

General Cutting Tool Information

With so many variables present in the machining process, it is essential to optimize every possible factor to achieve world-class efficiency. Your choice of a genuine **Ultra-Tool®** Solid Carbide product is an excellent first step in the process. **Ultra-Tool®** Solid Carbide products are high-performance tools that will perform best in a machining environment characterized by rigid fixturing and minimal spindle runout. Attention to proper speed and feed will eliminate vibration, chatter, and overheating as well as extending tool life. Generally speaking, the peripheral speed of solid carbide tools will vary with the hardness of the material being cut. The harder the material, the slower the speed. High speed and insufficient feed will cause work surface glazing and poor tool life. Chipping of cutting edges is an indication of chatter which can be caused by too high a speed, too light a cut, or improper support of the tool or workpiece. Handling is also very important; sharpened cutting edges should never be allowed to come into contact with any hard object (or another tool) in a non-machining environment as they will chip easily. Keep your **Ultra-Tool®** products in their original protective packaging until ready for use.

The following guidelines are generalities designed to demonstrate the operating window within you may experience the best results. The charts and information should prove valuable in longer tool life with greatly reduced operational costs. **This information is for uncoated product: Ultra-Coat products will have significantly higher speed and feed rates.** For more information contact an **Ultra-Tool®** Factory Engineer, Sales Manager or consult our website at www.ultra-tool.com. Also coming soon, the ultimate shared applications database: speedsandfeeds.com.

Ultra-Tool® Solid Carbide Endmills

• Speed & Feed Recommendations



Material Group	Speed SFM	Feed Per Tooth (IPT)* Endmill Diameter equals			
		up to 1/4"	1/4" to 1/2"	1/2" to 3/4"	3/4" to 1"
Aluminum/Related Alloys	600-1200	.001-.002	.002-.004	.004-.006	.006-.008
Brass/Bronze	300-550	.001-.002	.002-.003	.003-.004	.004-.005
Copper/Related Alloys	500-900	.001-.002	.002-.003	.003-.005	.005-.006
Cast Iron (soft ±195bhn)	200-500	.001-.002	.002-.003	.003-.005	.005-.008
Cast Iron (medium ±225bhn)	125-350	.001-.002	.002-.003	.003-.004	.004-.007
Cast Iron (hard ±275bhn)	80-300	.0005-.001	.001-.002	.002-.003	.003-.005
Magnesium	800-1400	.001-.003	.003-.005	.005-.007	.007-.009
Monel/Nickel Alloys	65-175	.0005-.001	.001-.002	.002-.003	.003-.004
Plastics	600-1200	.001-.003	.003-.006	.006-.010	.010-.015
Steel-Heat Treated (35-40Rc)	150-350	.0003-.0005	.0005-.001	.001-.003	.003-.005
Steel-Heat Treated (40-45Rc)	125-275	.0002-.0005	.0005-.001	.001-.002	.002-.004
Steel-Heat Treated (45+Rc)	50-200	.0002-.0005	.0005-.001	.001-.002	.002-.003
Steel-Medium Carbon	175-350	.0005-.001	.001-.002	.002-.004	.004-.006
Steel; Mold & Die	50-250	.0005-.001	.001-.002	.002-.004	.004-.007
Steel; Tool	150-250	.0005-.001	.001-.002	.002-.004	.004-.006
Stainless-Soft	250-400	.0005-.001	.001-.002	.002-.004	.004-.006
Stainless-Hard	75-250	.0005-.001	.001-.002	.002-.003	.003-.005
Titanium Alloys	90-225	.0003-.0008	.0008-.002	.002-.003	.003-.005

*Feeds are governed by the depth of cut. Average axial depth is 1/2 to 1-1/2 times the endmill diameter. Use higher end of range for lighter axial depths of cut, and lower end for greater depths. Reduce speeds by 25-35% for pure slotting applications. Reduce feeds by 30-50% when using **Ultra** Series 382, 383, or 384 Extended Length endmills.

All **Ultra-Tool®** Endmill products are manufactured from **Ultra-Grain® 1**. All **Ultra** endmills feature center-cutting capabilities as a standard feature. Proprietary fixtures are used in attempt to hold concentricity levels to industry-leading tolerances.

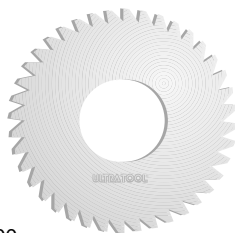
Specifications:

Diameter: +.000 / -.002
Shank Diameter: +.0000 / -.0003
LOC: +.060 / -.000
OAL: ±.060
Helix: ± 2° TIR: Max .0005 (.0008 on extended lengths)

Diameter (mm): +.000 / -.051mm
Shank Diameter(mm): +.000 / -.007mm
LOC: +1.52 / -.00mm
OAL: ±1.52mm
Radius: ±.001

Ultra-Tool® Solid Carbide Saws

• Speed & Feed Recommendations



Specifications:

Diameter: ±.015
Hole (ID): +.0005 / -.0000
Thickness: ±.00025

All **Ultra-Tool®** Saw products are manufactured from **Ultra-Carb®**. Use a higher RPM and lower feed ratios than in most cutting tool applications. Use light viscosity coolants at most; dry running is acceptable and/or preferred. Concentricity is the single most determining factor in an efficient slotting operation.

Material Group

Material Group	Speed SFM
Aluminum/Related Alloys	700-1000
Brass/Bronze	450-750
Cast Iron (soft)	250-450
Cast Iron (medium)	150-350
Cast Iron (hard)	100-200
Magnesium	800-1200
Monel/Nickel Alloys	150-225
Steel-Heat Treated (35-40Rc)	150-250
Steel-Heat Treated (40-45Rc)	100-200
Steel-Heat Treated (45+Rc)	75-135
Steel-Low Carbon	250-425
Stainless-Soft	200-300
Stainless-Hard	100-200
Titanium Alloys	150-275

Feed Rate: Chip Load from .0001 to .0015 (per tooth)

Ultra-Carb® Drills

• Speed & Feed Recommendations



Material Group	Speed SFM
Aluminum/Related Alloys	250-550
Aluminum/High Silicon	100-350
Brass	250-400
Bronze	150-250
Copper/Related Alloys	150-350
Cast Iron (soft)	130-250
Cast Iron (medium)	100-175
Cast Iron (hard)	50-150
Inconel	30-70
Magnesium	300-600
Monel	60-180
Nickel Alloys	75-200
Rene	30-75
Resins/Plastics	200-650
Steel-Cast & Forged	60-120
Steel-Heat Treated (35-40Rc)	60-125
Steel-Heat Treated (40-45Rc)	40-85
Steel-Heat Treated (45+Rc)	20-60
Steel-Medium Carbon	100-200
Steel; Mold	60-130
Steel; Tool	40-110
Stainless-300 Series	30-90
Stainless-400 Series	60-140
Titanium	40-125
Waspoly	30-60

Recommended Feeds:
Inches per Revolution (IPR)*

Up to 1/16	.0005-.001
1/16 to 1/8	.001-.003
1/8 to 3/16	.002-.005
3/16 to 1/4	.002-.007
1/4 to 3/8	.003-.012
3/8 to 1/2	.004-.012
1/2 to 3/4	.005-.015

*Feeds are governed by the size of the tool and the material being drilled. The harder the material, the lighter the feed. Hard materials (stainless, etc.) will be at the low end of the listed range, while softer materials (aluminum, magnesium, etc.) will be at the high end.

Speed and feed should be sensibly reduced when hole depth exceeds three times the diameter of the drill being used.

All **Ultra-Tool®** Drill products are manufactured from **Ultra-Carb®**.

Specifications:

Diameter: +.0000 / -.0003
LOC: +.060 / -.090
OAL: +.060 / -.090
Point Angle: ±1°
Helix Angle: ±1°
Note: Series 560 Combined Drill/C'sink
Body Diameter: +.0000 / -.0003
Drill Diameter: +.003 / -.000