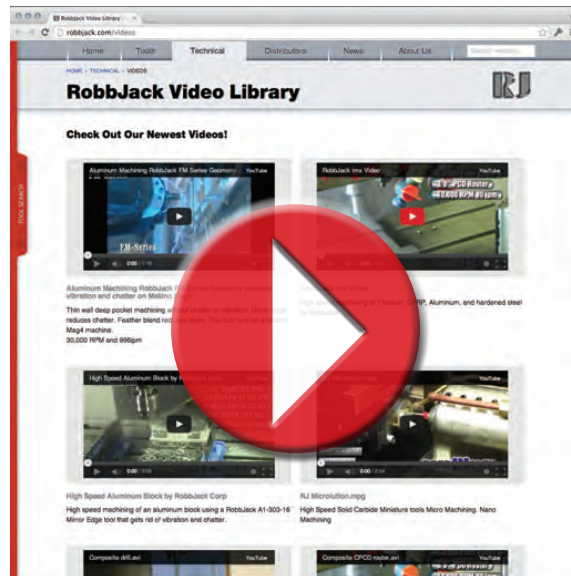
Axial depth of cut up to $1.5 \times$ diameter of the tool with 50% radial step over.

MA1-303 SPEEDS & FEEDS

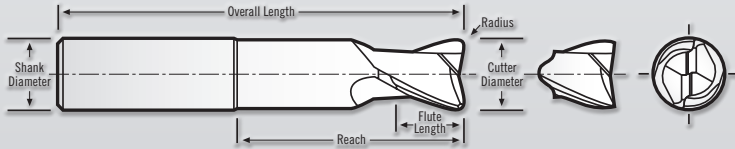
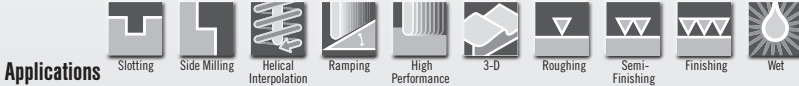
| Tool Diameter | Aluminum 6061-T6 | | Aluminum 6061-T3 | | Aluminum 7075 | | Aluminum 2024 | |
|---------------|------------------|---------|------------------|---------|---------------|---------|---------------|---------|
| | RPM | CLPT | RPM | CLPT | RPM | CLPT | RPM | CLPT |
| 3mm | Max | 0.048mm | Max | 0.042mm | Max | 0.048mm | Max | 0.048mm |
| 4mm | Max | 0.064mm | Max | 0.056mm | Max | 0.064mm | Max | 0.064mm |
| 5mm | Max | 0.080mm | Max | 0.070mm | Max | 0.080mm | Max | 0.080mm |
| 6mm | Max | 0.096mm | Max | 0.084mm | Max | 0.096mm | Max | 0.096mm |
| 8mm | Max | 0.128mm | Max | 0.112mm | Max | 0.128mm | Max | 0.128mm |
| 10mm | Max | 0.160mm | Max | 0.140mm | Max | 0.160mm | Max | 0.160mm |
| 12mm | Max | 0.192mm | Max | 0.168mm | Max | 0.192mm | Max | 0.192mm |
| 16mm | Max | 0.256mm | Max | 0.224mm | Max | 0.256mm | Max | 0.256mm |
| 20mm | Max | 0.320mm | Max | 0.280mm | Max | 0.320mm | Max | 0.320mm |

Axial depth of cut up to $1.5 \times$ diameter of the tool with 50% radial step over.

See RobbJack Videos at www.robbjack.com/videos



FM 2 Flute High Performance Tools for Aluminum



FM Series Tolerances:
 Cutting Dia. = $-.001/-0.0015$ "
 Shank Dia. = $-.0001/-0.0002$ "
 Flute Length = $+0.060/-0.000$ "
 OAL = $+/- .060$ "



NEW!

FM 2 Flute (Short to Long Reach)

| | Cutting Diameter | Shank Diameter | Flute Length | Corner Radius | Reach Length* | Overall Length | Tool Number Uncoated | Tool Number DLC Coated | |
|------------|------------------|----------------|--------------|---------------|---------------|----------------|----------------------|------------------------|----------------|
| SHORT | 1/4" | 1/4" | 1/4" | Sq. End | 0.625" | 3" | FM-201-08 | FM-201-08-DLC | 1/4" DIAMETER |
| | 1/4" | 1/4" | 1/4" | 0.03" | 0.625" | 3" | FM-201-08-030 | FM-201-08-030-DLC | |
| | 1/4" | 1/4" | 1/4" | 0.06" | 0.625" | 3" | FM-201-08-060 | FM-201-08-060-DLC | |
| | 1/4" | 1/4" | 1/4" | 0.09" | 0.625" | 3" | FM-201-08-090 | FM-201-08-090-DLC | |
| | 1/4" | 1/4" | 1/4" | Ball End | 0.625" | 3" | FM-201-08-BN | FM-201-08-BN-DLC | |
| MEDIUM | 1/4" | 1/4" | 1/4" | Sq. End | 0.875" | 3" | FM-202-08 | FM-202-08-DLC | |
| | 1/4" | 1/4" | 1/4" | 0.03" | 0.875" | 3" | FM-202-08-030 | FM-202-08-030-DLC | |
| | 1/4" | 1/4" | 1/4" | 0.06" | 0.875" | 3" | FM-202-08-060 | FM-202-08-060-DLC | |
| | 1/4" | 1/4" | 1/4" | 0.09" | 0.875" | 3" | FM-202-08-090 | FM-202-08-090-DLC | |
| | 1/4" | 1/4" | 1/4" | Ball End | 0.875" | 3" | FM-202-08-BN | FM-202-08-BN-DLC | |
| LONG | 1/4" | 1/4" | 1/4" | Sq. End | 1.063" | 3" | FM-204-08 | FM-204-08-DLC | |
| | 1/4" | 1/4" | 1/4" | 0.03" | 1.063" | 3" | FM-204-08-030 | FM-204-08-030-DLC | |
| | 1/4" | 1/4" | 1/4" | 0.06" | 1.063" | 3" | FM-204-08-060 | FM-204-08-060-DLC | |
| | 1/4" | 1/4" | 1/4" | 0.09" | 1.063" | 3" | FM-204-08-090 | FM-204-08-090-DLC | |
| | 1/4" | 1/4" | 1/4" | Ball End | 1.063" | 3" | FM-204-08-BN | FM-204-08-BN-DLC | |
| EXTRA LONG | 1/4" | 1/4" | 1/4" | Sq. End | 1.500" | 3" | FM-205-08 | FM-205-08-DLC | |
| | 1/4" | 1/4" | 1/4" | 0.03" | 1.500" | 3" | FM-205-08-030 | FM-205-08-030-DLC | |
| | 1/4" | 1/4" | 1/4" | 0.06" | 1.500" | 3" | FM-205-08-060 | FM-205-08-060-DLC | |
| | 1/4" | 1/4" | 1/4" | 0.09" | 1.500" | 3" | FM-205-08-090 | FM-205-08-090-DLC | |
| | 1/4" | 1/4" | 1/4" | Ball End | 1.500" | 3" | FM-205-08-BN | FM-205-08-BN-DLC | |
| SHORT | 5/16" | 5/16" | 5/16" | Sq. End | 0.875" | 3-1/8" | FM-201-10 | FM-201-10-DLC | 5/16" DIAMETER |
| | 5/16" | 5/16" | 5/16" | 0.03" | 0.875" | 3-1/8" | FM-201-10-030 | FM-201-10-030-DLC | |
| | 5/16" | 5/16" | 5/16" | 0.06" | 0.875" | 3-1/8" | FM-201-10-060 | FM-201-10-060-DLC | |
| | 5/16" | 5/16" | 5/16" | 0.09" | 0.875" | 3-1/8" | FM-201-10-090 | FM-201-10-090-DLC | |
| | 5/16" | 5/16" | 5/16" | 0.12" | 0.875" | 3-1/8" | FM-201-10-120 | FM-201-10-120-DLC | |
| MEDIUM | 5/16" | 5/16" | 5/16" | Ball End | 0.875" | 3-1/8" | FM-201-10-BN | FM-201-10-BN-DLC | |
| | 5/16" | 5/16" | 5/16" | Sq. End | 1.094" | 3-1/8" | FM-202-10 | FM-202-10-DLC | |
| | 5/16" | 5/16" | 5/16" | 0.03" | 1.094" | 3-1/8" | FM-202-10-030 | FM-202-10-030-DLC | |
| | 5/16" | 5/16" | 5/16" | 0.06" | 1.094" | 3-1/8" | FM-202-10-060 | FM-202-10-060-DLC | |
| | 5/16" | 5/16" | 5/16" | 0.09" | 1.094" | 3-1/8" | FM-202-10-090 | FM-202-10-090-DLC | |
| | 5/16" | 5/16" | 5/16" | 0.12" | 1.094" | 3-1/8" | FM-202-10-120 | FM-202-10-120-DLC | |
| | 5/16" | 5/16" | 5/16" | Ball End | 1.094" | 3-1/8" | FM-202-10-BN | FM-202-10-BN-DLC | |

*Other Reach Lengths available upon request.

2 Flute High Performance Tools for Aluminum **FM**



NEW!

FM 2 Flute (Short to Long Reach) —CONTINUED FROM PREVIOUS



| | Cutting Diameter | Shank Diameter | Flute Length | Corner Radius | Reach Length* | Overall Length | Tool Number Uncoated | Tool Number DLC Coated | |
|------------|------------------|----------------|--------------|---------------|---------------|----------------|----------------------|------------------------|-------------------|
| LONG | 5/16" | 5/16" | 5/16" | Sq. End | 1.313" | 3-1/8" | FM-204-10 | FM-204-10-DLC | 5/16" DIAMETER |
| | 5/16" | 5/16" | 5/16" | 0.03" | 1.313" | 3-1/8" | FM-204-10-030 | FM-204-10-030-DLC | |
| | 5/16" | 5/16" | 5/16" | 0.06" | 1.313" | 3-1/8" | FM-204-10-060 | FM-204-10-060-DLC | |
| | 5/16" | 5/16" | 5/16" | 0.09" | 1.313" | 3-1/8" | FM-204-10-090 | FM-204-10-090-DLC | |
| | 5/16" | 5/16" | 5/16" | 0.12" | 1.313" | 3-1/8" | FM-204-10-120 | FM-204-10-120-DLC | |
| | 5/16" | 5/16" | 5/16" | Ball End | 1.313" | 3-1/8" | FM-204-10-BN | FM-204-10-BN-DLC | |
| EXTRA LONG | 5/16" | 5/16" | 5/16" | Sq. End | 1.625" | 3-1/8" | FM-205-10 | FM-205-10-DLC | |
| | 5/16" | 5/16" | 5/16" | 0.03" | 1.625" | 3-1/8" | FM-205-10-030 | FM-205-10-030-DLC | |
| | 5/16" | 5/16" | 5/16" | 0.06" | 1.625" | 3-1/8" | FM-205-10-060 | FM-205-10-060-DLC | |
| | 5/16" | 5/16" | 5/16" | 0.09" | 1.625" | 3-1/8" | FM-205-10-090 | FM-205-10-090-DLC | |
| | 5/16" | 5/16" | 5/16" | 0.12" | 1.625" | 3-1/8" | FM-205-10-120 | FM-205-10-120-DLC | |
| | 5/16" | 5/16" | 5/16" | Ball End | 1.625" | 3-1/8" | FM-205-10-BN | FM-205-10-BN-DLC | |
| SHORT | 3/8" | 3/8" | 3/8" | Sq. End | 1.000" | 4" | FM-201-12 | FM-201-12-DLC | 3/8" DIAMETER |
| | 3/8" | 3/8" | 3/8" | 0.03" | 1.000" | 4" | FM-201-12-030 | FM-201-12-030-DLC | |
| | 3/8" | 3/8" | 3/8" | 0.06" | 1.000" | 4" | FM-201-12-060 | FM-201-12-060-DLC | |
| | 3/8" | 3/8" | 3/8" | 0.09" | 1.000" | 4" | FM-201-12-090 | FM-201-12-090-DLC | |
| | 3/8" | 3/8" | 3/8" | 0.12" | 1.000" | 4" | FM-201-12-120 | FM-201-12-120-DLC | |
| | 3/8" | 3/8" | 3/8" | Ball End | 1.000" | 4" | FM-201-12-BN | FM-201-12-BN-DLC | |
| MEDIUM | 3/8" | 3/8" | 3/8" | Sq. End | 1.250" | 4" | FM-202-12 | FM-202-12-DLC | |
| | 3/8" | 3/8" | 3/8" | 0.03" | 1.250" | 4" | FM-202-12-030 | FM-202-12-030-DLC | |
| | 3/8" | 3/8" | 3/8" | 0.06" | 1.250" | 4" | FM-202-12-060 | FM-202-12-060-DLC | |
| | 3/8" | 3/8" | 3/8" | 0.09" | 1.250" | 4" | FM-202-12-090 | FM-202-12-090-DLC | |
| | 3/8" | 3/8" | 3/8" | 0.12" | 1.250" | 4" | FM-202-12-120 | FM-202-12-120-DLC | |
| | 3/8" | 3/8" | 3/8" | Ball End | 1.250" | 4" | FM-202-12-BN | FM-202-12-BN-DLC | |
| LONG | 3/8" | 3/8" | 3/8" | Sq. End | 1.563" | 4" | FM-204-12 | FM-204-12-DLC | |
| | 3/8" | 3/8" | 3/8" | 0.03" | 1.563" | 4" | FM-204-12-030 | FM-204-12-030-DLC | |
| | 3/8" | 3/8" | 3/8" | 0.06" | 1.563" | 4" | FM-204-12-060 | FM-204-12-060-DLC | |
| | 3/8" | 3/8" | 3/8" | 0.09" | 1.563" | 4" | FM-204-12-090 | FM-204-12-090-DLC | |
| | 3/8" | 3/8" | 3/8" | 0.12" | 1.563" | 4" | FM-204-12-120 | FM-204-12-120-DLC | |
| | 3/8" | 3/8" | 3/8" | Ball End | 1.563" | 4" | FM-204-12-BN | FM-204-12-BN-DLC | |
| EXTRA LONG | 3/8" | 3/8" | 3/8" | Sq. End | 2.125" | 4" | FM-205-12 | FM-205-12-DLC | |
| | 3/8" | 3/8" | 3/8" | 0.03" | 2.125" | 4" | FM-205-12-030 | FM-205-12-030-DLC | |
| | 3/8" | 3/8" | 3/8" | 0.06" | 2.125" | 4" | FM-205-12-060 | FM-205-12-060-DLC | |
| | 3/8" | 3/8" | 3/8" | 0.09" | 2.125" | 4" | FM-205-12-090 | FM-205-12-090-DLC | |
| | 3/8" | 3/8" | 3/8" | 0.12" | 2.125" | 4" | FM-205-12-120 | FM-205-12-120-DLC | |
| | 3/8" | 3/8" | 3/8" | Ball End | 2.125" | 4" | FM-205-12-BN | FM-205-12-BN-DLC | |
| SHORT | 1/2" | 1/2" | 1/2" | Sq. End | 1.250" | 5" | FM-201-16 | FM-201-16-DLC | 1/2" DIAMETER |
| | 1/2" | 1/2" | 1/2" | 0.03" | 1.250" | 5" | FM-201-16-030 | FM-201-16-030-DLC | |
| | 1/2" | 1/2" | 1/2" | 0.06" | 1.250" | 5" | FM-201-16-060 | FM-201-16-060-DLC | |
| | 1/2" | 1/2" | 1/2" | 0.09" | 1.250" | 5" | FM-201-16-090 | FM-201-16-090-DLC | |
| | 1/2" | 1/2" | 1/2" | 0.12" | 1.250" | 5" | FM-201-16-120 | FM-201-16-120-DLC | |
| | 1/2" | 1/2" | 1/2" | Ball End | 1.250" | 5" | FM-201-16-BN | FM-201-16-BN-DLC | |
| MEDIUM | 1/2" | 1/2" | 1/2" | Sq. End | 1.625" | 5" | FM-202-16 | FM-202-16-DLC | |
| | 1/2" | 1/2" | 1/2" | 0.03" | 1.625" | 5" | FM-202-16-030 | FM-202-16-030-DLC | |
| | 1/2" | 1/2" | 1/2" | 0.06" | 1.625" | 5" | FM-202-16-060 | FM-202-16-060-DLC | |
| | 1/2" | 1/2" | 1/2" | 0.09" | 1.625" | 5" | FM-202-16-090 | FM-202-16-090-DLC | |
| | 1/2" | 1/2" | 1/2" | 0.12" | 1.625" | 5" | FM-202-16-120 | FM-202-16-120-DLC | |
| | 1/2" | 1/2" | 1/2" | Ball End | 1.625" | 5" | FM-202-16-BN | FM-202-16-BN-DLC | |
| LONG | 1/2" | 1/2" | 1/2" | Sq. End | 2.125" | 5" | FM-204-16 | FM-204-16-DLC | |
| | 1/2" | 1/2" | 1/2" | 0.03" | 2.125" | 5" | FM-204-16-030 | FM-204-16-030-DLC | |
| | 1/2" | 1/2" | 1/2" | 0.06" | 2.125" | 5" | FM-204-16-060 | FM-204-16-060-DLC | |
| | 1/2" | 1/2" | 1/2" | 0.09" | 2.125" | 5" | FM-204-16-090 | FM-204-16-090-DLC | |
| | 1/2" | 1/2" | 1/2" | 0.12" | 2.125" | 5" | FM-204-16-120 | FM-204-16-120-DLC | |
| | 1/2" | 1/2" | 1/2" | Ball End | 2.125" | 5" | FM-204-16-BN | FM-204-16-BN-DLC | |

*Other Reach Lengths available upon request.

CONTINUED ON NEXT PAGE—

FM 2 Flute High Performance Tools for Aluminum


NEW!

FM 2 Flute (Short to Long Reach) —CONTINUED FROM PREVIOUS



| | Cutting Diameter | Shank Diameter | Flute Length | Corner Radius | Reach Length* | Overall Length | Tool Number Uncoated | Tool Number DLC Coated | |
|------------|------------------|----------------|--------------|---------------|---------------|----------------|----------------------|------------------------|------------------|
| EXTRA LONG | 1/2" | 1/2" | 1/2" | Sq. End | 2.625" | 5" | FM-205-16 | FM-205-16-DLC | 1/2" DIAMETER |
| | 1/2" | 1/2" | 1/2" | 0.03" | 2.625" | 5" | FM-205-16-030 | FM-205-16-030-DLC | |
| | 1/2" | 1/2" | 1/2" | 0.06" | 2.625" | 5" | FM-205-16-060 | FM-205-16-060-DLC | |
| | 1/2" | 1/2" | 1/2" | 0.09" | 2.625" | 5" | FM-205-16-090 | FM-205-16-090-DLC | |
| | 1/2" | 1/2" | 1/2" | 0.12" | 2.625" | 5" | FM-205-16-120 | FM-205-16-120-DLC | |
| | 1/2" | 1/2" | 1/2" | Ball End | 2.625" | 5" | FM-205-16-BN | FM-205-16-BN-DLC | |
| SHORT | 5/8" | 5/8" | 5/8" | Sq. End | 1.500" | 6" | FM-201-20 | FM-201-20-DLC | 5/8" DIAMETER |
| | 5/8" | 5/8" | 5/8" | 0.03" | 1.500" | 6" | FM-201-20-030 | FM-201-20-030-DLC | |
| | 5/8" | 5/8" | 5/8" | 0.06" | 1.500" | 6" | FM-201-20-060 | FM-201-20-060-DLC | |
| | 5/8" | 5/8" | 5/8" | 0.09" | 1.500" | 6" | FM-201-20-090 | FM-201-20-090-DLC | |
| | 5/8" | 5/8" | 5/8" | 0.12" | 1.500" | 6" | FM-201-20-120 | FM-201-20-120-DLC | |
| | 5/8" | 5/8" | 5/8" | Ball End | 1.500" | 6" | FM-201-20-BN | FM-201-20-BN-DLC | |
| MEDIUM | 5/8" | 5/8" | 5/8" | Sq. End | 2.063" | 6" | FM-202-20 | FM-202-20-DLC | |
| | 5/8" | 5/8" | 5/8" | 0.03" | 2.063" | 6" | FM-202-20-030 | FM-202-20-030-DLC | |
| | 5/8" | 5/8" | 5/8" | 0.06" | 2.063" | 6" | FM-202-20-060 | FM-202-20-060-DLC | |
| | 5/8" | 5/8" | 5/8" | 0.09" | 2.063" | 6" | FM-202-20-090 | FM-202-20-090-DLC | |
| | 5/8" | 5/8" | 5/8" | 0.12" | 2.063" | 6" | FM-202-20-120 | FM-202-20-120-DLC | |
| | 5/8" | 5/8" | 5/8" | Ball End | 2.063" | 6" | FM-202-20-BN | FM-202-20-BN-DLC | |
| LONG | 5/8" | 5/8" | 5/8" | Sq. End | 2.625" | 6" | FM-204-20 | FM-204-20-DLC | |
| | 5/8" | 5/8" | 5/8" | 0.03" | 2.625" | 6" | FM-204-20-030 | FM-204-20-030-DLC | |
| | 5/8" | 5/8" | 5/8" | 0.06" | 2.625" | 6" | FM-204-20-060 | FM-204-20-060-DLC | |
| | 5/8" | 5/8" | 5/8" | 0.09" | 2.625" | 6" | FM-204-20-090 | FM-204-20-090-DLC | |
| | 5/8" | 5/8" | 5/8" | 0.12" | 2.625" | 6" | FM-204-20-120 | FM-204-20-120-DLC | |
| | 5/8" | 5/8" | 5/8" | Ball End | 2.625" | 6" | FM-204-20-BN | FM-204-20-BN-DLC | |
| EXTRA LONG | 5/8" | 5/8" | 5/8" | Sq. End | 3.125" | 6" | FM-205-20 | FM-205-20-DLC | |
| | 5/8" | 5/8" | 5/8" | 0.03" | 3.125" | 6" | FM-205-20-030 | FM-205-20-030-DLC | |
| | 5/8" | 5/8" | 5/8" | 0.06" | 3.125" | 6" | FM-205-20-060 | FM-205-20-060-DLC | |
| | 5/8" | 5/8" | 5/8" | 0.09" | 3.125" | 6" | FM-205-20-090 | FM-205-20-090-DLC | |
| | 5/8" | 5/8" | 5/8" | 0.12" | 3.125" | 6" | FM-205-20-120 | FM-205-20-120-DLC | |
| | 5/8" | 5/8" | 5/8" | Ball End | 3.125" | 6" | FM-205-20-BN | FM-205-20-BN-DLC | |
| SHORT | 3/4" | 3/4" | 3/4" | Sq. End | 2.000" | 6" | FM-201-24 | FM-201-24-DLC | 3/4" DIAMETER |
| | 3/4" | 3/4" | 3/4" | 0.03" | 2.000" | 6" | FM-201-24-030 | FM-201-24-030-DLC | |
| | 3/4" | 3/4" | 3/4" | 0.06" | 2.000" | 6" | FM-201-24-060 | FM-201-24-060-DLC | |
| | 3/4" | 3/4" | 3/4" | 0.09" | 2.000" | 6" | FM-201-24-090 | FM-201-24-090-DLC | |
| | 3/4" | 3/4" | 3/4" | 0.12" | 2.000" | 6" | FM-201-24-120 | FM-201-24-120-DLC | |
| | 3/4" | 3/4" | 3/4" | Ball End | 2.000" | 6" | FM-201-24-BN | FM-201-24-BN-DLC | |
| MEDIUM | 3/4" | 3/4" | 3/4" | Sq. End | 2.563" | 6" | FM-202-24 | FM-202-24-DLC | |
| | 3/4" | 3/4" | 3/4" | 0.03" | 2.563" | 6" | FM-202-24-030 | FM-202-24-030-DLC | |
| | 3/4" | 3/4" | 3/4" | 0.06" | 2.563" | 6" | FM-202-24-060 | FM-202-24-060-DLC | |
| | 3/4" | 3/4" | 3/4" | 0.09" | 2.563" | 6" | FM-202-24-090 | FM-202-24-090-DLC | |
| | 3/4" | 3/4" | 3/4" | 0.12" | 2.563" | 6" | FM-202-24-120 | FM-202-24-120-DLC | |
| | 3/4" | 3/4" | 3/4" | Ball End | 2.563" | 6" | FM-202-24-BN | FM-202-24-BN-DLC | |
| LONG | 3/4" | 3/4" | 3/4" | Sq. End | 3.125" | 6" | FM-204-24 | FM-204-24-DLC | |
| | 3/4" | 3/4" | 3/4" | 0.03" | 3.125" | 6" | FM-204-24-030 | FM-204-24-030-DLC | |
| | 3/4" | 3/4" | 3/4" | 0.06" | 3.125" | 6" | FM-204-24-060 | FM-204-24-060-DLC | |
| | 3/4" | 3/4" | 3/4" | 0.09" | 3.125" | 6" | FM-204-24-090 | FM-204-24-090-DLC | |
| | 3/4" | 3/4" | 3/4" | 0.12" | 3.125" | 6" | FM-204-24-120 | FM-204-24-120-DLC | |
| | 3/4" | 3/4" | 3/4" | Ball End | 3.125" | 6" | FM-204-24-BN | FM-204-24-BN-DLC | |
| EXTRA LONG | 3/4" | 3/4" | 3/4" | Sq. End | 3.750" | 6" | FM-205-24 | FM-205-24-DLC | |
| | 3/4" | 3/4" | 3/4" | 0.03" | 3.750" | 6" | FM-205-24-030 | FM-205-24-030-DLC | |
| | 3/4" | 3/4" | 3/4" | 0.06" | 3.750" | 6" | FM-205-24-060 | FM-205-24-060-DLC | |
| | 3/4" | 3/4" | 3/4" | 0.09" | 3.750" | 6" | FM-205-24-090 | FM-205-24-090-DLC | |
| | 3/4" | 3/4" | 3/4" | 0.12" | 3.750" | 6" | FM-205-24-120 | FM-205-24-120-DLC | |
| | 3/4" | 3/4" | 3/4" | Ball End | 3.750" | 6" | FM-205-24-BN | FM-205-24-BN-DLC | |

*Other Reach Lengths available upon request.

CONTINUED ON NEXT PAGE—

2 Flute High Performance Tools for Aluminum **FM**



NEW!

FM 2 Flute (Short to Long Reach) —CONTINUED FROM PREVIOUS



| | Cutting Diameter | Shank Diameter | Flute Length | Corner Radius | Reach Length* | Overall Length | Tool Number Uncoated | Tool Number DLC Coated | |
|------------|------------------|----------------|--------------|---------------|---------------|----------------|----------------------|------------------------|-------------|
| SHORT | 1" | 1" | 1" | Sq. End | 2.000" | 6" | FM-201-32 | FM-201-32-DLC | 1" DIAMETER |
| | 1" | 1" | 1" | 0.03" | 2.000" | 6" | FM-201-32-030 | FM-201-32-030-DLC | |
| | 1" | 1" | 1" | 0.06" | 2.000" | 6" | FM-201-32-060 | FM-201-32-060-DLC | |
| | 1" | 1" | 1" | 0.09" | 2.000" | 6" | FM-201-32-090 | FM-201-32-090-DLC | |
| | 1" | 1" | 1" | 0.12" | 2.000" | 6" | FM-201-32-120 | FM-201-32-120-DLC | |
| | 1" | 1" | 1" | Ball End | 2.000" | 6" | FM-201-32-BN | FM-201-32-BN-DLC | |
| MEDIUM | 1" | 1" | 1" | Sq. End | 3.000" | 6" | FM-202-32 | FM-202-32-DLC | |
| | 1" | 1" | 1" | 0.03" | 3.000" | 6" | FM-202-32-030 | FM-202-32-030-DLC | |
| | 1" | 1" | 1" | 0.06" | 3.000" | 6" | FM-202-32-060 | FM-202-32-060-DLC | |
| | 1" | 1" | 1" | 0.09" | 3.000" | 6" | FM-202-32-090 | FM-202-32-090-DLC | |
| | 1" | 1" | 1" | 0.12" | 3.000" | 6" | FM-202-32-120 | FM-202-32-120-DLC | |
| | 1" | 1" | 1" | Ball End | 3.000" | 6" | FM-202-32-BN | FM-202-32-BN-DLC | |
| LONG | 1" | 1" | 1" | Sq. End | 3.500" | 6" | FM-203-32 | FM-203-32-DLC | |
| | 1" | 1" | 1" | 0.03" | 3.500" | 6" | FM-203-32-030 | FM-203-32-030-DLC | |
| | 1" | 1" | 1" | 0.06" | 3.500" | 6" | FM-203-32-060 | FM-203-32-060-DLC | |
| | 1" | 1" | 1" | 0.09" | 3.500" | 6" | FM-203-32-090 | FM-203-32-090-DLC | |
| | 1" | 1" | 1" | 0.12" | 3.500" | 6" | FM-203-32-120 | FM-203-32-120-DLC | |
| | 1" | 1" | 1" | Ball End | 3.500" | 6" | FM-203-32-BN | FM-203-32-BN-DLC | |
| EXTRA LONG | 1" | 1" | 1" | Sq. End | 4.000" | 6" | FM-204-32 | FM-204-32-DLC | |
| | 1" | 1" | 1" | 0.03" | 4.000" | 6" | FM-204-32-030 | FM-204-32-030-DLC | |
| | 1" | 1" | 1" | 0.06" | 4.000" | 6" | FM-204-32-060 | FM-204-32-060-DLC | |
| | 1" | 1" | 1" | 0.09" | 4.000" | 6" | FM-204-32-090 | FM-204-32-090-DLC | |
| | 1" | 1" | 1" | 0.12" | 4.000" | 6" | FM-204-32-120 | FM-204-32-120-DLC | |
| | 1" | 1" | 1" | Ball End | 4.000" | 6" | FM-204-32-BN | FM-204-32-BN-DLC | |

*Other Reach Lengths available upon request.

Need a Different Reach?

Any neck length available at same price!

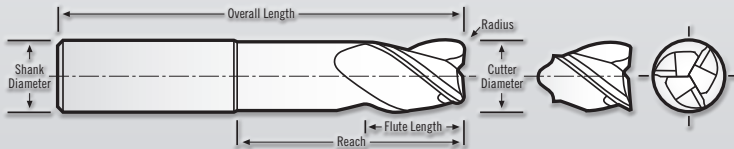
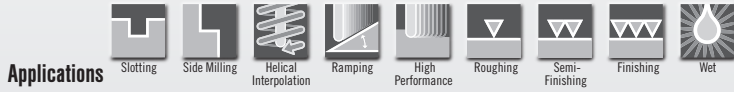
Eliminate Tool Pull Out!
 1/4"–5/16" h5 Shank Tolerance
 3/8"–1" h4 Shank Tolerance
 Tightest in the Industry!

FM SERIES SPEEDS & FEEDS

| Tool Diameter | Typical Z-Depth | Aluminum 6061-T6 | | Aluminum 6061-T3 | | Aluminum 7075 | | Aluminum 2024 | |
|---------------|-----------------|------------------|---------|------------------|---------|---------------|---------|---------------|---------|
| | | RPM | CLPT | RPM | CLPT | RPM | CLPT | RPM | CLPT |
| 1/4" | 0.1500" | Max | 0.0040" | Max | 0.0035" | Max | 0.0040" | Max | 0.0040" |
| 5/16" | 0.1500" | Max | 0.0050" | Max | 0.0044" | Max | 0.0050" | Max | 0.0050" |
| 3/8" | 0.1875" | Max | 0.0060" | Max | 0.0053" | Max | 0.0060" | Max | 0.0060" |
| 1/2" | 0.2000" | Max | 0.0080" | Max | 0.0070" | Max | 0.0080" | Max | 0.0080" |
| 5/8" | 0.2000" | Max | 0.0100" | Max | 0.0088" | Max | 0.0100" | Max | 0.0100" |
| 3/4" | 0.2500" | Max | 0.0120" | Max | 0.0105" | Max | 0.0120" | Max | 0.0120" |
| 1" | 0.2500" | Max | 0.0160" | Max | 0.0140" | Max | 0.0160" | Max | 0.0160" |

Z-Depth of cut per pass should be deeper than the corner radius to help reduce chatter

FM 3 Flute High Performance Tools for Aluminum



FM Series Tolerances:
 Cutting Dia. = $-.001/-0.0015$ "
 Shank Dia. = $-.0001/-0.0002$ "
 Flute Length = $+.060/-0.000$ "
 OAL = $\pm .060$ "



NEW!

FM 3 Flute (Short to Long Reach)

| | Cutting Diameter | Shank Diameter | Flute Length | Corner Radius | Reach Length* | Overall Length | Tool Number Uncoated | Tool Number DLC Coated | |
|------------|------------------|----------------|--------------|---------------|---------------|----------------|----------------------|------------------------|----------------|
| SHORT | 1/4" | 1/4" | 1/4" | Sq. End | 0.625" | 3" | FM-301-08 | FM-301-08-DLC | 1/4" DIAMETER |
| | 1/4" | 1/4" | 1/4" | 0.03" | 0.625" | 3" | FM-301-08-030 | FM-301-08-030-DLC | |
| | 1/4" | 1/4" | 1/4" | 0.06" | 0.625" | 3" | FM-301-08-060 | FM-301-08-060-DLC | |
| | 1/4" | 1/4" | 1/4" | 0.09" | 0.625" | 3" | FM-301-08-090 | FM-301-08-090-DLC | |
| | 1/4" | 1/4" | 1/4" | Ball End | 0.625" | 3" | FM-301-08-BN | FM-301-08-BN-DLC | |
| MEDIUM | 1/4" | 1/4" | 1/4" | Sq. End | 0.875" | 3" | FM-302-08 | FM-302-08-DLC | 1/4" DIAMETER |
| | 1/4" | 1/4" | 1/4" | 0.03" | 0.875" | 3" | FM-302-08-030 | FM-302-08-030-DLC | |
| | 1/4" | 1/4" | 1/4" | 0.06" | 0.875" | 3" | FM-302-08-060 | FM-302-08-060-DLC | |
| | 1/4" | 1/4" | 1/4" | 0.09" | 0.875" | 3" | FM-302-08-090 | FM-302-08-090-DLC | |
| | 1/4" | 1/4" | 1/4" | Ball End | 0.875" | 3" | FM-302-08-BN | FM-302-08-BN-DLC | |
| LONG | 1/4" | 1/4" | 1/4" | Sq. End | 1.063" | 3" | FM-304-08 | FM-304-08-DLC | 1/4" DIAMETER |
| | 1/4" | 1/4" | 1/4" | 0.03" | 1.063" | 3" | FM-304-08-030 | FM-304-08-030-DLC | |
| | 1/4" | 1/4" | 1/4" | 0.06" | 1.063" | 3" | FM-304-08-060 | FM-304-08-060-DLC | |
| | 1/4" | 1/4" | 1/4" | 0.09" | 1.063" | 3" | FM-304-08-090 | FM-304-08-090-DLC | |
| | 1/4" | 1/4" | 1/4" | Ball End | 1.063" | 3" | FM-304-08-BN | FM-304-08-BN-DLC | |
| EXTRA LONG | 1/4" | 1/4" | 1/4" | Sq. End | 1.500" | 3" | FM-305-08 | FM-305-08-DLC | 1/4" DIAMETER |
| | 1/4" | 1/4" | 1/4" | 0.03" | 1.500" | 3" | FM-305-08-030 | FM-305-08-030-DLC | |
| | 1/4" | 1/4" | 1/4" | 0.06" | 1.500" | 3" | FM-305-08-060 | FM-305-08-060-DLC | |
| | 1/4" | 1/4" | 1/4" | 0.09" | 1.500" | 3" | FM-305-08-090 | FM-305-08-090-DLC | |
| | 1/4" | 1/4" | 1/4" | Ball End | 1.500" | 3" | FM-305-08-BN | FM-305-08-BN-DLC | |
| SHORT | 5/16" | 5/16" | 5/16" | Sq. End | 0.875" | 3-1/8" | FM-301-10 | FM-301-10-DLC | 5/16" DIAMETER |
| | 5/16" | 5/16" | 5/16" | 0.03" | 0.875" | 3-1/8" | FM-301-10-030 | FM-301-10-030-DLC | |
| | 5/16" | 5/16" | 5/16" | 0.06" | 0.875" | 3-1/8" | FM-301-10-060 | FM-301-10-060-DLC | |
| | 5/16" | 5/16" | 5/16" | 0.09" | 0.875" | 3-1/8" | FM-301-10-090 | FM-301-10-090-DLC | |
| | 5/16" | 5/16" | 5/16" | 0.12" | 0.875" | 3-1/8" | FM-301-10-120 | FM-301-10-120-DLC | |
| MEDIUM | 5/16" | 5/16" | 5/16" | Ball End | 0.875" | 3-1/8" | FM-301-10-BN | FM-301-10-BN-DLC | 5/16" DIAMETER |
| | 5/16" | 5/16" | 5/16" | Sq. End | 1.094" | 3-1/8" | FM-302-10 | FM-302-10-DLC | |
| | 5/16" | 5/16" | 5/16" | 0.03" | 1.094" | 3-1/8" | FM-302-10-030 | FM-302-10-030-DLC | |
| | 5/16" | 5/16" | 5/16" | 0.06" | 1.094" | 3-1/8" | FM-302-10-060 | FM-302-10-060-DLC | |
| | 5/16" | 5/16" | 5/16" | 0.09" | 1.094" | 3-1/8" | FM-302-10-090 | FM-302-10-090-DLC | |
| MEDIUM | 5/16" | 5/16" | 5/16" | 0.12" | 1.094" | 3-1/8" | FM-302-10-120 | FM-302-10-120-DLC | 5/16" DIAMETER |
| | 5/16" | 5/16" | 5/16" | Ball End | 1.094" | 3-1/8" | FM-302-10-BN | FM-302-10-BN-DLC | |
| | 5/16" | 5/16" | 5/16" | Ball End | 1.094" | 3-1/8" | FM-302-10-BN | FM-302-10-BN-DLC | |

*Other Reach Lengths available on request.

3 Flute High Performance Tools for Aluminum **FM**



NEW!

FM 3 Flute (Short to Long Reach) —CONTINUED FROM PREVIOUS



| | Cutting Diameter | Shank Diameter | Flute Length | Corner Radius | Reach Length* | Overall Length | Tool Number Uncoated | Tool Number DLC Coated | |
|------------|------------------|----------------|--------------|---------------|---------------|----------------|----------------------|------------------------|----------------|
| LONG | 5/16" | 5/16" | 5/16" | Sq. End | 1.313" | 3-1/8" | FM-304-10 | FM-304-10-DLC | 5/16" DIAMETER |
| | 5/16" | 5/16" | 5/16" | 0.03" | 1.313" | 3-1/8" | FM-304-10-030 | FM-304-10-030-DLC | |
| | 5/16" | 5/16" | 5/16" | 0.06" | 1.313" | 3-1/8" | FM-304-10-060 | FM-304-10-060-DLC | |
| | 5/16" | 5/16" | 5/16" | 0.09" | 1.313" | 3-1/8" | FM-304-10-090 | FM-304-10-090-DLC | |
| | 5/16" | 5/16" | 5/16" | 0.12" | 1.313" | 3-1/8" | FM-304-10-120 | FM-304-10-120-DLC | |
| | 5/16" | 5/16" | 5/16" | Ball End | 1.313" | 3-1/8" | FM-304-10-BN | FM-304-10-BN-DLC | |
| EXTRA LONG | 5/16" | 5/16" | 5/16" | Sq. End | 1.625" | 3-1/8" | FM-305-10 | FM-305-10-DLC | 5/16" DIAMETER |
| | 5/16" | 5/16" | 5/16" | 0.03" | 1.625" | 3-1/8" | FM-305-10-030 | FM-305-10-030-DLC | |
| | 5/16" | 5/16" | 5/16" | 0.06" | 1.625" | 3-1/8" | FM-305-10-060 | FM-305-10-060-DLC | |
| | 5/16" | 5/16" | 5/16" | 0.09" | 1.625" | 3-1/8" | FM-305-10-090 | FM-305-10-090-DLC | |
| | 5/16" | 5/16" | 5/16" | 0.12" | 1.625" | 3-1/8" | FM-305-10-120 | FM-305-10-120-DLC | |
| | 5/16" | 5/16" | 5/16" | Ball End | 1.625" | 3-1/8" | FM-305-10-BN | FM-305-10-BN-DLC | |
| SHORT | 3/8" | 3/8" | 3/8" | Sq. End | 1.000" | 4" | FM-301-12 | FM-301-12-DLC | 3/8" DIAMETER |
| | 3/8" | 3/8" | 3/8" | 0.03" | 1.000" | 4" | FM-301-12-030 | FM-301-12-030-DLC | |
| | 3/8" | 3/8" | 3/8" | 0.06" | 1.000" | 4" | FM-301-12-060 | FM-301-12-060-DLC | |
| | 3/8" | 3/8" | 3/8" | 0.09" | 1.000" | 4" | FM-301-12-090 | FM-301-12-090-DLC | |
| | 3/8" | 3/8" | 3/8" | 0.12" | 1.000" | 4" | FM-301-12-120 | FM-301-12-120-DLC | |
| | 3/8" | 3/8" | 3/8" | Ball End | 1.000" | 4" | FM-301-12-BN | FM-301-12-BN-DLC | |
| MEDIUM | 3/8" | 3/8" | 3/8" | Sq. End | 1.250" | 4" | FM-302-12 | FM-302-12-DLC | 3/8" DIAMETER |
| | 3/8" | 3/8" | 3/8" | 0.03" | 1.250" | 4" | FM-302-12-030 | FM-302-12-030-DLC | |
| | 3/8" | 3/8" | 3/8" | 0.06" | 1.250" | 4" | FM-302-12-060 | FM-302-12-060-DLC | |
| | 3/8" | 3/8" | 3/8" | 0.09" | 1.250" | 4" | FM-302-12-090 | FM-302-12-090-DLC | |
| | 3/8" | 3/8" | 3/8" | 0.12" | 1.250" | 4" | FM-302-12-120 | FM-302-12-120-DLC | |
| | 3/8" | 3/8" | 3/8" | Ball End | 1.250" | 4" | FM-302-12-BN | FM-302-12-BN-DLC | |
| LONG | 3/8" | 3/8" | 3/8" | Sq. End | 1.563" | 4" | FM-304-12 | FM-304-12-DLC | 3/8" DIAMETER |
| | 3/8" | 3/8" | 3/8" | 0.03" | 1.563" | 4" | FM-304-12-030 | FM-304-12-030-DLC | |
| | 3/8" | 3/8" | 3/8" | 0.06" | 1.563" | 4" | FM-304-12-060 | FM-304-12-060-DLC | |
| | 3/8" | 3/8" | 3/8" | 0.09" | 1.563" | 4" | FM-304-12-090 | FM-304-12-090-DLC | |
| | 3/8" | 3/8" | 3/8" | 0.12" | 1.563" | 4" | FM-304-12-120 | FM-304-12-120-DLC | |
| | 3/8" | 3/8" | 3/8" | Ball End | 1.563" | 4" | FM-304-12-BN | FM-304-12-BN-DLC | |
| EXTRA LONG | 3/8" | 3/8" | 3/8" | Sq. End | 2.125" | 4" | FM-305-12 | FM-305-12-DLC | 3/8" DIAMETER |
| | 3/8" | 3/8" | 3/8" | 0.03" | 2.125" | 4" | FM-305-12-030 | FM-305-12-030-DLC | |
| | 3/8" | 3/8" | 3/8" | 0.06" | 2.125" | 4" | FM-305-12-060 | FM-305-12-060-DLC | |
| | 3/8" | 3/8" | 3/8" | 0.09" | 2.125" | 4" | FM-305-12-090 | FM-305-12-090-DLC | |
| | 3/8" | 3/8" | 3/8" | 0.12" | 2.125" | 4" | FM-305-12-120 | FM-305-12-120-DLC | |
| | 3/8" | 3/8" | 3/8" | Ball End | 2.125" | 4" | FM-305-12-BN | FM-305-12-BN-DLC | |
| SHORT | 1/2" | 1/2" | 1/2" | Sq. End | 1.250" | 5" | FM-301-16 | FM-301-16-DLC | 1/2" DIAMETER |
| | 1/2" | 1/2" | 1/2" | 0.03" | 1.250" | 5" | FM-301-16-030 | FM-301-16-030-DLC | |
| | 1/2" | 1/2" | 1/2" | 0.06" | 1.250" | 5" | FM-301-16-060 | FM-301-16-060-DLC | |
| | 1/2" | 1/2" | 1/2" | 0.09" | 1.250" | 5" | FM-301-16-090 | FM-301-16-090-DLC | |
| | 1/2" | 1/2" | 1/2" | 0.12" | 1.250" | 5" | FM-301-16-120 | FM-301-16-120-DLC | |
| | 1/2" | 1/2" | 1/2" | Ball End | 1.250" | 5" | FM-301-16-BN | FM-301-16-BN-DLC | |
| MEDIUM | 1/2" | 1/2" | 1/2" | Sq. End | 1.625" | 5" | FM-302-16 | FM-302-16-DLC | 1/2" DIAMETER |
| | 1/2" | 1/2" | 1/2" | 0.03" | 1.625" | 5" | FM-302-16-030 | FM-302-16-030-DLC | |
| | 1/2" | 1/2" | 1/2" | 0.06" | 1.625" | 5" | FM-302-16-060 | FM-302-16-060-DLC | |
| | 1/2" | 1/2" | 1/2" | 0.09" | 1.625" | 5" | FM-302-16-090 | FM-302-16-090-DLC | |
| | 1/2" | 1/2" | 1/2" | 0.12" | 1.625" | 5" | FM-302-16-120 | FM-302-16-120-DLC | |
| | 1/2" | 1/2" | 1/2" | Ball End | 1.625" | 5" | FM-302-16-BN | FM-302-16-BN-DLC | |
| LONG | 1/2" | 1/2" | 1/2" | Sq. End | 2.125" | 5" | FM-304-16 | FM-304-16-DLC | 1/2" DIAMETER |
| | 1/2" | 1/2" | 1/2" | 0.03" | 2.125" | 5" | FM-304-16-030 | FM-304-16-030-DLC | |
| | 1/2" | 1/2" | 1/2" | 0.06" | 2.125" | 5" | FM-304-16-060 | FM-304-16-060-DLC | |
| | 1/2" | 1/2" | 1/2" | 0.09" | 2.125" | 5" | FM-304-16-090 | FM-304-16-090-DLC | |
| | 1/2" | 1/2" | 1/2" | 0.12" | 2.125" | 5" | FM-304-16-120 | FM-304-16-120-DLC | |
| | 1/2" | 1/2" | 1/2" | Ball End | 2.125" | 5" | FM-304-16-BN | FM-304-16-BN-DLC | |

*Other Reach Lengths available upon request.

FM 3 Flute High Performance Tools for Aluminum



NEW!

Eliminate Tool Pull Out!
 1/4"-5/16" h5 Shank Tolerance
 3/8"-1" h4 Shank Tolerance
Tightest in the Industry!

FM 3 Flute (Short to Long Reach) —CONTINUED FROM PREVIOUS

| | Cutting Diameter | Shank Diameter | Flute Length | Corner Radius | Reach Length* | Overall Length | Tool Number Uncoated | Tool Number Coated | |
|------------|------------------|----------------|--------------|---------------|---------------|----------------|----------------------|--------------------|------------------|
| EXTRA LONG | 1/2" | 1/2" | 1/2" | Sq. End | 2.625" | 5" | FM-305-16 | FM-305-16-DLC | 1/2" DIAMETER |
| | 1/2" | 1/2" | 1/2" | 0.03" | 2.625" | 5" | FM-305-16-030 | FM-305-16-030-DLC | |
| | 1/2" | 1/2" | 1/2" | 0.06" | 2.625" | 5" | FM-305-16-060 | FM-305-16-060-DLC | |
| | 1/2" | 1/2" | 1/2" | 0.09" | 2.625" | 5" | FM-305-16-090 | FM-305-16-090-DLC | |
| | 1/2" | 1/2" | 1/2" | 0.12" | 2.625" | 5" | FM-305-16-120 | FM-305-16-120-DLC | |
| | 1/2" | 1/2" | 1/2" | Ball End | 2.625" | 5" | FM-305-16-BN | FM-305-16-BN-DLC | |
| SHORT | 5/8" | 5/8" | 5/8" | Sq. End | 1.500" | 6" | FM-301-20 | FM-301-20-DLC | 5/8" DIAMETER |
| | 5/8" | 5/8" | 5/8" | 0.03" | 1.500" | 6" | FM-301-20-030 | FM-301-20-030-DLC | |
| | 5/8" | 5/8" | 5/8" | 0.06" | 1.500" | 6" | FM-301-20-060 | FM-301-20-060-DLC | |
| | 5/8" | 5/8" | 5/8" | 0.09" | 1.500" | 6" | FM-301-20-090 | FM-301-20-090-DLC | |
| | 5/8" | 5/8" | 5/8" | 0.12" | 1.500" | 6" | FM-301-20-120 | FM-301-20-120-DLC | |
| | 5/8" | 5/8" | 5/8" | Ball End | 1.500" | 6" | FM-301-20-BN | FM-301-20-BN-DLC | |
| MEDIUM | 5/8" | 5/8" | 5/8" | Sq. End | 2.063" | 6" | FM-302-20 | FM-302-20-DLC | 5/8" DIAMETER |
| | 5/8" | 5/8" | 5/8" | 0.03" | 2.063" | 6" | FM-302-20-030 | FM-302-20-030-DLC | |
| | 5/8" | 5/8" | 5/8" | 0.06" | 2.063" | 6" | FM-302-20-060 | FM-302-20-060-DLC | |
| | 5/8" | 5/8" | 5/8" | 0.09" | 2.063" | 6" | FM-302-20-090 | FM-302-20-090-DLC | |
| | 5/8" | 5/8" | 5/8" | 0.12" | 2.063" | 6" | FM-302-20-120 | FM-302-20-120-DLC | |
| | 5/8" | 5/8" | 5/8" | Ball End | 2.063" | 6" | FM-302-20-BN | FM-302-20-BN-DLC | |
| LONG | 5/8" | 5/8" | 5/8" | Sq. End | 2.625" | 6" | FM-304-20 | FM-304-20-DLC | 5/8" DIAMETER |
| | 5/8" | 5/8" | 5/8" | 0.03" | 2.625" | 6" | FM-304-20-030 | FM-304-20-030-DLC | |
| | 5/8" | 5/8" | 5/8" | 0.06" | 2.625" | 6" | FM-304-20-060 | FM-304-20-060-DLC | |
| | 5/8" | 5/8" | 5/8" | 0.09" | 2.625" | 6" | FM-304-20-090 | FM-304-20-090-DLC | |
| | 5/8" | 5/8" | 5/8" | 0.12" | 2.625" | 6" | FM-304-20-120 | FM-304-20-120-DLC | |
| | 5/8" | 5/8" | 5/8" | Ball End | 2.625" | 6" | FM-304-20-BN | FM-304-20-BN-DLC | |
| EXTRA LONG | 5/8" | 5/8" | 5/8" | Sq. End | 3.125" | 6" | FM-305-20 | FM-305-20-DLC | 5/8" DIAMETER |
| | 5/8" | 5/8" | 5/8" | 0.03" | 3.125" | 6" | FM-305-20-030 | FM-305-20-030-DLC | |
| | 5/8" | 5/8" | 5/8" | 0.06" | 3.125" | 6" | FM-305-20-060 | FM-305-20-060-DLC | |
| | 5/8" | 5/8" | 5/8" | 0.09" | 3.125" | 6" | FM-305-20-090 | FM-305-20-090-DLC | |
| | 5/8" | 5/8" | 5/8" | 0.12" | 3.125" | 6" | FM-305-20-120 | FM-305-20-120-DLC | |
| | 5/8" | 5/8" | 5/8" | Ball End | 3.125" | 6" | FM-305-20-BN | FM-305-20-BN-DLC | |
| SHORT | 3/4" | 3/4" | 3/4" | Sq. End | 2.000" | 6" | FM-301-24 | FM-301-24-DLC | 3/4" DIAMETER |
| | 3/4" | 3/4" | 3/4" | 0.03" | 2.000" | 6" | FM-301-24-030 | FM-301-24-030-DLC | |
| | 3/4" | 3/4" | 3/4" | 0.06" | 2.000" | 6" | FM-301-24-060 | FM-301-24-060-DLC | |
| | 3/4" | 3/4" | 3/4" | 0.09" | 2.000" | 6" | FM-301-24-090 | FM-301-24-090-DLC | |
| | 3/4" | 3/4" | 3/4" | 0.12" | 2.000" | 6" | FM-301-24-120 | FM-301-24-120-DLC | |
| | 3/4" | 3/4" | 3/4" | Ball End | 2.000" | 6" | FM-301-24-BN | FM-301-24-BN-DLC | |
| MEDIUM | 3/4" | 3/4" | 3/4" | Sq. End | 2.563" | 6" | FM-302-24 | FM-302-24-DLC | 3/4" DIAMETER |
| | 3/4" | 3/4" | 3/4" | 0.03" | 2.563" | 6" | FM-302-24-030 | FM-302-24-030-DLC | |
| | 3/4" | 3/4" | 3/4" | 0.06" | 2.563" | 6" | FM-302-24-060 | FM-302-24-060-DLC | |
| | 3/4" | 3/4" | 3/4" | 0.09" | 2.563" | 6" | FM-302-24-090 | FM-302-24-090-DLC | |
| | 3/4" | 3/4" | 3/4" | 0.12" | 2.563" | 6" | FM-302-24-120 | FM-302-24-120-DLC | |
| | 3/4" | 3/4" | 3/4" | Ball End | 2.563" | 6" | FM-302-24-BN | FM-302-24-BN-DLC | |
| LONG | 3/4" | 3/4" | 3/4" | Sq. End | 3.125" | 6" | FM-304-24 | FM-304-24-DLC | 3/4" DIAMETER |
| | 3/4" | 3/4" | 3/4" | 0.03" | 3.125" | 6" | FM-304-24-030 | FM-304-24-030-DLC | |
| | 3/4" | 3/4" | 3/4" | 0.06" | 3.125" | 6" | FM-304-24-060 | FM-304-24-060-DLC | |
| | 3/4" | 3/4" | 3/4" | 0.09" | 3.125" | 6" | FM-304-24-090 | FM-304-24-090-DLC | |
| | 3/4" | 3/4" | 3/4" | 0.12" | 3.125" | 6" | FM-304-24-120 | FM-304-24-120-DLC | |
| | 3/4" | 3/4" | 3/4" | Ball End | 3.125" | 6" | FM-304-24-BN | FM-304-24-BN-DLC | |
| EXTRA LONG | 3/4" | 3/4" | 3/4" | Sq. End | 3.750" | 6" | FM-305-24 | FM-305-24-DLC | 3/4" DIAMETER |
| | 3/4" | 3/4" | 3/4" | 0.03" | 3.750" | 6" | FM-305-24-030 | FM-305-24-030-DLC | |
| | 3/4" | 3/4" | 3/4" | 0.06" | 3.750" | 6" | FM-305-24-060 | FM-305-24-060-DLC | |
| | 3/4" | 3/4" | 3/4" | 0.09" | 3.750" | 6" | FM-305-24-090 | FM-305-24-090-DLC | |
| | 3/4" | 3/4" | 3/4" | 0.12" | 3.750" | 6" | FM-305-24-120 | FM-305-24-120-DLC | |
| | 3/4" | 3/4" | 3/4" | Ball End | 3.750" | 6" | FM-305-24-BN | FM-305-24-BN-DLC | |

*Other Reach Lengths available upon request.

3 Flute High Performance Tools for Aluminum **FM**



NEW!

FM 3 Flute (Short to Long Reach) —CONTINUED FROM PREVIOUS

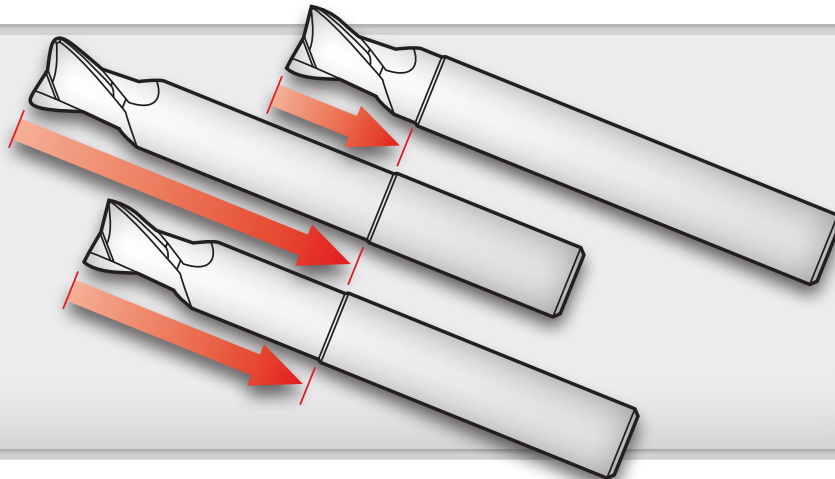


| | Cutting Diameter | Shank Diameter | Flute Length | Corner Radius | Reach Length* | Overall Length | Tool Number Uncoated | Tool Number DLC Coated | |
|------------|------------------|----------------|--------------|---------------|---------------|----------------|----------------------|------------------------|-------------|
| SHORT | 1" | 1" | 1" | Sq. End | 2.000" | 6" | FM-301-32 | FM-301-32-DLC | 1" DIAMETER |
| | 1" | 1" | 1" | 0.03" | 2.000" | 6" | FM-301-32-030 | FM-301-32-030-DLC | |
| | 1" | 1" | 1" | 0.06" | 2.000" | 6" | FM-301-32-060 | FM-301-32-060-DLC | |
| | 1" | 1" | 1" | 0.09" | 2.000" | 6" | FM-301-32-090 | FM-301-32-090-DLC | |
| | 1" | 1" | 1" | 0.12" | 2.000" | 6" | FM-301-32-120 | FM-301-32-120-DLC | |
| | 1" | 1" | 1" | Ball End | 2.000" | 6" | FM-301-32-BN | FM-301-32-BN-DLC | |
| MEDIUM | 1" | 1" | 1" | Sq. End | 3.000" | 6" | FM-302-32 | FM-302-32-DLC | |
| | 1" | 1" | 1" | 0.03" | 3.000" | 6" | FM-302-32-030 | FM-302-32-030-DLC | |
| | 1" | 1" | 1" | 0.06" | 3.000" | 6" | FM-302-32-060 | FM-302-32-060-DLC | |
| | 1" | 1" | 1" | 0.09" | 3.000" | 6" | FM-302-32-090 | FM-302-32-090-DLC | |
| | 1" | 1" | 1" | 0.12" | 3.000" | 6" | FM-302-32-120 | FM-302-32-120-DLC | |
| | 1" | 1" | 1" | Ball End | 3.000" | 6" | FM-302-32-BN | FM-302-32-BN-DLC | |
| LONG | 1" | 1" | 1" | Sq. End | 3.500" | 6" | FM-303-32 | FM-303-32-DLC | |
| | 1" | 1" | 1" | 0.03" | 3.500" | 6" | FM-303-32-030 | FM-303-32-030-DLC | |
| | 1" | 1" | 1" | 0.06" | 3.500" | 6" | FM-303-32-060 | FM-303-32-060-DLC | |
| | 1" | 1" | 1" | 0.09" | 3.500" | 6" | FM-303-32-090 | FM-303-32-090-DLC | |
| | 1" | 1" | 1" | 0.12" | 3.500" | 6" | FM-303-32-120 | FM-303-32-120-DLC | |
| | 1" | 1" | 1" | Ball End | 3.500" | 6" | FM-303-32-BN | FM-303-32-BN-DLC | |
| EXTRA LONG | 1" | 1" | 1" | Sq. End | 4.000" | 6" | FM-304-32 | FM-304-32-DLC | |
| | 1" | 1" | 1" | 0.03" | 4.000" | 6" | FM-304-32-030 | FM-304-32-030-DLC | |
| | 1" | 1" | 1" | 0.06" | 4.000" | 6" | FM-304-32-060 | FM-304-32-060-DLC | |
| | 1" | 1" | 1" | 0.09" | 4.000" | 6" | FM-304-32-090 | FM-304-32-090-DLC | |
| | 1" | 1" | 1" | 0.12" | 4.000" | 6" | FM-304-32-120 | FM-304-32-120-DLC | |
| | 1" | 1" | 1" | Ball End | 4.000" | 6" | FM-304-32-BN | FM-304-32-BN-DLC | |

*Other Reach Lengths available upon request.

Need a Different Reach?

Any neck length available at same price!



FM SERIES SPEEDS & FEEDS

| Tool Diameter | Typical Z-Depth | Aluminum 6061-T6 | | Aluminum 6061-T3 | | Aluminum 7075 | | Aluminum 2024 | |
|---------------|-----------------|------------------|---------|------------------|---------|---------------|---------|---------------|---------|
| | | RPM | CLPT | RPM | CLPT | RPM | CLPT | RPM | CLPT |
| 1/4" | 0.1500" | Max | 0.0040" | Max | 0.0035" | Max | 0.0040" | Max | 0.0040" |
| 5/16" | 0.1500" | Max | 0.0050" | Max | 0.0044" | Max | 0.0050" | Max | 0.0050" |
| 3/8" | 0.1875" | Max | 0.0060" | Max | 0.0053" | Max | 0.0060" | Max | 0.0060" |
| 1/2" | 0.2000" | Max | 0.0080" | Max | 0.0070" | Max | 0.0080" | Max | 0.0080" |
| 5/8" | 0.2000" | Max | 0.0100" | Max | 0.0088" | Max | 0.0100" | Max | 0.0100" |
| 3/4" | 0.2500" | Max | 0.0120" | Max | 0.0105" | Max | 0.0120" | Max | 0.0120" |
| 1" | 0.2500" | Max | 0.0160" | Max | 0.0140" | Max | 0.0160" | Max | 0.0160" |

Z-Depth of cut per pass should be deeper than the corner radius to help reduce chatter

MFM Metric 2 Flute High Performance Tools for Aluminum

Characteristics

- Corner Radius
- 2 Flute
- 40° Helix
- Feather Blend
- Necked
- Mirror Edge

Applications

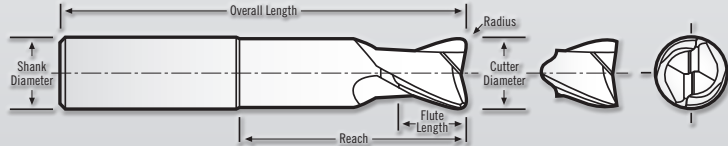
- Slotting
- Side Milling
- Helical Interpolation
- Ramping
- High Performance
- 3-D
- Roughing
- Semi-Finishing
- Finishing
- Wet

Materials

- Aluminum
- Copper
- Magnesium
- BRASS

Coatings

- Diamond-Like Carbon (DLC)



MFM Series comes with Mirror Edge!
for Chatter Reduction

Eliminate Tool Pull Out!
6-8mm h5 Shank Tolerance
10-25mm h4 Shank Tolerance
Tightest in the Industry!

MFM Series Tolerances:

Cutting Dia. = $-0.025/-0.038$ mm
 Shank Dia. = $-0.002/-0.005$ mm
 Flute Length (<10D) = $+0.750/-0.000$ mm
 (>10D) = $+1.500/-0.000$ mm
 OAL = $+/- 1.000$ mm



MFM 2 Flute Metric (Short to Long Reach) METRIC

| | Cutting Diameter | Shank Diameter | Flute Length | Corner Radius | Reach Length* | Overall Length | Tool Number Uncoated | Tool Number DLC Coated | |
|--------|------------------|----------------|--------------|---------------|---------------|----------------|----------------------|------------------------|---------------|
| S | 6mm | 6mm | 7mm | Sq. End | 12mm | 75mm | MFM-201-06 | MFM-201-06-DLC | 6 mm DIAMETER |
| | 6mm | 6mm | 7mm | 0.5mm | 12mm | 75mm | MFM-201-06-050 | MFM-201-06-050-DLC | |
| | 6mm | 6mm | 7mm | 1.0mm | 12mm | 75mm | MFM-201-06-100 | MFM-201-06-100-DLC | |
| | 6mm | 6mm | 7mm | Ball End | 12mm | 75mm | MFM-201-06-BN | MFM-201-06-BN-DLC | |
| M | 6mm | 6mm | 7mm | Sq. End | 18mm | 75mm | MFM-202-06 | MFM-202-06-DLC | |
| | 6mm | 6mm | 7mm | 0.5mm | 18mm | 75mm | MFM-202-06-050 | MFM-202-06-050-DLC | |
| | 6mm | 6mm | 7mm | 1.0mm | 18mm | 75mm | MFM-202-06-100 | MFM-202-06-100-DLC | |
| L | 6mm | 6mm | 7mm | Ball End | 18mm | 75mm | MFM-202-06-BN | MFM-202-06-BN-DLC | |
| | 6mm | 6mm | 7mm | Sq. End | 24mm | 75mm | MFM-203-06 | MFM-203-06-DLC | |
| | 6mm | 6mm | 7mm | 0.5mm | 24mm | 75mm | MFM-203-06-050 | MFM-203-06-050-DLC | |
| XL | 6mm | 6mm | 7mm | 1.0mm | 24mm | 75mm | MFM-203-06-100 | MFM-203-06-100-DLC | |
| | 6mm | 6mm | 7mm | Ball End | 24mm | 75mm | MFM-203-06-BN | MFM-203-06-BN-DLC | |
| | 6mm | 6mm | 7mm | Sq. End | 30mm | 75mm | MFM-204-06 | MFM-204-06-DLC | |
| | 6mm | 6mm | 7mm | 0.5mm | 30mm | 75mm | MFM-204-06-050 | MFM-204-06-050-DLC | |
| SHORT | 6mm | 6mm | 7mm | 1.0mm | 30mm | 75mm | MFM-204-06-100 | MFM-204-06-100-DLC | 8 mm DIAMETER |
| | 6mm | 6mm | 7mm | Ball End | 30mm | 75mm | MFM-204-06-BN | MFM-204-06-BN-DLC | |
| | 8mm | 8mm | 9mm | Sq. End | 16mm | 80mm | MFM-201-08 | MFM-201-08-DLC | |
| | 8mm | 8mm | 9mm | 1.0mm | 16mm | 80mm | MFM-201-08-100 | MFM-201-08-100-DLC | |
| MED | 8mm | 8mm | 9mm | 2.0mm | 16mm | 80mm | MFM-201-08-200 | MFM-201-08-200-DLC | |
| | 8mm | 8mm | 9mm | 2.5mm | 16mm | 80mm | MFM-201-08-250 | MFM-201-08-250-DLC | |
| | 8mm | 8mm | 9mm | Ball End | 16mm | 80mm | MFM-201-08-BN | MFM-201-08-BN-DLC | |
| | 8mm | 8mm | 9mm | Sq. End | 24mm | 80mm | MFM-202-08 | MFM-202-08-DLC | |
| | 8mm | 8mm | 9mm | 1.0mm | 24mm | 80mm | MFM-202-08-100 | MFM-202-08-100-DLC | |
| LONG | 8mm | 8mm | 9mm | 2.0mm | 24mm | 80mm | MFM-202-08-200 | MFM-202-08-200-DLC | |
| | 8mm | 8mm | 9mm | 2.5mm | 24mm | 80mm | MFM-202-08-250 | MFM-202-08-250-DLC | |
| | 8mm | 8mm | 9mm | Ball End | 24mm | 80mm | MFM-202-08-BN | MFM-202-08-BN-DLC | |
| | 8mm | 8mm | 9mm | Sq. End | 32mm | 80mm | MFM-203-08 | MFM-203-08-DLC | |
| | 8mm | 8mm | 9mm | 1.0mm | 32mm | 80mm | MFM-203-08-100 | MFM-203-08-100-DLC | |
| X LONG | 8mm | 8mm | 9mm | 2.0mm | 32mm | 80mm | MFM-203-08-200 | MFM-203-08-200-DLC | |
| | 8mm | 8mm | 9mm | 2.5mm | 32mm | 80mm | MFM-203-08-250 | MFM-203-08-250-DLC | |
| | 8mm | 8mm | 9mm | Ball End | 32mm | 80mm | MFM-203-08-BN | MFM-203-08-BN-DLC | |
| | 8mm | 8mm | 9mm | Sq. End | 40mm | 80mm | MFM-204-08 | MFM-204-08-DLC | |
| | 8mm | 8mm | 9mm | 1.0mm | 40mm | 80mm | MFM-204-08-100 | MFM-204-08-100-DLC | |
| | 8mm | 8mm | 9mm | 2.0mm | 40mm | 80mm | MFM-204-08-200 | MFM-204-08-200-DLC | |
| | 8mm | 8mm | 9mm | 2.5mm | 40mm | 80mm | MFM-204-08-250 | MFM-204-08-250-DLC | |
| | 8mm | 8mm | 9mm | Ball End | 40mm | 80mm | MFM-204-08-BN | MFM-204-08-BN-DLC | |

*Other Reach Lengths available upon request.

Metric 2 Flute High Performance Tools for Aluminum

MFM



MFM 2 Flute Metric (Short to Long Reach) METRIC



| | Cutting Diameter | Shank Diameter | Flute Length | Corner Radius | Reach Length* | Overall Length | Tool Number Uncoated | Tool Number DLC Coated | |
|--------|------------------|----------------|--------------|---------------|---------------|----------------|----------------------|------------------------|----------------|
| S | 10mm | 10mm | 11mm | Sq. End | 20mm | 100mm | MFM-201-10 | MFM-201-10-DLC | 10 mm DIAMETER |
| | 10mm | 10mm | 11mm | 1.5mm | 20mm | 100mm | MFM-201-10-150 | MFM-201-10-150-DLC | |
| | 10mm | 10mm | 11mm | 2.5mm | 20mm | 100mm | MFM-201-10-250 | MFM-201-10-250-DLC | |
| | 10mm | 10mm | 11mm | Ball End | 20mm | 100mm | MFM-201-10-BN | MFM-201-10-BN-DLC | |
| M | 10mm | 10mm | 11mm | Sq. End | 30mm | 100mm | MFM-202-10 | MFM-202-10-DLC | |
| | 10mm | 10mm | 11mm | 1.5mm | 30mm | 100mm | MFM-202-10-150 | MFM-202-10-150-DLC | |
| | 10mm | 10mm | 11mm | 2.5mm | 30mm | 100mm | MFM-202-10-250 | MFM-202-10-250-DLC | |
| | 10mm | 10mm | 11mm | Ball End | 30mm | 100mm | MFM-202-10-BN | MFM-202-10-BN-DLC | |
| L | 10mm | 10mm | 11mm | Sq. End | 40mm | 100mm | MFM-203-10 | MFM-203-10-DLC | |
| | 10mm | 10mm | 11mm | 1.5mm | 40mm | 100mm | MFM-203-10-150 | MFM-203-10-150-DLC | |
| | 10mm | 10mm | 11mm | 2.5mm | 40mm | 100mm | MFM-203-10-250 | MFM-203-10-250-DLC | |
| | 10mm | 10mm | 11mm | Ball End | 40mm | 100mm | MFM-203-10-BN | MFM-203-10-BN-DLC | |
| XL | 10mm | 10mm | 11mm | Sq. End | 50mm | 100mm | MFM-204-10 | MFM-204-10-DLC | |
| | 10mm | 10mm | 11mm | 1.5mm | 50mm | 100mm | MFM-204-10-150 | MFM-204-10-150-DLC | |
| | 10mm | 10mm | 11mm | 2.5mm | 50mm | 100mm | MFM-204-10-250 | MFM-204-10-250-DLC | |
| | 10mm | 10mm | 11mm | Ball End | 50mm | 100mm | MFM-204-10-BN | MFM-204-10-BN-DLC | |
| S | 12mm | 12mm | 13mm | Sq. End | 24mm | 110mm | MFM-201-12 | MFM-201-12-DLC | 12 mm DIAMETER |
| | 12mm | 12mm | 13mm | 1.5mm | 24mm | 110mm | MFM-201-12-150 | MFM-201-12-150-DLC | |
| | 12mm | 12mm | 13mm | 2.5mm | 24mm | 110mm | MFM-201-12-250 | MFM-201-12-250-DLC | |
| | 12mm | 12mm | 13mm | 4.0mm | 24mm | 110mm | MFM-201-12-400 | MFM-201-12-400-DLC | |
| | 12mm | 12mm | 13mm | Ball End | 24mm | 110mm | MFM-201-12-BN | MFM-201-12-BN-DLC | |
| M | 12mm | 12mm | 13mm | Sq. End | 36mm | 110mm | MFM-202-12 | MFM-202-12-DLC | |
| | 12mm | 12mm | 13mm | 1.5mm | 36mm | 110mm | MFM-202-12-150 | MFM-202-12-150-DLC | |
| | 12mm | 12mm | 13mm | 2.5mm | 36mm | 110mm | MFM-202-12-250 | MFM-202-12-250-DLC | |
| | 12mm | 12mm | 13mm | 4.0mm | 36mm | 110mm | MFM-202-12-400 | MFM-202-12-400-DLC | |
| | 12mm | 12mm | 13mm | Ball End | 36mm | 110mm | MFM-202-12-BN | MFM-202-12-BN-DLC | |
| L | 12mm | 12mm | 13mm | Sq. End | 48mm | 110mm | MFM-203-12 | MFM-203-12-DLC | |
| | 12mm | 12mm | 13mm | 1.5mm | 48mm | 110mm | MFM-203-12-150 | MFM-203-12-150-DLC | |
| | 12mm | 12mm | 13mm | 2.5mm | 48mm | 110mm | MFM-203-12-250 | MFM-203-12-250-DLC | |
| | 12mm | 12mm | 13mm | 4.0mm | 48mm | 110mm | MFM-203-12-400 | MFM-203-12-400-DLC | |
| | 12mm | 12mm | 13mm | Ball End | 48mm | 110mm | MFM-203-12-BN | MFM-203-12-BN-DLC | |
| XL | 12mm | 12mm | 13mm | Sq. End | 60mm | 110mm | MFM-204-12 | MFM-204-12-DLC | |
| | 12mm | 12mm | 13mm | 1.5mm | 60mm | 110mm | MFM-204-12-150 | MFM-204-12-150-DLC | |
| | 12mm | 12mm | 13mm | 2.5mm | 60mm | 110mm | MFM-204-12-250 | MFM-204-12-250-DLC | |
| | 12mm | 12mm | 13mm | 4.0mm | 60mm | 110mm | MFM-204-12-400 | MFM-204-12-400-DLC | |
| | 12mm | 12mm | 13mm | Ball End | 60mm | 110mm | MFM-204-12-BN | MFM-204-12-BN-DLC | |
| SHORT | 16mm | 16mm | 17mm | Sq. End | 32mm | 130mm | MFM-201-16 | MFM-201-16-DLC | 16 mm DIAMETER |
| | 16mm | 16mm | 17mm | 2.0mm | 32mm | 130mm | MFM-201-16-200 | MFM-201-16-200-DLC | |
| | 16mm | 16mm | 17mm | 2.5mm | 32mm | 130mm | MFM-201-16-250 | MFM-201-16-250-DLC | |
| | 16mm | 16mm | 17mm | 3.0mm | 32mm | 130mm | MFM-201-16-300 | MFM-201-16-300-DLC | |
| | 16mm | 16mm | 17mm | 4.0mm | 32mm | 130mm | MFM-201-16-400 | MFM-201-16-400-DLC | |
| MEDIUM | 16mm | 16mm | 17mm | Ball End | 32mm | 130mm | MFM-201-16-BN | MFM-201-16-BN-DLC | |
| | 16mm | 16mm | 17mm | Sq. End | 48mm | 130mm | MFM-202-16 | MFM-202-16-DLC | |
| | 16mm | 16mm | 17mm | 2.0mm | 48mm | 130mm | MFM-202-16-200 | MFM-202-16-200-DLC | |
| | 16mm | 16mm | 17mm | 2.5mm | 48mm | 130mm | MFM-202-16-250 | MFM-202-16-250-DLC | |
| | 16mm | 16mm | 17mm | 3.0mm | 48mm | 130mm | MFM-202-16-300 | MFM-202-16-300-DLC | |
| LONG | 16mm | 16mm | 17mm | 4.0mm | 48mm | 130mm | MFM-202-16-400 | MFM-202-16-400-DLC | |
| | 16mm | 16mm | 17mm | Ball End | 48mm | 130mm | MFM-202-16-BN | MFM-202-16-BN-DLC | |
| | 16mm | 16mm | 17mm | Sq. End | 64mm | 130mm | MFM-203-16 | MFM-203-16-DLC | |
| | 16mm | 16mm | 17mm | 2.0mm | 64mm | 130mm | MFM-203-16-200 | MFM-203-16-200-DLC | |
| | 16mm | 16mm | 17mm | 2.5mm | 64mm | 130mm | MFM-203-16-250 | MFM-203-16-250-DLC | |
| 16mm | 16mm | 17mm | 3.0mm | 64mm | 130mm | MFM-203-16-300 | MFM-203-16-300-DLC | | |
| 16mm | 16mm | 17mm | 4.0mm | 64mm | 130mm | MFM-203-16-400 | MFM-203-16-400-DLC | | |
| 16mm | 16mm | 17mm | Ball End | 64mm | 130mm | MFM-203-16-BN | MFM-203-16-BN-DLC | | |

*Other Reach Lengths available upon request.

MFM Metric 2 Flute High Performance Tools for Aluminum



MFM 2 Flute Metric (Short to Long Reach) **METRIC** —CONTINUED FROM PREVIOUS



| | Cutting Diameter | Shank Diameter | Flute Length | Corner Radius | Reach Length* | Overall Length | Tool Number Uncoated | Tool Number DLC Coated | |
|--------|------------------|----------------|--------------|---------------|---------------|----------------|----------------------|------------------------|----------------|
| X LONG | 16mm | 16mm | 17mm | Sq. End | 80mm | 130mm | MFM-204-16 | MFM-204-16-DLC | 16 mm DIAMETER |
| | 16mm | 16mm | 17mm | 2.0mm | 80mm | 130mm | MFM-204-16-200 | MFM-204-16-200-DLC | |
| | 16mm | 16mm | 17mm | 2.5mm | 80mm | 130mm | MFM-204-16-250 | MFM-204-16-250-DLC | |
| | 16mm | 16mm | 17mm | 3.0mm | 80mm | 130mm | MFM-204-16-300 | MFM-204-16-300-DLC | |
| | 16mm | 16mm | 17mm | 4.0mm | 80mm | 130mm | MFM-204-16-400 | MFM-204-16-400-DLC | |
| | 16mm | 16mm | 17mm | Ball End | 80mm | 130mm | MFM-204-16-BN | MFM-204-16-BN-DLC | |
| SHORT | 20mm | 20mm | 21mm | Sq. End | 40mm | 150mm | MFM-201-20 | MFM-201-20-DLC | 20 mm DIAMETER |
| | 20mm | 20mm | 21mm | 2.0mm | 40mm | 150mm | MFM-201-20-200 | MFM-201-20-200-DLC | |
| | 20mm | 20mm | 21mm | 2.5mm | 40mm | 150mm | MFM-201-20-250 | MFM-201-20-250-DLC | |
| | 20mm | 20mm | 21mm | 3.0mm | 40mm | 150mm | MFM-201-20-300 | MFM-201-20-300-DLC | |
| | 20mm | 20mm | 21mm | 4.0mm | 40mm | 150mm | MFM-201-20-400 | MFM-201-20-400-DLC | |
| | 20mm | 20mm | 21mm | Ball End | 40mm | 150mm | MFM-201-20-BN | MFM-201-20-BN-DLC | |
| MEDIUM | 20mm | 20mm | 21mm | Sq. End | 60mm | 150mm | MFM-202-20 | MFM-202-20-DLC | 20 mm DIAMETER |
| | 20mm | 20mm | 21mm | 2.0mm | 60mm | 150mm | MFM-202-20-200 | MFM-202-20-200-DLC | |
| | 20mm | 20mm | 21mm | 2.5mm | 60mm | 150mm | MFM-202-20-250 | MFM-202-20-250-DLC | |
| | 20mm | 20mm | 21mm | 3.0mm | 60mm | 150mm | MFM-202-20-300 | MFM-202-20-300-DLC | |
| | 20mm | 20mm | 21mm | 4.0mm | 60mm | 150mm | MFM-202-20-400 | MFM-202-20-400-DLC | |
| | 20mm | 20mm | 21mm | Ball End | 60mm | 150mm | MFM-202-20-BN | MFM-202-20-BN-DLC | |
| LONG | 20mm | 20mm | 21mm | Sq. End | 80mm | 150mm | MFM-203-20 | MFM-203-20-DLC | 20 mm DIAMETER |
| | 20mm | 20mm | 21mm | 2.0mm | 80mm | 150mm | MFM-203-20-200 | MFM-203-20-200-DLC | |
| | 20mm | 20mm | 21mm | 2.5mm | 80mm | 150mm | MFM-203-20-250 | MFM-203-20-250-DLC | |
| | 20mm | 20mm | 21mm | 3.0mm | 80mm | 150mm | MFM-203-20-300 | MFM-203-20-300-DLC | |
| | 20mm | 20mm | 21mm | 4.0mm | 80mm | 150mm | MFM-203-20-400 | MFM-203-20-400-DLC | |
| | 20mm | 20mm | 21mm | Ball End | 80mm | 150mm | MFM-203-20-BN | MFM-203-20-BN-DLC | |
| X LONG | 20mm | 20mm | 21mm | Sq. End | 100mm | 150mm | MFM-204-20 | MFM-204-20-DLC | 20 mm DIAMETER |
| | 20mm | 20mm | 21mm | 2.0mm | 100mm | 150mm | MFM-204-20-200 | MFM-204-20-200-DLC | |
| | 20mm | 20mm | 21mm | 2.5mm | 100mm | 150mm | MFM-204-20-250 | MFM-204-20-250-DLC | |
| | 20mm | 20mm | 21mm | 3.0mm | 100mm | 150mm | MFM-204-20-300 | MFM-204-20-300-DLC | |
| | 20mm | 20mm | 21mm | 4.0mm | 100mm | 150mm | MFM-204-20-400 | MFM-204-20-400-DLC | |
| | 20mm | 20mm | 21mm | Ball End | 100mm | 150mm | MFM-204-20-BN | MFM-204-20-BN-DLC | |
| S | 25mm | 25mm | 26mm | Sq. End | 50mm | 165mm | MFM-201-25 | MFM-201-25-DLC | 25 mm DIAMETER |
| | 25mm | 25mm | 26mm | 2.5mm | 50mm | 165mm | MFM-201-25-250 | MFM-201-25-250-DLC | |
| | 25mm | 25mm | 26mm | 4.0mm | 50mm | 165mm | MFM-201-25-400 | MFM-201-25-400-DLC | |
| | 25mm | 25mm | 26mm | Ball End | 50mm | 165mm | MFM-201-25-BN | MFM-201-25-BN-DLC | |
| M | 25mm | 25mm | 26mm | Sq. End | 75mm | 165mm | MFM-202-25 | MFM-202-25-DLC | 25 mm DIAMETER |
| | 25mm | 25mm | 26mm | 2.5mm | 75mm | 165mm | MFM-202-25-250 | MFM-202-25-250-DLC | |
| | 25mm | 25mm | 26mm | 4.0mm | 75mm | 165mm | MFM-202-25-400 | MFM-202-25-400-DLC | |
| | 25mm | 25mm | 26mm | Ball End | 75mm | 165mm | MFM-202-25-BN | MFM-202-25-BN-DLC | |
| XL | 25mm | 25mm | 26mm | Sq. End | 100mm | 165mm | MFM-204-25 | MFM-204-25-DLC | 25 mm DIAMETER |
| | 25mm | 25mm | 26mm | 2.5mm | 100mm | 165mm | MFM-204-25-250 | MFM-204-25-250-DLC | |
| | 25mm | 25mm | 26mm | 4.0mm | 100mm | 165mm | MFM-204-25-400 | MFM-204-25-400-DLC | |
| | 25mm | 25mm | 26mm | Ball End | 100mm | 165mm | MFM-204-25-BN | MFM-204-25-BN-DLC | |

MFM SERIES SPEEDS & FEEDS

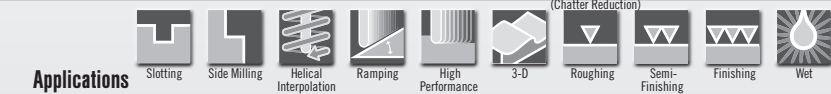
| Tool Diameter | Typical Z-Depth | Aluminum 6061-T6 | | Aluminum 6061-T3 | | Aluminum 7075 | | Aluminum 2024 | |
|---------------|-----------------|------------------|---------|------------------|---------|---------------|---------|---------------|---------|
| | | RPM | CLPT | RPM | CLPT | RPM | CLPT | RPM | CLPT |
| 6mm | 4mm | Max | 0.096mm | Max | 0.084mm | Max | 0.096mm | Max | 0.096mm |
| 8mm | 4mm | Max | 0.128mm | Max | 0.112mm | Max | 0.128mm | Max | 0.128mm |
| 10mm | 5mm | Max | 0.16mm | Max | 0.14mm | Max | 0.16mm | Max | 0.16mm |
| 12mm | 5mm | Max | 0.192mm | Max | 0.168mm | Max | 0.192mm | Max | 0.192mm |
| 16mm | 5mm | Max | 0.256mm | Max | 0.224mm | Max | 0.256mm | Max | 0.256mm |
| 20mm | 6.5mm | Max | 0.32mm | Max | 0.28mm | Max | 0.32mm | Max | 0.32mm |
| 25mm | 6.5mm | Max | 0.4mm | Max | 0.35mm | Max | 0.4mm | Max | 0.4mm |

Z-Depth of cut per pass should be deeper than the corner radius to help reduce chatter

Metric 3 Flute High Performance Tools for Aluminum **MFM**



Characteristics



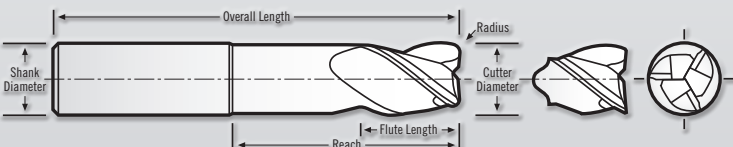
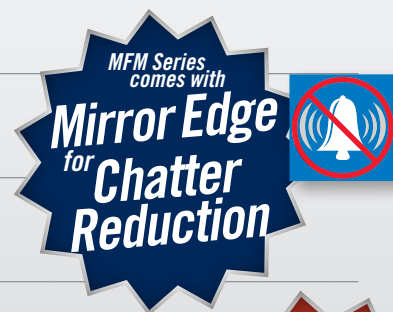
Applications



Materials



Coatings



MFM Series Tolerances:

Cutting Dia. = $-0,025/-0,038$ mm
 Shank Dia. = $-0,002/-0,005$ mm
 Flute Length (<10D) = $+0,750/-0,000$ mm
 (>10D) = $+1,500/-0,000$ mm
 OAL = $+/- 1,000$ mm



MFM 3 Flute Metric (Short to Long Reach)



| | Cutting Diameter | Shank Diameter | Flute Length | Corner Radius | Reach Length* | Overall Length | Tool Number Uncoated | Tool Number DLC Coated | |
|-------|------------------|----------------|--------------|---------------|---------------|----------------|----------------------|------------------------|---------------|
| S | 6mm | 6mm | 7mm | Sq. End | 12mm | 75mm | MFM-301-06 | MFM-301-06-DLC | 6 mm DIAMETER |
| | 6mm | 6mm | 7mm | 0,5mm | 12mm | 75mm | MFM-301-06-050 | MFM-301-06-050-DLC | |
| | 6mm | 6mm | 7mm | 1,0mm | 12mm | 75mm | MFM-301-06-100 | MFM-301-06-100-DLC | |
| | 6mm | 6mm | 7mm | Ball End | 12mm | 75mm | MFM-301-06-BN | MFM-301-06-BN-DLC | |
| M | 6mm | 6mm | 7mm | Sq. End | 18mm | 75mm | MFM-302-06 | MFM-302-06-DLC | |
| | 6mm | 6mm | 7mm | 0,5mm | 18mm | 75mm | MFM-302-06-050 | MFM-302-06-050-DLC | |
| | 6mm | 6mm | 7mm | 1,0mm | 18mm | 75mm | MFM-302-06-100 | MFM-302-06-100-DLC | |
| | 6mm | 6mm | 7mm | Ball End | 18mm | 75mm | MFM-302-06-BN | MFM-302-06-BN-DLC | |
| L | 6mm | 6mm | 7mm | Sq. End | 24mm | 75mm | MFM-303-06 | MFM-303-06-DLC | |
| | 6mm | 6mm | 7mm | 0,5mm | 24mm | 75mm | MFM-303-06-050 | MFM-303-06-050-DLC | |
| | 6mm | 6mm | 7mm | 1,0mm | 24mm | 75mm | MFM-303-06-100 | MFM-303-06-100-DLC | |
| | 6mm | 6mm | 7mm | Ball End | 24mm | 75mm | MFM-303-06-BN | MFM-303-06-BN-DLC | |
| XL | 6mm | 6mm | 7mm | Sq. End | 30mm | 75mm | MFM-304-06 | MFM-304-06-DLC | |
| | 6mm | 6mm | 7mm | 0,5mm | 30mm | 75mm | MFM-304-06-050 | MFM-304-06-050-DLC | |
| | 6mm | 6mm | 7mm | 1,0mm | 30mm | 75mm | MFM-304-06-100 | MFM-304-06-100-DLC | |
| | 6mm | 6mm | 7mm | Ball End | 30mm | 75mm | MFM-304-06-BN | MFM-304-06-BN-DLC | |
| SHORT | 8mm | 8mm | 9mm | Sq. End | 16mm | 80mm | MFM-301-08 | MFM-301-08-DLC | 8 mm DIAMETER |
| | 8mm | 8mm | 9mm | 1,0mm | 16mm | 80mm | MFM-301-08-100 | MFM-301-08-100-DLC | |
| | 8mm | 8mm | 9mm | 2,0mm | 16mm | 80mm | MFM-301-08-200 | MFM-301-08-200-DLC | |
| | 8mm | 8mm | 9mm | 2,5mm | 16mm | 80mm | MFM-301-08-250 | MFM-301-08-250-DLC | |
| | 8mm | 8mm | 9mm | Ball End | 16mm | 80mm | MFM-301-08-BN | MFM-301-08-BN-DLC | |
| MED | 8mm | 8mm | 9mm | Sq. End | 24mm | 80mm | MFM-302-08 | MFM-302-08-DLC | |
| | 8mm | 8mm | 9mm | 1,0mm | 24mm | 80mm | MFM-302-08-100 | MFM-302-08-100-DLC | |
| | 8mm | 8mm | 9mm | 2,0mm | 24mm | 80mm | MFM-302-08-200 | MFM-302-08-200-DLC | |
| | 8mm | 8mm | 9mm | 2,5mm | 24mm | 80mm | MFM-302-08-250 | MFM-302-08-250-DLC | |
| | 8mm | 8mm | 9mm | Ball End | 24mm | 80mm | MFM-302-08-BN | MFM-302-08-BN-DLC | |
| LONG | 8mm | 8mm | 9mm | Sq. End | 32mm | 80mm | MFM-303-08 | MFM-303-08-DLC | |
| | 8mm | 8mm | 9mm | 1,0mm | 32mm | 80mm | MFM-303-08-100 | MFM-303-08-100-DLC | |
| | 8mm | 8mm | 9mm | 2,0mm | 32mm | 80mm | MFM-303-08-200 | MFM-303-08-200-DLC | |
| | 8mm | 8mm | 9mm | 2,5mm | 32mm | 80mm | MFM-303-08-250 | MFM-303-08-250-DLC | |
| | 8mm | 8mm | 9mm | Ball End | 32mm | 80mm | MFM-303-08-BN | MFM-303-08-BN-DLC | |

*Other Reach Lengths available upon request.

CONTINUED ON NEXT PAGE—

MFM Metric 3 Flute High Performance Tools for Aluminum

MFM 3 Flute (Short to Long Reach) — CONTINUED FROM PREVIOUS



| | Cutting Diameter | Shank Diameter | Flute Length | Corner Radius | Reach Length* | Overall Length | Tool Number Uncoated | Tool Number DLC Coated | |
|--------|------------------|----------------|--------------|---------------|---------------|----------------|----------------------|------------------------|----------------|
| X LONG | 8mm | 8mm | 9mm | Sq. End | 40mm | 80mm | MFM-304-08 | MFM-304-08-DLC | 8 mm DIAMETER |
| | 8mm | 8mm | 9mm | 1,0mm | 40mm | 80mm | MFM-304-08-100 | MFM-304-08-100-DLC | |
| | 8mm | 8mm | 9mm | 2,0mm | 40mm | 80mm | MFM-304-08-200 | MFM-304-08-200-DLC | |
| | 8mm | 8mm | 9mm | 2,5mm | 40mm | 80mm | MFM-304-08-250 | MFM-304-08-250-DLC | |
| | 8mm | 8mm | 9mm | Ball End | 40mm | 80mm | MFM-304-08-BN | MFM-304-08-BN-DLC | |
| S | 10mm | 10mm | 11mm | Sq. End | 20mm | 100mm | MFM-301-10 | MFM-301-10-DLC | 10 mm DIAMETER |
| | 10mm | 10mm | 11mm | 1,5mm | 20mm | 100mm | MFM-301-10-150 | MFM-301-10-150-DLC | |
| | 10mm | 10mm | 11mm | 2,5mm | 20mm | 100mm | MFM-301-10-250 | MFM-301-10-250-DLC | |
| | 10mm | 10mm | 11mm | Ball End | 20mm | 100mm | MFM-301-10-BN | MFM-301-10-BN-DLC | |
| M | 10mm | 10mm | 11mm | Sq. End | 30mm | 100mm | MFM-302-10 | MFM-302-10-DLC | 10 mm DIAMETER |
| | 10mm | 10mm | 11mm | 1,5mm | 30mm | 100mm | MFM-302-10-150 | MFM-302-10-150-DLC | |
| | 10mm | 10mm | 11mm | 2,5mm | 30mm | 100mm | MFM-302-10-250 | MFM-302-10-250-DLC | |
| L | 10mm | 10mm | 11mm | Sq. End | 40mm | 100mm | MFM-303-10 | MFM-303-10-DLC | 10 mm DIAMETER |
| | 10mm | 10mm | 11mm | 1,5mm | 40mm | 100mm | MFM-303-10-150 | MFM-303-10-150-DLC | |
| | 10mm | 10mm | 11mm | 2,5mm | 40mm | 100mm | MFM-303-10-250 | MFM-303-10-250-DLC | |
| | 10mm | 10mm | 11mm | Ball End | 40mm | 100mm | MFM-303-10-BN | MFM-303-10-BN-DLC | |
| XL | 10mm | 10mm | 11mm | Sq. End | 50mm | 100mm | MFM-304-10 | MFM-304-10-DLC | 10 mm DIAMETER |
| | 10mm | 10mm | 11mm | 1,5mm | 50mm | 100mm | MFM-304-10-150 | MFM-304-10-150-DLC | |
| | 10mm | 10mm | 11mm | 2,5mm | 50mm | 100mm | MFM-304-10-250 | MFM-304-10-250-DLC | |
| | 10mm | 10mm | 11mm | Ball End | 50mm | 100mm | MFM-304-10-BN | MFM-304-10-BN-DLC | |
| S | 12mm | 12mm | 13mm | Sq. End | 24mm | 110mm | MFM-301-12 | MFM-301-12-DLC | 12 mm DIAMETER |
| | 12mm | 12mm | 13mm | 1,5mm | 24mm | 110mm | MFM-301-12-150 | MFM-301-12-150-DLC | |
| | 12mm | 12mm | 13mm | 2,5mm | 24mm | 110mm | MFM-301-12-250 | MFM-301-12-250-DLC | |
| | 12mm | 12mm | 13mm | 4,0mm | 24mm | 110mm | MFM-301-12-400 | MFM-301-12-400-DLC | |
| | 12mm | 12mm | 13mm | Ball End | 24mm | 110mm | MFM-301-12-BN | MFM-301-12-BN-DLC | |
| M | 12mm | 12mm | 13mm | Sq. End | 36mm | 110mm | MFM-302-12 | MFM-302-12-DLC | 12 mm DIAMETER |
| | 12mm | 12mm | 13mm | 1,5mm | 36mm | 110mm | MFM-302-12-150 | MFM-302-12-150-DLC | |
| | 12mm | 12mm | 13mm | 2,5mm | 36mm | 110mm | MFM-302-12-250 | MFM-302-12-250-DLC | |
| | 12mm | 12mm | 13mm | 4,0mm | 36mm | 110mm | MFM-302-12-400 | MFM-302-12-400-DLC | |
| L | 12mm | 12mm | 13mm | Sq. End | 48mm | 110mm | MFM-303-12 | MFM-303-12-DLC | 12 mm DIAMETER |
| | 12mm | 12mm | 13mm | 1,5mm | 48mm | 110mm | MFM-303-12-150 | MFM-303-12-150-DLC | |
| | 12mm | 12mm | 13mm | 2,5mm | 48mm | 110mm | MFM-303-12-250 | MFM-303-12-250-DLC | |
| | 12mm | 12mm | 13mm | 4,0mm | 48mm | 110mm | MFM-303-12-400 | MFM-303-12-400-DLC | |
| | 12mm | 12mm | 13mm | Ball End | 48mm | 110mm | MFM-303-12-BN | MFM-303-12-BN-DLC | |
| XL | 12mm | 12mm | 13mm | Sq. End | 60mm | 110mm | MFM-304-12 | MFM-304-12-DLC | 12 mm DIAMETER |
| | 12mm | 12mm | 13mm | 1,5mm | 60mm | 110mm | MFM-304-12-150 | MFM-304-12-150-DLC | |
| | 12mm | 12mm | 13mm | 2,5mm | 60mm | 110mm | MFM-304-12-250 | MFM-304-12-250-DLC | |
| | 12mm | 12mm | 13mm | 4,0mm | 60mm | 110mm | MFM-304-12-400 | MFM-304-12-400-DLC | |
| | 12mm | 12mm | 13mm | Ball End | 60mm | 110mm | MFM-304-12-BN | MFM-304-12-BN-DLC | |
| SHORT | 16mm | 16mm | 17mm | Sq. End | 32mm | 130mm | MFM-301-16 | MFM-301-16-DLC | 16 mm DIAMETER |
| | 16mm | 16mm | 17mm | 2,0mm | 32mm | 130mm | MFM-301-16-200 | MFM-301-16-200-DLC | |
| | 16mm | 16mm | 17mm | 2,5mm | 32mm | 130mm | MFM-301-16-250 | MFM-301-16-250-DLC | |
| | 16mm | 16mm | 17mm | 3,0mm | 32mm | 130mm | MFM-301-16-300 | MFM-301-16-300-DLC | |
| | 16mm | 16mm | 17mm | 4,0mm | 32mm | 130mm | MFM-301-16-400 | MFM-301-16-400-DLC | |
| | 16mm | 16mm | 17mm | Ball End | 32mm | 130mm | MFM-301-16-BN | MFM-301-16-BN-DLC | |
| MEDIUM | 16mm | 16mm | 17mm | Sq. End | 48mm | 130mm | MFM-302-16 | MFM-302-16-DLC | 16 mm DIAMETER |
| | 16mm | 16mm | 17mm | 2,0mm | 48mm | 130mm | MFM-302-16-200 | MFM-302-16-200-DLC | |
| | 16mm | 16mm | 17mm | 2,5mm | 48mm | 130mm | MFM-302-16-250 | MFM-302-16-250-DLC | |
| | 16mm | 16mm | 17mm | 3,0mm | 48mm | 130mm | MFM-302-16-300 | MFM-302-16-300-DLC | |
| | 16mm | 16mm | 17mm | 4,0mm | 48mm | 130mm | MFM-302-16-400 | MFM-302-16-400-DLC | |
| | 16mm | 16mm | 17mm | Ball End | 48mm | 130mm | MFM-302-16-BN | MFM-302-16-BN-DLC | |
| LONG | 16mm | 16mm | 17mm | Sq. End | 64mm | 130mm | MFM-303-16 | MFM-303-16-DLC | 16 mm DIAMETER |
| | 16mm | 16mm | 17mm | 2,0mm | 64mm | 130mm | MFM-303-16-200 | MFM-303-16-200-DLC | |
| | 16mm | 16mm | 17mm | 2,5mm | 64mm | 130mm | MFM-303-16-250 | MFM-303-16-250-DLC | |

*Other Reach Lengths available upon request.

CONTINUED ON NEXT PAGE—

Metric 3 Flute High Performance Tools for Aluminum **MFM**

MFM 3 Flute (Short to Long Reach) — CONTINUED FROM PREVIOUS



| | Cutting Diameter | Shank Diameter | Flute Length | Corner Radius | Reach Length* | Overall Length | Tool Number Uncoated | Tool Number DLC Coated | |
|--------|------------------|----------------|--------------|---------------|---------------|----------------|----------------------|------------------------|----------------|
| LONG | 16mm | 16mm | 17mm | 3,0mm | 64mm | 130mm | MFM-303-16-300 | MFM-303-16-300-DLC | 16 mm DIAMETER |
| | 16mm | 16mm | 17mm | 4,0mm | 64mm | 130mm | MFM-303-16-400 | MFM-303-16-400-DLC | |
| | 16mm | 16mm | 17mm | Ball End | 64mm | 130mm | MFM-303-16-BN | MFM-303-16-BN-DLC | |
| X LONG | 16mm | 16mm | 17mm | Sq. End | 80mm | 130mm | MFM-304-16 | MFM-304-16-DLC | 16 mm DIAMETER |
| | 16mm | 16mm | 17mm | 2,0mm | 80mm | 130mm | MFM-304-16-200 | MFM-304-16-200-DLC | |
| | 16mm | 16mm | 17mm | 2,5mm | 80mm | 130mm | MFM-304-16-250 | MFM-304-16-250-DLC | |
| | 16mm | 16mm | 17mm | 3,0mm | 80mm | 130mm | MFM-304-16-300 | MFM-304-16-300-DLC | |
| | 16mm | 16mm | 17mm | 4,0mm | 80mm | 130mm | MFM-304-16-400 | MFM-304-16-400-DLC | |
| | 16mm | 16mm | 17mm | Ball End | 80mm | 130mm | MFM-304-16-BN | MFM-304-16-BN-DLC | |
| SHORT | 20mm | 20mm | 21mm | Sq. End | 40mm | 150mm | MFM-301-20 | MFM-301-20-DLC | 20 mm DIAMETER |
| | 20mm | 20mm | 21mm | 2,0mm | 40mm | 150mm | MFM-301-20-200 | MFM-301-20-200-DLC | |
| | 20mm | 20mm | 21mm | 2,5mm | 40mm | 150mm | MFM-301-20-250 | MFM-301-20-250-DLC | |
| | 20mm | 20mm | 21mm | 3,0mm | 40mm | 150mm | MFM-301-20-300 | MFM-301-20-300-DLC | |
| | 20mm | 20mm | 21mm | 4,0mm | 40mm | 150mm | MFM-301-20-400 | MFM-301-20-400-DLC | |
| | 20mm | 20mm | 21mm | Ball End | 40mm | 150mm | MFM-301-20-BN | MFM-301-20-BN-DLC | |
| MEDIUM | 20mm | 20mm | 21mm | Sq. End | 60mm | 150mm | MFM-302-20 | MFM-302-20-DLC | 20 mm DIAMETER |
| | 20mm | 20mm | 21mm | 2,0mm | 60mm | 150mm | MFM-302-20-200 | MFM-302-20-200-DLC | |
| | 20mm | 20mm | 21mm | 2,5mm | 60mm | 150mm | MFM-302-20-250 | MFM-302-20-250-DLC | |
| | 20mm | 20mm | 21mm | 3,0mm | 60mm | 150mm | MFM-302-20-300 | MFM-302-20-300-DLC | |
| | 20mm | 20mm | 21mm | 4,0mm | 60mm | 150mm | MFM-302-20-400 | MFM-302-20-400-DLC | |
| | 20mm | 20mm | 21mm | Ball End | 60mm | 150mm | MFM-302-20-BN | MFM-302-20-BN-DLC | |
| LONG | 20mm | 20mm | 21mm | Sq. End | 80mm | 150mm | MFM-303-20 | MFM-303-20-DLC | 20 mm DIAMETER |
| | 20mm | 20mm | 21mm | 2,0mm | 80mm | 150mm | MFM-303-20-200 | MFM-303-20-200-DLC | |
| | 20mm | 20mm | 21mm | 2,5mm | 80mm | 150mm | MFM-303-20-250 | MFM-303-20-250-DLC | |
| | 20mm | 20mm | 21mm | 3,0mm | 80mm | 150mm | MFM-303-20-300 | MFM-303-20-300-DLC | |
| | 20mm | 20mm | 21mm | 4,0mm | 80mm | 150mm | MFM-303-20-400 | MFM-303-20-400-DLC | |
| | 20mm | 20mm | 21mm | Ball End | 80mm | 150mm | MFM-303-20-BN | MFM-303-20-BN-DLC | |
| X LONG | 20mm | 20mm | 21mm | Sq. End | 100mm | 150mm | MFM-304-20 | MFM-304-20-DLC | 20 mm DIAMETER |
| | 20mm | 20mm | 21mm | 2,0mm | 100mm | 150mm | MFM-304-20-200 | MFM-304-20-200-DLC | |
| | 20mm | 20mm | 21mm | 2,5mm | 100mm | 150mm | MFM-304-20-250 | MFM-304-20-250-DLC | |
| | 20mm | 20mm | 21mm | 3,0mm | 100mm | 150mm | MFM-304-20-300 | MFM-304-20-300-DLC | |
| | 20mm | 20mm | 21mm | 4,0mm | 100mm | 150mm | MFM-304-20-400 | MFM-304-20-400-DLC | |
| | 20mm | 20mm | 21mm | Ball End | 100mm | 150mm | MFM-304-20-BN | MFM-304-20-BN-DLC | |
| S | 25mm | 25mm | 26mm | Sq. End | 50mm | 165mm | MFM-301-25 | MFM-301-25-DLC | 25 mm DIAMETER |
| | 25mm | 25mm | 26mm | 2,5mm | 50mm | 165mm | MFM-301-25-250 | MFM-301-25-250-DLC | |
| | 25mm | 25mm | 26mm | 4,0mm | 50mm | 165mm | MFM-301-25-400 | MFM-301-25-400-DLC | |
| | 25mm | 25mm | 26mm | Ball End | 50mm | 165mm | MFM-301-25-BN | MFM-301-25-BN-DLC | |
| M | 25mm | 25mm | 26mm | Sq. End | 75mm | 165mm | MFM-302-25 | MFM-302-25-DLC | 25 mm DIAMETER |
| | 25mm | 25mm | 26mm | 2,5mm | 75mm | 165mm | MFM-302-25-250 | MFM-302-25-250-DLC | |
| | 25mm | 25mm | 26mm | 4,0mm | 75mm | 165mm | MFM-302-25-400 | MFM-302-25-400-DLC | |
| | 25mm | 25mm | 26mm | Ball End | 75mm | 165mm | MFM-302-25-BN | MFM-302-25-BN-DLC | |
| XL | 25mm | 25mm | 26mm | Sq. End | 100mm | 165mm | MFM-304-25 | MFM-304-25-DLC | 25 mm DIAMETER |
| | 25mm | 25mm | 26mm | 2,5mm | 100mm | 165mm | MFM-304-25-250 | MFM-304-25-250-DLC | |
| | 25mm | 25mm | 26mm | 4,0mm | 100mm | 165mm | MFM-304-25-400 | MFM-304-25-400-DLC | |
| | 25mm | 25mm | 26mm | Ball End | 100mm | 165mm | MFM-304-25-BN | MFM-304-25-BN-DLC | |

*Other Reach Lengths available upon request.

MFM SERIES SPEEDS & FEEDS

| Tool Diameter | Typical Z-Depth | Aluminum 6061-T6 | | Aluminum 6061-T3 | | Aluminum 7075 | | Aluminum 2024 | |
|---------------|-----------------|------------------|---------------------|------------------|---------------------|---------------|---------------------|---------------|---------------------|
| | | RPM | Chip Load per Tooth | RPM | Chip Load per Tooth | RPM | Chip Load per Tooth | RPM | Chip Load per Tooth |
| 6mm | 4mm | Max | 0,096mm | Max | 0,084mm | Max | 0,096mm | Max | 0,096mm |
| 8mm | 4mm | Max | 0,128mm | Max | 0,112mm | Max | 0,128mm | Max | 0,128mm |
| 10mm | 5mm | Max | 0,16mm | Max | 0,14mm | Max | 0,16mm | Max | 0,16mm |
| 12mm | 5mm | Max | 0,192mm | Max | 0,168mm | Max | 0,192mm | Max | 0,192mm |
| 16mm | 5mm | Max | 0,256mm | Max | 0,224mm | Max | 0,256mm | Max | 0,256mm |
| 20mm | 6,5mm | Max | 0,32mm | Max | 0,28mm | Max | 0,32mm | Max | 0,32mm |
| 25mm | 6,5mm | Max | 0,4mm | Max | 0,35mm | Max | 0,4mm | Max | 0,4mm |

Z-Depth of cut per pass should be deeper than the corner radius to help reduce chatter

S1/MS1 C-2 Grade Carbide End Mills

Characteristics

- Square End
- 2 Flute
- 3 Flute
- 4 Flute
- 30° Helix

Applications

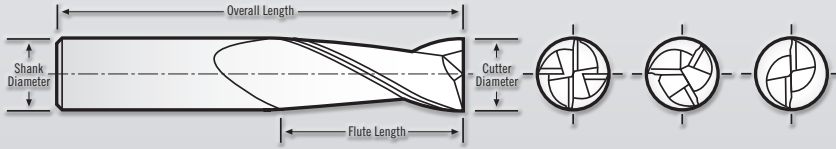
- Slotting
- Side Milling
- High Performance
- Roughing
- Semi-Finishing
- Finishing
- Dry
- Wet
- Cold Air
- Spray Mist

Materials

- Aluminum
- Copper
- Magnesium
- Plastics
- Composites
- BRASS

Coatings

- Diamond-Like Carbon (DLC)



S1 Tolerances

Cutting Dia. (1/16" to 1/4") = +.000/- .002"
 (9/32" to 3/4") = +.000/- .003"
 Shank Dia. = -.0001/- .0002"
 Flute Length (1/16" to 5/16") = +.030/- .000"
 (3/8" to 3/4") = +.060/- .000"
 OAL = ±.060"

MS1 Tolerances

Cutting Dia. = +.000/- .075mm
 Shank Dia. = -.002/- .005mm
 Flute Length = +0.500/+1.500mm
 OAL = ±1.000mm



Slotting

Side Milling

Helical Interpolation

S1-201 2 Flute C-2 Grade Stub Length

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|
| 1/16" | 1/8" | 1/8" | 1-1/2" | S1-201-02 | S1-201-02-DLC |
| 3/32" | 1/8" | 3/16" | 1-1/2" | S1-201-03 | S1-201-03-DLC |
| 1/8" | 1/8" | 1/4" | 1-1/2" | S1-201-04 | S1-201-04-DLC |
| 3/16" | 3/16" | 3/8" | 2" | S1-201-06 | S1-201-06-DLC |
| 1/4" | 1/4" | 1/2" | 2" | S1-201-08 | S1-201-08-DLC |
| 5/16" | 5/16" | 1/2" | 2-1/2" | S1-201-10 | S1-201-10-DLC |
| 3/8" | 3/8" | 5/8" | 2-1/2" | S1-201-12 | S1-201-12-DLC |
| 7/16" | 7/16" | 5/8" | 2-3/4" | S1-201-14 | S1-201-14-DLC |
| 1/2" | 1/2" | 5/8" | 3" | S1-201-16 | S1-201-16-DLC |
| 5/8" | 5/8" | 7/8" | 3-1/2" | S1-201-20 | S1-201-20-DLC |
| 3/4" | 3/4" | 1" | 4" | S1-201-24 | S1-201-24-DLC |



MS1-201 Metric 2 Flute C-2 Grade Stub Length METRIC

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|
| 2mm | 3mm | 5mm | 38mm | MS1-201-02 | MS1-201-02-DLC |
| 3mm | 3mm | 6mm | 38mm | MS1-201-03 | MS1-201-03-DLC |
| 4mm | 4mm | 8mm | 50mm | MS1-201-04 | MS1-201-04-DLC |
| 5mm | 5mm | 8mm | 50mm | MS1-201-05 | MS1-201-05-DLC |
| 6mm | 6mm | 8mm | 50mm | MS1-201-06 | MS1-201-06-DLC |
| 8mm | 8mm | 12mm | 58mm | MS1-201-08 | MS1-201-08-DLC |
| 10mm | 10mm | 14mm | 66mm | MS1-201-10 | MS1-201-10-DLC |
| 12mm | 12mm | 16mm | 73mm | MS1-201-12 | MS1-201-12-DLC |
| 16mm | 16mm | 20mm | 82mm | MS1-201-16 | MS1-201-16-DLC |
| 20mm | 20mm | 25mm | 92mm | MS1-201-20 | MS1-201-20-DLC |

Available with

Wiper Flats

See Page 14

Available with

45° Chamfer

See Page 14

Available with

Coolant Grooves

See Page 13

C-2 Grade Carbide End Mills **S1/MS1**



S1-301 3 Flute C-2 Grade Stub Length



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|
| 1/16" | 1/8" | 1/8" | 1-1/2" | S1-301-02 | S1-301-02-DLC |
| 3/32" | 1/8" | 3/16" | 1-1/2" | S1-301-03 | S1-301-03-DLC |
| 1/8" | 1/8" | 1/4" | 1-1/2" | S1-301-04 | S1-301-04-DLC |
| 3/16" | 3/16" | 3/8" | 2" | S1-301-06 | S1-301-06-DLC |
| 1/4" | 1/4" | 1/2" | 2" | S1-301-08 | S1-301-08-DLC |
| 5/16" | 5/16" | 1/2" | 2-1/2" | S1-301-10 | S1-301-10-DLC |
| 3/8" | 3/8" | 5/8" | 2-1/2" | S1-301-12 | S1-301-12-DLC |
| 7/16" | 7/16" | 5/8" | 2-3/4" | S1-301-14 | S1-301-14-DLC |
| 1/2" | 1/2" | 5/8" | 3" | S1-301-16 | S1-301-16-DLC |



S1-401 4 Flute C-2 Grade Stub Length



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|
| 1/16" | 1/8" | 1/8" | 1-1/2" | S1-401-02 | S1-401-02-DLC |
| 3/32" | 1/8" | 3/16" | 1-1/2" | S1-401-03 | S1-401-03-DLC |
| 1/8" | 1/8" | 1/4" | 1-1/2" | S1-401-04 | S1-401-04-DLC |
| 3/16" | 3/16" | 3/8" | 2" | S1-401-06 | S1-401-06-DLC |
| 1/4" | 1/4" | 1/2" | 2" | S1-401-08 | S1-401-08-DLC |
| 5/16" | 5/16" | 1/2" | 2-1/2" | S1-401-10 | S1-401-10-DLC |
| 3/8" | 3/8" | 5/8" | 2-1/2" | S1-401-12 | S1-401-12-DLC |
| 7/16" | 7/16" | 5/8" | 2-3/4" | S1-401-14 | S1-401-14-DLC |
| 1/2" | 1/2" | 5/8" | 3" | S1-401-16 | S1-401-16-DLC |
| 5/8" | 5/8" | 7/8" | 3-1/2" | S1-401-20 | S1-401-20-DLC |
| 3/4" | 3/4" | 1" | 4" | S1-401-24 | S1-401-24-DLC |

Available with
Flats
 Eliminate Slippage in the Tool Holder!
 Page 15

C1/MC1 C-2 Grade Carbide End Mills

Characteristics

- Square End
- 2 Flute
- 3 Flute
- 4 Flute
- 30° Helix

Applications

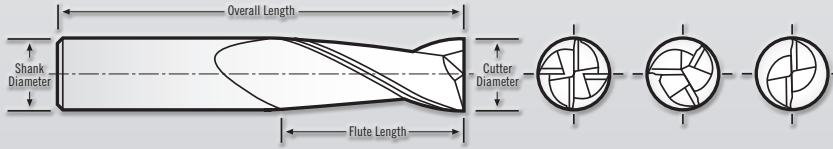
- Slotting
- Side Milling
- Conventional
- High Performance
- Roughing
- Semi-Finishing
- Finishing
- Dry
- Wet
- Cold Air
- Spray Mist

Materials

- Aluminum
- Copper
- Magnesium
- Plastics
- Composites
- BRASS

Coatings

- Diamond-Like Carbon (DLC)



C1 Tolerances

Cutting Dia. (1/16" to 1/4") = +.000/- .002"
 (9/32" to 3/4") = +.000/- .003"
 Shank Dia. = -.0001/- .0002"
 Flute length (1/16" to 5/16") = +.030/- .000"
 (3/8" to 3/4") = +.060/- .000"
 OAL = ±.060"

MC1 Tolerances

Cutting Dia. = +.000/- .075mm
 Shank Dia. = -.002/- .005mm
 Flute Length = +0.500/+1.500mm
 OAL = ±1.000mm



Slotting Side Milling Helical Interpolation



C1-201 2 Flute C-2 Grade Standard Length

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|
| 1/16" | 1/8" | 3/16" | 1-1/2" | C1-201-02 | C1-201-02-DLC |
| 3/32" | 1/8" | 3/8" | 1-1/2" | C1-201-03 | C1-201-03-DLC |
| 1/8" | 1/8" | 1/2" | 1-1/2" | C1-201-04 | C1-201-04-DLC |
| 5/32" | 3/16" | 9/16" | 2" | C1-201-05 | C1-201-05-DLC |
| 3/16" | 3/16" | 5/8" | 2" | C1-201-06 | C1-201-06-DLC |
| 7/32" | 1/4" | 5/8" | 2-1/2" | C1-201-07 | C1-201-07-DLC |
| 1/4" | 1/4" | 3/4" | 2-1/2" | C1-201-08 | C1-201-08-DLC |
| 9/32" | 5/16" | 3/4" | 2-1/2" | C1-201-09 | C1-201-09-DLC |
| 5/16" | 5/16" | 13/16" | 2-1/2" | C1-201-10 | C1-201-10-DLC |
| 3/8" | 3/8" | 7/8" | 2-1/2" | C1-201-12 | C1-201-12-DLC |
| 7/16" | 7/16" | 1" | 2-3/4" | C1-201-14 | C1-201-14-DLC |
| 1/2" | 1/2" | 1" | 3" | C1-201-16 | C1-201-16-DLC |
| 9/16" | 9/16" | 1-1/4" | 3-1/2" | C1-201-18 | C1-201-18-DLC |
| 5/8" | 5/8" | 1-1/4" | 3-1/2" | C1-201-20 | C1-201-20-DLC |
| 3/4" | 3/4" | 1-1/2" | 4" | C1-201-24 | C1-201-24-DLC |



MC1-201 Metric 2 Flute C-2 Grade Standard Length METRIC

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|-------------|------------------------|
| 2mm | 3mm | 8mm | 38mm | MC1-201-02 | MC1-201-02-DLC |
| 3mm | 3mm | 12mm | 38mm | MC1-201-03 | MC1-201-03-DLC |
| 4mm | 4mm | 12mm | 50mm | MC1-201-04 | MC1-201-04-DLC |
| 5mm | 5mm | 14mm | 50mm | MC1-201-05 | MC1-201-05-DLC |
| 6mm | 6mm | 14mm | 57mm | MC1-201-06 | MC1-201-06-DLC |
| 8mm | 8mm | 16mm | 63mm | MC1-201-08 | MC1-201-08-DLC |
| 10mm | 10mm | 20mm | 72mm | MC1-201-10 | MC1-201-10-DLC |
| 12mm | 12mm | 25mm | 83mm | MC1-201-12 | MC1-201-12-DLC |
| 16mm | 16mm | 32mm | 92mm | MC1-201-16 | MC1-201-16-DLC |
| 20mm | 20mm | 38mm | 104mm | MC1-201-20 | MC1-201-20-DLC |
| 25mm | 25mm | 38mm | 104mm | MC1-201-25 | MC1-201-25-DLC |

C-2 Grade Carbide End Mills C1/MC1



Side Milling



C1-301 3 Flute C-2 Grade Standard Length



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|
| 1/16" | 1/8" | 3/16" | 1-1/2" | C1-301-02 | C1-301-02-DLC |
| 3/32" | 1/8" | 3/8" | 1-1/2" | C1-301-03 | C1-301-03-DLC |
| 1/8" | 1/8" | 1/2" | 1-1/2" | C1-301-04 | C1-301-04-DLC |
| 5/32" | 3/16" | 9/16" | 2" | C1-301-05 | C1-301-05-DLC |
| 3/16" | 3/16" | 5/8" | 2" | C1-301-06 | C1-301-06-DLC |
| 7/32" | 1/4" | 5/8" | 2-1/2" | C1-301-07 | C1-301-07-DLC |
| 1/4" | 1/4" | 3/4" | 2-1/2" | C1-301-08 | C1-301-08-DLC |
| 9/32" | 5/16" | 3/4" | 2-1/2" | C1-301-09 | C1-301-09-DLC |
| 5/16" | 5/16" | 13/16" | 2-1/2" | C1-301-10 | C1-301-10-DLC |
| 3/8" | 3/8" | 7/8" | 2-1/2" | C1-301-12 | C1-301-12-DLC |
| 7/16" | 7/16" | 1" | 2-3/4" | C1-301-14 | C1-301-14-DLC |
| 1/2" | 1/2" | 1" | 3" | C1-301-16 | C1-301-16-DLC |
| 9/16" | 9/16" | 1-1/4" | 3-1/2" | C1-301-18 | C1-301-18-DLC |
| 5/8" | 5/8" | 1-1/4" | 3-1/2" | C1-301-20 | C1-301-20-DLC |
| 3/4" | 3/4" | 1-1/2" | 4" | C1-301-24 | C1-301-24-DLC |



MC1-301 Metric 3 Flute C-2 Grade Standard Length **METRIC**



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|-------------|------------------------|
| 2mm | 3mm | 8mm | 38mm | MC1-301-02 | MC1-301-02-DLC |
| 3mm | 3mm | 12mm | 38mm | MC1-301-03 | MC1-301-03-DLC |
| 4mm | 4mm | 12mm | 50mm | MC1-301-04 | MC1-301-04-DLC |
| 5mm | 5mm | 14mm | 50mm | MC1-301-05 | MC1-301-05-DLC |
| 6mm | 6mm | 14mm | 57mm | MC1-301-06 | MC1-301-06-DLC |
| 8mm | 8mm | 16mm | 63mm | MC1-301-08 | MC1-301-08-DLC |
| 10mm | 10mm | 20mm | 72mm | MC1-301-10 | MC1-301-10-DLC |
| 12mm | 12mm | 25mm | 83mm | MC1-301-12 | MC1-301-12-DLC |
| 16mm | 16mm | 32mm | 92mm | MC1-301-16 | MC1-301-16-DLC |
| 20mm | 20mm | 38mm | 104mm | MC1-301-20 | MC1-301-20-DLC |
| 25mm | 25mm | 38mm | 104mm | MC1-301-25 | MC1-301-25-DLC |



Side Milling



C1-401 4 Flute C-2 Grade Standard Length



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|
| 1/16" | 1/8" | 3/16" | 1-1/2" | C1-401-02 | C1-401-02-DLC |
| 3/32" | 1/8" | 3/8" | 1-1/2" | C1-401-03 | C1-401-03-DLC |
| 1/8" | 1/8" | 1/2" | 1-1/2" | C1-401-04 | C1-401-04-DLC |
| 5/32" | 3/16" | 9/16" | 2" | C1-401-05 | C1-401-05-DLC |
| 3/16" | 3/16" | 5/8" | 2" | C1-401-06 | C1-401-06-DLC |
| 7/32" | 1/4" | 5/8" | 2-1/2" | C1-401-07 | C1-401-07-DLC |
| 1/4" | 1/4" | 3/4" | 2-1/2" | C1-401-08 | C1-401-08-DLC |
| 9/32" | 5/16" | 3/4" | 2-1/2" | C1-401-09 | C1-401-09-DLC |
| 5/16" | 5/16" | 13/16" | 2-1/2" | C1-401-10 | C1-401-10-DLC |
| 3/8" | 3/8" | 7/8" | 2-1/2" | C1-401-12 | C1-401-12-DLC |
| 7/16" | 7/16" | 1" | 2-3/4" | C1-401-14 | C1-401-14-DLC |
| 1/2" | 1/2" | 1" | 3" | C1-401-16 | C1-401-16-DLC |
| 9/16" | 9/16" | 1-1/4" | 3-1/2" | C1-401-18 | C1-401-18-DLC |
| 5/8" | 5/8" | 1-1/4" | 3-1/2" | C1-401-20 | C1-401-20-DLC |
| 3/4" | 3/4" | 1-1/2" | 4" | C1-401-24 | C1-401-24-DLC |

PM/MPM/PMD Tuffy Grade Carbide Router Bits

Characteristics

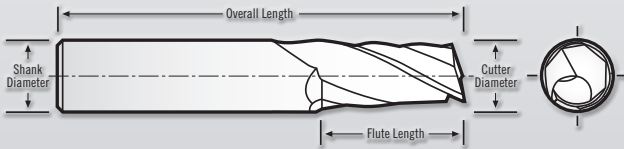
- Square End
- 1 Flute
- Polished

Applications

- Slotting
- Side Milling
- Helical Interpolation
- Ramping
- Roughing
- Semi-Finishing
- Finishing
- Dry
- Wet
- Cold Air
- Spray Mist

Materials

- Aluminum
- Plastics
- Wood



PM/PMD Series Tolerances

Cutting Dia. = +0.000/-0.002"
 Shank Dia. = -0.0001/-0.0002"
 Flute Length = +0.060/-0.000"
 OAL = ±0.060"

MPM Tolerances

Cutting Dia. = +.000/-.075mm
 Shank Dia. = -.002/-.005mm
 Flute Length = +0.500/+1.500mm
 OAL = ±1.000mm

PM Up Shear 1 Flute Tuffy Grade

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number |
|------------------|----------------|--------------|----------------|-------------|
| 1/8" | 1/8" | 1/2" | 2" | PM-104-04 |
| 1/8" | 1/4" | 1/2" | 2" | PM-108-04 |
| 3/16" | 3/16" | 5/8" | 2" | PM-106-06 |
| 3/16" | 1/4" | 5/8" | 2" | PM-108-06 |
| 3/16" | 1/4" | 1-1/4" | 3" | PM-108-06L |
| 1/4" | 1/4" | 3/4" | 2" | PM-108-08 |
| 1/4" | 1/4" | 1-1/2" | 3" | PM-108-08L |
| 3/8" | 3/8" | 1-1/4" | 3" | PM-112-12 |
| 1/2" | 1/2" | 1-1/2" | 4" | PM-116-16 |

PMD Down Shear 1 Flute Tuffy Grade

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number |
|------------------|----------------|--------------|----------------|-------------|
| 1/8" | 1/4" | 1/2" | 2" | PMD-108-04 |
| 3/16" | 1/4" | 5/8" | 2" | PMD-108-06 |
| 1/4" | 1/4" | 3/4" | 2" | PMD-108-08 |

MPM Up Shear 1 Flute Tuffy Grade METRIC

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number |
|------------------|----------------|--------------|----------------|-------------|
| 4mm | 3mm | 12mm | 50mm | MPM-104-04 |
| 6mm | 4mm | 12mm | 50mm | MPM-106-04 |
| 6mm | 6mm | 14mm | 50mm | MPM-106-05 |
| 6mm | 6mm | 14mm | 57mm | MPM-106-06 |
| 8mm | 8mm | 22mm | 63mm | MPM-108-08 |
| 10mm | 10mm | 25mm | 72mm | MPM-110-10 |
| 12mm | 12mm | 25mm | 83mm | MPM-112-12 |

NEW

Polished

Best Tool for Gummy/Soft Aluminum

Reduces Material Sticking to Tool

Router for Aluminum Aircraft Skins

WU1/WD1

Characteristics

- Square End
- 3 Flute
- 10° Helix

Applications

- Slotting
- Side Milling
- Roughing
- Semi-Finishing
- Finishing
- Dry
- Wet
- Cold Air
- Spray Mist

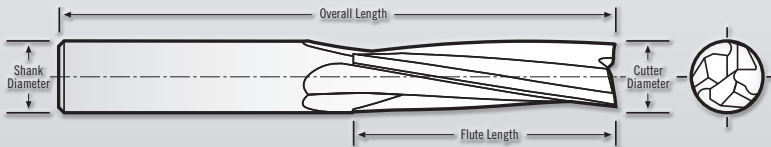
Materials

- Aluminum
- Copper
- Magnesium
- Plastics

Available with

Chatter Reduction with Mirror Edge!

See Page 6



WU1/WD1 Tolerances

Cutting Dia. = .001/- .002"
 Shank Dia. = -.0001/- .0002"
 Flute Length (<5/16") = +.020/+ .030"
 (>5/16") = +.030/+ .060"
 OAL = ±.060"



WU1-310 Up Shear 3 Flute Standard Length (10° Helix)

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number |
|------------------|----------------|--------------|----------------|-------------|
| 1/2" | 1/2" | 1-3/4" | 4" | WU1-310-16 |
| 5/8" | 5/8" | 2" | 4-5/8" | WU1-310-20 |
| 3/4" | 3/4" | 2-1/2" | 5" | WU1-310-24 |



WD1-310 Down Shear 3 Flute Standard Length (10° Helix)

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number |
|------------------|----------------|--------------|----------------|-------------|
| 1/2" | 1/2" | 1-3/4" | 4" | WD1-310-16 |
| 5/8" | 5/8" | 2" | 4-5/8" | WD1-310-20 |
| 3/4" | 3/4" | 2-1/2" | 5" | WD1-310-24 |

Aluminum Tools in Other Sections

SB / B 201/203
MSB / MB 201/203

2 Flute Ball End
 (See Multiple Applications)



110

C8
201/203/301/303

2 & 3 Flute on 1/4" Shank
 (See Multiple Applications)



105

NR / MNR
204/303/404

2, 3 and 4 Flute
 (See Multiple Applications)



115

PCD
203 Routers

2 Flute PCD Diamond
 (See Composites & Plastics)



71

PCD-BN
201 Routers

2 Flute PCD Diamond, Ball End
 (See Composites & Plastics)



71

MINIATURES

(See Miniatures Applications)



89

SAWS

(See Saws Applications)



121

TOOLS FOR

Titanium, Steel & High-Temp Alloys



Titanium Machining at 75 ipm!

Scan this code to:

- See How to Cut Titanium at 75 ipm
- Watch Videos
- See How to High-Speed Machine Steel
- And More...

Featured Tools:

NS Series – Machine Steel with Ease!

Page 44



Variable Helix Offset Fluting

- **500% Increase** in Metal Removal Rates
- **Reduced Cycle Time** from 45 minutes to 9 minutes
- **Speeds and Feeds up to 5X** Those of Traditional Steel Cutting Tools
- Available in **Inch and Metric Sizes**



XG Series – The Highest Performing Tool in Steel, Stainless & Other Difficult Alloys

Page 46



114–800 Linear Inches*
13 Manufacturers US and Europe

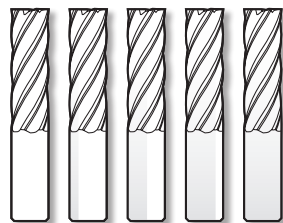
2300 Linear Inches*

RJ XG-Series

*304 SS Slotting & Profiling 400sfm 24ipm

XF Series – Best Tool for High-Speed Machining

Page 49



Other High-Performance Tools



6Al4V Titanium Flap Trac for Airplane Wing

VS.



RJ XF-Series



6Al4V Titanium Flap Trac for Airplane Wing

RJ XF-Series

15X LIFE!

of Comparable Tools!



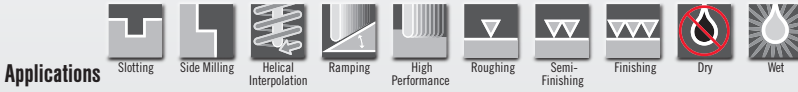
Titanium, Steel & High-Temp Alloys Tools

| | | | | |
|--------------------------------|---|--|---|------------|
| NS / MNS 402 | 4 Flute Tuffy Grade |  |  | 44 |
| XG / MXG 400/402 | 4 Flute Tuffy Grade |  |  | 46 |
| XG / MXG 500/502 | 5 Flute Tuffy Grade |  |  | 47 |
| XG-BN / MXG-BN | 4 Flute Tuffy Grade, Ball End |  |  | 48 |
| XF / MXF | 6 and 8 Flute Tuffy Grade |  | | 49 |
| ST / MST 341/343 | 3 Flute Super Tuffy Grade |  | | 52 |
| STR / MSTR 301/303 | 3 Flute Super Tuffy Grade |  | | 54 |
| STR / MSTR 401/404 | 4 Flute Super Tuffy Grade |  | | 56 |
| B / MB 300/330 | 3 Flute Tuffy Grade |  | | 58 |
| B / MB 440 | 4 Flute Tuffy Grade |  | | 59 |
| ST / MST 360/646/630 | 3 and 6 Flute Super Tuffy Grade |  | | 60 |
| ST / MST 430/434 | 3 and 6 Flute Super Tuffy Grade |  | | 62 |
| TS / MTS 201/301/401 | 2, 3 and 4 Flute (See Multiple Applications) |  | | 106 |
| TR 303/404/606 | 3, 4 and 6 Flute (See Multiple Applications) |  | | 108 |
| MINIATURES | (See Miniatures Applications) |  | | 89 |
| SAWS | (See Saws Applications) |  | | 121 |

NS/MNS Tuffy Grade Carbide End Mills



Characteristics



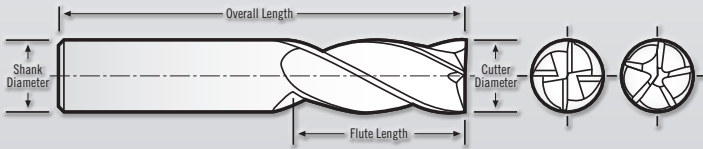
Applications



Materials



Coatings



NS Tolerances

Cutting Dia. = $-.001/-0.002$ "
 Shank Dia. = $-.0001/-0.0002$ "
 Flute Length = $+0.060/-0.000$ "
 OAL = $+/-0.060$ "

MNS Tolerances

Cutting Dia. = $-0.025/-0.050$ mm
 Shank Dia. = $-0.002/-0.005$ mm
 Flute Length = $+0.50/+1.50$ mm
 OAL = $+/-1.00$ mm

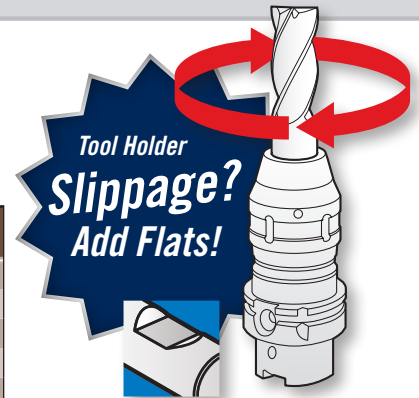


Add Flats for High Torque Cuts!



NS-401 4 Flute Stub Length

| Cutting Diameter | Chamfer | Shank Diameter | Flute Length | Overall Length | AlTiN | |
|------------------|---------|----------------|--------------|----------------|---------------------------------|------------------------------------|
| | | | | | Tool number Flats, AlTiN Coated | Tool number No Flats, AlTiN Coated |
| 3/16" | 0.008 | 3/16" | 3/8" | 2-1/2" | NS-401-06-FL | NS-401-06 |
| 1/4" | 0.008 | 1/4" | 1/2" | 2-1/2" | NS-401-08-FL | NS-401-08 |
| 5/16" | 0.01 | 5/16" | 1/2" | 2-1/2" | NS-401-10-FL | NS-401-10 |
| 3/8" | 0.01 | 3/8" | 5/8" | 2-1/2" | NS-401-12-FL | NS-401-12 |
| 1/2" | 0.01 | 1/2" | 3/4" | 3" | NS-401-16-FL | NS-401-16 |
| 5/8" | 0.015 | 5/8" | 7/8" | 3-1/2" | NS-401-20-FL | NS-401-20 |
| 3/4" | 0.015 | 3/4" | 1" | 4" | NS-401-24-FL | NS-401-24 |
| 1" | 0.02 | 1" | 1" | 5" | NS-401-32-FL | NS-401-32 |



NS-402 4 Flute Standard Length

| Cutting Diameter | Chamfer | Shank Diameter | Flute Length | Overall Length | AlTiN | |
|------------------|---------|----------------|--------------|----------------|---------------------------------|------------------------------------|
| | | | | | Tool number Flats, AlTiN Coated | Tool number No Flats, AlTiN Coated |
| 3/16" | 0.008 | 3/16" | 5/8" | 2-1/2" | NS-402-06-FL | NS-402-06 |
| 1/4" | 0.008 | 1/4" | 3/4" | 2-1/2" | NS-402-08-FL | NS-402-08 |
| 5/16" | 0.01 | 5/16" | 7/8" | 2-1/2" | NS-402-10-FL | NS-402-10 |
| 3/8" | 0.01 | 3/8" | 1" | 2-1/2" | NS-402-12-FL | NS-402-12 |
| 1/2" | 0.01 | 1/2" | 1-1/8" | 3" | NS-402-16-FL | NS-402-16 |
| 5/8" | 0.015 | 5/8" | 1-1/4" | 3-1/2" | NS-402-20-FL | NS-402-20 |
| 3/4" | 0.015 | 3/4" | 1-1/2" | 4" | NS-402-24-FL | NS-402-24 |
| 1" | 0.02 | 1" | 1-3/4" | 5" | NS-402-32-FL | NS-402-32 |

NS-403 4 Flute Long Length

| Cutting Diameter | Chamfer | Shank Diameter | Flute Length | Overall Length | AlTiN | |
|------------------|---------|----------------|--------------|----------------|---------------------------------|------------------------------------|
| | | | | | Tool number Flats, AlTiN Coated | Tool number No Flats, AlTiN Coated |
| 3/16" | 0.008 | 3/16" | 7/8" | 2-1/2" | NS-403-06-FL | NS-403-06 |
| 1/4" | 0.008 | 1/4" | 1" | 2-1/2" | NS-403-08-FL | NS-403-08 |
| 5/16" | 0.01 | 5/16" | 1-1/8" | 2-1/2" | NS-403-10-FL | NS-403-10 |
| 3/8" | 0.01 | 3/8" | 1-1/4" | 3" | NS-403-12-FL | NS-403-12 |
| 1/2" | 0.01 | 1/2" | 1-1/2" | 4" | NS-403-16-FL | NS-403-16 |
| 5/8" | 0.015 | 5/8" | 1-3/4" | 4" | NS-403-20-FL | NS-403-20 |
| 3/4" | 0.015 | 3/4" | 2" | 5" | NS-403-24-FL | NS-403-24 |
| 1" | 0.02 | 1" | 2-1/2" | 6" | NS-403-32-FL | NS-403-32 |

Tuffy Grade Carbide End Mills **NS/MNS**



Add Flats for High Torque Cuts!



MNS-402 4 Flute Standard Length **METRIC**

| Cutting Diameter | Chamfer | Shank Diameter | Flute Length | Overall Length | Tool Number | |
|------------------|---------|----------------|--------------|----------------|-----------------------|------------------------|
| | | | | | w/Flats, AITiN Coated | No Flats, AITiN Coated |
| 4mm | 0.2mm | 4mm | 14mm | 58mm | | MNS-402-04 |
| 5mm | 0.2mm | 5mm | 14mm | 58mm | | MNS-402-05 |
| 6mm | 0.2mm | 6mm | 16mm | 58mm | MNS-402-06-FL | MNS-402-06 |
| 8mm | 0.25mm | 8mm | 22mm | 64mm | MNS-402-08-FL | MNS-402-08 |
| 10mm | 0.25mm | 10mm | 25mm | 73mm | MNS-402-10-FL | MNS-402-10 |
| 12mm | 0.35mm | 12mm | 30mm | 84mm | MNS-402-12-FL | MNS-402-12 |
| 16mm | 0.35mm | 16mm | 35mm | 93mm | MNS-402-16-FL | MNS-402-16 |
| 20mm | 0.5mm | 20mm | 42mm | 105mm | MNS-402-20-FL | MNS-402-20 |
| 25mm | 0.5mm | 25mm | 45mm | 121mm | MNS-402-25-FL | MNS-402-25 |

NS SERIES SPEEDS & FEEDS

| Material | Surface Footage | 3/16" | | 1/4" | | 5/16" | | 3/8" | | 1/2" | | 5/8" | | 3/4" | | 1" | |
|------------------------------|-----------------|-------|--------|------|--------|-------|--------|------|--------|------|--------|------|--------|------|--------|------|--------|
| | | RPM | in/min | RPM | in/min | RPM | in/min | RPM | in/min | RPM | in/min | RPM | in/min | RPM | in/min | RPM | in/min |
| CAST IRON | | | | | | | | | | | | | | | | | |
| Ductile | 400 | 8149 | 20 | 6112 | 20 | 4890 | 24 | 4075 | 28 | 3056 | 31 | 2445 | 28 | 2037 | 24 | 1528 | 21 |
| Gray | 525 | 10696 | 42 | 8022 | 42 | 6418 | 51 | 5348 | 58 | 4011 | 64 | 3209 | 58 | 2674 | 51 | 2006 | 45 |
| STEEL | | | | | | | | | | | | | | | | | |
| 1018/1020 | 500 | 10187 | 32 | 7640 | 32 | 6112 | 39 | 5093 | 44 | 3820 | 49 | 3056 | 44 | 2547 | 39 | 1910 | 34 |
| 4130 | 400 | 8149 | 20 | 6112 | 20 | 4890 | 24 | 4075 | 28 | 3056 | 31 | 2445 | 28 | 2037 | 24 | 1528 | 21 |
| 4140 | 400 | 8149 | 20 | 6112 | 20 | 4890 | 24 | 4075 | 28 | 3056 | 31 | 2445 | 28 | 2037 | 24 | 1528 | 21 |
| 4340 | 415 | 8455 | 21 | 6341 | 21 | 5073 | 25 | 4227 | 29 | 3171 | 32 | 2536 | 29 | 2114 | 25 | 1585 | 22 |
| TODL STEEL (ANNEALED) | | | | | | | | | | | | | | | | | |
| A2 | 400 | 8149 | 17 | 6112 | 17 | 4890 | 22 | 4075 | 24 | 3056 | 27 | 2445 | 24 | 2037 | 22 | 1528 | 19 |
| D2 | 360 | 7334 | 16 | 5501 | 16 | 4401 | 19 | 3667 | 22 | 2750 | 24 | 2200 | 22 | 1834 | 19 | 1375 | 17 |
| H13 | 400 | 8149 | 17 | 6112 | 17 | 4890 | 22 | 4075 | 24 | 3056 | 27 | 2445 | 24 | 2037 | 22 | 1528 | 19 |
| P20 | 400 | 8149 | 23 | 6112 | 23 | 4890 | 28 | 4075 | 31 | 3056 | 35 | 2445 | 31 | 2037 | 28 | 1528 | 24 |

Speeds and feeds are based on applications with very rigid machine tools, toolholders, and fixturing. Speeds and feeds will vary dramatically depending on the application. Extreme forces can be generated and can cause damage, if not appropriate for the cutting conditions.

Helical interpolation or ramping should be used to enter pockets. For the highest material removal rates and longest tool life profile milling is preferred over slotting. (See diagrams below)

Slotting



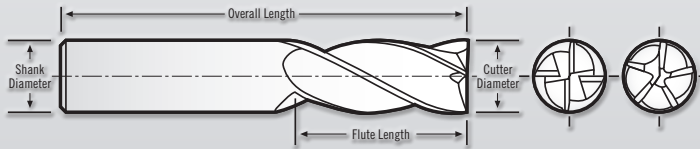
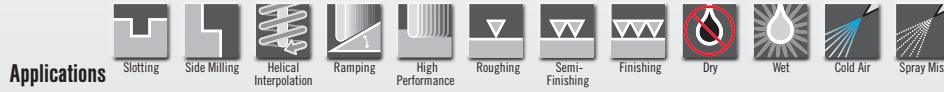
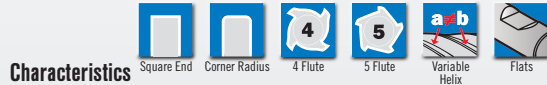
Profiling



MNS SERIES SPEEDS & FEEDS **METRIC**

| Material | Surface Meters/min | 6mm | | 8mm | | 10mm | | 12mm | | 16mm | | 20mm | | 25mm | |
|------------------------------|--------------------|------|--------|------|--------|------|--------|------|--------|------|--------|------|--------|------|--------|
| | | RPM | mm/min | RPM | mm/min | RPM | mm/min | RPM | mm/min | RPM | mm/min | RPM | mm/min | RPM | mm/min |
| CAST IRON | | | | | | | | | | | | | | | |
| Ductile | 400 | 6475 | 505 | 4851 | 505 | 3881 | 621 | 3234 | 699 | 2426 | 776 | 1941 | 699 | 1552 | 543 |
| Gray | 525 | 8498 | 1060 | 6367 | 1060 | 5094 | 1304 | 4245 | 1467 | 3184 | 1630 | 2547 | 1467 | 2038 | 1141 |
| STEEL | | | | | | | | | | | | | | | |
| 1018/1020 | 500 | 8093 | 807 | 6064 | 807 | 4851 | 994 | 4043 | 1118 | 3032 | 1242 | 2426 | 1118 | 1941 | 869 |
| 4130 | 400 | 6475 | 505 | 4851 | 505 | 3881 | 621 | 3234 | 699 | 2426 | 776 | 1941 | 699 | 1552 | 543 |
| 4140 | 400 | 6475 | 505 | 4851 | 505 | 3881 | 621 | 3234 | 699 | 2426 | 776 | 1941 | 699 | 1552 | 543 |
| 4340 | 415 | 6717 | 523 | 5033 | 523 | 4027 | 644 | 3356 | 725 | 2517 | 805 | 2013 | 725 | 1611 | 564 |
| TODL STEEL (ANNEALED) | | | | | | | | | | | | | | | |
| A2 | 400 | 6475 | 444 | 4851 | 444 | 3881 | 546 | 3234 | 615 | 2426 | 683 | 1941 | 615 | 1552 | 478 |
| D2 | 360 | 5827 | 400 | 4366 | 400 | 3493 | 492 | 2911 | 553 | 2183 | 615 | 1747 | 553 | 1397 | 430 |
| H13 | 400 | 6475 | 444 | 4851 | 444 | 3881 | 546 | 3234 | 615 | 2426 | 683 | 1941 | 615 | 1552 | 478 |
| P20 | 400 | 6475 | 575 | 4851 | 575 | 3881 | 708 | 3234 | 796 | 2426 | 885 | 1941 | 796 | 1552 | 619 |

XG/MXG Tuffy Grade Carbide End Mills



XG Tolerances
 Cutting Dia. = $-.001/-0.002$ "
 Shank Dia. = $-.0001/-0.0002$ "
 Flute Length = $+0.060/-0.000$ "
 OAL = $+/-0.060$ "

MXG Tolerances
 Cutting Dia. = $-.025/-0.050$ mm
 Shank Dia. = $-.002/-0.005$ mm
 Flute Length = $+0.50/+1.50$ mm
 OAL = $+/-1.00$ mm



Add Flats for High Torque Cuts!



XG-400 4 Flute Stub Length

| Cutting Diameter | Corner Radius | Shank Diameter | Flute Length | Overall Length | Tool Number Flats, AITiN Coated | Tool Number No Flats, AITiN Coated |
|------------------|---------------|----------------|--------------|----------------|---------------------------------|------------------------------------|
| 1/4" | .017-.019" | 1/4" | 3/8" | 2-1/2" | XG-400-08-FL | XG-400-08 |
| 5/16" | .020-.022" | 5/16" | 7/16" | 2-1/2" | XG-400-10-FL | XG-400-10 |
| 3/8" | .023-.025" | 3/8" | 1/2" | 2-1/2" | XG-400-12-FL | XG-400-12 |
| 1/2" | .025-.027" | 1/2" | 5/8" | 3" | XG-400-16-FL | XG-400-16 |
| 5/8" | .027-.029" | 5/8" | 3/4" | 3-1/2" | XG-400-20-FL | XG-400-20 |
| 3/4" | .028-.030" | 3/4" | 1" | 4" | XG-400-24-FL | XG-400-24 |
| 1" | .028-.030" | 1" | 1-1/8" | 5" | XG-400-32-FL | XG-400-32 |



XG-402 4 Flute Standard Length



| Cutting Diameter | Corner Radius | Shank Diameter | Flute Length | Overall Length | Tool Number Flats, AITiN Coated | Tool Number No Flats, AITiN Coated |
|------------------|---------------|----------------|--------------|----------------|---------------------------------|------------------------------------|
| 1/4" | .017-.019" | 1/4" | 3/4" | 2-1/2" | XG-402-08-FL | XG-402-08 |
| 5/16" | .020-.022" | 5/16" | 13/16" | 2-1/2" | XG-402-10-FL | XG-402-10 |
| 3/8" | .023-.025" | 3/8" | 7/8" | 2-1/2" | XG-402-12-FL | XG-402-12 |
| 1/2" | .025-.027" | 1/2" | 1" | 3" | XG-402-16-FL | XG-402-16 |
| 5/8" | .027-.029" | 5/8" | 1-1/4" | 3-1/2" | XG-402-20-FL | XG-402-20 |
| 3/4" | .028-.030" | 3/4" | 1-1/2" | 4" | XG-402-24-FL | XG-402-24 |
| 1" | .028-.030" | 1" | 2" | 5" | XG-402-32-FL | XG-402-32 |



MXG-402 Metric 4 Flute Standard Length METRIC



| Cutting Diameter | Corner Radius | Shank Diameter | Flute Length | Overall Length | Tool Number Flats, AITiN Coated | Tool Number No Flats, AITiN Coated |
|------------------|---------------|----------------|--------------|----------------|---------------------------------|------------------------------------|
| 6mm | .50-.55mm | 6mm | 14mm | 57mm | MXG-402-06-FL | MXG-402-06 |
| 8mm | .55-.60mm | 8mm | 16mm | 63mm | MXG-402-08-FL | MXG-402-08 |
| 10mm | .60-.65mm | 10mm | 20mm | 72mm | MXG-402-10-FL | MXG-402-10 |
| 12mm | .65-.70mm | 12mm | 25mm | 83mm | MXG-402-12-FL | MXG-402-12 |
| 16mm | .70-.75mm | 16mm | 32mm | 92mm | MXG-402-16-FL | MXG-402-16 |
| 20mm | .90-1.0mm | 20mm | 38mm | 104mm | MXG-402-20-FL | MXG-402-20 |

NOTE: Metric tools do not have flats.

Tuffy Grade Carbide End Mills **XG/MXG**



Add Flats for High Torque Cuts!



XG-500 5 Flute Stub Length

| Cutting Diameter | Corner Radius | Shank Diameter | Flute Length | Overall Length | AITiN | |
|------------------|---------------|----------------|--------------|----------------|---------------------------------|------------------------------------|
| | | | | | Tool Number Flats, AITiN Coated | Tool Number No Flats, AITiN Coated |
| 1/4" | .017-.019" | 1/4" | 3/8" | 2-1/2" | XG-500-08-FL | XG-500-08 |
| 5/16" | .020-.022" | 5/16" | 7/16" | 2-1/2" | XG-500-10-FL | XG-500-10 |
| 3/8" | .023-.025" | 3/8" | 1/2" | 2-1/2" | XG-500-12-FL | XG-500-12 |
| 1/2" | .025-.027" | 1/2" | 5/8" | 3" | XG-500-16-FL | XG-500-16 |
| 5/8" | .027-.029" | 5/8" | 3/4" | 3-1/2" | XG-500-20-FL | XG-500-20 |
| 3/4" | .028-.030" | 3/4" | 1" | 4" | XG-500-24-FL | XG-500-24 |
| 1" | .028-.030" | 1" | 1-1/8" | 5" | XG-500-32-FL | XG-500-32 |

XG-502 5 Flute Standard Length

| Cutting Diameter | Corner Radius | Shank Diameter | Flute Length | Overall Length | AITiN | |
|------------------|---------------|----------------|--------------|----------------|---------------------------------|------------------------------------|
| | | | | | Tool Number Flats, AITiN Coated | Tool Number No Flats, AITiN Coated |
| 1/4" | .017-.019" | 1/4" | 3/4" | 2-1/2" | XG-502-08-FL | XG-502-08 |
| 5/16" | .020-.022" | 5/16" | 13/16" | 2-1/2" | XG-502-10-FL | XG-502-10 |
| 3/8" | .023-.025" | 3/8" | 7/8" | 2-1/2" | XG-502-12-FL | XG-502-12 |
| 1/2" | .025-.027" | 1/2" | 1" | 3" | XG-502-16-FL | XG-502-16 |
| 5/8" | .027-.029" | 5/8" | 1-1/4" | 3-1/2" | XG-502-20-FL | XG-502-20 |
| 3/4" | .028-.030" | 3/4" | 1-1/2" | 4" | XG-502-24-FL | XG-502-24 |
| 1" | .028-.030" | 1" | 2" | 5" | XG-502-32-FL | XG-502-32 |



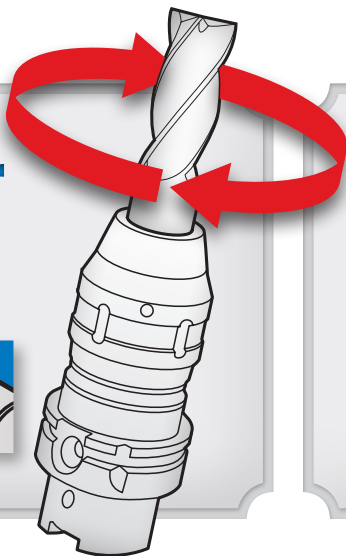
MXG-502 Metric 5 Flute Standard Length **METRIC**

| Cutting Diameter | Corner Radius | Shank Diameter | Flute Length | Overall Length | AITiN | |
|------------------|---------------|----------------|--------------|----------------|---------------------------------|------------------------------------|
| | | | | | Tool Number Flats, AITiN Coated | Tool Number No Flats, AITiN Coated |
| 6mm | .50-.55mm | 6mm | 14mm | 57mm | MXG-502-06-FL | MXG-502-06 |
| 8mm | .55-.60mm | 8mm | 16mm | 63mm | MXG-502-08-FL | MXG-502-08 |
| 10mm | .60-.65mm | 10mm | 20mm | 72mm | MXG-502-10-FL | MXG-502-10 |
| 12mm | .65-.70mm | 12mm | 25mm | 83mm | MXG-502-12-FL | MXG-502-12 |
| 16mm | .70-.75mm | 16mm | 32mm | 92mm | MXG-502-16-FL | MXG-502-16 |
| 20mm | .90-1.0mm | 20mm | 38mm | 104mm | MXG-502-20-FL | MXG-502-20 |

NOTE: Metric tools do not have flats.

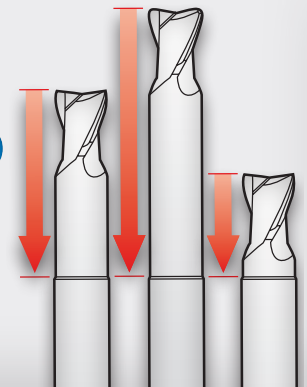
Tool Holder Slippage?

Add Flats! Use shrink fit or equivalent gripping force. If not, use flats.



Need Reach?

See End Mill Modifications (page 14)



XG/MXG Tuffy Grade Carbide End Mills

Characteristics

- Ball End
- 4 Flute
- Variable Helix
- Flats

Applications

- Slotting
- Side Milling
- Helical Interpolation
- Ramping
- High Performance
- Roughing
- Semi-Finishing
- Finishing
- Dry
- Wet
- Cold Air
- Spray Mist

Materials

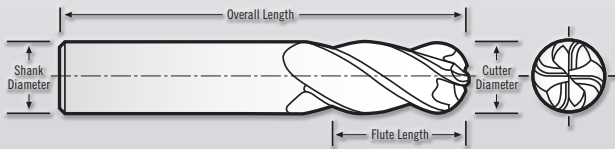
- Ti
- Cast Iron
- Steel
- Stainless Steel
- SUPER Alloys
- 40 HRC Hardness

Variable Helix

$a \neq b$

Coatings

Aluminum Titan. Nitride



XG-BN Tolerances

Cutting Dia. = $-.001/-0.002$ "
 Shank Dia. = $-.0001/-0.0002$ "
 Flute Length = $+0.060/-0.000$ "
 OAL = $+/-0.060$ "

MXG-BN Tolerances

Cutting Dia. = $-.025/-0.050$ mm
 Shank Dia. = $-.002/-0.005$ mm
 Flute Length = $+0.50/+1.50$ mm
 OAL = $+/-1.00$ mm



Add Flats for High Torque Cuts!



XG-402BN 4 Flute Ball End Standard Length

| Cutting Diameter | Corner Radius | Shank Diameter | Flute Length | Overall Length | AITiN Coated | |
|------------------|---------------|----------------|--------------|----------------|---------------------------------|------------------------------------|
| | | | | | Tool Number Flats, AITiN Coated | Tool Number No Flats, AITiN Coated |
| 1/4" | — | 1/4" | 3/4" | 2-1/2" | XG-402-08-BN-FL | XG-402-08-BN |
| 5/16" | — | 5/16" | 13/16" | 2-1/2" | XG-402-10-BN-FL | XG-402-10-BN |
| 3/8" | — | 3/8" | 7/8" | 2-1/2" | XG-402-12-BN-FL | XG-402-12-BN |
| 1/2" | — | 1/2" | 1" | 3" | XG-402-16-BN-FL | XG-402-16-BN |
| 5/8" | — | 5/8" | 1-1/4" | 3-1/2" | XG-402-20-BN-FL | XG-402-20-BN |
| 3/4" | — | 3/4" | 1-1/2" | 4" | XG-402-24-BN-FL | XG-402-24-BN |
| 1" | — | 1" | 2" | 5" | XG-402-32-BN-FL | XG-402-32-BN |

Tool Holder Slippage? Add Flats!



Add Flats for High Torque Cuts!



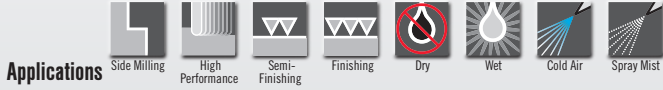
MXG-402BN Metric 4 Flute Ball End Standard Length

METRIC

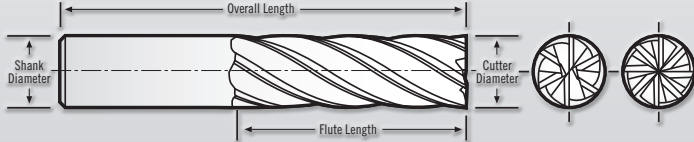
| Cutting Diameter | Corner Radius | Shank Diameter | Flute Length | Overall Length | AITiN Coated | |
|------------------|---------------|----------------|--------------|----------------|---------------------------------|------------------------------------|
| | | | | | Tool Number Flats, AITiN Coated | Tool Number No Flats, AITiN Coated |
| 6mm | — | 6mm | 14mm | 57mm | MXG-402-06-BN-FL | MXG-402-06-BN |
| 8mm | — | 8mm | 16mm | 63mm | MXG-402-08-BN-FL | MXG-402-08-BN |
| 10mm | — | 10mm | 20mm | 72mm | MXG-402-10-BN-FL | MXG-402-10-BN |
| 12mm | — | 12mm | 25mm | 83mm | MXG-402-12-BN-FL | MXG-402-12-BN |
| 16mm | — | 16mm | 32mm | 92mm | MXG-402-16-BN-FL | MXG-402-16-BN |
| 20mm | — | 20mm | 38mm | 104mm | MXG-402-20-BN-FL | MXG-402-20-BN |

NOTE: Metric tools do not have flats.

Tuffy Grade Carbide End Mills **XF/MXF**



Eliminate Tool Pull Out!
 1/4"-5/16" h5 Shank Tolerance
 3/8"-1" h4 Shank Tolerance
Tightest in the Industry!



XF Tolerances

Cutting Dia. = $-0.01/-0.002$ "
 Shank Dia. = $-0.001/-0.0002$ "
 Flute Length = $+0.060/-0.000$ "
 OAL = $+/-0.060$ "

MXF Tolerances

Cutting Dia. = $-0.025/-0.050$ mm
 Shank Dia. = $-0.002/-0.005$ mm
 Flute Length = $+0.500/+1.500$ mm
 OAL = ± 1.000 mm



XF-602/802 6/8 Flute Standard Length

| Cutting Diameter | Corner Radius | Shank Diameter | Flute Length | Overall Length | AITiN | |
|------------------|---------------|----------------|--------------|----------------|---------------------------------|------------------------------------|
| | | | | | Tool Number Flats, AITiN Coated | Tool Number No Flats, AITiN Coated |
| 3/8" | 0.030" | 3/8" | 7/8" | 2-1/2" | XF-602-12-030-FL | XF-602-12-030 |
| 3/8" | 0.060" | 3/8" | 7/8" | 2-1/2" | XF-602-12-060-FL | XF-602-12-060 |
| 3/8" | 0.090" | 3/8" | 7/8" | 2-1/2" | XF-602-12-090-FL | XF-602-12-090 |
| 1/2" | 0.030" | 1/2" | 1" | 3" | XF-602-16-030-FL | XF-602-16-030 |
| 1/2" | 0.060" | 1/2" | 1" | 3" | XF-602-16-060-FL | XF-602-16-060 |
| 1/2" | 0.090" | 1/2" | 1" | 3" | XF-602-16-090-FL | XF-602-16-090 |
| 1/2" | 0.120" | 1/2" | 1" | 3" | XF-602-16-120-FL | XF-602-16-120 |
| 5/8" | 0.030" | 5/8" | 1-1/4" | 3-1/2" | XF-602-20-030-FL | XF-602-20-030 |
| 5/8" | 0.060" | 5/8" | 1-1/4" | 3-1/2" | XF-602-20-060-FL | XF-602-20-060 |
| 5/8" | 0.090" | 5/8" | 1-1/4" | 3-1/2" | XF-602-20-090-FL | XF-602-20-090 |
| 5/8" | 0.120" | 5/8" | 1-1/4" | 3-1/2" | XF-602-20-120-FL | XF-602-20-120 |
| 3/4" | 0.060" | 3/4" | 1-1/2" | 4" | XF-802-24-060-FL | XF-802-24-060 |
| 3/4" | 0.090" | 3/4" | 1-1/2" | 4" | XF-802-24-090-FL | XF-802-24-090 |
| 3/4" | 0.120" | 3/4" | 1-1/2" | 4" | XF-802-24-120-FL | XF-802-24-120 |
| 1" | 0.060" | 1" | 2" | 5" | XF-802-32-060-FL | XF-802-32-060 |
| 1" | 0.090" | 1" | 2" | 5" | XF-802-32-090-FL | XF-802-32-090 |
| 1" | 0.120" | 1" | 2" | 5" | XF-802-32-120-FL | XF-802-32-120 |

MXF-602/802 6/8 Flute Standard Length **METRIC**

| Cutting Diameter | Corner Radius | Shank Diameter | Flute Length | Overall Length | AITiN | |
|------------------|---------------|----------------|--------------|----------------|---------------------------------|------------------------------------|
| | | | | | Tool Number Flats, AITiN Coated | Tool Number No Flats, AITiN Coated |
| 10mm | 2.0mm | 10mm | 20mm | 72mm | MXF-602-10-020-FL | MXF-602-10-020 |
| 10mm | 2.5mm | 10mm | 20mm | 72mm | MXF-602-10-025-FL | MXF-602-10-025 |
| 10mm | 3.0mm | 10mm | 20mm | 72mm | MXF-602-10-030-FL | MXF-602-10-030 |
| 12mm | 2.0mm | 12mm | 25mm | 83mm | MXF-602-12-020-FL | MXF-602-12-020 |
| 12mm | 2.5mm | 12mm | 25mm | 83mm | MXF-602-12-025-FL | MXF-602-12-025 |
| 12mm | 3.0mm | 12mm | 25mm | 83mm | MXF-602-12-030-FL | MXF-602-12-030 |
| 16mm | 2.0mm | 16mm | 32mm | 92mm | MXF-602-16-020-FL | MXF-602-16-020 |
| 16mm | 2.5mm | 16mm | 32mm | 92mm | MXF-602-16-025-FL | MXF-602-16-025 |
| 16mm | 3.0mm | 16mm | 32mm | 92mm | MXF-602-16-030-FL | MXF-602-16-030 |
| 20mm | 2.0mm | 20mm | 38mm | 104mm | MXF-802-20-020-FL | MXF-802-20-020 |
| 20mm | 2.5mm | 20mm | 38mm | 104mm | MXF-802-20-025-FL | MXF-802-20-025 |
| 20mm | 3.0mm | 20mm | 38mm | 104mm | MXF-802-20-030-FL | MXF-802-20-030 |
| 25mm | 2.0mm | 25mm | 38mm | 104mm | MXF-802-25-020-FL | MXF-802-25-020 |
| 25mm | 2.5mm | 25mm | 38mm | 104mm | MXF-802-25-025-FL | MXF-802-25-025 |
| 25mm | 3.0mm | 25mm | 38mm | 104mm | MXF-802-25-030-FL | MXF-802-25-030 |

NOTE: Metric tools do not have flats.

See New Trochoidal Tool Paths
www.robbjack.com/videos

**Cut Titanium up to 75 inches/minute
 1905 mm/minute**



Eliminate Tool Pull Out!
 6-8mm h5 Shank Tolerances
 10-25mm h4 Shank Tolerances
Tightest in the Industry!



XG/MXG Speeds & Feeds

XG-402 SPEEDS & FEEDS

| Material | Surface Feet | 1/4" | | 5/16" | | 3/8" | | 1/2" | | 5/8" | | 3/4" | | 1" | |
|------------------------------|--------------|------|--------|-------|--------|------|--------|------|--------|------|--------|------|--------|------|--------|
| | | RPM | in/min | RPM | in/min | RPM | in/min | RPM | in/min | RPM | in/min | RPM | in/min | RPM | in/min |
| CAST IRON | | | | | | | | | | | | | | | |
| Ductile | 400 | 6112 | 28 | 4890 | 34 | 4075 | 39 | 3056 | 43 | 2445 | 39 | 2037 | 34 | 1528 | 30 |
| Gray | 525 | 8022 | 42 | 6418 | 51 | 5348 | 58 | 4011 | 64 | 3209 | 58 | 2674 | 51 | 2006 | 45 |
| INCONEL | | | | | | | | | | | | | | | |
| 625/718 | 100 | 1528 | 4 | 1222 | 5 | 1019 | 6 | 764 | 7 | 611 | 6 | 509 | 5 | 382 | 5 |
| STEEL | | | | | | | | | | | | | | | |
| 1018/1020 | 500 | 7640 | 32 | 6112 | 39 | 5093 | 44 | 3820 | 49 | 3056 | 44 | 2547 | 39 | 1910 | 34 |
| 4130 | 400 | 6112 | 20 | 4890 | 24 | 4075 | 28 | 3056 | 31 | 2445 | 28 | 2037 | 24 | 1528 | 21 |
| 4140 | 400 | 6112 | 20 | 4890 | 24 | 4075 | 28 | 3056 | 31 | 2445 | 28 | 2037 | 24 | 1528 | 21 |
| 4340 | 415 | 6341 | 21 | 5073 | 25 | 4227 | 29 | 3171 | 32 | 2536 | 29 | 2114 | 25 | 1585 | 22 |
| STAINLESS STEEL | | | | | | | | | | | | | | | |
| 303 | 550 | 8404 | 31 | 6723 | 38 | 5603 | 43 | 4202 | 48 | 3362 | 43 | 2801 | 38 | 2101 | 34 |
| 304 | 400 | 6112 | 17 | 4890 | 22 | 4075 | 24 | 3056 | 27 | 2445 | 24 | 2037 | 22 | 1528 | 19 |
| 316 | 400 | 6112 | 17 | 4890 | 22 | 4075 | 24 | 3056 | 27 | 2445 | 24 | 2037 | 22 | 1528 | 19 |
| 15-5/17-4 | 300 | 4584 | 13 | 3667 | 16 | 3056 | 18 | 2292 | 20 | 1834 | 18 | 1528 | 16 | 1146 | 14 |
| 13-8 | 300 | 4584 | 13 | 3667 | 16 | 3056 | 18 | 2292 | 20 | 1834 | 18 | 1528 | 16 | 1146 | 14 |
| 440C | 300 | 4584 | 13 | 3667 | 16 | 3056 | 18 | 2292 | 20 | 1834 | 18 | 1528 | 16 | 1146 | 14 |
| TOOL STEEL (ANNEALED) | | | | | | | | | | | | | | | |
| A2 | 400 | 6112 | 17 | 4890 | 22 | 4075 | 24 | 3056 | 27 | 2445 | 24 | 2037 | 22 | 1528 | 19 |
| D2 | 360 | 5501 | 16 | 4401 | 19 | 3667 | 22 | 2750 | 24 | 2200 | 22 | 1834 | 19 | 1375 | 17 |
| H13 | 400 | 6112 | 17 | 4890 | 22 | 4075 | 24 | 3056 | 27 | 2445 | 24 | 2037 | 22 | 1528 | 19 |
| P20 | 400 | 6112 | 23 | 4890 | 28 | 4075 | 31 | 3056 | 35 | 2445 | 31 | 2037 | 28 | 1528 | 24 |
| TITANIUM | | | | | | | | | | | | | | | |
| Com. pure | 300 | 4584 | 17 | 3667 | 21 | 3056 | 24 | 2292 | 26 | 1834 | 24 | 1528 | 21 | 1146 | 18 |
| 6AL-4V | 200 | 3056 | 9 | 2445 | 11 | 2037 | 12 | 1528 | 13 | 1222 | 12 | 1019 | 11 | 764 | 9 |
| 6AL-6V | 175 | 2674 | 8 | 2139 | 9 | 1783 | 11 | 1337 | 12 | 1070 | 11 | 891 | 9 | 669 | 8 |

MXG-402 SPEEDS & FEEDS METRIC

| Material | Surface Meters | 6 mm | | 8 mm | | 10 mm | | 12 mm | | 16 mm | | 20 mm | |
|------------------------|----------------|------|--------|------|--------|-------|--------|-------|--------|-------|--------|-------|--------|
| | | RPM | mm/min | RPM | mm/min | RPM | mm/min | RPM | mm/min | RPM | mm/min | RPM | mm/min |
| CAST IRON | | | | | | | | | | | | | |
| Ductile | 122 | 6475 | 706 | 4851 | 869 | 3881 | 978 | 3235 | 1087 | 2426 | 978 | 1941 | 869 |
| Gray | 160 | 8498 | 1060 | 6367 | 1304 | 5094 | 1467 | 4245 | 1630 | 3184 | 1467 | 2547 | 1304 |
| INCONEL | | | | | | | | | | | | | |
| 625/718 | 30 | 1619 | 108 | 1213 | 134 | 970 | 150 | 809 | 167 | 606 | 150 | 485 | 134 |
| STEEL | | | | | | | | | | | | | |
| 1018/1020 | 152 | 8093 | 807 | 6063 | 994 | 4851 | 1118 | 4043 | 1242 | 3032 | 1118 | 2426 | 994 |
| 4130 | 122 | 6475 | 505 | 4851 | 621 | 3881 | 699 | 3235 | 776 | 2426 | 699 | 1941 | 621 |
| 4140 | 122 | 6475 | 505 | 4851 | 621 | 3881 | 699 | 3235 | 776 | 2426 | 699 | 1941 | 621 |
| 4340 | 126 | 6717 | 523 | 5033 | 644 | 4027 | 725 | 3356 | 805 | 2517 | 725 | 2013 | 644 |
| STAINLESS STEEL | | | | | | | | | | | | | |
| 303 | 168 | 8903 | 791 | 6670 | 973 | 5337 | 1095 | 4448 | 1217 | 3335 | 1095 | 2668 | 973 |
| 304 | 122 | 6475 | 444 | 4851 | 546 | 3881 | 615 | 3235 | 683 | 2426 | 615 | 1941 | 546 |
| 316 | 122 | 6475 | 444 | 4851 | 546 | 3881 | 615 | 3235 | 683 | 2426 | 615 | 1941 | 546 |
| 15-5/17-4 | 91 | 4856 | 333 | 3638 | 410 | 2911 | 461 | 2426 | 512 | 1819 | 461 | 1455 | 410 |
| 13-8 | 91 | 4856 | 333 | 3638 | 410 | 2911 | 461 | 2426 | 512 | 1819 | 461 | 1455 | 410 |
| 440C | 91 | 4856 | 333 | 3638 | 410 | 2911 | 461 | 2426 | 512 | 1819 | 461 | 1455 | 410 |

CONTINUED ON NEXT PAGE—

Speeds & Feeds **MXG/XF**

MXG-402 SPEEDS & FEEDS METRIC —CONTINUED FROM PREVIOUS

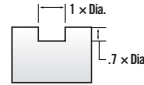
| Material | Surface Meters | 6 mm | | 8 mm | | 10 mm | | 12 mm | | 16 mm | | 20 mm | |
|------------------------------|----------------|------|--------|------|--------|-------|--------|-------|--------|-------|--------|-------|--------|
| | | RPM | mm/min | RPM | mm/min | RPM | mm/min | RPM | mm/min | RPM | mm/min | RPM | mm/min |
| TOOL STEEL (ANNEALED) | | | | | | | | | | | | | |
| A2 | 122 | 6475 | 444 | 4851 | 546 | 3881 | 615 | 3235 | 683 | 2426 | 615 | 1941 | 546 |
| D2 | 110 | 5827 | 400 | 4366 | 492 | 3493 | 553 | 2911 | 615 | 2183 | 553 | 1747 | 492 |
| H13 | 122 | 6475 | 444 | 4851 | 546 | 3881 | 615 | 3235 | 683 | 2426 | 615 | 1941 | 546 |
| P20 | 122 | 6475 | 575 | 4851 | 708 | 3881 | 796 | 3235 | 885 | 2426 | 796 | 1941 | 708 |
| TITANIUM | | | | | | | | | | | | | |
| Com. pure | 91 | 4856 | 431 | 3638 | 531 | 2911 | 597 | 2426 | 664 | 1819 | 597 | 1455 | 531 |
| 6AL-4V | 61 | 3237 | 222 | 2425 | 273 | 1941 | 307 | 1617 | 342 | 1213 | 307 | 970 | 273 |
| 6AL-6V | 53 | 2833 | 194 | 2122 | 239 | 1698 | 269 | 1415 | 299 | 1061 | 269 | 849 | 239 |

General Guidelines for XG-402 and MXG-402

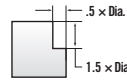
- Speeds and feeds are based on applications with very rigid machine tools, toolholders, and fixturing. Speeds and feeds will vary dramatically depending on the application. Extreme forces can be generated and can cause damage, if not appropriate for the cutting conditions.

- Helical interpolation or ramping should be used to enter pockets.
- For the highest material removal rates and longest tool life profile milling is preferred over slotting (See diagrams at right).
- Use shrink fit or equivalent tool holder. If not, use flats to eliminate slippage in the tool holder!
- Climb milling is recommended.
- For ball end tools reduce feed rate by 10%.

Slotting



Profiling



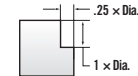
XG-502 AND XF SERIES SPEEDS & FEEDS

| Material | Surface Feet | 3/8" | | 1/2" | | 5/8" | | 3/4" | | 1" | |
|------------------------------|--------------|------|--------|------|--------|------|--------|------|--------|------|--------|
| | | RPM | in/min | RPM | in/min | RPM | in/min | RPM | in/min | RPM | in/min |
| CAST IRON | | | | | | | | | | | |
| Ductile | 400 | 4075 | 58 | 3056 | 64 | 2445 | 58 | 2037 | 68 | 1528 | 60 |
| Gray | 525 | 5348 | 86 | 4011 | 96 | 3209 | 86 | 2674 | 102 | 2006 | 90 |
| INCONEL | | | | | | | | | | | |
| 625/718 | 150 | 1528 | 12 | 1146 | 14 | 917 | 12 | 764 | 16 | 573 | 14 |
| STEEL | | | | | | | | | | | |
| 1018/1020 | 500 | 5093 | 62 | 3820 | 68 | 3056 | 62 | 2547 | 74 | 1910 | 32 |
| 4130 | 400 | 4075 | 42 | 3056 | 46 | 2445 | 42 | 2037 | 48 | 1528 | 42 |
| 4140 | 400 | 4075 | 42 | 3056 | 46 | 2445 | 42 | 2037 | 48 | 1528 | 42 |
| 4340 | 415 | 4227 | 42 | 3171 | 48 | 2536 | 42 | 2114 | 50 | 1585 | 44 |
| STAINLESS STEEL | | | | | | | | | | | |
| 303 | 550 | 5603 | 62 | 4202 | 68 | 3362 | 62 | 2801 | 72 | 2101 | 64 |
| 304 | 400 | 4075 | 36 | 3056 | 40 | 2445 | 36 | 2037 | 44 | 1528 | 38 |
| 316 | 400 | 4075 | 36 | 3056 | 40 | 2445 | 36 | 2037 | 44 | 1528 | 38 |
| 15-5/17-4 | 300 | 3056 | 28 | 2292 | 30 | 1834 | 28 | 1528 | 32 | 1146 | 28 |
| 13-8 | 300 | 3056 | 28 | 2292 | 30 | 1834 | 28 | 1528 | 32 | 1146 | 28 |
| 440C | 300 | 3056 | 28 | 2292 | 30 | 1834 | 28 | 1528 | 32 | 1146 | 28 |
| TOOL STEEL (ANNEALED) | | | | | | | | | | | |
| A2 | 400 | 4075 | 36 | 3056 | 40 | 2445 | 36 | 2037 | 44 | 1528 | 38 |
| D2 | 360 | 3667 | 32 | 2750 | 36 | 2200 | 32 | 1834 | 38 | 1375 | 34 |
| H13 | 400 | 4075 | 36 | 3056 | 40 | 2445 | 36 | 2037 | 44 | 1528 | 38 |
| P20 | 400 | 4075 | 44 | 3056 | 50 | 2445 | 44 | 2037 | 52 | 1528 | 46 |
| TITANIUM | | | | | | | | | | | |
| Com. pure | 300 | 3056 | 34 | 2292 | 38 | 1834 | 34 | 1528 | 40 | 1146 | 34 |
| 6AL-4V | 380 | 3871 | 42 | 2903 | 48 | 2323 | 42 | 1935 | 50 | 1452 | 44 |
| 6AL-6V | 175 | 1783 | 20 | 1337 | 22 | 1070 | 20 | 891 | 24 | 669 | 20 |

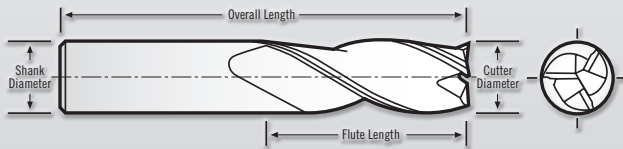
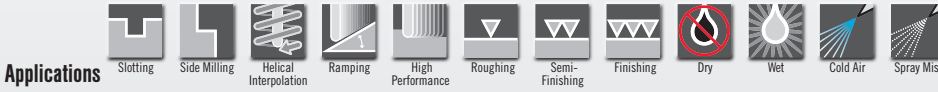
XF Finish Profiling



XG-502 Profiling



ST/MST Super Tuffy Grade Carbide End Mills



ST-341 and ST-343 Tolerances

Cutting Dia. (1/8" to 1/4") = +.000/-0.002"
 (5/16" to 3/4") = +.000/-0.003"
 Shank Dia. = -.0001/-0.0002"
 Flute Length (1/8" to 5/16") = +.030/-0.000"
 (3/8" to 3/4") = +.060/-0.000"
 OAL = ±.060"

MST-341 Tolerances

Cutting Dia. = +.000/-0.075mm
 Shank Dia. = -.002/-0.005mm
 Flute Length = +0.500/+1.500mm
 OAL = ±1.000mm



ST-341 3 Flute Super Tuffy Carbide Stub Length



| Cutting Diameter | Shank Diameter | Flute Length | Corner Break Size | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated |
|------------------|----------------|--------------|-------------------|----------------|----------------------|------------------------|-------------------------|--------------------------|
| 1/8" | 1/8" | 1/4" | .003"/.005" | 1-1/2" | ST-341-04 | ST-341-04-T | ST-341-04-C | ST-341-04-A |
| 3/16" | 3/16" | 3/8" | .003"/.005" | 2" | ST-341-06 | ST-341-06-T | ST-341-06-C | ST-341-06-A |
| 1/4" | 1/4" | 1/2" | .003"/.005" | 2-1/2" | ST-341-08 | ST-341-08-T | ST-341-08-C | ST-341-08-A |
| 5/16" | 5/16" | 1/2" | .004"/.006" | 2-1/2" | ST-341-10 | ST-341-10-T | ST-341-10-C | ST-341-10-A |
| 3/8" | 3/8" | 5/8" | .005"/.007" | 2-1/2" | ST-341-12 | ST-341-12-T | ST-341-12-C | ST-341-12-A |
| 1/2" | 1/2" | 5/8" | .006"/.009" | 3" | ST-341-16 | ST-341-16-T | ST-341-16-C | ST-341-16-A |
| 5/8" | 5/8" | 3/4" | .009"/.011" | 3-1/2" | ST-341-20 | ST-341-20-T | ST-341-20-C | ST-341-20-A |
| 3/4" | 3/4" | 1" | .011"/.014" | 4" | ST-341-24 | ST-341-24-T | ST-341-24-C | ST-341-24-A |



MST-341 Metric 3 Flute Super Tuffy Carbide Stub Length **METRIC**



| Cutting Diameter | Shank Diameter | Flute Length | Corner Break Size | Overall Length | Tool Number Uncoated | Tool Number Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated |
|------------------|----------------|--------------|-------------------|----------------|----------------------|--------------------|-------------------------|--------------------------|
| 3mm | 3mm | 6mm | .075/.125mm | 38mm | MST-341-03 | MST-341-03-T | MST-341-03-C | MST-341-03-A |
| 4mm | 4mm | 8mm | .075/.125mm | 50mm | MST-341-04 | MST-341-04-T | MST-341-04-C | MST-341-04-A |
| 5mm | 5mm | 8mm | .075/.125mm | 50mm | MST-341-05 | MST-341-05-T | MST-341-05-C | MST-341-05-A |
| 6mm | 6mm | 8mm | .075/.125mm | 57mm | MST-341-06 | MST-341-06-T | MST-341-06-C | MST-341-06-A |
| 8mm | 8mm | 12mm | .100/.150mm | 63mm | MST-341-08 | MST-341-08-T | MST-341-08-C | MST-341-08-A |
| 10mm | 10mm | 14mm | .125/.175mm | 72mm | MST-341-10 | MST-341-10-T | MST-341-10-C | MST-341-10-A |
| 12mm | 12mm | 16mm | .150/.130mm | 83mm | MST-341-12 | MST-341-12-T | MST-341-12-C | MST-341-12-A |
| 16mm | 16mm | 20mm | .230/.280mm | 92mm | MST-341-16 | MST-341-16-T | MST-341-16-C | MST-341-16-A |
| 20mm | 20mm | 25mm | .280/.360mm | 104mm | MST-341-20 | MST-341-20-T | MST-341-20-C | MST-341-20-A |

Super Tuffy Grade Carbide End Mills **ST**

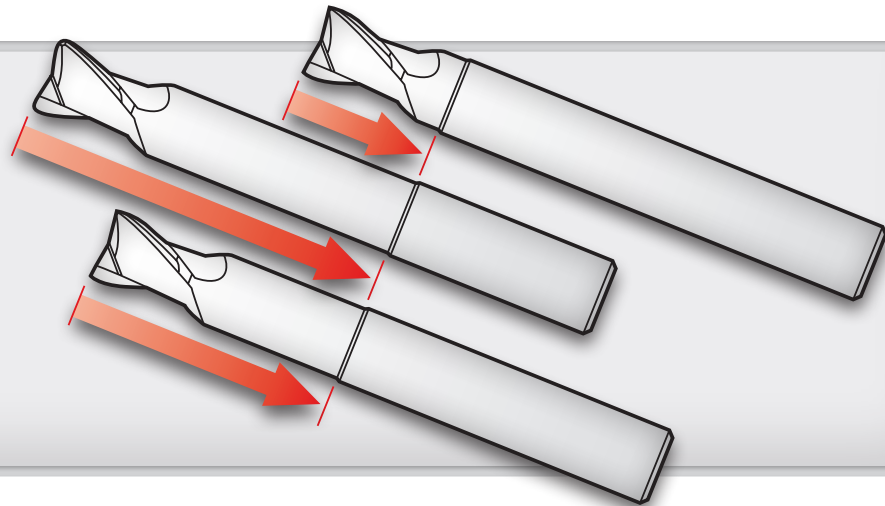


ST-343 3 Flute Super Tuffy Carbide Standard Length

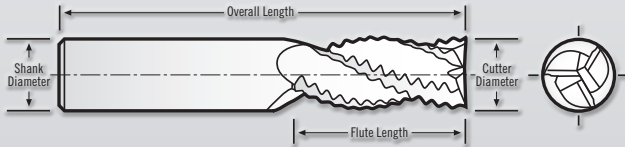
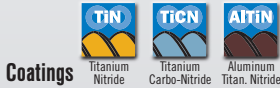
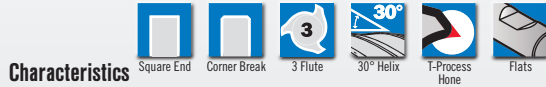
| Cutting Diameter | Shank Diameter | Flute Length | Corner Break Size | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated |
|------------------|----------------|--------------|-------------------|----------------|----------------------|------------------------|-------------------------|--------------------------|
| 1/8" | 1/8" | 1/2" | .003"/.005" | 1-1/2" | ST-343-04 | ST-343-04-T | ST-343-04-C | ST-343-04-A |
| 3/16" | 3/16" | 5/8" | .003"/.005" | 2" | ST-343-06 | ST-343-06-T | ST-343-06-C | ST-343-06-A |
| 1/4" | 1/4" | 3/4" | .003"/.005" | 2-1/2" | ST-343-08 | ST-343-08-T | ST-343-08-C | ST-343-08-A |
| 5/16" | 5/16" | 13/16" | .004"/.006" | 2-1/2" | ST-343-10 | ST-343-10-T | ST-343-10-C | ST-343-10-A |
| 3/8" | 3/8" | 7/8" | .005"/.007" | 2-1/2" | ST-343-12 | ST-343-12-T | ST-343-12-C | ST-343-12-A |
| 1/2" | 1/2" | 1" | .006"/.009" | 3" | ST-343-16 | ST-343-16-T | ST-343-16-C | ST-343-16-A |
| 5/8" | 5/8" | 1-1/4" | .009"/.011" | 3-1/2" | ST-343-20 | ST-343-20-T | ST-343-20-C | ST-343-20-A |
| 3/4" | 3/4" | 1-1/2" | .011"/.014" | 4" | ST-343-24 | ST-343-24-T | ST-343-24-C | ST-343-24-A |

Need Reach?

See End Mill Modifications (page 14)



STR/MSTR 3 Flute Super Tuffy Grade Carbide Rufflers



STR Series Tolerances

Cutting Dia. = $-.003/-0.007$ "
 Shank Dia. = $-.0001/-0.0002$ "
 Flute Length (1/4" to 5/16") = $+.030/-0.000$ "
 (3/8" to 3/4") = $+.060/-0.000$ "
 OAL = ±0.060 "

MSTR Tolerances

Cutting Dia. = $-.075/-0.180$ mm
 Shank Dia. = $-.002/-0.005$ mm
 Flute Length = $+0.500/+1.500$ mm
 OAL = ±1.000 mm



STR-301 3 Flute Super Tuffy Carbide Ruffler Stub Length



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|
| 1/4" | 1/4" | 1/2" | 2-1/2" | STR-301-08* | STR-301-08-T* | STR-301-08-C* | STR-301-08-A* |
| 5/16" | 5/16" | 1/2" | 2-1/2" | STR-301-10* | STR-301-10-T* | STR-301-10-C* | STR-301-10-A* |
| 3/8" | 3/8" | 5/8" | 2-1/2" | STR-301-12 | STR-301-12-T | STR-301-12-C | STR-301-12-A |
| 7/16" | 7/16" | 5/8" | 2-3/4" | STR-301-14* | STR-301-14-T* | STR-301-14-C* | STR-301-14-A* |
| 1/2" | 1/2" | 5/8" | 3" | STR-301-16 | STR-301-16-T | STR-301-16-C | STR-301-16-A |
| 5/8" | 5/8" | 7/8" | 3-1/2" | STR-301-20 | STR-301-20-T | STR-301-20-C | STR-301-20-A |
| 3/4" | 3/4" | 1" | 4" | STR-301-24 | STR-301-24-T | STR-301-24-C | STR-301-24-A |

*Does not come with flats.



MSTR-301 3 Flute Super Tuffy Carbide Ruffler Stub Length

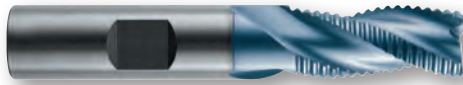
METRIC



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|
| 6mm | 6mm | 8mm | 57mm | MSTR-301-06 | MSTR-301-06-T | MSTR-301-06-C | MSTR-301-06-A |
| 8mm | 8mm | 12mm | 63mm | MSTR-301-08 | MSTR-301-08-T | MSTR-301-08-C | MSTR-301-08-A |
| 10mm | 10mm | 14mm | 72mm | MSTR-301-10 | MSTR-301-10-T | MSTR-301-10-C | MSTR-301-10-A |
| 12mm | 12mm | 16mm | 83mm | MSTR-301-12 | MSTR-301-12-T | MSTR-301-12-C | MSTR-301-12-A |
| 16mm | 16mm | 20mm | 92mm | MSTR-301-16 | MSTR-301-16-T | MSTR-301-16-C | MSTR-301-16-A |
| 20mm | 20mm | 25mm | 104mm | MSTR-301-20 | MSTR-301-20-T | MSTR-301-20-C | MSTR-301-20-A |

NOTE: Metric tools do not have flats.

3 Flute Super Tuffy Grade Carbide Ruffers **STR/MSTR**



STR-303 3 Flute Super Tuffy Carbide Ruffer Standard Length

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------|
| 1/4" | 1/4" | 3/4" | 2-1/2" | STR-303-08* | STR-303-08-T* | STR-303-08-C* | STR-303-08-A* |
| 9/32" | 5/16" | 3/4" | 2-1/2" | STR-303-09* | STR-303-09-T* | STR-303-09-C* | STR-303-09-A* |
| 5/16" | 5/16" | 13/16" | 2-1/2" | STR-303-10* | STR-303-10-T* | STR-303-10-C* | STR-303-10-A* |
| 3/8" | 3/8" | 7/8" | 2-1/2" | STR-303-12 | STR-303-12-T | STR-303-12-C | STR-303-12-A |
| 7/16" | 7/16" | 1" | 2-3/4" | STR-303-14* | STR-303-14-T* | STR-303-14-C* | STR-303-14-A* |
| 1/2" | 1/2" | 1" | 3" | STR-303-16 | STR-303-16-T | STR-303-16-C | STR-303-16-A |
| 9/16" | 9/16" | 1-1/4" | 3-1/2" | STR-303-18* | STR-303-18-T* | STR-303-18-C* | STR-303-18-A* |
| 5/8" | 5/8" | 1-1/4" | 3-1/2" | STR-303-20 | STR-303-20-T | STR-303-20-C | STR-303-20-A |
| 3/4" | 3/4" | 1-1/2" | 4" | STR-303-24 | STR-303-24-T | STR-303-24-C | STR-303-24-A |
| 1" | 1" | 2-1/2" | 5" | STR-303-32 | STR-303-32-T | STR-303-32-C | STR-303-32-A |

*Does not come with flats.



MSTR-303 Flute Super Tuffy Carbide Ruffer Standard Length

METRIC



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|
| 6mm | 6mm | 14mm | 57mm | MSTR-303-06 | MSTR-303-06-T | MSTR-303-06-C | MSTR-303-06-A |
| 8mm | 8mm | 16mm | 63mm | MSTR-303-08 | MSTR-303-08-T | MSTR-303-08-C | MSTR-303-08-A |
| 10mm | 10mm | 20mm | 72mm | MSTR-303-10 | MSTR-303-10-T | MSTR-303-10-C | MSTR-303-10-A |
| 12mm | 12mm | 25mm | 83mm | MSTR-303-12 | MSTR-303-12-T | MSTR-303-12-C | MSTR-303-12-A |
| 16mm | 16mm | 32mm | 92mm | MSTR-303-16 | MSTR-303-16-T | MSTR-303-16-C | MSTR-303-16-A |
| 20mm | 20mm | 38mm | 104mm | MSTR-303-20 | MSTR-303-20-T | MSTR-303-20-C | MSTR-303-20-A |

NOTE: Metric tools do not have flats.

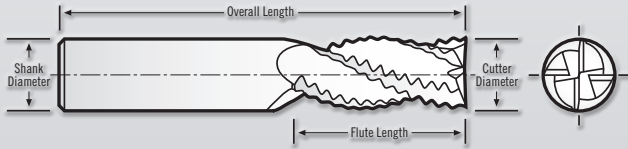
Need Without Flats?

Order any tool without flats by adding "-NF" to end of Tool Number!

NOTE: Metric sizes do not come with flats.



STR/MSTR 4 Flute Super Tuffy Grade Carbide Rufflers



STR Series Tolerances

Cutting Dia. = $-.003/-0.007$ "
 Shank Dia. = $-.0001/-0.0002$ "
 Flute length (1/4" to 5/16") = $+.030/-0.000$ "
 (3/8" to 3/4") = $+.060/-0.000$ "
 OAL = ±0.060 "

MSTR Tolerances

Cutting Dia. = $-.075/-0.180$ mm
 Shank Dia. = $-.002/-0.005$ mm
 Flute Length = $+0.500/+1.500$ mm
 OAL = ±1.000 mm



STR-401 4 Flute Super Tuffy Carbide Ruffler Stub Length



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|
| 1/4" | 1/4" | 1/2" | 2-1/2" | STR-401-08* | STR-401-08-T* | STR-401-08-C* | STR-401-08-A* |
| 5/16" | 5/16" | 1/2" | 2-1/2" | STR-401-10* | STR-401-10-T* | STR-401-10-C* | STR-401-10-A* |
| 3/8" | 3/8" | 5/8" | 2-1/2" | STR-401-12 | STR-401-12-T | STR-401-12-C | STR-401-12-A |
| 7/16" | 7/16" | 5/8" | 2-3/4" | STR-401-14* | STR-401-14-T* | STR-401-14-C* | STR-401-14-A* |
| 1/2" | 1/2" | 5/8" | 3" | STR-401-16 | STR-401-16-T | STR-401-16-C | STR-401-16-A |
| 5/8" | 5/8" | 7/8" | 3-1/2" | STR-401-20 | STR-401-20-T | STR-401-20-C | STR-401-20-A |
| 3/4" | 3/4" | 1" | 4" | STR-401-24 | STR-401-24-T | STR-401-24-C | STR-401-24-A |
| 1" | 1" | 1-1/2" | 5" | STR-401-32 | STR-401-32-T | STR-401-32-C | STR-401-32-A |

*Does not come with flats.



MSTR-401 4 Flute Super Tuffy Carbide Ruffler Stub Length

METRIC



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|
| 6mm | 6mm | 8mm | 57mm | MSTR-401-06 | MSTR-401-06-T | MSTR-401-06-C | MSTR-401-06-A |
| 8mm | 8mm | 12mm | 63mm | MSTR-401-08 | MSTR-401-08-T | MSTR-401-08-C | MSTR-401-08-A |
| 10mm | 10mm | 14mm | 72mm | MSTR-401-10 | MSTR-401-10-T | MSTR-401-10-C | MSTR-401-10-A |
| 12mm | 12mm | 16mm | 83mm | MSTR-401-12 | MSTR-401-12-T | MSTR-401-12-C | MSTR-401-12-A |
| 16mm | 16mm | 20mm | 92mm | MSTR-401-16 | MSTR-401-16-T | MSTR-401-16-C | MSTR-401-16-A |
| 20mm | 20mm | 25mm | 104mm | MSTR-401-20 | MSTR-401-20-T | MSTR-401-20-C | MSTR-401-20-A |

NOTE: Metric tools do not have flats.

4 Flute Super Tuffy Grade Carbide Ruffers **STR/MSTR**



STR-404 4 Flute Super Tuffy Carbide Ruffer Standard Length

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated |
|------------------|----------------|--------------|----------------|----------------------|--------------------|-------------------------|--------------------------|
| 1/4" | 1/4" | 3/4" | 2-1/2" | STR-404-08* | STR-404-08-T* | STR-404-08-C* | STR-404-08-A* |
| 9/32" | 5/16" | 3/4" | 2-1/2" | STR-404-09* | STR-404-09-T* | STR-404-09-C* | STR-404-09-A* |
| 5/16" | 5/16" | 13/16" | 2-1/2" | STR-404-10* | STR-404-10-T* | STR-404-10-C* | STR-404-10-A* |
| 3/8" | 3/8" | 7/8" | 2-1/2" | STR-404-12 | STR-404-12-T | STR-404-12-C | STR-404-12-A |
| 7/16" | 7/16" | 1" | 2-3/4" | STR-404-14* | STR-404-14-T* | STR-404-14-C* | STR-404-14-A* |
| 1/2" | 1/2" | 1" | 3" | STR-404-16 | STR-404-16-T | STR-404-16-C | STR-404-16-A |
| 9/16" | 9/16" | 1-1/4" | 3-1/2" | STR-404-18* | STR-404-18-T* | STR-404-18-C* | STR-404-18-A* |
| 5/8" | 5/8" | 1-1/4" | 3-1/2" | STR-404-20 | STR-404-20-T | STR-404-20-C | STR-404-20-A |
| 3/4" | 3/4" | 1-1/2" | 4" | STR-404-24 | STR-404-24-T | STR-404-24-C | STR-404-24-A |
| 1" | 1" | 2-1/2" | 5" | STR-404-32 | STR-404-32-T | STR-404-32-C | STR-404-32-A |

*Does not come with flats.



MSTR-404 4 Flute Super Tuffy Carbide Ruffer Standard Length

METRIC



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|
| 6mm | 6mm | 14mm | 57mm | MSTR-404-06 | MSTR-404-06-T | MSTR-404-06-C | MSTR-404-06-A |
| 8mm | 8mm | 16mm | 63mm | MSTR-404-08 | MSTR-404-08-T | MSTR-404-08-C | MSTR-404-08-A |
| 10mm | 10mm | 20mm | 72mm | MSTR-404-10 | MSTR-404-10-T | MSTR-404-10-C | MSTR-404-10-A |
| 12mm | 12mm | 25mm | 83mm | MSTR-404-12 | MSTR-404-12-T | MSTR-404-12-C | MSTR-404-12-A |
| 16mm | 16mm | 32mm | 92mm | MSTR-404-16 | MSTR-404-16-T | MSTR-404-16-C | MSTR-404-16-A |
| 20mm | 20mm | 38mm | 104mm | MSTR-404-20 | MSTR-404-20-T | MSTR-404-20-C | MSTR-404-20-A |

NOTE: Metric tools do not have flats.

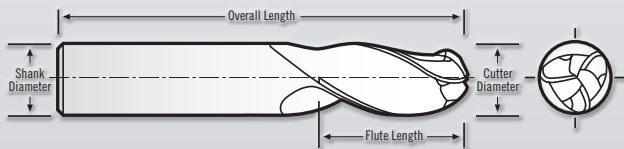
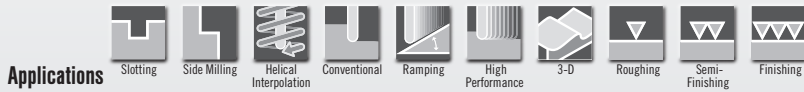
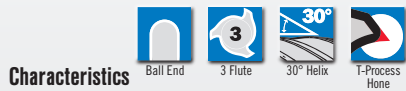
Need Without Flats?

Order any tool without flats by adding "-NF" to end of Tool Number!

NOTE: Metric sizes do not come with flats.



B 3 Flute Tuffy Grade Carbide Ball End Mills



B Series Tolerances

Cutting Dia. (1/16" to 1/4") = +.000/-0.002"
 (9/32" to 3/4") = +.000/-0.003"
 Shank Dia. = -.0001/-0.0002"
 Flute Length (1/16" to 5/16") = +.030/-0.000"
 (3/8" to 1") = +.060/-0.000"
 OAL = ±.060"



B-300 3 Flute Tuffy Ball End Stub Length

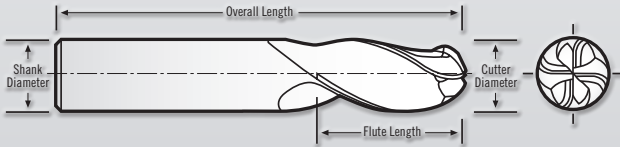
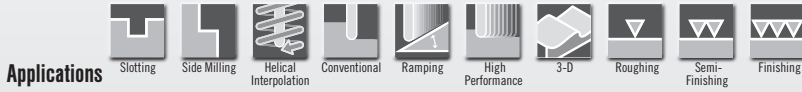
| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|
| 1/8" | 1/8" | 1/4" | 1-1/2" | B-300-04 | B-300-04-T | B-300-04-C | B-300-04-A |
| 3/16" | 3/16" | 5/16" | 2" | B-300-06 | B-300-06-T | B-300-06-C | B-300-06-A |
| 1/4" | 1/4" | 5/16" | 2-1/2" | B-300-08 | B-300-08-T | B-300-08-C | B-300-08-A |
| 5/16" | 5/16" | 7/16" | 2-1/2" | B-300-10 | B-300-10-T | B-300-10-C | B-300-10-A |
| 3/8" | 3/8" | 1/2" | 2-1/2" | B-300-12 | B-300-12-T | B-300-12-C | B-300-12-A |
| 1/2" | 1/2" | 5/8" | 3" | B-300-16 | B-300-16-T | B-300-16-C | B-300-16-A |
| 5/8" | 5/8" | 7/8" | 3-1/2" | B-300-20 | B-300-20-T | B-300-20-C | B-300-20-A |
| 3/4" | 3/4" | 1" | 4" | B-300-24 | B-300-24-T | B-300-24-C | B-300-24-A |



B-330 3 Flute Tuffy Ball End Standard Length

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|
| 1/8" | 1/8" | 1/2" | 1-1/2" | B-330-04 | B-330-04-T | B-330-04-C | B-330-04-A |
| 3/16" | 3/16" | 5/8" | 2" | B-330-06 | B-330-06-T | B-330-06-C | B-330-06-A |
| 1/4" | 1/4" | 3/4" | 2-1/2" | B-330-08 | B-330-08-T | B-330-08-C | B-330-08-A |
| 5/16" | 5/16" | 13/16" | 2-1/2" | B-330-10 | B-330-10-T | B-330-10-C | B-330-10-A |
| 3/8" | 3/8" | 7/8" | 2-1/2" | B-330-12 | B-330-12-T | B-330-12-C | B-330-12-A |
| 1/2" | 1/2" | 1" | 3" | B-330-16 | B-330-16-T | B-330-16-C | B-330-16-A |
| 5/8" | 5/8" | 1-1/4" | 3-1/2" | B-330-20 | B-330-20-T | B-330-20-C | B-330-20-A |
| 3/4" | 3/4" | 1-1/2" | 4" | B-330-24 | B-330-24-T | B-330-24-C | B-330-24-A |

4 Flute Tuffy Grade Carbide Ball End Mills **B/MB**



B Series Tolerances

Cutting Dia. (1/16" to 1/4") = +.000/-0.002"
 (9/32" to 3/4") = +.000/-0.003"
 Shank Dia. = -.0001/-0.0002"
 Flute Length (1/16" to 5/16") = +.030/-0.000"
 (3/8" to 1") = +.060/-0.000"
 OAL = ±.060"

MB Tolerances

Cutting Dia. = +.000/-0.075mm
 Shank Dia. = -.002/-0.005mm
 Flute Length = +0.500/+1.500mm
 OAL = ±1.000mm



B-440 4 Flute Tuffy Ball End Standard Length 40° Helix

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|
| 1/8" | 1/8" | 1/2" | 1-1/2" | B-440-04 | B-440-04-T | B-440-04-C | B-440-04-A |
| 3/16" | 3/16" | 5/8" | 2" | B-440-06 | B-440-06-T | B-440-06-C | B-440-06-A |
| 1/4" | 1/4" | 3/4" | 2-1/2" | B-440-08 | B-440-08-T | B-440-08-C | B-440-08-A |
| 5/16" | 5/16" | 13/16" | 2-1/2" | B-440-10 | B-440-10-T | B-440-10-C | B-440-10-A |
| 3/8" | 3/8" | 7/8" | 2-1/2" | B-440-12 | B-440-12-T | B-440-12-C | B-440-12-A |
| 1/2" | 1/2" | 1" | 3" | B-440-16 | B-440-16-T | B-440-16-C | B-440-16-A |
| 5/8" | 5/8" | 1-1/4" | 3-1/2" | B-440-20 | B-440-20-T | B-440-20-C | B-440-20-A |
| 3/4" | 3/4" | 1-1/2" | 4" | B-440-24 | B-440-24-T | B-440-24-C | B-440-24-A |



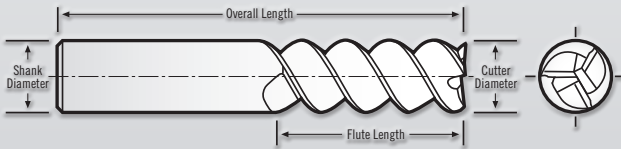
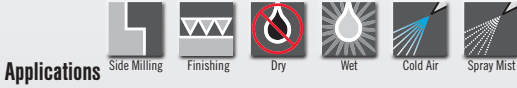
MB-440

4 Flute Tuffy Ball End Standard Length 40° Helix METRIC



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|
| 3mm | 3mm | 12mm | 38mm | MB-440-03 | MB-440-03-T | MB-440-03-C | MB-440-03-A |
| 4mm | 4mm | 12mm | 50mm | MB-440-04 | MB-440-04-T | MB-440-04-C | MB-440-04-A |
| 5mm | 5mm | 14mm | 50mm | MB-440-05 | MB-440-05-T | MB-440-05-C | MB-440-05-A |
| 6mm | 6mm | 14mm | 57mm | MB-440-06 | MB-440-06-T | MB-440-06-C | MB-440-06-A |
| 8mm | 8mm | 16mm | 63mm | MB-440-08 | MB-440-08-T | MB-440-08-C | MB-440-08-A |
| 10mm | 10mm | 20mm | 72mm | MB-440-10 | MB-440-10-T | MB-440-10-C | MB-440-10-A |
| 12mm | 12mm | 25mm | 83mm | MB-440-12 | MB-440-12-T | MB-440-12-C | MB-440-12-A |
| 16mm | 16mm | 32mm | 92mm | MB-440-16 | MB-440-16-T | MB-440-16-C | MB-440-16-A |
| 20mm | 20mm | 38mm | 104mm | MB-440-20 | MB-440-20-T | MB-440-20-C | MB-440-20-A |

ST/MST 3 Flute Super Tuffy Grade Carbide End Mills



ST-360 Tolerances

Cutting Dia. = +.000/-0.003"
 Shank Dia. = -.0001/-0.0002"
 Flute Length (1/8" to 1/4") = +.030/-0.002"
 (5/16" to 3/4") = +.060/-0.003"
 OAL = ±.060"

MST-360 Tolerances

Cutting Dia. = +.000/-0.075mm
 Shank Dia. = -.002/-0.005mm
 Flute Length = +0.500/+1.500mm
 OAL = ±1.000mm



ST-360 3 Flute Super Tuffy Carbide Standard Length



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|
| 1/8" | 1/8" | 1/2" | 1-1/2" | ST-360-04 | ST-360-04-T | ST-360-04-C | ST-360-04-A |
| 3/16" | 3/16" | 5/8" | 2" | ST-360-06 | ST-360-06-T | ST-360-06-C | ST-360-06-A |
| 1/4" | 1/4" | 3/4" | 2-1/2" | ST-360-08 | ST-360-08-T | ST-360-08-C | ST-360-08-A |
| 5/16" | 5/16" | 13/16" | 2-1/2" | ST-360-10 | ST-360-10-T | ST-360-10-C | ST-360-10-A |
| 3/8" | 3/8" | 7/8" | 2-1/2" | ST-360-12 | ST-360-12-T | ST-360-12-C | ST-360-12-A |
| 7/16" | 7/16" | 1" | 2-3/4" | ST-360-14 | ST-360-14-T | ST-360-14-C | ST-360-14-A |
| 1/2" | 1/2" | 1" | 3" | ST-360-16 | ST-360-16-T | ST-360-16-C | ST-360-16-A |
| 9/16" | 9/16" | 1-1/4" | 3-1/2" | ST-360-18 | ST-360-18-T | ST-360-18-C | ST-360-18-A |
| 5/8" | 5/8" | 1-1/4" | 3-1/2" | ST-360-20 | ST-360-20-T | ST-360-20-C | ST-360-20-A |
| 3/4" | 3/4" | 1-1/2" | 4" | ST-360-24 | ST-360-24-T | ST-360-24-C | ST-360-24-A |



MST-360 3 Flute Super Tuffy Carbide Standard Length METRIC



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|
| 3mm | 3mm | 12mm | 38mm | MST-360-03 | MST-360-03-T | MST-360-03-C | MST-360-03-A |
| 4mm | 4mm | 12mm | 50mm | MST-360-04 | MST-360-04-T | MST-360-04-C | MST-360-04-A |
| 5mm | 5mm | 14mm | 50mm | MST-360-05 | MST-360-05-T | MST-360-05-C | MST-360-05-A |
| 6mm | 6mm | 14mm | 57mm | MST-360-06 | MST-360-06-T | MST-360-06-C | MST-360-06-A |
| 8mm | 8mm | 16mm | 63mm | MST-360-08 | MST-360-08-T | MST-360-08-C | MST-360-08-A |
| 10mm | 10mm | 20mm | 72mm | MST-360-10 | MST-360-10-T | MST-360-10-C | MST-360-10-A |
| 12mm | 12mm | 25mm | 83mm | MST-360-12 | MST-360-12-T | MST-360-12-C | MST-360-12-A |
| 16mm | 16mm | 32mm | 92mm | MST-360-16 | MST-360-16-T | MST-360-16-C | MST-360-16-A |
| 20mm | 20mm | 38mm | 104mm | MST-360-20 | MST-360-20-T | MST-360-20-C | MST-360-20-A |

6 Flute Super Tuffy Grade Carbide End Mills **ST/MST**

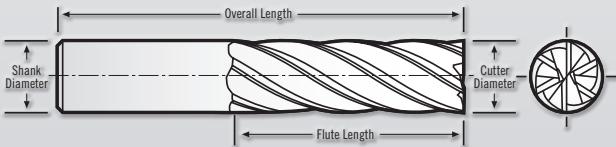
Characteristics

Applications

Materials

Coatings

Available with
Coolant Grooves
See Page 13



ST-630/ST-646 Tolerances
 Cutting Dia. = $+0.001/-0.000$ "
 Shank Dia. = $-0.001/-0.002$ "
 Flute Length = $+0.060/-0.000$ "
 OAL = ± 0.060 "

MST-646 Tolerances
 Cutting Dia. = $+0.025/-0.000$ mm
 Shank Dia. = $-0.002/-0.005$ mm
 Flute Length = $+0.500/+1.500$ mm
 OAL = ± 1.000 mm



+
Tolerances

Honed Radius



ST-646 6 Flute Super Tuffy Carbide Standard Length

| Cutting Diameter | Shank Diameter | Flute Length | Corner Radius | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated |
|------------------|----------------|--------------|---------------|----------------|----------------------|------------------------|-------------------------|--------------------------|
| 3/8" | 3/8" | 7/8" | .005"/.007" | 2-1/2" | ST-646-12 | ST-646-12-T | ST-646-12-C | ST-646-12-A |
| 1/2" | 1/2" | 1" | .006"/.009" | 3" | ST-646-16 | ST-646-16-T | ST-646-16-C | ST-646-16-A |
| 5/8" | 5/8" | 1-1/4" | .009"/.011" | 3-1/2" | ST-646-20 | ST-646-20-T | ST-646-20-C | ST-646-20-A |
| 3/4" | 3/4" | 1-1/2" | .011"/.014" | 4" | ST-646-24 | ST-646-24-T | ST-646-24-C | ST-646-24-A |
| 1" | 1" | 2-1/2" | .012"/.015" | 5" | ST-646-32 | ST-646-32-T | ST-646-32-C | ST-646-32-A |



MST-646 6 Flute Super Tuffy Carbide Standard Length **METRIC**

| Cutting Diameter | Shank Diameter | Flute Length | Corner Radius | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated |
|------------------|----------------|--------------|---------------|----------------|----------------------|------------------------|-------------------------|--------------------------|
| 10mm | 10mm | 20mm | .125/.180mm | 72mm | MST-646-10 | MST-646-10-T | MST-646-10-C | MST-646-10-A |
| 12mm | 12mm | 25mm | .150/.230mm | 83mm | MST-646-12 | MST-646-12-T | MST-646-12-C | MST-646-12-A |
| 16mm | 16mm | 32mm | .230/.280mm | 92mm | MST-646-16 | MST-646-16-T | MST-646-16-C | MST-646-16-A |
| 20mm | 20mm | 38mm | .280/.355mm | 104mm | MST-646-20 | MST-646-20-T | MST-646-20-C | MST-646-20-A |



+
Tolerances



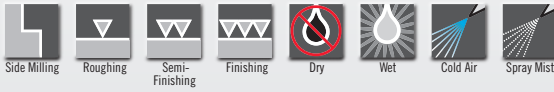
ST-630 6 Flute Super Tuffy Carbide Standard Length

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|
| 3/8" | 3/8" | 7/8" | 2-1/2" | ST-630-12 | ST-630-12-T | ST-630-12-C | ST-630-12-A |
| 1/2" | 1/2" | 1" | 3" | ST-630-16 | ST-630-16-T | ST-630-16-C | ST-630-16-A |
| 5/8" | 5/8" | 1-1/4" | 3-1/2" | ST-630-20 | ST-630-20-T | ST-630-20-C | ST-630-20-A |
| 3/4" | 3/4" | 1-1/2" | 4" | ST-630-24 | ST-630-24-T | ST-630-24-C | ST-630-24-A |
| 1" | 1" | 2-1/2" | 5" | ST-630-32 | ST-630-32-T | ST-630-32-C | ST-630-32-A |

ST/MST 4 Flute Super Tuffy Grade Carbide End Mills



Characteristics



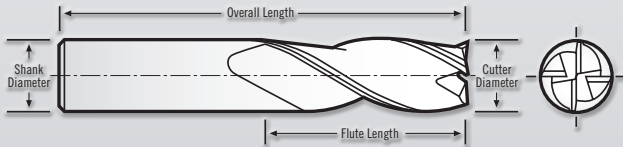
Applications



Materials



Coatings



ST-430/434 Tolerances

Cutting Dia. = $+0.001/-0.000$ "
 Shank Dia. = $-0.001/-0.0002$ "
 Flute Length (1/8" to 5/16") = $+0.030/-0.000$ "
 (3/8" to 1") = $+0.060/-0.000$ "
 OAL = ± 0.060 "

MST-430 and MST-434 Tolerances

Cutting Dia. = $+0.025/-0.000$ mm
 Shank Dia. = $-0.002/-0.005$ mm
 Flute Length = $+0.500/+1.500$ mm
 OAL = ± 1.000 mm



ST-430 4 Flute Super Tuffy Carbide Standard Length



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|
| 1/8" | 1/8" | 1/2" | 1-1/2" | ST-430-04 | ST-430-04-T | ST-430-04-C | ST-430-04-A |
| 5/32" | 3/16" | 9/16" | 2" | ST-430-05 | ST-430-05-T | ST-430-05-C | ST-430-05-A |
| 3/16" | 3/16" | 5/8" | 2" | ST-430-06 | ST-430-06-T | ST-430-06-C | ST-430-06-A |
| 7/32" | 1/4" | 5/8" | 2-1/2" | ST-430-07 | ST-430-07-T | ST-430-07-C | ST-430-07-A |
| 1/4" | 1/4" | 3/4" | 2-1/2" | ST-430-08 | ST-430-08-T | ST-430-08-C | ST-430-08-A |
| 9/32" | 5/16" | 3/4" | 2-1/2" | ST-430-09 | ST-430-09-T | ST-430-09-C | ST-430-09-A |
| 5/16" | 5/16" | 13/16" | 2-1/2" | ST-430-10 | ST-430-10-T | ST-430-10-C | ST-430-10-A |
| 3/8" | 3/8" | 7/8" | 2-1/2" | ST-430-12 | ST-430-12-T | ST-430-12-C | ST-430-12-A |
| 7/16" | 7/16" | 1" | 2-3/4" | ST-430-14 | ST-430-14-T | ST-430-14-C | ST-430-14-A |
| 1/2" | 1/2" | 1" | 3" | ST-430-16 | ST-430-16-T | ST-430-16-C | ST-430-16-A |
| 9/16" | 9/16" | 1-1/4" | 3-1/2" | ST-430-18 | ST-430-18-T | ST-430-18-C | ST-430-18-A |
| 5/8" | 5/8" | 1-1/4" | 3-1/2" | ST-430-20 | ST-430-20-T | ST-430-20-C | ST-430-20-A |
| 3/4" | 3/4" | 1-1/2" | 4" | ST-430-24 | ST-430-24-T | ST-430-24-C | ST-430-24-A |



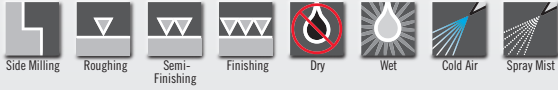
MST-430 4 Flute Super Tuffy Carbide Standard Length **METRIC**

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|
| 3mm | 3mm | 12mm | 38mm | MST-430-03 | MST-430-03-T | MST-430-03-C | MST-430-03-A |
| 4mm | 4mm | 12mm | 50mm | MST-430-04 | MST-430-04-T | MST-430-04-C | MST-430-04-A |
| 5mm | 5mm | 14mm | 50mm | MST-430-05 | MST-430-05-T | MST-430-05-C | MST-430-05-A |
| 6mm | 6mm | 14mm | 57mm | MST-430-06 | MST-430-06-T | MST-430-06-C | MST-430-06-A |
| 8mm | 8mm | 16mm | 63mm | MST-430-08 | MST-430-08-T | MST-430-08-C | MST-430-08-A |
| 10mm | 10mm | 20mm | 72mm | MST-430-10 | MST-430-10-T | MST-430-10-C | MST-430-10-A |
| 12mm | 12mm | 25mm | 83mm | MST-430-12 | MST-430-12-T | MST-430-12-C | MST-430-12-A |
| 16mm | 16mm | 32mm | 92mm | MST-430-16 | MST-430-16-T | MST-430-16-C | MST-430-16-A |
| 20mm | 20mm | 38mm | 104mm | MST-430-20 | MST-430-20-T | MST-430-20-C | MST-430-20-A |

4 Flute Super Tuffy Grade Carbide End Mills **ST/MST**



Characteristics



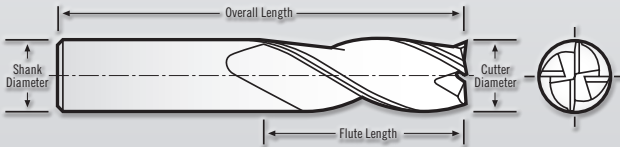
Applications



Materials



Coatings



ST-430/434 Tolerances

Cutting Dia. = $+0.001/-0.000$ "
 Shank Dia. = $-0.0001/-0.0002$ "
 Flute Length (1/8" to 5/16") = $+0.030/-0.000$ "
 (3/8" to 1") = $+0.060/-0.000$ "
 OAL = ± 0.060 "

MST-430 and MST-434 Tolerances

Cutting Dia. = $+0.025/-0.000$ mm
 Shank Dia. = $-0.002/-0.005$ mm
 Flute Length = $+0.500/+1.500$ mm
 OAL = ± 1.000 mm



ST-434 4 Flute Super Tuffy Carbide Standard Length

| Cutting Diameter | Shank Diameter | Flute Length | Corner Break Size | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated |
|------------------|----------------|--------------|-------------------|----------------|----------------------|------------------------|-------------------------|--------------------------|
| 1/8" | 1/8" | 1/2" | .003"/.005" | 1-1/2" | ST-434-04 | ST-434-04-T | ST-434-04-C | ST-434-04-A |
| 3/16" | 3/16" | 5/8" | .003"/.005" | 2" | ST-434-06 | ST-434-06-T | ST-434-06-C | ST-434-06-A |
| 1/4" | 1/4" | 3/4" | .003"/.005" | 2-1/2" | ST-434-08 | ST-434-08-T | ST-434-08-C | ST-434-08-A |
| 5/16" | 5/16" | 13/16" | .004"/.006" | 2-1/2" | ST-434-10 | ST-434-10-T | ST-434-10-C | ST-434-10-A |
| 3/8" | 3/8" | 7/8" | .005"/.007" | 2-1/2" | ST-434-12 | ST-434-12-T | ST-434-12-C | ST-434-12-A |
| 1/2" | 1/2" | 1" | .006"/.009" | 3" | ST-434-16 | ST-434-16-T | ST-434-16-C | ST-434-16-A |
| 5/8" | 5/8" | 1-1/4" | .009"/.011" | 3-1/2" | ST-434-20 | ST-434-20-T | ST-434-20-C | ST-434-20-A |
| 3/4" | 3/4" | 1-1/2" | .011"/.014" | 4" | ST-434-24 | ST-434-24-T | ST-434-24-C | ST-434-24-A |



MST-434 4 Flute Super Tuffy Carbide Standard Length **METRIC**

| Cutting Diameter | Shank Diameter | Flute Length | Corner Break Size | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated |
|------------------|----------------|--------------|-------------------|----------------|----------------------|------------------------|-------------------------|--------------------------|
| 3mm | 3mm | 12mm | .075/.125mm | 38mm | MST-434-03 | MST-434-03-T | MST-434-03-C | MST-434-03-A |
| 4mm | 4mm | 12mm | .075/.125mm | 50mm | MST-434-04 | MST-434-04-T | MST-434-04-C | MST-434-04-A |
| 5mm | 5mm | 14mm | .075/.125mm | 50mm | MST-434-05 | MST-434-05-T | MST-434-05-C | MST-434-05-A |
| 6mm | 6mm | 14mm | .075/.125mm | 57mm | MST-434-06 | MST-434-06-T | MST-434-06-C | MST-434-06-A |
| 8mm | 8mm | 16mm | .100/.150mm | 63mm | MST-434-08 | MST-434-08-T | MST-434-08-C | MST-434-08-A |
| 10mm | 10mm | 20mm | .125/.175mm | 72mm | MST-434-10 | MST-434-10-T | MST-434-10-C | MST-434-10-A |
| 12mm | 12mm | 25mm | .150/.130mm | 83mm | MST-434-12 | MST-434-12-T | MST-434-12-C | MST-434-12-A |
| 16mm | 16mm | 32mm | .230/.280mm | 92mm | MST-434-16 | MST-434-16-T | MST-434-16-C | MST-434-16-A |
| 20mm | 20mm | 38mm | .280/.360mm | 104mm | MST-434-20 | MST-434-20-T | MST-434-20-C | MST-434-20-A |

Hi-Temp Alloys Tools in Other Sections

TS / MTS
201/301/401

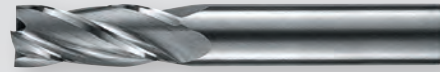
(See Multiple Applications)



106

TR
303/404/606

(See Multiple Applications)



108

MINIATURES

(See Miniatures Applications)



89

SAWS

(See Saws Applications)



121

TOOLS FOR

Composites

TOOLS FOR

Composites



Composite Solutions

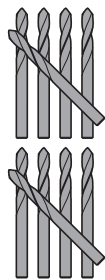
Scan this code to view:

- Videos on Drilling
- Videos on Trimming
- Tips and Tricks to Machine CFRP and Other Composites Made Easy!
- And More...

Featured Tools:

Solid PCD W-Point

Page 69



Wing Spars
Complete Ship Set

VS.



Wing Spars
Complete Ship Set

Before

After



- No Delamination
- No Uncut Fibers
- No Fiber Pull Out
- Can be Resharpended



SOLID PCD



CPCD-203 – Best Trimming Tool for Composites

Page 71



View the CPD-203 in action on our web site!

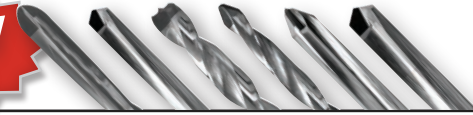
Features:

- Drill point for plunging into the part without blowing out the back side of the part
- Over 13,000 linear inches in Aircraft CFRP material

Composites Tools

PCD-TIPPED Drills

PCD-Tipped Diamond Drills



68

PCD / MPCD 203 Routers

2 Flute PCD-Tipped Routers
Square End



71

CPCD / MCPCD 203 Routers

2 Flute PCD-Tipped Routers
118° Point



71

PCD-BN 201 Routers

2 Flute PCD-Tipped Routers
Ball Nose



71

CR / MCR 402/602

4 and 6 Flute Compression Routers



72

CE / MCE 602/802

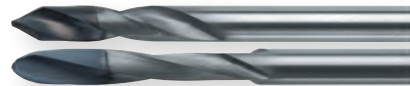
6 and 8 Flute Carbide Composite Routers



73

P810 / F104 Drills

Diamond Coated Drills



NEW!

70

PM / MPM / PMD Routers

1 Flute Routers
Uncoated



NEW

74

GTS 201 Routers

2 Flute Routers
Uncoated



74

MINIATURES

(See Miniatures Applications)



89

A1 / MA1 201

(See Aluminum Applications)



18

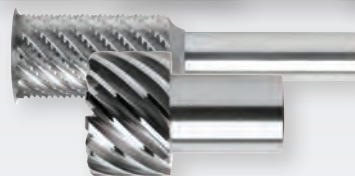
SAWS

(See Saws Applications)



121

SPECIALS



PCD PCD-Tipped Diamond Drills

Characteristics

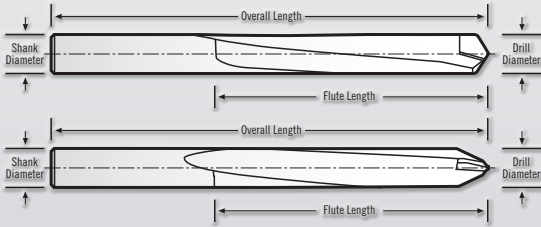
- 2 Flute
- 118°/62° Drill Tip
- W Point Drill Tip
- PCD Diamond

Applications

- Hole Drilling
- Dry
- Wet
- Cold Air
- Spray Mist

Materials

- Aluminum
- Copper
- Magnesium
- Plastics
- Composites
- Brass



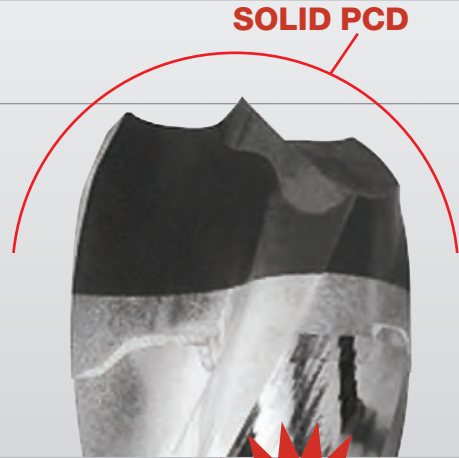
PCD-Tipped Drills Tolerances

Drill Dia. = +0.0000/-0.0005"
 +0.0000/-0.0013mm

Shank Dia. = -0.0001/-0.0002"
 -0.002/-0.005mm

Flute Length = +0.030"
 +0.762mm

OAL = +0.060"
 +1.5mm



Composite Taper Tip



PCD CTT Point 118/62° PCD-Tipped Std. Length - 8 Facet

| Tool Diameter | Flute Length | Overall Length | Tool Number |
|---------------|--------------|----------------|---------------|
| .1655" | 1.4" | 2.7" | PCD-11862-166 |
| .1915" | 1.4" | 2.7" | PCD-11862-192 |
| .2210" | 1.4" | 2.7" | PCD-11862-221 |
| .2510" | 1.4" | 2.7" | PCD-11862-251 |
| .3125" | 1.5" | 2.7" | PCD-11862-313 |
| .3765" | 1.5" | 2.7" | PCD-11862-377 |



Solid Tipped PCD



PCD W Point PCD-Tipped Standard Length - Solid Tip

| Tool Diameter | Flute Length | Overall Length | Tool Number |
|---------------|--------------|----------------|---------------|
| .1655" | 1.4" | 2.7" | PCD-11987-166 |
| .1915" | 1.4" | 2.7" | PCD-11987-192 |
| .2210" | 1.4" | 2.7" | PCD-11987-221 |
| .2510" | 1.4" | 2.7" | PCD-11987-251 |
| .3125" | 1.5" | 2.7" | PCD-11987-313 |
| .3765" | 1.5" | 2.7" | PCD-11987-377 |

10-20X
 Tool Life Over Carbide!

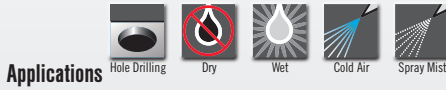
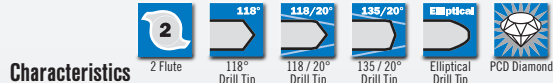
New Solid Tipped PCD!

Get the advantage of geometries that used to be only available in carbide. Get the wear resistance of Diamond and the ability to re-sharpen PCD drills.

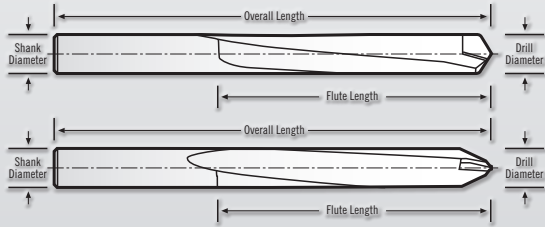
See RobbJack Videos at www.robbjack.com/videos



PCD-Tipped Diamond Drills PCD



Solid PCD helical tips available on certain styles



PCD-Tipped Drills Tolerances
 Drill Dia. = +0.0000/-0.0005"
 +0.0000/-0.0013mm
 Shank Dia. = -0.0001/-0.0002"
 -0.002/-0.005mm
 Flute Length = +0.030"
 +0.762mm
 OAL = +0.060"
 +1.5mm

See RobbJack Videos at www.robbjack.com/videos



PCD 118° PCD-Tipped Standard Length - 4 Facet

| Tool Diameter | Flute Length | Overall Length | Tool Number |
|---------------|--------------|----------------|-------------|
| .1655" | 1.4" | 2.7" | PCD-118-166 |
| .1915" | 1.4" | 2.7" | PCD-118-192 |
| .2210" | 1.4" | 2.7" | PCD-118-221 |
| .2510" | 1.4" | 2.7" | PCD-118-251 |
| .3125" | 1.5" | 2.7" | PCD-118-313 |
| .3765" | 1.5" | 2.7" | PCD-118-377 |



PCD 135/20° PCD-Tipped Standard Length - 8 Facet

| Tool Diameter | Flute Length | Overall Length | Tool Number |
|---------------|--------------|----------------|---------------|
| .1655" | 1.4" | 2.7" | PCD-13520-166 |
| .1915" | 1.4" | 2.7" | PCD-13520-192 |
| .2210" | 1.4" | 2.7" | PCD-13520-221 |
| .2510" | 1.4" | 2.7" | PCD-13520-251 |
| .3125" | 1.5" | 2.7" | PCD-13520-313 |
| .3765" | 1.5" | 2.7" | PCD-13520-377 |



PCD 118/20° PCD-Tipped Standard Length - 8 Facet

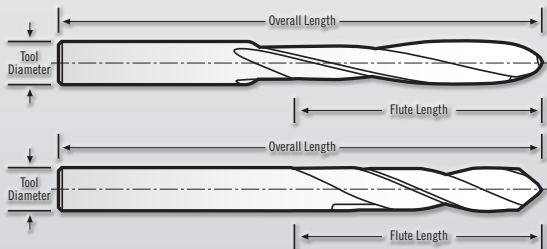
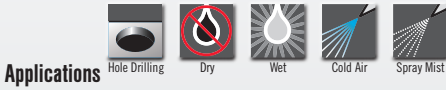
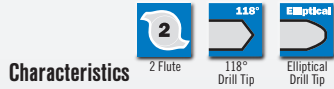
| Tool Diameter | Flute Length | Overall Length | Tool Number |
|---------------|--------------|----------------|---------------|
| .1655" | 1.4" | 2.7" | PCD-11820-166 |
| .1915" | 1.4" | 2.7" | PCD-11820-192 |
| .2210" | 1.4" | 2.7" | PCD-11820-221 |
| .2510" | 1.4" | 2.7" | PCD-11820-251 |
| .3125" | 1.5" | 2.7" | PCD-11820-313 |
| .3765" | 1.5" | 2.7" | PCD-11820-377 |



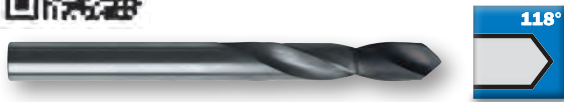
PCD Elliptical PCD-Tipped Standard Length

| Tool Diameter | Flute Length | Overall Length | Tool Number |
|---------------|--------------|----------------|-------------|
| .1655" | 1.4" | 2.7" | PCD-360-166 |
| .1915" | 1.4" | 2.7" | PCD-360-192 |
| .2210" | 1.4" | 2.7" | PCD-360-221 |
| .2510" | 1.4" | 2.7" | PCD-360-251 |
| .3125" | 1.5" | 2.7" | PCD-360-313 |
| .3765" | 1.5" | 2.7" | PCD-360-377 |

P810/F104 Diamond Coated Aircraft Drills



P810/F104 Drills Tolerances
 Drill Dia. = +0.0000/-0.0005"
 +0.000mm/-0.0127mm
 Shank Dia. = -0.0001/-0.0030"
 +0.000mm/-0.076mm
 Flute Length = +0.030"
 +0.762mm
 OAL = +/-0.060"
 +/-1.5mm



P810 118° Diamond Coated Standard Length Drills - 4 Facet

| Tool Diameter | Flute Length | Overall Length | Tool Number Diamond Coated |
|---------------|--------------|----------------|----------------------------|
| 0.0980" | 1.4" | 2.7" | P810-100345-1 |
| 0.1285" | 1.4" | 2.7" | P810-100344-1 |
| 0.1655" | 1.4" | 2.7" | P810-100335-1 |
| 0.1915" | 1.4" | 2.7" | P810-100336-1 |
| 0.2515" | 1.4" | 2.7" | P810-100337-1 |
| 0.2812" | 1.4" | 2.7" | P810-100410-1 |
| 0.3135" | 1.5" | 2.7" | P810-100338-1 |
| 0.3765" | 1.5" | 2.7" | P810-100341-1 |



F104 Elliptical Diamond Coated Standard Length Drills

| Tool Diameter | Flute Length | Overall Length | Tool Number Diamond Coated |
|---------------|--------------|----------------|----------------------------|
| 0.0980" | 1.4" | 2.7" | F104-100001-1 |
| 0.1285" | 1.4" | 2.7" | F104-100003-1 |
| 0.1655" | 1.4" | 2.7" | F104-100007-1 |
| 0.1915" | 1.4" | 2.7" | F104-100010-1 |
| 0.2515" | 1.4" | 2.7" | F104-100002-1 |
| 0.2812" | 1.4" | 2.7" | F104-100017-1 |
| 0.3135" | 1.5" | 2.7" | F104-100018-1 |
| 0.3765" | 1.5" | 2.7" | F104-100019-1 |



Get the advantage of geometries that used to be only available in carbide. Get the wear resistance of Diamond and the ability to re-sharpen PCD drills.

See Page 68

PCD-Tipped Router Bits **CPCD/MCPCD**



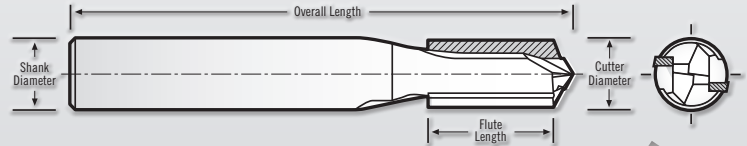
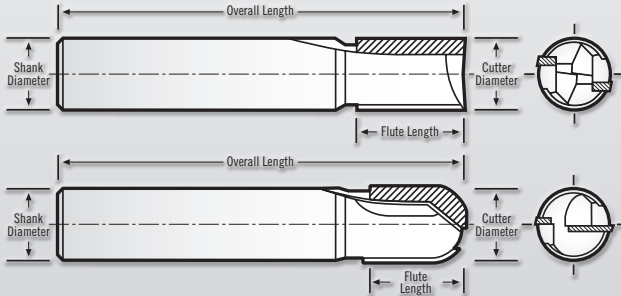
Characteristics



Applications



Materials

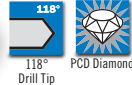


CPCD Tolerances

Cutting Dia. = $\pm 0.003"$
 Shank Dia. = $-0.0001/-0.0002"$
 Flute Length = $\pm 0.030"$
 OAL = $\pm 0.060"$

MCPCD Tolerances

Cutting Dia. = $\pm 0.076\text{mm}$
 Shank Dia. = $-0.003/-0.005\text{mm}$
 Flute Length = $\pm 0.76\text{mm}$
 OAL = $\pm 1.5\text{mm}$



CPCD-203 Drill Point Composite 2 Flute Standard Length

| Cutting Diameter | Shank Diameter | Flute Length | Drill Point | Overall Length | Tool Number |
|------------------|----------------|--------------|-------------|----------------|-------------|
| 1/8" | 1/8" | 5/16" | 118° | 1-1/2" | CPCD-203-04 |
| 3/16" | 3/16" | 7/16" | 118° | 2" | CPCD-203-06 |
| 1/4" | 1/4" | 9/16" | 118° | 2" | CPCD-203-08 |
| 3/8" | 3/8" | 5/8" | 118° | 2-1/2" | CPCD-203-12 |
| 1/2" | 1/2" | 7/8" | 118° | 3" | CPCD-203-16 |
| 5/8" | 5/8" | 7/8" | 118° | 3-1/2" | CPCD-203-20 |
| 3/4" | 3/4" | 7/8" | 118° | 4" | CPCD-203-24 |



PCD-203 Square End 2 Flute Standard Length

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number |
|------------------|----------------|--------------|----------------|---------------|
| 1/8" | 1/8" | 3/8" | 1-1/2" | PCD-203-04-CF |
| 3/16" | 3/16" | 1/2" | 2" | PCD-203-06-CF |
| 1/4" | 1/4" | 5/8" | 2" | PCD-203-08-CF |
| 3/8" | 3/8" | 3/4" | 2-1/2" | PCD-203-12-CF |
| 1/2" | 1/2" | 1" | 3" | PCD-203-16-CF |
| 5/8" | 5/8" | 1" | 3-1/2" | PCD-203-20-CF |
| 3/4" | 3/4" | 1" | 4" | PCD-203-24-CF |



MCPCD-203 METRIC Drill Point Composite 2 Flute Std. Lgth.



| Cutting Diameter | Shank Diameter | Flute Length | Drill Point | Overall Length | Tool Number |
|------------------|----------------|--------------|-------------|----------------|------------------|
| 3mm | 3mm | 8mm | 118° | 38mm | MCPCD-203-03-118 |
| 6mm | 6mm | 14mm | 118° | 50mm | MCPCD-203-06-118 |
| 10mm | 10mm | 16mm | 118° | 63mm | MCPCD-203-10-118 |
| 12mm | 12mm | 22mm | 118° | 76mm | MCPCD-203-12-118 |



MPCD-203 METRIC Square End Composite 2 Flute Std. Lgth.



| Cutting Diameter | Shank Diameter | Number of Flutes | Flute Length | End Style | Overall Length | Tool Number |
|------------------|----------------|------------------|--------------|-----------|----------------|--------------|
| 3mm | 3mm | 2 | 8mm | SE | 38mm | MCPCD-203-03 |
| 6mm | 6mm | 2 | 14mm | SE | 50mm | MCPCD-203-06 |
| 10mm | 10mm | 2 | 16mm | SE | 63mm | MCPCD-203-10 |
| 12mm | 12mm | 2 | 22mm | SE | 76mm | MCPCD-203-12 |



PCD-201BN 2 Flute Ball End Stub Length

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number |
|------------------|----------------|--------------|----------------|--------------|
| 1/8" | 1/8" | 1/4" | 1-1/2" | PCD-201-04BN |
| 3/16" | 3/16" | 5/16" | 2" | PCD-201-06BN |
| 1/4" | 1/4" | 3/8" | 2" | PCD-201-08BN |
| 3/8" | 3/8" | 1/2" | 2-1/2" | PCD-201-12BN |
| 1/2" | 1/2" | 5/8" | 3" | PCD-201-16BN |
| 5/8" | 5/8" | 7/8" | 3-1/2" | PCD-201-20BN |
| 3/4" | 3/4" | 1" | 4" | PCD-201-24BN |



PCD-203 Square End 2 Flute Standard Length

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number |
|------------------|----------------|--------------|----------------|-------------|
| 1/8" | 1/8" | 3/8" | 1-1/2" | PCD-203-04 |
| 3/16" | 3/16" | 1/2" | 2" | PCD-203-06 |
| 1/4" | 1/4" | 5/8" | 2" | PCD-203-08 |
| 3/8" | 3/8" | 3/4" | 2-1/2" | PCD-203-12 |
| 1/2" | 1/2" | 1" | 3" | PCD-203-16 |
| 5/8" | 5/8" | 1" | 3-1/2" | PCD-203-20 |
| 3/4" | 3/4" | 1" | 4" | PCD-203-24 |

Composites

CR/MCR Compression Router

Characteristics

- Square End
- 4 Flute
- 6 Flute

Applications

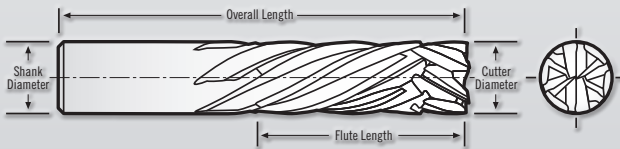
- Slotting
- Side Milling
- Helical Interpolation
- Ramping
- Roughing
- Semi-Finishing
- Finishing
- Dry
- Wet
- Cold Air
- Spray Mist

Materials

- Composites

Coatings

- Diamond Coated (DCC)
- Diamond-Like Carbon (DLC)



CR Tolerances

Cutting Dia. = $-.001/-0.003$ "
 Shank Dia. = $-.0001/-0.0002$ "
 Flute Length ($<5/16$ ") = $+0.020/+0.030$ "
 ($>5/16$ ") = $+0.030/+0.060$ "
 OAL = ± 0.060 "

MCR Tolerances

Cutting Dia. = $-0.025/-0.075$ mm
 Shank Dia. = $-0.002/-0.005$ mm
 Flute Length = $+0.500/+1.500$ mm
 OAL = ± 1.000 mm

UNCOATED

CR Compression Router – 4/6 Flute Uncoated

| Cutting Diameter | Shank Diameter | Number of Flutes | Upshear Length | Flute Length | Overall Length | Tool Number Uncoated |
|------------------|----------------|------------------|----------------|--------------|----------------|----------------------|
| 1/4" | 1/4" | 4 | 3/16" | 3/4" | 2-1/2" | CR-402-08 |
| 3/8" | 3/8" | 6 | 1/4" | 1" | 2-1/2" | CR-602-12 |
| 1/2" | 1/2" | 6 | 1/4" | 1-1/8" | 3" | CR-602-16 |

MCR Compression Router – 4/6 Flute Uncoated **METRIC**

| Cutting Diameter | Shank Diameter | Number of Flutes | Upshear Length | Flute Length | Overall Length | Tool Number Uncoated |
|------------------|----------------|------------------|----------------|--------------|----------------|----------------------|
| 6mm | 6mm | 4 | 5mm | 20mm | 63mm | MCR-402-06 |
| 10mm | 10mm | 6 | 6mm | 25mm | 63mm | MCR-602-10 |
| 12mm | 12mm | 6 | 6mm | 28mm | 76mm | MCR-602-12 |

DLC COATED



CR Compression Router – 4/6 Flute Black Widow DLC Coated

| Cutting Diameter | Shank Diameter | Number of Flutes | Upshear Length | Flute Length | Overall Length | Tool Number DLC Coated |
|------------------|----------------|------------------|----------------|--------------|----------------|------------------------|
| 1/4" | 1/4" | 4 | 3/16" | 3/4" | 2-1/2" | CR-402-08-DLC |
| 3/8" | 3/8" | 6 | 1/4" | 1" | 2-1/2" | CR-602-12-DLC |
| 1/2" | 1/2" | 6 | 1/4" | 1-1/8" | 3" | CR-602-16-DLC |

MCR Compression Router – 4/6 Flute Black Widow DLC Coated **METRIC**

| Cutting Diameter | Shank Diameter | Number of Flutes | Upshear Length | Flute Length | Overall Length | Tool Number DLC Coated |
|------------------|----------------|------------------|----------------|--------------|----------------|------------------------|
| 6mm | 6mm | 4 | 5mm | 20mm | 63mm | MCR-402-06-DLC |
| 10mm | 10mm | 6 | 6mm | 25mm | 63mm | MCR-602-10-DLC |
| 12mm | 12mm | 6 | 6mm | 28mm | 76mm | MCR-602-12-DLC |

DIAMOND COATED

10-20X Tool Life!



CR Compression Router – 4/6 Flute Diamond Coated

| Cutting Diameter | Shank Diameter | Number of Flutes | Upshear Length | Flute Length | Overall Length | Tool Number Diamond Coated |
|------------------|----------------|------------------|----------------|--------------|----------------|----------------------------|
| 1/4" | 1/4" | 4 | 3/16" | 3/4" | 2-1/2" | CR-402-08-D |
| 3/8" | 3/8" | 6 | 1/4" | 1" | 2-1/2" | CR-602-12-D |
| 1/2" | 1/2" | 6 | 1/4" | 1-1/8" | 3" | CR-602-16-D |

MCR Compression Router – 4/6 Flute Diamond Coated **METRIC**

| Cutting Diameter | Shank Diameter | Number of Flutes | Upshear Length | Flute Length | Overall Length | Tool Number Diamond Coated |
|------------------|----------------|------------------|----------------|--------------|----------------|----------------------------|
| 6mm | 6mm | 4 | 5mm | 20mm | 63mm | MCR-402-06-D |
| 10mm | 10mm | 6 | 6mm | 25mm | 63mm | MCR-602-10-D |
| 12mm | 12mm | 6 | 6mm | 28mm | 76mm | MCR-602-12-D |

Carbide Composite Router **CE/MCE**



Characteristics



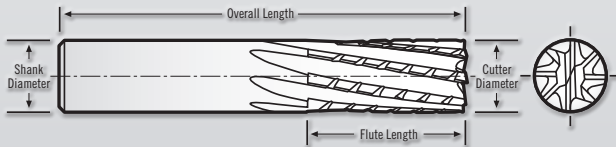
Applications



Materials



Coatings



CE Tolerances

Cutting Dia. = $-.001/-0.003$ "
 Shank Dia. = $-.0001/-0.0002$ "
 Flute Length ($<5/16"$) = $+.020/+0.030$ "
 ($>5/16"$) = $+.030/+0.060$ "
 OAL = ± 0.060 "

MCE Tolerances

Cutting Dia. = $-0.025/-0.075$ mm
 Shank Dia. = $-0.002/-0.005$ mm
 Flute Length = $+0.500/+1.500$ mm
 OAL = ± 1.000 mm

Composites



UNCOATED



CE Carbide Composite Router – 6/8 Flute Uncoated

| Cutting Diameter | Shank Diameter | Number of Flutes | Flute Length | Overall Length | Tool Number Uncoated |
|------------------|----------------|------------------|--------------|----------------|----------------------|
| 1/4" | 1/4" | 6 | 3/4" | 2-1/2" | CE-602-08 |
| 3/8" | 3/8" | 8 | 1" | 2-1/2" | CE-802-12 |
| 1/2" | 1/2" | 8 | 1-1/8" | 3" | CE-802-16 |



MCE Carbide Composite Router – 6/8 Flute Uncoated **METRIC**

| Cutting Diameter | Shank Diameter | Number of Flutes | Flute Length | Overall Length | Tool Number Uncoated |
|------------------|----------------|------------------|--------------|----------------|----------------------|
| 6mm | 6mm | 6 | 20mm | 63mm | MCE-602-06 |
| 10mm | 10mm | 8 | 25mm | 63mm | MCE-802-10 |
| 12mm | 12mm | 8 | 28mm | 76mm | MCE-802-12 |



DLC COATED



CE Carbide Composite Router – 6/8 Flute Black Widow DLC Coated

| Cutting Diameter | Shank Diameter | Number of Flutes | Flute Length | Overall Length | Tool Number DLC Coated |
|------------------|----------------|------------------|--------------|----------------|------------------------|
| 1/4" | 1/4" | 6 | 3/4" | 2-1/2" | CE-602-08-DLC |
| 3/8" | 3/8" | 8 | 1" | 2-1/2" | CE-802-12-DLC |
| 1/2" | 1/2" | 8 | 1-1/8" | 3" | CE-802-16-DLC |



MCE Carbide Composite Router – 6/8 Flute Black Widow DLC Coated **METRIC**

| Cutting Diameter | Shank Diameter | Number of Flutes | Flute Length | Overall Length | Tool Number DLC Coated |
|------------------|----------------|------------------|--------------|----------------|------------------------|
| 6mm | 6mm | 6 | 20mm | 63mm | MCE-602-06-DLC |
| 10mm | 10mm | 8 | 25mm | 63mm | MCE-802-10-DLC |
| 12mm | 12mm | 8 | 28mm | 76mm | MCE-802-12-DLC |



DIAMOND COATED



CE Carbide Composite Router – 6/8 Flute Diamond Coated

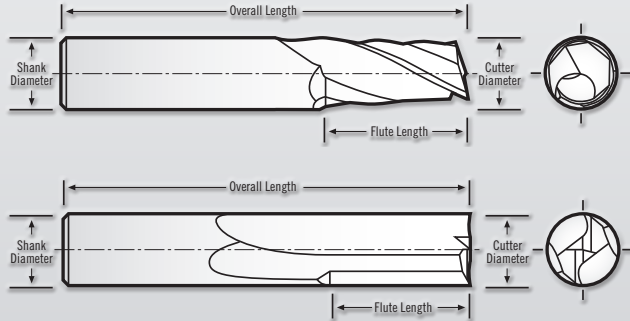
| Cutting Diameter | Shank Diameter | Number of Flutes | Flute Length | Overall Length | Tool Number Diamond Coated |
|------------------|----------------|------------------|--------------|----------------|----------------------------|
| 1/4" | 1/4" | 6 | 3/4" | 2-1/2" | CE-602-08-D |
| 3/8" | 3/8" | 8 | 1" | 2-1/2" | CE-802-12-D |
| 1/2" | 1/2" | 8 | 1-1/8" | 3" | CE-802-16-D |



MCE Carbide Composite Router – 6/8 Flute Diamond Coated **METRIC**

| Cutting Diameter | Shank Diameter | Number of Flutes | Flute Length | Overall Length | Tool Number Diamond Coated |
|------------------|----------------|------------------|--------------|----------------|----------------------------|
| 6mm | 6mm | 6 | 20mm | 63mm | MCE-602-06-D |
| 10mm | 10mm | 8 | 25mm | 63mm | MCE-802-10-D |
| 12mm | 12mm | 8 | 28mm | 76mm | MCE-802-12-D |

PM/MPM/MPD/GTS Tuffy Grade Carbide Router Bits



PM/PMD Series Tolerances
 Cutting Dia. = $+0.000/-0.002$ "
 Shank Dia. = $-0.0001/-0.0002$ "
 Flute Length = $+0.060/-0.000$ "
 OAL = ± 0.060 "

MPM Tolerances
 Cutting Dia. = $+0.000/-0.075$ mm
 Shank Dia. = $-0.002/-0.005$ mm
 Flute Length = $+0.500/+1.500$ mm
 OAL = ± 1.000 mm

GTS Series Tolerances
 Cutting Dia. = $+0.000/-0.002$ "
 Shank Dia. = $-0.0001/-0.0002$ "
 Flute Length = $+0.060/-0.000$ "
 OAL = ± 0.060 "



PM Up Shear 1 Flute Tuffy Grade

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number |
|------------------|----------------|--------------|----------------|-------------|
| 1/8" | 1/8" | 1/2" | 2" | PM-104-04 |
| 1/8" | 1/4" | 1/2" | 2" | PM-108-04 |
| 3/16" | 3/16" | 5/8" | 2" | PM-106-06 |
| 3/16" | 1/4" | 5/8" | 2" | PM-108-06 |
| 3/16" | 1/4" | 1-1/4" | 3" | PM-108-06L |
| 1/4" | 1/4" | 3/4" | 2" | PM-108-08 |
| 1/4" | 1/4" | 1-1/2" | 3" | PM-108-08L |
| 3/8" | 3/8" | 1-1/4" | 3" | PM-112-12 |
| 1/2" | 1/2" | 1-1/2" | 4" | PM-116-16 |



PMD Down Shear 1 Flute Tuffy Grade

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number |
|------------------|----------------|--------------|----------------|-------------|
| 1/8" | 1/4" | 1/2" | 2" | PMD-108-04 |
| 3/16" | 1/4" | 5/8" | 2" | PMD-108-06 |
| 1/4" | 1/4" | 3/4" | 2" | PMD-108-08 |



GTS 2 Flute Tuffy Grade Straight Flute

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number |
|------------------|----------------|--------------|----------------|-------------|
| 1/8" | 1/4" | 1/2" | 2" | GTS-201-04 |
| 1/4" | 1/4" | 3/4" | 2-1/2" | GTS-201-08 |
| 3/8" | 3/8" | 7/8" | 2-1/2" | GTS-201-12 |
| 1/2" | 1/2" | 1" | 3" | GTS-201-16 |



MPM Up Shear 1 Flute Tuffy Grade METRIC

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number |
|------------------|----------------|--------------|----------------|-------------|
| 4mm | 3mm | 12mm | 50mm | MPM-104-04 |
| 6mm | 4mm | 12mm | 50mm | MPM-106-04 |
| 6mm | 6mm | 14mm | 50mm | MPM-106-05 |
| 6mm | 6mm | 14mm | 57mm | MPM-106-06 |
| 8mm | 8mm | 22mm | 63mm | MPM-108-08 |
| 10mm | 10mm | 25mm | 72mm | MPM-110-10 |
| 12mm | 12mm | 25mm | 83mm | MPM-112-12 |

Composites

FROM ROBBJACK:

2 Great Problem Solving Tools Made to Order

Sound Reduction Perforation Tools

Designed for Airplane Engine Nacelles

Up to 80,000 Holes
in Fiberglass
Up to 40,000 Holes
in Carbon Fiber

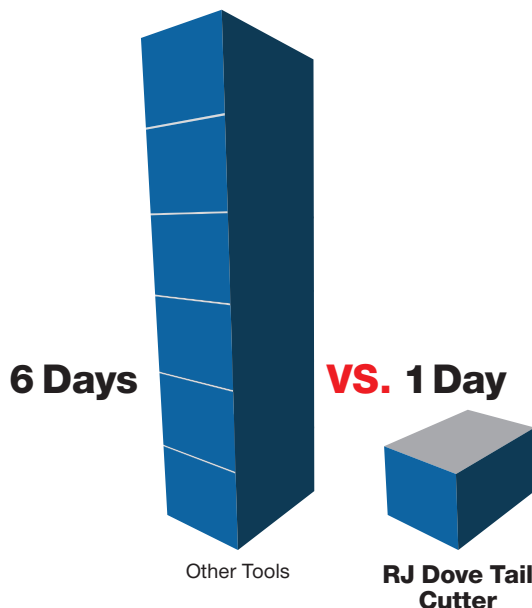
- No Uncut Fiber
- No Delamination
- No Fiber Pullout
- Best Finishes



Produces the
Cleanest Holes



Dove Tail Cutters – Cut 40 Hours Off Operation!



- Reduce Cycle Time by 1 Week
- Cut the Dove Tail and Trim the Part at the Same Time
- Available with Diamond Coating



Special dove tail cutters for carbon fiber that eliminate the operation of trimming the part to match the CAD file. Used in composite aircraft ribs and spars or where any dovetail cuts are needed.

Composites Tools in Other Sections

MINIATURES

(See Miniatures Applications)



89

A1 / MA1 201

(See Aluminum Applications)



18

SAWS

(See Saws Applications)



121

SPECIALS



Made to Order



Eliminate the problem of TIR and tool length associated with brazed threads. Can be diamond coated.



TOOLS FOR

Die/Mold & Hardened Materials

TOOLS FOR

Die/Mold & Hardened Materials



Die/Mold

Scan this code to:

- Watch Videos
- See Tips and Tricks
- Learn How to Choose the Right Tool
- And More...

Featured Tools: TM/MTM Series – High Feed Mill



Page 83

- High Speed Geometry
- This Tool Works Great in High Speed Tool Paths and in Tight Areas

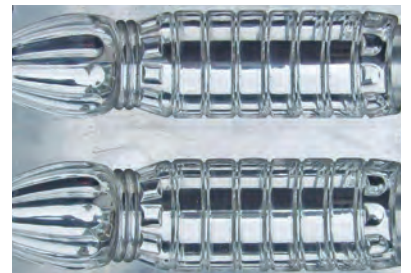


DM/MDM Series – 3-D Cutting of Cavities & Cores



Page 80

Best Tool for 3-D Cutting of Cavities & Cores



HM/MHM Series – Straight Walls, Flat Floors, Open Areas



Page 85

Best Tool for Straight Walls, Open Areas, & Flat Floors



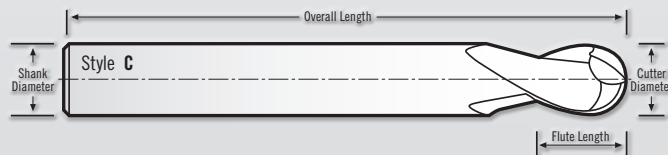
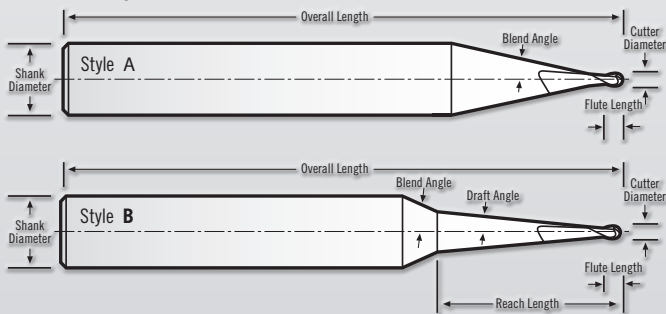
Die/Mold & Hardened Materials Tools

| | | | | |
|------------|-------------|---|--|------------|
| DM | | 2 Flute Extended Length Ball Nose |  | 80 |
| MDM | | 2 Flute Extended Length Ball Nose |  | 81 |
| TM | | 2 Flute Extended Length Toroidal Corner Radius |  | 83 |
| MTM | | 2 Flute Extended Length Toroidal Corner Radius |  | 84 |
| HM | | 4, 6, 8 and 10 Flute Corner Radius |  | 85 |
| MHM | | 4, 6, 8 and 10 Flute Corner Radius |  | 85 |
| ET | NEW! | Engraving Tools (See Multiple Applications) |  | 118 |

DM Die/Mold End Mills



Coatings Aluminum Titan. Nitride



DM Tolerances

Cutting Dia. (1/32"–3/16") = ±.0003"
 (1/4"–1/2") = –.0007/–.0013"
 Shank Dia. = –.0001/–.0002"
 Flute Length (1/32"–1/2") = +.000/+ .020"
 OAL = ±.060"

MDM Tolerances

Cutting Dia. (0.5–5.0) = ±.008mm
 (6.0–12.0) = –.018/–.033mm
 Shank Dia. = –.002/–.005mm
 Flute Length (0.5–12.0) = +.000/+ .500mm
 OAL = ±1.000mm



DM 2 Flute Grade Ball End Extended Length

| Cutting Diameter | Shank Diameter | Flute Length | Reach Length | Draft Angle | Blend Angle | Tool Style | Overall Length | Tool Number AITIN Coated |
|------------------|----------------|--------------|--------------|-------------|-------------|------------|----------------|-----------------------------|
| 1/32" | 1/4" | 1/32" | – | – | 8° | A | 2-1/2" | DM-201-01 |
| 1/32" | 1/4" | 1/32" | 1/8" | 3° | 18° | B | 2-1/2" | DM-202-01 |
| 1/32" | 1/4" | 1/32" | 3/16" | 1.5° | 16.5° | B | 2-1/2" | DM-203-01 |
| 1/32" | 1/4" | 1/32" | 3/8" | 1.5° | 16.5° | B | 2-1/2" | DM-204-01 |
| 1/32" | 1/4" | 1/32" | 9/16" | 1.5° | 16.5° | B | 2-1/2" | DM-205-01 |
| 1/16" | 1/4" | 1/16" | – | – | 8° | A | 2-1/2" | DM-201-02 |
| 1/16" | 1/4" | 1/16" | 3/16" | 3° | 18° | B | 2-1/2" | DM-202-02 |
| 1/16" | 1/4" | 1/16" | 3/8" | 1.5° | 16.5° | B | 2-1/2" | DM-203-02 |
| 1/16" | 1/4" | 1/16" | 3/4" | 1.5° | 16.5° | B | 2-1/2" | DM-204-02 |
| 1/16" | 1/4" | 1/16" | 1-1/8" | 1.5° | 16.5° | B | 2-1/2" | DM-205-02 |
| 3/32" | 1/4" | 3/32" | – | – | 8° | A | 2-1/2" | DM-201-03 |
| 3/32" | 1/4" | 3/32" | 1/4" | 3° | 18° | B | 2-1/2" | DM-202-03 |
| 3/32" | 1/4" | 3/32" | 1/2" | 1.5° | 16.5° | B | 2-1/2" | DM-203-03 |
| 3/32" | 1/4" | 3/32" | 15/16" | 1.5° | 16.5° | B | 2-1/2" | DM-204-03 |
| 3/32" | 1/4" | 3/32" | 1-5/16" | 1.5° | 16.5° | B | 2-1/2" | DM-205-03 |
| 1/8" | 1/4" | 1/8" | – | – | 8° | A | 3" | DM-201-04 |
| 1/8" | 1/4" | 1/8" | 5/16" | 3° | 18° | B | 3" | DM-202-04 |
| 1/8" | 1/4" | 1/8" | 5/8" | 1.5° | 16.5° | B | 3" | DM-203-04 |
| 1/8" | 1/4" | 1/8" | 1" | 1° | 16° | B | 3" | DM-204-04 |
| 1/8" | 1/4" | 1/8" | 1-1/2" | 1° | 16° | B | 3" | DM-205-04 |

Die/Mold End Mills **DM/MDM**

DM 2 Flute Grade Ball End Extended Length —CONTINUED FROM PREVIOUS



| Cutting Diameter | Shank Diameter | Flute Length | Reach Length | Draft Angle | Blend Angle | Tool Style | Overall Length | Tool Number AITIN Coated |
|------------------|----------------|--------------|--------------|-------------|-------------|------------|----------------|-----------------------------|
| 3/16" | 1/4" | 3/16" | — | — | 8° | A | 3" | DM-201-06 |
| 3/16" | 1/4" | 3/16" | 3/8" | 2° | 17° | B | 3" | DM-202-06 |
| 3/16" | 1/4" | 3/16" | 3/4" | 1.5° | 16.5° | B | 3" | DM-203-06 |
| 3/16" | 1/4" | 3/16" | 1-1/8" | 1° | 16° | B | 3" | DM-204-06 |
| 3/16" | 1/4" | 3/16" | 1-9/16" | 1° | 16° | B | 3" | DM-205-06 |
| 1/4" | 1/4" | 1/4" | — | — | — | C | 3" | DM-201-08 |
| 5/16" | 5/16" | 5/16" | — | — | — | C | 3-1/8" | DM-201-10 |
| 3/8" | 3/8" | 3/8" | — | — | — | C | 3-1/2" | DM-201-12 |
| 7/16" | 7/16" | 7/16" | — | — | — | C | 3-3/4" | DM-201-14 |
| 1/2" | 1/2" | 1/2" | — | — | — | C | 4" | DM-201-16 |



MDM 2 Flute Tuffy Ball End Extended Length **METRIC**



| Cutting Diameter | Shank Diameter | Flute Length | Reach Length | Draft Angle | Blend Angle | Tool Style | Overall Length | Tool Number AITIN Coated |
|------------------|----------------|--------------|--------------|-------------|-------------|------------|----------------|-----------------------------|
| 0.5mm | 6mm | 0.5mm | — | — | 8° | A | 63mm | MDM-201-0.5 |
| 0.5mm | 6mm | 0.5mm | 1mm | 3° | 18° | B | 63mm | MDM-203-0.5 |
| 0.5mm | 6mm | 0.5mm | 3mm | 1.5° | 16.5° | B | 63mm | MDM-204-0.5 |
| 0.5mm | 6mm | 0.5mm | 5mm | 1.5° | 16.5° | B | 63mm | MDM-205-0.5 |
| 0.5mm | 6mm | 0.5mm | 10mm | 1.5° | 16.5° | B | 63mm | MDM-206-0.5 |
| 0.8mm | 6mm | 0.8mm | — | — | 8° | A | 63mm | MDM-201-0.8 |
| 0.8mm | 6mm | 0.8mm | 3mm | 3° | 18° | B | 63mm | MDM-203-0.8 |
| 0.8mm | 6mm | 0.8mm | 5mm | 1.5° | 16.5° | B | 63mm | MDM-204-0.8 |
| 0.8mm | 6mm | 0.8mm | 10mm | 1.5° | 16.5° | B | 63mm | MDM-205-0.8 |
| 0.8mm | 6mm | 0.8mm | 15mm | 1.5° | 16.5° | B | 63mm | MDM-206-0.8 |
| 1mm | 6mm | 1mm | — | — | 8° | A | 63mm | MDM-201-01 |
| 1mm | 6mm | 1mm | 3mm | 3° | 18° | B | 63mm | MDM-203-01 |
| 1mm | 6mm | 1mm | 5mm | 1.5° | 16.5° | B | 63mm | MDM-204-01 |
| 1mm | 6mm | 1mm | 10mm | 1.5° | 16.5° | B | 63mm | MDM-205-01 |
| 1mm | 6mm | 1mm | 20mm | 1.5° | 16.5° | B | 63mm | MDM-206-01 |
| 1.5mm | 6mm | 1.5mm | — | — | 8° | A | 63mm | MDM-201-01.5 |
| 1.5mm | 6mm | 1.5mm | 5mm | 3° | 18° | B | 63mm | MDM-203-01.5 |
| 1.5mm | 6mm | 1.5mm | 10mm | 1.5° | 16.5° | B | 63mm | MDM-204-01.5 |
| 1.5mm | 6mm | 1.5mm | 20mm | 1.5° | 16.5° | B | 63mm | MDM-205-01.5 |
| 1.5mm | 6mm | 1.5mm | 30mm | 1.5° | 16.5° | B | 63mm | MDM-206-01.5 |
| 2mm | 6mm | 2mm | — | — | 8° | A | 63mm | MDM-201-02 |
| 2mm | 6mm | 2mm | 5mm | 3° | 18° | B | 63mm | MDM-203-02 |
| 2mm | 6mm | 2mm | 10mm | 1.5° | 16.5° | B | 63mm | MDM-204-02 |
| 2mm | 6mm | 2mm | 20mm | 1.5° | 16.5° | B | 63mm | MDM-205-02 |
| 2mm | 6mm | 2mm | 30mm | 1.5° | 16.5° | B | 63mm | MDM-206-02 |
| 3mm | 6mm | 3mm | — | — | 8° | A | 75mm | MDM-201-03 |
| 3mm | 6mm | 3mm | 5mm | 3° | 18° | B | 75mm | MDM-203-03 |
| 3mm | 6mm | 3mm | 15mm | 1.5° | 16.5° | B | 75mm | MDM-204-03 |
| 3mm | 6mm | 3mm | 30mm | 1° | 16° | B | 75mm | MDM-205-03 |
| 3mm | 6mm | 3mm | 45mm | 1° | 16° | B | 75mm | MDM-206-03 |
| 4mm | 6mm | 4mm | — | — | 8° | A | 75mm | MDM-201-04 |
| 4mm | 6mm | 4mm | 10mm | 2° | 17° | B | 75mm | MDM-203-04 |
| 4mm | 6mm | 4mm | 15mm | 1.5° | 16.5° | B | 75mm | MDM-204-04 |
| 4mm | 6mm | 4mm | 20mm | 1° | 16° | B | 75mm | MDM-205-04 |
| 5mm | 6mm | 5mm | — | — | 8° | B | 75mm | MDM-201-05 |
| 5mm | 6mm | 5mm | 10mm | 2° | 17° | B | 75mm | MDM-203-05 |
| 5mm | 6mm | 5mm | 25mm | 1° | 16° | B | 75mm | MDM-204-05 |
| 6mm | 6mm | 6mm | — | — | — | C | 75mm | MDM-201-06 |
| 8mm | 8mm | 8mm | — | — | — | C | 80mm | MDM-201-08 |
| 10mm | 10mm | 10mm | — | — | — | C | 82mm | MDM-201-10 |
| 12mm | 12mm | 12mm | — | — | — | C | 100mm | MDM-201-12 |

DM Die/Mold End Mills

DM SERIES SPEEDS & FEEDS (Chipload per Tooth)

| Tool Number | Cutter Diameter | Steels 30-40 HRc | | Steels 40-50 HRc | | Steels 50-60 HRc | |
|-------------|-----------------|------------------|---------------|------------------|---------------|------------------|---------------|
| | | ROUGHING | FINISHING | ROUGHING | FINISHING | ROUGHING | FINISHING |
| DM-201-01 | 1/32" | 0.0006-0.0008 | 0.0005-0.0006 | 0.0005-0.0006 | 0.0004-0.0005 | 0.0004-0.0005 | 0.0003-0.0004 |
| DM-201-02 | 1/16" | 0.0013-0.0015 | 0.0010-0.0013 | 0.0010-0.0013 | 0.0008-0.0010 | 0.0008-0.0010 | 0.0005-0.0008 |
| DM-201-03 | 3/32" | 0.0019-0.0023 | 0.0015-0.0019 | 0.0015-0.0019 | 0.0011-0.0015 | 0.0011-0.0015 | 0.0008-0.0011 |
| DM-201-04 | 1/8" | 0.0025-0.0030 | 0.0020-0.0025 | 0.0020-0.0025 | 0.0015-0.0020 | 0.0015-0.0020 | 0.0010-0.0015 |
| DM-201-06 | 3/16" | 0.0038-0.0045 | 0.0030-0.0038 | 0.0030-0.0038 | 0.0023-0.0030 | 0.0023-0.0030 | 0.0015-0.0023 |
| DM-201-08 | 1/4" | 0.0050-0.0060 | 0.0040-0.0050 | 0.0040-0.0050 | 0.0030-0.0040 | 0.0030-0.0040 | 0.0020-0.0030 |
| DM-201-10 | 5/16" | 0.0063-0.0075 | 0.0050-0.0063 | 0.0050-0.0063 | 0.0038-0.0050 | 0.0038-0.0050 | 0.0025-0.0038 |
| DM-201-12 | 3/8" | 0.0075-0.0090 | 0.0060-0.0075 | 0.0060-0.0075 | 0.0045-0.0060 | 0.0045-0.0060 | 0.0030-0.0045 |
| DM-201-14 | 7/16" | 0.0088-0.0105 | 0.0070-0.0088 | 0.0070-0.0088 | 0.0053-0.0070 | 0.0053-0.0070 | 0.0035-0.0053 |
| DM-201-16 | 1/2" | 0.0100-0.0120 | 0.0080-0.0100 | 0.0080-0.0100 | 0.0060-0.0080 | 0.0060-0.0080 | 0.0040-0.0060 |

DM SERIES SPEEDS & FEEDS (Roughing & Semi-Finishing)

| Tool Number | Cutter Diameter | Rotations Per Minute (RPM) | | |
|-------------|-----------------|----------------------------|-----------------|-----------------|
| | | STEELS 30-40HRc | STEELS 40-50HRc | STEELS 50-60HRc |
| DM-201-01 | 1/32" | 20,000-40,000 | 20,000-40,000 | 20,000-40,000 |
| DM-201-02 | 1/16" | 20,000-40,000 | 20,000-40,000 | 20,000-36,000 |
| DM-201-03 | 3/32" | 20,000-32,000 | 20,000-32,000 | 16,000-24,000 |
| DM-201-04 | 1/8" | 15,000-24,000 | 18,000-24,000 | 12,000-18,000 |
| DM-201-06 | 3/16" | 10,000-16,000 | 12,000-16,000 | 8,100-12,000 |
| DM-201-08 | 1/4" | 7,600-12,000 | 9,100-12,000 | 6,100-9,100 |
| DM-201-10 | 5/16" | 6,000-9,700 | 7,300-9,700 | 4,800-7,300 |
| DM-201-12 | 3/8" | 5,000-8,100 | 6,100-8,100 | 4,000-6,100 |
| DM-201-14 | 7/16" | 4,300-6,900 | 5,200-6,900 | 3,400-5,200 |
| DM-201-16 | 1/2" | 3,800-6,100 | 4,500-6,100 | 3,000-4,500 |

DM Series Guidelines

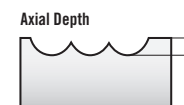
- Special diameters and lengths are available on a make-to-order basis.
- Air or mist coolant on materials greater than 40 HRc.



Radial Step Over
 Radial Step Over for finishing depends on finish requirements. 25%-40% of tool diameter

DM SERIES SPEEDS & FEEDS (Finishing)

| Tool Number | Cutter Diameter | Rotations Per Minute (RPM) | | |
|-------------|-----------------|----------------------------|-----------------|-----------------|
| | | STEELS 30-40HRc | STEELS 40-50HRc | STEELS 50-60HRc |
| DM-201-01 | 1/32" | 20,000-40,000 | 20,000-40,000 | 20,000-40,000 |
| DM-201-02 | 1/16" | 20,000-40,000 | 20,000-40,000 | 20,000-36,000 |
| DM-201-03 | 3/32" | 20,000-32,000 | 20,000-32,000 | 16,000-24,000 |
| DM-201-04 | 1/8" | 15,000-24,000 | 18,000-24,000 | 12,000-18,000 |
| DM-201-06 | 3/16" | 10,000-16,000 | 12,000-16,000 | 8,100-12,000 |
| DM-201-08 | 1/4" | 7,600-12,000 | 9,100-12,000 | 6,100-9,100 |
| DM-201-10 | 5/16" | 6,000-9,700 | 7,300-9,700 | 4,800-7,300 |
| DM-201-12 | 3/8" | 5,000-8,100 | 6,100-8,100 | 4,000-6,100 |
| DM-201-14 | 7/16" | 4,300-6,900 | 5,200-6,900 | 3,400-5,200 |
| DM-201-16 | 1/2" | 3,800-6,100 | 4,500-6,100 | 3,000-4,500 |

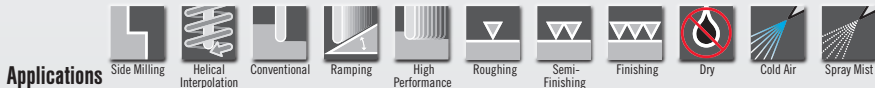


Axial Depth
 30-40 HRc Axial depth = 10% of tool diameter
 40-50 HRc Axial depth = 5% of tool diameter
 50-60 HRc Axial depth = 4% of tool diameter

Solid Carbide Toroid Style End Mills **TM/MTM**



Characteristics



Applications

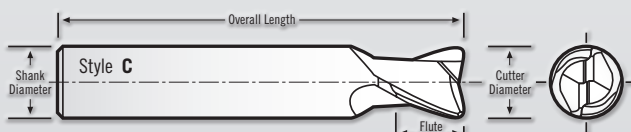
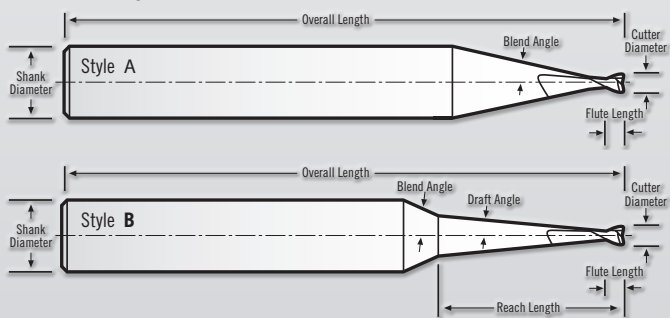


Materials



Coatings

Aluminum
Titan. Nitride



TM Tolerances:

Cutting Dia. = $-.001/-0.002$ "
 Shank Dia. = $-.0001/-0.0002$ "
 Flute Length (1/32" to 1/2") = $+0.000/+0.020$ "
 OAL = ±0.060 "

MTM Tolerances

Cutting Dia. = $-.025/-0.050$ mm
 Shank Dia. = $-.002/-0.005$ mm
 Flute Length = $+0.50/+1.50$ mm
 OAL = ±1.000 mm



TM 2 Flute Tuffy Grade Toroid End Mill

| Cutting Diameter | Shank Diameter | Flute Length | Reach Length | Draft Angle | Blend Angle | Corner Radius | Tool Style | Overall Length | Tool Number AlTiN Coated |
|------------------|----------------|--------------|--------------|-------------|-------------|---------------|------------|----------------|-----------------------------|
| 1/32" | 1/4" | 1/32" | — | — | 8° | .008" | A | 2-1/2" | TM-201-01 |
| 1/32" | 1/4" | 1/32" | 1/8" | 3° | 18° | .008" | B | 2-1/2" | TM-202-01 |
| 1/32" | 1/4" | 1/32" | 3/16" | 1.5° | 16.5° | .008" | B | 2-1/2" | TM-203-01 |
| 1/32" | 1/4" | 1/32" | 3/8" | 1.5° | 16.5° | .008" | B | 2-1/2" | TM-204-01 |
| 1/32" | 1/4" | 1/32" | 9/16" | 1.5° | 16.5° | .008" | B | 2-1/2" | TM-205-01 |
| 1/16" | 1/4" | 1/16" | — | — | 8° | .012" | A | 2-1/2" | TM-201-02 |
| 1/16" | 1/4" | 1/16" | 3/16" | 3° | 18° | .012" | B | 2-1/2" | TM-202-02 |
| 1/16" | 1/4" | 1/16" | 3/8" | 1.5° | 16.5° | .012" | B | 2-1/2" | TM-203-02 |
| 1/16" | 1/4" | 1/16" | 3/4" | 1.5° | 16.5° | .012" | B | 2-1/2" | TM-204-02 |
| 1/16" | 1/4" | 1/16" | 1-1/8" | 1.5° | 16.5° | .012" | B | 2-1/2" | TM-205-02 |
| 3/32" | 1/4" | 3/32" | — | — | 8° | .020" | A | 2-1/2" | TM-201-03 |
| 3/32" | 1/4" | 3/32" | 1/4" | 3° | 18° | .020" | B | 2-1/2" | TM-202-03 |
| 3/32" | 1/4" | 3/32" | 1/2" | 1.5° | 16.5° | .020" | B | 2-1/2" | TM-203-03 |
| 3/32" | 1/4" | 3/32" | 15/16" | 1.5° | 16.5° | .020" | B | 2-1/2" | TM-204-03 |
| 3/32" | 1/4" | 3/32" | 1-5/16" | 1.5° | 16.5° | .020" | B | 2-1/2" | TM-205-03 |
| 1/8" | 1/4" | 1/8" | — | — | 8° | .020" | A | 3" | TM-201-04 |
| 1/8" | 1/4" | 1/8" | 5/16" | 3° | 18° | .020" | B | 3" | TM-202-04 |
| 1/8" | 1/4" | 1/8" | 5/8" | 1.5° | 16.5° | .020" | B | 3" | TM-203-04 |
| 1/8" | 1/4" | 1/8" | 1" | 1° | 16° | .020" | B | 3" | TM-204-04 |
| 1/8" | 1/4" | 1/8" | 1-1/2" | 1° | 16° | .020" | B | 3" | TM-205-04 |
| 3/16" | 1/4" | 3/16" | — | — | 8° | .040" | A | 3" | TM-201-06 |
| 3/16" | 1/4" | 3/16" | 3/8" | 2° | 17° | .040" | B | 3" | TM-202-06 |
| 3/16" | 1/4" | 3/16" | 3/4" | 1.5° | 16.5° | .040" | B | 3" | TM-203-06 |
| 3/16" | 1/4" | 3/16" | 1-1/8" | 1° | 16° | .040" | B | 3" | TM-204-06 |
| 3/16" | 1/4" | 3/16" | 1-9/16" | 1° | 16° | .040" | B | 3" | TM-205-06 |
| 1/4" | 1/4" | 1/4" | — | — | — | .040" | C | 3" | TM-201-08 |
| 5/16" | 5/16" | 5/16" | — | — | — | .040" | C | 3-1/8" | TM-201-10 |
| 3/8" | 3/8" | 3/8" | — | — | — | .080" | C | 3-1/5" | TM-201-12 |
| 7/16" | 7/16" | 7/16" | — | — | — | .080" | C | 3-3/4" | TM-201-14 |
| 1/2" | 1/2" | 1/2" | — | — | — | .120" | C | 4" | TM-201-16 |

Die/Mold

TM/MTM Solid Carbide Toroid Style End Mills

NEW
Sizes Now Available!



MTM Metrics 2 Flute Tuffy Grade Toroid End Mill **METRIC**



| Cutting Diameter | Shank Diameter | Flute Length | Reach Length | Draft Angle | Blend Angle | Corner Radius | Tool Style | Overall Length | Tool Number AlTiN Coated |
|------------------|----------------|--------------|--------------|-------------|-------------|---------------|------------|----------------|-----------------------------|
| 0.8mm | 6mm | 0.8mm | — | — | 8° | 0.2mm | A | 63mm | MTM-201-0.8 |
| 0.8mm | 6mm | 0.8mm | 3mm | 3° | 18° | 0.2mm | B | 63mm | MTM-202-0.8 |
| 0.8mm | 6mm | 0.8mm | 5mm | 1.5° | 16.5° | 0.2mm | B | 63mm | MTM-203-0.8 |
| 0.8mm | 6mm | 0.8mm | 10mm | 1.5° | 16.5° | 0.2mm | B | 63mm | MTM-204-0.8 |
| 0.8mm | 6mm | 0.8mm | 15mm | 1.5° | 16.5° | 0.2mm | B | 63mm | MTM-205-0.8 |
| 1mm | 6mm | 1mm | — | — | 8° | 0.3mm | A | 63mm | MTM-201-01 |
| 1mm | 6mm | 1mm | 3mm | 3° | 18° | 0.3mm | B | 63mm | MTM-202-01 |
| 1mm | 6mm | 1mm | 5mm | 1.5° | 16.5° | 0.3mm | B | 63mm | MTM-203-01 |
| 1mm | 6mm | 1mm | 10mm | 1.5° | 16.5° | 0.3mm | B | 63mm | MTM-204-01 |
| 1mm | 6mm | 1mm | 20mm | 1.5° | 16.5° | 0.3mm | B | 63mm | MTM-205-01 |
| 1.5mm | 6mm | 1.5mm | — | — | 8° | 0.5mm | A | 63mm | MTM-201-01.5 |
| 1.5mm | 6mm | 1.5mm | 5mm | 3° | 18° | 0.5mm | B | 63mm | MTM-202-01.5 |
| 1.5mm | 6mm | 1.5mm | 10mm | 1.5° | 16.5° | 0.5mm | B | 63mm | MTM-203-01.5 |
| 1.5mm | 6mm | 1.5mm | 20mm | 1.5° | 16.5° | 0.5mm | B | 63mm | MTM-204-01.5 |
| 1.5mm | 6mm | 1.5mm | 30mm | 1.5° | 16.5° | 0.5mm | B | 63mm | MTM-205-01.5 |
| 2mm | 6mm | 2mm | — | — | 8° | 0.5mm | A | 63mm | MTM-201-02 |
| 2mm | 6mm | 2mm | 5mm | 3° | 18° | 0.5mm | B | 63mm | MTM-202-02 |
| 2mm | 6mm | 2mm | 10mm | 1.5° | 16.5° | 0.5mm | B | 63mm | MTM-203-02 |
| 2mm | 6mm | 2mm | 20mm | 1.5° | 16.5° | 0.5mm | B | 63mm | MTM-204-02 |
| 2mm | 6mm | 2mm | 30mm | 1.5° | 16.5° | 0.5mm | B | 63mm | MTM-205-02 |
| 3mm | 6mm | 3mm | — | — | 8° | 0.5mm | A | 75mm | MTM-201-03 |
| 3mm | 6mm | 3mm | 5mm | 3° | 18° | 0.5mm | B | 75mm | MTM-202-03 |
| 3mm | 6mm | 3mm | 15mm | 1.5° | 16.5° | 0.5mm | B | 75mm | MTM-203-03 |
| 3mm | 6mm | 3mm | 30mm | 1° | 16° | 0.5mm | B | 75mm | MTM-204-03 |
| 3mm | 6mm | 3mm | 45mm | 1° | 16° | 0.5mm | B | 75mm | MTM-205-03 |
| 4mm | 6mm | 4mm | — | — | 8° | 0.5mm | A | 75mm | MTM-201-04 |
| 4mm | 6mm | 4mm | 10mm | 2° | 17° | 0.5mm | B | 75mm | MTM-202-04 |
| 4mm | 6mm | 4mm | 15mm | 1.5° | 16.5° | 0.5mm | B | 75mm | MTM-203-04 |
| 4mm | 6mm | 4mm | 20mm | 1° | 16° | 0.5mm | B | 75mm | MTM-204-04 |
| 5mm | 6mm | 5mm | — | — | 8° | 1mm | A | 75mm | MTM-201-05 |
| 5mm | 6mm | 5mm | 10mm | 3° | 18° | 1mm | B | 75mm | MTM-202-05 |
| 5mm | 6mm | 5mm | 25mm | 1° | 16° | 1mm | B | 75mm | MTM-203-05 |
| 6mm | 6mm | 6mm | — | — | — | 1mm | C | 75mm | MTM-201-06 |
| 8mm | 8mm | 8mm | — | — | — | 1mm | C | 80mm | MTM-201-08 |
| 10mm | 10mm | 10mm | — | — | — | 2mm | C | 82mm | MTM-201-10 |
| 12mm | 12mm | 12mm | — | — | — | 3mm | C | 100mm | MTM-201-12 |

TM SERIES SPEEDS & FEEDS (Semi-Finishing & Finishing)

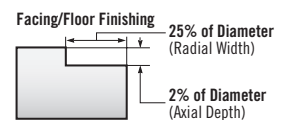
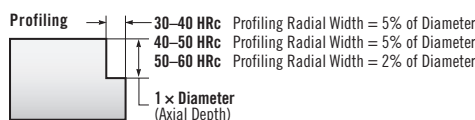
| Tool Number | Cutter Diameter | Steels 30–40 HRC | | Steels 40–50 HRC | | Steels 50–60 HRC | |
|-------------|-----------------|------------------|----------------|------------------|---------------|------------------|---------------|
| | | ROUGHING | FINISHING | ROUGHING | FINISHING | ROUGHING | FINISHING |
| TM-201-01 | 1/32" | 34,000–40,000 | 0.0001–0.00025 | 26,000–30,000 | 0.0001–0.0002 | 16,000–18,000 | 0.0001–0.0002 |
| TM-201-02 | 1/16" | 34,000–40,000 | 0.0003–0.0005 | 25,000–30,000 | 0.0003–0.0005 | 16,000–18,000 | 0.0002–0.0004 |
| TM-201-03 | 3/32" | 22,000–26,000 | 0.0006–0.00075 | 16,000–19,000 | 0.0005–0.0007 | 10,000–12,000 | 0.0005–0.0006 |
| TM-201-04 | 1/8" | 17,000–20,000 | 0.0008–0.001 | 13,000–17,000 | 0.0007–0.0009 | 8,000–13,000 | 0.0006–0.0008 |
| TM-201-06 | 3/16" | 12,000–14,000 | 0.0011–0.0015 | 9,000–12,000 | 0.001–0.0014 | 5,300–9,000 | 0.0009–0.0012 |
| TM-201-08 | 1/4" | 9,000–10,400 | 0.0015–0.002 | 7,000–9,000 | 0.0014–0.0018 | 4,000–6,600 | 0.0012–0.0016 |
| TM-201-10 | 5/16" | 7,200–8,300 | 0.0019–0.0025 | 5,500–7,200 | 0.0017–0.0023 | 3,200–5,400 | 0.0015–0.0020 |
| TM-201-12 | 3/8" | 6,000–6,900 | 0.0020–0.003 | 4,600–6,000 | 0.0018–0.0027 | 2,700–4,500 | 0.0016–0.0024 |
| TM-201-14 | 7/16" | 5,200–6,000 | 0.0023–0.0035 | 4,000–5,200 | 0.0021–0.0032 | 2,300–3,900 | 0.0019–0.0028 |
| TM-201-16 | 1/2" | 4,500–5,200 | 0.0025–0.004 | 3,500–4,500 | 0.0023–0.0036 | 2,100–3,500 | 0.0020–0.0032 |

(Use maximum RPM if suggested RPM is higher than the machine's capabilities)

TM Series Guidelines

- Speeds and feeds are only general starting points and may vary depending on specific applications.
- Use Climb Milling for better finish and longer tool life.
- Air or mist coolant on materials greater than 40 HRC.

- Good machines, tool holders, and programming methods all help in extending tool life.
- The best way to engage into the material is by helical interpolation or entering from off the part.
- Use for tight areas like helical bores or tight corners. For large open areas use HM/MHM Series.



Additional Notes

- Special diameters, lengths, and corner radii are available on a make-to-order basis.
- Special draft angles (blend angle) or necked shanks for part clearance are available upon request and usually ship within the next business day.

Die/Mold End Mills **HM/MHM**

Characteristics

- 4 Flute
- 6 Flute
- 8 Flute
- 10 Flute
- 45° Helix

Applications

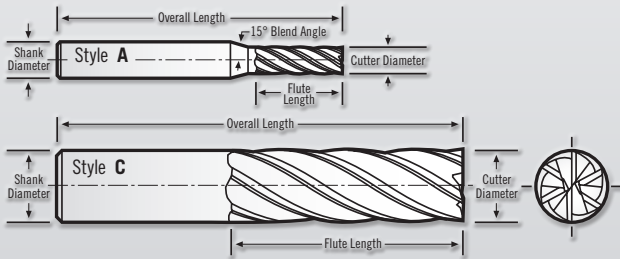
- Side Milling
- High Performance
- Roughing
- Semi-Finishing
- Finishing
- Dry
- Cold Air
- Spray Mist

Materials

- ≤40 HRC Hardness
- ≤50 HRC Hardness
- ≤64 HRC Hardness

Coatings

AlTiN
Aluminum Titan. Nitride



HM Tolerances

Cutting Dia. = $-.001/-0.002$ "
 Shank Dia. = $-.0001/-0.0002$ "
 Flute Length = $+0.060/-0.000$ "
 OAL = ± 0.060 "

MHM Tolerances

Cutting Dia. = $-.025/-0.050$ mm
 Shank Dia. = $-.002/-0.005$ mm
 Flute Length = $+0.50/+1.50$ mm
 OAL = ± 1.000 mm



HM Multi-Flute Tuffy Grade



| Cutting Diameter | Shank Diameter | Number of Flutes | Flute Length | Corner Radius | Tool Style | Overall Length | Tool Number AlTiN Coated |
|------------------|----------------|------------------|--------------|---------------|------------|----------------|--------------------------|
| 1/8" | 1/4" | 4 | 3/8" | 0.015" | A | 3" | HM-402-04 |
| 3/16" | 1/4" | 4 | 9/16" | 0.02" | A | 3" | HM-402-06 |
| 1/4" | 1/4" | 6 | 5/8" | 0.02" | C | 3-1/2" | HM-602-08 |
| 5/16" | 5/16" | 6 | 3/4" | 0.03" | C | 4" | HM-602-10 |
| 3/8" | 3/8" | 6 | 1" | 0.03" | C | 4" | HM-602-12 |
| 7/16" | 7/16" | 6 | 1-1/8" | 0.04" | C | 4" | HM-602-14 |
| 1/2" | 1/2" | 6 | 1-1/4" | 0.04" | C | 4" | HM-602-16 |
| 5/8" | 5/8" | 6 | 1-5/8" | 0.04" | C | 6" | HM-602-20 |
| 3/4" | 3/4" | 8 | 1-3/4" | 0.06" | C | 6" | HM-802-24 |
| 1" | 1" | 10 | 2" | 0.06" | C | 6" | HM-102-32 |



MHM Metric Multi-Flute Tuffy Grade **METRIC**



| Cutting Diameter | Shank Diameter | Number of Flutes | Flute Length | Corner Radius | Tool Style | Overall Length | Tool Number AlTiN Coated |
|------------------|----------------|------------------|--------------|---------------|------------|----------------|--------------------------|
| 3mm | 6mm | 4 | 9mm | 0.4mm | A | 76mm | MHM-402-03 |
| 4mm | 6mm | 4 | 12mm | 0.5mm | A | 76mm | MHM-402-04 |
| 5mm | 6mm | 4 | 15mm | 0.5mm | C | 90mm | MHM-402-05 |
| 6mm | 6mm | 6 | 15mm | 0.5mm | C | 90mm | MHM-602-06 |
| 8mm | 8mm | 6 | 20mm | 0.75mm | C | 100mm | MHM-602-08 |
| 10mm | 10mm | 6 | 25mm | 0.75mm | C | 100mm | MHM-602-10 |
| 12mm | 12mm | 6 | 30mm | 1mm | C | 100mm | MHM-602-12 |
| 16mm | 16mm | 6 | 40mm | 1mm | C | 150mm | MHM-602-16 |
| 20mm | 20mm | 8 | 45mm | 1.5mm | C | 150mm | MHM-802-20 |
| 25mm | 25mm | 10 | 50mm | 1.5mm | C | 150mm | MHM-102-25 |

HM Die/Mold End Mills

HM SERIES SPEEDS & FEEDS (Semi-Finishing & Finishing)

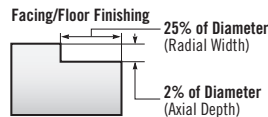
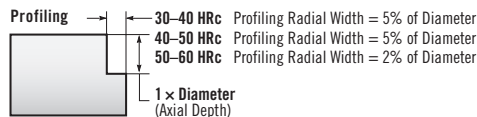
| Tool Number | Cutter Diameter | Steels 30-40 HRc | | Steels 40-50 HRc | | Steels 50-60 HRc | |
|-------------|-----------------|------------------|---------------|------------------|---------------|------------------|---------------|
| | | RPM | CLPT | RPM | CLPT | RPM | CLPT |
| HM-402-04 | 1/8" | 17,000-20,000 | 0.0008-0.001 | 13,000-17,000 | 0.0007-0.0009 | 8,000-13,000 | 0.0006-0.0008 |
| HM-402-06 | 3/16" | 12,000-14,000 | 0.0011-0.0015 | 9,000-12,000 | 0.0010-0.0014 | 5,300-9,000 | 0.0009-0.0012 |
| HM-602-08 | 1/4" | 9,000-10,400 | 0.0015-0.002 | 7,000-9,000 | 0.0014-0.0018 | 4,000-6,600 | 0.0012-0.0016 |
| HM-602-10 | 5/16" | 7,200-8,300 | 0.0019-0.0025 | 5,500-7,200 | 0.0017-0.0023 | 3,200-5,400 | 0.0015-0.0020 |
| HM-602-12 | 3/8" | 6,000-6,900 | 0.0020-0.003 | 4,600-6,000 | 0.0018-0.0027 | 2,700-4,500 | 0.0016-0.0024 |
| HM-602-14 | 7/16" | 5,200-6,000 | 0.0023-0.0035 | 4,000-5,200 | 0.0021-0.0032 | 2,300-3,900 | 0.0019-0.0028 |
| HM-602-16 | 1/2" | 4,500-5,200 | 0.0025-0.004 | 3,500-4,500 | 0.0023-0.0036 | 2,100-3,500 | 0.0020-0.0032 |
| HM-602-20 | 5/8" | 3,600-4,150 | 0.0026-0.0042 | 2,800-3,600 | 0.0023-0.0038 | 1,600-2,750 | 0.0021-0.0034 |
| HM-802-24 | 3/4" | 3,000-3,500 | 0.0028-0.005 | 2,300-3,000 | 0.0025-0.0045 | 1,350-2,250 | 0.0023-0.0041 |
| HM-102-32 | 1" | 2,200-2,600 | 0.0030-0.006 | 1,700-2,200 | 0.0027-0.0054 | 1,000-1,700 | 0.0024-0.0049 |

HM Series Guidelines

- Speeds and feeds are only general starting points and may vary depending on specific applications.
- Use Climb Milling for better finish and longer tool life.
- Air or mist coolant on materials greater than 40 HRc.
- Good machines, tool holders, and programming methods all help in extending tool life.
- The best way to engage into the material is by helical interpolation or entering from off the part.
- Use for open areas of floors or walls. For tight areas like helical bores or tight corners use TM/MTM Series.

Additional Notes

- Special draft angles (blend angle) or necked shanks for part clearance are available upon request.
- Special diameters, lengths, and corner radii are available on a make-to-order basis.



Die/Mold Tools in Other Sections

ET

Engraving Tools
(See Multiple Applications)



118

TOOLS FOR

Miniature Applications

TOOLS FOR

Miniature Applications



Scan this code to:

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The BEST Miniature Tools in Any Size as Standard

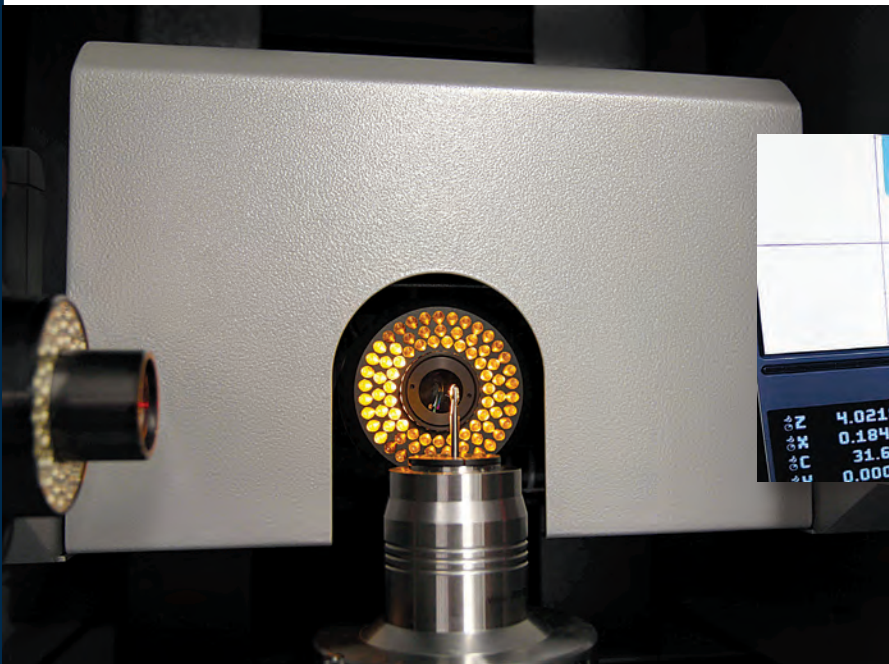


- .005"-.062" in every .001" increment as standard. All shipped from stock.








- You can get any size in between to .0002" tolerance.

“We only use RobbJack’s SS and SR tools on our machines. When you need a tool to work, the first time, every time, we can count on RobbJack.”

“...these tools are amazing! They run faster and longer than any other tool we have ever tried.”



Miniature Applications Tools

| | | | |
|-------------------------------|---|--|-----------|
| SS-2 / MSS-2 | 2 Flute Stub Length |  | 90 |
| SR-2 / MSR-2 | 2 Flute Standard Length |  | 92 |
| SS-2BN / MSS-2BN | 2 Flute Stub Length Ball Nose |  | 94 |
| SR-2BN / MSR-2BN | 2 Flute Standard Length Ball Nose |  | 95 |
| SS-4 / MSS-4 | 4 Flute Stub Length |  | 96 |
| SR-4 / MSR-4 | 4 Flute Standard Length |  | 97 |
| ACH / MAH Accuhold | Extension Holder (Also in Multiple Apps) |  | 97 |



SS-2 2 Flute Miniature End Mills

Characteristics

- Square End
- 2 Flute
- 30° Helix

Applications

- Slotting
- Side Milling
- Helical Interpolation
- Ramping
- High Performance
- Roughing
- Semi-Finishing
- Finishing
- Dry
- Wet
- Cold Air
- Spray Mist

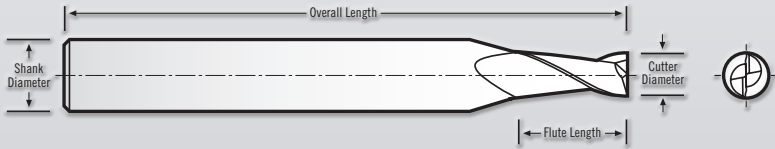
Materials

- Aluminum
- Copper
- Titanium
- Magnesium
- Cast Iron
- Steel
- Stainless Steel
- SUPER Alloys
- Plastics
- Composites
- 40 HRC Hardness
- BRASS

Coatings

- Titanium Nitride
- Titanium Carbo-Nitride
- Aluminum Titan. Nitride
- Diamond-Like Carbon (DLC)

**Hand-Select
+/- .0002"
Available**



SS/SR Tolerances

Cutting Dia. = ±.0005"
Shank Dia. = -.0001/- .0002"
Flute Length = +.003/- .000"
OAL = +.040"/-.000"

MSS/MSR Tolerances

Cutting Dia. = ±.010mm
Shank Dia. = -.002/- .005mm
Flute Length = +0.10/-0.00mm
OAL = +1.00/-0.00mm



**Tight
Tolerances**



SS-2 2 Flute Tuff Grade Stub Length



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number Coated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------|------------------------|
| .005" | 1/8" | .0100" | 1-1/2" | SS-2-005 | SS-2-005-T | SS-2-005-C | SS-2-005-A | SS-2-005-DLC |
| .006" | 1/8" | .0120" | 1-1/2" | SS-2-006 | SS-2-006-T | SS-2-006-C | SS-2-006-A | SS-2-006-DLC |
| .007" | 1/8" | .0140" | 1-1/2" | SS-2-007 | SS-2-007-T | SS-2-007-C | SS-2-007-A | SS-2-007-DLC |
| .008" | 1/8" | .0160" | 1-1/2" | SS-2-008 | SS-2-008-T | SS-2-008-C | SS-2-008-A | SS-2-008-DLC |
| .009" | 1/8" | .0180" | 1-1/2" | SS-2-009 | SS-2-009-T | SS-2-009-C | SS-2-009-A | SS-2-009-DLC |
| .010" | 1/8" | .0150" | 1-1/2" | SS-2-010 | SS-2-010-T | SS-2-010-C | SS-2-010-A | SS-2-010-DLC |
| .011" | 1/8" | .0165" | 1-1/2" | SS-2-011 | SS-2-011-T | SS-2-011-C | SS-2-011-A | SS-2-011-DLC |
| .012" | 1/8" | .0180" | 1-1/2" | SS-2-012 | SS-2-012-T | SS-2-012-C | SS-2-012-A | SS-2-012-DLC |
| .013" | 1/8" | .0195" | 1-1/2" | SS-2-013 | SS-2-013-T | SS-2-013-C | SS-2-013-A | SS-2-013-DLC |
| .014" | 1/8" | .0210" | 1-1/2" | SS-2-014 | SS-2-014-T | SS-2-014-C | SS-2-014-A | SS-2-014-DLC |
| .015" | 1/8" | .0225" | 1-1/2" | SS-2-015 | SS-2-015-T | SS-2-015-C | SS-2-015-A | SS-2-015-DLC |
| .016" | 1/8" | .0240" | 1-1/2" | SS-2-016 | SS-2-016-T | SS-2-016-C | SS-2-016-A | SS-2-016-DLC |
| .017" | 1/8" | .0255" | 1-1/2" | SS-2-017 | SS-2-017-T | SS-2-017-C | SS-2-017-A | SS-2-017-DLC |
| .018" | 1/8" | .0270" | 1-1/2" | SS-2-018 | SS-2-018-T | SS-2-018-C | SS-2-018-A | SS-2-018-DLC |
| .019" | 1/8" | .0285" | 1-1/2" | SS-2-019 | SS-2-019-T | SS-2-019-C | SS-2-019-A | SS-2-019-DLC |
| .020" | 1/8" | .0300" | 1-1/2" | SS-2-020 | SS-2-020-T | SS-2-020-C | SS-2-020-A | SS-2-020-DLC |
| .021" | 1/8" | .0315" | 1-1/2" | SS-2-021 | SS-2-021-T | SS-2-021-C | SS-2-021-A | SS-2-021-DLC |
| .022" | 1/8" | .0330" | 1-1/2" | SS-2-022 | SS-2-022-T | SS-2-022-C | SS-2-022-A | SS-2-022-DLC |
| .023" | 1/8" | .0345" | 1-1/2" | SS-2-023 | SS-2-023-T | SS-2-023-C | SS-2-023-A | SS-2-023-DLC |
| .024" | 1/8" | .0360" | 1-1/2" | SS-2-024 | SS-2-024-T | SS-2-024-C | SS-2-024-A | SS-2-024-DLC |
| .025" | 1/8" | .0375" | 1-1/2" | SS-2-025 | SS-2-025-T | SS-2-025-C | SS-2-025-A | SS-2-025-DLC |
| .026" | 1/8" | .0390" | 1-1/2" | SS-2-026 | SS-2-026-T | SS-2-026-C | SS-2-026-A | SS-2-026-DLC |
| .027" | 1/8" | .0405" | 1-1/2" | SS-2-027 | SS-2-027-T | SS-2-027-C | SS-2-027-A | SS-2-027-DLC |
| .028" | 1/8" | .0420" | 1-1/2" | SS-2-028 | SS-2-028-T | SS-2-028-C | SS-2-028-A | SS-2-028-DLC |
| .029" | 1/8" | .0435" | 1-1/2" | SS-2-029 | SS-2-029-T | SS-2-029-C | SS-2-029-A | SS-2-029-DLC |
| .030" | 1/8" | .0450" | 1-1/2" | SS-2-030 | SS-2-030-T | SS-2-030-C | SS-2-030-A | SS-2-030-DLC |
| .031" | 1/8" | .0465" | 1-1/2" | SS-2-031 | SS-2-031-T | SS-2-031-C | SS-2-031-A | SS-2-031-DLC |
| .032" | 1/8" | .0480" | 1-1/2" | SS-2-032 | SS-2-032-T | SS-2-032-C | SS-2-032-A | SS-2-032-DLC |
| .033" | 1/8" | .0495" | 1-1/2" | SS-2-033 | SS-2-033-T | SS-2-033-C | SS-2-033-A | SS-2-033-DLC |
| .034" | 1/8" | .0510" | 1-1/2" | SS-2-034 | SS-2-034-T | SS-2-034-C | SS-2-034-A | SS-2-034-DLC |

2 Flute Miniature End Mills **SS-2/MSS-2**



SS-2 2 Flute Tuffy Grade Stub Length — CONTINUED FROM PREVIOUS



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|------------------------|
| .035" | 1/8" | .0525" | 1-1/2" | SS-2-035 | SS-2-035-T | SS-2-035-C | SS-2-035-A | SS-2-035-DLC |
| .036" | 1/8" | .0540" | 1-1/2" | SS-2-036 | SS-2-036-T | SS-2-036-C | SS-2-036-A | SS-2-036-DLC |
| .037" | 1/8" | .0555" | 1-1/2" | SS-2-037 | SS-2-037-T | SS-2-037-C | SS-2-037-A | SS-2-037-DLC |
| .038" | 1/8" | .0570" | 1-1/2" | SS-2-038 | SS-2-038-T | SS-2-038-C | SS-2-038-A | SS-2-038-DLC |
| .039" | 1/8" | .0585" | 1-1/2" | SS-2-039 | SS-2-039-T | SS-2-039-C | SS-2-039-A | SS-2-039-DLC |
| .040" | 1/8" | .0600" | 1-1/2" | SS-2-040 | SS-2-040-T | SS-2-040-C | SS-2-040-A | SS-2-040-DLC |
| .041" | 1/8" | .0615" | 1-1/2" | SS-2-041 | SS-2-041-T | SS-2-041-C | SS-2-041-A | SS-2-041-DLC |
| .042" | 1/8" | .0630" | 1-1/2" | SS-2-042 | SS-2-042-T | SS-2-042-C | SS-2-042-A | SS-2-042-DLC |
| .043" | 1/8" | .0645" | 1-1/2" | SS-2-043 | SS-2-043-T | SS-2-043-C | SS-2-043-A | SS-2-043-DLC |
| .044" | 1/8" | .0660" | 1-1/2" | SS-2-044 | SS-2-044-T | SS-2-044-C | SS-2-044-A | SS-2-044-DLC |
| .045" | 1/8" | .0675" | 1-1/2" | SS-2-045 | SS-2-045-T | SS-2-045-C | SS-2-045-A | SS-2-045-DLC |
| .046" | 1/8" | .0690" | 1-1/2" | SS-2-046 | SS-2-046-T | SS-2-046-C | SS-2-046-A | SS-2-046-DLC |
| .047" | 1/8" | .0705" | 1-1/2" | SS-2-047 | SS-2-047-T | SS-2-047-C | SS-2-047-A | SS-2-047-DLC |
| .048" | 1/8" | .0720" | 1-1/2" | SS-2-048 | SS-2-048-T | SS-2-048-C | SS-2-048-A | SS-2-048-DLC |
| .049" | 1/8" | .0735" | 1-1/2" | SS-2-049 | SS-2-049-T | SS-2-049-C | SS-2-049-A | SS-2-049-DLC |
| .050" | 1/8" | .0750" | 1-1/2" | SS-2-050 | SS-2-050-T | SS-2-050-C | SS-2-050-A | SS-2-050-DLC |
| .051" | 1/8" | .0765" | 1-1/2" | SS-2-051 | SS-2-051-T | SS-2-051-C | SS-2-051-A | SS-2-051-DLC |
| .052" | 1/8" | .0780" | 1-1/2" | SS-2-052 | SS-2-052-T | SS-2-052-C | SS-2-052-A | SS-2-052-DLC |
| .053" | 1/8" | .0795" | 1-1/2" | SS-2-053 | SS-2-053-T | SS-2-053-C | SS-2-053-A | SS-2-053-DLC |
| .054" | 1/8" | .0810" | 1-1/2" | SS-2-054 | SS-2-054-T | SS-2-054-C | SS-2-054-A | SS-2-054-DLC |
| .055" | 1/8" | .0825" | 1-1/2" | SS-2-055 | SS-2-055-T | SS-2-055-C | SS-2-055-A | SS-2-055-DLC |
| .056" | 1/8" | .0840" | 1-1/2" | SS-2-056 | SS-2-056-T | SS-2-056-C | SS-2-056-A | SS-2-056-DLC |
| .057" | 1/8" | .0855" | 1-1/2" | SS-2-057 | SS-2-057-T | SS-2-057-C | SS-2-057-A | SS-2-057-DLC |
| .058" | 1/8" | .0870" | 1-1/2" | SS-2-058 | SS-2-058-T | SS-2-058-C | SS-2-058-A | SS-2-058-DLC |
| .059" | 1/8" | .0885" | 1-1/2" | SS-2-059 | SS-2-059-T | SS-2-059-C | SS-2-059-A | SS-2-059-DLC |
| .060" | 1/8" | .0900" | 1-1/2" | SS-2-060 | SS-2-060-T | SS-2-060-C | SS-2-060-A | SS-2-060-DLC |
| .061" | 1/8" | .0915" | 1-1/2" | SS-2-061 | SS-2-061-T | SS-2-061-C | SS-2-061-A | SS-2-061-DLC |
| .062" | 1/8" | .0930" | 1-1/2" | SS-2-062 | SS-2-062-T | SS-2-062-C | SS-2-062-A | SS-2-062-DLC |



MSS-2 Metric 2 Flute Miniature Stub Length **METRIC**



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|------------------------|
| .15mm | 3mm | .225mm | 38mm | MSS-2-015 | MSS-2-015-T | MSS-2-015-C | MSS-2-015-A | MSS-2-015-DLC |
| .20mm | 3mm | .300mm | 38mm | MSS-2-020 | MSS-2-020-T | MSS-2-020-C | MSS-2-020-A | MSS-2-020-DLC |
| .25mm | 3mm | .375mm | 38mm | MSS-2-025 | MSS-2-025-T | MSS-2-025-C | MSS-2-025-A | MSS-2-025-DLC |
| .30mm | 3mm | .450mm | 38mm | MSS-2-030 | MSS-2-030-T | MSS-2-030-C | MSS-2-030-A | MSS-2-030-DLC |
| .35mm | 3mm | .525mm | 38mm | MSS-2-035 | MSS-2-035-T | MSS-2-035-C | MSS-2-035-A | MSS-2-035-DLC |
| .40mm | 3mm | .600mm | 38mm | MSS-2-040 | MSS-2-040-T | MSS-2-040-C | MSS-2-040-A | MSS-2-040-DLC |
| .45mm | 3mm | .675mm | 38mm | MSS-2-045 | MSS-2-045-T | MSS-2-045-C | MSS-2-045-A | MSS-2-045-DLC |
| .50mm | 3mm | .750mm | 38mm | MSS-2-050 | MSS-2-050-T | MSS-2-050-C | MSS-2-050-A | MSS-2-050-DLC |
| .55mm | 3mm | .825mm | 38mm | MSS-2-055 | MSS-2-055-T | MSS-2-055-C | MSS-2-055-A | MSS-2-055-DLC |
| .60mm | 3mm | .900mm | 38mm | MSS-2-060 | MSS-2-060-T | MSS-2-060-C | MSS-2-060-A | MSS-2-060-DLC |
| .65mm | 3mm | .975mm | 38mm | MSS-2-065 | MSS-2-065-T | MSS-2-065-C | MSS-2-065-A | MSS-2-065-DLC |
| .70mm | 3mm | 1.05mm | 38mm | MSS-2-070 | MSS-2-070-T | MSS-2-070-C | MSS-2-070-A | MSS-2-070-DLC |
| .80mm | 3mm | 1.20mm | 38mm | MSS-2-080 | MSS-2-080-T | MSS-2-080-C | MSS-2-080-A | MSS-2-080-DLC |
| 1.00mm | 3mm | 1.50mm | 38mm | MSS-2-100 | MSS-2-100-T | MSS-2-100-C | MSS-2-100-A | MSS-2-100-DLC |
| 1.50mm | 3mm | 2.25mm | 38mm | MSS-2-150 | MSS-2-150-T | MSS-2-150-C | MSS-2-150-A | MSS-2-150-DLC |

SR-2 2 Flute Miniature End Mills



SR-2 2 Flute Tuffy Grade Standard Length

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|------------------------|
| .010" | 1/8" | .0300" | 1-1/2" | SR-2-010 | SR-2-010-T | SR-2-010-C | SR-2-010-A | SR-2-010-DLC |
| .011" | 1/8" | .0330" | 1-1/2" | SR-2-011 | SR-2-011-T | SR-2-011-C | SR-2-011-A | SR-2-011-DLC |
| .012" | 1/8" | .0360" | 1-1/2" | SR-2-012 | SR-2-012-T | SR-2-012-C | SR-2-012-A | SR-2-012-DLC |
| .013" | 1/8" | .0390" | 1-1/2" | SR-2-013 | SR-2-013-T | SR-2-013-C | SR-2-013-A | SR-2-013-DLC |
| .014" | 1/8" | .0420" | 1-1/2" | SR-2-014 | SR-2-014-T | SR-2-014-C | SR-2-014-A | SR-2-014-DLC |
| .015" | 1/8" | .0450" | 1-1/2" | SR-2-015 | SR-2-015-T | SR-2-015-C | SR-2-015-A | SR-2-015-DLC |
| .016" | 1/8" | .0480" | 1-1/2" | SR-2-016 | SR-2-016-T | SR-2-016-C | SR-2-016-A | SR-2-016-DLC |
| .017" | 1/8" | .0510" | 1-1/2" | SR-2-017 | SR-2-017-T | SR-2-017-C | SR-2-017-A | SR-2-017-DLC |
| .018" | 1/8" | .0540" | 1-1/2" | SR-2-018 | SR-2-018-T | SR-2-018-C | SR-2-018-A | SR-2-018-DLC |
| .019" | 1/8" | .0570" | 1-1/2" | SR-2-019 | SR-2-019-T | SR-2-019-C | SR-2-019-A | SR-2-019-DLC |
| .020" | 1/8" | .0600" | 1-1/2" | SR-2-020 | SR-2-020-T | SR-2-020-C | SR-2-020-A | SR-2-020-DLC |
| .021" | 1/8" | .0630" | 1-1/2" | SR-2-021 | SR-2-021-T | SR-2-021-C | SR-2-021-A | SR-2-021-DLC |
| .022" | 1/8" | .0660" | 1-1/2" | SR-2-022 | SR-2-022-T | SR-2-022-C | SR-2-022-A | SR-2-022-DLC |
| .023" | 1/8" | .0690" | 1-1/2" | SR-2-023 | SR-2-023-T | SR-2-023-C | SR-2-023-A | SR-2-023-DLC |
| .024" | 1/8" | .0720" | 1-1/2" | SR-2-024 | SR-2-024-T | SR-2-024-C | SR-2-024-A | SR-2-024-DLC |
| .025" | 1/8" | .0750" | 1-1/2" | SR-2-025 | SR-2-025-T | SR-2-025-C | SR-2-025-A | SR-2-025-DLC |
| .026" | 1/8" | .0780" | 1-1/2" | SR-2-026 | SR-2-026-T | SR-2-026-C | SR-2-026-A | SR-2-026-DLC |
| .027" | 1/8" | .0810" | 1-1/2" | SR-2-027 | SR-2-027-T | SR-2-027-C | SR-2-027-A | SR-2-027-DLC |
| .028" | 1/8" | .0840" | 1-1/2" | SR-2-028 | SR-2-028-T | SR-2-028-C | SR-2-028-A | SR-2-028-DLC |
| .029" | 1/8" | .0870" | 1-1/2" | SR-2-029 | SR-2-029-T | SR-2-029-C | SR-2-029-A | SR-2-029-DLC |
| .030" | 1/8" | .0900" | 1-1/2" | SR-2-030 | SR-2-030-T | SR-2-030-C | SR-2-030-A | SR-2-030-DLC |
| .031" | 1/8" | .0930" | 1-1/2" | SR-2-031 | SR-2-031-T | SR-2-031-C | SR-2-031-A | SR-2-031-DLC |
| .032" | 1/8" | .0960" | 1-1/2" | SR-2-032 | SR-2-032-T | SR-2-032-C | SR-2-032-A | SR-2-032-DLC |
| .033" | 1/8" | .0990" | 1-1/2" | SR-2-033 | SR-2-033-T | SR-2-033-C | SR-2-033-A | SR-2-033-DLC |
| .034" | 1/8" | .1020" | 1-1/2" | SR-2-034 | SR-2-034-T | SR-2-034-C | SR-2-034-A | SR-2-034-DLC |
| .035" | 1/8" | .1050" | 1-1/2" | SR-2-035 | SR-2-035-T | SR-2-035-C | SR-2-035-A | SR-2-035-DLC |
| .036" | 1/8" | .1080" | 1-1/2" | SR-2-036 | SR-2-036-T | SR-2-036-C | SR-2-036-A | SR-2-036-DLC |
| .037" | 1/8" | .1110" | 1-1/2" | SR-2-037 | SR-2-037-T | SR-2-037-C | SR-2-037-A | SR-2-037-DLC |
| .038" | 1/8" | .1140" | 1-1/2" | SR-2-038 | SR-2-038-T | SR-2-038-C | SR-2-038-A | SR-2-038-DLC |
| .039" | 1/8" | .1170" | 1-1/2" | SR-2-039 | SR-2-039-T | SR-2-039-C | SR-2-039-A | SR-2-039-DLC |
| .040" | 1/8" | .1200" | 1-1/2" | SR-2-040 | SR-2-040-T | SR-2-040-C | SR-2-040-A | SR-2-040-DLC |
| .041" | 1/8" | .1230" | 1-1/2" | SR-2-041 | SR-2-041-T | SR-2-041-C | SR-2-041-A | SR-2-041-DLC |
| .042" | 1/8" | .1260" | 1-1/2" | SR-2-042 | SR-2-042-T | SR-2-042-C | SR-2-042-A | SR-2-042-DLC |
| .043" | 1/8" | .1290" | 1-1/2" | SR-2-043 | SR-2-043-T | SR-2-043-C | SR-2-043-A | SR-2-043-DLC |
| .044" | 1/8" | .1320" | 1-1/2" | SR-2-044 | SR-2-044-T | SR-2-044-C | SR-2-044-A | SR-2-044-DLC |
| .045" | 1/8" | .1350" | 1-1/2" | SR-2-045 | SR-2-045-T | SR-2-045-C | SR-2-045-A | SR-2-045-DLC |
| .046" | 1/8" | .1380" | 1-1/2" | SR-2-046 | SR-2-046-T | SR-2-046-C | SR-2-046-A | SR-2-046-DLC |
| .047" | 1/8" | .1410" | 1-1/2" | SR-2-047 | SR-2-047-T | SR-2-047-C | SR-2-047-A | SR-2-047-DLC |
| .048" | 1/8" | .1440" | 1-1/2" | SR-2-048 | SR-2-048-T | SR-2-048-C | SR-2-048-A | SR-2-048-DLC |
| .049" | 1/8" | .1470" | 1-1/2" | SR-2-049 | SR-2-049-T | SR-2-049-C | SR-2-049-A | SR-2-049-DLC |
| .050" | 1/8" | .1500" | 1-1/2" | SR-2-050 | SR-2-050-T | SR-2-050-C | SR-2-050-A | SR-2-050-DLC |
| .051" | 1/8" | .1530" | 1-1/2" | SR-2-051 | SR-2-051-T | SR-2-051-C | SR-2-051-A | SR-2-051-DLC |
| .052" | 1/8" | .1560" | 1-1/2" | SR-2-052 | SR-2-052-T | SR-2-052-C | SR-2-052-A | SR-2-052-DLC |
| .053" | 1/8" | .1590" | 1-1/2" | SR-2-053 | SR-2-053-T | SR-2-053-C | SR-2-053-A | SR-2-053-DLC |
| .054" | 1/8" | .1620" | 1-1/2" | SR-2-054 | SR-2-054-T | SR-2-054-C | SR-2-054-A | SR-2-054-DLC |
| .055" | 1/8" | .1650" | 1-1/2" | SR-2-055 | SR-2-055-T | SR-2-055-C | SR-2-055-A | SR-2-055-DLC |
| .056" | 1/8" | .1680" | 1-1/2" | SR-2-056 | SR-2-056-T | SR-2-056-C | SR-2-056-A | SR-2-056-DLC |
| .057" | 1/8" | .1710" | 1-1/2" | SR-2-057 | SR-2-057-T | SR-2-057-C | SR-2-057-A | SR-2-057-DLC |
| .058" | 1/8" | .1740" | 1-1/2" | SR-2-058 | SR-2-058-T | SR-2-058-C | SR-2-058-A | SR-2-058-DLC |
| .059" | 1/8" | .1770" | 1-1/2" | SR-2-059 | SR-2-059-T | SR-2-059-C | SR-2-059-A | SR-2-059-DLC |
| .060" | 1/8" | .1800" | 1-1/2" | SR-2-060 | SR-2-060-T | SR-2-060-C | SR-2-060-A | SR-2-060-DLC |
| .061" | 1/8" | .1830" | 1-1/2" | SR-2-061 | SR-2-061-T | SR-2-061-C | SR-2-061-A | SR-2-061-DLC |
| .062" | 1/8" | .1860" | 1-1/2" | SR-2-062 | SR-2-062-T | SR-2-062-C | SR-2-062-A | SR-2-062-DLC |

2 Flute Miniature End Mills **MSR-2**



Tight Tolerances



MSR-2 2 Flute Standard Length **METRIC**

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated | Tool Number Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|--------------------|
| .25mm | 3mm | .75mm | 38mm | MSR-2-025 | MSR-2-025-T | MSR-2-025-C | MSR-2-025-A | MSR-2-025-DLC |
| .30mm | 3mm | .90mm | 38mm | MSR-2-030 | MSR-2-030-T | MSR-2-030-C | MSR-2-030-A | MSR-2-030-DLC |
| .35mm | 3mm | 1.05mm | 38mm | MSR-2-035 | MSR-2-035-T | MSR-2-035-C | MSR-2-035-A | MSR-2-035-DLC |
| .40mm | 3mm | 1.20mm | 38mm | MSR-2-040 | MSR-2-040-T | MSR-2-040-C | MSR-2-040-A | MSR-2-040-DLC |
| .45mm | 3mm | 1.35mm | 38mm | MSR-2-045 | MSR-2-045-T | MSR-2-045-C | MSR-2-045-A | MSR-2-045-DLC |
| .50mm | 3mm | 1.50mm | 38mm | MSR-2-050 | MSR-2-050-T | MSR-2-050-C | MSR-2-050-A | MSR-2-050-DLC |
| .55mm | 3mm | 1.65mm | 38mm | MSR-2-055 | MSR-2-055-T | MSR-2-055-C | MSR-2-055-A | MSR-2-055-DLC |
| .60mm | 3mm | 1.80mm | 38mm | MSR-2-060 | MSR-2-060-T | MSR-2-060-C | MSR-2-060-A | MSR-2-060-DLC |
| .65mm | 3mm | 1.95mm | 38mm | MSR-2-065 | MSR-2-065-T | MSR-2-065-C | MSR-2-065-A | MSR-2-065-DLC |
| .70mm | 3mm | 2.10mm | 38mm | MSR-2-070 | MSR-2-070-T | MSR-2-070-C | MSR-2-070-A | MSR-2-070-DLC |
| .80mm | 3mm | 2.40mm | 38mm | MSR-2-080 | MSR-2-080-T | MSR-2-080-C | MSR-2-080-A | MSR-2-080-DLC |
| 1.00mm | 3mm | 3.00mm | 38mm | MSR-2-100 | MSR-2-100-T | MSR-2-100-C | MSR-2-100-A | MSR-2-100-DLC |
| 1.50mm | 3mm | 4.50mm | 38mm | MSR-2-150 | MSR-2-150-T | MSR-2-150-C | MSR-2-150-A | MSR-2-150-DLC |



Videos Online



See RobbJack's miniatures in action online:
www.youtube.com/RobbJackCorp
 or
www.robbjack.com/videos

**Hand-Select
 +/- .0002"
 Available**

Miniatures



Speed & Feed



Speed & Feed Calculations
 now online at:
www.robbjack.com/technical/speed-and-feed

The screenshot shows the 'End Mill Cutting Parameters' software interface. It includes input fields for Max. Power (15 hp), Max. RPM (10000), Max. Feedrate (300 in/min), Tool Diameter (0.5 in), and Total Depth of Cut (0.5 in). It also features a 'TOLERANCES' section with a table of tolerances for different grades of steel (1009, 1111, 401, 111) and a 'Roughing Tools' section listing ST-545-1105 and ST-646-1105.

SS/SR-2BN 2 Flute Miniature Ball End Mills

Characteristics

- Ball End
- 2 Flute
- 30° Helix

Applications

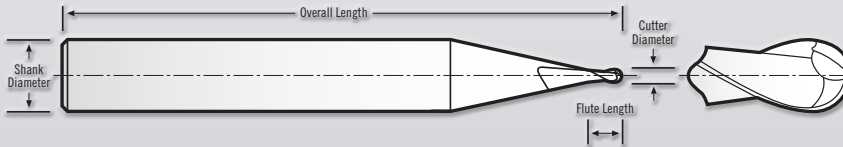
- Slotting
- Side Milling
- Helical Interpolation
- Conventional
- Ramping
- 3-D
- High Performance
- Roughing
- Semi-Finishing
- Finishing
- Dry
- Wet
- Cold Air
- Spray Mist

Materials

- Aluminum
- Copper
- Titanium
- Magnesium
- Cast Iron
- Steel
- Stainless Steel
- SUPER Alloys
- Plastics
- Composites
- 40 HRC Hardness
- BRASS

Coatings

- Titanium Nitride
- Titanium Carbo-Nitride
- Aluminum Titan. Nitride
- Diamond-Like Carbon (DLC)



SS/SR Tolerances
 Cutting Dia. = ±.0005"
 Shank Dia. = -.0001/-.0002"
 Flute Length = +.003/-.000"
 OAL = +.040"/-.000"

MSS/MSR Tolerances
 Cutting Dia. = ±.010 mm
 Shank Dia. = -.002/-.005 mm
 Flute Length = +0.10/-0.00 mm
 OAL = +1.00/-0.00 mm



SS-2BN 2 Flute Ball End Stub Length

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | TiN | TiCN | AlTiN | DLC |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|------------------------|
| | | | | | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated | Tool Number DLC Coated |
| .010" | 1/8" | .0150" | 1-1/2" | SS-2-010-BN | SS-2-010-BN-T | SS-2-010-BN-C | SS-2-010-BN-A | SS-2-010-BN-DLC |
| .015" | 1/8" | .0230" | 1-1/2" | SS-2-015-BN | SS-2-015-BN-T | SS-2-015-BN-C | SS-2-015-BN-A | SS-2-015-BN-DLC |
| .016" | 1/8" | .0240" | 1-1/2" | SS-2-016-BN | SS-2-016-BN-T | SS-2-016-BN-C | SS-2-016-BN-A | SS-2-016-BN-DLC |
| .020" | 1/8" | .0300" | 1-1/2" | SS-2-020-BN | SS-2-020-BN-T | SS-2-020-BN-C | SS-2-020-BN-A | SS-2-020-BN-DLC |
| .025" | 1/8" | .0375" | 1-1/2" | SS-2-025-BN | SS-2-025-BN-T | SS-2-025-BN-C | SS-2-025-BN-A | SS-2-025-BN-DLC |
| .030" | 1/8" | .0450" | 1-1/2" | SS-2-030-BN | SS-2-030-BN-T | SS-2-030-BN-C | SS-2-030-BN-A | SS-2-030-BN-DLC |
| .031" | 1/8" | .0465" | 1-1/2" | SS-2-031-BN | SS-2-031-BN-T | SS-2-031-BN-C | SS-2-031-BN-A | SS-2-031-BN-DLC |
| .040" | 1/8" | .0600" | 1-1/2" | SS-2-040-BN | SS-2-040-BN-T | SS-2-040-BN-C | SS-2-040-BN-A | SS-2-040-BN-DLC |
| .047" | 1/8" | .0750" | 1-1/2" | SS-2-047-BN | SS-2-047-BN-T | SS-2-047-BN-C | SS-2-047-BN-A | SS-2-047-BN-DLC |
| .055" | 1/8" | .0825" | 1-1/2" | SS-2-055-BN | SS-2-055-BN-T | SS-2-055-BN-C | SS-2-055-BN-A | SS-2-055-BN-DLC |
| .060" | 1/8" | .0900" | 1-1/2" | SS-2-060-BN | SS-2-060-BN-T | SS-2-060-BN-C | SS-2-060-BN-A | SS-2-060-BN-DLC |



MSS-2BN Metric 2 Flute Ball End Stub Length **METRIC**

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | TiN | TiCN | AlTiN | DLC |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|------------------------|
| | | | | | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated | Tool Number DLC Coated |
| .50mm | 3mm | .750mm | 38mm | MSS-2-050-BN | MSS-2-050-BN-T | MSS-2-050BN-C | MSS-2-050BN-A | MSS-2-050BN-DLC |
| .60mm | 3mm | .900mm | 38mm | MSS-2-060-BN | MSS-2-060-BN-T | MSS-2-060BN-C | MSS-2-060BN-A | MSS-2-060BN-DLC |
| .70mm | 3mm | 1.05mm | 38mm | MSS-2-070-BN | MSS-2-070-BN-T | MSS-2-070BN-C | MSS-2-070BN-A | MSS-2-070BN-DLC |
| .80mm | 3mm | 1.20mm | 38mm | MSS-2-080-BN | MSS-2-080-BN-T | MSS-2-080BN-C | MSS-2-080BN-A | MSS-2-080BN-DLC |
| 1.00mm | 3mm | 1.50mm | 38mm | MSS-2-100-BN | MSS-2-100-BN-T | MSS-2-100BN-C | MSS-2-100BN-A | MSS-2-100BN-DLC |
| 1.50mm | 3mm | 2.25mm | 38mm | MSS-2-150-BN | MSS-2-150-BN-T | MSS-2-150BN-C | MSS-2-150BN-A | MSS-2-150BN-DLC |

2 Flute Miniature Ball End Mills **MSS/MSR-2BN**



Tight Tolerances



SR-2BN 2 Flute Ball End Tuffy Grade Standard Length



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|------------------------|
| .010" | 1/8" | .0300" | 1-1/2" | SR-2-010-BN | SR-2-010-BN-T | SR-2-010-BN-C | SR-2-010-BN-A | SR-2-010-BN-DLC |
| .015" | 1/8" | .0450" | 1-1/2" | SR-2-015-BN | SR-2-015-BN-T | SR-2-015-BN-C | SR-2-015-BN-A | SR-2-015-BN-DLC |
| .016" | 1/8" | .0480" | 1-1/2" | SR-2-016-BN | SR-2-016-BN-T | SR-2-016-BN-C | SR-2-016-BN-A | SR-2-016-BN-DLC |
| .020" | 1/8" | .0600" | 1-1/2" | SR-2-020-BN | SR-2-020-BN-T | SR-2-020-BN-C | SR-2-020-BN-A | SR-2-020-BN-DLC |
| .025" | 1/8" | .0750" | 1-1/2" | SR-2-025-BN | SR-2-025-BN-T | SR-2-025-BN-C | SR-2-025-BN-A | SR-2-025-BN-DLC |
| .030" | 1/8" | .0900" | 1-1/2" | SR-2-030-BN | SR-2-030-BN-T | SR-2-030-BN-C | SR-2-030-BN-A | SR-2-030-BN-DLC |
| .031" | 1/8" | .0930" | 1-1/2" | SR-2-031-BN | SR-2-031-BN-T | SR-2-031-BN-C | SR-2-031-BN-A | SR-2-031-BN-DLC |
| .040" | 1/8" | .1200" | 1-1/2" | SR-2-040-BN | SR-2-040-BN-T | SR-2-040-BN-C | SR-2-040-BN-A | SR-2-040-BN-DLC |
| .047" | 1/8" | .1410" | 1-1/2" | SR-2-047-BN | SR-2-047-BN-T | SR-2-047-BN-C | SR-2-047-BN-A | SR-2-047-BN-DLC |
| .050" | 1/8" | .1500" | 1-1/2" | SR-2-050-BN | SR-2-050-BN-T | SR-2-050-BN-C | SR-2-050-BN-A | SR-2-050-BN-DLC |
| .055" | 1/8" | .1650" | 1-1/2" | SR-2-055-BN | SR-2-055-BN-T | SR-2-055-BN-C | SR-2-055-BN-A | SR-2-055-BN-DLC |
| .060" | 1/8" | .1800" | 1-1/2" | SR-2-060-BN | SR-2-060-BN-T | SR-2-060-BN-C | SR-2-060-BN-A | SR-2-060-BN-DLC |



MSR-2BN Metric 2 Flute Ball End Tuffy Grade Standard Length

METRIC



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN-Coated | Tool Number AlTiN Coated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|------------------------|
| .50mm | 3mm | 1.50mm | 38mm | MSR-2-050-BN | MSR-2-050-BN-T | MSR-2-050-BN-C | MSR-2-050-BN-A | MSR-2-050-BN-DLC |
| .60mm | 3mm | 1.80mm | 38mm | MSR-2-060-BN | MSR-2-060-BN-T | MSR-2-060-BN-C | MSR-2-060-BN-A | MSR-2-060-BN-DLC |
| .70mm | 3mm | 2.10mm | 38mm | MSR-2-070-BN | MSR-2-070-BN-T | MSR-2-070-BN-C | MSR-2-070-BN-A | MSR-2-070-BN-DLC |
| .80mm | 3mm | 2.40mm | 38mm | MSR-2-080-BN | MSR-2-080-BN-T | MSR-2-080-BN-C | MSR-2-080-BN-A | MSR-2-080-BN-DLC |
| 1.00mm | 3mm | 3.00mm | 38mm | MSR-2-100-BN | MSR-2-100-BN-T | MSR-2-100-BN-C | MSR-2-100-BN-A | MSR-2-100-BN-DLC |
| 1.50mm | 3mm | 4.50mm | 38mm | MSR-2-150-BN | MSR-2-150-BN-T | MSR-2-150-BN-C | MSR-2-150-BN-A | MSR-2-150-BN-DLC |



Videos Online



See RobbJack's miniatures in action online:
www.youtube.com/RobbJackCorp
 or
www.robjack.com/videos

SS/MSS-4 4 Flute Miniature End Mills

Characteristics

- Square End
- 4 Flute
- 30° Helix

Applications

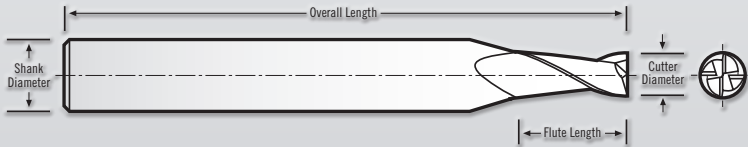
- Slotting
- Side Milling
- Helical Interpolation
- Ramping
- High Performance
- Roughing
- Semi-Finishing
- Finishing
- Dry
- Wet
- Cold Air
- Spray Mist

Materials

- Aluminum
- Copper
- Titanium
- Magnesium
- Cast Iron
- Steel
- Stainless Steel
- SUPER Alloys
- Plastics
- Composites
- 40 HRC Hardness
- BRASS

Coatings

- Titanium Nitride
- Titanium Carbo-Nitride
- Aluminum Titan. Nitride
- Diamond-Like Carbon (DLC)



SS/SR Tolerances

Cutting Dia. = $\pm 0.005"$
 Shank Dia. = $-.0001/-0.0002"$
 Flute Length = $+0.003/-0.000"$
 OAL = $+0.040"/-0.000"$

MSS/MSR Tolerances

Cutting Dia. = ± 0.010 mm
 Shank Dia. = $-.002/-0.005$ mm
 Flute Length = $+0.10/-0.00$ mm
 OAL = $+1.00/-0.00$ mm



Tight Tolerances



SS-4 4 Flute Tuffy Grade Stub Length



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|------------------------|
| .031" | 1/8" | .0465" | 1-1/2" | SS-4-031 | SS-4-031-T | SS-4-031-C | SS-4-031-A | SS-4-031-DLC |
| .040" | 1/8" | .0600" | 1-1/2" | SS-4-040 | SS-4-040-T | SS-4-040-C | SS-4-040-A | SS-4-040-DLC |
| .047" | 1/8" | .0705" | 1-1/2" | SS-4-047 | SS-4-047-T | SS-4-047-C | SS-4-047-A | SS-4-047-DLC |
| .050" | 1/8" | .0750" | 1-1/2" | SS-4-050 | SS-4-050-T | SS-4-050-C | SS-4-050-A | SS-4-050-DLC |
| .055" | 1/8" | .0825" | 1-1/2" | SS-4-055 | SS-4-055-T | SS-4-055-C | SS-4-055-A | SS-4-055-DLC |
| .060" | 1/8" | .0900" | 1-1/2" | SS-4-060 | SS-4-060-T | SS-4-060-C | SS-4-060-A | SS-4-060-DLC |



MSS-4 Metric 4 Flute Tuffy Grade Stub Length **METRIC**



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|------------------------|
| .80mm | 3mm | 1.20mm | 38mm | MSS-4-080 | MSS-4-080-T | MSS-4-080-C | MSS-4-080-A | MSS-4-080-DLC |
| 1.00mm | 3mm | 1.50mm | 38mm | MSS-4-100 | MSS-4-100-T | MSS-4-100-C | MSS-4-100-A | MSS-4-100-DLC |
| 1.50mm | 3mm | 2.25mm | 38mm | MSS-4-150 | MSS-4-150-T | MSS-4-150-C | MSS-4-150-A | MSS-4-150-DLC |

4 Flute Miniature End Mills **SR/MSR-4**



SR-4 4 Flute Tuffy Grade Standard Length



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|------------------------|
| .031" | 1/8" | .0930" | 1-1/2" | SR-4-031 | SR-4-031-T | SR-4-031-C | SR-4-031-A | SR-4-031-DLC |
| .040" | 1/8" | .1200" | 1-1/2" | SR-4-040 | SR-4-040-T | SR-4-040-C | SR-4-040-A | SR-4-040-DLC |
| .047" | 1/8" | .1410" | 1-1/2" | SR-4-047 | SR-4-047-T | SR-4-047-C | SR-4-047-A | SR-4-047-DLC |
| .050" | 1/8" | .1500" | 1-1/2" | SR-4-050 | SR-4-050-T | SR-4-050-C | SR-4-050-A | SR-4-050-DLC |
| .055" | 1/8" | .1650" | 1-1/2" | SR-4-055 | SR-4-055-T | SR-4-055-C | SR-4-055-A | SR-4-055-DLC |
| .060" | 1/8" | .1800" | 1-1/2" | SR-4-060 | SR-4-060-T | SR-4-060-C | SR-4-060-A | SR-4-060-DLC |

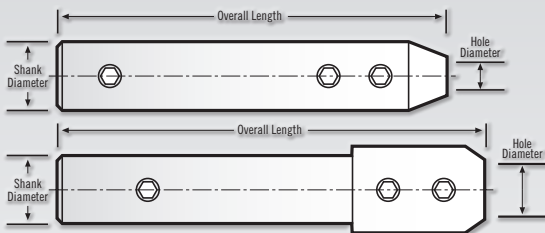


MSR-4 Metric 4 Flute Standard Length **METRIC**



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|------------------------|
| .80mm | 3mm | 2.40mm | 38mm | MSR-4-080 | MSR-4-080-T | MSR-4-080-C | MSR-4-080-A | MSR-4-080-DLC |
| 1.00mm | 3mm | 3.00mm | 38mm | MSR-4-100 | MSR-4-100-T | MSR-4-100-C | MSR-4-100-A | MSR-4-100-DLC |
| 1.50mm | 3mm | 4.50mm | 38mm | MSR-4-150 | MSR-4-150-T | MSR-4-150-C | MSR-4-150-A | MSR-4-150-DLC |

Accuhold End Mill Extension Holder **ACH/MAH**



ACH Tolerances

Hole Dia. = +.00015/-0.00000"
 Shank Dia. = -.0001/-0.0003"
 OAL = ±.060"

MAH Tolerances

Hole Dia. = +.004/-0.000 mm
 Shank Dia. = +.000/-0.007 mm
 OAL = ±1.5 mm



ACH Accuhold - End Mill Extension Holder

| Hole Diameter | Shank Diameter | Overall Length | Tool Number |
|---------------|----------------|----------------|-------------|
| 1/8" | 3/8" | 3-1/4" | ACH-04 |
| 3/16" | 1/2" | 3-1/2" | ACH-06 |
| 1/4" | 5/8" | 4-1/4" | ACH-08 |
| 3/8" | 3/4" | 4-1/2" | ACH-12 |
| * 1/2" | 3/4" | 4-3/4" | ACH-16 |
| * 1/2" | 1" | 4-3/4" | ACH-16L |

* 1" Diameter x 1.5" Long Head

















MAH Accuhold - Metric End Mill Extension Holder **METRIC**

| Hole Diameter | Shank Diameter | Overall Length | Tool Number |
|---------------|----------------|----------------|-------------|
| 3mm | 10mm | 82.5mm | MAH-03 |
| 4mm | 12mm | 110mm | MAH-04 |
| 5mm | 12mm | 110mm | MAH-05 |
| 6mm | 16mm | 125mm | MAH-06 |
| 8mm | 20mm | 135mm | MAH-08 |
| 10mm | 20mm | 135mm | MAH-10 |
| * 12mm | 25mm | 150mm | MAH-12 |

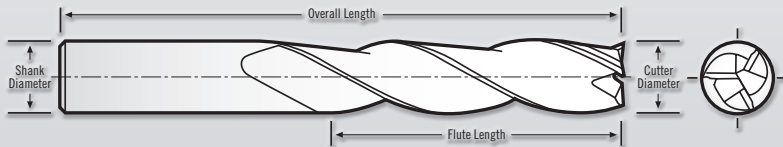
TOOLS FOR

Multiple Applications

Multiple Application Tools

| | | | |
|--|---|--|------------|
| NR / MNR 204/303/404 | 2, 3 and 4 Flute Nominal Plus Diameter Tolerance |  | 114 |
| TS / MTS 201/301/401 | 2, 3 and 4 Flute |  | 106 |
| TR 303/404/606 | 3, 4 and 6 Flute |  | 108 |
| T6 200/202/400/402 | 2 and 4 Flute Double End |  | 101 |
| C8 201/203 | 2 Flute |  | 105 |
| C8 301/303 | 3 Flute |  | 105 |
| T12 201/203 | 2 Flute |  | 103 |
| T12 403/405 | 2 and 4 Flute |  | 104 |
| SB / MSB 201 B / MB 203 | 2 Flute Ball End |  | 110 |
| SB / MSB 301 B / MB 333 | 3 Flute Ball End |  | 112 |
| EX 204/206 | 2 Flute Extended Reach |  | 117 |
| TL / MTL 303 | 3 Flute Extra Long Cutting Length |  | 100 |
| ET | Engraving Tools |  | 118 |
| ACH / MAH Accuhold | Extension Holder |  | 119 |

TL/MTL Tuffy Grade Carbide End Mills



TL Series Tolerances

Cutting Dia. = $+0.001/-0.000$ "
 Shank Dia. = $-0.0001/-0.0002$ "
 Flute Length = $+0.060/-0.000$ "
 OAL = ± 0.060 "

MTL Tolerances

Cutting Dia. = $+0.025/-0.000$ mm
 Shank Dia. = $-0.002/-0.005$ mm
 Flute Length = $+0.500/+1.500$ mm
 OAL = ± 1.000 mm



TL-303 3 Flute Tuffy Grade Extra Length

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number |
|------------------|----------------|--------------|----------------|-------------|
| 1/8" | 1/8" | 1" | 3" | TL-303-04* |
| 3/16" | 3/16" | 1-1/8" | 3" | TL-303-06* |
| 1/4" | 1/4" | 1-1/4" | 3" | TL-303-08* |
| 5/16" | 5/16" | 1-3/8" | 3-1/8" | TL-303-10* |
| 3/8" | 3/8" | 1-1/2" | 3-1/4" | TL-303-12 |
| 7/16" | 7/16" | 1-3/4" | 3-3/4" | TL-303-14* |
| 1/2" | 1/2" | 2" | 4" | TL-303-16 |
| 5/8" | 5/8" | 2-1/2" | 4-5/8" | TL-303-20 |
| 3/4" | 3/4" | 3" | 5" | TL-303-24 |

*Does not come with flats.

MTL-303 Metric 3 Flute Tuffy Grade Extra Length METRIC

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number |
|------------------|----------------|--------------|----------------|-------------|
| 3mm | 3mm | 25mm | 75mm | MTL-303-03 |
| 4mm | 4mm | 26mm | 75mm | MTL-303-04 |
| 5mm | 5mm | 28mm | 75mm | MTL-303-05 |
| 6mm | 6mm | 32mm | 75mm | MTL-303-06 |
| 8mm | 8mm | 35mm | 80mm | MTL-303-08 |
| 10mm | 10mm | 38mm | 82mm | MTL-303-10 |
| 12mm | 12mm | 50mm | 100mm | MTL-303-12 |
| 16mm | 16mm | 63mm | 110mm | MTL-303-16 |
| 20mm | 20mm | 75mm | 130mm | MTL-303-20 |

NOTE: Metric tools do not have flats.

2 Flute Tuffy Grade Carbide End Mills T6

Characteristics

- Square End
- 2 Flute
- 30° Helix

Applications

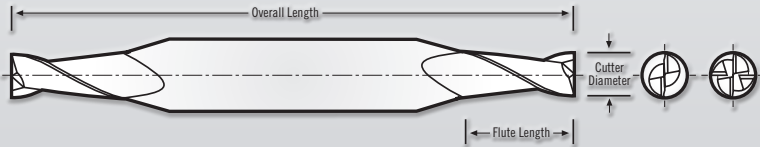
- Slotting
- Side Milling
- Helical Interpolation
- Ramping
- Roughing
- Semi-Finishing
- Finishing
- Dry
- Wet
- Cold Air
- Spray Mist

Materials

- Aluminum
- Copper
- Titanium
- Magnesium
- Cast Iron
- Steel
- Stainless Steel
- BRASS
- Wood

Coatings

- Titanium Nitride
- Titanium Carbo-Nitride
- Aluminum Titan. Nitride
- Diamond-Like Carbon (DLC)



T6 Series Tolerances
 Cutting Dia. = $\pm 0.005"$
 Shank Dia. = $-0.001/-0.002"$
 Flute Length = $+0.030/-0.000"$
 OAL = $\pm 0.060"$



T6-200 2 Flute Tuffy Grade Stub Length

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|------------------------|
| 1/16" | 3/16" | 1/8" | 2-1/2" | T6-200-02 | T6-200-02-T | T6-200-02-C | T6-200-02-A | T6-200-02-DLC |
| 5/64" | 3/16" | 5/32" | 2-1/2" | T6-200-02.5 | T6-200-02.5-T | T6-200-02.5-C | T6-200-02.5-A | T6-200-02.5-DLC |
| 3/32" | 3/16" | 5/32" | 2-1/2" | T6-200-03 | T6-200-03-T | T6-200-03-C | T6-200-03-A | T6-200-03-DLC |
| 7/64" | 3/16" | 3/16" | 2-1/2" | T6-200-03.5 | T6-200-03.5-T | T6-200-03.5-C | T6-200-03.5-A | T6-200-03.5-DLC |
| 1/8" | 3/16" | 3/16" | 2-1/2" | T6-200-04 | T6-200-04-T | T6-200-04-C | T6-200-04-A | T6-200-04-DLC |
| 9/64" | 3/16" | 7/32" | 2-1/2" | T6-200-04.5 | T6-200-04.5-T | T6-200-04.5-C | T6-200-04.5-A | T6-200-04.5-DLC |
| 5/32" | 3/16" | 9/32" | 2-1/2" | T6-200-05 | T6-200-05-T | T6-200-05-C | T6-200-05-A | T6-200-05-DLC |
| 11/64" | 3/16" | 9/32" | 2-1/2" | T6-200-05.5 | T6-200-05.5-T | T6-200-05.5-C | T6-200-05.5-A | T6-200-05.5-DLC |
| 3/16" | 3/16" | 3/8" | 2" | T6-200-06* | T6-200-06-T* | T6-200-06-C* | T6-200-06-A* | T6-200-06-DLC* |

*Single End only to allow plus/minus tolerance



T6-202 2 Flute Tuffy Grade Standard Length

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|------------------------|
| 1/16" | 3/16" | 3/16" | 2-1/2" | T6-202-02 | T6-202-02-T | T6-202-02-C | T6-202-02-A | T6-202-02-DLC |
| 5/64" | 3/16" | 5/16" | 2-1/2" | T6-202-02.5 | T6-202-02.5-T | T6-202-02.5-C | T6-202-02.5-A | T6-202-02.5-DLC |
| 3/32" | 3/16" | 3/8" | 2-1/2" | T6-202-03 | T6-202-03-T | T6-202-03-C | T6-202-03-A | T6-202-03-DLC |
| 7/64" | 3/16" | 3/8" | 2-1/2" | T6-202-03.5 | T6-202-03.5-T | T6-202-03.5-C | T6-202-03.5-A | T6-202-03.5-DLC |
| 1/8" | 3/16" | 3/8" | 2-1/2" | T6-202-04 | T6-202-04-T | T6-202-04-C | T6-202-04-A | T6-202-04-DLC |
| 9/64" | 3/16" | 7/16" | 2-1/2" | T6-202-04.5 | T6-202-04.5-T | T6-202-04.5-C | T6-202-04.5-A | T6-202-04.5-DLC |
| 5/32" | 3/16" | 7/16" | 2-1/2" | T6-202-05 | T6-202-05-T | T6-202-05-C | T6-202-05-A | T6-202-05-DLC |
| 11/64" | 3/16" | 7/16" | 2-1/2" | T6-202-05.5 | T6-202-05.5-T | T6-202-05.5-C | T6-202-05.5-A | T6-202-05.5-DLC |
| 3/16" | 3/16" | 1/2" | 2" | T6-202-06* | T6-202-06-T* | T6-202-06-C* | T6-202-06-A* | T6-202-06-DLC* |

*Single End only to allow plus/minus tolerance

T6 4 Flute Tuffly Grade Carbide End Mills



Characteristics



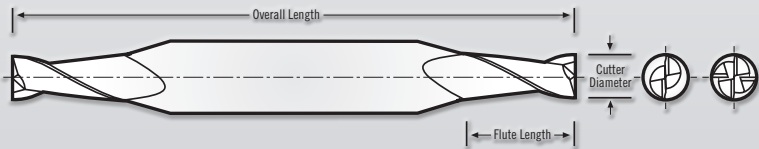
Applications



Materials



Coatings



T6 Series Tolerances

Cutting Dia. = $\pm 0.005''$
 Shank Dia. = $-0.001/-0.002''$
 Flute Length = $+0.030/-0.000''$
 OAL = $\pm 0.060''$



T6-400 4 Flute Tuffly Grade Stub Length



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|------------------------|
| 1/16" | 3/16" | 1/8" | 2-1/2" | T6-400-02 | T6-400-02-T | T6-400-02-C | T6-400-02-A | T6-400-02-DLC |
| 5/64" | 3/16" | 5/32" | 2-1/2" | T6-400-02.5 | T6-400-02.5-T | T6-400-02.5-C | T6-400-02.5-A | T6-400-02.5-DLC |
| 3/32" | 3/16" | 5/32" | 2-1/2" | T6-400-03 | T6-400-03-T | T6-400-03-C | T6-400-03-A | T6-400-03-DLC |
| 7/64" | 3/16" | 3/16" | 2-1/2" | T6-400-03.5 | T6-400-03.5-T | T6-400-03.5-C | T6-400-03.5-A | T6-400-03.5-DLC |
| 1/8" | 3/16" | 3/16" | 2-1/2" | T6-400-04 | T6-400-04-T | T6-400-04-C | T6-400-04-A | T6-400-04-DLC |
| 9/64" | 3/16" | 7/32" | 2-1/2" | T6-400-04.5 | T6-400-04.5-T | T6-400-04.5-C | T6-400-04.5-A | T6-400-04.5-DLC |
| 5/32" | 3/16" | 9/32" | 2-1/2" | T6-400-05 | T6-400-05-T | T6-400-05-C | T6-400-05-A | T6-400-05-DLC |
| 11/64" | 3/16" | 9/32" | 2-1/2" | T6-400-05.5 | T6-400-05.5-T | T6-400-05.5-C | T6-400-05.5-A | T6-400-05.5-DLC |
| 3/16" | 3/16" | 3/8" | 2" | T6-400-06* | T6-400-06-T* | T6-400-06-C* | T6-400-06-A* | T6-400-06-DLC* |

*Single End only to allow plus/minus tolerance



T6-402 4 Flute Tuffly Grade Standard Length



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|------------------------|
| 1/16" | 3/16" | 3/16" | 2-1/2" | T6-402-02 | T6-402-02-T | T6-402-02-C | T6-402-02-A | T6-402-02-DLC |
| 5/64" | 3/16" | 5/16" | 2-1/2" | T6-402-02.5 | T6-402-02.5-T | T6-402-02.5-C | T6-402-02.5-A | T6-402-02.5-DLC |
| 3/32" | 3/16" | 3/8" | 2-1/2" | T6-402-03 | T6-402-03-T | T6-402-03-C | T6-402-03-A | T6-402-03-DLC |
| 7/64" | 3/16" | 3/8" | 2-1/2" | T6-402-03.5 | T6-402-03.5-T | T6-402-03.5-C | T6-402-03.5-A | T6-402-03.5-DLC |
| 1/8" | 3/16" | 3/8" | 2-1/2" | T6-402-04 | T6-402-04-T | T6-402-04-C | T6-402-04-A | T6-402-04-DLC |
| 9/64" | 3/16" | 7/16" | 2-1/2" | T6-402-04.5 | T6-402-04.5-T | T6-402-04.5-C | T6-402-04.5-A | T6-402-04.5-DLC |
| 5/32" | 3/16" | 7/16" | 2-1/2" | T6-402-05 | T6-402-05-T | T6-402-05-C | T6-402-05-A | T6-402-05-DLC |
| 11/64" | 3/16" | 7/16" | 2-1/2" | T6-402-05.5 | T6-402-05.5-T | T6-402-05.5-C | T6-402-05.5-A | T6-402-05.5-DLC |
| 3/16" | 3/16" | 1/2" | 2" | T6-402-06* | T6-402-06-T* | T6-402-06-C* | T6-402-06-A* | T6-402-06-DLC* |

*Single End only to allow plus/minus tolerance

2 Flute Tuffy Grade Carbide End Mills T12



Characteristics



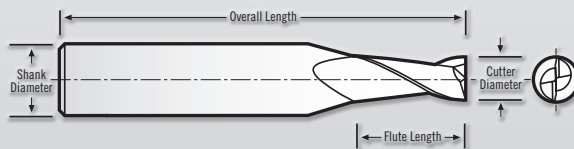
Applications



Materials



Coatings



T12 Series Tolerances

Cutting Dia. = +.001/- .000"

Shank Dia. = -.0001/- .0002"

Flute Length (1/8" to 5/16") = +.030/- .000"
(21/64" to 3/4") = +.060/- .000"

OAL = ±.060"

T12 Series
Comes in
64th
Sizes

All Sizes
Smaller than 3/8" on
3/8"
Shanks
for Strength



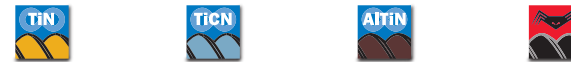
T12-201 2 Flute Tuffy Grade Stub Length



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|------------------------|
| 1/8" | 3/8" | 1/4" | 2-1/2" | T12-201-04 | T12-201-04-T | T12-201-04-C | T12-201-04-A | T12-201-04-DLC |
| 5/32" | 3/8" | 1/4" | 2-1/2" | T12-201-05 | T12-201-05-T | T12-201-05-C | T12-201-05-A | T12-201-05-DLC |
| 3/16" | 3/8" | 5/16" | 2-1/2" | T12-201-06 | T12-201-06-T | T12-201-06-C | T12-201-06-A | T12-201-06-DLC |
| 7/32" | 3/8" | 5/16" | 2-1/2" | T12-201-07 | T12-201-07-T | T12-201-07-C | T12-201-07-A | T12-201-07-DLC |
| 1/4" | 3/8" | 5/16" | 2-1/2" | T12-201-08 | T12-201-08-T | T12-201-08-C | T12-201-08-A | T12-201-08-DLC |
| 9/32" | 3/8" | 7/16" | 2-1/2" | T12-201-09 | T12-201-09-T | T12-201-09-C | T12-201-09-A | T12-201-09-DLC |
| 5/16" | 3/8" | 7/16" | 2-1/2" | T12-201-10 | T12-201-10-T | T12-201-10-C | T12-201-10-A | T12-201-10-DLC |
| 3/8" | 3/8" | 1/2" | 2-1/2" | T12-201-12 | T12-201-12-T | T12-201-12-C | T12-201-12-A | T12-201-12-DLC |
| 7/16" | 1/2" | 5/8" | 3" | T12-201-14 | T12-201-14-T | T12-201-14-C | T12-201-14-A | T12-201-14-DLC |
| 1/2" | 1/2" | 5/8" | 3" | T12-201-16 | T12-201-16-T | T12-201-16-C | T12-201-16-A | T12-201-16-DLC |
| 5/8" | 5/8" | 7/8" | 3-1/4" | T12-201-20 | T12-201-20-T | T12-201-20-C | T12-201-20-A | T12-201-20-DLC |
| 3/4" | 3/4" | 1" | 3-1/2" | T12-201-24 | T12-201-24-T | T12-201-24-C | T12-201-24-A | T12-201-24-DLC |



T12-203 2 Flute Tuffy Grade Standard Length



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|------------------------|
| 1/8" | 3/8" | 1/2" | 2-1/2" | T12-203-04 | T12-203-04-T | T12-203-04-C | T12-203-04-A | T12-203-04-DLC |
| 9/64" | 3/8" | 1/2" | 2-1/2" | T12-203-04.5 | T12-203-04.5-T | T12-203-04.5-C | T12-203-04.5-A | T12-203-04.5-DLC |
| 5/32" | 3/8" | 9/16" | 2-1/2" | T12-203-05 | T12-203-05-T | T12-203-05-C | T12-203-05-A | T12-203-05-DLC |
| 11/64" | 3/8" | 9/16" | 2-1/2" | T12-203-05.5 | T12-203-05.5-T | T12-203-05.5-C | T12-203-05.5-A | T12-203-05.5-DLC |
| 3/16" | 3/8" | 5/8" | 2-1/2" | T12-203-06 | T12-203-06-T | T12-203-06-C | T12-203-06-A | T12-203-06-DLC |
| 13/64" | 3/8" | 5/8" | 2-1/2" | T12-203-06.5 | T12-203-06.5-T | T12-203-06.5-C | T12-203-06.5-A | T12-203-06.5-DLC |
| 7/32" | 3/8" | 5/8" | 2-1/2" | T12-203-07 | T12-203-07-T | T12-203-07-C | T12-203-07-A | T12-203-07-DLC |
| 15/64" | 3/8" | 5/8" | 2-1/2" | T12-203-07.5 | T12-203-07.5-T | T12-203-07.5-C | T12-203-07.5-A | T12-203-07.5-DLC |
| 1/4" | 3/8" | 3/4" | 2-1/2" | T12-203-08 | T12-203-08-T | T12-203-08-C | T12-203-08-A | T12-203-08-DLC |
| 17/64" | 3/8" | 3/4" | 2-1/2" | T12-203-08.5 | T12-203-08.5-T | T12-203-08.5-C | T12-203-08.5-A | T12-203-08.5-DLC |
| 9/32" | 3/8" | 3/4" | 2-1/2" | T12-203-09 | T12-203-09-T | T12-203-09-C | T12-203-09-A | T12-203-09-DLC |
| 19/64" | 3/8" | 3/4" | 2-1/2" | T12-203-09.5 | T12-203-09.5-T | T12-203-09.5-C | T12-203-09.5-A | T12-203-09.5-DLC |
| 5/16" | 3/8" | 13/16" | 2-1/2" | T12-203-10 | T12-203-10-T | T12-203-10-C | T12-203-10-A | T12-203-10-DLC |
| 21/64" | 3/8" | 13/16" | 2-1/2" | T12-203-10.5 | T12-203-10.5-T | T12-203-10.5-C | T12-203-10.5-A | T12-203-10.5-DLC |
| 11/32" | 3/8" | 13/16" | 2-1/2" | T12-203-11 | T12-203-11-T | T12-203-11-C | T12-203-11-A | T12-203-11-DLC |
| 23/64" | 3/8" | 13/16" | 2-1/2" | T12-203-11.5 | T12-203-11.5-T | T12-203-11.5-C | T12-203-11.5-A | T12-203-11.5-DLC |
| 3/8" | 3/8" | 7/8" | 2-1/2" | T12-203-12 | T12-203-12-T | T12-203-12-C | T12-203-12-A | T12-203-12-DLC |
| 13/32" | 1/2" | 1" | 3" | T12-203-13 | T12-203-13-T | T12-203-13-C | T12-203-13-A | T12-203-13-DLC |
| 7/16" | 1/2" | 1" | 3" | T12-203-14 | T12-203-14-T | T12-203-14-C | T12-203-14-A | T12-203-14-DLC |
| 15/32" | 1/2" | 1" | 3" | T12-203-15 | T12-203-15-T | T12-203-15-C | T12-203-15-A | T12-203-15-DLC |
| 1/2" | 1/2" | 1" | 3" | T12-203-16 | T12-203-16-T | T12-203-16-C | T12-203-16-A | T12-203-16-DLC |

Multiple Applications

T12 4 Flute Tuffy Grade Carbide End Mills



Characteristics



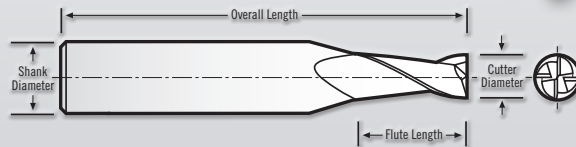
Applications



Materials



Coatings



T12 Series Tolerances

Cutting Dia. = $\pm .001/- .000$ "
 Shank Dia. = $-.0001/- .0002$ "
 Flute Length (1/8" to 5/16") = $+.030/- .000$ "
 (21/64" to 3/4") = $+.060/- .000$ "
 OAL = $\pm .060$ "

T12 Series Comes in **64th** Sizes

All Sizes Smaller than 3/8" on **3/8" Shanks** for Strength

Need **WITHOUT Flats?**
 Order any tool without flats by adding "NF" to the end of the tool number.



T12-403 4 Flute Tuffy Grade Stub Length



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|------------------------|
| 1/8" | 3/8" | 1/4" | 2-1/2" | T12-403-04 | T12-403-04-T | T12-403-04-C | T12-403-04-A | T12-403-04-DLC |
| 5/32" | 3/8" | 1/4" | 2-1/2" | T12-403-05 | T12-403-05-T | T12-403-05-C | T12-403-05-A | T12-403-05-DLC |
| 3/16" | 3/8" | 5/16" | 2-1/2" | T12-403-06 | T12-403-06-T | T12-403-06-C | T12-403-06-A | T12-403-06-DLC |
| 7/32" | 3/8" | 5/16" | 2-1/2" | T12-403-07 | T12-403-07-T | T12-403-07-C | T12-403-07-A | T12-403-07-DLC |
| 1/4" | 3/8" | 5/16" | 2-1/2" | T12-403-08 | T12-403-08-T | T12-403-08-C | T12-403-08-A | T12-403-08-DLC |
| 9/32" | 3/8" | 7/16" | 2-1/2" | T12-403-09 | T12-403-09-T | T12-403-09-C | T12-403-09-A | T12-403-09-DLC |
| 5/16" | 3/8" | 7/16" | 2-1/2" | T12-403-10 | T12-403-10-T | T12-403-10-C | T12-403-10-A | T12-403-10-DLC |
| 3/8" | 3/8" | 1/2" | 2-1/2" | T12-403-12 | T12-403-12-T | T12-403-12-C | T12-403-12-A | T12-403-12-DLC |
| 7/16" | 1/2" | 5/8" | 3" | T12-403-14 | T12-403-14-T | T12-403-14-C | T12-403-14-A | T12-403-14-DLC |
| 1/2" | 1/2" | 5/8" | 3" | T12-403-16 | T12-403-16-T | T12-403-16-C | T12-403-16-A | T12-403-16-DLC |
| 5/8" | 5/8" | 7/8" | 3-1/2" | T12-403-20 | T12-403-20-T | T12-403-20-C | T12-403-20-A | T12-403-20-DLC |
| 3/4" | 3/4" | 1" | 3-1/2" | T12-403-24 | T12-403-24-T | T12-403-24-C | T12-403-24-A | T12-403-24-DLC |

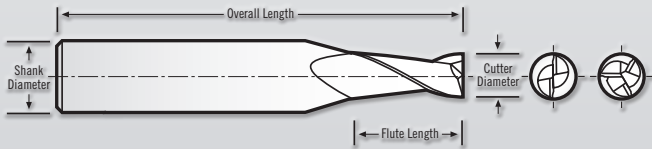


T12-405 4 Flute Tuffy Grade Standard Length



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|------------------------|
| 1/8" | 3/8" | 1/2" | 2-1/2" | T12-405-04 | T12-405-04-T | T12-405-04-C | T12-405-04-A | T12-405-04-DLC |
| 9/64" | 3/8" | 1/2" | 2-1/2" | T12-405-04.5 | T12-405-04.5-T | T12-405-04.5-C | T12-405-04.5-A | T12-405-04.5-DLC |
| 5/32" | 3/8" | 9/16" | 2-1/2" | T12-405-05 | T12-405-05-T | T12-405-05-C | T12-405-05-A | T12-405-05-DLC |
| 11/64" | 3/8" | 9/16" | 2-1/2" | T12-405-05.5 | T12-405-05.5-T | T12-405-05.5-C | T12-405-05.5-A | T12-405-05.5-DLC |
| 3/16" | 3/8" | 5/8" | 2-1/2" | T12-405-06 | T12-405-06-T | T12-405-06-C | T12-405-06-A | T12-405-06-DLC |
| 13/64" | 3/8" | 5/8" | 2-1/2" | T12-405-06.5 | T12-405-06.5-T | T12-405-06.5-C | T12-405-06.5-A | T12-405-06.5-DLC |
| 7/32" | 3/8" | 5/8" | 2-1/2" | T12-405-07 | T12-405-07-T | T12-405-07-C | T12-405-07-A | T12-405-07-DLC |
| 15/64" | 3/8" | 5/8" | 2-1/2" | T12-405-07.5 | T12-405-07.5-T | T12-405-07.5-C | T12-405-07.5-A | T12-405-07.5-DLC |
| 1/4" | 3/8" | 3/4" | 2-1/2" | T12-405-08 | T12-405-08-T | T12-405-08-C | T12-405-08-A | T12-405-08-DLC |
| 17/64" | 3/8" | 3/4" | 2-1/2" | T12-405-08.5 | T12-405-08.5-T | T12-405-08.5-C | T12-405-08.5-A | T12-405-08.5-DLC |
| 9/32" | 3/8" | 3/4" | 2-1/2" | T12-405-09 | T12-405-09-T | T12-405-09-C | T12-405-09-A | T12-405-09-DLC |
| 19/64" | 3/8" | 3/4" | 2-1/2" | T12-405-09.5 | T12-405-09.5-T | T12-405-09.5-C | T12-405-09.5-A | T12-405-09.5-DLC |
| 5/16" | 3/8" | 13/16" | 2-1/2" | T12-405-10 | T12-405-10-T | T12-405-10-C | T12-405-10-A | T12-405-10-DLC |
| 21/64" | 3/8" | 13/16" | 2-1/2" | T12-405-10.5 | T12-405-10.5-T | T12-405-10.5-C | T12-405-10.5-A | T12-405-10.5-DLC |
| 11/32" | 3/8" | 13/16" | 2-1/2" | T12-405-11 | T12-405-11-T | T12-405-11-C | T12-405-11-A | T12-405-11-DLC |
| 23/64" | 3/8" | 13/16" | 2-1/2" | T12-405-11.5 | T12-405-11.5-T | T12-405-11.5-C | T12-405-11.5-A | T12-405-11.5-DLC |
| 3/8" | 3/8" | 7/8" | 2-1/2" | T12-405-12 | T12-405-12-T | T12-405-12-C | T12-405-12-A | T12-405-12-DLC |
| 13/32" | 1/2" | 1" | 3" | T12-405-13 | T12-405-13-T | T12-405-13-C | T12-405-13-A | T12-405-13-DLC |
| 7/16" | 1/2" | 1" | 3" | T12-405-14 | T12-405-14-T | T12-405-14-C | T12-405-14-A | T12-405-14-DLC |
| 15/32" | 1/2" | 1" | 3" | T12-405-15 | T12-405-15-T | T12-405-15-C | T12-405-15-A | T12-405-15-DLC |
| 1/2" | 1/2" | 1" | 3" | T12-405-16 | T12-405-16-T | T12-405-16-C | T12-405-16-A | T12-405-16-DLC |

C-2 Grade Carbide End Mills C8



C8 Series Tolerances
 Cutting Dia. = $+0.000/-0.002$ "
 Shank Dia. = $-0.0001/-0.0002$ "
 Flute Length = $+0.030/-0.000$ "
 OAL = ± 0.060 "

**All Sizes on
1/4"
Shanks
for Strength**



C8-201 2 Flute C-2 Grade Stub Length

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|
| 1/16" | 1/4" | 1/8" | 2" | C8-201-02 | C8-201-02-DLC |
| 1/8" | 1/4" | 1/4" | 2" | C8-201-04 | C8-201-04-DLC |
| 3/16" | 1/4" | 3/8" | 2" | C8-201-06 | C8-201-06-DLC |
| 1/4" | 1/4" | 1/2" | 2" | C8-201-08 | C8-201-08-DLC |



C8-203 2 Flute C-2 Grade Standard Length

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|
| 1/16" | 1/4" | 1/4" | 2-1/2" | C8-203-02 | C8-203-02-DLC |
| 1/8" | 1/4" | 1/2" | 2-1/2" | C8-203-04 | C8-203-04-DLC |
| 3/16" | 1/4" | 5/8" | 2-1/2" | C8-203-06 | C8-203-06-DLC |
| 1/4" | 1/4" | 3/4" | 2-1/2" | C8-203-08 | C8-203-08-DLC |



C8-301 3 Flute C-2 Grade Stub Length

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|
| 1/8" | 1/4" | 1/4" | 2" | C8-301-04 | C8-301-04-DLC |
| 3/16" | 1/4" | 3/8" | 2" | C8-301-06 | C8-301-06-DLC |
| 1/4" | 1/4" | 1/2" | 2" | C8-301-08 | C8-301-08-DLC |

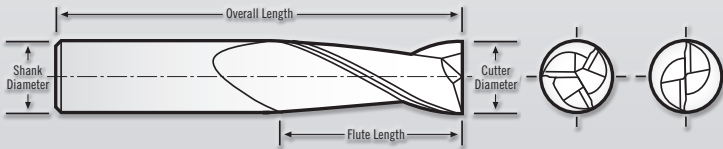
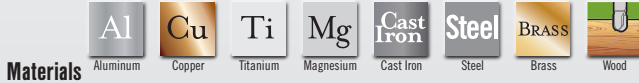
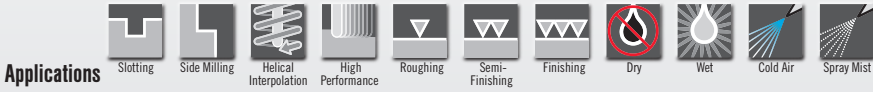


C8-303 3 Flute C-2 Grade Standard Length

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|
| 1/8" | 1/4" | 1/2" | 2-1/2" | C8-303-04 | C8-303-04-DLC |
| 3/16" | 1/4" | 5/8" | 2-1/2" | C8-303-06 | C8-303-06-DLC |
| 1/4" | 1/4" | 3/4" | 2-1/2" | C8-303-08 | C8-303-08-DLC |

Multiple Applications

TS 2 & 3 Flute Tuffy Grade Carbide End Mills

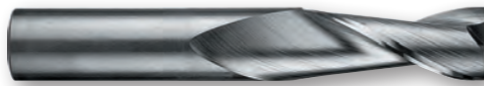


TS Tolerances

Cutting Dia. (1/16" to 1/4") = +.000/-.002"
 (5/16" to 3/4") = +.000/-.003"
 Shank Dia. = -.0001/-.0002"
 Flute Length (1/16" to 5/16") = +.030/- .000"
 (3/8" to 3/4") = +.060/- .000"
 OAL = ±.060"

MTS Tolerances

Cutting Dia. = +.000/- .075mm
 Shank Dia. = -.002/- .005mm
 Flute Length = +0.500/+1.500mm
 OAL = ±1.000mm



TS-201 2 Flute Tuffy Grade Stub Length

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|------------------------|
| 1/16" | 1/8" | 1/8" | 1-1/2" | TS-201-02 | TS-201-02-T | TS-201-02-C | TS-201-02-A | TS-201-02-DLC |
| 3/32" | 1/8" | 3/16" | 1-1/2" | TS-201-03 | TS-201-03-T | TS-201-03-C | TS-201-03-A | TS-201-03-DLC |
| 1/8" | 1/8" | 1/4" | 1-1/2" | TS-201-04 | TS-201-04-T | TS-201-04-C | TS-201-04-A | TS-201-04-DLC |
| 3/16" | 3/16" | 3/8" | 2" | TS-201-06 | TS-201-06-T | TS-201-06-C | TS-201-06-A | TS-201-06-DLC |
| 1/4" | 1/4" | 1/2" | 2" | TS-201-08 | TS-201-08-T | TS-201-08-C | TS-201-08-A | TS-201-08-DLC |
| 5/16" | 5/16" | 1/2" | 2-1/2" | TS-201-10 | TS-201-10-T | TS-201-10-C | TS-201-10-A | TS-201-10-DLC |
| 3/8" | 3/8" | 5/8" | 2-1/2" | TS-201-12 | TS-201-12-T | TS-201-12-C | TS-201-12-A | TS-201-12-DLC |
| 7/16" | 7/16" | 5/8" | 2-3/4" | TS-201-14 | TS-201-14-T | TS-201-14-C | TS-201-14-A | TS-201-14-DLC |
| 1/2" | 1/2" | 5/8" | 3" | TS-201-16 | TS-201-16-T | TS-201-16-C | TS-201-16-A | TS-201-16-DLC |
| 5/8" | 5/8" | 7/8" | 3-1/2" | TS-201-20 | TS-201-20-T | TS-201-20-C | TS-201-20-A | TS-201-20-DLC |
| 3/4" | 3/4" | 1" | 4" | TS-201-24 | TS-201-24-T | TS-201-24-C | TS-201-24-A | TS-201-24-DLC |



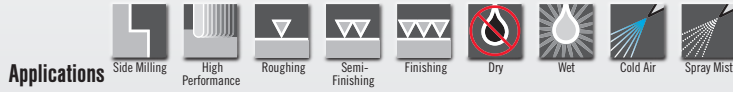
TS-301 3 Flute Tuffy Grade Stub Length

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|------------------------|
| 1/16" | 1/8" | 1/8" | 1-1/2" | TS-301-02 | TS-301-02-T | TS-301-02-C | TS-301-02-A | TS-301-02-DLC |
| 3/32" | 1/8" | 3/16" | 1-1/2" | TS-301-03 | TS-301-03-T | TS-301-03-C | TS-301-03-A | TS-301-03-DLC |
| 1/8" | 1/8" | 1/4" | 1-1/2" | TS-301-04 | TS-301-04-T | TS-301-04-C | TS-301-04-A | TS-301-04-DLC |
| 3/16" | 3/16" | 3/8" | 2" | TS-301-06 | TS-301-06-T | TS-301-06-C | TS-301-06-A | TS-301-06-DLC |
| 1/4" | 1/4" | 1/2" | 2" | TS-301-08 | TS-301-08-T | TS-301-08-C | TS-301-08-A | TS-301-08-DLC |
| 5/16" | 5/16" | 1/2" | 2-1/2" | TS-301-10 | TS-301-10-T | TS-301-10-C | TS-301-10-A | TS-301-10-DLC |
| 3/8" | 3/8" | 5/8" | 2-1/2" | TS-301-12 | TS-301-12-T | TS-301-12-C | TS-301-12-A | TS-301-12-DLC |
| 7/16" | 7/16" | 5/8" | 2-3/4" | TS-301-14 | TS-301-14-T | TS-301-14-C | TS-301-14-A | TS-301-14-DLC |
| 1/2" | 1/2" | 5/8" | 3" | TS-301-16 | TS-301-16-T | TS-301-16-C | TS-301-16-A | TS-301-16-DLC |

4 Flute Tuffy Grade Carbide End Mills TS/MTS



Characteristics



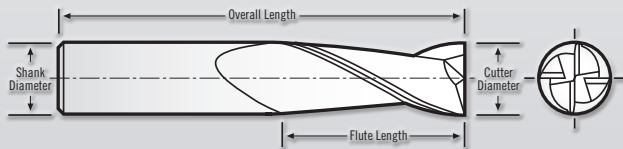
Applications



Materials



Coatings



TS Tolerances

Cutting Dia. (1/16" to 1/4") = +.000/-0.002"
 (5/16" to 3/4") = +.000/-0.003"
 Shank Dia. = -.0001/-0.0002"
 Flute Length (1/16" to 5/16") = +.030/-0.000"
 (3/8" to 3/4") = +.060/-0.000"
 OAL = ±.060"

MTS Tolerances

Cutting Dia. = +.000/-0.075mm
 Shank Dia. = -.002/-0.005mm
 Flute Length = +0.500/+1.500mm
 OAL = ±1.000mm



TS-401 4 Flute Tuffy Grade Stub Length

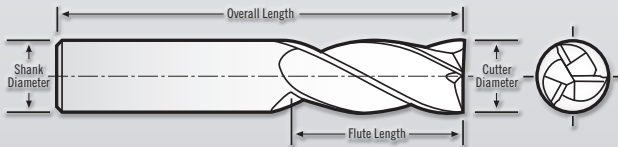
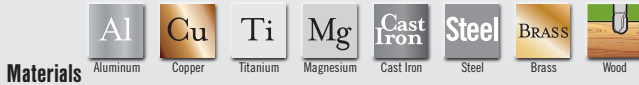
| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Coatings | | | |
|------------------|----------------|--------------|----------------|----------------------|-------------|-------------|--------------|---------------|
| | | | | | TiN Coated | TiCN Coated | AlTiN Coated | DLC Coated |
| 1/16" | 1/8" | 1/8" | 1-1/2" | TS-401-02 | TS-401-02-T | TS-401-02-C | TS-401-02-A | TS-401-02-DLC |
| 3/32" | 1/8" | 3/16" | 1-1/2" | TS-401-03 | TS-401-03-T | TS-401-03-C | TS-401-03-A | TS-401-03-DLC |
| 1/8" | 1/8" | 1/4" | 1-1/2" | TS-401-04 | TS-401-04-T | TS-401-04-C | TS-401-04-A | TS-401-04-DLC |
| 3/16" | 3/16" | 3/8" | 2" | TS-401-06 | TS-401-06-T | TS-401-06-C | TS-401-06-A | TS-401-06-DLC |
| 1/4" | 1/4" | 1/2" | 2" | TS-401-08 | TS-401-08-T | TS-401-08-C | TS-401-08-A | TS-401-08-DLC |
| 5/16" | 5/16" | 1/2" | 2-1/2" | TS-401-10 | TS-401-10-T | TS-401-10-C | TS-401-10-A | TS-401-10-DLC |
| 3/8" | 3/8" | 5/8" | 2-1/2" | TS-401-12 | TS-401-12-T | TS-401-12-C | TS-401-12-A | TS-401-12-DLC |
| 7/16" | 7/16" | 5/8" | 2-3/4" | TS-401-14 | TS-401-14-T | TS-401-14-C | TS-401-14-A | TS-401-14-DLC |
| 1/2" | 1/2" | 5/8" | 3" | TS-401-16 | TS-401-16-T | TS-401-16-C | TS-401-16-A | TS-401-16-DLC |
| 5/8" | 5/8" | 7/8" | 3-1/2" | TS-401-20 | TS-401-20-T | TS-401-20-C | TS-401-20-A | TS-401-20-DLC |
| 3/4" | 3/4" | 1" | 4" | TS-401-24 | TS-401-24-T | TS-401-24-C | TS-401-24-A | TS-401-24-DLC |



MTS-401 Metric 4 Flute Tuffy Grade Stub Length **METRIC**

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Coatings | | | |
|------------------|----------------|--------------|----------------|----------------------|--------------|--------------|--------------|----------------|
| | | | | | TiN Coated | TiCN Coated | AlTiN Coated | DLC Coated |
| 2mm | 3mm | 5mm | 38mm | MTS-401-02 | MTS-401-02-T | MTS-401-02-C | MTS-401-02-A | MTS-401-02-DLC |
| 3mm | 3mm | 6mm | 38mm | MTS-401-03 | MTS-401-03-T | MTS-401-03-C | MTS-401-03-A | MTS-401-03-DLC |
| 4mm | 4mm | 8mm | 50mm | MTS-401-04 | MTS-401-04-T | MTS-401-04-C | MTS-401-04-A | MTS-401-04-DLC |
| 5mm | 5mm | 8mm | 50mm | MTS-401-05 | MTS-401-05-T | MTS-401-05-C | MTS-401-05-A | MTS-401-05-DLC |
| 6mm | 6mm | 8mm | 50mm | MTS-401-06 | MTS-401-06-T | MTS-401-06-C | MTS-401-06-A | MTS-401-06-DLC |
| 8mm | 8mm | 12mm | 58mm | MTS-401-08 | MTS-401-08-T | MTS-401-08-C | MTS-401-08-A | MTS-401-08-DLC |
| 10mm | 10mm | 14mm | 66mm | MTS-401-10 | MTS-401-10-T | MTS-401-10-C | MTS-401-10-A | MTS-401-10-DLC |
| 12mm | 12mm | 16mm | 73mm | MTS-401-12 | MTS-401-12-T | MTS-401-12-C | MTS-401-12-A | MTS-401-12-DLC |
| 16mm | 16mm | 20mm | 82mm | MTS-401-16 | MTS-401-16-T | MTS-401-16-C | MTS-401-16-A | MTS-401-16-DLC |
| 20mm | 20mm | 25mm | 92mm | MTS-401-20 | MTS-401-20-T | MTS-401-20-C | MTS-401-20-A | MTS-401-20-DLC |

TR 3 Flute Tuffy Grade Carbide End Mills



TR-303 Tolerances

Cutting Dia. = $+0.001/-0.000$ "
 Shank Dia. = $-0.001/-0.002$ "
 Flute Length (1/8" to 5/16") = $+0.030/-0.000$ "
 (3/8" to 3/4") = $+0.060/-0.000$ "
 OAL = ± 0.060 "



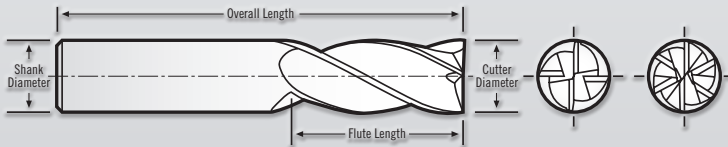
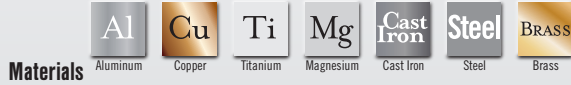
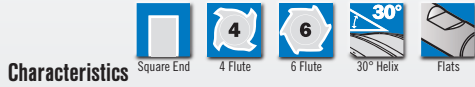
TR-303 3 Flute Tuffy Grade Standard Length

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|------------------------|
| 1/8" | 1/8" | 1/2" | 1-1/2" | TR-303-04* | TR-303-04-T* | TR-303-04-C* | TR-303-04-A* | TR-303-04-DLC* |
| 5/32" | 3/16" | 9/16" | 2" | TR-303-05* | TR-303-05-T* | TR-303-05-C* | TR-303-05-A* | TR-303-05-DLC* |
| 3/16" | 3/16" | 5/8" | 2" | TR-303-06* | TR-303-06-T* | TR-303-06-C* | TR-303-06-A* | TR-303-06-DLC* |
| 7/32" | 1/4" | 5/8" | 2-1/2" | TR-303-07* | TR-303-07-T* | TR-303-07-C* | TR-303-07-A* | TR-303-07-DLC* |
| 1/4" | 1/4" | 3/4" | 2-1/2" | TR-303-08* | TR-303-08-T* | TR-303-08-C* | TR-303-08-A* | TR-303-08-DLC* |
| 9/32" | 5/16" | 3/4" | 2-1/2" | TR-303-09* | TR-303-09-T* | TR-303-09-C* | TR-303-09-A* | TR-303-09-DLC* |
| 5/16" | 5/16" | 13/16" | 2-1/2" | TR-303-10* | TR-303-10-T* | TR-303-10-C* | TR-303-10-A* | TR-303-10-DLC* |
| 3/8" | 3/8" | 7/8" | 2-1/2" | TR-303-12 | TR-303-12-T | TR-303-12-C | TR-303-12-A | TR-303-12-DLC |
| 7/16" | 7/16" | 1" | 2-3/4" | TR-303-14* | TR-303-14-T* | TR-303-14-C* | TR-303-14-A* | TR-303-14-DLC* |
| 1/2" | 1/2" | 1" | 3" | TR-303-16 | TR-303-16-T | TR-303-16-C | TR-303-16-A | TR-303-16-DLC |
| 9/16" | 9/16" | 1-1/4" | 3-1/2" | TR-303-18* | TR-303-18-T* | TR-303-18-C* | TR-303-18-A* | TR-303-18-DLC* |
| 5/8" | 5/8" | 1-1/4" | 3-1/2" | TR-303-20 | TR-303-20-T | TR-303-20-C | TR-303-20-A | TR-303-20-DLC |
| 3/4" | 3/4" | 1-1/2" | 4" | TR-303-24 | TR-303-24-T | TR-303-24-C | TR-303-24-A | TR-303-24-DLC |

*Does not come with flats.



4/6 Flute Tuffy Grade Carbide End Mills **TR**



TR-404 Tolerances
 Cutting Dia. = $+0.001/-0.000$ "
 Shank Dia. = $-0.001/-0.002$ "
 Flute Length (1/8" to 5/16") = $+0.030/-0.000$ "
 (3/8" to 3/4") = $+0.060/-0.000$ "
 OAL = ± 0.060 "

TR-606 Tolerances
 Cutting Dia. = $+0.001/-0.000$ "
 Shank Dia. = $-0.001/-0.002$ "
 Flute Length = $+0.060/-0.000$ "
 OAL = ± 0.060 "



TR-404 4 Flute Tuffy Grade Standard Length

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|------------------------|
| 1/8" | 1/8" | 1/2" | 1-1/2" | TR-404-04* | TR-404-04-T* | TR-404-04-C* | TR-404-04-A* | TR-404-04-DLC* |
| 5/32" | 3/16" | 9/16" | 2" | TR-404-05* | TR-404-05-T* | TR-404-05-C* | TR-404-05-A* | TR-404-05-DLC* |
| 3/16" | 3/16" | 5/8" | 2" | TR-404-06* | TR-404-06-T* | TR-404-06-C* | TR-404-06-A* | TR-404-06-DLC* |
| 7/32" | 1/4" | 5/8" | 2-1/2" | TR-404-07* | TR-404-07-T* | TR-404-07-C* | TR-404-07-A* | TR-404-07-DLC* |
| 1/4" | 1/4" | 3/4" | 2-1/2" | TR-404-08* | TR-404-08-T* | TR-404-08-C* | TR-404-08-A* | TR-404-08-DLC* |
| 9/32" | 5/16" | 3/4" | 2-1/2" | TR-404-09* | TR-404-09-T* | TR-404-09-C* | TR-404-09-A* | TR-404-09-DLC* |
| 5/16" | 5/16" | 13/16" | 2-1/2" | TR-404-10* | TR-404-10-T* | TR-404-10-C* | TR-404-10-A* | TR-404-10-DLC* |
| 3/8" | 3/8" | 7/8" | 2-1/2" | TR-404-12 | TR-404-12-T | TR-404-12-C | TR-404-12-A | TR-404-12-DLC |
| 7/16" | 7/16" | 1" | 2-3/4" | TR-404-14* | TR-404-14-T* | TR-404-14-C* | TR-404-14-A* | TR-404-14-DLC* |
| 1/2" | 1/2" | 1" | 3" | TR-404-16 | TR-404-16-T | TR-404-16-C | TR-404-16-A | TR-404-16-DLC |
| 9/16" | 9/16" | 1-1/4" | 3-1/2" | TR-404-18* | TR-404-18-T* | TR-404-18-C* | TR-404-18-A* | TR-404-18-DLC* |
| 5/8" | 5/8" | 1-1/4" | 3-1/2" | TR-404-20 | TR-404-20-T | TR-404-20-C | TR-404-20-A | TR-404-20-DLC |
| 3/4" | 3/4" | 1-1/2" | 4" | TR-404-24 | TR-404-24-T | TR-404-24-C | TR-404-24-A | TR-404-24-DLC |

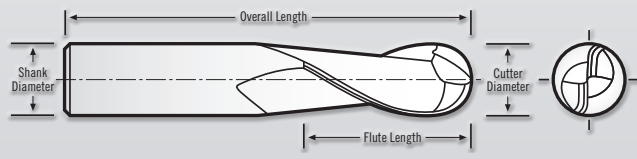
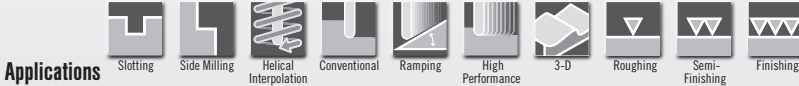
*Does not come with flats.



TR-606 6 Flute Tuffy Grade Standard Length

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|------------------------|
| 1" | 1" | 2-1/2" | 5" | TR-606-32 | TR-606-32-T | TR-606-32-C | TR-606-32-A | TR-606-32-DLC |

SB/MSB 2 Flute Tuffy Grade Carbide Ball End Mills



SB Series Tolerances
 Cutting Dia. (1/16" to 1/4") = +.000/- .002"
 (9/32" to 3/4") = +.000/- .003"
 Shank Dia. = -.0001/- .0002"
 Flute Length (1/16" to 5/16") = +.030/- .000"
 (3/8" to 3/4") = +.060/- .000"
 OAL = ±.060"

MSB Tolerances
 Cutting Dia. = +.000/- .075mm
 Shank Dia. = -.002/- .005mm
 Flute Length = +0.500/+1.500mm
 OAL = ±1.000mm

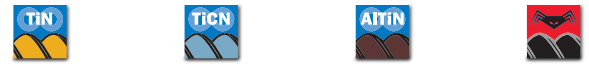


SB-201 2 Flute Tuffy Ball End Stub Length

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|------------------------|
| 1/16" | 1/8" | 1/8" | 1-1/2" | SB-201-02 | SB-201-02-T | SB-201-02-C | SB-201-02-A | SB-201-02-DLC |
| 3/32" | 1/8" | 3/16" | 1-1/2" | SB-201-03 | SB-201-03-T | SB-201-03-C | SB-201-03-A | SB-201-03-DLC |
| 1/8" | 1/8" | 1/4" | 1-1/2" | SB-201-04 | SB-201-04-T | SB-201-04-C | SB-201-04-A | SB-201-04-DLC |
| 5/32" | 3/16" | 1/4" | 2" | SB-201-05 | SB-201-05-T | SB-201-05-C | SB-201-05-A | SB-201-05-DLC |
| 3/16" | 3/16" | 5/16" | 2" | SB-201-06 | SB-201-06-T | SB-201-06-C | SB-201-06-A | SB-201-06-DLC |
| 7/32" | 1/4" | 5/16" | 2-1/2" | SB-201-07 | SB-201-07-T | SB-201-07-C | SB-201-07-A | SB-201-07-DLC |
| 1/4" | 1/4" | 5/16" | 2-1/2" | SB-201-08 | SB-201-08-T | SB-201-08-C | SB-201-08-A | SB-201-08-DLC |
| 9/32" | 5/16" | 7/16" | 2-1/2" | SB-201-09 | SB-201-09-T | SB-201-09-C | SB-201-09-A | SB-201-09-DLC |
| 5/16" | 5/16" | 7/16" | 2-1/2" | SB-201-10 | SB-201-10-T | SB-201-10-C | SB-201-10-A | SB-201-10-DLC |
| 3/8" | 3/8" | 1/2" | 2-1/2" | SB-201-12 | SB-201-12-T | SB-201-12-C | SB-201-12-A | SB-201-12-DLC |
| 7/16" | 7/16" | 5/8" | 2-3/4" | SB-201-14 | SB-201-14-T | SB-201-14-C | SB-201-14-A | SB-201-14-DLC |
| 1/2" | 1/2" | 5/8" | 3" | SB-201-16 | SB-201-16-T | SB-201-16-C | SB-201-16-A | SB-201-16-DLC |
| 5/8" | 5/8" | 7/8" | 3-1/2" | SB-201-20 | SB-201-20-T | SB-201-20-C | SB-201-20-A | SB-201-20-DLC |
| 3/4" | 3/4" | 1" | 4" | SB-201-24 | SB-201-24-T | SB-201-24-C | SB-201-24-A | SB-201-24-DLC |



MSB-201 Metric 2 Flute Tuffy Ball End Mill Stub METRIC



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|------------------------|
| 2mm | 3mm | 5mm | 38mm | MSB-201-02 | MSB-201-02-T | MSB-201-02-C | MSB-201-02-A | MSB-201-02-DLC |
| 3mm | 3mm | 6mm | 38mm | MSB-201-03 | MSB-201-03-T | MSB-201-03-C | MSB-201-03-A | MSB-201-03-DLC |
| 4mm | 4mm | 8mm | 50mm | MSB-201-04 | MSB-201-04-T | MSB-201-04-C | MSB-201-04-A | MSB-201-04-DLC |
| 5mm | 5mm | 8mm | 50mm | MSB-201-05 | MSB-201-05-T | MSB-201-05-C | MSB-201-05-A | MSB-201-05-DLC |
| 6mm | 6mm | 8mm | 50mm | MSB-201-06 | MSB-201-06-T | MSB-201-06-C | MSB-201-06-A | MSB-201-06-DLC |
| 8mm | 8mm | 12mm | 58mm | MSB-201-08 | MSB-201-08-T | MSB-201-08-C | MSB-201-08-A | MSB-201-08-DLC |
| 10mm | 10mm | 14mm | 66mm | MSB-201-10 | MSB-201-10-T | MSB-201-10-C | MSB-201-10-A | MSB-201-10-DLC |
| 12mm | 12mm | 16mm | 73mm | MSB-201-12 | MSB-201-12-T | MSB-201-12-C | MSB-201-12-A | MSB-201-12-DLC |
| 16mm | 16mm | 20mm | 82mm | MSB-201-16 | MSB-201-16-T | MSB-201-16-C | MSB-201-16-A | MSB-201-16-DLC |
| 20mm | 20mm | 25mm | 92mm | MSB-201-20 | MSB-201-20-T | MSB-201-20-C | MSB-201-20-A | MSB-201-20-DLC |

Multiple Applications

2 Flute Tuffy Grade Carbide Ball End Mills **B/MB**



B-203 2 Flute Tuffy Ball End Standard Length



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|------------------------|
| 1/16" | 1/8" | 3/16" | 1-1/2" | B-203-02 | B-203-02-T | B-203-02-C | B-203-02-A | B-203-02-DLC |
| 3/32" | 1/8" | 3/8" | 1-1/2" | B-203-03 | B-203-03-T | B-203-03-C | B-203-03-A | B-203-03-DLC |
| 1/8" | 1/8" | 1/2" | 1-1/2" | B-203-04 | B-203-04-T | B-203-04-C | B-203-04-A | B-203-04-DLC |
| 5/32" | 3/16" | 9/16" | 2" | B-203-05 | B-203-05-T | B-203-05-C | B-203-05-A | B-203-05-DLC |
| 3/16" | 3/16" | 5/8" | 2" | B-203-06 | B-203-06-T | B-203-06-C | B-203-06-A | B-203-06-DLC |
| 7/32" | 1/4" | 5/8" | 2-1/2" | B-203-07 | B-203-07-T | B-203-07-C | B-203-07-A | B-203-07-DLC |
| 1/4" | 1/4" | 3/4" | 2-1/2" | B-203-08 | B-203-08-T | B-203-08-C | B-203-08-A | B-203-08-DLC |
| 9/32" | 5/16" | 3/4" | 2-1/2" | B-203-09 | B-203-09-T | B-203-09-C | B-203-09-A | B-203-09-DLC |
| 5/16" | 5/16" | 13/16" | 2-1/2" | B-203-10 | B-203-10-T | B-203-10-C | B-203-10-A | B-203-10-DLC |
| 3/8" | 3/8" | 7/8" | 2-1/2" | B-203-12 | B-203-12-T | B-203-12-C | B-203-12-A | B-203-12-DLC |
| 7/16" | 7/16" | 1" | 2-3/4" | B-203-14 | B-203-14-T | B-203-14-C | B-203-14-A | B-203-14-DLC |
| 1/2" | 1/2" | 1" | 3" | B-203-16 | B-203-16-T | B-203-16-C | B-203-16-A | B-203-16-DLC |
| 5/8" | 5/8" | 1-1/4" | 3-1/2" | B-203-20 | B-203-20-T | B-203-20-C | B-203-20-A | B-203-20-DLC |
| 3/4" | 3/4" | 1-1/2" | 4" | B-203-24 | B-203-24-T | B-203-24-C | B-203-24-A | B-203-24-DLC |

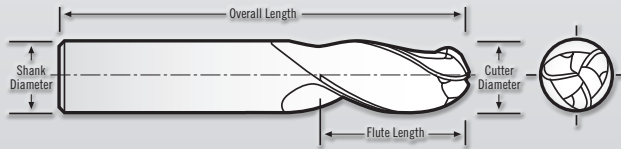
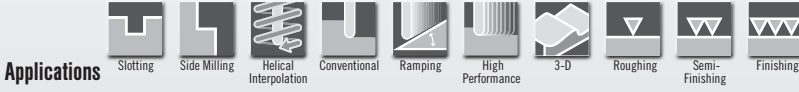


MB-203 Metric 2 Flute Tuffy Ball End Standard Length **METRIC**



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|------------------------|
| 2mm | 3mm | 8mm | 38mm | MB-203-02 | MB-203-02-T | MB-203-02-C | MB-203-02-A | MB-203-02-DLC |
| 3mm | 3mm | 12mm | 38mm | MB-203-03 | MB-203-03-T | MB-203-03-C | MB-203-03-A | MB-203-03-DLC |
| 4mm | 4mm | 12mm | 50mm | MB-203-04 | MB-203-04-T | MB-203-04-C | MB-203-04-A | MB-203-04-DLC |
| 5mm | 5mm | 14mm | 50mm | MB-203-05 | MB-203-05-T | MB-203-05-C | MB-203-05-A | MB-203-05-DLC |
| 6mm | 6mm | 14mm | 57mm | MB-203-06 | MB-203-06-T | MB-203-06-C | MB-203-06-A | MB-203-06-DLC |
| 8mm | 8mm | 16mm | 63mm | MB-203-08 | MB-203-08-T | MB-203-08-C | MB-203-08-A | MB-203-08-DLC |
| 10mm | 10mm | 20mm | 72mm | MB-203-10 | MB-203-10-T | MB-203-10-C | MB-203-10-A | MB-203-10-DLC |
| 12mm | 12mm | 25mm | 83mm | MB-203-12 | MB-203-12-T | MB-203-12-C | MB-203-12-A | MB-203-12-DLC |
| 16mm | 16mm | 32mm | 92mm | MB-203-16 | MB-203-16-T | MB-203-16-C | MB-203-16-A | MB-203-16-DLC |
| 20mm | 20mm | 38mm | 104mm | MB-203-20 | MB-203-20-T | MB-203-20-C | MB-203-20-A | MB-203-20-DLC |

SB/MSB 3 Flute Tuffy Grade Carbide Ball End Mills



SB/B Series Tolerances
 Cutting Dia. (1/16" to 1/4") = +.000/-0.002"
 (9/32" to 3/4") = +.000/-0.003"
 Shank Dia. = -.0001/-0.0002"
 Flute Length (1/16" to 5/16") = +.030/-0.000"
 (3/8" to 1") = +.060/-0.000"
 OAL = ±.060"

MB Tolerances
 Cutting Dia. = +.000/-0.075mm
 Shank Dia. = -.002/-0.005mm
 Flute Length = +0.500/+1.500mm
 OAL = ±1.000mm



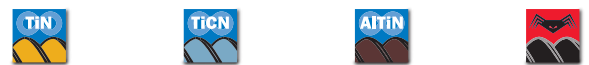
SB-301 3 Flute Tuffy Ball End Stub Length



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|------------------------|
| 1/16" | 1/8" | 1/8" | 1-1/2" | SB-301-02 | SB-301-02-T | SB-301-02-C | SB-301-02-A | SB-301-02-DLC |
| 3/32" | 1/8" | 3/16" | 1-1/2" | SB-301-03 | SB-301-03-T | SB-301-03-C | SB-301-03-A | SB-301-03-DLC |
| 1/8" | 1/8" | 1/4" | 1-1/2" | SB-301-04 | SB-301-04-T | SB-301-04-C | SB-301-04-A | SB-301-04-DLC |
| 5/32" | 3/16" | 1/4" | 2" | SB-301-05 | SB-301-05-T | SB-301-05-C | SB-301-05-A | SB-301-05-DLC |
| 3/16" | 3/16" | 5/16" | 2" | SB-301-06 | SB-301-06-T | SB-301-06-C | SB-301-06-A | SB-301-06-DLC |
| 7/32" | 1/4" | 5/16" | 2-1/2" | SB-301-07 | SB-301-07-T | SB-301-07-C | SB-301-07-A | SB-301-07-DLC |
| 1/4" | 1/4" | 5/16" | 2-1/2" | SB-301-08 | SB-301-08-T | SB-301-08-C | SB-301-08-A | SB-301-08-DLC |
| 9/32" | 5/16" | 7/16" | 2-1/2" | SB-301-09 | SB-301-09-T | SB-301-09-C | SB-301-09-A | SB-301-09-DLC |
| 5/16" | 5/16" | 7/16" | 2-1/2" | SB-301-10 | SB-301-10-T | SB-301-10-C | SB-301-10-A | SB-301-10-DLC |
| 3/8" | 3/8" | 1/2" | 2-1/2" | SB-301-12 | SB-301-12-T | SB-301-12-C | SB-301-12-A | SB-301-12-DLC |
| 7/16" | 7/16" | 5/8" | 2-3/4" | SB-301-14 | SB-301-14-T | SB-301-14-C | SB-301-14-A | SB-301-14-DLC |
| 1/2" | 1/2" | 5/8" | 3" | SB-301-16 | SB-301-16-T | SB-301-16-C | SB-301-16-A | SB-301-16-DLC |
| 5/8" | 5/8" | 7/8" | 3-1/2" | SB-301-20 | SB-301-20-T | SB-301-20-C | SB-301-20-A | SB-301-20-DLC |
| 3/4" | 3/4" | 1" | 4" | SB-301-24 | SB-301-24-T | SB-301-24-C | SB-301-24-A | SB-301-24-DLC |



MSB-301 Metric 3 Flute Tuffy Ball End Stub Length



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|------------------------|
| 1.5mm | 3mm | 3mm | 38mm | MSB-301-1.5 | MSB-301-1.5-T | MSB-301-1.5-C | MSB-301-1.5-A | MSB-301-1.5-DLC |
| 2mm | 3mm | 5mm | 38mm | MSB-301-02 | MSB-301-02-T | MSB-301-02-C | MSB-301-02-A | MSB-301-02-DLC |
| 3mm | 3mm | 6mm | 38mm | MSB-301-03 | MSB-301-03-T | MSB-301-03-C | MSB-301-03-A | MSB-301-03-DLC |
| 4mm | 4mm | 8mm | 50mm | MSB-301-04 | MSB-301-04-T | MSB-301-04-C | MSB-301-04-A | MSB-301-04-DLC |
| 5mm | 5mm | 8mm | 50mm | MSB-301-05 | MSB-301-05-T | MSB-301-05-C | MSB-301-05-A | MSB-301-05-DLC |
| 6mm | 6mm | 8mm | 50mm | MSB-301-06 | MSB-301-06-T | MSB-301-06-C | MSB-301-06-A | MSB-301-06-DLC |
| 8mm | 8mm | 12mm | 58mm | MSB-301-08 | MSB-301-08-T | MSB-301-08-C | MSB-301-08-A | MSB-301-08-DLC |
| 10mm | 10mm | 14mm | 66mm | MSB-301-10 | MSB-301-10-T | MSB-301-10-C | MSB-301-10-A | MSB-301-10-DLC |
| 12mm | 12mm | 16mm | 73mm | MSB-301-12 | MSB-301-12-T | MSB-301-12-C | MSB-301-12-A | MSB-301-12-DLC |
| 16mm | 16mm | 20mm | 82mm | MSB-301-16 | MSB-301-16-T | MSB-301-16-C | MSB-301-16-A | MSB-301-16-DLC |
| 20mm | 20mm | 25mm | 92mm | MSB-301-20 | MSB-301-20-T | MSB-301-20-C | MSB-301-20-A | MSB-301-20-DLC |

Multiple Applications

3 Flute Tuffy Grade Carbide Ball End Mills **B/MB**



B-333 3 Flute Tuffy Ball End Standard Length



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|------------------------|
| 1/16" | 1/8" | 3/16" | 1-1/2" | B-333-02 | B-333-02-T | B-333-02-C | B-333-02-A | B-333-02-DLC |
| 3/32" | 1/8" | 3/8" | 1-1/2" | B-333-03 | B-333-03-T | B-333-03-C | B-333-03-A | B-333-03-DLC |
| 1/8" | 1/8" | 1/2" | 1-1/2" | B-333-04 | B-333-04-T | B-333-04-C | B-333-04-A | B-333-04-DLC |
| 5/32" | 3/16" | 9/16" | 2" | B-333-05 | B-333-05-T | B-333-05-C | B-333-05-A | B-333-05-DLC |
| 3/16" | 3/16" | 5/8" | 2" | B-333-06 | B-333-06-T | B-333-06-C | B-333-06-A | B-333-06-DLC |
| 7/32" | 1/4" | 5/8" | 2-1/2" | B-333-07 | B-333-07-T | B-333-07-C | B-333-07-A | B-333-07-DLC |
| 1/4" | 1/4" | 3/4" | 2-1/2" | B-333-08 | B-333-08-T | B-333-08-C | B-333-08-A | B-333-08-DLC |
| 9/32" | 5/16" | 3/4" | 2-1/2" | B-333-09 | B-333-09-T | B-333-09-C | B-333-09-A | B-333-09-DLC |
| 5/16" | 5/16" | 13/16" | 2-1/2" | B-333-10 | B-333-10-T | B-333-10-C | B-333-10-A | B-333-10-DLC |
| 3/8" | 3/8" | 7/8" | 2-1/2" | B-333-12 | B-333-12-T | B-333-12-C | B-333-12-A | B-333-12-DLC |
| 7/16" | 7/16" | 1" | 2-3/4" | B-333-14 | B-333-14-T | B-333-14-C | B-333-14-A | B-333-14-DLC |
| 1/2" | 1/2" | 1" | 3" | B-333-16 | B-333-16-T | B-333-16-C | B-333-16-A | B-333-16-DLC |
| 5/8" | 5/8" | 1-1/4" | 3-1/2" | B-333-20 | B-333-20-T | B-333-20-C | B-333-20-A | B-333-20-DLC |
| 3/4" | 3/4" | 1-1/2" | 4" | B-333-24 | B-333-24-T | B-333-24-C | B-333-24-A | B-333-24-DLC |
| 1" | 1" | 2" | 5" | B-333-32 | B-333-32-T | B-333-32-C | B-333-32-A | B-333-32-DLC |
| 1" | 1" | 2-1/2" | 5" | BL-333-32 | BL-333-32-T | BL-333-32-C | BL-333-32-A | BL-333-32-DLC |
| 1" | 1" | 4" | 7" | BX-333-32 | BX-333-32-T | BX-333-32-C | BX-333-32-A | BX-333-32-DLC |



MB-333 Metric 3 Flute Tuffy Ball End Standard Length **METRIC**



| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated | Tool Number TiN Coated | Tool Number TiCN Coated | Tool Number AlTiN Coated | Tool Number DLC Coated |
|------------------|----------------|--------------|----------------|----------------------|------------------------|-------------------------|--------------------------|------------------------|
| 1.5mm | 3mm | 6mm | 38mm | MB-333-1.5 | MB-333-1.5-T | MB-333-1.5-C | MB-333-1.5-A | MB-333-1.5-DLC |
| 2mm | 3mm | 8mm | 38mm | MB-333-02 | MB-333-02-T | MB-333-02-C | MB-333-02-A | MB-333-02-DLC |
| 3mm | 3mm | 12mm | 38mm | MB-333-03 | MB-333-03-T | MB-333-03-C | MB-333-03-A | MB-333-03-DLC |
| 4mm | 4mm | 12mm | 50mm | MB-333-04 | MB-333-04-T | MB-333-04-C | MB-333-04-A | MB-333-04-DLC |
| 5mm | 5mm | 14mm | 50mm | MB-333-05 | MB-333-05-T | MB-333-05-C | MB-333-05-A | MB-333-05-DLC |
| 6mm | 6mm | 14mm | 57mm | MB-333-06 | MB-333-06-T | MB-333-06-C | MB-333-06-A | MB-333-06-DLC |
| 8mm | 8mm | 16mm | 63mm | MB-333-08 | MB-333-08-T | MB-333-08-C | MB-333-08-A | MB-333-08-DLC |
| 10mm | 10mm | 20mm | 72mm | MB-333-10 | MB-333-10-T | MB-333-10-C | MB-333-10-A | MB-333-10-DLC |
| 12mm | 12mm | 25mm | 83mm | MB-333-12 | MB-333-12-T | MB-333-12-C | MB-333-12-A | MB-333-12-DLC |
| 16mm | 16mm | 32mm | 92mm | MB-333-16 | MB-333-16-T | MB-333-16-C | MB-333-16-A | MB-333-16-DLC |
| 20mm | 20mm | 38mm | 104mm | MB-333-20 | MB-333-20-T | MB-333-20-C | MB-333-20-A | MB-333-20-DLC |

NR C-2 Grade Carbide End Mills



Characteristics



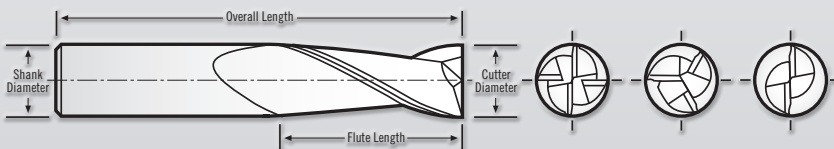
Applications



Materials



Coatings



NR Series Tolerances

Cutting Dia. = +.001/-0.000"
 Shank Dia. = -.0001/-0.0002"
 Flute Length (1/16" to 5/16") = +.030/-0.000"
 (21/64" to 1") = +.060/-0.000"
 OAL = ±.060"

MNR Tolerances

Cutting Dia. = +.025/-0.000mm
 Shank Dia. = -.002/-0.005mm
 Flute Length = +0.500/+1.500mm
 OAL = ±1.000mm



NR-204 2 Flute C-2 Grade Standard Length

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Flats, Uncoated | Tool Number No Flats, Uncoated | Tool Number Flats, DLC Coated | Tool Number No Flats, DLC Coated |
|------------------|----------------|--------------|----------------|--------------------------------|-----------------------------------|----------------------------------|-------------------------------------|
| 1/16" | 1/8" | 3/16" | 1-1/2" | - | NR-204-02 | - | NR-204-02-DLC |
| 5/64" | 1/8" | 1/4" | 1-1/2" | - | NR-204-02.5 | - | NR-204-02.5-DLC |
| 3/32" | 1/8" | 3/8" | 1-1/2" | - | NR-204-03 | - | NR-204-03-DLC |
| 7/64" | 1/8" | 7/16" | 1-1/2" | - | NR-204-03.5 | - | NR-204-03.5-DLC |
| 1/8" | 1/8" | 1/2" | 1-1/2" | | NR-204-04 | - | NR-204-04-DLC |
| 9/64" | 3/16" | 1/2" | 2" | | NR-204-04.5 | - | NR-204-04.5-DLC |
| 5/32" | 3/16" | 9/16" | 2" | - | NR-204-05 | - | NR-204-05-DLC |
| 11/64" | 3/16" | 5/8" | 2" | - | NR-204-05.5 | - | NR-204-05.5-DLC |
| 3/16" | 3/16" | 5/8" | 2" | - | NR-204-06 | - | NR-204-06-DLC |
| 13/64" | 1/4" | 5/8" | 2-1/2" | - | NR-204-06.5 | - | NR-204-06.5-DLC |
| 7/32" | 1/4" | 5/8" | 2-1/2" | - | NR-204-07 | - | NR-204-07-DLC |
| 15/64" | 1/4" | 5/8" | 2-1/2" | - | NR-204-07.5 | - | NR-204-07.5-DLC |
| 1/4" | 1/4" | 3/4" | 2-1/2" | - | NR-204-08 | - | NR-204-08-DLC |
| 17/64" | 5/16" | 3/4" | 2-1/2" | - | NR-204-08.5 | - | NR-204-08.5-DLC |
| 9/32" | 5/16" | 3/4" | 2-1/2" | - | NR-204-09 | - | NR-204-09-DLC |
| 19/64" | 5/16" | 3/4" | 2-1/2" | - | NR-204-09.5 | - | NR-204-09.5-DLC |
| 5/16" | 5/16" | 13/16" | 2-1/2" | - | NR-204-10 | - | NR-204-10-DLC |
| 21/64" | 3/8" | 13/16" | 2-1/2" | NR-204-10.5 | NR-204-10.5-NF | NR-204-10.5-DLC | NR-204-10.5-NF-DLC |
| 11/32" | 3/8" | 13/16" | 2-1/2" | NR-204-11 | NR-204-11-NF | NR-204-11-DLC | NR-204-11-NF-DLC |
| 23/64" | 3/8" | 7/8" | 2-1/2" | NR-204-11.5 | NR-204-11.5-NF | NR-204-11.5-DLC | NR-204-11.5-NF-DLC |
| 3/8" | 3/8" | 7/8" | 2-1/2" | NR-204-12 | NR-204-12-NF | NR-204-12-DLC | NR-204-12-NF-DLC |
| 25/64" | 7/16" | 1" | 2-3/4" | - | NR-204-12.5 | - | NR-204-12.5-DLC |
| 13/32" | 7/16" | 1" | 2-3/4" | - | NR-204-13 | - | NR-204-13-DLC |
| 27/64" | 7/16" | 1" | 2-3/4" | - | NR-204-13.5 | - | NR-204-13.5-DLC |
| 7/16" | 7/16" | 1" | 2-3/4" | - | NR-204-14 | - | NR-204-14-DLC |
| 29/64" | 1/2" | 1" | 3" | NR-204-14.5 | NR-204-14.5-NF | NR-204-14.5-DLC | NR-204-14.5-NF-DLC |
| 15/32" | 1/2" | 1" | 3" | NR-204-15 | NR-204-15-NF | NR-204-15-DLC | NR-204-15-NF-DLC |
| 31/64" | 1/2" | 1" | 3" | NR-204-15.5 | NR-204-15.5-NF | NR-204-15.5-DLC | NR-204-15.5-NF-DLC |
| 1/2" | 1/2" | 1" | 3" | NR-204-16 | NR-204-16-NF | NR-204-16-DLC | NR-204-16-NF-DLC |
| 33/64" | 1/2" | 1" | 3" | NR-204-16.5 | NR-204-16.5-NF | NR-204-16.5-DLC | NR-204-16.5-NF-DLC |
| 9/16" | 9/16" | 1-1/4" | 3-1/2" | - | NR-204-18 | - | NR-204-18-DLC |
| 5/8" | 5/8" | 1-1/4" | 3-1/2" | NR-204-20 | NR-204-20-NF | NR-204-20-DLC | NR-204-20-NF-DLC |
| 3/4" | 3/4" | 1-1/2" | 4" | NR-204-24 | NR-204-24-NF | NR-204-24-DLC | NR-204-24-NF-DLC |
| 1" | 1" | 1-1/2" | 4" | NR-204-32 | NR-204-32-NF | NR-204-32-DLC | NR-204-32-NF-DLC |

Multiple Applications

C-2 Grade Carbide End Mills NR/MNR



MNR-204 Metric 2 Flute C-2 Grade Standard Length METRIC

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Flats, Uncoated | Tool Number No Flats, Uncoated | Tool Number Flats, DLC Coated | Tool Number No Flats, DLC Coated |
|------------------|----------------|--------------|----------------|-----------------------------|--------------------------------|-------------------------------|----------------------------------|
| 2mm | 3mm | 8mm | 38mm | — | MNR-204-02 | — | MNR-204-02-DLC |
| 3mm | 3mm | 12mm | 38mm | — | MNR-204-03 | — | MNR-204-03-DLC |
| 4mm | 4mm | 12mm | 50mm | — | MNR-204-04 | — | MNR-204-04-DLC |
| 5mm | 5mm | 14mm | 50mm | — | MNR-204-05 | — | MNR-204-05-DLC |
| 6mm | 6mm | 14mm | 57mm | — | MNR-204-06 | — | MNR-204-06-DLC |
| 8mm | 8mm | 16mm | 63mm | — | MNR-204-08 | — | MNR-204-08-DLC |
| 10mm | 10mm | 20mm | 72mm | — | MNR-204-10 | — | MNR-204-10-DLC |
| 12mm | 12mm | 25mm | 83mm | — | MNR-204-12 | — | MNR-204-12-DLC |
| 16mm | 16mm | 32mm | 92mm | — | MNR-204-16 | — | MNR-204-16-DLC |
| 20mm | 20mm | 38mm | 104mm | — | MNR-204-20 | — | MNR-204-20-DLC |
| 25mm | 25mm | 38mm | 104mm | — | MNR-204-25 | — | MNR-204-25-DLC |

NOTE: Metric tools do not have flats.



Flats!



NR-303 3 Flute C-2 Grade Standard Length

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Flats, Uncoated | Tool Number No Flats, Uncoated | Tool Number Flats, DLC Coated | Tool Number No Flats, DLC Coated |
|------------------|----------------|--------------|----------------|-----------------------------|--------------------------------|-------------------------------|----------------------------------|
| 1/16" | 1/8" | 3/16" | 1-1/2" | — | NR-303-02 | — | NR-303-02-DLC |
| 5/64" | 1/8" | 1/4" | 1-1/2" | Flats! | NR-303-02.5 | — | NR-303-02.5-DLC |
| 3/32" | 1/8" | 3/8" | 1-1/2" | | NR-303-03 | — | NR-303-03-DLC |
| 7/64" | 1/8" | 7/16" | 1-1/2" | | NR-303-03.5 | — | NR-303-03.5-DLC |
| 1/8" | 1/8" | 1/2" | 1-1/2" | — | NR-303-04 | — | NR-303-04-DLC |
| 5/32" | 3/16" | 9/16" | 2" | — | NR-303-05 | — | NR-303-05-DLC |
| 3/16" | 3/16" | 5/8" | 2" | — | NR-303-06 | — | NR-303-06-DLC |
| 7/32" | 1/4" | 5/8" | 2-1/2" | — | NR-303-07 | — | NR-303-07-DLC |
| 1/4" | 1/4" | 3/4" | 2-1/2" | — | NR-303-08 | — | NR-303-08-DLC |
| 9/32" | 5/16" | 3/4" | 2-1/2" | — | NR-303-09 | — | NR-303-09-DLC |
| 5/16" | 5/16" | 13/16" | 2-1/2" | — | NR-303-10 | — | NR-303-10-DLC |
| 3/8" | 3/8" | 7/8" | 2-1/2" | NR-303-12 | NR-303-12-NF | NR-303-12-DLC | NR-303-12-NF-DLC |
| 7/16" | 7/16" | 1" | 2-3/4" | — | NR-303-14 | — | NR-303-14-DLC |
| 1/2" | 1/2" | 1" | 3" | NR-303-16 | NR-303-16-NF | NR-303-16-DLC | NR-303-16-NF-DLC |
| 9/16" | 9/16" | 1-1/4" | 3-1/2" | — | NR-303-18 | — | NR-303-18-DLC |
| 5/8" | 5/8" | 1-1/4" | 3-1/2" | NR-303-20 | NR-303-20-NF | NR-303-20-DLC | NR-303-20-NF-DLC |
| 3/4" | 3/4" | 1-1/2" | 4" | NR-303-24 | NR-303-24-NF | NR-303-24-DLC | NR-303-24-NF-DLC |



MNR-303 Metric 3 Flute C-2 Grade Standard Length METRIC

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Flats, Uncoated | Tool Number No Flats, Uncoated | Tool Number Flats, DLC Coated | Tool Number No Flats, DLC Coated |
|------------------|----------------|--------------|----------------|-----------------------------|--------------------------------|-------------------------------|----------------------------------|
| 2mm | 3mm | 8mm | 38mm | — | MNR-303-02 | — | MNR-303-02-DLC |
| 3mm | 3mm | 12mm | 38mm | — | MNR-303-03 | — | MNR-303-03-DLC |
| 4mm | 4mm | 12mm | 50mm | — | MNR-303-04 | — | MNR-303-04-DLC |
| 5mm | 5mm | 14mm | 50mm | — | MNR-303-05 | — | MNR-303-05-DLC |
| 6mm | 6mm | 14mm | 57mm | — | MNR-303-06 | — | MNR-303-06-DLC |
| 8mm | 8mm | 16mm | 63mm | — | MNR-303-08 | — | MNR-303-08-DLC |
| 10mm | 10mm | 20mm | 72mm | — | MNR-303-10 | — | MNR-303-10-DLC |
| 12mm | 12mm | 25mm | 83mm | — | MNR-303-12 | — | MNR-303-12-DLC |
| 16mm | 16mm | 32mm | 92mm | — | MNR-303-16 | — | MNR-303-16-DLC |
| 20mm | 20mm | 38mm | 104mm | — | MNR-303-20 | — | MNR-303-20-DLC |
| 25mm | 25mm | 38mm | 104mm | — | MNR-303-25 | — | MNR-303-25-DLC |

NOTE: Metric tools do not have flats.

NR C-2 Grade Carbide End Mills



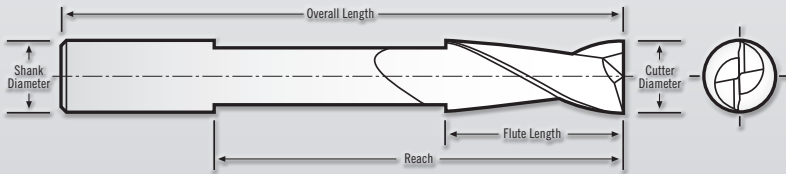
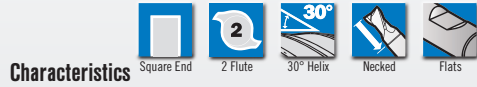
Flats!



NR-404 4 Flute C-2 Grade Standard Length

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Flats, Uncoated | Tool Number No Flats, Uncoated | Tool Number Flats, DLC Coated | Tool Number No Flats, DLC Coated |
|------------------|----------------|--------------|----------------|--------------------------------|-----------------------------------|----------------------------------|-------------------------------------|
| 1/16" | 1/8" | 3/16" | 1-1/2" | — | NR-404-02 | — | NR-404-02-DLC |
| 5/64" | 1/8" | 1/4" | 1-1/2" | — | NR-404-02.5 | — | NR-404-02.5-DLC |
| 3/32" | 1/8" | 3/8" | 1-1/2" | — | NR-404-03 | — | NR-404-03-DLC |
| 7/64" | 1/8" | 7/16" | 1-1/2" | — | NR-404-03.5 | — | NR-404-03.5-DLC |
| 1/8" | 1/8" | 1/2" | 1-1/2" | — | NR-404-04 | — | NR-404-04-DLC |
| 9/64" | 3/16" | 1/2" | 2" | — | NR-404-04.5 | — | NR-404-04.5-DLC |
| 5/32" | 3/16" | 9/16" | 2" | — | NR-404-05 | — | NR-404-05-DLC |
| 11/64" | 3/16" | 5/8" | 2" | — | NR-404-05.5 | — | NR-404-05.5-DLC |
| 3/16" | 3/16" | 5/8" | 2" | — | NR-404-06 | — | NR-404-06-DLC |
| 13/64" | 1/4" | 5/8" | 2-1/2" | — | NR-404-06.5 | — | NR-404-06.5-DLC |
| 7/32" | 1/4" | 5/8" | 2-1/2" | — | NR-404-07 | — | NR-404-07-DLC |
| 15/64" | 1/4" | 5/8" | 2-1/2" | — | NR-404-07.5 | — | NR-404-07.5-DLC |
| 1/4" | 1/4" | 3/4" | 2-1/2" | — | NR-404-08 | — | NR-404-08-DLC |
| 17/64" | 5/16" | 3/4" | 2-1/2" | — | NR-404-08.5 | — | NR-404-08.5-DLC |
| 9/32" | 5/16" | 3/4" | 2-1/2" | — | NR-404-09 | — | NR-404-09-DLC |
| 19/64" | 5/16" | 3/4" | 2-1/2" | — | NR-404-09.5 | — | NR-404-09.5-DLC |
| 5/16" | 5/16" | 13/16" | 2-1/2" | — | NR-404-10 | — | NR-404-10-DLC |
| 21/64" | 3/8" | 13/16" | 2-1/2" | NR-404-10.5 | NR-404-10.5-NF | NR-404-10.5-DLC | NR-404-10.5-NF-DLC |
| 11/32" | 3/8" | 13/16" | 2-1/2" | NR-404-11 | NR-404-11-NF | NR-404-11-DLC | NR-404-11-NF-DLC |
| 23/64" | 3/8" | 7/8" | 2-1/2" | NR-404-11.5 | NR-404-11.5-NF | NR-404-11.5-DLC | NR-404-11.5-NF-DLC |
| 3/8" | 3/8" | 7/8" | 2-1/2" | NR-404-12 | NR-404-12-NF | NR-404-12-DLC | NR-404-12-NF-DLC |
| 25/64" | 7/16" | 1" | 2-3/4" | — | NR-404-12.5 | — | NR-404-12.5-DLC |
| 13/32" | 7/16" | 1" | 2-3/4" | — | NR-404-13 | — | NR-404-13-DLC |
| 27/64" | 7/16" | 1" | 2-3/4" | — | NR-404-13.5 | — | NR-404-13.5-DLC |
| 7/16" | 7/16" | 1" | 2-3/4" | — | NR-404-14 | — | NR-404-14-DLC |
| 29/64" | 1/2" | 1" | 3" | NR-404-14.5 | NR-404-14.5-NF | NR-404-14.5-DLC | NR-404-14.5-NF-DLC |
| 15/32" | 1/2" | 1" | 3" | NR-404-15 | NR-404-15-NF | NR-404-15-DLC | NR-404-15-NF-DLC |
| 31/64" | 1/2" | 1" | 3" | NR-404-15.5 | NR-404-15.5-NF | NR-404-15.5-DLC | NR-404-15.5-NF-DLC |
| 1/2" | 1/2" | 1" | 3" | NR-404-16 | NR-404-16-NF | NR-404-16-DLC | NR-404-16-NF-DLC |
| 33/64" | 1/2" | 1" | 3" | NR-404-16.5 | NR-404-16.5-NF | NR-404-16.5-DLC | NR-404-16.5-NF-DLC |
| 9/16" | 9/16" | 1-1/4" | 3-1/2" | — | NR-404-18 | — | NR-404-18-DLC |
| 5/8" | 5/8" | 1-1/4" | 3-1/2" | NR-404-20 | NR-404-20-NF | NR-404-20-DLC | NR-404-20-NF-DLC |
| 3/4" | 3/4" | 1-1/2" | 4" | NR-404-24 | NR-404-24-NF | NR-404-24-DLC | NR-404-24-NF-DLC |
| 1" | 1" | 1-1/2" | 4" | NR-404-32 | NR-404-32-NF | NR-404-32-DLC | NR-404-32-NF-DLC |

Tuffy Grade Carbide End Mills **EX**



EX Series Tolerances
 Cutting Dia. = $+0.001/-0.000$ "
 Shank Dia. = $-0.0001/-0.0002$ "
 Flute Length = $+0.060/-0.000$ "
 OAL = ± 0.060 "



EX-204 2 Flute Tuffy Grade Extra Length

| Cutting Diameter | Shank Diameter | Flute Length | Reach | Overall Length | Tool Number Flats | Tool Number No Flats |
|------------------|----------------|--------------|--------|----------------|-------------------|----------------------|
| 1/8" | 1/8" | 3/8" | 2" | 3" | — | EX-204-04 |
| 3/16" | 3/16" | 1/2" | 2" | 3" | — | EX-204-06 |
| 1/4" | 1/4" | 5/8" | 2" | 3" | — | EX-204-08 |
| 5/16" | 5/16" | 3/4" | 2-1/8" | 3-1/8" | — | EX-204-10 |
| 3/8" | 3/8" | 3/4" | 2" | 3-1/2" | EX-204-12 | EX-204-12-NF |
| 7/16" | 7/16" | 3/4" | 2-1/4" | 3-3/4" | — | EX-204-14 |
| 1/2" | 1/2" | 1" | 2-1/2" | 4" | EX-204-16 | EX-204-16-NF |



EX-206 2 Flute Tuffy Grade Extra Length Extended Reach

| Cutting Diameter | Shank Diameter | Flute Length | Reach | Overall Length | Tool Number |
|------------------|----------------|--------------|-------|----------------|-------------|
| 1/2" | 1/2" | 1" | 4" | 6" | EX-206-16 |
| 5/8" | 5/8" | 1-3/8" | 4" | 6" | EX-206-20 |
| 3/4" | 3/4" | 1-5/8" | 4" | 6" | EX-206-24 |
| 1" | 1" | 2" | 4" | 6" | EX-206-32 |



ET Engraving Tools



Characteristics

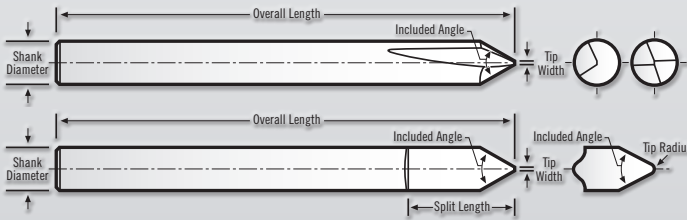
1 1 Flute 2 2 Flute

Applications

Slotting Side Milling Semi-Finishing Finishing Dry Wet Cold Air Spray Mist

Materials

Aluminum Copper Titanium Magnesium Cast Iron Steel Stainless Steel SUPER Alloys Plastics Composites 40 HRC Hardness BRASS Wood



ET1 Double Lip Engraving Tool for Tougher Materials

| Tip Width | Shank Diameter | Included Angle | Split Length | Overall Length | Tool Number |
|-----------|----------------|----------------|--------------|----------------|-------------|
| .010" | 1/4" | 30° | — | 2" | ET1-01030 |
| .015" | 1/4" | 30° | — | 2" | ET1-01530 |
| .020" | 1/4" | 30° | — | 2" | ET1-02030 |
| .030" | 1/4" | 30° | — | 2" | ET1-03030 |
| .040" | 1/4" | 30° | — | 2" | ET1-04030 |
| .050" | 1/4" | 30° | — | 2" | ET1-05030 |
| .060" | 1/4" | 30° | — | 2" | ET1-06030 |
| .010" | 1/4" | 45° | — | 2" | ET1-01045 |
| .015" | 1/4" | 45° | — | 2" | ET1-01545 |
| .020" | 1/4" | 45° | — | 2" | ET1-02045 |
| .030" | 1/4" | 45° | — | 2" | ET1-03045 |
| .040" | 1/4" | 45° | — | 2" | ET1-04045 |
| .050" | 1/4" | 45° | — | 2" | ET1-05045 |
| .060" | 1/4" | 45° | — | 2" | ET1-06045 |

NOTE: Specially designed to maximize the tip strength of the tool by removing the minimum amount of material from the end.



ET3 Ball Tip Engraving Tool

| Tip Radius | Shank Diameter | Included Angle | Split Length | Overall Length | Tool Number |
|------------|----------------|----------------|--------------|----------------|-------------|
| .005" | 1/4" | 30° | .650" | 2" | ET3-00530 |
| .010" | 1/4" | 30° | .650" | 2" | ET3-01030 |
| .020" | 1/4" | 30° | .650" | 2" | ET3-02030 |
| .030" | 1/4" | 30° | .650" | 2" | ET3-03030 |
| .005" | 1/4" | 60° | .650" | 2" | ET3-00560 |
| .010" | 1/4" | 60° | .650" | 2" | ET3-01060 |
| .020" | 1/4" | 60° | .650" | 2" | ET3-02060 |
| .030" | 1/4" | 60° | .650" | 2" | ET3-03060 |

NOTE: Ball shaped radius on the tip, excellent results for high speed engraving and 3D engraving applications



ET2 Plunge Tip Engraving Tool for Drill & Engrave

| Tip Width | Shank Diameter | Included Angle | Split Length | Overall Length | Tool Number |
|-----------|----------------|----------------|--------------|----------------|-------------|
| .010" | 1/4" | 60° | — | 2" | ET2-01060 |
| .020" | 1/4" | 60° | — | 2" | ET2-02060 |
| .010" | 1/4" | 90° | — | 2" | ET2-01090 |
| .020" | 1/4" | 90° | — | 2" | ET2-02090 |

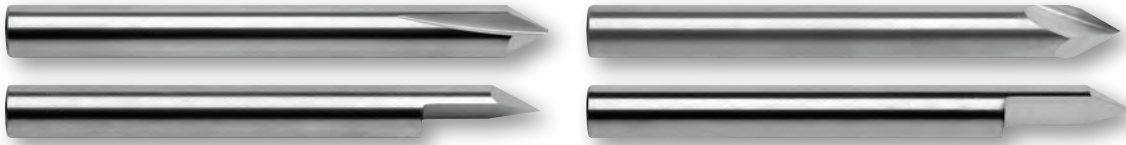
NOTE: Two flute tool serves as a multipurpose tool, which can be used for engraving, chamfering, spot-drilling and countersinking.



ET4 Standard Engraving Tool for Most Applications

| Tip Width | Shank Diameter | Included Angle | Split Length | Overall Length | Tool Number |
|-----------|----------------|----------------|--------------|----------------|-------------|
| .010" | 1/4" | 60° | .650" | 2" | ET4-01060 |
| .020" | 1/4" | 60° | .650" | 2" | ET4-02060 |
| .030" | 1/4" | 60° | .650" | 2" | ET4-03060 |
| .050" | 1/4" | 60° | .650" | 2" | ET4-05060 |
| .060" | 1/4" | 60° | .650" | 2" | ET4-06060 |
| .010" | 1/4" | 90° | .650" | 2" | ET4-01060 |
| .020" | 1/4" | 90° | .650" | 2" | ET4-02090 |
| .030" | 1/4" | 90° | .650" | 2" | ET4-03090 |
| .050" | 1/4" | 90° | .650" | 2" | ET4-05090 |
| .060" | 1/4" | 90° | .650" | 2" | ET4-06090 |

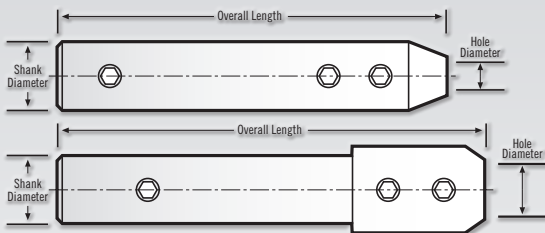
NOTE: Utilized in a wide variety of machines, including top loading engraving machines, CNC milling machines and industrial engraving marking systems.



ET SPEEDS & FEEDS

| Material | 5000 RPM | 7500 RPM | 10,000 RPM |
|---------------------------|----------|-----------|------------|
| | in/min | in/min | in/min |
| NON-FERROUS METALS | | | |
| Aluminum/Aluminum Alloys | 10 ipm | 15 ipm | 20 ipm |
| Brass/Bronze | 10 ipm | 15 ipm | 20 ipm |
| Copper/Copper Alloys | 10 ipm | 15 ipm | 20 ipm |
| Magnesium | 10 ipm | 15 ipm | 20 ipm |
| COMPOSITES | | | |
| G10 Fiberglass | 15 ipm | 22.5 ipm | 30 ipm |
| Graphite | 15 ipm | 22.5 ipm | 30 ipm |
| Carbon Fiber | 15 ipm | 22.5 ipm | 30 ipm |
| Plastics | 15 ipm | 22.5 ipm | 30 ipm |
| FERROUS METALS | | | |
| Cast Iron | 5 ipm | 7.5 ipm | 10 ipm |
| Steel, Low Carbon | 5 ipm | 7.5 ipm | 10 ipm |
| Steel, Medium Carbon | 7.5 ipm | 11.25 ipm | 15 ipm |
| Steel, Hardened | 2.5 ipm | 3.75 ipm | 5 ipm |
| Stainless Steel, Soft | 5 ipm | 7.5 ipm | 10 ipm |
| Stainless Steel, Hard | 2.5 ipm | 3.75 ipm | 5 ipm |
| Inconel | 4 ipm | 6 ipm | 8 ipm |
| Titanium, Soft | 5 ipm | 7.5 ipm | 10 ipm |
| Titanium, Hard | 2.5 ipm | 3.75 ipm | 5 ipm |

Accuhold End Mill Extension Holder **ACH/MAH**



ACH Tolerances

Hole Dia. = +.00015/-0.00000"
 Shank Dia. = -.0001/-0.0003"
 OAL = ±.060"

MAH Tolerances

Hole Dia. = +.004/-0.000 mm
 Shank Dia. = +.000/-0.007 mm
 OAL = ±1.5 mm



ACH Accuhold - End Mill Extension Holder

| Hole Diameter | Shank Diameter | Overall Length | Tool Number |
|---------------|----------------|----------------|-------------|
| 1/8" | 3/8" | 3-1/4" | ACH-04 |
| 3/16" | 1/2" | 3-1/2" | ACH-06 |
| 1/4" | 5/8" | 4-1/4" | ACH-08 |
| 3/8" | 3/4" | 4-1/2" | ACH-12 |
| * 1/2" | 3/4" | 4-3/4" | ACH-16 |
| * 1/2" | 1" | 4-3/4" | ACH-16L |

* 1" Diameter x 1.5" Long Head



MAH Accuhold - Metric End Mill Extension Holder **METRIC**

| Hole Diameter | Shank Diameter | Overall Length | Tool Number |
|---------------|----------------|----------------|-------------|
| 3mm | 10mm | 82.5mm | MAH-03 |
| 4mm | 12mm | 110mm | MAH-04 |
| 5mm | 12mm | 110mm | MAH-05 |
| 6mm | 16mm | 125mm | MAH-06 |
| 8mm | 20mm | 135mm | MAH-08 |
| 10mm | 20mm | 135mm | MAH-10 |
| * 12mm | 25mm | 150mm | MAH-12 |

TOOLS FOR

Saw Applications



Saws

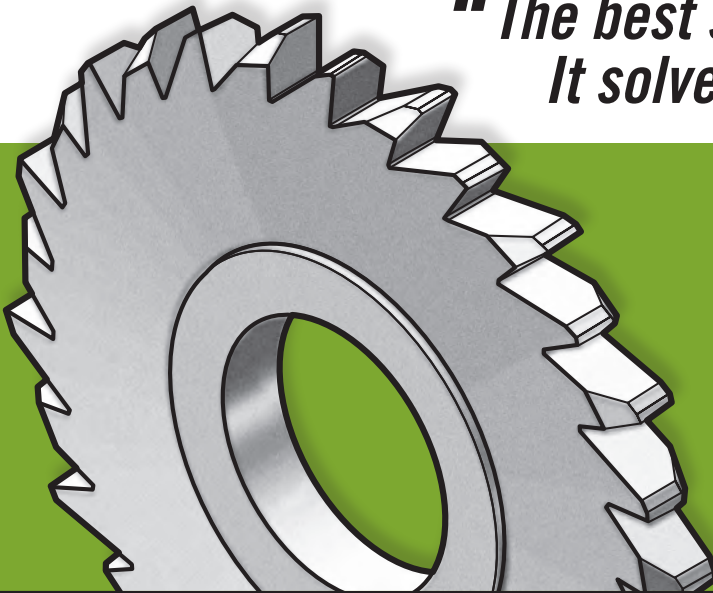
Scan this code to:

- Watch Videos
- How to Assemble a Saw and Arbor
- Tips and Tricks
- And More...

Featured Tools:

The **K-Series** Solves ALL Your Saw Problems

*“The best saw we have ever used!
It solved all our problems.”*



- Use any time the saw depth is more than 5x the saw thickness
- Double Concavity
- Alternate Tooth Chamfer
- Flat and Parallel Hubs

NAB Page 136

- 15X Gripping Force
- Built-In Spacers
- Keyways Available
- Tightest Tolerances in the Industry less than .0002" Runout

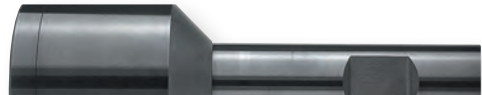
15X Gripping Force



TOOLS FOR Saw Applications

SAWS Standard Coarse and Fine Pitch  **121**

SAWS Metric Coarse and Fine Pitch  **132**

AB Arbors Precision Stub Arbors  **136**

MSA Arbors Precision Metric Stub Arbors  **136**

NAB Arbors Precision Arbors  **136**

CAPS Extension Caps for AB Arbors  **137**

FLANGES Gauge Tolerance Arbor Flanges  **137**

Quantity Discount

1-2 of a sizeNet
3-6 Less 5%
7-24 Less 10%
25 or more Less 15%

Pricing Special Decimal Thicknesses

To price a saw thickness not listed in the catalog, use the price of the closest thicker standard saw.

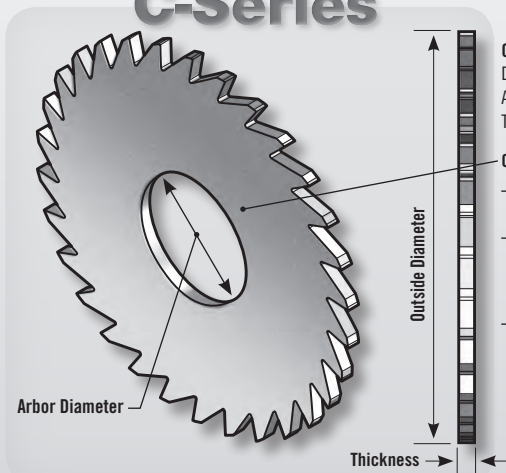
Quantity discounts apply to special thicknesses.

Saws made for gangs with special tolerances are priced on application.

Special Note: Saws under .008" or .19 mm thickness are non-returnable.

SAWS

C-Series



Carbide Saw Tolerances
 Diameter = $+ .002"/- .000"$
 Arbor Diameter = $+ .0002"/+ .0004"$
 Thickness = $+ .0002"/- .0000"$

C-Series Concavity
 - Saws .010" and under:
 Are flat and parallel
 - Saw thickness (T)
 under .020":
 Concavity (c) = .001"
 per inch per side
 - Saw thickness (T)
 .020" and over:
 Concavity (c) = .002"
 per inch per side

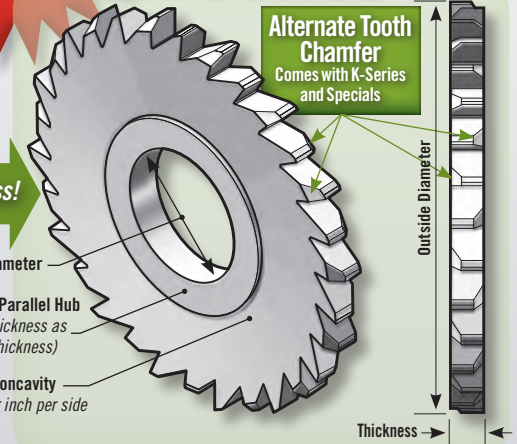


K-Series

Use the
 K-Series
 if DOC
 is more
 than
 5X
 saw
 thickness!

**Alternate Tooth
 Chamfer**
 Comes with K-Series
 and Specials

Arbor Diameter
 Flat and Parallel Hub
 (Same thickness as
 cutting thickness)
 Double Concavity
 .004" per inch per side



Formulas

| INCH SIZES | |
|-------------------------|---|
| Surface Feet per Minute | = RPM x .262 x Tool Diameter |
| RPM | = $\frac{\text{Surface Feet per Minute} \times 3.82}{\text{Tool Diameter}}$ |
| Feed Rate (in./min.) | = RPM x Chip Load per Tooth x Number of Teeth |
| Chip Load Per Tooth | = $\frac{\text{in./min.}}{\text{RPM} \times \text{Number of Teeth}}$ |
| in ³ /min | = Width x Depth x Inches per Minute |
| Horsepower | = 1.341 x kW |

| METRIC SIZES | |
|---------------------------|---|
| Surface Meters per Minute | = RPM x .00314 x Tool Diameter |
| RPM | = $\frac{\text{Surface Meters per Minute} \times 318.057}{\text{Tool Diameter}}$ |
| Feed Rate (mm/min.) | = RPM x Chip Load per Tooth x Number of Teeth |
| Chip Load Per Tooth | = $\frac{\text{mm/min.}}{\text{RPM} \times \text{Number of Teeth}}$ |
| cm ³ /min | = $\frac{\text{Width (mm)} \times \text{Depth (mm)} \times \text{mm per Minute}}{1000}$ |
| Horsepower | = 1.341 x kW |
| kW | = .7457 x Horsepower |

RobbJack Saw Features

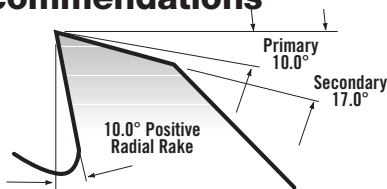
All RobbJack saws are designed for use individually and have concavity (dish). Saws which are to be assembled in gangs should have flat hubs (plus concavity to depth of cut) to assure spacing accuracy.

| | |
|------------------------------|--|
| O.D. Tolerances: | + .002"/- .000" |
| Concavity: | See drawing above |
| Coarse Pitch: | (10° rake) for non-ferrous material |
| Fine Pitch: | (5° rake) for ferrous material |
| Gang Saws: | With integral hubs available |
| I.D. Tolerance: | + .0002"/+ .0004" to assure proper arbor fit and for reduced O.D. runout |
| 48 Hour Availability: | Any thickness from .008" to .250" |
| Thickness Tolerance: | + .0002"/- .000" to assure accuracy |

Tooth Recommendations

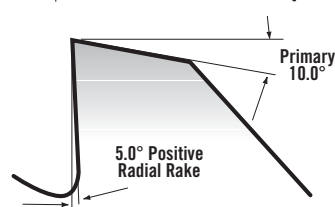
Coarse Pitch

Coarse Tooth
 recommended
 for use in non-ferrous
 materials.



Fine Pitch

Fine Tooth
 recommended
 for use in ferrous
 materials.

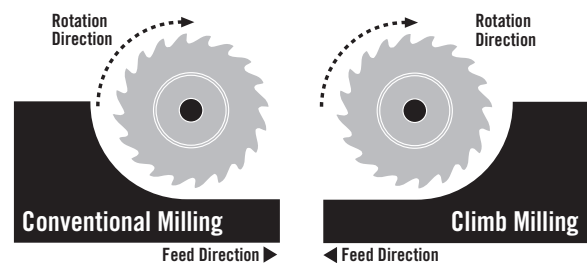


Application Guidelines

| | |
|---|---|
| For standard side concavity: | See C-Series diagram above |
| If depth of cut exceeds 3 times saw thickness: | Use Double standard concavity (.004" per inch per side) or K-Series |
| If depth of cut exceeds 5 times saw thickness: | Use K-Series Saws |
| Saw diameter concentricity: | Should be within .001" when assembled on arbor |
| When using more than one saw at a time: | A flat and parallel hub is used to ensure proper spacing |
| If steel flanges are used: | Select the largest diameter possible (see page 124) |
| Keywords: | Generally not used with solid carbide slitting saws, but are available upon request |

Conventional Milling vs. Climb Milling

RobbJack recommends Climb Milling (as opposed to Conventional Milling) for most applications (assuming back-lash control in the machine). Climb Milling generally allows better flute engagement in the material, resulting in more efficient machining and superior part finishes. Conventional Milling can lead to work hardening in some ferrous materials.



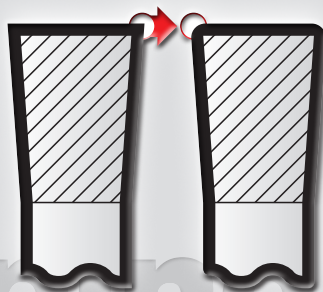
Saw Speeds & Feeds

| Material | Max Axial Depth/Pass (Times Thickness) | Teeth | Inch | | | | Metric | | | |
|---|---|--------|----------------------------|--------------------------------|------------------------------|-------------------------|------------------------------|------------------------------|------------------------------|-------------------------|
| | | | SFM Surface Feet/Minute | Chip Load per Tooth – Standard | | | SMM Surface Meters/Minute | Chip Load per Tooth – Metric | | |
| | | | | Saw Thickness .002"-.031" | Saw Thickness .031"-.100" | Saw Thickness >.100" | | Saw Thickness .05mm-1.0mm | Saw Thickness 1.0mm-3.0mm | Saw Thickness >3.0mm |
| Aluminum / Non-Ferrous | | | | | | | | | | |
| Ferrous | | | | | | | | | | |
| 2024 | 4 | Coarse | 3600 | .000234"/.000273" | .000273"/.00052" | 0.00052" | 1100 | .0059mm/.0069mm | .0069mm/.013mm | 0.013mm |
| 6061 (T1-T3) | 4 | Coarse | 3600 | .000234"/.000273" | .000273"/.00052" | 0.00052" | 1100 | .0059mm/.0069mm | .0069mm/.013mm | 0.013mm |
| 6061 (T4-T6) | 4 | Coarse | 3600 | .000234"/.000273" | .000273"/.00052" | 0.00052" | 1100 | .0059mm/.0069mm | .0069mm/.013mm | 0.013mm |
| 7075 | 4 | Coarse | 3600 | .000234"/.000273" | .000273"/.00052" | 0.00052" | 1100 | .0059mm/.0069mm | .0069mm/.013mm | 0.013mm |
| Non-Ferrous | | | | | | | | | | |
| Brass | 4 | Coarse | 750 | .000234"/.000273" | .000273"/.00052" | 0.00052" | 230 | .0059mm/.0069mm | .0069mm/.013mm | 0.013mm |
| Copper | 4 | Coarse | 600 | .000234"/.000273" | .000273"/.00052" | 0.00052" | 190 | .0059mm/.0069mm | .0069mm/.013mm | 0.013mm |
| Magnesium | 4 | Coarse | 3600 | .000234"/.000273" | .000273"/.00052" | 0.00052" | 1100 | .0059mm/.0069mm | .0069mm/.013mm | 0.013mm |
| Titanium, Steel and High-Temp Alloys | | | | | | | | | | |
| Titanium | | | | | | | | | | |
| Commercially Pure | 2 | Fine | 700 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 210 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| 6AL-4V | 2 | Fine | 350 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 105 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| 6AL-6V | 2 | Fine | 230 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 70 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| Steel | | | | | | | | | | |
| 1018-1020 | 4 | Fine | 350 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 110 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| 4130 | 2 | Fine | 260 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 80 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| 4140 | 2 | Fine | 220 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 70 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| 4340 | 2 | Fine | 280 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 90 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| Tool Steel Annealed | | | | | | | | | | |
| A2 | 2 | Fine | 350 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 110 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| D2 | 2 | Fine | 260 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 80 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| H13 | 2 | Fine | 230 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 70 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| P20 | 2 | Fine | 350 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 110 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| Stainless Steel | | | | | | | | | | |
| 303 | 2 | Fine | 500 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 150 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| 304 | 2 | Fine | 200 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 70 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| 316 | 2 | Fine | 240 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 75 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| 15-5/17-4 PH | 2 | Fine | 200 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 60 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| 440C | 2 | Fine | 200 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 60 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| Inconel | | | | | | | | | | |
| 625 / 718 | 2 | Fine | 100 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 30 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| Composites | | | | | | | | | | |
| G10 Fiberglass/Polyester | 4 | Coarse | 1000 | .000234"/.000273" | .000273"/.00052" | 0.00052" | 300 | .0059mm/.0069mm | .0069mm/.013mm | 0.013mm |
| Graphite | 4 | Coarse | 1000 | .000234"/.000273" | .000273"/.00052" | 0.00052" | 300 | .0059mm/.0069mm | .0069mm/.013mm | 0.013mm |
| Graphite Fiber/Epoxy | 4 | Coarse | 800 | .000234"/.000273" | .000273"/.00052" | 0.00052" | 250 | .0059mm/.0069mm | .0069mm/.013mm | 0.013mm |
| Other Material Applications | | | | | | | | | | |
| Cast Iron | | | | | | | | | | |
| Ductile Iron | 2 | Fine | 350 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 110 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| Gray Cast Iron | 2 | Fine | 500 | .00018"/.00021" | .00021"/.0004" | 0.0004" | 150 | .0046mm/.0053mm | .0053mm/.010mm | 0.010mm |
| Wood & Plastics | | | | | | | | | | |
| Wood | 4 | Coarse | 3600 | .000234"/.000273" | .000273"/.00052" | 0.00052" | 1100 | .0059mm/.0069mm | .0069mm/.013mm | 0.013mm |
| Plastics | 4 | Coarse | 1600 | .000234"/.000273" | .000273"/.00052" | 0.00052" | 400 | .0059mm/.0069mm | .0069mm/.013mm | 0.013mm |

Saw Modifications

T-Process

T-Process is a honed edge we put on a saw to help eliminate chipping.



Pros: T-Process strengthens the edge, helps eliminate chipping and gives a smooth edge.
Cons: T-Process will bring up a burr in certain materials, it is not for materials that like a sharp edge, such as aluminum and plastics.

To order a RobbJack saw with a **T-Process**, use the existing standard *Part Number*, and add **-TP**.

Example: A 4" saw with a T-Process is Part Number:

▶ **C40-0312-32-36-TP**
See price sheet for pricing

Alternate Tooth Chamfer



Alternate Tooth Chamfer is an alternating 45° grind on the teeth of the saw. It helps the saw from binding and aids in chip evacuation. Alternate Tooth Chamfer should be used on saws when the depth of cut is more than 5× the saw thickness and the saw is thicker than .020"

▶ **Use the New K-Series Part Number**
(Please see Saw Section)

Hub

A saw Hub is a section of the saw where there is no concavity. It is a flat and parallel area that is the same thickness as the tooth cutting near the ID of the saw where the flange contacts the saw. Should



be used on any saw that is used in cuts deeper than 3× the saw thickness. If the depth is more than 5× the saw thickness use with Alternate Tooth Chamfer, specify the K-Series Part Number.

Pros: Better surface contact with the flange of the arbor, saws run very true, reduces slippage problems

Cons: None

To order a RobbJack saw with a **Hub**, use the existing standard *Part Number*, and add **-H**, followed by *Hub Diameter*.

Example:
 4" saw with a 2.000" diameter hub

▶ **C40-0312-32-36-H 2.000"**
See price sheet for pricing

Keyway

A saw Keyway not usually recommended on saws thinner than .125" thick. If there are slippage problems you may first want to try a hub if the thickness is less than .125" thick.



Pros: Helps eliminate slippage problems on thick saws in high torque cuts

Cons: Can cause stress risers and cracks in saws thinner than .125" thick

To order a RobbJack saw with a **Keyway**, use the existing standard *Part Number*, and add **-K**.

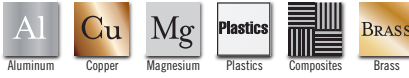
Example:
 4" saw with a 1/4" keyway

▶ **C40-1250-32-36-K**
See price sheet for pricing

Solid Carbide SAWS

3/4" Diameter 1/4" Arbor

Proper Max Depth of Cut:
Using AB Arbor = .075"
Using NAB Arbor = .040"



Use if DOC is more than 5X saw thickness

| 10 TEETH | | |
|---------------|--------------------|--|
| Saw Thickness | Standard Concavity | Alternate Tooth Chamfer Double Concavity 1/2" HUB Diameter |
| .0020" | C07-0020-08-10 | |
| .0040" | C07-0040-08-10 | |
| .0060" | C07-0060-08-10 | |
| .0080" | C07-0080-08-10 | |
| .0100" | C07-0100-08-10 | |
| .0120" | C07-0120-08-10 | |
| .0140" | C07-0140-08-10 | |
| .0156" | C07-0156-08-10 | |
| .0180" | C07-0180-08-10 | |
| .0200" | C07-0200-08-10 | |
| .0230" | C07-0230-08-10 | K07-0230-08-10 |
| .0250" | C07-0250-08-10 | K07-0250-08-10 |
| .0280" | C07-0280-08-10 | K07-0280-08-10 |
| .0312" | C07-0312-08-10 | K07-0312-08-10 |
| .0350" | C07-0350-08-10 | K07-0350-08-10 |
| .0400" | C07-0400-08-10 | K07-0400-08-10 |
| .0468" | C07-0468-08-10 | K07-0468-08-10 |
| .0510" | C07-0510-08-10 | K07-0510-08-10 |
| .0625" | C07-0625-08-10 | K07-0625-08-10 |
| .0781" | C07-0781-08-10 | K07-0781-08-10 |
| .0937" | C07-0937-08-10 | K07-0937-08-10 |
| .1250" | C07-1250-08-10 | K07-1250-08-10 |
| .1562" | C07-1562-08-10 | K07-1562-08-10 |
| .1875" | C07-1875-08-10 | K07-1875-08-10 |
| .2500" | C07-2500-08-10 | K07-2500-08-10 |

Any Saw Thickness Available

1" Diameter 3/8" Arbor

Proper Max Depth of Cut:
Using AB Arbor = .1375"
Using NAB Arbor = .095"



Use if DOC is more than 5X saw thickness

| 12 TEETH | | |
|---------------|--------------------|--|
| Saw Thickness | Standard Concavity | Alternate Tooth Chamfer Double Concavity 5/8" HUB Diameter |
| .0020" | C10-0020-12-12 | |
| .0040" | C10-0040-12-12 | |
| .0060" | C10-0060-12-12 | |
| .0080" | C10-0080-12-12 | |
| .0100" | C10-0100-12-12 | |
| .0120" | C10-0120-12-12 | |
| .0140" | C10-0140-12-12 | |
| .0156" | C10-0156-12-12 | |
| .0180" | C10-0180-12-12 | |
| .0200" | C10-0200-12-12 | |
| .0230" | C10-0230-12-12 | K10-0230-12-12 |
| .0250" | C10-0250-12-12 | K10-0250-12-12 |
| .0280" | C10-0280-12-12 | K10-0280-12-12 |
| .0312" | C10-0312-12-12 | K10-0312-12-12 |
| .0350" | C10-0350-12-12 | K10-0350-12-12 |
| .0400" | C10-0400-12-12 | K10-0400-12-12 |
| .0468" | C10-0468-12-12 | K10-0468-12-12 |
| .0510" | C10-0510-12-12 | K10-0510-12-12 |
| .0625" | C10-0625-12-12 | K10-0625-12-12 |
| .0781" | C10-0781-12-12 | K10-0781-12-12 |
| .0937" | C10-0937-12-12 | K10-0937-12-12 |
| .1250" | C10-1250-12-12 | K10-1250-12-12 |
| .1562" | C10-1562-12-12 | K10-1562-12-12 |
| .1875" | C10-1875-12-12 | K10-1875-12-12 |
| .2500" | C10-2500-12-12 | K10-2500-12-12 |



Use if DOC is more than 5X saw thickness

| 20 TEETH | | |
|---------------|--------------------|--|
| Saw Thickness | Standard Concavity | Alternate Tooth Chamfer Double Concavity 1/2" HUB Diameter |
| .0020" | C07-0020-08-20 | |
| .0040" | C07-0040-08-20 | |
| .0060" | C07-0060-08-20 | |
| .0080" | C07-0080-08-20 | |
| .0100" | C07-0100-08-20 | |
| .0120" | C07-0120-08-20 | |
| .0140" | C07-0140-08-20 | |
| .0156" | C07-0156-08-20 | |
| .0180" | C07-0180-08-20 | |
| .0200" | C07-0200-08-20 | |
| .0230" | C07-0230-08-20 | K07-0230-08-20 |
| .0250" | C07-0250-08-20 | K07-0250-08-20 |
| .0280" | C07-0280-08-20 | K07-0280-08-20 |
| .0312" | C07-0312-08-20 | K07-0312-08-20 |
| .0350" | C07-0350-08-20 | K07-0350-08-20 |
| .0400" | C07-0400-08-20 | K07-0400-08-20 |
| .0468" | C07-0468-08-20 | K07-0468-08-20 |
| .0510" | C07-0510-08-20 | K07-0510-08-20 |
| .0625" | C07-0625-08-20 | K07-0625-08-20 |
| .0781" | C07-0781-08-20 | K07-0781-08-20 |
| .0937" | C07-0937-08-20 | K07-0937-08-20 |
| .1250" | C07-1250-08-20 | K07-1250-08-20 |
| .1562" | C07-1562-08-20 | K07-1562-08-20 |
| .1875" | C07-1875-08-20 | K07-1875-08-20 |
| .2500" | C07-2500-08-20 | K07-2500-08-20 |

Any Saw Thickness Available



Use if DOC is more than 5X saw thickness

| 24 TEETH | | |
|---------------|--------------------|--|
| Saw Thickness | Standard Concavity | Alternate Tooth Chamfer Double Concavity 5/8" HUB Diameter |
| .0020" | C10-0020-12-24 | |
| .0040" | C10-0040-12-24 | |
| .0060" | C10-0060-12-24 | |
| .0080" | C10-0080-12-24 | |
| .0100" | C10-0100-12-24 | |
| .0120" | C10-0120-12-24 | |
| .0140" | C10-0140-12-24 | |
| .0156" | C10-0156-12-24 | |
| .0180" | C10-0180-12-24 | |
| .0200" | C10-0200-12-24 | |
| .0230" | C10-0230-12-24 | K10-0230-12-24 |
| .0250" | C10-0250-12-24 | K10-0250-12-24 |
| .0280" | C10-0280-12-24 | K10-0280-12-24 |
| .0312" | C10-0312-12-24 | K10-0312-12-24 |
| .0350" | C10-0350-12-24 | K10-0350-12-24 |
| .0400" | C10-0400-12-24 | K10-0400-12-24 |
| .0468" | C10-0468-12-24 | K10-0468-12-24 |
| .0510" | C10-0510-12-24 | K10-0510-12-24 |
| .0625" | C10-0625-12-24 | K10-0625-12-24 |
| .0781" | C10-0781-12-24 | K10-0781-12-24 |
| .0937" | C10-0937-12-24 | K10-0937-12-24 |
| .1250" | C10-1250-12-24 | K10-1250-12-24 |
| .1562" | C10-1562-12-24 | K10-1562-12-24 |
| .1875" | C10-1875-12-24 | K10-1875-12-24 |
| .2500" | C10-2500-12-24 | K10-2500-12-24 |

Solid carbide spacers and flanges for 3/4" saws are available with 1/4" arbor holes in diameters ranging from .500" to .700" and thicknesses from .002" to .250". Call for price and delivery.

Solid carbide spacers and flanges for 1" saws are available with 3/8" arbor holes in diameters ranging from .650" to .950" and thicknesses from .002" to .250". Call for price and delivery.

SAWS Solid Carbide

1 1/4" Diameter 1/2" Arbor

Proper Max Depth of Cut:
Using AB Arbor = .200"
Using NAB Arbor = .1475"



Use if DOC is more than 5X saw thickness

16 TEETH

| Saw Thickness | Standard Concavity | Alternate Tooth Chamfer Double Concavity 3/4" HUB Diameter |
|---------------|--------------------|--|
| .0020" | C12-0020-16-16 | |
| .0040" | C12-0040-16-16 | |
| .0060" | C12-0060-16-16 | |
| .0080" | C12-0080-16-16 | |
| .0100" | C12-0100-16-16 | |
| .0120" | C12-0120-16-16 | |
| .0140" | C12-0140-16-16 | |
| .0156" | C12-0156-16-16 | |
| .0180" | C12-0180-16-16 | |
| .0200" | C12-0200-16-16 | K12-0200-16-16 |
| .0230" | C12-0230-16-16 | K12-0230-16-16 |
| .0250" | C12-0250-16-16 | K12-0250-16-16 |
| .0280" | C12-0280-16-16 | K12-0280-16-16 |
| .0312" | C12-0312-16-16 | K12-0312-16-16 |
| .0350" | C12-0350-16-16 | K12-0350-16-16 |
| .0400" | C12-0400-16-16 | K12-0400-16-16 |
| .0468" | C12-0468-16-16 | K12-0468-16-16 |
| .0510" | C12-0510-16-16 | K12-0510-16-16 |
| .0625" | C12-0625-16-16 | K12-0625-16-16 |
| .0781" | C12-0781-16-16 | K12-0781-16-16 |
| .0937" | C12-0937-16-16 | K12-0937-16-16 |
| .1250" | C12-1250-16-16 | K12-1250-16-16 |
| .1562" | C12-1562-16-16 | K12-1562-16-16 |
| .1875" | C12-1875-16-16 | K12-1875-16-16 |
| .2500" | C12-2500-16-16 | K12-2500-16-16 |

Any Saw Thickness Available



Use if DOC is more than 5X saw thickness

36 TEETH

| Saw Thickness | Standard Concavity | Alternate Tooth Chamfer Double Concavity 3/4" HUB Diameter |
|---------------|--------------------|--|
| .0020" | C12-0020-16-36 | |
| .0040" | C12-0040-16-36 | |
| .0060" | C12-0060-16-36 | |
| .0080" | C12-0080-16-36 | |
| .0100" | C12-0100-16-36 | |
| .0120" | C12-0120-16-36 | |
| .0140" | C12-0140-16-36 | |
| .0156" | C12-0156-16-36 | |
| .0180" | C12-0180-16-36 | |
| .0200" | C12-0200-16-36 | K12-0200-16-36 |
| .0230" | C12-0230-16-36 | K12-0230-16-36 |
| .0250" | C12-0250-16-36 | K12-0250-16-36 |
| .0280" | C12-0280-16-36 | K12-0280-16-36 |
| .0312" | C12-0312-16-36 | K12-0312-16-36 |
| .0350" | C12-0350-16-36 | K12-0350-16-36 |
| .0400" | C12-0400-16-36 | K12-0400-16-36 |
| .0468" | C12-0468-16-36 | K12-0468-16-36 |
| .0510" | C12-0510-16-36 | K12-0510-16-36 |
| .0625" | C12-0625-16-36 | K12-0625-16-36 |
| .0781" | C12-0781-16-36 | K12-0781-16-36 |
| .0937" | C12-0937-16-36 | K12-0937-16-36 |
| .1250" | C12-1250-16-36 | K12-1250-16-36 |
| .1562" | C12-1562-16-36 | K12-1562-16-36 |
| .1875" | C12-1875-16-36 | K12-1875-16-36 |
| .2500" | C12-2500-16-36 | K12-2500-16-36 |

Any Saw Thickness Available

Solid carbide spacers and flanges for 1-1/4" saws are available with 1/2" arbor holes in diameters ranging from .750" to 1.200" and thicknesses from .002" to .250". Call for price and delivery.

1 1/2" Diameter 1/2" Arbor

Proper Max Depth of Cut:
Using AB Arbor = .325"
Using NAB Arbor = .2725"



Use if DOC is more than 5X saw thickness

16 TEETH

| Saw Thickness | Standard Concavity | Alternate Tooth Chamfer Double Concavity 3/4" HUB Diameter |
|---------------|--------------------|--|
| .0020" | C15-0020-16-16 | |
| .0040" | C15-0040-16-16 | |
| .0060" | C15-0060-16-16 | |
| .0080" | C15-0080-16-16 | |
| .0100" | C15-0100-16-16 | |
| .0120" | C15-0120-16-16 | |
| .0140" | C15-0140-16-16 | |
| .0156" | C15-0156-16-16 | |
| .0180" | C15-0180-16-16 | |
| .0200" | C15-0200-16-16 | K15-0200-16-16 |
| .0230" | C15-0230-16-16 | K15-0230-16-16 |
| .0250" | C15-0250-16-16 | K15-0250-16-16 |
| .0280" | C15-0280-16-16 | K15-0280-16-16 |
| .0312" | C15-0312-16-16 | K15-0312-16-16 |
| .0350" | C15-0350-16-16 | K15-0350-16-16 |
| .0400" | C15-0400-16-16 | K15-0400-16-16 |
| .0468" | C15-0468-16-16 | K15-0468-16-16 |
| .0510" | C15-0510-16-16 | K15-0510-16-16 |
| .0625" | C15-0625-16-16 | K15-0625-16-16 |
| .0781" | C15-0781-16-16 | K15-0781-16-16 |
| .0937" | C15-0937-16-16 | K15-0937-16-16 |
| .1250" | C15-1250-16-16 | K15-1250-16-16 |
| .1562" | C15-1562-16-16 | K15-1562-16-16 |
| .1875" | C15-1875-16-16 | K15-1875-16-16 |
| .2500" | C15-2500-16-16 | K15-2500-16-16 |



Use if DOC is more than 5X saw thickness

36 TEETH

| Saw Thickness | Standard Concavity | Alternate Tooth Chamfer Double Concavity 3/4" HUB Diameter |
|---------------|--------------------|--|
| .0020" | C15-0020-16-36 | |
| .0040" | C15-0040-16-36 | |
| .0060" | C15-0060-16-36 | |
| .0080" | C15-0080-16-36 | |
| .0100" | C15-0100-16-36 | |
| .0120" | C15-0120-16-36 | |
| .0140" | C15-0140-16-36 | |
| .0156" | C15-0156-16-36 | |
| .0180" | C15-0180-16-36 | |
| .0200" | C15-0200-16-36 | K15-0200-16-36 |
| .0230" | C15-0230-16-36 | K15-0230-16-36 |
| .0250" | C15-0250-16-36 | K15-0250-16-36 |
| .0280" | C15-0280-16-36 | K15-0280-16-36 |
| .0312" | C15-0312-16-36 | K15-0312-16-36 |
| .0350" | C15-0350-16-36 | K15-0350-16-36 |
| .0400" | C15-0400-16-36 | K15-0400-16-36 |
| .0468" | C15-0468-16-36 | K15-0468-16-36 |
| .0510" | C15-0510-16-36 | K15-0510-16-36 |
| .0625" | C15-0625-16-36 | K15-0625-16-36 |
| .0781" | C15-0781-16-36 | K15-0781-16-36 |
| .0937" | C15-0937-16-36 | K15-0937-16-36 |
| .1250" | C15-1250-16-36 | K15-1250-16-36 |
| .1562" | C15-1562-16-36 | K15-1562-16-36 |
| .1875" | C15-1875-16-36 | K15-1875-16-36 |
| .2500" | C15-2500-16-36 | K15-2500-16-36 |

Solid carbide spacers and flanges for 1-1/2" saws are available with 1/2" arbor holes in diameters ranging from .750" to 1.400" and thicknesses from .002" to .250". Call for price and delivery.

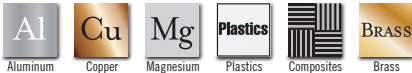
Solid Carbide SAWS

1 3/4" Diameter **1/2" Arbor**

Proper Max Depth of Cut:
Using AB Arbor = .450"
Using NAB Arbor = .3975"

1 3/4" Diameter **5/8" Arbor**

Proper Max Depth of Cut:
Using AB Arbor = .325"
Using NAB Arbor = .2875"



Use if DOC is more than 5X saw thickness

24 TEETH

| Saw Thickness | Standard Concavity | Alternate Tooth Chamfer Double Concavity 3/4" HUB Diameter |
|---------------|--------------------|--|
| .0020" | C17-0020-16-24 | |
| .0040" | C17-0040-16-24 | |
| .0060" | C17-0060-16-24 | |
| .0080" | C17-0080-16-24 | |
| .0100" | C17-0100-16-24 | |
| .0120" | C17-0120-16-24 | |
| .0140" | C17-0140-16-24 | |
| .0156" | C17-0156-16-24 | |
| .0180" | C17-0180-16-24 | |
| .0200" | C17-0200-16-24 | K17-0200-16-24 |
| .0230" | C17-0230-16-24 | K17-0230-16-24 |
| .0250" | C17-0250-16-24 | K17-0250-16-24 |
| .0280" | C17-0280-16-24 | K17-0280-16-24 |
| .0312" | C17-0312-16-24 | K17-0312-16-24 |
| .0350" | C17-0350-16-24 | K17-0350-16-24 |
| .0400" | C17-0400-16-24 | K17-0400-16-24 |
| .0468" | C17-0468-16-24 | K17-0468-16-24 |
| .0510" | C17-0510-16-24 | K17-0510-16-24 |
| .0625" | C17-0625-16-24 | K17-0625-16-24 |
| .0781" | C17-0781-16-24 | K17-0781-16-24 |
| .0937" | C17-0937-16-24 | K17-0937-16-24 |
| .1250" | C17-1250-16-24 | K17-1250-16-24 |
| .1562" | C17-1562-16-24 | K17-1562-16-24 |
| .1875" | C17-1875-16-24 | K17-1875-16-24 |
| .2500" | C17-2500-16-24 | K17-2500-16-24 |



Any Saw Thickness Available



Use if DOC is more than 5X saw thickness

24 TEETH

| Saw Thickness | Standard Concavity | Alternate Tooth Chamfer Double Concavity 1" HUB Diameter |
|---------------|--------------------|--|
| .0020" | C17-0020-20-24 | |
| .0040" | C17-0040-20-24 | |
| .0060" | C17-0060-20-24 | |
| .0080" | C17-0080-20-24 | |
| .0100" | C17-0100-20-24 | |
| .0120" | C17-0120-20-24 | |
| .0140" | C17-0140-20-24 | |
| .0156" | C17-0156-20-24 | |
| .0180" | C17-0180-20-24 | |
| .0200" | C17-0200-20-24 | K17-0200-20-24 |
| .0230" | C17-0230-20-24 | K17-0230-20-24 |
| .0250" | C17-0250-20-24 | K17-0250-20-24 |
| .0280" | C17-0280-20-24 | K17-0280-20-24 |
| .0312" | C17-0312-20-24 | K17-0312-20-24 |
| .0350" | C17-0350-20-24 | K17-0350-20-24 |
| .0400" | C17-0400-20-24 | K17-0400-20-24 |
| .0468" | C17-0468-20-24 | K17-0468-20-24 |
| .0510" | C17-0510-20-24 | K17-0510-20-24 |
| .0625" | C17-0625-20-24 | K17-0625-20-24 |
| .0781" | C17-0781-20-24 | K17-0781-20-24 |
| .0937" | C17-0937-20-24 | K17-0937-20-24 |
| .1250" | C17-1250-20-24 | K17-1250-20-24 |
| .1562" | C17-1562-20-24 | K17-1562-20-24 |
| .1875" | C17-1875-20-24 | K17-1875-20-24 |
| .2500" | C17-2500-20-24 | K17-2500-20-24 |



Use if DOC is more than 5X saw thickness

36 TEETH

| Saw Thickness | Standard Concavity | Alternate Tooth Chamfer Double Concavity 3/4" HUB Diameter |
|---------------|--------------------|--|
| .0020" | C17-0020-16-36 | |
| .0040" | C17-0040-16-36 | |
| .0060" | C17-0060-16-36 | |
| .0080" | C17-0080-16-36 | |
| .0100" | C17-0100-16-36 | |
| .0120" | C17-0120-16-36 | |
| .0140" | C17-0140-16-36 | |
| .0156" | C17-0156-16-36 | |
| .0180" | C17-0180-16-36 | |
| .0200" | C17-0200-16-36 | K17-0200-16-36 |
| .0230" | C17-0230-16-36 | K17-0230-16-36 |
| .0250" | C17-0250-16-36 | K17-0250-16-36 |
| .0280" | C17-0280-16-36 | K17-0280-16-36 |
| .0312" | C17-0312-16-36 | K17-0312-16-36 |
| .0350" | C17-0350-16-36 | K17-0350-16-36 |
| .0400" | C17-0400-16-36 | K17-0400-16-36 |
| .0468" | C17-0468-16-36 | K17-0468-16-36 |
| .0510" | C17-0510-16-36 | K17-0510-16-36 |
| .0625" | C17-0625-16-36 | K17-0625-16-36 |
| .0781" | C17-0781-16-36 | K17-0781-16-36 |
| .0937" | C17-0937-16-36 | K17-0937-16-36 |
| .1250" | C17-1250-16-36 | K17-1250-16-36 |
| .1562" | C17-1562-16-36 | K17-1562-16-36 |
| .1875" | C17-1875-16-36 | K17-1875-16-36 |
| .2500" | C17-2500-16-36 | K17-2500-16-36 |



Any Saw Thickness Available



Use if DOC is more than 5X saw thickness

36 TEETH

| Saw Thickness | Standard Concavity | Alternate Tooth Chamfer Double Concavity 1" HUB Diameter |
|---------------|--------------------|--|
| .0020" | C17-0020-20-36 | |
| .0040" | C17-0040-20-36 | |
| .0060" | C17-0060-20-36 | |
| .0080" | C17-0080-20-36 | |
| .0100" | C17-0100-20-36 | |
| .0120" | C17-0120-20-36 | |
| .0140" | C17-0140-20-36 | |
| .0156" | C17-0156-20-36 | |
| .0180" | C17-0180-20-36 | |
| .0200" | C17-0200-20-36 | K17-0200-20-36 |
| .0230" | C17-0230-20-36 | K17-0230-20-36 |
| .0250" | C17-0250-20-36 | K17-0250-20-36 |
| .0280" | C17-0280-20-36 | K17-0280-20-36 |
| .0312" | C17-0312-20-36 | K17-0312-20-36 |
| .0350" | C17-0350-20-36 | K17-0350-20-36 |
| .0400" | C17-0400-20-36 | K17-0400-20-36 |
| .0468" | C17-0468-20-36 | K17-0468-20-36 |
| .0510" | C17-0510-20-36 | K17-0510-20-36 |
| .0625" | C17-0625-20-36 | K17-0625-20-36 |
| .0781" | C17-0781-20-36 | K17-0781-20-36 |
| .0937" | C17-0937-20-36 | K17-0937-20-36 |
| .1250" | C17-1250-20-36 | K17-1250-20-36 |
| .1562" | C17-1562-20-36 | K17-1562-20-36 |
| .1875" | C17-1875-20-36 | K17-1875-20-36 |
| .2500" | C17-2500-20-36 | K17-2500-20-36 |



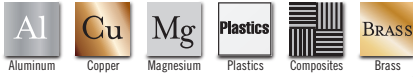
Solid carbide spacers and flanges for 1-3/4" saws are available with 1/2" arbor holes in diameters ranging from .750" to 1.650" and thicknesses from .002" to .250". Call for price and delivery.

Solid carbide spacers and flanges for 1-3/4" saws are available with 5/8" arbor holes in diameters ranging from .875" to 1.650" and thicknesses from .002" to .250". Call for price and delivery.

SAWS Solid Carbide

1 3/4" Diameter **7/8" Arbor**

Proper Max Depth of Cut:
Using AB Arbor = .200"
Using NAB Arbor = .108"



Use if
DOC is
more
than
5X saw
thickness

24 TEETH

| Saw Thickness | Standard Concavity | Alternate Tooth Chamfer Double Concavity 1-1/4" HUB Diameter |
|---------------|--------------------|--|
| .0020" | C17-0020-28-24 | |
| .0040" | C17-0040-28-24 | |
| .0060" | C17-0060-28-24 | |
| .0080" | C17-0080-28-24 | |
| .0100" | C17-0100-28-24 | |
| .0120" | C17-0120-28-24 | |
| .0140" | C17-0140-28-24 | |
| .0156" | C17-0156-28-24 | |
| .0180" | C17-0180-28-24 | |
| .0200" | C17-0200-28-24 | K17-0200-28-24 |
| .0230" | C17-0230-28-24 | K17-0230-28-24 |
| .0250" | C17-0250-28-24 | K17-0250-28-24 |
| .0280" | C17-0280-28-24 | K17-0280-28-24 |
| .0312" | C17-0312-28-24 | K17-0312-28-24 |
| .0350" | C17-0350-28-24 | K17-0350-28-24 |
| .0400" | C17-0400-28-24 | K17-0400-28-24 |
| .0468" | C17-0468-28-24 | K17-0468-28-24 |
| .0510" | C17-0510-28-24 | K17-0510-28-24 |
| .0625" | C17-0625-28-24 | K17-0625-28-24 |
| .0781" | C17-0781-28-24 | K17-0781-28-24 |
| .0937" | C17-0937-28-24 | K17-0937-28-24 |
| .1250" | C17-1250-28-24 | K17-1250-28-24 |
| .1562" | C17-1562-28-24 | K17-1562-28-24 |
| .1875" | C17-1875-28-24 | K17-1875-28-24 |
| .2500" | C17-2500-28-24 | K17-2500-28-24 |

Any Saw
Thickness
Available

2" Diameter **1/2" Arbor**

Proper Max Depth of Cut:
Using AB Arbor = .575"
Using NAB Arbor = .525"



Use if
DOC is
more
than
5X saw
thickness

24 TEETH

| Saw Thickness | Standard Concavity | Alternate Tooth Chamfer Double Concavity 3/4" HUB Diameter |
|---------------|--------------------|--|
| .0020" | C20-0020-16-24 | |
| .0040" | C20-0040-16-24 | |
| .0060" | C20-0060-16-24 | |
| .0080" | C20-0080-16-24 | |
| .0100" | C20-0100-16-24 | |
| .0120" | C20-0120-16-24 | |
| .0140" | C20-0140-16-24 | |
| .0156" | C20-0156-16-24 | |
| .0180" | C20-0180-16-24 | |
| .0200" | C20-0200-16-24 | K20-0200-16-24 |
| .0230" | C20-0230-16-24 | K20-0230-16-24 |
| .0250" | C20-0250-16-24 | K20-0250-16-24 |
| .0280" | C20-0280-16-24 | K20-0280-16-24 |
| .0312" | C20-0312-16-24 | K20-0312-16-24 |
| .0350" | C20-0350-16-24 | K20-0350-16-24 |
| .0400" | C20-0400-16-24 | K20-0400-16-24 |
| .0468" | C20-0468-16-24 | K20-0468-16-24 |
| .0510" | C20-0510-16-24 | K20-0510-16-24 |
| .0625" | C20-0625-16-24 | K20-0625-16-24 |
| .0781" | C20-0781-16-24 | K20-0781-16-24 |
| .0937" | C20-0937-16-24 | K20-0937-16-24 |
| .1250" | C20-1250-16-24 | K20-1250-16-24 |
| .1562" | C20-1562-16-24 | K20-1562-16-24 |
| .1875" | C20-1875-16-24 | K20-1875-16-24 |
| .2500" | C20-2500-16-24 | K20-2500-16-24 |



Use if
DOC is
more
than
5X saw
thickness

36 TEETH

| Saw Thickness | Standard Concavity | Alternate Tooth Chamfer Double Concavity 1-1/4" HUB Diameter |
|---------------|--------------------|--|
| .0020" | C17-0020-28-36 | |
| .0040" | C17-0040-28-36 | |
| .0060" | C17-0060-28-36 | |
| .0080" | C17-0080-28-36 | |
| .0100" | C17-0100-28-36 | |
| .0120" | C17-0120-28-36 | |
| .0140" | C17-0140-28-36 | |
| .0156" | C17-0156-28-36 | |
| .0180" | C17-0180-28-36 | |
| .0200" | C17-0200-28-36 | K17-0200-28-36 |
| .0230" | C17-0230-28-36 | K17-0230-28-36 |
| .0250" | C17-0250-28-36 | K17-0250-28-36 |
| .0280" | C17-0280-28-36 | K17-0280-28-36 |
| .0312" | C17-0312-28-36 | K17-0312-28-36 |
| .0350" | C17-0350-28-36 | K17-0350-28-36 |
| .0400" | C17-0400-28-36 | K17-0400-28-36 |
| .0468" | C17-0468-28-36 | K17-0468-28-36 |
| .0510" | C17-0510-28-36 | K17-0510-28-36 |
| .0625" | C17-0625-28-36 | K17-0625-28-36 |
| .0781" | C17-0781-28-36 | K17-0781-28-36 |
| .0937" | C17-0937-28-36 | K17-0937-28-36 |
| .1250" | C17-1250-28-36 | K17-1250-28-36 |
| .1562" | C17-1562-28-36 | K17-1562-28-36 |
| .1875" | C17-1875-28-36 | K17-1875-28-36 |
| .2500" | C17-2500-28-36 | K17-2500-28-36 |

Any Saw
Thickness
Available



Use if
DOC is
more
than
5X saw
thickness

48 TEETH

| Saw Thickness | Standard Concavity | Alternate Tooth Chamfer Double Concavity 3/4" HUB Diameter |
|---------------|--------------------|--|
| .0020" | C20-0020-16-48 | |
| .0040" | C20-0040-16-48 | |
| .0060" | C20-0060-16-48 | |
| .0080" | C20-0080-16-48 | |
| .0100" | C20-0100-16-48 | |
| .0120" | C20-0120-16-48 | |
| .0140" | C20-0140-16-48 | |
| .0156" | C20-0156-16-48 | |
| .0180" | C20-0180-16-48 | |
| .0200" | C20-0200-16-48 | K20-0200-16-48 |
| .0230" | C20-0230-16-48 | K20-0230-16-48 |
| .0250" | C20-0250-16-48 | K20-0250-16-48 |
| .0280" | C20-0280-16-48 | K20-0280-16-48 |
| .0312" | C20-0312-16-48 | K20-0312-16-48 |
| .0350" | C20-0350-16-48 | K20-0350-16-48 |
| .0400" | C20-0400-16-48 | K20-0400-16-48 |
| .0468" | C20-0468-16-48 | K20-0468-16-48 |
| .0510" | C20-0510-16-48 | K20-0510-16-48 |
| .0625" | C20-0625-16-48 | K20-0625-16-48 |
| .0781" | C20-0781-16-48 | K20-0781-16-48 |
| .0937" | C20-0937-16-48 | K20-0937-16-48 |
| .1250" | C20-1250-16-48 | K20-1250-16-48 |
| .1562" | C20-1562-16-48 | K20-1562-16-48 |
| .1875" | C20-1875-16-48 | K20-1875-16-48 |
| .2500" | C20-2500-16-48 | K20-2500-16-48 |

Solid carbide spacers and flanges for 1-3/4" saws are available with 7/8" arbor holes in diameters ranging from 1.125" to 1.650" and thicknesses from .002" to .250". Call for price and delivery.

Solid carbide spacers and flanges for 2" saws are available with 1/2" arbor holes in diameters ranging from .750" to 1.900" and thicknesses from .004" to .250". Call for price and delivery.

Solid Carbide SAWS

2" Diameter **1" Arbor**

Proper Max Depth of Cut:
Using AB Arbor = .200"
Using NAB Arbor = .210"



Use if DOC is more than 5X saw thickness

24 TEETH

| Saw Thickness | Standard Concavity | Alternate Tooth Chamfer Double Concavity 1-1/2" HUB Diameter |
|---------------|--------------------|--|
| .0020" | C20-0020-32-24 | |
| .0040" | C20-0040-32-24 | |
| .0060" | C20-0060-32-24 | |
| .0080" | C20-0080-32-24 | |
| .0100" | C20-0100-32-24 | |
| .0120" | C20-0120-32-24 | |
| .0140" | C20-0140-32-24 | |
| .0156" | C20-0156-32-24 | |
| .0180" | C20-0180-32-24 | |
| .0200" | C20-0200-32-24 | |
| .0230" | C20-0230-32-24 | |
| .0250" | C20-0250-32-24 | |
| .0280" | C20-0280-32-24 | |
| .0312" | C20-0312-32-24 | |
| .0350" | C20-0350-32-24 | |
| .0400" | C20-0400-32-24 | |
| .0468" | C20-0468-32-24 | |
| .0510" | C20-0510-32-24 | |
| .0625" | C20-0625-32-24 | |
| .0781" | C20-0781-32-24 | |
| .0937" | C20-0937-32-24 | |
| .1250" | C20-1250-32-24 | |
| .1562" | C20-1562-32-24 | |
| .1875" | C20-1875-32-24 | |
| .2500" | C20-2500-32-24 | |

Any Saw Thickness Available

2 1/4" Diameter **5/8" Arbor**

Proper Max Depth of Cut:
Using AB Arbor = .575"
Using NAB Arbor = .5375"



Use if DOC is more than 5X saw thickness

28 TEETH

| Saw Thickness | Standard Concavity | Alternate Tooth Chamfer Double Concavity 1" HUB Diameter |
|---------------|--------------------|--|
| .0020" | C22-0020-20-28 | |
| .0040" | C22-0040-20-28 | |
| .0060" | C22-0060-20-28 | |
| .0080" | C22-0080-20-28 | |
| .0100" | C22-0100-20-28 | |
| .0120" | C22-0120-20-28 | |
| .0140" | C22-0140-20-28 | |
| .0156" | C22-0156-20-28 | |
| .0180" | C22-0180-20-28 | |
| .0200" | C22-0200-20-28 | |
| .0230" | C22-0230-20-28 | |
| .0250" | C22-0250-20-28 | |
| .0280" | C22-0280-20-28 | |
| .0312" | C22-0312-20-28 | |
| .0350" | C22-0350-20-28 | |
| .0400" | C22-0400-20-28 | |
| .0468" | C22-0468-20-28 | |
| .0510" | C22-0510-20-28 | |
| .0625" | C22-0625-20-28 | |
| .0781" | C22-0781-20-28 | |
| .0937" | C22-0937-20-28 | |
| .1250" | C22-1250-20-28 | |
| .1562" | C22-1562-20-28 | |
| .1875" | C22-1875-20-28 | |
| .2500" | C22-2500-20-28 | |



Use if DOC is more than 5X saw thickness

48 TEETH

| Saw Thickness | Standard Concavity | Alternate Tooth Chamfer Double Concavity 1-1/2" HUB Diameter |
|---------------|--------------------|--|
| .0020" | C20-0020-32-48 | |
| .0040" | C20-0040-32-48 | |
| .0060" | C20-0060-32-48 | |
| .0080" | C20-0080-32-48 | |
| .0100" | C20-0100-32-48 | |
| .0120" | C20-0120-32-48 | |
| .0140" | C20-0140-32-48 | |
| .0156" | C20-0156-32-48 | |
| .0180" | C20-0180-32-48 | |
| .0200" | C20-0200-32-48 | |
| .0230" | C20-0230-32-48 | |
| .0250" | C20-0250-32-48 | |
| .0280" | C20-0280-32-48 | |
| .0312" | C20-0312-32-48 | |
| .0350" | C20-0350-32-48 | |
| .0400" | C20-0400-32-48 | |
| .0468" | C20-0468-32-48 | |
| .0510" | C20-0510-32-48 | |
| .0625" | C20-0625-32-48 | |
| .0781" | C20-0781-32-48 | |
| .0937" | C20-0937-32-48 | |
| .1250" | C20-1250-32-48 | |
| .1562" | C20-1562-32-48 | |
| .1875" | C20-1875-32-48 | |
| .2500" | C20-2500-32-48 | |

Any Saw Thickness Available



Use if DOC is more than 5X saw thickness

56 TEETH

| Saw Thickness | Standard Concavity | Alternate Tooth Chamfer Double Concavity 1" HUB Diameter |
|---------------|--------------------|--|
| .0020" | C22-0020-20-56 | |
| .0040" | C22-0040-20-56 | |
| .0060" | C22-0060-20-56 | |
| .0080" | C22-0080-20-56 | |
| .0100" | C22-0100-20-56 | |
| .0120" | C22-0120-20-56 | |
| .0140" | C22-0140-20-56 | |
| .0156" | C22-0156-20-56 | |
| .0180" | C22-0180-20-56 | |
| .0200" | C22-0200-20-56 | |
| .0230" | C22-0230-20-56 | |
| .0250" | C22-0250-20-56 | |
| .0280" | C22-0280-20-56 | |
| .0312" | C22-0312-20-56 | |
| .0350" | C22-0350-20-56 | |
| .0400" | C22-0400-20-56 | |
| .0468" | C22-0468-20-56 | |
| .0510" | C22-0510-20-56 | |
| .0625" | C22-0625-20-56 | |
| .0781" | C22-0781-20-56 | |
| .0937" | C22-0937-20-56 | |
| .1250" | C22-1250-20-56 | |
| .1562" | C22-1562-20-56 | |
| .1875" | C22-1875-20-56 | |
| .2500" | C22-2500-20-56 | |

Solid carbide spacers and flanges for 2" saws are available with 1" arbor holes in diameters ranging from 1.250" to 1.900" and thicknesses from .004" to .250". Call for price and delivery.

Solid carbide spacers and flanges for 2-1/4" saws are available with 5/8" arbor holes in diameters ranging from .875" to 2.150" and thicknesses from .004" to .250". Call for price and delivery.

SAWS Solid Carbide

2 1/2" Diameter **1" Arbor**

Proper Max Depth of Cut:
Using AB Arbor = .450"
Using NAB Arbor = .460"



Use if
DOC is
more
than
5X saw
thickness

28 TEETH

| Saw Thickness | Standard Concavity | Alternate Tooth Chamfer Double Concavity 1-1/2" HUB Diameter |
|---------------|--------------------|--|
| .0020" | C25-0020-32-28 | |
| .0040" | C25-0040-32-28 | |
| .0060" | C25-0060-32-28 | |
| .0080" | C25-0080-32-28 | |
| .0100" | C25-0100-32-28 | |
| .0120" | C25-0120-32-28 | |
| .0140" | C25-0140-32-28 | |
| .0156" | C25-0156-32-28 | |
| .0180" | C25-0180-32-28 | |
| .0200" | C25-0200-32-28 | |
| .0230" | C25-0230-32-28 | K25-0200-32-28 |
| .0250" | C25-0250-32-28 | K25-0230-32-28 |
| .0280" | C25-0280-32-28 | K25-0250-32-28 |
| .0312" | C25-0312-32-28 | K25-0280-32-28 |
| .0350" | C25-0350-32-28 | K25-0312-32-28 |
| .0400" | C25-0400-32-28 | K25-0350-32-28 |
| .0468" | C25-0468-32-28 | K25-0400-32-28 |
| .0510" | C25-0510-32-28 | K25-0468-32-28 |
| .0625" | C25-0625-32-28 | K25-0510-32-28 |
| .0781" | C25-0781-32-28 | K25-0625-32-28 |
| .0937" | C25-0937-32-28 | K25-0781-32-28 |
| .1250" | C25-1250-32-28 | K25-0937-32-28 |
| .1562" | C25-1562-32-28 | K25-1250-32-28 |
| .1875" | C25-1875-32-28 | K25-1562-32-28 |
| .2500" | C25-2500-32-28 | K25-1875-32-28 |
| | | K25-2500-32-28 |

Any Saw
Thickness
Available

2 3/4" Diameter **1" Arbor**

Proper Max Depth of Cut:
Using AB Arbor = .575"
Using NAB Arbor = .585"



Use if
DOC is
more
than
5X saw
thickness

30 TEETH

| Saw Thickness | Standard Concavity | Alternate Tooth Chamfer Double Concavity 1-1/2" HUB Diameter |
|---------------|--------------------|--|
| .0020" | C27-0020-32-30 | |
| .0040" | C27-0040-32-30 | |
| .0060" | C27-0060-32-30 | |
| .0080" | C27-0080-32-30 | |
| .0100" | C27-0100-32-30 | |
| .0120" | C27-0120-32-30 | |
| .0140" | C27-0140-32-30 | |
| .0156" | C27-0156-32-30 | |
| .0180" | C27-0180-32-30 | |
| .0200" | C27-0200-32-30 | |
| .0230" | C27-0230-32-30 | K27-0200-32-30 |
| .0250" | C27-0250-32-30 | K27-0230-32-30 |
| .0280" | C27-0280-32-30 | K27-0250-32-30 |
| .0312" | C27-0312-32-30 | K27-0280-32-30 |
| .0350" | C27-0350-32-30 | K27-0312-32-30 |
| .0400" | C27-0400-32-30 | K27-0350-32-30 |
| .0468" | C27-0468-32-30 | K27-0400-32-30 |
| .0510" | C27-0510-32-30 | K27-0468-32-30 |
| .0625" | C27-0625-32-30 | K27-0510-32-30 |
| .0781" | C27-0781-32-30 | K27-0625-32-30 |
| .0937" | C27-0937-32-30 | K27-0781-32-30 |
| .1250" | C27-1250-32-30 | K27-0937-32-30 |
| .1562" | C27-1562-32-30 | K27-1250-32-30 |
| .1875" | C27-1875-32-30 | K27-1562-32-30 |
| .2500" | C27-2500-32-30 | K27-1875-32-30 |
| | | K27-2500-32-30 |

Use if
DOC is
more
than
5X saw
thickness



Use if
DOC is
more
than
5X saw
thickness

56 TEETH

| Saw Thickness | Standard Concavity | Alternate Tooth Chamfer Double Concavity 1-1/2" HUB Diameter |
|---------------|--------------------|--|
| .0020" | C25-0020-32-56 | |
| .0040" | C25-0040-32-56 | |
| .0060" | C25-0060-32-56 | |
| .0080" | C25-0080-32-56 | |
| .0100" | C25-0100-32-56 | |
| .0120" | C25-0120-32-56 | |
| .0140" | C25-0140-32-56 | |
| .0156" | C25-0156-32-56 | |
| .0180" | C25-0180-32-56 | |
| .0200" | C25-0200-32-56 | |
| .0230" | C25-0230-32-56 | K25-0200-32-56 |
| .0250" | C25-0250-32-56 | K25-0230-32-56 |
| .0280" | C25-0280-32-56 | K25-0250-32-56 |
| .0312" | C25-0312-32-56 | K25-0280-32-56 |
| .0350" | C25-0350-32-56 | K25-0312-32-56 |
| .0400" | C25-0400-32-56 | K25-0350-32-56 |
| .0468" | C25-0468-32-56 | K25-0400-32-56 |
| .0510" | C25-0510-32-56 | K25-0468-32-56 |
| .0625" | C25-0625-32-56 | K25-0510-32-56 |
| .0781" | C25-0781-32-56 | K25-0625-32-56 |
| .0937" | C25-0937-32-56 | K25-0781-32-56 |
| .1250" | C25-1250-32-56 | K25-0937-32-56 |
| .1562" | C25-1562-32-56 | K25-1250-32-56 |
| .1875" | C25-1875-32-56 | K25-1562-32-56 |
| .2500" | C25-2500-32-56 | K25-1875-32-56 |
| | | K25-2500-32-56 |

Any Saw
Thickness
Available



Use if
DOC is
more
than
5X saw
thickness

60 TEETH

| Saw Thickness | Standard Concavity | Alternate Tooth Chamfer Double Concavity 1-1/2" HUB Diameter |
|---------------|--------------------|--|
| .0020" | C27-0020-32-60 | |
| .0040" | C27-0040-32-60 | |
| .0060" | C27-0060-32-60 | |
| .0080" | C27-0080-32-60 | |
| .0100" | C27-0100-32-60 | |
| .0120" | C27-0120-32-60 | |
| .0140" | C27-0140-32-60 | |
| .0156" | C27-0156-32-60 | |
| .0180" | C27-0180-32-60 | |
| .0200" | C27-0200-32-60 | |
| .0230" | C27-0230-32-60 | K27-0200-32-60 |
| .0250" | C27-0250-32-60 | K27-0230-32-60 |
| .0280" | C27-0280-32-60 | K27-0250-32-60 |
| .0312" | C27-0312-32-60 | K27-0280-32-60 |
| .0350" | C27-0350-32-60 | K27-0312-32-60 |
| .0400" | C27-0400-32-60 | K27-0350-32-60 |
| .0468" | C27-0468-32-60 | K27-0400-32-60 |
| .0510" | C27-0510-32-60 | K27-0468-32-60 |
| .0625" | C27-0625-32-60 | K27-0510-32-60 |
| .0781" | C27-0781-32-60 | K27-0625-32-60 |
| .0937" | C27-0937-32-60 | K27-0781-32-60 |
| .1250" | C27-1250-32-60 | K27-0937-32-60 |
| .1562" | C27-1562-32-60 | K27-1250-32-60 |
| .1875" | C27-1875-32-60 | K27-1562-32-60 |
| .2500" | C27-2500-32-60 | K27-1875-32-60 |
| | | K27-2500-32-60 |

Use if
DOC is
more
than
5X saw
thickness

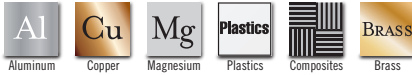
Solid carbide spacers and flanges for 2-1/2" saws are available with 1" arbor holes in diameters ranging from 1.250" to 2.400" and thicknesses from .004" to .250". Call for price and delivery.

Solid carbide spacers and flanges for 2-3/4" saws are available with 1" arbor holes in diameters ranging from 1.250" to 2.65" and thicknesses from .004" to .250". Call for price and delivery.

Solid Carbide SAWS

3" Diameter **1" Arbor**

Proper Max Depth of Cut:
Using AB Arbor = .700"
Using NAB Arbor = .710"



Use if DOC is more than 5X saw thickness

| 30 TEETH | | Alternate Tooth Chamfer Double Concavity 1-1/2" HUB Diameter | |
|---------------|--------------------|--|----------------|
| Saw Thickness | Standard Concavity | | |
| .0020" | C30-0020-32-30 | | |
| .0040" | C30-0040-32-30 | | |
| .0060" | C30-0060-32-30 | | |
| .0080" | C30-0080-32-30 | | |
| .0100" | C30-0100-32-30 | | |
| .0120" | C30-0120-32-30 | | |
| .0140" | C30-0140-32-30 | | |
| .0156" | C30-0156-32-30 | | |
| .0180" | C30-0180-32-30 | | |
| .0200" | C30-0200-32-30 | | K30-0200-32-30 |
| .0230" | C30-0230-32-30 | | K30-0230-32-30 |
| .0250" | C30-0250-32-30 | | K30-0250-32-30 |
| .0280" | C30-0280-32-30 | | K30-0280-32-30 |
| .0312" | C30-0312-32-30 | | K30-0312-32-30 |
| .0350" | C30-0350-32-30 | | K30-0350-32-30 |
| .0400" | C30-0400-32-30 | K30-0400-32-30 | |
| .0468" | C30-0468-32-30 | K30-0468-32-30 | |
| .0510" | C30-0510-32-30 | K30-0510-32-30 | |
| .0625" | C30-0625-32-30 | K30-0625-32-30 | |
| .0781" | C30-0781-32-30 | K30-0781-32-30 | |
| .0937" | C30-0937-32-30 | K30-0937-32-30 | |
| .1250" | C30-1250-32-30 | K30-1250-32-30 | |
| .1562" | C30-1562-32-30 | K30-1562-32-30 | |
| .1875" | C30-1875-32-30 | K30-1875-32-30 | |
| .2500" | C30-2500-32-30 | K30-2500-32-30 | |

Any Saw Thickness Available

4" Diameter **1" Arbor**

Proper Max Depth of Cut:
Using AB Arbor = 1.200"
Using NAB Arbor = 1.210"



Use if DOC is more than 5X saw thickness

| 36 TEETH | | Alternate Tooth Chamfer Double Concavity 1-1/2" HUB Diameter | |
|---------------|--------------------|--|----------------|
| Saw Thickness | Standard Concavity | | |
| .0020" | C40-0020-32-36 | | |
| .0040" | C40-0040-32-36 | | |
| .0060" | C40-0060-32-36 | | |
| .0080" | C40-0080-32-36 | | |
| .0100" | C40-0100-32-36 | | |
| .0120" | C40-0120-32-36 | | |
| .0140" | C40-0140-32-36 | | |
| .0156" | C40-0156-32-36 | | |
| .0180" | C40-0180-32-36 | | |
| .0200" | C40-0200-32-36 | | K40-0200-32-36 |
| .0230" | C40-0230-32-36 | | K40-0230-32-36 |
| .0250" | C40-0250-32-36 | | K40-0250-32-36 |
| .0280" | C40-0280-32-36 | | K40-0280-32-36 |
| .0312" | C40-0312-32-36 | | K40-0312-32-36 |
| .0350" | C40-0350-32-36 | | K40-0350-32-36 |
| .0400" | C40-0400-32-36 | K40-0400-32-36 | |
| .0468" | C40-0468-32-36 | K40-0468-32-36 | |
| .0510" | C40-0510-32-36 | K40-0510-32-36 | |
| .0625" | C40-0625-32-36 | K40-0625-32-36 | |
| .0781" | C40-0781-32-36 | K40-0781-32-36 | |
| .0937" | C40-0937-32-36 | K40-0937-32-36 | |
| .1250" | C40-1250-32-36 | K40-1250-32-36 | |
| .1562" | C40-1562-32-36 | K40-1562-32-36 | |
| .1875" | C40-1875-32-36 | K40-1875-32-36 | |
| .2500" | C40-2500-32-36 | K40-2500-32-36 | |



Use if DOC is more than 5X saw thickness

| 60 TEETH | | Alternate Tooth Chamfer Double Concavity 1-1/2" HUB Diameter | |
|---------------|--------------------|--|----------------|
| Saw Thickness | Standard Concavity | | |
| .0020" | C30-0020-32-60 | | |
| .0040" | C30-0040-32-60 | | |
| .0060" | C30-0060-32-60 | | |
| .0080" | C30-0080-32-60 | | |
| .0100" | C30-0100-32-60 | | |
| .0120" | C30-0120-32-60 | | |
| .0140" | C30-0140-32-60 | | |
| .0156" | C30-0156-32-60 | | |
| .0180" | C30-0180-32-60 | | |
| .0200" | C30-0200-32-60 | | K30-0200-32-60 |
| .0230" | C30-0230-32-60 | | K30-0230-32-60 |
| .0250" | C30-0250-32-60 | | K30-0250-32-60 |
| .0280" | C30-0280-32-60 | | K30-0280-32-60 |
| .0312" | C30-0312-32-60 | | K30-0312-32-60 |
| .0350" | C30-0350-32-60 | | K30-0350-32-60 |
| .0400" | C30-0400-32-60 | K30-0400-32-60 | |
| .0468" | C30-0468-32-60 | K30-0468-32-60 | |
| .0510" | C30-0510-32-60 | K30-0510-32-60 | |
| .0625" | C30-0625-32-60 | K30-0625-32-60 | |
| .0781" | C30-0781-32-60 | K30-0781-32-60 | |
| .0937" | C30-0937-32-60 | K30-0937-32-60 | |
| .1250" | C30-1250-32-60 | K30-1250-32-60 | |
| .1562" | C30-1562-32-60 | K30-1562-32-60 | |
| .1875" | C30-1875-32-60 | K30-1875-32-60 | |
| .2500" | C30-2500-32-60 | K30-2500-32-60 | |

Any Saw Thickness Available



Use if DOC is more than 5X saw thickness

| 72 TEETH | | Alternate Tooth Chamfer Double Concavity 1-1/2" HUB Diameter | |
|---------------|--------------------|--|----------------|
| Saw Thickness | Standard Concavity | | |
| .0020" | C40-0020-32-72 | | |
| .0040" | C40-0040-32-72 | | |
| .0060" | C40-0060-32-72 | | |
| .0080" | C40-0080-32-72 | | |
| .0100" | C40-0100-32-72 | | |
| .0120" | C40-0120-32-72 | | |
| .0140" | C40-0140-32-72 | | |
| .0156" | C40-0156-32-72 | | |
| .0180" | C40-0180-32-72 | | |
| .0200" | C40-0200-32-72 | | K40-0200-32-72 |
| .0230" | C40-0230-32-72 | | K40-0230-32-72 |
| .0250" | C40-0250-32-72 | | K40-0250-32-72 |
| .0280" | C40-0280-32-72 | | K40-0280-32-72 |
| .0312" | C40-0312-32-72 | | K40-0312-32-72 |
| .0350" | C40-0350-32-72 | | K40-0350-32-72 |
| .0400" | C40-0400-32-72 | K40-0400-32-72 | |
| .0468" | C40-0468-32-72 | K40-0468-32-72 | |
| .0510" | C40-0510-32-72 | K40-0510-32-72 | |
| .0625" | C40-0625-32-72 | K40-0625-32-72 | |
| .0781" | C40-0781-32-72 | K40-0781-32-72 | |
| .0937" | C40-0937-32-72 | K40-0937-32-72 | |
| .1250" | C40-1250-32-72 | K40-1250-32-72 | |
| .1562" | C40-1562-32-72 | K40-1562-32-72 | |
| .1875" | C40-1875-32-72 | K40-1875-32-72 | |
| .2500" | C40-2500-32-72 | K40-2500-32-72 | |

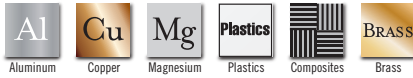
Solid carbide spacers and flanges for 3" saws are available with 1" arbor holes in diameters ranging from 1.250" to 2.900" and thicknesses from .006" to .250". Call for price and delivery.

Solid carbide spacers and flanges for 4" saws are available with 1" arbor holes in diameters ranging from 1.250" to 3.900" and thicknesses from .006" to .250". Call for price and delivery.

SAWS Solid Carbide

20 mm Diameter **5** mm Arbor

Proper Max Depth of Cut:
Using MSA Arbor = 3.5 mm



Use if
DOC is
more
than
5X saw
thickness

| 10 TEETH METRIC | | Alternate Tooth Chamfer Double Concavity 12mm HUB Diameter |
|-----------------|--------------------|--|
| Saw Thickness | Standard Concavity | |
| .05 mm | M20-0050-05-10 | |
| .10 mm | M20-0100-05-10 | |
| .15 mm | M20-0150-05-10 | |
| .20 mm | M20-0200-05-10 | |
| .40 mm | M20-0400-05-10 | |
| .60 mm | M20-0600-05-10 | MK20-0600-05-10 |
| 1.00 mm | M20-1000-05-10 | MK20-1000-05-10 |
| 1.20 mm | M20-1200-05-10 | MK20-1200-05-10 |
| 1.60 mm | M20-1600-05-10 | MK20-1600-05-10 |
| 2.00 mm | M20-2000-05-10 | MK20-2000-05-10 |
| 2.50 mm | M20-2500-05-10 | MK20-2500-05-10 |
| 3.00 mm | M20-3000-05-10 | MK20-3000-05-10 |
| 4.00 mm | M20-4000-05-10 | MK20-4000-05-10 |
| 5.00 mm | M20-5000-05-10 | MK20-5000-05-10 |
| 6.00 mm | M20-6000-05-10 | MK20-6000-05-10 |

Any Saw
Thickness
Available



Use if
DOC is
more
than
5X saw
thickness

| 20 TEETH METRIC | | Alternate Tooth Chamfer Double Concavity 12mm HUB Diameter |
|-----------------|--------------------|--|
| Saw Thickness | Standard Concavity | |
| .05 mm | M20-0050-05-20 | |
| .10 mm | M20-0100-05-20 | |
| .15 mm | M20-0150-05-20 | |
| .20 mm | M20-0200-05-20 | |
| .40 mm | M20-0400-05-20 | |
| .60 mm | M20-0600-05-20 | MK20-0600-05-20 |
| 1.00 mm | M20-1000-05-20 | MK20-1000-05-20 |
| 1.20 mm | M20-1200-05-20 | MK20-1200-05-20 |
| 1.60 mm | M20-1600-05-20 | MK20-1600-05-20 |
| 2.00 mm | M20-2000-05-20 | MK20-2000-05-20 |
| 2.50 mm | M20-2500-05-20 | MK20-2500-05-20 |
| 3.00 mm | M20-3000-05-20 | MK20-3000-05-20 |
| 4.00 mm | M20-4000-05-20 | MK20-4000-05-20 |
| 5.00 mm | M20-5000-05-20 | MK20-5000-05-20 |
| 6.00 mm | M20-6000-05-20 | MK20-6000-05-20 |

Solid carbide spacers and flanges available. See back of Saws section.

25 mm Diameter **8** mm Arbor

Proper Max Depth of Cut:
Using MSA Arbor = 4.0 mm



Use if
DOC is
more
than
5X saw
thickness

| 12 TEETH METRIC | | Alternate Tooth Chamfer Double Concavity 16mm HUB Diameter |
|-----------------|--------------------|--|
| Saw Thickness | Standard Concavity | |
| .05 mm | M25-0050-08-12 | |
| .10 mm | M25-0100-08-12 | |
| .15 mm | M25-0150-08-12 | |
| .20 mm | M25-0200-08-12 | |
| .40 mm | M25-0400-08-12 | |
| .60 mm | M25-0600-08-12 | MK25-0600-08-12 |
| 1.00 mm | M25-1000-08-12 | MK25-1000-08-12 |
| 1.20 mm | M25-1200-08-12 | MK25-1200-08-12 |
| 1.60 mm | M25-1600-08-12 | MK25-1600-08-12 |
| 2.00 mm | M25-2000-08-12 | MK25-2000-08-12 |
| 2.50 mm | M25-2500-08-12 | MK25-2500-08-12 |
| 3.00 mm | M25-3000-08-12 | MK25-3000-08-12 |
| 4.00 mm | M25-4000-08-12 | MK25-4000-08-12 |
| 5.00 mm | M25-5000-08-12 | MK25-5000-08-12 |
| 6.00 mm | M25-6000-08-12 | MK25-6000-08-12 |



Use if
DOC is
more
than
5X saw
thickness

| 24 TEETH METRIC | | Alternate Tooth Chamfer Double Concavity 16mm HUB Diameter |
|-----------------|--------------------|--|
| Saw Thickness | Standard Concavity | |
| .05 mm | M25-0050-08-24 | |
| .10 mm | M25-0100-08-24 | |
| .15 mm | M25-0150-08-24 | |
| .20 mm | M25-0200-08-24 | |
| .40 mm | M25-0400-08-24 | |
| .60 mm | M25-0600-08-24 | MK25-0600-08-24 |
| 1.00 mm | M25-1000-08-24 | MK25-1000-08-24 |
| 1.20 mm | M25-1200-08-24 | MK25-1200-08-24 |
| 1.60 mm | M25-1600-08-24 | MK25-1600-08-24 |
| 2.00 mm | M25-2000-08-24 | MK25-2000-08-24 |
| 2.50 mm | M25-2500-08-24 | MK25-2500-08-24 |
| 3.00 mm | M25-3000-08-24 | MK25-3000-08-24 |
| 4.00 mm | M25-4000-08-24 | MK25-4000-08-24 |
| 5.00 mm | M25-5000-08-24 | MK25-5000-08-24 |
| 6.00 mm | M25-6000-08-24 | MK25-6000-08-24 |

Solid carbide spacers and flanges available. See back of Saws section.

Any Saw
Thickness
Available!

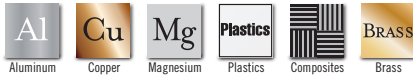
See Price Sheet for
Quantity Discount

Info on Page 108

Solid Carbide SAWS

32 mm Diameter 8 mm Arbor Proper Max Depth of Cut: Using MSA Arbor = 7.5 mm

Any Saw Thickness Available



Use if DOC is more than 5X saw thickness

| 16 TEETH METRIC | | Alternate Tooth Chamfer Double Concavity 16mm HUB Diameter |
|-----------------|--------------------|--|
| Saw Thickness | Standard Concavity | |
| .10 mm | M32-0100-08-16 | — |
| .15 mm | M32-0150-08-16 | — |
| .20 mm | M32-0200-08-16 | — |
| .40 mm | M32-0400-08-16 | — |
| .60 mm | M32-0600-08-16 | MK32-0600-08-16 |
| 1.00 mm | M32-1000-08-16 | MK32-1000-08-16 |
| 1.20 mm | M32-1200-08-16 | MK32-1200-08-16 |
| 1.60 mm | M32-1600-08-16 | MK32-1600-08-16 |
| 2.00 mm | M32-2000-08-16 | MK32-2000-08-16 |
| 2.50 mm | M32-2500-08-16 | MK32-2500-08-16 |
| 3.00 mm | M32-3000-08-16 | MK32-3000-08-16 |
| 4.00 mm | M32-4000-08-16 | MK32-4000-08-16 |
| 5.00 mm | M32-5000-08-16 | MK32-5000-08-16 |
| 6.00 mm | M32-6000-08-16 | MK32-6000-08-16 |



40 mm Diameter 10 mm Arbor Proper Max Depth of Cut: Using MSA Arbor = 10.5 mm



Use if DOC is more than 5X saw thickness

| 16 TEETH METRIC | | Alternate Tooth Chamfer Double Concavity 18mm HUB Diameter |
|-----------------|--------------------|--|
| Saw Thickness | Standard Concavity | |
| .10 mm | M40-0100-10-16 | — |
| .15 mm | M40-0150-10-16 | — |
| .20 mm | M40-0200-10-16 | — |
| .40 mm | M40-0400-10-16 | — |
| .60 mm | M40-0600-10-16 | MK40-0600-10-16 |
| 1.00 mm | M40-1000-10-16 | MK40-1000-10-16 |
| 1.20 mm | M40-1200-10-16 | MK40-1200-10-16 |
| 1.60 mm | M40-1600-10-16 | MK40-1600-10-16 |
| 2.00 mm | M40-2000-10-16 | MK40-2000-10-16 |
| 2.50 mm | M40-2500-10-16 | MK40-2500-10-16 |
| 3.00 mm | M40-3000-10-16 | MK40-3000-10-16 |
| 4.00 mm | M40-4000-10-16 | MK40-4000-10-16 |
| 5.00 mm | M40-5000-10-16 | MK40-5000-10-16 |
| 6.00 mm | M40-6000-10-16 | MK40-6000-10-16 |



Use if DOC is more than 5X saw thickness

| 36 TEETH METRIC | | Alternate Tooth Chamfer Double Concavity 16mm HUB Diameter |
|-----------------|--------------------|--|
| Saw Thickness | Standard Concavity | |
| .10 mm | M32-0100-08-36 | — |
| .15 mm | M32-0150-08-36 | — |
| .20 mm | M32-0200-08-36 | — |
| .40 mm | M32-0400-08-36 | — |
| .60 mm | M32-0600-08-36 | MK32-0600-08-36 |
| 1.00 mm | M32-1000-08-36 | MK32-1000-08-36 |
| 1.20 mm | M32-1200-08-36 | MK32-1200-08-36 |
| 1.60 mm | M32-1600-08-36 | MK32-1600-08-36 |
| 2.00 mm | M32-2000-08-36 | MK32-2000-08-36 |
| 2.50 mm | M32-2500-08-36 | MK32-2500-08-36 |
| 3.00 mm | M32-3000-08-36 | MK32-3000-08-36 |
| 4.00 mm | M32-4000-08-36 | MK32-4000-08-36 |
| 5.00 mm | M32-5000-08-36 | MK32-5000-08-36 |
| 6.00 mm | M32-6000-08-36 | MK32-6000-08-36 |



Use if DOC is more than 5X saw thickness

| 36 TEETH METRIC | | Alternate Tooth Chamfer Double Concavity 18mm HUB Diameter |
|-----------------|--------------------|--|
| Saw Thickness | Standard Concavity | |
| .10 mm | M40-0100-10-36 | — |
| .15 mm | M40-0150-10-36 | — |
| .20 mm | M40-0200-10-36 | — |
| .40 mm | M40-0400-10-36 | — |
| .60 mm | M40-0600-10-36 | MK40-0600-10-36 |
| 1.00 mm | M40-1000-10-36 | MK40-1000-10-36 |
| 1.20 mm | M40-1200-10-36 | MK40-1200-10-36 |
| 1.60 mm | M40-1600-10-36 | MK40-1600-10-36 |
| 2.00 mm | M40-2000-10-36 | MK40-2000-10-36 |
| 2.50 mm | M40-2500-10-36 | MK40-2500-10-36 |
| 3.00 mm | M40-3000-10-36 | MK40-3000-10-36 |
| 4.00 mm | M40-4000-10-36 | MK40-4000-10-36 |
| 5.00 mm | M40-5000-10-36 | MK40-5000-10-36 |
| 6.00 mm | M40-6000-10-36 | MK40-6000-10-36 |



Solid carbide spacers and flanges available. See back of Saws section.

Solid carbide spacers and flanges available. See back of Saws section.

NEW Coatings Available!

JUST ASK! Any Thickness Available!

SAWS Solid Carbide

50 mm Diameter 13 mm Arbor Proper Max Depth of Cut: Using MSA Arbor = 14.5 mm

Any Saw Thickness Available

63 mm Diameter 16 mm Arbor Proper Max Depth of Cut: Using MSA Arbor = 18.5 mm



Use if DOC is more than 5X saw thickness

| 24 TEETH METRIC | | Alternate Tooth Chamfer Double Concavity 20mm HUB Diameter |
|-----------------|--------------------|--|
| Saw Thickness | Standard Concavity | |
| .15 mm | M50-0150-13-24 | — |
| .20 mm | M50-0200-13-24 | — |
| .40 mm | M50-0400-13-24 | — |
| .60 mm | M50-0600-13-24 | MK50-0600-13-24 |
| 1.00 mm | M50-1000-13-24 | MK50-1000-13-24 |
| 1.20 mm | M50-1200-13-24 | MK50-1200-13-24 |
| 1.60 mm | M50-1600-13-24 | MK50-1600-13-24 |
| 2.00 mm | M50-2000-13-24 | MK50-2000-13-24 |
| 2.50 mm | M50-2500-13-24 | MK50-2500-13-24 |
| 3.00 mm | M50-3000-13-24 | MK50-3000-13-24 |
| 4.00 mm | M50-4000-13-24 | MK50-4000-13-24 |
| 5.00 mm | M50-5000-13-24 | MK50-5000-13-24 |
| 6.00 mm | M50-6000-13-24 | MK50-6000-13-24 |



Use if DOC is more than 5X saw thickness

| 28 TEETH METRIC | | Alternate Tooth Chamfer Double Concavity 25mm HUB Diameter |
|-----------------|--------------------|--|
| Saw Thickness | Standard Concavity | |
| .15 mm | M63-0150-16-28 | — |
| .20 mm | M63-0200-16-28 | — |
| .40 mm | M63-0400-16-28 | — |
| .60 mm | M63-0600-16-28 | MK63-0600-16-28 |
| 1.00 mm | M63-1000-16-28 | MK63-1000-16-28 |
| 1.20 mm | M63-1200-16-28 | MK63-1200-16-28 |
| 1.60 mm | M63-1600-16-28 | MK63-1600-16-28 |
| 2.00 mm | M63-2000-16-28 | MK63-2000-16-28 |
| 2.50 mm | M63-2500-16-28 | MK63-2500-16-28 |
| 3.00 mm | M63-3000-16-28 | MK63-3000-16-28 |
| 4.00 mm | M63-4000-16-28 | MK63-4000-16-28 |
| 5.00 mm | M63-5000-16-28 | MK63-5000-16-28 |
| 6.00 mm | M63-6000-16-28 | MK63-6000-16-28 |



Use if DOC is more than 5X saw thickness

| 48 TEETH METRIC | | Alternate Tooth Chamfer Double Concavity 20mm HUB Diameter |
|-----------------|--------------------|--|
| Saw Thickness | Standard Concavity | |
| .15 mm | M50-0150-13-48 | — |
| .20 mm | M50-0200-13-48 | — |
| .40 mm | M50-0400-13-48 | — |
| .60 mm | M50-0600-13-48 | MK50-0600-13-48 |
| 1.00 mm | M50-1000-13-48 | MK50-1000-13-48 |
| 1.20 mm | M50-1200-13-48 | MK50-1200-13-48 |
| 1.60 mm | M50-1600-13-48 | MK50-1600-13-48 |
| 2.00 mm | M50-2000-13-48 | MK50-2000-13-48 |
| 2.50 mm | M50-2500-13-48 | MK50-2500-13-48 |
| 3.00 mm | M50-3000-13-48 | MK50-3000-13-48 |
| 4.00 mm | M50-4000-13-48 | MK50-4000-13-48 |
| 5.00 mm | M50-5000-13-48 | MK50-5000-13-48 |
| 6.00 mm | M50-6000-13-48 | MK50-6000-13-48 |



Use if DOC is more than 5X saw thickness

| 56 TEETH METRIC | | Alternate Tooth Chamfer Double Concavity 25mm HUB Diameter |
|-----------------|--------------------|--|
| Saw Thickness | Standard Concavity | |
| .15 mm | M63-0150-16-56 | — |
| .20 mm | M63-0200-16-56 | — |
| .40 mm | M63-0400-16-56 | — |
| .60 mm | M63-0600-16-56 | MK63-0600-16-56 |
| 1.00 mm | M63-1000-16-56 | MK63-1000-16-56 |
| 1.20 mm | M63-1200-16-56 | MK63-1200-16-56 |
| 1.60 mm | M63-1600-16-56 | MK63-1600-16-56 |
| 2.00 mm | M63-2000-16-56 | MK63-2000-16-56 |
| 2.50 mm | M63-2500-16-56 | MK63-2500-16-56 |
| 3.00 mm | M63-3000-16-56 | MK63-3000-16-56 |
| 4.00 mm | M63-4000-16-56 | MK63-4000-16-56 |
| 5.00 mm | M63-5000-16-56 | MK63-5000-16-56 |
| 6.00 mm | M63-6000-16-56 | MK63-6000-16-56 |



Solid carbide spacers and flanges available. See back of Saws section.

Solid carbide spacers and flanges available. See back of Saws section.

Any Thickness Available!
Just Ask!

Solid Carbide SAWS

80 mm Diameter 22 mm Arbor

Proper Max Depth of Cut:
Using MSA Arbor = 21.5 mm

Any Saw Thickness Available



Use if DOC is more than 5X saw thickness

| 30 TEETH METRIC | | |
|-----------------|--------------------|--|
| Saw Thickness | Standard Concavity | Alternate Tooth Chamfer Double Concavity 35mm HUB Diameter |
| .20 mm | M80-0200-22-30 | — |
| .40 mm | M80-0400-22-30 | — |
| .60 mm | M80-0600-22-30 | MK80-0600-22-30 |
| 1.00 mm | M80-1000-22-30 | MK80-1000-22-30 |
| 1.20 mm | M80-1200-22-30 | MK80-1200-22-30 |
| 1.60 mm | M80-1600-22-30 | MK80-1600-22-30 |
| 2.00 mm | M80-2000-22-30 | MK80-2000-22-30 |
| 2.50 mm | M80-2500-22-30 | MK80-2500-22-30 |
| 3.00 mm | M80-3000-22-30 | MK80-3000-22-30 |
| 4.00 mm | M80-4000-22-30 | MK80-4000-22-30 |
| 5.00 mm | M80-5000-22-30 | MK80-5000-22-30 |
| 6.00 mm | M80-6000-22-30 | MK80-6000-22-30 |



100 mm Diameter 22 mm Arbor

Proper Max Depth of Cut:
Using MSA Arbor = 31.5 mm



Use if DOC is more than 5X saw thickness

| 36 TEETH METRIC | | |
|-----------------|--------------------|--|
| Saw Thickness | Standard Concavity | Alternate Tooth Chamfer Double Concavity 35mm HUB Diameter |
| .20 mm | M100-0200-22-36 | — |
| .40 mm | M100-0400-22-36 | — |
| .60 mm | M100-0600-22-36 | MK100-0600-22-36 |
| 1.00 mm | M100-1000-22-36 | MK100-1000-22-36 |
| 1.20 mm | M100-1200-22-36 | MK100-1200-22-36 |
| 1.60 mm | M100-1600-22-36 | MK100-1600-22-36 |
| 2.00 mm | M100-2000-22-36 | MK100-2000-22-36 |
| 2.50 mm | M100-2500-22-36 | MK100-2500-22-36 |
| 3.00 mm | M100-3000-22-36 | MK100-3000-22-36 |
| 4.00 mm | M100-4000-22-36 | MK100-4000-22-36 |
| 5.00 mm | M100-5000-22-36 | MK100-5000-22-36 |
| 6.00 mm | M100-6000-22-36 | MK100-6000-22-36 |



Use if DOC is more than 5X saw thickness

| 60 TEETH METRIC | | |
|-----------------|--------------------|--|
| Saw Thickness | Standard Concavity | Alternate Tooth Chamfer Double Concavity 35mm HUB Diameter |
| .20 mm | M80-0200-22-60 | — |
| .40 mm | M80-0400-22-60 | — |
| .60 mm | M80-0600-22-60 | MK80-0600-22-60 |
| 1.00 mm | M80-1000-22-60 | MK80-1000-22-60 |
| 1.20 mm | M80-1200-22-60 | MK80-1200-22-60 |
| 1.60 mm | M80-1600-22-60 | MK80-1600-22-60 |
| 2.00 mm | M80-2000-22-60 | MK80-2000-22-60 |
| 2.50 mm | M80-2500-22-60 | MK80-2500-22-60 |
| 3.00 mm | M80-3000-22-60 | MK80-3000-22-60 |
| 4.00 mm | M80-4000-22-60 | MK80-4000-22-60 |
| 5.00 mm | M80-5000-22-60 | MK80-5000-22-60 |
| 6.00 mm | M80-6000-22-60 | MK80-6000-22-60 |



Use if DOC is more than 5X saw thickness

| 72 TEETH METRIC | | |
|-----------------|--------------------|--|
| Saw Thickness | Standard Concavity | Alternate Tooth Chamfer Double Concavity 35mm HUB Diameter |
| .20 mm | M100-0200-22-72 | — |
| .40 mm | M100-0400-22-72 | — |
| .60 mm | M100-0600-22-72 | MK100-0600-22-72 |
| 1.00 mm | M100-1000-22-72 | MK100-1000-22-72 |
| 1.20 mm | M100-1200-22-72 | MK100-1200-22-72 |
| 1.60 mm | M100-1600-22-72 | MK100-1600-22-72 |
| 2.00 mm | M100-2000-22-72 | MK100-2000-22-72 |
| 2.50 mm | M100-2500-22-72 | MK100-2500-22-72 |
| 3.00 mm | M100-3000-22-72 | MK100-3000-22-72 |
| 4.00 mm | M100-4000-22-72 | MK100-4000-22-72 |
| 5.00 mm | M100-5000-22-72 | MK100-5000-22-72 |
| 6.00 mm | M100-6000-22-72 | MK100-6000-22-72 |



Solid carbide spacers and flanges available. See back of Saws section.

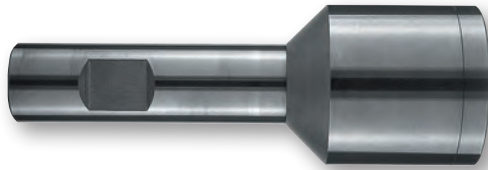
Solid carbide spacers and flanges available. See back of Saws section.

NEW Coatings Available!

Any Saw Thickness Available!

SAWS Arbors & Flanges for Saws

RobbJack Arbors are the tightest tolerances in the industry and solve many of the problems associated with using carbide slitting saws. RJ Arbors have less than .0002" Runout



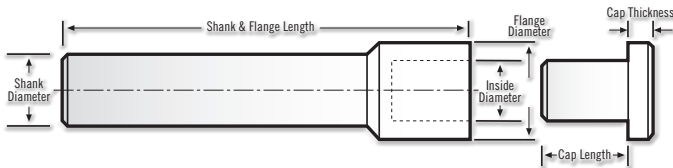
AB Arbors

| Arbor Size | Shank Diameter | Flange Diameter | Cap Length | Shank & Flange Length | Cap Thickness | Screw Size (Included) | Hex Key Size (Included) | Part Number |
|------------|----------------|-----------------|------------|-----------------------|---------------|--|-------------------------|-------------|
| 1/4" | 1/2" | 1/2" | 3/8" | 2-7/8" | 3/16" | 8-32 x 1" Flat-Head Socket Cap Screw | 3/32" | AB-250 |
| 3/8" | 1/2" | 5/8" | 3/8" | 2-7/8" | 1/4" | 10-32 x 1.5" Flat-Head Socket Cap Screw | 1/8" | AB-375 |
| 1/2" | 1/2" | 3/4" | 1/2" | 2-7/8" | 1/4" | 1/4-20 x 1.5" Flat-Head Socket Cap Screw | 5/32" | AB-500 |
| 5/8" | 3/4" | 1" | 7/8" | 4" | 1/4" | 1/4-20 x 2" Socket head cap screw | 3/16" | AB-625 |
| 7/8" | 3/4" | 1-1/4" | 1" | 4" | 1/4" | 5/16-18 x 2.5" Socket head cap screw | 1/4" | AB-875 |
| 1" | 3/4" | 1-1/2" | 1" | 4" | 1/4" | 5/16-18 x 2.5" Socket head cap screw | 1/4" | AB-1000 |
| 1" | 1" | 1-1/2" | 1" | 5" | 1/4" | 5/16-18 x 2.5" Socket head cap screw | 1/4" | AB-1000-1 |
| 1-1/4" | 1" | 1-3/4" | 1-3/8" | 5" | 1/4" | 1/2-13 x 3" Socket head cap screw | 3/8" | AB-1250 |



MSA Arbors **METRIC**

| Arbor Size | Shank Diameter | Flange Diameter | Cap Length | Shank & Flange Length | Cap Thickness | Screw Size (Included) | Hex Key Size (Included) | Part Number |
|------------|----------------|-----------------|------------|-----------------------|---------------|------------------------------------|-------------------------|-------------|
| 5mm | 12mm | 12mm | 10mm | 75mm | 4.5mm | M3 x 25 Flat-Head Socket Cap Screw | 2mm | MSA-05 |
| 8mm | 12mm | 16mm | 10mm | 75mm | 6mm | M3 x 25 Flat-Head Socket Cap Screw | 2mm | MSA-08 |
| 10mm | 12mm | 18mm | 10mm | 75mm | 6mm | M5 x 30 Flat-Head Socket Cap Screw | 3mm | MSA-10 |
| 13mm | 12mm | 20mm | 10mm | 75mm | 6mm | M5 x 30 Flat-Head Socket Cap Screw | 3mm | MSA-13 |
| 16mm | 16mm | 25mm | 22mm | 100mm | 6mm | M5 x 45 Socket head cap screw | 4mm | MSA-16 |
| 22mm | 20mm | 35mm | 22mm | 100mm | 6mm | M6 x 45 Socket head cap screw | 5mm | MSA-22 |



AB Arbor Tolerances

Inside Dia. = +.0001/+ .0003"
 Flange Dia. = ±.003"
 Shank Dia. = -.0001/- .0003"
 OAL = ±.060"
 Cap Dia. = +.0000/- .0002"
 Cap Length = +.060/- .000"
 Cap Thickness = +.060/- .000"

MSA Arbor Tolerances

Inside Dia. = +.005/+ .008mm
 Flange Dia. = ±.076mm
 Shank Dia. = -.0025/- .0076mm
 OAL = ±1.5mm
 Cap Dia. = +.0000/- .005mm
 Cap Length = +1.5/- .000mm
 Cap Thickness = +1.5/- .000mm

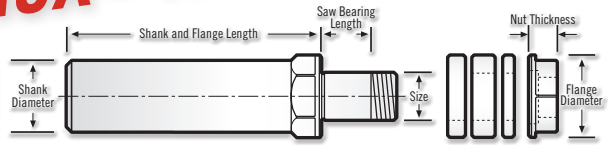
Notes:

Total thickness of saws/spacers should not exceed 50% of Cap Length.

Arbor caps with longer Cap Length dimension available.

Inside Diameter concentric to Shank Diameter within .005mm

NEW! 15X Gripping Force



NAB Arbors

| Arbor Size | Shank Diameter | Flange Diameter | Saw Bearing Length | Shank & Flange Length | Nut Thickness | Spacers Included | Part Number | Keyway Size (Removable) |
|------------|----------------|-----------------|--------------------|-----------------------|---------------|---------------------|-------------|-------------------------|
| .25" | .5" | 0.57" | 0.26" | 2.2" | .250" | .0625" .125" .1875" | NAB-250 | — |
| 0.375" | .625" | 0.71" | .375" | 2.4" | .280" | .0625" .125" .1875" | NAB-375 | — |
| .5" | .75" | 0.855" | .5" | 3.0" | .325" | .0625" .1875" .25" | NAB-500 | — |
| .625" | .875" | 1.075" | .5" | 3.15" | .390" | .0625" .1875" .25" | NAB-625 | 1/8" |
| .75" | 1.0" | 1.215" | .5" | 3.4" | .440" | .0625" .1875" .25" | NAB-750 | 1/8" |
| .875" | 1.0" | 1.434" | .5" | 3.4" | .440" | .0625" .1875" .25" | NAB-875 | 1/8" |
| 1.0" | 1.0" | 1.48" | .5" | 3.5" | .440" | .0625" .1875" .25" | NAB-1000 | 1/4" |
| 1.25" | 1-1/4" | 2" | .5" | 3.5" | .440" | .0625" .1875" .25" | NAB-1250 | 5/16" |

Arbors & Flanges for Saws **SAWS**



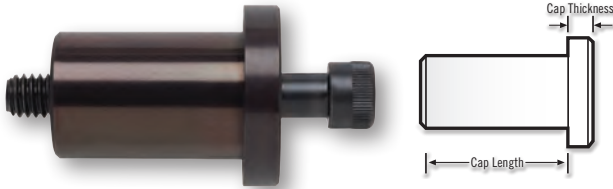
FLANGES (Any diameter between 2-4")

| Flange Diameter | Flange Part Number |
|-----------------|--------------------|
| 1.75-2" | FLANGES-2 |
| 2.125-2.5" | FLANGES-2.5 |
| 2.5-3" | FLANGES-3 |
| 3-3.5" | FLANGES-3.5 |
| 3.5-4" | FLANGES-4 |

Flange Tolerances

Steel flanges are heat treated and ground flat and parallel within plus or minus .00005". All steel flanges have 1" arbor hole. Steel flanges are custom ground as to diameter. Please specify exact diameter (see range).

Carbide spacers available.



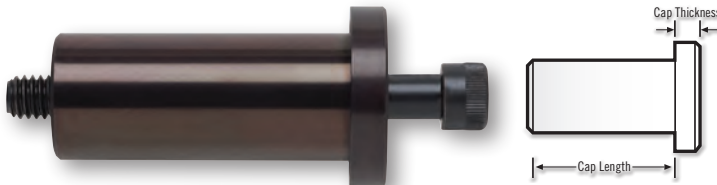
Notes:

Total thickness of saws/spacers should not exceed 50% of Cap Length.

Replacement caps with longer Cap Length dimension available.

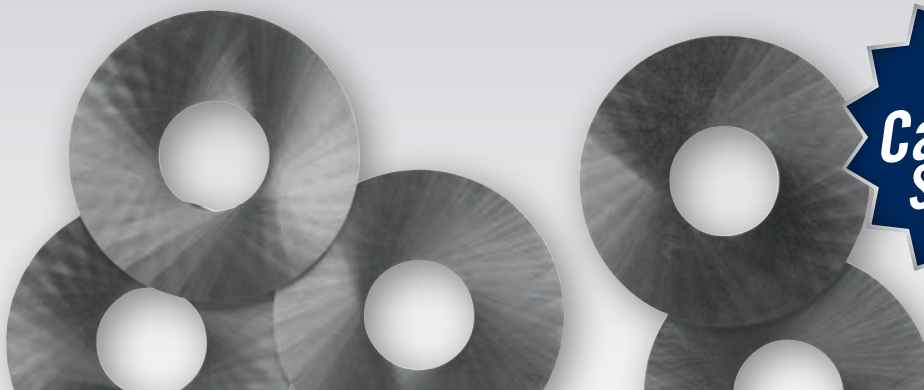
CAPS Standard Length Replacements

| Arbor Number | Cap Length | Screw Size (Included) | Hex Key Size | Standard Cap Part Number |
|--------------|------------|--|--------------|--------------------------|
| AB-250 | 3/8" | 8-32 x 1" Flat head Socket head cap screw | 3/32" | CP-AB-250 |
| AB-375 | 3/8" | 10-32 x 1.5" Flat head Socket head cap screw | 1/8" | CP-AB-375 |
| AB-500 | 1/2" | 1/4-20 x 1.5" Socket head cap screw | 5/32" | CP-AB-500 |
| AB-625 | 7/8" | 1/4-20 x 2" Socket head cap screw | 3/16" | CP-AB-625 |
| AB-875 | 1" | 5/16-18 x 2.5" Socket head cap screw | 1/4" | CP-AB-875 |
| AB-1000 | 1" | 5/16-18 x 2.5" Socket head cap screw | 1/4" | CP-AB-1000 |
| AB-1000-1 | 1" | 5/16-18 x 2.5" Socket head cap screw | 1/4" | CP-AB-1000 |



CAPS Extended Length Replacements

| Arbor Number | Cap Length | Screw Size (Included) | Hex Key Size | Extended Cap Part Number |
|--------------|------------|---|--------------|--------------------------|
| AB-250 | 3/4" | 8-32 x 1.5" Flat head Socket head cap screw | 3/32" | XCP-AB-250 |
| AB-375 | 7/8" | 10-32 x 2" Flat head Socket head cap screw | 1/8" | XCP-AB-375 |
| AB-500 | 3/4" | 1/4-20 x 1.75" Socket head cap screw | 5/32" | XCP-AB-500 |
| AB-625 | 1-3/4" | 1/4-20 x 2.5" Socket head cap screw | 3/16" | XCP-AB-625 |
| AB-875 | 2" | 5/16-18 x 3" Socket head cap screw | 1/4" | XCP-AB-875 |
| AB-1000 | 2" | 5/16-18 x 3" Socket head cap screw | 1/4" | XCP-AB-1000 |
| AB-1000-1 | 2" | 5/16-18 x 3" Socket head cap screw | 1/4" | XCP-AB-1000 |



Special Gang Carbide Spacers Available!

TOOLS FOR

Wood & Plastic Applications



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Shell Inlays and Inlay Pockets

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Roughing

WU1 Series
Pocketing

B Series
Ridge and Bridge Saddle Bodies and Shaping Neck and Carving

WD1 Series
Purfling and Binding

Wood & Plastic Tools

| | | | |
|--|--|--|------------|
| WU / WD / WTL 201/203/303 | 2 & 3 Flute |  | 140 |
| WRU / WRD 303 | 3 Flute |  | 141 |
| C8 / CD8 201/202/301/303 | 2 & 3 Flute |  | 142 |
| HB 401/402/404 | 2 Flute |  | 144 |
| PM / MPM / PMD Routers | 1 Flute |  | 145 |
| ET1 / ET2 / ET3 / ET4 | 1 Flute |  | 146 |
| ACH / MAH | Accuhold End Mill Extension Holder |  | 147 |
| MINIATURES | (See Miniatures Applications) |  | 89 |
| SAWS | (See Saws Applications) |  | 121 |
| S1 / MS1 301 | 2, 3 and 4 Flute |  | 36 |
| A1 / MA1 201 | (See Aluminum Applications) |  | 18 |
| C1 201/301 | 2 & 3 Flute on 1/4" Shank (See Multiple Applications) |  | 38 |
| SB / B 201/203 MSB / MB 201/203 | 2 Flute Ball End (See Multiple Applications) |  | 110 |
| PCD 203 Routers | 2 Flute PCD Diamond (See Composites & Plastics) |  | 71 |

W Precision Spiral Routers for CNC Production

Characteristics

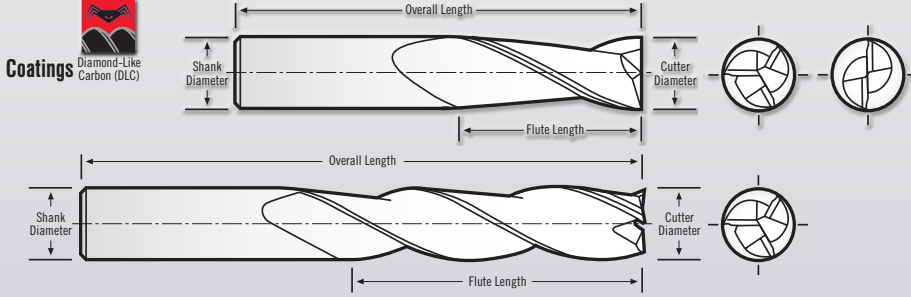
- Square End
- Chamfer
- 2 Flute
- 3 Flute
- 30° Helix

Applications

- Slotting
- Side Milling
- Helical Interpolation
- Ramping
- Roughing
- Semi-Finishing
- Dry
- Wet
- Cold Air
- Spray Mist

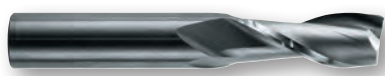
Materials

- Wood
- Aluminum
- Copper
- Magnesium
- Brass
- Plastics



WU/WD Tolerances
 Cutting Dia. (1/16" to 1/4") = +.000/-0.002"
 (9/32" to 3/4") = +.000/-0.003"
 Shank Dia. = -.0001/-0.0002"
 Flute Length (1/16" to 5/16") = +.030/-0.000"
 (3/8" to 3/4") = +.060/-0.000"
 OAL = ±.060"

WTL Tolerances
 Cutting Dia. = -.000/+0.001"
 Shank Dia. = -.0001/-0.0002"
 Flute Length (1/16" to 5/16") = +.030/-0.000"
 (3/8" to 3/4") = +.060/-0.000"
 OAL = ±.060"



WU1-201 2 Flute Stub Length Upshear

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated |
|------------------|----------------|--------------|----------------|----------------------|
| 3/16" | 3/16" | 3/8" | 2" | WU1-201-06 |
| 1/4" | 1/4" | 1/2" | 2" | WU1-201-08 |
| 3/8" | 3/8" | 5/8" | 2" | WU1-201-12 |
| 1/2" | 1/2" | 1-1/4" | 3-1/4" | WU1-201-16 |
| 5/8" | 5/8" | 1-1/2" | 3-1/2" | WU1-201-20 |
| 3/4" | 3/4" | 1-1/2" | 4" | WU1-201-24 |



WD1-201 2 Flute Stub Length Downshear

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated |
|------------------|----------------|--------------|----------------|----------------------|
| 3/16" | 3/16" | 3/8" | 2" | WD1-201-06 |
| 1/4" | 1/4" | 1/2" | 2" | WD1-201-08 |
| 3/8" | 3/8" | 5/8" | 2" | WD1-201-12 |
| 1/2" | 1/2" | 1-1/4" | 3-1/4" | WD1-201-16 |
| 5/8" | 5/8" | 1-1/2" | 3-1/2" | WD1-201-20 |
| 3/4" | 3/4" | 1-1/2" | 4" | WD1-201-24 |



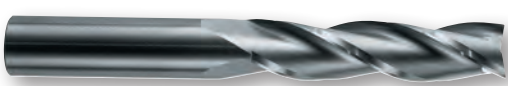
WU1-203 2 Flute Standard Length Upshear

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated |
|------------------|----------------|--------------|----------------|----------------------|
| 1/8" | 1/8" | 1/2" | 1-1/2" | WU1-203-04 |
| 3/16" | 3/16" | 5/8" | 2" | WU1-203-06 |
| 1/4" | 1/4" | 3/4" | 2-1/2" | WU1-203-08 |
| 3/8" | 3/8" | 1" | 2-1/2" | WU1-203-12 |
| 1/2" | 1/2" | 1-1/2" | 3-1/2" | WU1-203-16 |
| 16mm | 16mm | 55mm | 118mm | WU1-203-16mm |
| 5/8" | 5/8" | 2" | 4-5/8" | WU1-203-20 |
| 3/4" | 3/4" | 2-3/16" | 5-1/4" | WU1-203-24 |



WD1-203 2 Flute Standard Length Downshear

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated |
|------------------|----------------|--------------|----------------|----------------------|
| 1/8" | 1/8" | 1/2" | 1-1/2" | WD1-203-04 |
| 3/16" | 3/16" | 5/8" | 2" | WD1-203-06 |
| 1/4" | 1/4" | 3/4" | 2-1/2" | WD1-203-08 |
| 3/8" | 3/8" | 1" | 2-1/2" | WD1-203-12 |
| 1/2" | 1/2" | 1-1/2" | 3-1/2" | WD1-203-16 |
| 16mm | 16mm | 55mm | 118mm | WD1-203-16mm |
| 5/8" | 5/8" | 2" | 4-5/8" | WD1-203-20 |
| 3/4" | 3/4" | 2-3/16" | 5-1/4" | WD1-203-24 |

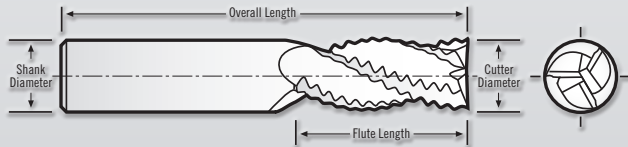


WTL-303 3 Flute Extra Long Length Upshear

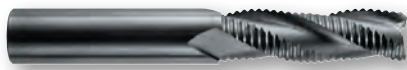
| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated |
|------------------|----------------|--------------|----------------|----------------------|
| 1/8" | 1/8" | 1" | 3" | WTL-303-04 |
| 3/16" | 3/16" | 1-1/8" | 3" | WTL-303-06 |
| 1/4" | 1/4" | 1-1/4" | 3-1/8" | WTL-303-08 |
| 5/16" | 5/16" | 1-3/8" | 3-1/8" | WTL-303-10 |
| 3/8" | 3/8" | 1-1/2" | 3-1/2" | WTL-303-12 |

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated |
|------------------|----------------|--------------|----------------|----------------------|
| 1/2" | 1/2" | 2" | 4" | WTL-303-16 |
| 5/8" | 5/8" | 2-1/2" | 4-5/8" | WTL-303-20 |
| 3/4" | 3/4" | 3" | 5-1/4" | WTL-303-24 |

Spiral Routers for Rough Cutting **WR**



WRU/WRD Tolerances
 Cutting Dia. (1/16" to 1/4") = +.000/- .002"
 (9/32" to 3/4") = +.000/- .003"
 Shank Dia. = -.0001/- .0002"
 Flute Length (1/16" to 5/16") = +.030/- .000"
 (3/8" to 3/4") = +.060/- .000"
 OAL = ±.060"



WRU-301 3 Flute Stub Length Ruffer Upshear

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated |
|------------------|----------------|--------------|----------------|----------------------|
| 1/2" | 1/2" | 1-1/2" | 3-1/2" | WRU-301-16 |
| 5/8" | 5/8" | 2-3/16" | 4-5/8" | WRU-301-20 |
| 3/4" | 3/4" | 2-3/16" | 5" | WRU-301-24 |



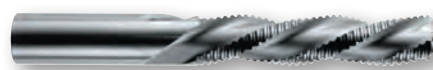
WRD-301 3 Flute Stub Length Downshear

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated |
|------------------|----------------|--------------|----------------|----------------------|
| 1/2" | 1/2" | 1-1/2" | 3-1/2" | WRD-301-16 |
| 5/8" | 5/8" | 2-3/16" | 4-5/8" | WRD-301-20 |
| 3/4" | 3/4" | 2-3/16" | 5" | WRD-301-24 |



WRU-303 3 Flute Standard Length Upshear

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated |
|------------------|----------------|--------------|----------------|----------------------|
| 1/2" | 1/2" | 2-3/16" | 4" | WRU-303-16 |
| 16mm | 16mm | 55mm | 118mm | WRU-303-16mm |
| 5/8" | 5/8" | 2-1/2" | 4-5/8" | WRU-303-20 |
| 3/4" | 3/4" | 2-1/2" | 5" | WRU-303-24 |



WRD-303 3 Flute Standard Length Downshear

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated |
|------------------|----------------|--------------|----------------|----------------------|
| 1/2" | 1/2" | 2-3/16" | 4" | WRD-303-16 |
| 16mm | 16mm | 55mm | 118mm | WRD-303-16mm |
| 5/8" | 5/8" | 2-1/2" | 4-5/8" | WRD-303-20 |
| 3/4" | 3/4" | 2-1/2" | 5" | WRD-303-24 |

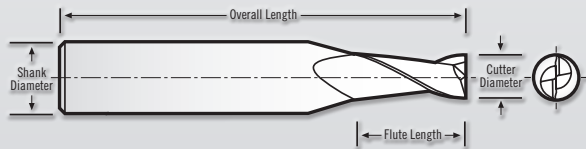
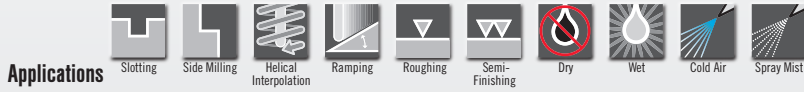
Another Popular Wood Tool

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B-333 3 Flute Tuffy Ball End Standard Length

C8 2 Flute Spiral Routers for Signmaking and Engraving



C8/CD8 Tolerances
 Cutting Dia. (1/16" to 1/4") = +.000/-0.002"
 (9/32" to 3/4") = +.000/-0.003"
 Shank Dia. = -.0001/-0.0002"
 Flute Length (1/16" to 5/16") = +.030/-0.000"
 (3/8" to 3/4") = +.060/-0.000"
 OAL = ±.060"



C8-201 2 Flute Stub Length Upshear

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated |
|------------------|----------------|--------------|----------------|----------------------|
| 1/8" | 1/4" | 1/4" | 2" | C8-201-04 |
| 3/16" | 1/4" | 3/8" | 2" | C8-201-06 |
| 1/4" | 1/4" | 1/2" | 2" | C8-201-08 |



CD8-201 2 Flute Stub Length Downshear

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated |
|------------------|----------------|--------------|----------------|----------------------|
| 1/8" | 1/4" | 1/4" | 2" | CD8-201-04 |
| 3/16" | 1/4" | 3/8" | 2" | CD8-201-06 |
| 1/4" | 1/4" | 1/2" | 2" | CD8-201-08 |

2 & 3 Flute Spiral Routers for CNC Production **C8**

Characteristics

- Square End
- Chamfer
- 2 Flute
- 3 Flute
- 30° Helix

Applications

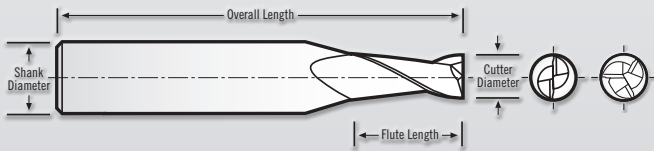
- Slotting
- Side Milling
- Helical Interpolation
- Ramping
- Roughing
- Semi-Finishing
- Dry
- Wet
- Cold Air
- Spray Mist

Materials

- Wood
- Aluminum
- Copper
- Magnesium
- BRASS

Coatings

- Diamond-Like Carbon (DLC)



C8/CD8 Tolerances

Cutting Dia. (1/16" to 1/4") = +.000/-0.002"
 (9/32" to 3/4") = +.000/-0.003"
 Shank Dia. = -.0001/-0.0002"
 Flute Length (1/16" to 5/16") = +.030/-0.000"
 (3/8" to 3/4") = +.060/-0.000"
 OAL = ±.060"



C8-203 2 Flute Regular Length Upshear

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated |
|------------------|----------------|--------------|----------------|----------------------|
| 1/8" | 1/4" | 1/2" | 2-1/2" | C8-203-04 |
| 3/16" | 1/4" | 5/8" | 2-1/2" | C8-203-06 |
| 1/4" | 1/4" | 3/4" | 2-1/2" | C8-203-08 |



C8-301 3 Flute Stub Length Upshear

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated |
|------------------|----------------|--------------|----------------|----------------------|
| 1/8" | 1/4" | 1/4" | 2" | C8-301-04 |
| 3/16" | 1/4" | 3/8" | 2" | C8-301-06 |
| 1/4" | 1/4" | 1/2" | 2" | C8-301-08 |



CD8-203 2 Flute Regular Length Downshear

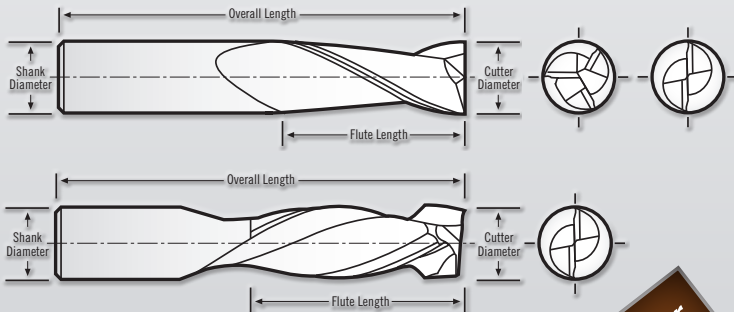
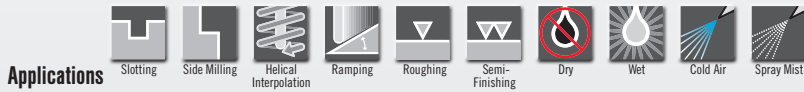
| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated |
|------------------|----------------|--------------|----------------|----------------------|
| 1/8" | 1/4" | 1/2" | 2-1/2" | CD8-203-04 |
| 3/16" | 1/4" | 5/8" | 2-1/2" | CD8-203-06 |
| 1/4" | 1/4" | 3/4" | 2-1/2" | CD8-203-08 |



C8-303 3 Flute Regular Length Upshear

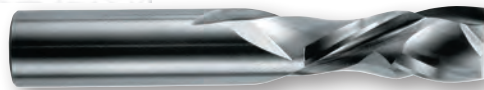
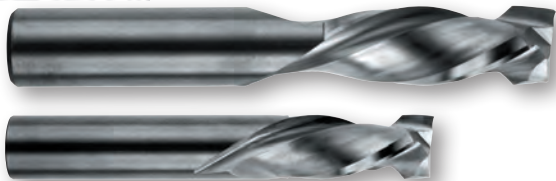
| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number Uncoated |
|------------------|----------------|--------------|----------------|----------------------|
| 1/8" | 1/4" | 1/2" | 2-1/2" | C8-303-04 |
| 3/16" | 1/4" | 5/8" | 2-1/2" | C8-303-06 |
| 1/4" | 1/4" | 3/4" | 2-1/2" | C8-303-08 |

HB 2+2 Herringbone Routers



HB Tolerances

Cutting Dia. (1/16" to 1/4") = +.000/- .002"
 (9/32" to 3/4") = +.000/- .003"
 Shank Dia. = -.0001/- .0002"
 Flute Length (1/16" to 5/16") = +.030/- .000"
 (3/8" to 3/4") = +.060/- .000"
 OAL = ±.060"



HB-401 2+2 Flute Herringbone Routers

| Cutting Diameter | Shank Diameter | Flute Length | Upshear Length | Overall Length | Tool Number Uncoated |
|------------------|----------------|--------------|----------------|----------------|----------------------|
| 1/4" | 1/4" | 3/4" | 3/16" | 2-1/2" | HB-401-08 |
| 3/8" | 3/8" | 1" | 1/4" | 2-1/2" | HB-401-12 |
| 1/2" | 1/2" | 1-1/8" | 1/4" | 3" | HB-401-16 |
| 5/8" | 5/8" | 1-5/16" | 5/16" | 4" | HB-401-20 |
| 3/4" | 3/4" | 1-5/16" | 3/8" | 4" | HB-401-24 |

HB-402 2+2 Flute Herringbone Routers

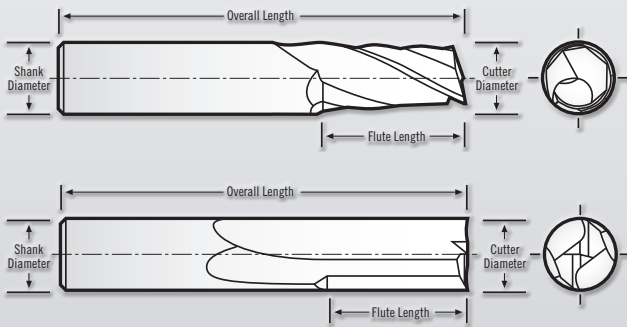
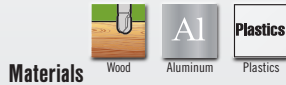
| Cutting Diameter | Shank Diameter | Flute Length | Upshear Length | Overall Length | Tool Number Uncoated |
|------------------|----------------|--------------|----------------|----------------|----------------------|
| 1/4" | 1/4" | 3/4" | 1/2" | 2-1/2" | HB-402-08 |
| 3/8" | 3/8" | 1" | 5/8" | 2-1/2" | HB-402-12 |
| 1/2" | 1/2" | 1-1/8" | 9/16" | 3" | HB-402-16 |
| 5/8" | 5/8" | 1-5/16" | 3/4" | 4" | HB-402-20 |
| 3/4" | 3/4" | 1-5/16" | 3/4" | 4" | HB-402-24 |



HB-404 2+2 Flute Extra Length Herringbone Routers

| Cutting Diameter | Shank Diameter | Flute Length | Upshear Length | Overall Length | Tool Number Uncoated |
|------------------|----------------|--------------|----------------|----------------|----------------------|
| 1/2" | 1/2" | 1-5/16" | 3/4" | 3-1/2" | HB-404-16 |

Tuffy Grade Carbide Router Bits **PM/MPM/GTS**



PM/PMD Series Tolerances

Cutting Dia. = +0.000/-0.002"
 Shank Dia. = -0.0001/-0.0002"
 Flute Length = +0.060/-0.000"
 OAL = ±0.060"

MPM Tolerances

Cutting Dia. = +.000/-0.075mm
 Shank Dia. = -.002/-0.005mm
 Flute Length = +0.500/+1.500mm
 OAL = ±1.000mm

GTS Series Tolerances

Cutting Dia. = +.000/-0.002"
 Shank Dia. = -.0001/-0.0002"
 Flute Length = +.060/-0.000"
 OAL = ±.060"



PM Up Shear 1 Flute Tuffy Grade

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number |
|------------------|----------------|--------------|----------------|-------------|
| 1/8" | 1/8" | 1/2" | 2" | PM-104-04 |
| 1/8" | 1/4" | 1/2" | 2" | PM-108-04 |
| 3/16" | 3/16" | 5/8" | 2" | PM-106-06 |
| 3/16" | 1/4" | 5/8" | 2" | PM-108-06 |
| 3/16" | 1/4" | 1-1/4" | 3" | PM-108-06L |
| 1/4" | 1/4" | 3/4" | 2" | PM-108-08 |
| 1/4" | 1/4" | 1-1/2" | 3" | PM-108-08L |
| 3/8" | 3/8" | 1-1/4" | 3" | PM-112-12 |
| 1/2" | 1/2" | 1-1/2" | 4" | PM-116-16 |



PMD Down Shear 1 Flute Tuffy Grade

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number |
|------------------|----------------|--------------|----------------|-------------|
| 1/8" | 1/4" | 1/2" | 2" | PMD-108-04 |
| 3/16" | 1/4" | 5/8" | 2" | PMD-108-06 |
| 1/4" | 1/4" | 3/4" | 2" | PMD-108-08 |



Best Used in Plastics



GTS 2 Flute Tuffy Grade Straight Flute

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number |
|------------------|----------------|--------------|----------------|-------------|
| 1/8" | 1/4" | 1/2" | 2" | GTS-201-04 |
| 1/4" | 1/4" | 3/4" | 2-1/2" | GTS-201-08 |
| 3/8" | 3/8" | 7/8" | 2-1/2" | GTS-201-12 |
| 1/2" | 1/2" | 1" | 3" | GTS-201-16 |



MPM Up Shear 1 Flute Tuffy Grade **METRIC**

| Cutting Diameter | Shank Diameter | Flute Length | Overall Length | Tool Number |
|------------------|----------------|--------------|----------------|-------------|
| 4mm | 3mm | 12mm | 50mm | MPM-104-04 |
| 6mm | 4mm | 12mm | 50mm | MPM-106-04 |
| 6mm | 6mm | 14mm | 50mm | MPM-106-05 |
| 6mm | 6mm | 14mm | 57mm | MPM-106-06 |
| 8mm | 8mm | 22mm | 63mm | MPM-108-08 |
| 10mm | 10mm | 25mm | 72mm | MPM-110-10 |
| 12mm | 12mm | 25mm | 83mm | MPM-112-12 |

ET Engraving Tools



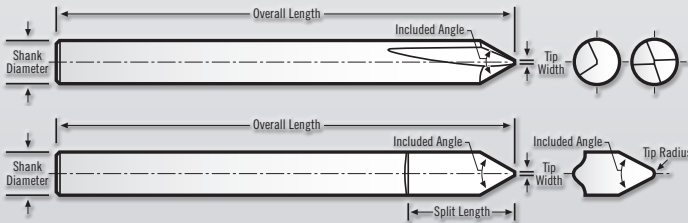
Characteristics



Applications



Materials



ET1 Double Lip Engraving Tool for Tougher Materials

| Tip Width | Shank Diameter | Included Angle | Split Length | Overall Length | Tool Number |
|-----------|----------------|----------------|--------------|----------------|-------------|
| .010" | 1/4" | 30° | — | 2" | ET1-01030 |
| .015" | 1/4" | 30° | — | 2" | ET1-01530 |
| .020" | 1/4" | 30° | — | 2" | ET1-02030 |
| .030" | 1/4" | 30° | — | 2" | ET1-03030 |
| .040" | 1/4" | 30° | — | 2" | ET1-04030 |
| .050" | 1/4" | 30° | — | 2" | ET1-05030 |
| .060" | 1/4" | 30° | — | 2" | ET1-06030 |
| .010" | 1/4" | 45° | — | 2" | ET1-01045 |
| .015" | 1/4" | 45° | — | 2" | ET1-01545 |
| .020" | 1/4" | 45° | — | 2" | ET1-02045 |
| .030" | 1/4" | 45° | — | 2" | ET1-03045 |
| .040" | 1/4" | 45° | — | 2" | ET1-04045 |
| .050" | 1/4" | 45° | — | 2" | ET1-05045 |
| .060" | 1/4" | 45° | — | 2" | ET1-06045 |

NOTE: Specially designed to maximize the tip strength of the tool by removing the minimum amount of material from the end.



ET3 Ball Tip Engraving Tool

| Tip Radius | Shank Diameter | Included Angle | Split Length | Overall Length | Tool Number |
|------------|----------------|----------------|--------------|----------------|-------------|
| .005" | 1/4" | 30° | .650" | 2" | ET3-00530 |
| .010" | 1/4" | 30° | .650" | 2" | ET3-01030 |
| .020" | 1/4" | 30° | .650" | 2" | ET3-02030 |
| .030" | 1/4" | 30° | .650" | 2" | ET3-03030 |
| .005" | 1/4" | 60° | .650" | 2" | ET3-00560 |
| .010" | 1/4" | 60° | .650" | 2" | ET3-01060 |
| .020" | 1/4" | 60° | .650" | 2" | ET3-02060 |
| .030" | 1/4" | 60° | .650" | 2" | ET3-03060 |

NOTE: Ball shaped radius on the tip, excellent results for high speed engraving and 3D engraving applications



ET2 Plunge Tip Engraving Tool for Drill & Engrave

| Tip Width | Shank Diameter | Included Angle | Split Length | Overall Length | Tool Number |
|-----------|----------------|----------------|--------------|----------------|-------------|
| .010" | 1/4" | 60° | — | 2" | ET2-01060 |
| .020" | 1/4" | 60° | — | 2" | ET2-02060 |
| .010" | 1/4" | 90° | — | 2" | ET2-01090 |
| .020" | 1/4" | 90° | — | 2" | ET2-02090 |

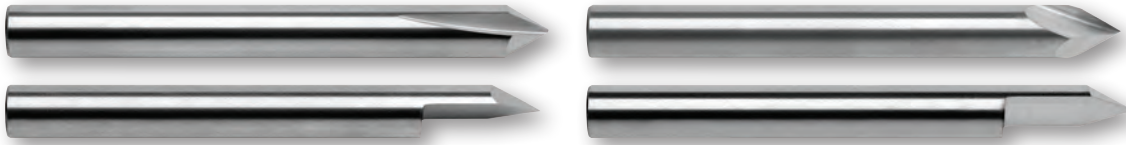
NOTE: Two flute tool serves as a multipurpose tool, which can be used for engraving, chamfering, spot-drilling and countersinking.



ET4 Standard Engraving Tool for Most Applications

| Tip Width | Shank Diameter | Included Angle | Split Length | Overall Length | Tool Number |
|-----------|----------------|----------------|--------------|----------------|-------------|
| .010" | 1/4" | 60° | .650" | 2" | ET4-01060 |
| .020" | 1/4" | 60° | .650" | 2" | ET4-02060 |
| .030" | 1/4" | 60° | .650" | 2" | ET4-03060 |
| .050" | 1/4" | 60° | .650" | 2" | ET4-05060 |
| .060" | 1/4" | 60° | .650" | 2" | ET4-06060 |
| .010" | 1/4" | 90° | .650" | 2" | ET4-01060 |
| .020" | 1/4" | 90° | .650" | 2" | ET4-02090 |
| .030" | 1/4" | 90° | .650" | 2" | ET4-03090 |
| .050" | 1/4" | 90° | .650" | 2" | ET4-05090 |
| .060" | 1/4" | 90° | .650" | 2" | ET4-06090 |

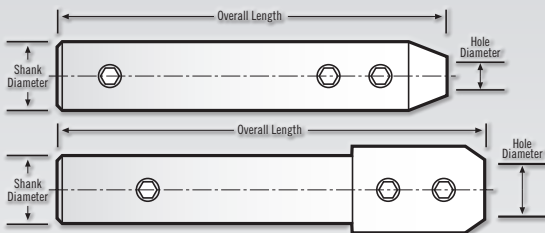
NOTE: Utilized in a wide variety of machines, including top loading engraving machines, CNC milling machines and industrial engraving marking systems.



ET SPEEDS & FEEDS

| Material | 5000 RPM | 7500 RPM | 10,000 RPM |
|---------------------------|----------|-----------|------------|
| | in/min | in/min | in/min |
| NON-FERROUS METALS | | | |
| Aluminum/Aluminum Alloys | 10 ipm | 15 ipm | 20 ipm |
| Brass/Bronze | 10 ipm | 15 ipm | 20 ipm |
| Copper/Copper Alloys | 10 ipm | 15 ipm | 20 ipm |
| Magnesium | 10 ipm | 15 ipm | 20 ipm |
| COMPOSITES | | | |
| G10 Fiberglass | 15 ipm | 22.5 ipm | 30 ipm |
| Graphite | 15 ipm | 22.5 ipm | 30 ipm |
| Carbon Fiber | 15 ipm | 22.5 ipm | 30 ipm |
| Plastics | 15 ipm | 22.5 ipm | 30 ipm |
| FERROUS METALS | | | |
| Cast Iron | 5 ipm | 7.5 ipm | 10 ipm |
| Steel, Low Carbon | 5 ipm | 7.5 ipm | 10 ipm |
| Steel, Medium Carbon | 7.5 ipm | 11.25 ipm | 15 ipm |
| Steel, Hardened | 2.5 ipm | 3.75 ipm | 5 ipm |
| Stainless Steel, Soft | 5 ipm | 7.5 ipm | 10 ipm |
| Stainless Steel, Hard | 2.5 ipm | 3.75 ipm | 5 ipm |
| Inconel | 4 ipm | 6 ipm | 8 ipm |
| Titanium, Soft | 5 ipm | 7.5 ipm | 10 ipm |
| Titanium, Hard | 2.5 ipm | 3.75 ipm | 5 ipm |

Accuhold End Mill Extension Holder **ACH/MAH**



ACH Tolerances

Hole Dia. = $+0.0015/-0.0000$ "
 Shank Dia. = $-0.0001/-0.0003$ "
 OAL = ± 0.060 "

MAH Tolerances

Hole Dia. = $+0.004/-0.000$ mm
 Shank Dia. = $+0.000/-0.007$ mm
 OAL = ± 1.5 mm



ACH Accuhold – End Mill Extension Holder

| Hole Diameter | Shank Diameter | Overall Length | Tool Number |
|---------------|----------------|----------------|-------------|
| 1/8" | 3/8" | 3-1/4" | ACH-04 |
| 3/16" | 1/2" | 3-1/2" | ACH-06 |
| 1/4" | 5/8" | 4-1/4" | ACH-08 |
| 3/8" | 3/4" | 4-1/2" | ACH-12 |
| * 1/2" | 3/4" | 4-3/4" | ACH-16 |
| * 1/2" | 1" | 4-3/4" | ACH-16L |

* 1" Diameter x 1.5" Long Head

MAH Accuhold – Metric End Mill Extension Holder **METRIC**

| Hole Diameter | Shank Diameter | Overall Length | Tool Number |
|---------------|----------------|----------------|-------------|
| 3mm | 10mm | 82.5mm | MAH-03 |
| 4mm | 12mm | 110mm | MAH-04 |
| 5mm | 12mm | 110mm | MAH-05 |
| 6mm | 16mm | 125mm | MAH-06 |
| 8mm | 20mm | 135mm | MAH-08 |
| 10mm | 20mm | 135mm | MAH-10 |
| * 12mm | 25mm | 150mm | MAH-12 |

Speeds & Feeds

WOOD SERIES SPEEDS & FEEDS

| Material | RPM (1/4") | Feed Inches/Minute |
|---------------------|---------------|-----------------------|
| Wood | | |
| Hardwoods | 18,000 | 180–250 |
| Softwoods | 18,000 | 180–250 |
| MDF | 18,000 | 150–250 |
| Laminated Materials | 18,000 | 150–250 |

General Guidelines

- Select the shortest flute length possible for the application. Shorter flute length router tools offer better stability and increased feed rates.
- Select the largest diameter tool for the job. Increasing diameter by 10% provides 25% more strength.
- Adjust RPM and feed rate to reduce vibration. Vibration will cause poor finish and chip tools. Too slow a feed rate can also cause vibration and poor tool life.
- Regular cleaning of tool holders and collets help ensure the tool's performance and life.
- Securing the part as rigidly as possible will improve finishes and tool life.

| Material | RPM (1/4") | Feed Inches/Minute |
|---------------------------|---------------|-----------------------|
| Plastics, Others | | |
| Solid Surface | 15,300 | 70–130 |
| Fiberglass | 15,300 | 80–150 |
| Phenolic | 15,300 | 80–150 |
| Aluminum (Soft) | 18,000 | 90–120 |
| Aluminum (Aircraft Grade) | 18,000 | 180–230 |
| Copper | 9,200 | 45–60 |
| Foam | 18,000 | 150–300 |
| Plastics (Soft) | 18,000 | 180–250 |
| Plastics (Hard) | 18,000 | 150–200 |

Wood Tools in Other Sections

MINIATURES

(See Miniatures Applications)



89

SAWS

(See Saws Applications)



121

S1 / MS1 301

2, 3 and 4 Flute



36

A1 / MA1 201

(See Aluminum Applications)



18

C1 201/301

2 & 3 Flute on 1/4" Shank
(See Multiple Applications)



38

SB / B 201/203 MSB / MB 201/203

2 Flute Ball End
(See Multiple Applications)



110

PCD 203 Routers

2 Flute PCD Diamond
(See Composites)



71

PM / MPM / PMD Routers

Single Flute



145

Custom End Mills

DON'T SEE WHAT YOU NEED?

RobbJack manufactures a wide variety of end mills in addition to those listed in our catalog. We can make tools for your specific needs by modifying standard tools or through custom manufacture. We can work directly from your prints to design and build the exact tool for your requirements. Contact us if you need:

- Special Cutting and/or Shank Diameters
- Special Cutting Length and/or Overall Lengths
- Corner Radii, Full Ball or Corner Chamfer Configurations
- Chip Breakers or Roughing Cutters
- Special Tolerances
- Tapered End Mills, Constant Helix or Constant Lead.
- Special Coatings Available.

To get a quote or more information about a custom tool, fax or call us with your specifications and any other pertinent information (photocopy the form below). If you are not sure of the best configuration for your application, we will be glad to help you.

Remember, to obtain the best performance in all end mill applications:

- Use the largest diameter possible.
- Use the shortest flute length possible.
- Use the correct number of flutes for your application.
- Use recommended speed and feed rates.

Copy this form and fax it to us at (916) 645-0146 or (916) 645-1668 or email: quotes@robbjack.com

RobbJack Custom End Mill Request for Quote/Information

Description of Application:

Order Quantity:

Cutting Diameter:

Tolerance:

Cutting Length:

Shank Diameter:

Overall Length:

Number of Flutes:

Special Configurations (Radii, Chamfers, Set Screw Flats, Chip Breakers, Coatings, etc.):

For Tapered Tools:

Major Diameter:

Tip Diameter:

Per Side/Included Angle:

Tolerance:

End Configuration (Full Ball, Corner Radii, Square End):

(Note: RobbJack recommends 3 flutes for all tapered applications)



Questions?

Call us:
at (916) 645-6045
or (800) 527-8883

Fax us:
at (916) 645-0146
or (916) 645-1668

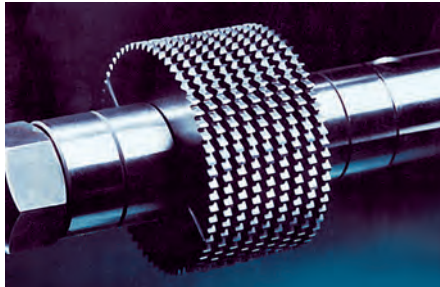


Visit us: at www.robbjack.com
Email us: quotes@robbjack.com

Custom Carbide Saws

SPECIAL SAWS TO MEET YOUR SPECIFIC NEEDS

In addition to the broad line of standard saws listed in this catalog, RobbJack is capable of manufacturing a wide variety of special saws. If our standard offerings do not meet your needs, call or fax your specifications to us for quotation. Contact us if you need:



- **Special Cutting Diameters**
- **Special Thicknesses**
- **Special Arbor Hole Sizes and Keyways**
- **Special Chamfers, Angles or Radii**
- **Special Tooth Configurations and Pitches**
- **Special Coatings Available.**
- **Gang Saws** – If your requirements call for the use of more than one saw at a time, contact us for a complete, ready-to-use package, including saws, arbors and spacers. We are experts in ganging saws, which generally require flat and parallel hubs, made to your exacting specifications.

**Copy this form and fax it to us at
(916) 645-0146 or (916) 645-1668
or email: quotes@robbjack.com**

We are frequently able to combine saws and spacers into an integral saw with offset hub, which reduces tolerances buildup by one-half.

Many of these features can be achieved by modifying standard saws. Others require that we start from scratch. We will work directly from your prints or help you design

the saws you need from the following information. Simply photocopy the bottom of this page, fill it out and fax it to us along with any other pertinent data. And remember, to obtain the best performance in all saw applications:

- Use the smallest diameter and the greatest thickness possible.
- Choose the number of teeth (tooth count) to meet your specific application (if you are not sure of the best configuration for your application, call us and we'll advise you).
- Ask for feed and speed recommendations to get started right.

RobbJack Custom Saw Request for Quote/Information

Outside Diameter: _____

Saw Thickness: _____

Inside Diameter: _____

Number of Teeth: _____

Keyway on I.D.: _____

For Gang Use: _____

Special Configurations (such as
Chamfers, Angles, Radii or Forms): _____

Order Quantity: _____

RJ **RobbJack**
CORPORATION

Questions?

Call us:
at (916) 645-6045
or (800) 527-8883

Fax us:
at (916) 645-0146
or (916) 645-1668

Visit us:
at www.robbjack.com

Email us:
quotes@robbjack.com

