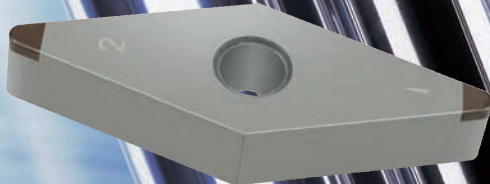
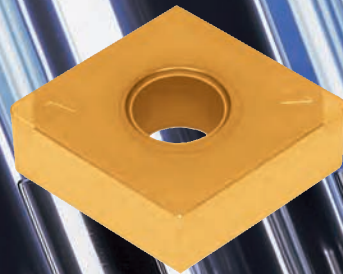


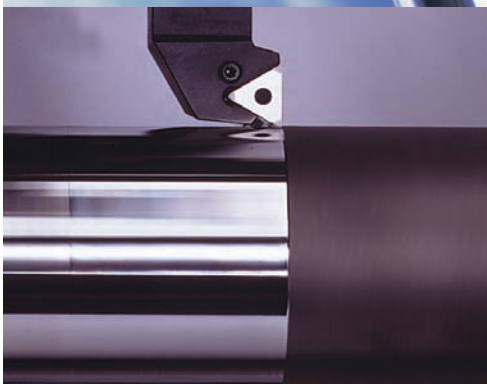
Products for Machining Hard Materials



Featuring New Grade BXC30



NEW
BXC30
BXC50
BX310
BX330
BX360
BX380
LX11



Introduction to Hard Turning Introduction

The machining of hard steels is probably the most unique of any other classification because of the materials and cutting conditions that must be used to cut them. These hard materials are generally classified as steels that have hardness from 45 to 65 HRc. Traditional machining was done only at extremely slow speeds. The only other process is grinding which takes even more time and specialized equipment. Advancements in cutting tool materials and technology have allowed the industry to machine hard materials in more efficient ways.

Material Structure

Hard materials are created from different treatments or can just be made as hard steel. Case-hardening, tempering, quenching, and surface-hardening are a few of the ways steel can be hardened to over 45 HRc. Steels like high-speed steel, tool steel, and bearing steels are a few examples of materials that fall under this classification.

Heat treating metals consists of changing properties of the material through regulating the heating and cooling process that the metal undertakes. Different temperatures are used depending on the processes that are taking place in the metal. Some of the processes that can be used include:

- Tempering
- Hardening
- Case-Hardening
- Surface-Hardening

Tempering is used to raise the toughness of the steel and remove the stress that normally occurs in hardening. This can be carried out by heating the steel to the tempering temperature, hold at the temperature for a certain time, then left to cool in the air. This is a completely controlled process, so special furnaces are used.

Hardening is a method of quenching the metal and cooling it at a higher rate than the critical rate. A material's hardenability is proportional to the amount of carbon that is present. Steels with a carbon content above 0.5% (ie: 1060, 1095, 4150) are easiest to harden because the carbon is already present in the material.

Case-Hardening is the hardening to a particular depth of the material, typically 0.020" ~ 0.030" deep. The main process is called carburizing, which involves adding carbon to the surface of the material and then hardening it. The core of the material is usually unaffected by case-hardening. Normally, medium to high carbon steels are used because of the high content of carbon on the surface.

Surface-Hardening is more general than case-hardening. It involves producing wear-resistance surfaces and can be done by any one of these three methods:

1. Induction: Wrapping part in a coil and sending electric current through, causing heat and hardening.
2. Carburizing: Diffusing carbon into surface by heating in a carbon-rich medium followed by a quench.
3. Nitriding: Forming nitrides at surface by heating in ammonia gas.

Tungaloy Navigator System

ISO Code	Material
P	Steels
K	Cast Irons
M	Stainless Steels
N	Non-Ferrous Metals
S	High Temp Alloys
H	Hardened Materials



Customer Service: 1-888-554-8394
Technical Support: 1-888-554-8391

●: Stocked Standard
 ○: Non-Stocked Standard

Machinability of Hard Materials

Machining hard materials is one of the most unique applications in metalworking. Hard metals are very demanding to machine and require specialized materials for use as the cutting tool. Some of the properties of the tool include:

1. High hardness & Hot hardness
2. Wear resistance
3. Chemical stability

For these reasons, special materials are needed to cut hard metals. Tool materials like ceramic and polycrystalline cubic boron nitride (PcBN) are typically used in these applications. PcBN and ceramics have the properties that are listed above, so they are used successfully in hard turning.

A few problems can arise when machining hardened materials and can result in poor performance of the tool. These problems include:

- Rapid cutting edge wear
- High pressures on the cutting edge
- High temperatures on the cutting edge
- High cutting forces

Each of these aspects can be prevented with the correct combination of tool materials, tool geometry, proper use of coolant and rigidity in the setup.

Keys to Successful Hard Turning

- **Rigidity:**
 - Machine* Maximize rigidity in all elements of the machine
 - Toolholder* Clean and inspect toolholder & parts for wear
Use holders such as Tungaloy's A-Type
 - Workholding* Maximize rigidity in all aspects of workholding
- **Coolant should be used when:**
 - Very low (less than 16 μ in.) surface finish is required
 - Very tight tolerance workpiece
 - Using wiper type insert
 - *Generally dry machining is preferred*
- **Workpiece hardness:**
 - Workpiece hardness should be greater than 45 HRc
 - If workpiece hardness is less than 45 HRc a chemical reaction may occur which will cause premature tool failure

Tungaloy Navigator System Grade Selection for Hard Materials



CBN Grades for Hard Materials

NEW BXC30 - For high speed (up to 1000 sfm) continuous hard turning

BXC50 - For medium to high speed (up to 1000 sfm) continuous and interrupted hard turning

BX310 - For high speed (up to 1000 sfm) continuous hard turning

BX330 - For medium speed (up to 650 sfm) continuous hard turning

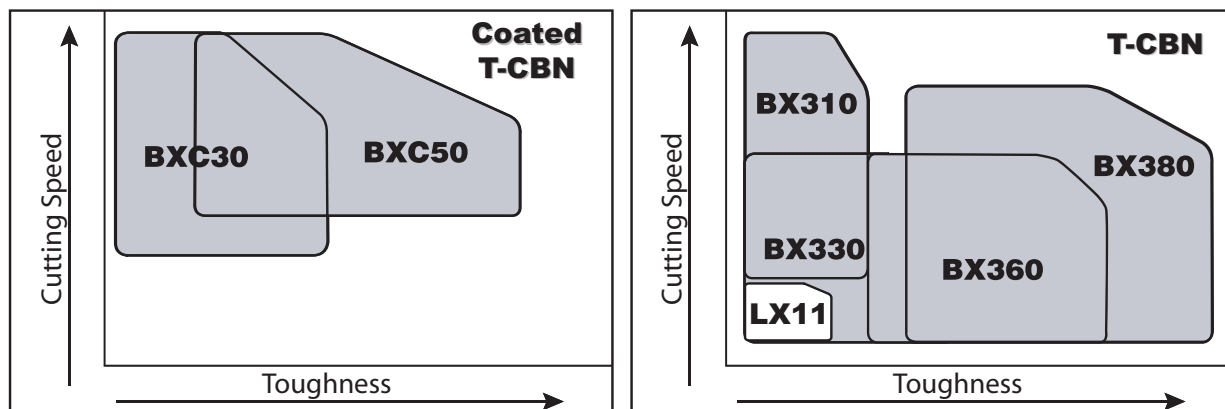
BX360 - For medium speed (up to 600 sfm) interrupted hard turning

BX380 - For high speed (up to 800 sfm) heavy interrupted hard turning

Ceramic Grades for Hard Materials

LX11 - For medium speed (up to 600 sfm) continuous hard turning

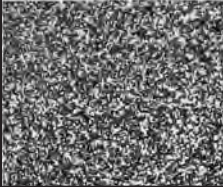

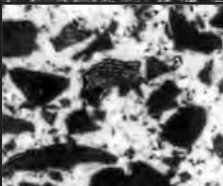



Application Range



Customer Service: 1-888-554-8394
Technical Support: 1-888-554-8391

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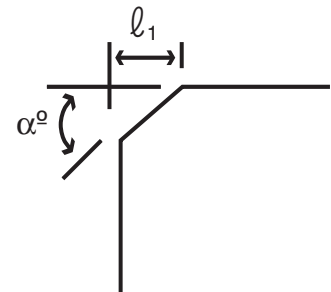
■ T-CBN Grade Specification

Grade	Microstructure	Hardness (Hv)	TRS (GPa)	Feature	Application
NEW BXC30		2800 - 3000	0.85 - 0.95	PVD coated CBN. Composed of very fine grain CBN. Excels in wear resistance and surface finish.	Continuous medium speed turning and boring of hardened steels and hard materials.
BXC50		3500 - 3700	1.15 - 1.30	PVD coated CBN that excels in high wear resistance along with high toughness.	General to high speed turning of hardened steels. Continuous to heavy interrupted turning.
BX310		2700 - 2900	.080 - 0.90	Composed of both ultra-fine and medium grain CBN. Excels in wear resistance and surface finish.	Continuous high speed turning of hardened steels and hard materials.
BX330		2800 - 3000	0.85 - 0.95	Composed of very fine grain CBN. Excels in wear resistance and surface finish.	Continuous medium speed turning and boring of hardened steels and hard materials.
BX360		3200 - 3400	1.00 - 1.10	Composed of medium and fine grain CBN. Provides well balanced wear and shock resistance. Good G.P. grade.	Light to heavy interrupted turning of hardened steels and hard materials.
BX380		3500 - 3700	1.15 - 1.30	Composed of medium grain CBN. Excels in cutting edge toughness. Toughest grade.	Heavy interrupted turning of hardened steels. Capable of high cutting speeds.

■ Standard Honing Dimensions

Grade	l_1	α°
NEW BXC30	0.005"	-25°
BXC50	0.005"	-25°
BX310	0.005"	-25°
BX330 negative	0.005"	-25°
BX360	0.005"	-25°
BX380	0.005"	-25°

Grade	l_1	α°
BX930	0.005"	-15°
BX950	0.005"	-25°
BX450	0.005"	-25°
BX480	0.005"	-25°
Positive inserts including BXC30		
All	0.002"	-15°



NEW
BXC30

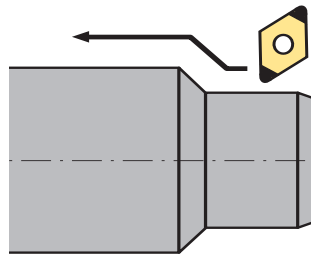
CBN GRADE FOR
MEDIUM TO HIGH SPEED HARD TURNING

Medium to High Speed (up to 1000 sfm) Continuous Turning and Boring of Hardened Steels

Improve your tool life by using CBN Grade BXC30 compared to competitive grades.

**Tungaloy
BXC30**

- *Speed*
770 sfm
- *Surface Finish*
24 Rms
- *Tool Life*
98 pieces



Competitive CBN Grade

- *Speed*
550 sfm
- *Surface Finish*
24 Rms
- *Tool Life*
60 pieces

63% Increase in Tool Life

RECOMMENDED CUTTING CONDITIONS FOR BXC30

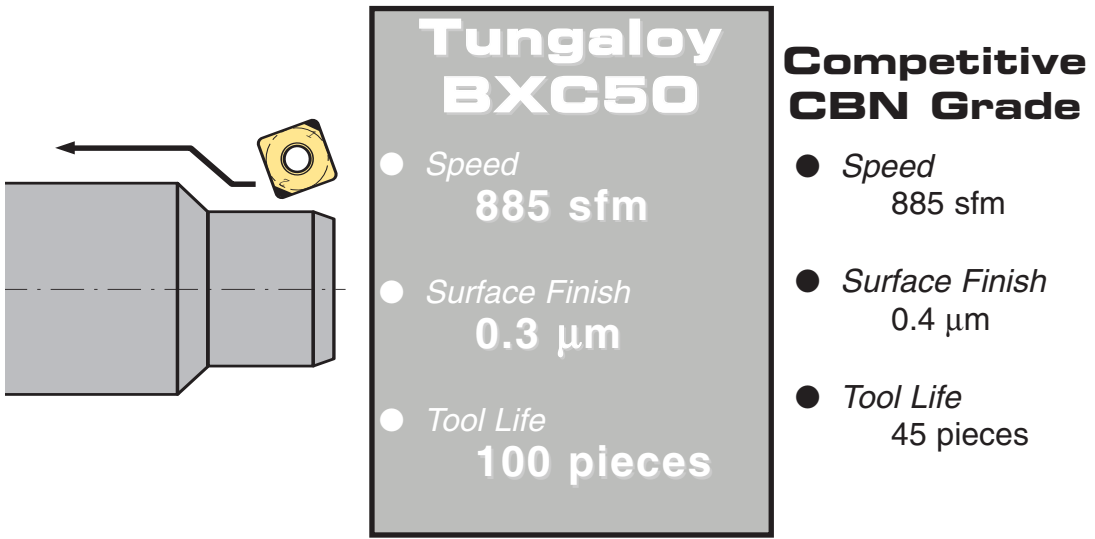
Work Materials		Cutting Conditions		
Type	Hardness	V (sfm)	F (ipr)	D (inch)
Medium carbon steels Alloy steels Bearing steels	HRc 50~65	350~1000	.002~.008	~.020
Die steels High speed steels	HRc 55~65	250~700	.002~.008	~.020

BXC50

PVD COATED CBN GRADE FOR
HIGH EFFICIENT HARD TURNING

**Medium to High Speed (up to 1000 sfm)
Continuous and Interrupted Turning of Hardened Steels**

BXC50 can last over two times longer than uncoated CBN and 25% longer than competitive coated CBN with no chipping or breakage.



Tungaloy BXC50	Competitive CBN Grade
● Speed 885 sfm	● Speed 885 sfm
● Surface Finish 0.3 μm	● Surface Finish 0.4 μm
● Tool Life 100 pieces	● Tool Life 45 pieces

**25% Improvement
in Surface Finish**

**100% Increase in
Tool Life**

RECOMMENDED CUTTING CONDITIONS FOR BXC50

Work Materials		Cutting Conditions		
Type	Hardness	V (sfm)	F (ipr)	D (inch)
Medium carbon steels Alloy steels Bearing steels	HRc 50-65	350 ~ 1000	.002 ~ .008	~ .020
Die steels High speed steels	HRc 55-65	250 ~ 700	.002 ~ .008	~.020

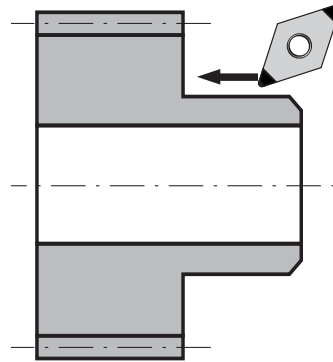
CBN GRADE FOR HIGH SPEED HARD TURNING
BX310

High Speed (up to 1000 sfm) Turning of Hardened Steels

Increase your cutting speed and decrease your cycle time by using CBN Grade BX310 compared to conventional CBN Grades.

**Tungaloy
BX310**

- *Speed*
950 sfm
- *Efficiency*
696 parts/hr.
- *Tool Life*
1200 pieces



Conventional Grade

- *Speed*
430 sfm
- *Efficiency*
315 parts/hr.
- *Tool Life*
800 pieces

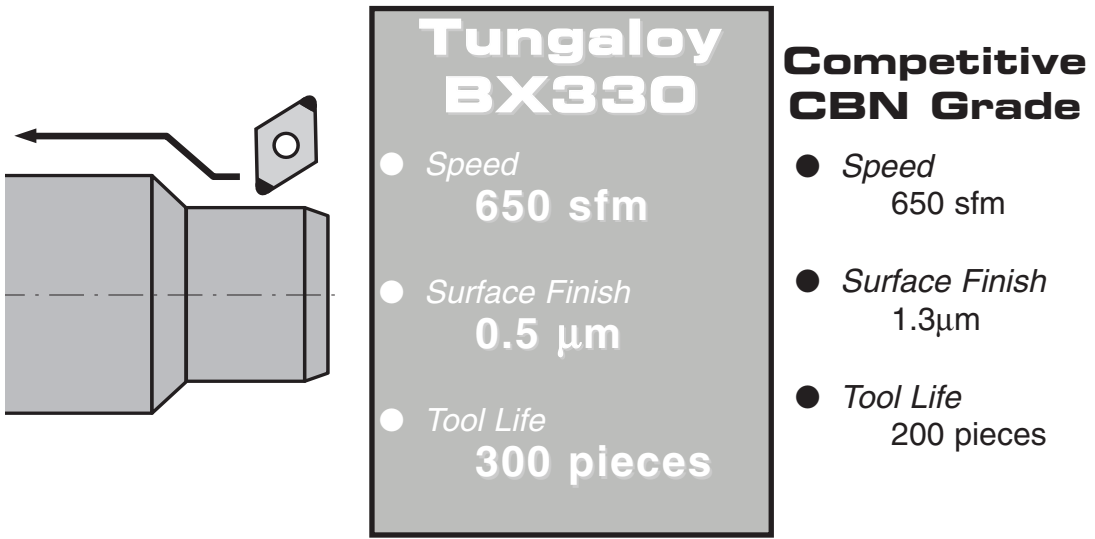
51% Decrease in Production Costs

RECOMMENDED CUTTING CONDITIONS FOR BX310

Work Materials		Cutting Conditions		
Type	Hardness	V (sfm)	F (ipr)	D (inch)
Medium carbon steels Alloy steels Bearing steels	HRc 50~65	600~1000	.002~.008	~.020
Die steels High speed steels	HRc 55~65	400~700	.002~.006	~.020

**Medium Speed (up to 650 sfm)
Turning and Boring of Hardened Steels**

Improve your surface finish and improve your tool life by using CBN Grade BX330 compared to competitive grades.



Tungaloy BX330	Competitive CBN Grade
● Speed 650 sfm	● Speed 650 sfm
● Surface Finish 0.5 μm	● Surface Finish 1.3μm
● Tool Life 300 pieces	● Tool Life 200 pieces

**60% Improvement
in Surface Finish**

**50% Increase in
Tool Life**

RECOMMENDED CUTTING CONDITIONS FOR BX330

Work Materials		Cutting Conditions		
Type	Hardness	V (sfm)	F (ipr)	D (inch)
Medium carbon steels Alloy steels Bearing steels	HRc 50~65	300~650	.002~.008	~.020
Die steels High speed steels	HRc 55~65	200~500	.002~.006	~.020

BX330

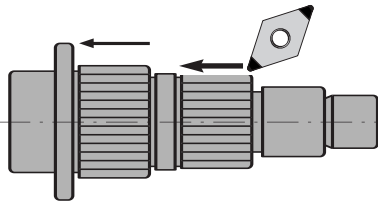
CBN GRADE FOR
MEDIUM SPEED HARD TURNING

**CBN GRADE FOR
 MEDIUM SPEED INTERRUPTED
 HARD TURNING**

BX360

Medium Speed (up to 600 sfm) General Turning of Hardened Steels

Improve your operational efficiency by using flexible CBN Grade BX360 for continuous to interrupted hard turning at a variety of speeds.



**Tungaloy
BX360**

- *Speed*
330 sfm
- *Tool Life*
400 pieces
- *Failure Mode*
Wear

Competitive CBN Grade

- *Speed*
330 sfm
- *Tool Life*
200 pieces
- *Failure Mode*
Chipping

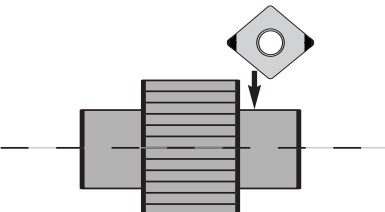
100% Improvement in Tool Life

RECOMMENDED CUTTING CONDITIONS FOR BX360

Work Materials		Cutting Conditions		
Type	Hardness	V (sfm)	F (ipr)	D (inch)
Medium carbon steels Alloy steels Bearing steels	HRc 50~65	200~600	.002~.008	~.020
Die steels High speed steels	HRc 55~65	150~450	.002~.006	~.020

**High Speed (up to 800 sfm)
Heavy Interrupted Turning of Hardened Steels**

Improve your production of severely interrupted hardened steel parts by using CBN Grade BX380.



Tungaloy BX380	Competitive CBN Grade
● <i>Speed</i> 500 sfm	● <i>Speed</i> 500 sfm
● <i>Tool Life</i> 120 pieces	● <i>Tool Life</i> 60 pieces
● <i>Failure Mode</i> Wear	● <i>Failure Mode</i> Severe Chipping

**100% Improvement
in Tool Life**

BX380
CBN GRADE FOR
HIGH SPEED HEAVY INTERRUPTED
HARD TURNING

RECOMMENDED CUTTING CONDITIONS FOR BX380

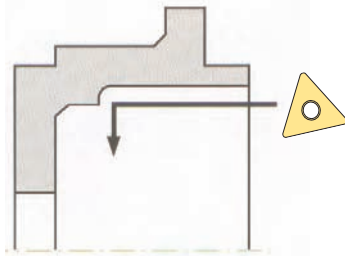
Work Materials		Cutting Conditions		
Type	Hardness	V (sfm)	F (ipr)	D (inch)
Medium carbon steels Alloy steels Bearing steels	HRc 50-65	200-800	.002~.008	~.020
Die steels High speed steels	HRc 55-65	200-650	.002~.008	~.020

Medium Speed (up to 600 sfm) Continuous Turning of Hardened Steels

Decrease your tooling cost by using cost-effective ceramic grade LX11 for continuous hard turning.

LX11

CERAMIC GRADE FOR
MEDIUM TO HIGH SPEED
HARD TURNING



**Tungaloy
LX11**

- Speed
260 sfm
- Tool Life
100 pieces
- Failure Mode
Wear

Competitive CBN Grade

- Speed
260 sfm
- Tool Life
50 pieces
- Failure Mode
Flaking Fracture

100% Improvement in Tool Life

87% Reduction in Tool Costs

RECOMMENDED CUTTING CONDITIONS FOR LX11

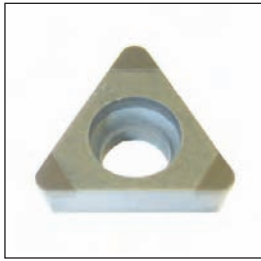
Work Materials		Cutting Conditions		
Type	Hardness	V (sfm)	F (ipr)	D (inch)
Medium carbon steels Alloy steels Bearing steels	HRc 45~65	250~600	.001~.006	~.040
Die steels High speed steels	HRc 55~65	200~400	.001~.004	~.040

Mini-Tipped, Multi-Cornered CBN

Insert Program



• Inserts are **STOCKED** in three separate honing dimensions to cover more applications.



• Both negative and positive CBN inserts are multi-cornered, mini-tipped.

• Item number indicates number of tips and honing level.

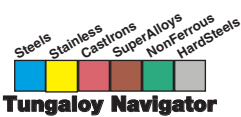
NUMBER OF TIPS

2QP CNGA 432 L	→ Light Honing, for light continuous cutting	→ .005x15°
2QP CNGA 432	→ Standard Honing, for most applications	→ .005x25°
2QP CNGA 432 H	→ Heavy Honing, for heavy interrupted cutting	→ .005x35°
2QP CNGA 432 W	→ Wiper type corner radius	→ .005x25°

General Cutting Conditions For CBN Inserts

Work Materials		Cutting	Conditions		Grade	
Type	Hardness	V (sfm)	F (ipr)	DOC (inch)		
Low carbon steels High carbon steels Bearing steels	Continuous HRC 45~65	600~900	0.002~0.008	~0.020	BX310 BX330	BXC30
	Interrupted HRC 45~65	150~500	0.002~0.006	~0.010	BX360 BX380	
Die steels High speed steels	HRC 55~63	400~700	0.002~0.006	~0.020	BX310	BXC30
		150~350	0.002~0.006	~0.020	BX330, BX360	BXC50
Chilled cast iron	HRC 55~83	125~250	0.002~0.006	~0.020	BX950	

*Dry cutting is generally recommended for most applications of CBN.









Customer Service: 1-888-554-8394
Technical Support: 1-888-554-8391

●: Stocked Standard
 ○: Non-Stocked Standard







One Time Use-QP Mini-Tip Series

Multi-Corner Type-Negative

Shape	Item Number Inch	Item Number Metric	Stocked Grades						Dimensions (in)			
			BX310	BX330	BX360	BX380	BXC30	BXC50	I.C. Dia.	Thk.	Hole Dia.	Corner Radius
	4QP-CNGA431	4QP-CNGA120404					●	●	0.500	0.187	0.203	0.016 0.031 0.047
	4QP-CNGA432	4QP-CNGA120408					●	●				
	4QP-CNGA433	4QP-CNGA120412					●	●				
	2QP-CNGA431-L	2QP-CNGA120404-L		●					0.500	0.187	0.203	0.016
	2QP-CNGA431	2QP-CNGA120404	●	○	●	●						
	2QP-CNGA431-H	2QP-CNGA120404-H			○	○						
	2QP-CNGA431-W	2QP-CNGA120404-W	●									
	2QP-CNGA432-L	2QP-CNGA120408-L		●								
	2QP-CNGA432	2QP-CNGA120408	●	○	●	●						
	2QP-CNGA432-H	2QP-CNGA120408-H			○	●						
	2QP-CNGA432-W	2QP-CNGA120408-W	●									
	2QP-CNGA433-L	2QP-CNGA120412-L		○								
	2QP-CNGA433	2QP-CNGA120412	●	○	●	●						
	2QP-CNGA433-H	2QP-CNGA120412-H			●	●						
	2QP-CNGA433-W	2QP-CNGA120412-W	●									
	4QP-DNGA431	4QP-DNGA150404					●	●	0.500	0.187	0.203	0.016 0.031 0.047
	4QP-DNGA432	4QP-DNGA150408					●	●				
	4QP-DNGA433	4QP-DNGA150412					●	●				
	2QP-DNGA431-L	2QP-DNGA150404-L		●					0.500	0.187	0.203	0.016
	2QP-DNGA431	2QP-DNGA150404	●	○	●	●						
	2QP-DNGA431-H	2QP-DNGA150404-H			○	○						
	2QP-DNGA432-L	2QP-DNGA150408-L		●								
	2QP-DNGA432	2QP-DNGA150408	●	●	●	●						
	2QP-DNGA432-H	2QP-DNGA150408-H			○	●						
	2QP-DNGA432-W	2QP-DNGA150408-W	●									
	2QP-DNGA433-L	2QP-DNGA150412-L		○								
	2QP-DNGA433	2QP-DNGA150412	○	○	●	○						
	2QP-DNGA433-H	2QP-DNGA150412-H			○	●						
	4QP-SNGA431	4QP-SNGA120404					●	●	0.500	0.187	0.203	0.016 0.031 0.047
	4QP-SNGA432	4QP-SNGA120408					●	●				
	4QP-SNGA433	4QP-SNGA120412					●	●				
	2QP-SNGA431-L	2QP-SNGA120404-L		○					0.500	0.187	0.203	0.016
	2QP-SNGA431	2QP-SNGA120404	●	○	●	●						
	2QP-SNGA431-H	2QP-SNGA120404-H			○	○						
	2QP-SNGA432-L	2QP-SNGA120408-L		○								
	2QP-SNGA432	2QP-SNGA120408	●	○	●	●						
	2QP-SNGA432-H	2QP-SNGA120408-H			○	○						
	2QP-SNGA433-L	2QP-SNGA120412-L		○								
	2QP-SNGA433	2QP-SNGA120412	●	○	●	●						
2QP-SNGA433-H	2QP-SNGA120412-H			○	○							

One Time Use-QP Mini-Tip Series

■ Multi-Corner Type-Negative

Shape	Item Number Inch	Item Number Metric	Stocked Grades						Dimensions (in)			
			BX310	BX330	BX360	BX380	BXC30	BXC50	I.C. Dia.	Thk.	Hole Dia.	Corner Radius
	6QP-TNGA331	6QP-TNGA160404					●	●	0.375	0.187	0.150	0.016 0.031 0.047
	6QP-TNGA332	6QP-TNGA160408					●	●				
	6QP-TNGA333	6QP-TNGA160412					●	●				
	3QP-TNGA331-L	3QP-TNGA160404-L		●					0.375	0.187	0.150	0.016
	3QP-TNGA331	3QP-TNGA160404	●	○	●	●						
	3QP-TNGA331-H	3QP-TNGA160404-H			○	●						
	3QP-TNGA332-L	3QP-TNGA160408-L		●								
	3QP-TNGA332	3QP-TNGA160408	●	○	●	●						
	3QP-TNGA332-H	3QP-TNGA160408-H			○	●						
	3QP-TNGA333-L	3QP-TNGA160412-L			○							
	3QP-TNGA333	3QP-TNGA160412	●	○	●	●						
3QP-TNGA333-H	3QP-TNGA160412-H			○	●							
	4QP-VNGA331	4QP-VNGA160404					●	●	0.375	0.187	0.150	0.016 0.031
	4QP-VNGA332	4QP-VNGA160408					●	●				
	2QP-VNGA331-L	2QP-VNGA160404-L		●					0.375	0.187	0.150	0.016
	2QP-VNGA331	2QP-VNGA160404	●	○	●	●						
	2QP-VNGA331-H	2QP-VNGA160404-H			○	○						
	2QP-VNGA332-L	2QP-VNGA160408-L		●								
	2QP-VNGA332	2QP-VNGA160408	●	○	●	●						
	2QP-VNGA332-H	2QP-VNGA160408-H			○	●						
	6QP-WNGA431	6QP-WNGA080404					●	●	0.500	0.187	0.203	0.031
	6QP-WNGA432	6QP-WNGA080408					●	●				
	3QP-WNGA432	3QP-WNGA080408	○	○	○	●			0.500	0.187	0.203	0.031
	3QP-WNGA433	3QP-WNGA080412				●						










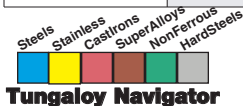
Customer Service: 1-888-554-8394
Technical Support: 1-888-554-8391

●: Stocked Standard
○: Non-Stocked Standard

One Time Use-QP Mini-Tip Series

Multi-Corner Type-Positive

Shape	Item Number Inch	Item Number Metric	Stocked Grades					Dimensions (in)						
			BX310	BX330	BX360	BX380	BXC30	I.C. Dia.	Thk.	Hole Dia.	Corner Radius			
	2QP-CCMW21.50.5	2QP-CCMW060202					●	0.250	0.094	0.110	0.008			
	2QP-CCMW21.51	2QP-CCMW060204	●	○			●				0.016			
	2QP-CCMW21.51-W	2QP-CCMW060204-W	○								0.031			
	2QP-CCMW21.52	2QP-CCMW060208	●								0.016			
	2QP-CCMW21.52-W	2QP-CCMW060208-W	○									0.031		
	2QP-CCMW32.51	2QP-CCMW09T304	●	○			●				0.375		0.156	0.173
	2QP-CCMW32.51-W	2QP-CCMW09T304-W	●									0.031		
	2QP-CCMW32.52	2QP-CCMW09T308	●				●					0.016		
2QP-CCMW32.52-W	2QP-CCMW09T308-W	●					0.031							
	2QP-DCMW21.50.5	2QP-DCMW070202						●	0.250	0.094	0.110	0.008		
	2QP-DCMW21.51	2QP-DCMW070204	●	○			●	0.016						
	2QP-DCMW21.52	2QP-DCMW070208	●					0.031						
	2QP-DCMW32.50.5	2QP-DCMW11T302					●	0.008						
	2QP-DCMW32.51	2QP-DCMW11T304	●	○			●					0.016		
2QP-DCMW32.52	2QP-DCMW11T308	●				●	0.031							
	2QP-SPU321	2QP-SPMN090304		○	○			0.375	0.125	-	0.016			
	2QP-SPU322	2QP-SPMN090308		○	○						0.031			
	3QP-TCMW21.51	3QP-TCMW110204	●					0.250	0.094	0.110	0.016			
	3QP-TCMW21.52	3QP-TCMW110208	●								0.031			
	3QP-TCMW32.51	3QP-TCMW16T304	●					0.375	0.156	0.173	0.016			
	3QP-TCMW32.52	3QP-TCMW16T308	●								0.031			
	3QP-TPU221	3QP-TPMN110304	●	○				0.250	0.125	-	0.016			
	3QP-TPU222	3QP-TPMN110308	●	○							0.031			
	3QP-TPU321	3QP-TPMN160304	●	○				0.375	0.125	-	0.016			
	3QP-TPU322	3QP-TPMN160308	●	●							0.031			
	3QP-TPMW631	3QP-TPMW080204		○	○		●	0.187	0.094	0.090	0.016			
	3QP-TPMW730.5	3QP-TPMW090202		○	○						0.219	0.094	0.098	0.008
	3QP-TPMW731	3QP-TPMW090204		○	○		●	0.016						
	3QP-TPMW21.50.5	3QP-TPMW110202		○	○		●	0.250	0.094	0.110	0.008			
	3QP-TPMW21.51	3QP-TPMW110204		○	○		●				0.016			
	3QP-TPMW220.5	3QP-TPMW110302					●				0.008			
	3QP-TPMW221	3QP-TPMW110304	●	○			●	0.250	0.125	0.110	0.016			
	3QP-TPMW222	3QP-TPMW110308	●	○			●				0.031			
	3QP-TPMW2.520.5	3QP-TPMW130302		○	○		●	0.312	0.125	0.110	0.008			
	3QP-TPMW2.521	3QP-TPMW130304		○	○		●				0.016			
	3QP-TPMW331	3QP-TPMW160404	●	○			●	0.375	0.187	0.173	0.016			
	3QP-TPMW332	3QP-TPMW160408	●	○			●				0.031			
	3QP-TPMW32.51	3QP-TPMW16T304		○	○		●	0.375	0.156	0.173	0.016			
	2QP-VBMW221	2QP-VBMW110304	●	○			●	0.250	0.125	0.173	0.016			
	2QP-VBMW222	2QP-VBMW110308	●	○			●				0.031			
	2QP-VBMW331	2QP-VBMW160404					●				0.016			
	2QP-VBMW332	2QP-VBMW160408					●				0.031			
	2QP-VCMW331	2QP-VCMW160404		○	○						0.375	0.187	0.173	0.016



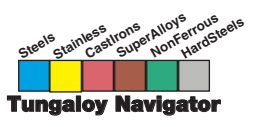
Customer Service: 1-888-554-8394
 Technical Support: 1-888-554-8391

●: Stocked Standard
 ○: Non-Stocked Standard

CBN Full Tip Insert Series

■ Single-Corner Type-Negative

Shape	Item Number Inch	Item Number Metric	Stocked Grades				Dimensions (in)			
			BX310	BX330	BX360	BX380	I.C. Dia.	Thk.	Hole Dia.	Corner Radius
	CNGA430.5-QBN	CNGA120402-QBN			○	0.500	0.187	0.203	0.008 0.016 0.031 0.047	
	CNGA431-QBN	CNGA120404-QBN			●					
	CNGA432-QBN	CNGA120408-QBN			●					
	CNGA433-QBN	CNGA120412-QBN			●					
	CNGN331-QBN	CNGN090404-QBN			○	0.375	0.187	-	0.016	
	CNGN332-QBN	CNGN090408-QBN			○				0.031	
	DNGA430.5-QBN	DNGA150402-QBN			○	0.500	0.187	0.203	0.008 0.016 0.031 0.047	
	DNGA431-QBN	DNGA150404-QBN			○					
	DNGA432-QBN	DNGA150408-QBN			●					
	DNGA433-QBN	DNGA150412-QBN			●					
	SNGA430.5-QBN	SNGA120402-QBN			○	0.500	0.187	0.203	0.008 0.016 0.031 0.047	
	SNGA431-QBN	SNGA120404-QBN			○					
	SNGA432-QBN	SNGA120408-QBN			●					
	SNGA433-QBN	SNGA120412-QBN			●					
	SNGN430.5-QBN	SNGN120402-QBN			○	0.500	0.187	-	0.008 0.016 0.031 0.047	
	SNGN431-QBN	SNGN120404-QBN			○					
	SNGN432-QBN	SNGN120408-QBN			○					
	SNGN433-QBN	SNGN120412-QBN			○					
	TNGA330.5-QBN	TNGA160402-QBN			○	0.375	0.187	0.150	0.008 0.016 0.031 0.047	
	TNGA331-QBN	TNGA160404-QBN			○					
	TNGA332-QBN	TNGA160408-QBN			●					
	TNGA333-QBN	TNGA160412-QBN			●					
	TNGN330.5-QBN	TNGN160402-QBN			○	0.375	0.187	-	0.008 0.016 0.031 0.047	
	TNGN331-QBN	TNGN160404-QBN			○					
	TNGN332-QBN	TNGN160408-QBN			○					
	TNGN333-QBN	TNGN160412-QBN			○					









Customer Service: 1-888-554-8394
Technical Support: 1-888-554-8391

●: Stocked Standard
○: Non-Stocked Standard

CBN Full Tip Insert Series

■ Single-Corner Type-Positive

Shape	Item Number Inch	Item Number Metric	Stocked Grades				Dimensions (in)			
			BX310	BX330	BX360	BX380	I.C. Dia.	Thk.	Hole Dia.	Corner Radius
	CPGA31.51-QBN	CPGA090204-QBN			○	0.375	0.094	0.150	0.016 0.031	
	CPGA31.52-QBN	CPGA090208-QBN			○					
	SPG321-QBN	SPGN090304-QBN			○	0.375	0.125	-	0.016 0.031 0.047	
	SPG322-QBN	SPGN090308-QBN			○					
	SPG323-QBN	SPGN090312-QBN			○					
	SPG422-QBN	SPGN120308-QBN			○	0.500	0.125	-	0.031 0.047	
SPG423-QBN	SPGN120312-QBN			○						
	TBGN521-QBN	TBGN060104-15-QBN			○	0.156	0.062	-	0.016 0.031	
	TBGN522-QBN	TBGN060108-15-QBN			○					
	TPGA730.5-QBN	TPGA090202-QBN			○	0.219	0.094	0.098	0.008 0.016	
	TPGA731-QBN	TPGA090204-QBN			○					
	TPGA21.50.5-QBN	TPGA110202-QBN			○	0.250	0.094	0.110	0.008 0.016	
	TPGA21.51-QBN	TPGA110204-QBN			○					
	TPGA220.5-QBN	TPGA110302-QBN			○	0.250	0.125	0.110	0.008 0.016	
	TPGA221-QBN	TPGA110304-QBN			○					
	TPGA320.5-QBN	TPGA160302-QBN			○	0.375	0.125	0.173	0.008 0.016 0.031	
	TPGA321-QBN	TPGA160304-QBN			○					
	TPGA322-QBN	TPGA160308-QBN			○					
		TPG221-QBN	TPGN110304-QBN			●	0.250	0.125	-	0.016 0.031
TPG222-QBN		TPGN110308-QBN			●					
TPG321-QBN		TPGN160304-QBN			●	0.375	0.125	-	0.016 0.031	
TPG322-QBN		TPGN160308-QBN			●					
		TPGW730.5-QBN	TPGW090202-QBN			○	0.219	0.094	0.098	0.008 0.016
		TPGW731-QBN	TPGW090204-QBN			○				
	TPGW21.50.5-QBN	TPGW110202-QBN			○	0.250	0.094	0.110	0.008 0.016	
	TPGW21.51-QBN	TPGW110204-QBN			○					
	TPGW2.520.5-QBN	TPGW130302-QBN			○	0.312	0.125	0.139	0.008 0.016	
	TPGW2.521-QBN	TPGW130304-QBN			○					
	TPGW32.50.5-QBN	TPGW16T302-QBN			○	0.375	0.156	0.173	0.008 0.016 0.031	
	TPGW32.51-QBN	TPGW16T304-QBN			○					
TPGW32.52-QBN	TPGW16T308-QBN			○						

TAC T-CBN (PCBN) Inserts for General Turning

■ General Turning

Shape	Item Number Inch	Item Number Metric	Accuracy	Stocked grades	Dimension(mm)		
				BXC90	I.C.	Thick	Corner Radius
	S-CNGN322	S-CNGN090308	G	○	.375	.125	.031
	S-CNGN323	S-CNGN090312		○			.047
	S-CNGN432	S-CNGN120408	G	○	.500	.187	.031
	S-CNGN433	S-CNGN120412		○			.047
	S-RNGN32	S-RNGN090300	G	○	.375	.125	-
	S-RNGN43	S-RNGN120400	G	●	.500	.187	-
	S-SNGN322	S-SNGN090308	G	○	.375	.125	.031
	S-SNGN323	S-SNGN090312		○			.047
	S-SNGN422	S-SNGN120308	G	○	.375	.125	.031
	S-SNGN423	S-SNGN120312		○			.047
	S-SNGN432	S-SNGN120408	G	○	.500	.187	.031
	S-SNGN433	S-SNGN120412		○			.047
	S-TNGN222	S-TNGN110308	G	○	.250	.125	.031
	S-TNGN223	S-TNGN110312		○			.047
	S-TNGN322	S-TNGN160408	G	○	.375	.187	.031
	S-TNGN333	S-TNGN160412		○			.047

Tungaloy

Keeping the Customer First

At Tungaloy our customers' needs are our first priority. Our commitment is to understand our customer's problems and to solve those problems. We understand that "Keeping the Customer First" means working every day to win our customers trust by providing consistent quality products that generate value. We dedicate ourselves to putting the customer first.

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