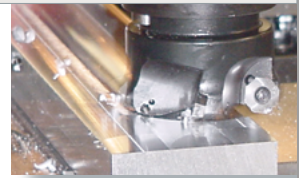




Mil-Tec Freedom Cutter® Speeds and Feeds

Speeds and Feeds for the most common material groups plus typical insert selection. Recommendations based on cut using 2/3rds body width and .150 or less axial depth. Speed in Surface Feet Per Minute (SFPM). Feed in inches per tooth.

*Grade references the last 4 characters of the complete 10 symbol insert name.
 **Feed Rate for Square is low to mid-range; Octagon & Round mid to high-range.



See these EDP#s for our most popular insert selections sorted by shape and material. These items also feature a 95% + stock availability.



1st Choice Class / Prep Coating



Material	Alloy Grade	Mil-Tec Geometry	Octagon 1 st Choice	Square 1 st Choice	Round 1 st Choice	Mil-Tec Grade* (last 4 characters)	Coolant	Speed SFPM	Feed Rate**
Non-Ferrous	6061, 7075	Super Shear SS	#50020UC	#52320UC	#51020A1	20UC or 20A1	W or D	1000 - 5000	.003 - .018
	Copper, Brass	Super Shear SS	#50020UC	#52320UC	#51020UC	20UC or 20A1	Wet	800 - 2000	.003 - .010
	Plastics	Super Shear SS	#50020UC	#52320UC	#51020UC	20UC or 20A1	W or D	500 - 3000+	.003 - .018
Steels	1018, 1020	Power Shear PS	#60051TA	#62351TA	#61051TA	51TA or 52TA	Dry	800 - 1200	.003 - .010
	4140, 4340, P20	Power Shear PS	#60051TA	#62352TA	#61051TA	51TA or 52TA	Dry	600 - 1200	.002 - .008
	A2, D2, H13	Power Shear PS	#60052TA	#62352TA	#61052TA	52TA	Dry	400 - 1200	.002 - .006
Steels	1018, 1020	Neg / Positive NP	#70051TA	#72351TA	#71051TA	51TA or 52TA	Dry	800 - 1200	.006 - .018
	4140, 4340, P20	Neg / Positive NP	#70051TA	#72351TA	#71051TA	51TA or 52TA	Dry	600 - 1200	.006 - .012
	A2, D2, H13	Neg / Positive NP	#70052TA	#72352TA	#71052TA	52TA	Dry	400 - 1200	.006 - .012
Stainless	13-8, 15-5, 17-4	Power Shear PS	#60052TA	#62352TA	#61052TA	52TA or 22TA	Dry	500 - 1200	.002 - .010
	303, 304, 316	Power Shear PS	#60051TA	#62351TA	#61051TA	51TA or 21TA	Dry	800 - 1300	.002 - .015
	420, 440C	Power Shear PS	#60052TA	#62352TA	#61052TA	51TA or 52TA	Dry	800 - 1200	.002 - .012
Stainless	13-8, 15-5, 17-4	Neg / Positive NP	#70052TA	#72352TA	#71052TA	52TA or 22TA	Dry	500 - 1200	.006 - .012
	303, 304, 316	Neg / Positive NP	#70051TA	#72351TA	#71051TA	51TA or 21TA	Dry	800 - 1300	.006 - .020
	420, 440C	Neg / Positive NP	#70052TA	#72352TA	#71052TA	51TA or 52TA	Dry	800 - 1200	.006 - .014
High Temp	Inconel	Power Shear PS	#60012TA	#62312TA	#61012TA	12TA or 52TA	Wet	50 - 180	.002 - .006
	Titanium	Power Shear PS	#60012TA	#62312TA	#61012TA	12TA or 52TA	Wet	70 - 300	.002 - .006
High Temp	Inconel	Mag Na Shear MS	#80012TA	#80311AT	n/a	12TA or 52TA	Wet	50 - 250	.002 - .004
	Titanium	Mag Na Shear MS	#80012TA	#80311AT	n/a	12TA or 52TA	Wet	70 - 300	.002 - .004
Cast Iron	Gray Iron	Power Shear PS	#60022TA	#62322TA	#61022TA	22TA or 52TA	Dry	500 - 1200	.004 - .010
	Ductile Iron	Power Shear PS	#60022TA	#62322TA	#61022TA	22TA or 52TA	Dry	600 - 1200	.004 - .010
Cast Iron	Gray Iron	Neg / Positive NP	#70022TA	#72322TA	#71022TA	22TA or 52TA	Dry	500 - 1200	.006 - .014
	Ductile Iron	Neg / Positive NP	#70022TA	#72322TA	#71022TA	22TA or 52TA	Dry	600 - 1200	.006 - .014

FC Series Specifications: Body Diameter ±.005, TIR with installed insert ±.001

Material	Operating Tips
Non-Ferrous	Our 20UC grade is ideal in aluminum and plastics. The polished surface provides a smooth cutting face with a low coefficient of friction. This grade also features an extremely sharp cutting edge for free cutting in soft or gummy materials. The 20A1 grade includes A1 coating. A1 adds additional lubricity and dramatically reduces chip welding. 20A1 is ideal in low coolant or dry machining applications.
Steels	We feature 2 primary grades for steel alloys, 51TA and 52TA. Both use a wear resistant carbide substrate that has been designed for performance in high heat applications. SmoothCoat TA provides further wear resistance, thermal protection, and lubricity. Our TA (a hybrid version of TiAlN) is well suited for dry machining of steel alloys. The difference between the 51TA and 52TA is the edge preparation; 52TA's heavier hone adds strength in the toughest alloys and heat treated steels, and is effective in reducing edge chipping in applications where vibration is a concern.
Stainless Steel	Variations of stainless steel are immense. 15-5 PH and 440C can be heat treated and have increased hardness. Others such as 304 and 316 will work harden and are gummy to machine. The challenge is to find the optimal combination of hardness and wear resistance that is balanced with toughness to prevent excessive chipping. We offer several grades that feature our SmoothEdge hone and TA coating to obtain the perfect balance.
High Temp	Titanium, Inconel, and other chromium / nickel alloys can be a challenge to machine. They were developed specifically for airframe applications where strength and toughness are primary goals. Insert toughness and wear characteristics are critical due to the slower speeds these materials are machined at. Our 12TA provides an excellent balance of both. For finishing applications, our 52TA can be highly effective due to outstanding wear abilities.
Cast Iron	Materials featuring short chips like cast iron require high cutting edge toughness. Casted materials can feature voids and inclusions that are destructive to cutting tools. Our 22TA and 52TA grades are designed to withstand these attributes. 22TA, the first choice, exhibits great toughness while 52TA has better wear resistance.



Mil-Tec Freedom Cutter® Inserts Nomenclature Guide & Technical Information

Example: ① Octagon ② Super Shear ③ .062 ④ Ultra-Carb 2 ⑤ SmoothEdge 1 ⑥ TiAlN

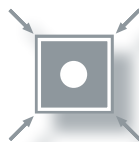
Insert Description = **O-SS-062-2-1-TA**, or **OSS06221TA** (every Freedom Cutter Insert has 10 characters total)
Note that the combination of ④ Carbide, ⑤ Edge Prep & ⑥ Coating constitute the **Insert Grade** ("21TA" in this example)



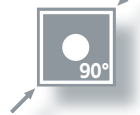
Insert Shape Availability order as O, S, Z, or R



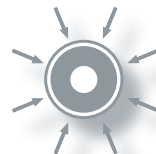
Octagon (O)



Square (S)



Square 90 (Z)



Round (R)

Each arrow represents a cutting edge index.

Octagon (O) = 8 indexes
Square (S) = 4 indexes
Square 90 (Z) = 2 indexes
Round (R) = 8 indexes



Geometry Availability order as SS, PS, NP, MS, GP, or SA



High positive grind available in all shapes. Ideal for aluminum, non-ferrous, plastic, & non-metals.



Medium positive grind for steel, stainless, and exotics. The perfect "all-application" geometry.



Strongest insert and designed for heavy feed rates. Ideal for steel, stainless, & heat-treated alloys.



Molded and ground chip control; ideal for stainless & exotics including titanium and inconel.



Flat top grind for all materials.



Maximum high positive grind for milling 90° corner in Aluminum. Available in Square 90 (Z) shape.



Super Shear grind for milling 90° corner available in Square 90 (Z).



Power Shear grind for milling 90° corner available in Square 90 (Z).



Radius Availability order as 000, 005, 016, 032, 047, 062, 093, 125, 187, 250, or 312

Octagon shape available in 062 only; Round is 312 by default.

Radius =	000	005	016	032	047	062	093	125	187	250	312
decimal	.000	.005	.016	.032	.047	.062	.093	.125	.187	.250	.312
metric	0.00 mm	0.13 mm	0.40 mm	0.81 mm	1.20 mm	1.57 mm	2.36 mm	3.18 mm	4.75 mm	6.35 mm	7.92 mm



Carbide Classification Availability order as 1, 2, or 5



Toughest Carbide
All applications + Exotics



Hardest Carbide
Cast Iron, Stainless
Low Carbon Steels



Tough + Hard Carbide
Steels, Stainless
Hard materials

Please note that the combination of ④ Carbide, ⑤ Edge Prep & ⑥ Coating constitute the **Insert Grade**, i.e. "21TA"



Edge Prep Availability order as 0, 1, or 2



No Hone, Upsharp = 0
Razor sharp for max shearing
Plastics, Aluminum, Non-Ferrous



Light Hone = 1
Added edge strength w/high shear
General Purpose for most materials



Heavy Hone = 2
Strongest cutting edge
Exotics, PH Stainless, Heat treated alloys



Coating Availability order as UC, TA, TN, A1, AT, D1, D2, or TC



UnCoated



TiAlN



TiN



TiB2



AlTiN



PVD Diamond



CVD Diamond



TiCN

• All selections not available • Stocked catalog standards are listed by EDP# on pages # 12 to # 17 • Specials available upon quotation
Mil-Tec Freedom Cutter inserts can be ordered in hundreds of variations. The ability to match a specific application with geometry, coating, edge prep and carbide substrate make the Freedom Cutter the perfect application-specific milling system.