

## Solid Carbide Multi-Helix Square & Corner Radius End Mill Router Bits with TiAlN Coating Speed and Feed Chart

|              | Materials                            | Hardness | USA Standards, SAE/AISI/UNS                            | Surface Feet<br>Per Minute | Suggested End Mill<br>Starting Feed Per Tooth |        |        |
|--------------|--------------------------------------|----------|--|----------------------------|---|--------|--------|
|              |                                      |          |  |                            | 1/4"  | 3/8"   | 1/2"   |
| <b>Steel</b> | Magnetic Soft Steel                  | < 120 B  | 12L14, 12L15   | 525-790                    | 0.0015  | 0.0025 | 0.003  |
|              | Structural, Case Carburising         | < 200 B  | 1005-1025, 1214, 1215, A36                             | 525-790                    | 0.0015  | 0.0025 | 0.003  |
|              | Plain Carbon Steel                   | < 250 B  | 1030-1060, 1144-1146                                   | 395-525                    | 0.0015  | 0.0025 | 0.003  |
|              | Alloy Steel                          | < 250 B  | 4140, 4340, 52100, 8620, H11-H41, A2, D2, O1, P20, 420 | 395-525                    | 0.0015  | 0.0025 | 0.003  |
|              | Alloy Steel, Hardened/Tempered Steel | 350      | 4140, 4340, 52100, 8620, H11-H41, A2, D2, O1, P20, 420 | 260-525                    | 0.001   | 0.002  | 0.0025 |
|              | Alloy Steel, Hardened/Tempered Steel | > 350 B  | 4140, 4340, 52100, 8620, H11-H41, A2, D2, O1, P20, 420 | 130-260                    | 0.001   | 0.002  | 0.0025 |
|              | Alloy Steel, Hardened                | 49-55 C  | A2, H10-H41, L1-L6, M1-M42, T1                         | 130-260                    | 0.001   | 0.002  | 0.0025 |
|              | Alloy Steel, Hardened                | 55-60 C  | A2, H10-H41, L1-L6, M1-M42, T1                         | 130-260                    | 0.001   | 0.002  | 0.0025 |
|              | Alloy Steel, Hardened                | > 60 C   | A2, H10-H41, L1-L6, M1-M42, T1                         | 130-260                    | 0.001   | 0.002  | 0.0025 |

|                        | Materials                          | Hardness | USA Standards, SAE/AISI/UNS                      | Surface Feet<br>Per Minute | Suggested End Mill<br>Starting Feed Per Tooth |        |        |
|------------------------|------------------------------------|----------|--|----------------------------|---|--------|--------|
|                        |                                    |          |  |                            | 1/4"  | 3/8"   | 1/2"   |
| <b>Stainless Steel</b> | Free Machining Stainless           | < 250 B  | 200, 303, 416, 420F, 430F, 440                   | 260-525                    | 0.0015  | 0.0025 | 0.003  |
|                        | Austenetic                         | < 250 B  | 301, 302, 304, 316, 321, 330, AM-350, Custom 455 | 200-330                    | 0.001   | 0.002  | 0.0025 |
|                        | Ferritic + Austenetic, Martensitic | < 300 B  | 318-329, 400-446, 15-4PH, 17-4PH, Duplex         | 160-260                    | 0.001   | 0.002  | 0.0025 |
|                        | Precipitation Hardened             | < 300 B  | 15-5PH, 17-4PH, Custom 450                       | 150-220                    | 0.001   | 0.002  | 0.0025 |

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|------------------|---------------------------------------|-------------|--|----------------------------|---|-------|--------|
|                  |                                       |             |  |                            | 1/4"  | 3/8"  | 1/2"   |
| <b>Cast Iron</b> | Lamellar Graphite                     | < 150       | Grey, G10, Gg40, J431C, A48 Class20        | 330-500                    | 0.002   | 0.003 | 0.0035 |
|                  | Lamellar Graphite                     | > 150 < 300 | Grey, Gg25, Gg40, J158, A48 Class 40-60    | 260-460                    | 0.002   | 0.003 | 0.0035 |
|                  | Nodular Graphite, Maileable Case Iron | < 200       | A220, A436, A439, A602, Black, GGG40-GGG70 | 230-330                    | 0.001   | 0.003 | 0.0035 |
|                  | Nodular Graphite, Maileable Case Iron | > 200 < 300 | Black Gts/Gtw, J434C                       | 160-260                    | 0.001   | 0.003 | 0.0035 |

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### Titanium

| Materials | Hardness    | USA Standards, SAE/AISI/UNS       | Surface Feet<br>Per Minute | Suggested End Mill<br>Starting Feed Per Tooth |        |       |
|-----------|-------------|-----------------------------------|----------------------------|---|--------|-------|
|           |             |                                   |                            | 1/4"  | 3/8"   | 1/2"  |
| Unalloyed | < 200       | Commercially Pure                 | 400-650                    | 0.001   | 0.0015 | 0.002 |
| Alloyed   | < 270       | 6A14V, 6A14V-25n, Monel, Monel K  | 260-400                    | 0.001   | 0.0015 | 0.002 |
| Alloyed   | > 270 < 350 | 6A14-V-4Mo, 7A14-V-4Mo, 4911-4967 | 130-200                    | 0.001   | 0.0015 | 0.002 |

### Nickel

| Materials | Hardness    | USA Standards, SAE/AISI/UNS                            | Surface Feet<br>Per Minute | Suggested End Mill<br>Starting Feed Per Tooth |        |       |
|-----------|-------------|--|----------------------------|---|--------|-------|
|           |             |  |                            | 1/4"  | 3/8"   | 1/2"  |
| Unalloyed | < 150       | Commercially Pure                                      | 400-650                    | 0.001   | 0.0015 | 0.002 |
| Alloyed   | < 270       | Monel 400, Hastelloy C, Inconel 625, Waspaloy          | 200-400                    | 0.001   | 0.0015 | 0.002 |
| Alloyed   | > 270 < 350 | Inconel 718, Nimonic 75-95, Rene 41, Inconel 825, A286 | 130-330                    | 0.001   | 0.0015 | 0.002 |

### Copper

| Materials            | Hardness | USA Standards, SAE/AISI/UNS         | Surface Feet<br>Per Minute | Suggested End Mill<br>Starting Feed Per Tooth |        |       |
|----------------------|----------|-------------------------------------|----------------------------|---|--------|-------|
|                      |          |                                     |                            | 1/4"  | 3/8"   | 1/2"  |
| Copper               | < 100    | Commercially Pure                   | 650-1,350                  | 0.0015  | 0.0025 | 0.003 |
| Brass, Bronze        | < 200    | 314-340, 350-370                    | 850-1,150                  | 0.0015  | 0.0025 | 0.003 |
| Brass                | < 200    | Alloyed Cu + Al + Fe, Long Chipping | 850-1,150                  | 0.0015  | 0.0025 | 0.003 |
| High Strength Bronze | < 470    | Ampco 18-25                         | 165-330                    | 0.001   | 0.0015 | 0.002 |

### Aluminum, Magnesium

| Materials                       | Hardness | USA Standards, SAE/AISI/UNS  | Surface Feet<br>Per Minute | Suggested End Mill<br>Starting Feed Per Tooth |       |        |
|---------------------------------|----------|------------------------------|----------------------------|---|-------|--------|
|                                 |          |                              |                            | 1/4"  | 3/8"  | 1/2"   |
| Aluminum, Magnesium Unalloyed   | < 100    | Commercially Pure            |                            | 0.002   | 0.003 | 0.0035 |
| Aluminum Alloyed, Si <0.5%      | < 150    | 6061 T6, 7075, 314-340       |                            | 0.002   | 0.003 | 0.0035 |
| Aluminum Alloyed, Si >0.5% <10% | < 120    | 6061 T6, 380-390             |                            | 0.002   | 0.003 | 0.0035 |
| Aluminum Alloyed, Si >10%       | < 120    | Magnesium Whisker Reinforced |                            | 0.002   | 0.003 | 0.0035 |



**INDUSTRIAL**

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### Synthetic Materials

| Materials                    | Hardness | USA Standards, SAE/AISI/UNS | Surface Feet<br>Per Minute | Suggested End Mill<br>Starting Feed Per Tooth |       |        |
|------------------------------|----------|-----------------------------|----------------------------|---|-------|--------|
|                              |          |                             |                            | 1/4"  | 3/8"  | 1/2"   |
| Thermoplastics               | n/a      | Ultramid, Polystrol         |                            | 0.002   | 0.003 | 0.0035 |
| Thermosetting Plastics       | n/a      | Bakelite, Pertinax          |                            | 0.002   | 0.003 | 0.0035 |
| Reinforced Plastic Materials | n/a      | CFK, GFKAFK                 |                            | 0.002   | 0.003 | 0.0035 |

### Hard Materials

| Materials                | Hardness | USA Standards, SAE/AISI/UNS | Surface Feet<br>Per Minute | Suggested End Mill<br>Starting Feed Per Tooth |       |       |
|--------------------------|----------|-----------------------------|----------------------------|---|-------|-------|
|                          |          |                             |                            | 1/4"  | 3/8"  | 1/2"  |
| Cermets (Metal-Ceramics) | < 550    | Commercially Pure           | 25-50                      | 0.0015  | 0.025 | 0.003 |