

H.O.T. PRODUCT MEMO # 019-W

**FX105 Si<sub>3</sub>N<sub>4</sub>  
Ceramic Grade**



**Product category:** H.O.T. product

**Application Area:** High speed efficient turning and milling of **gray** cast iron.

**Target market:** Automotive market, manufacturers of engine and chassis components such as brake rotors and engine blocks, drive train manufacturers, pump manufactures, electric motor component and motor frame manufacturers.

**Features and Benefits:**

- Provided with a fine microstructure, FX105 exhibits 20% higher transverse rupture strength and 10% higher high-temperature hardness than existing ceramic grades.
- Due to high thermal conductivity, FX105 provides superior resistance to thermal cracks.
- Because good thermal properties FX105 can also work well in wet cutting conditions.
- Because FX105 is primarily used for medium to rough cutting we can offer M-class inserts as an economical alternate to our G-class inserts.

**TURNING**



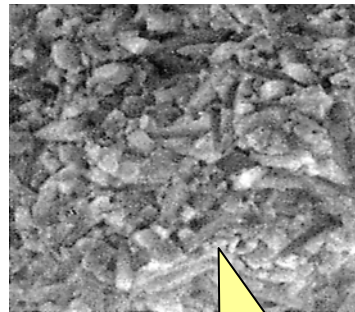
**TUNGALOY AMERICA**

**Product Strengths:**

- Brand awareness. Tungaloy FX105 is well known in the industry for machining cast iron.
- Tungaloy offers the right combination of grade and geometry for most applications in cast iron turning and milling including new dimple top or top notch type clamping type inserts (i.e. CNGX453)
- Pricing. Tungaloy is very competitive with all of our competitors in general market pricing and we can meet pricing in highly competitive large volume users.
- Versatility. FX105 can run in medium speed cutting (700 sfm) or high speed cutting (~3000 sfm). Additionally it runs very well in wet or dry conditions and in turning or milling applications.
- Tungaloy has an extensive database of FX105 tests available in our Application Library. Ask your Tungaloy Sales Engineer for more information.

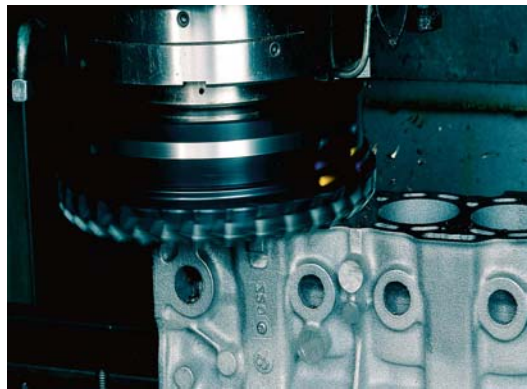
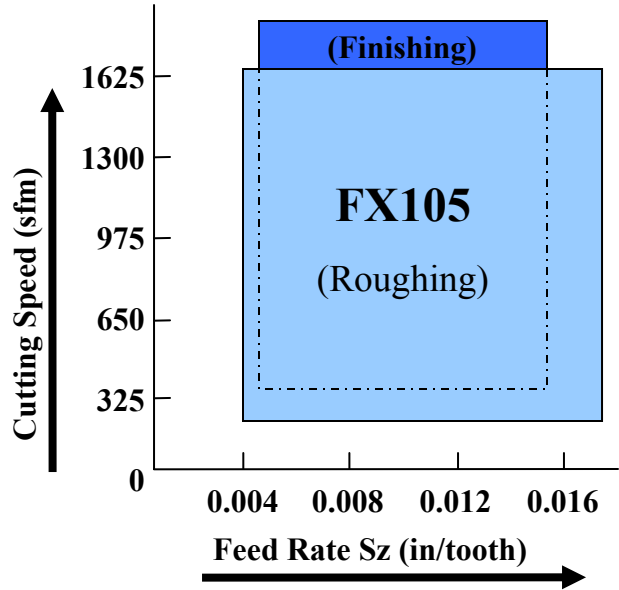
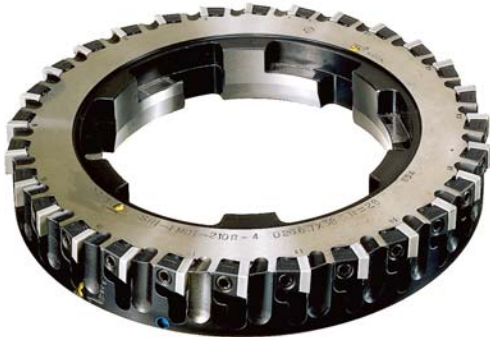
**Technical Data:**

- FX105 is a  $\text{Si}_3\text{N}_4$  (silicon nitride) type ceramic grade. Silicon nitride ceramic material has very good hot hardness and thermal conductivity compared to another type of ceramic such as  $\text{Al}_2\text{O}_3$  type. Additionally  $\text{Si}_3\text{N}_4$  type ceramics have more toughness compared to  $\text{Al}_2\text{O}_3$  type.
- FX105 should mainly be applied only to gray cast irons. During the high speed machining of gray cast irons the silicon nitride material has a chemical reaction with the cast iron that produces a protective layer similar to a coating. This causes the FX105 to be very efficient and wear resistant in gray irons. However ductile iron materials which have a different microstructure do not enjoy this same chemical reaction. Therefore FX105 typically will not be efficient for machining ductile irons.
- Similar to CBN; grades sometimes it is necessary to alter the standard edge prep to meet the demands of a particular application. This can easily be done. Also we can apply wiper type corners or special radii as needed. For these needs please contact Engineering.
- For certain industries such as brake rotor turning we have added specially designed “dimple type” inserts to our stock. These inserts are thicker than standard turning inserts, this coupled with the high strength dimple clamping system allows the customer to apply for high feed rates and heavy cutting depths.



Micro Structure  
of FX105

**Technical data:**  
**Milling**

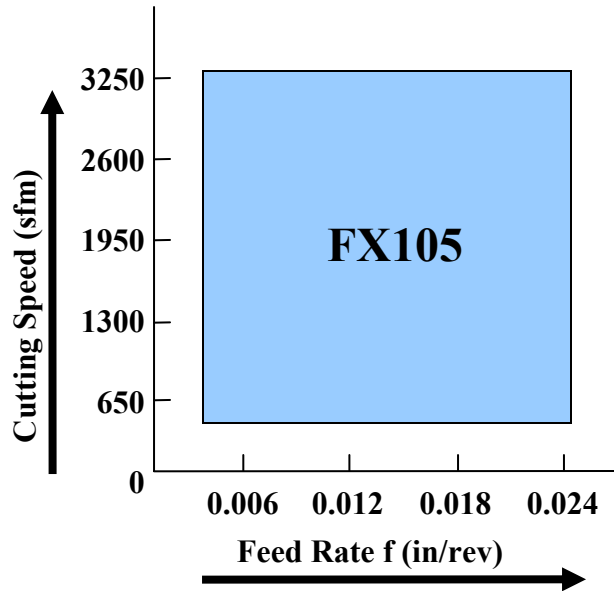


**Recommended Cutting Conditions for Milling**  
**Roughing and Finishing**

Work Material	Roughing		Finishing	
	Cutting speeds	Feed	Cutting speed	Feed
	v (sfm)	Sz (in/tooth)	V (sfm)	Sz (in/tooth)
Gray cast irons	260-1650	0.004-0.016	330-2000	0.004-0.014

**Technical data:**

**Turning**



**Recommended Cutting Conditions for Turning  
Roughing and Finishing**

Work Material	Roughing and Finishing	
	Cutting speeds $v$ (sfm)	Feed $f$ (in/rev)
Gray cast irons	300-3300	0.004-0.024

**Technical Note:**

- The most common question about failure of FX105 is top flaking. If you encounter a situation where FX105 is breaking in top layers, 99% of the time the operator is clamping the insert too tight. Remember this is ceramic not carbide. If the top clamp is made for carbide and not ceramic the possibility of flaking from the top is very likely. You can use a mechanical chip breaker to distribute the forces equally over the insert. The operator only has to finger tighten the clamp.
- If this is a continuing problem a torque wrench will solve this problem. FX105 can handle torque pressure up to 125 in/lbs but you should not have to apply more than 50 in/lbs for secure clamping.
- This product is complemented by use of Tungaloy A-style holder. These two products offer you a distinct accuracy and indexing time advantage. However the D-type holders have some problem with the piston seizing because of cast iron dust and coolant. The D-type holders can be used if they are frequently taken apart and cleaned.