Member IMC Group Tungaloy INDUSTRY 4.0

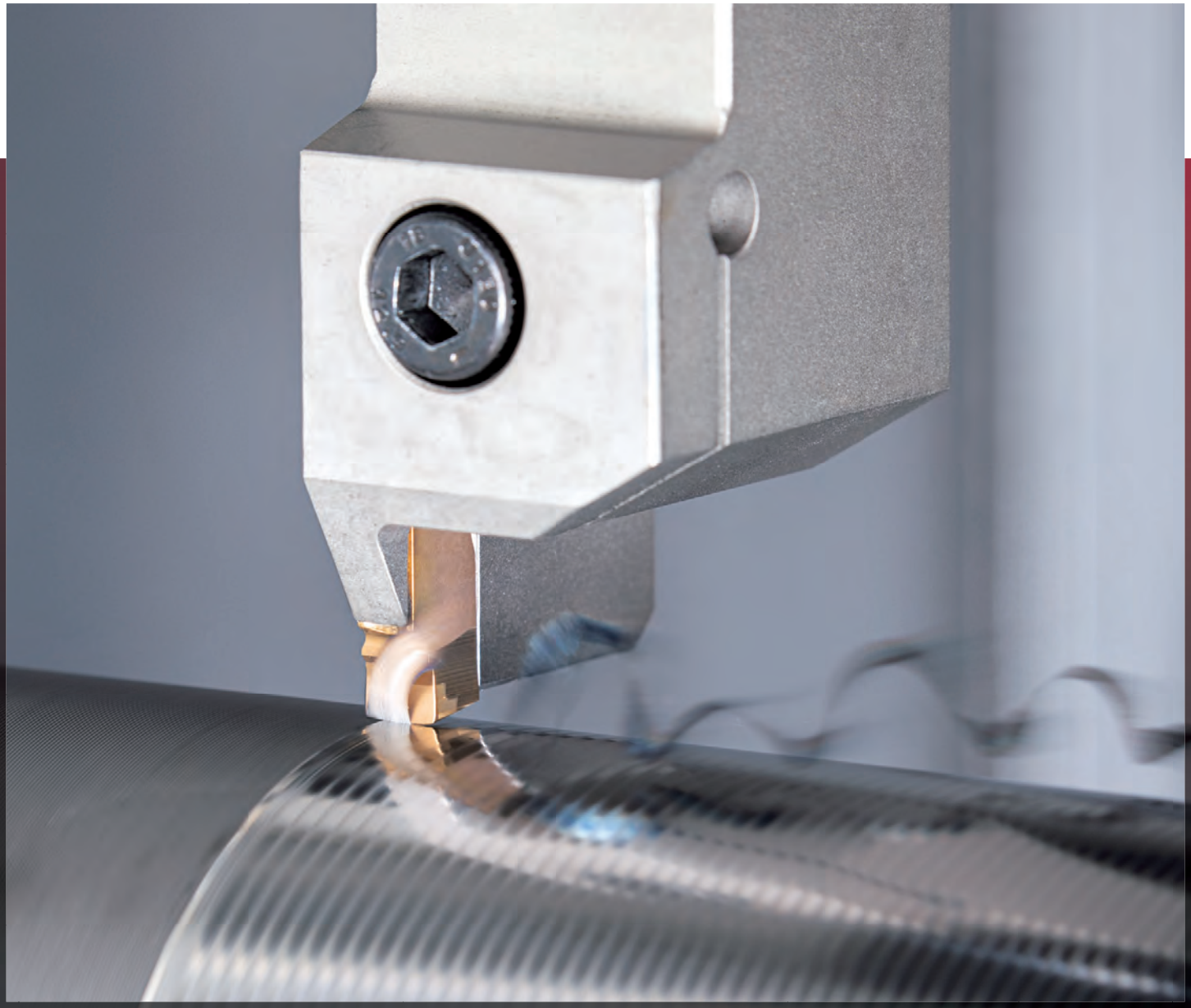
TurnLine

CBN inserts

TUNGCUT

Tungaloy Report No. 391S7-US

Innovative CBN inserts for accelerated machining of hard part turning



TUNGALOY ADDFORCE ACCELERATED LINES

TUNGCUT

For more information

Unique brazing geometry of CBN-tipped TungCut inserts for high feed continuous turning of hardened steel

Innovative insert design for turning

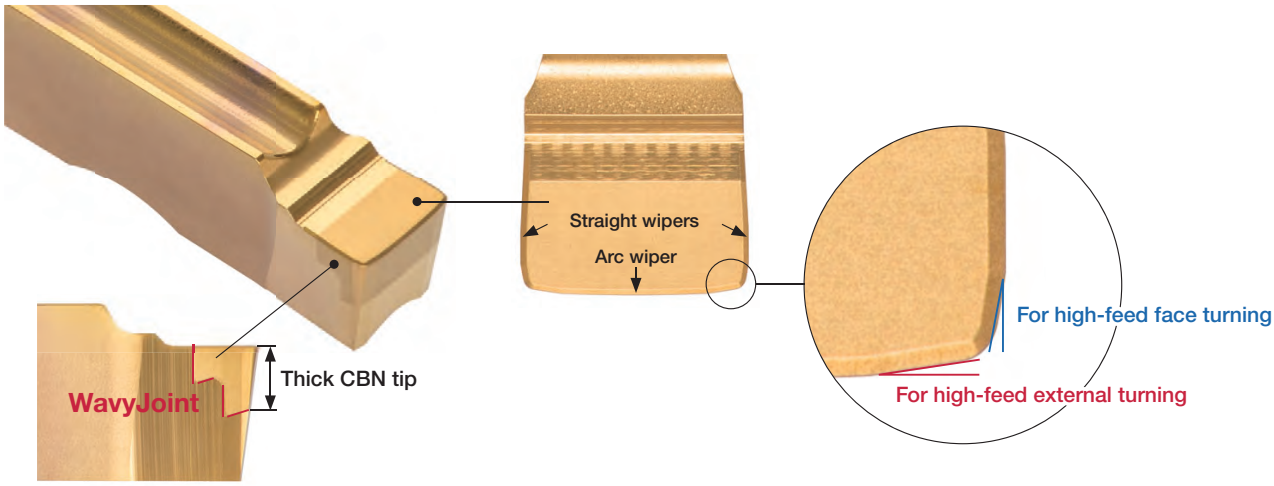
1 Optimized cutting edge geometry for high feed turning

- Turning insert in the shape of grooving insert—This innovative design allows the cutting edge to have longer wipers than traditional ISO wiper insert, providing superior surface finishing in high feed machining.
- Front and side cutting edges form small entry angles that generate chip thinning effect during machining at a high feed rate.

Note: When used for grooving, the insert will not provide the groove bottom with square corners due to the cutting edge profile with an arc wiper.

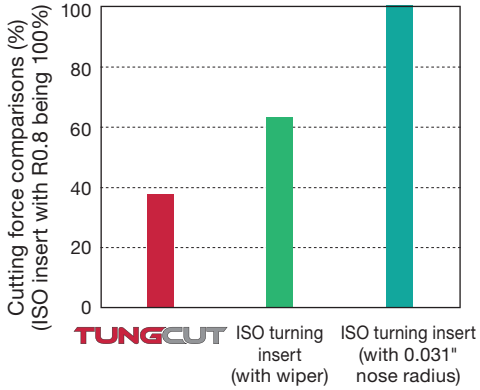
2 WavyJoint technology for enhanced brazing

- WavyJoint technology provides enhanced CBN tip and carbide insert bonding. A thick CBN tip dissipates the heat accumulated on the cutting edge during high feed machining, preventing the CBN tip from de-brazing.



Low cutting force

Optimized for high feed machining, the cutting edge creates thin chips, generating lower cutting forces than ISO inserts.



H

Insert	: STH500-SR BXA10
	: 2QP-CNGA120408WL BXA10
	: 2QP-CNGA120408 BXA10
Holder	: CTEL16-5T12
	: ACLNL164-A
Workpiece material	: 4140 (60HRC)
Cutting speed	: *Vc* = 492 sfm
Feed	: *f* = 0.035 ipr
Depth of cut	: *ap* = 0.004"
Application	: External turning, continuous cut
Coolant	: Wet

High productive machining (for external turning)

An arc wiper on the front cutting edge provides superior surface finish when external turning at high feed rates.

	Feed: *f* (ipr)					
	0.004	0.012	0.024	0.035	0.047	0.059
TUNGCUT	✓	✓	✓	✓	✓	✓
ISO turning insert (with wiper)	✓	✓	×	×	×	×
ISO turning insert (with 0.031" nose radius)	✓	×	×	×	×	×

✓ Rz = less than 3.2 µm
× Rz = 3.2 µm or greater

H

Insert	: STH500-SR BXA10
	: 2QP-CNGA120408WL BXA10
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Holder	: CTEL16-5T12
	: ACLNL164-A
Workpiece material	: 4140 (60HRC)
Cutting speed	: *V*c = 492 sfm
Feed	: *f* = 0.004 - 0.059 ipr
Depth of cut	: *a*p = 0.004"
Application	: External turning, continuous cut
Coolant	: Wet

High productive machining (for face turning)

Straight wipers on the side cutting edges provides superior surface finish when face turning at high feed rates.

	Feed: *f* (ipr)					
	0.004	0.012	0.024	0.035	0.047	0.059
TUNGCUT	✓	✓	✓	×	×	×
ISO turning insert (with wiper)	✓	✓	×	×	×	×
ISO turning insert (with 0.031" nose radius)	✓	×	×	×	×	×

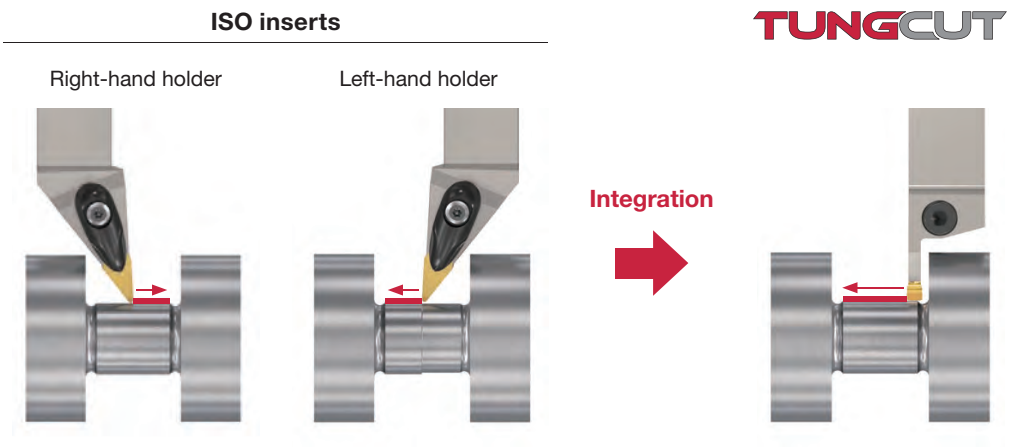
✓ Rz = less than 3.2 µm
× Rz = 3.2 µm or greater

H

Insert	: STH500-SR BXA10
	: 2QP-CNGA120408WL BXA10
	: 2QP-CNGA120408 BXA10
Holder	: CTEL16-5T12
	: ACLNL164-A
Workpiece material	: 4140 (60HRC)
Cutting speed	: *V*c = 394 sfm
Feed	: *f* = 0.004 - 0.059 ipr
Depth of cut	: *a*p = 0.004"
Application	: Face turning, continuous cut
Coolant	: Wet

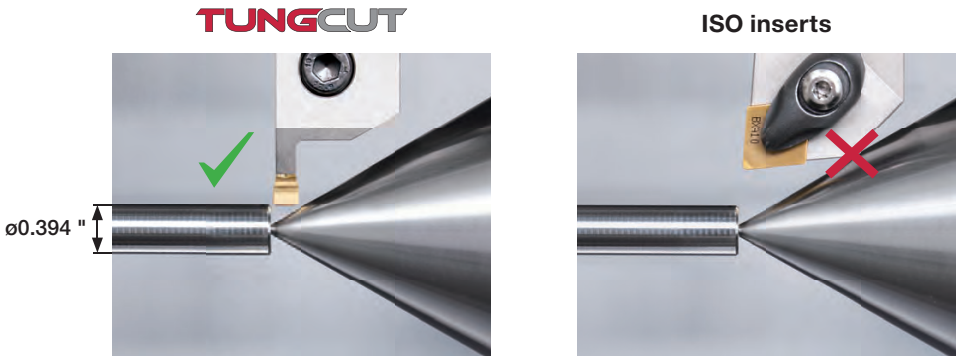
Integration of machining processes

To avoid tool interference, conventional turning method with ISO inserts requires two passes with two different turning holders. Using TungCut CBN insert with a grooving toolholder enables the machining processes to be integrated in a single machining pass.



Minimum tool interference

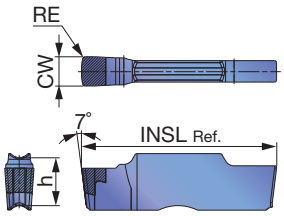
TungCut insert is positioned perpendicular to the workpiece center axis. This minimizes tool interference when entering the cut from the tail stock side, making it easy to machine small-diameter shafts.



INSERT

STH

External and face turning of hardened steel parts



P	Steel	
M	Stainless	
K	Cast iron	
N	Non-ferrous	
S	Superalloys	
H	Hard materials	★

★ : First choice

Designation	Seat size	CW±0.025	RE	CBN	INSL	h	Edge prep.
				BXA10			SR (S01325)
STH300-SR	3	0.118	0.012	●	0.787	0.197	○
STH500-SR	5	0.197	0.012	●	0.984	0.217	○

● : New product

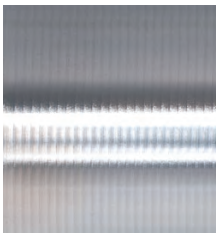
STANDARD CUTTING CONDITIONS

ISO	CW	Application	Cutting speed *Vc* (sfm)	Depth of cut *ap* (in)	Feed *f* (ipr)
H	3	External	328 - 755	0.003 - 0.005	0.016 - 0.039
		Face	328 - 755	0.003 - 0.005	0.016 - 0.031
	5	External	328 - 755	0.003 - 0.005	0.020 - 0.059
		Face	328 - 755	0.003 - 0.005	0.020 - 0.031

Cautions when turning with TungCut

⚠ **Since the wiper geometry consists of a long arc, TungCut CBN insert provides wavy surface finishing, despite the results with excellent Ra values.**

TUNGCUT
Feed: *f* = 0.039 ipr



Surface quality
Ra = 0.3 µm

ISO turning insert (with 0.031" nose radius)
Feed: *f* = 0.004 ipr

Surface quality
Ra = 0.4 µm

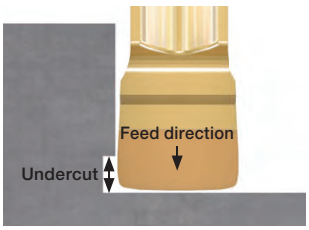
H

Insert	: STH500-SR BXA10
	: 2QP-CNGA120408 BXA10
Holder	: CTEL16-5T12
	: ACLNL164-A
Workpiece material	: 4140 (60HRC)
Cutting speed	: *V*c = 492 sfm
Feed	: *f* = 0.004, 0.039 ipr
Depth of cut	: *a*p = 0.004"
Application	: External turning, continuous cut
Coolant	: Wet

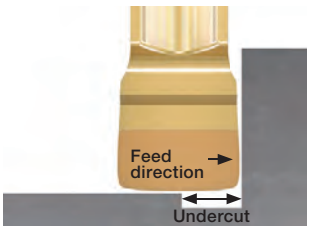
⚠ **Due to the wiper geometry, ensure machine is programmed so that the wiper section of the cutting edge completely passes over the workpiece edge when external turning or face turning, otherwise, material will be left uncut on the workpiece. When cutting towards the wall or bottom, provide proper undercutting, as listed below, at the wall or bottom to eliminate uncut material.**

Designation	CW±0.001	Application	Minimum undercutting required (in)
STH300-SR	0.118	External	0.059
		Face	0.016
STH500-SR	0.197	External	0.098
		Face	0.028

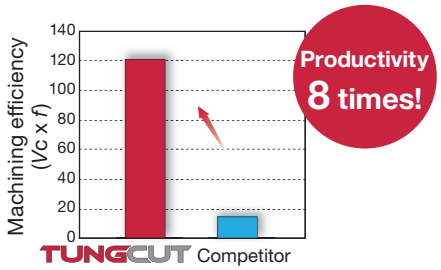
Face turning



External turning



PRACTICAL EXAMPLES

Workpiece type		Shaft	Shaft
Toolholder		CTER16-3T25	CTER16-3T09
Insert		STH300-SR	STH300-SR
Grade		BXA10	BXA10
Workpiece material		52100 (60HRC)	D2 (60 - 64HRC)
		 H	 H
Cutting conditions	Cutting speed: *Vc* (sfm)	492	394
	Feed : *f* (ipr)	0.031	0.039
	Depth of cut : *ap* (in)	0.004 x 3 passes	0.002 x 91 passes
	Application	External turning	External turning
	Coolant	Wet	Wet
Results		 **TungCut CBN** enabled 8x higher feed rate than ISO insert.	0.197" stock had to be removed by external turning. **TungCut CBN** provided a high feed rate of 0.039 ipr., providing significantly reduced machining time.

MEMO

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