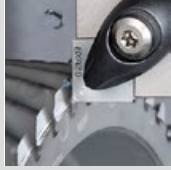


CONTENTS



General product information

[View](#)

Added products



BXA10-20, WXGQ

Expansion of **BXA10**, **corner radius**, **edge prep.** and now available in cost-efficient **MiniForce-Turn**

[View](#)

T-CBN SERIES

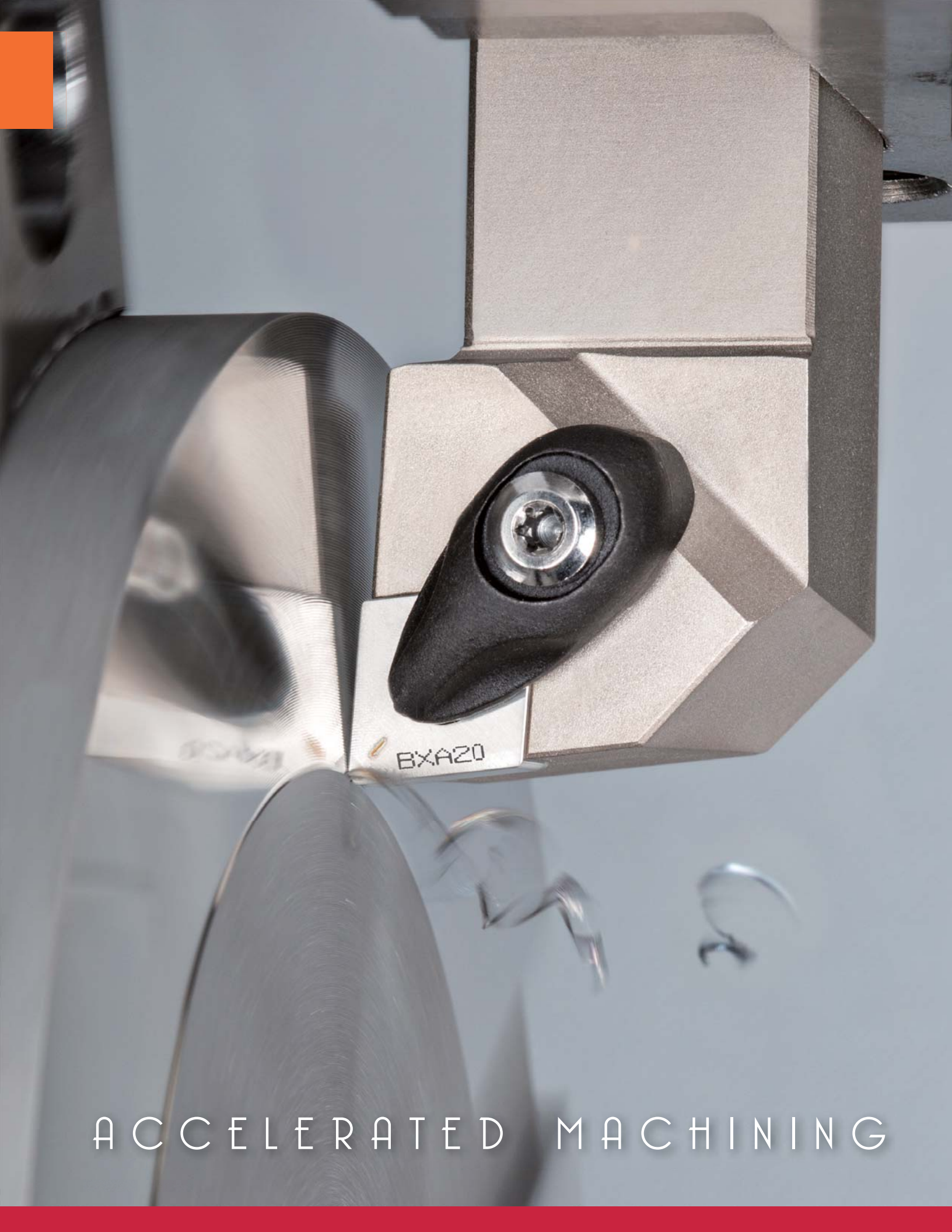
www.tungaloyamerica.com

Tungaloy Report No. 515-US

CBN with **Wavy Joint** technology achieves stable machining of hardened steels



INDUSTRY 4.0
FEED the SPEED!



ACCELERATED MACHINING

T-CBN SERIES

TUNGALOY



Increased brazing strength and CBN volume

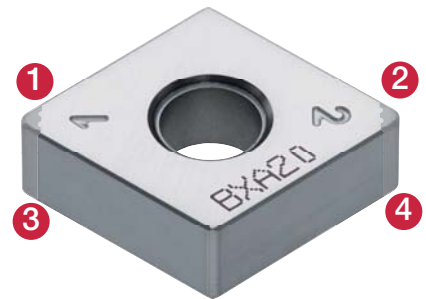
For outstanding performance in hard turning applications.

For **high efficiency** hardened steel machining

New brazing technology for increased machining efficiency - "Wavy Joint"

- A maximum depth of cut up to 0.031"
 - Reduces the number of passes to increase productivity
- Innovative WavyJoint brazing technology
 - Prevents the CBN tips from debrazing, eliminating abrupt insert fractures during demanding dry machining, while securing stable and predictable hard turning operations.

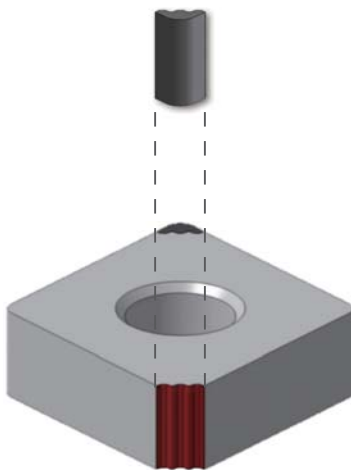
4 cutting edges



Wavy Joint BXA20

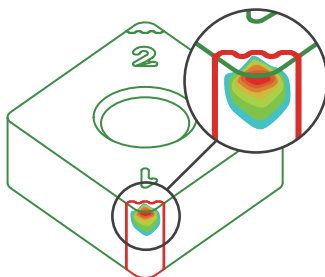
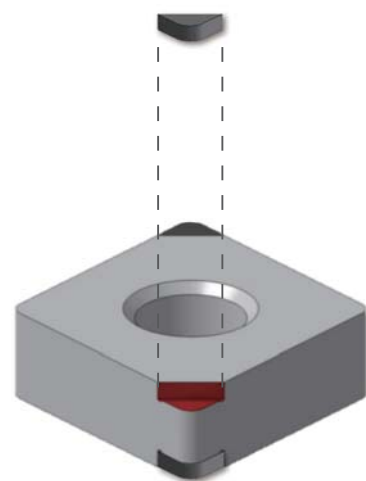
Vs.

Standard



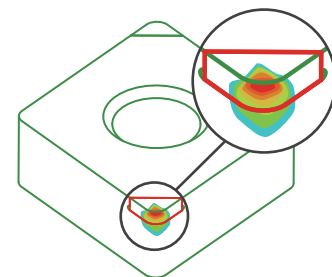
CBN tip size:
Up **200%** for improved heat control in the cutting zone

Brazing area:
Up **160%** for enhanced brazing strength



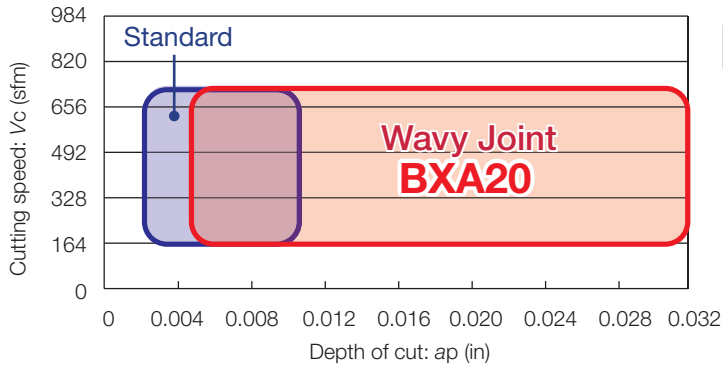
Temperature during machining is concentrated on the CBN tip, reducing temperature issues in the brazing zone.

Workpiece material : SCM420 / 20CrMo4 (60HRC)
 Cutting speed : $V_c = 492$ sfm
 Feed : $f_z = 0.008$ ipr
 Depth of cut : $a_p = 0.030$ "
 Coolant : Dry



APPLICATION

Hard Turning

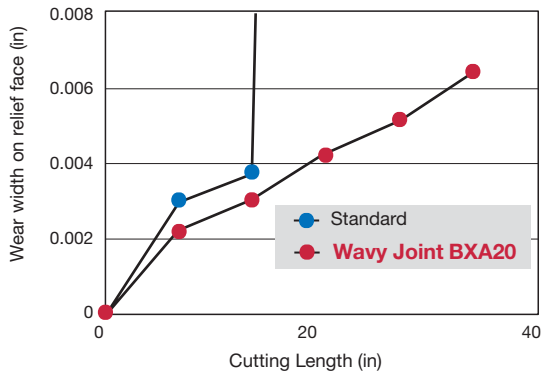


Wavy Joint BXA20

Great performance for continuous to heavy interrupted cutting at low and medium speeds.

CUTTING PERFORMANCE

Effect of increased brazing area



Insert : Standard = 2QP-CNGM 432 HM BX20
 Wavy Joint = 4QS-CNGG432-HM BXA20
 Workpiece material : SCM420
 Cutting speed : $V_c = 492$ sfm
 Feed : $f_z = 0.008$ ipt
 Depth of cut : $a_p = 0.030$ "
 Coolant : Dry



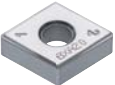

Standard



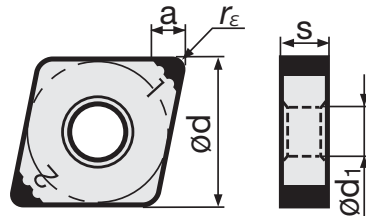
Wavy Joint BXA20

The WavyJoint technology prevents the braze from overheating due to the increase in cutting edge temperature during dry cutting, greatly improving the brazing strength. The result: stable machining and extended tool life.

INSERT

Feature	Shape	Designation		Grade	No. of corners	I. C. dia.	Thick-ness	Hole dia.	Corner radius	CBN length
				Coated						
		Inch	Metric	BXA20						
New		4QS-CNGG432-HM	4QS-CNGG120408-HM	●	4	0.500	0.187	0.203	0.031	0.059
		4QS-CNGG433-HM	4QS-CNGG120412-HM	●	4	0.500	0.187	0.203	0.047	0.067
Standard		4QS-CNGA432-H	4QS-CNGA120408-H	●	4	0.500	0.187	0.203	0.031	0.059
New		4QS-CNGA433-H	4QS-CNGA120412-H	●	4	0.500	0.187	0.203	0.047	0.067


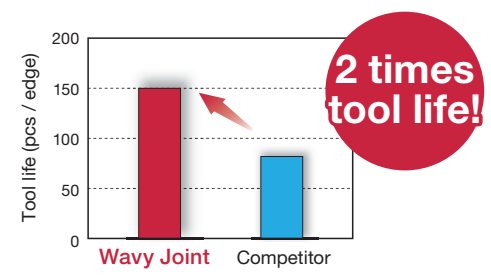
● : Line-up



STANDARD CUTTING CONDITIONS

ISO	Workpiece materials	Grade	Work condition	Cutting speed Vc(sfm)	Depth of cut ap (in)	Feed f (ipr)
H	Hardened steel	BXA20	Continuous	164 - 722	0.005 - 0.031	0.004 - 0.012
		BXA20	Interrupted	164 - 656	0.005 - 0.031	0.004 - 0.008

PRACTICAL EXAMPLES

Workpiece type		Automotive part
Insert		4QS-CNGA433-H
Grade		BXA20
Workpiece material		SCM420
		
Cutting conditions	Cutting speed : V_c (sfm)	328
	Feed : f (ipr)	0.004 - 0.008
	Depth of cut : a_p (in)	0.028 - 0.039
	Coolant	Dry
Results		 <p>2 times tool life!</p> <p>The Wavy Joint technology insert successfully machined 150 pcs/corner, almost twice that of the competitor's, without CBN tip failure.</p>

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Tungaloy Report No. 515S1-US

Expansion of **BXA10 corner radius, edge prep.** and now available in cost-efficient **MiniForce-Turn**



INDUSTRY 4.0
FEED the SPEED!



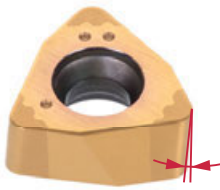
Expanded lineup of WavyJoint CBN inserts

Double-sided **positive** insert with CBN tips

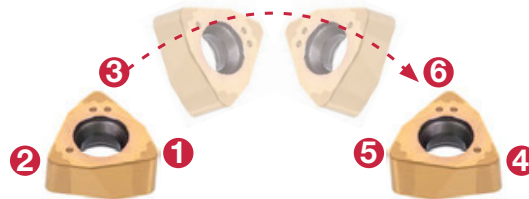
MiniForce-Turn now offers WavyJoint CBN inserts that provide additional strength and security in aggressive cutting conditions.

■ WXGQ0403... insert

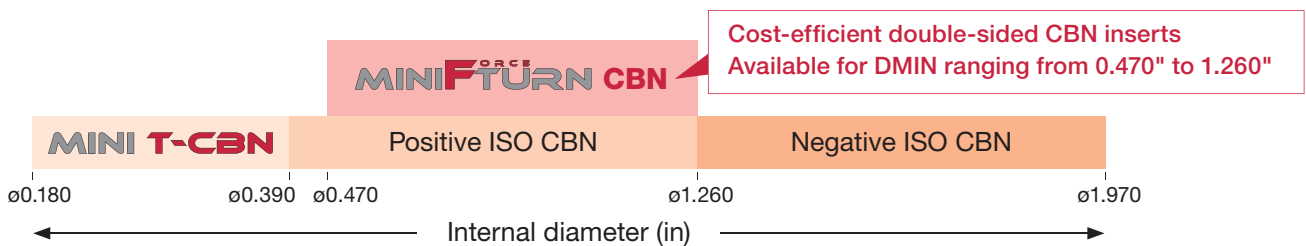
Double-sided positive inserts



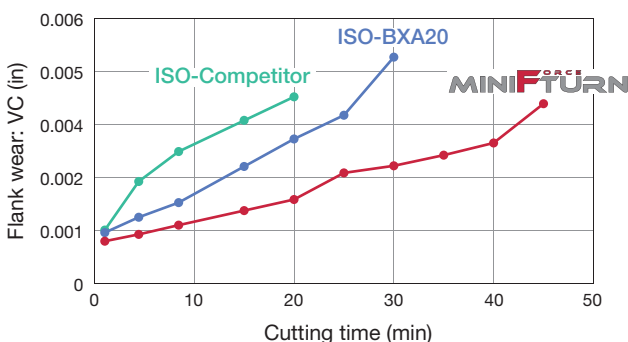
6-edged insert with dovetail design



■ Application range – ID turning of hardened steel



■ Cutting performance – for ID turning of continuous cut (4xD)



Insert : 6QS-WXGQ 221SPL BXA20 (**MiniForce-Turn**)
 2QP-CCGW 21.51 BXA20 (ISO)
 CCGW 21.51 type Competitor's H20 grade (ISO)

Toolholder : E10M-SWLXR04-D120 (**MiniForce-Turn**)
 E10M-SCLCR06-D120 (ISO)

Workpiece material : 4140 (60HRC)
 Cutting speed : $V_c = 490$ sfm
 Feed : $f = 0.004$ ipr
 Depth of cut : $a_p = 0.006$ "
 Coolant : Wet

Due to unique geometry design, MiniForce-Turn insert provides double tool life over competitor's ISO positive insert.

Double-sided **negative** inserts

Expanded lineup for BXA10 and more corner radius variations.

BXA10

Shape	Corner R (in)				
	0.008	0.016	0.031	0.047	Wiper
C	-	●	●	●	●
D	●	●	●	●	-
S	-	●	●	●	-
T	-	●	●	●	-
V	●	●	●	●	-
W	-	●	●	●	●

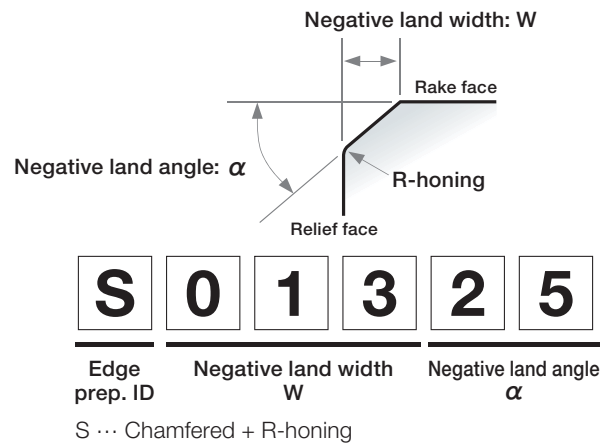
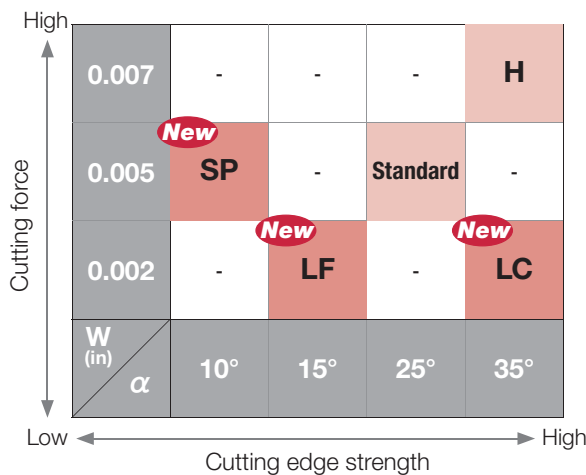
BXA20

Shape	Corner R (in)				
	0.008	0.016	0.031	0.047	Wiper
C	-	●	●	●	●
D	●	●	●	●	-
S	-	●	●	●	-
T	-	●	●	●	-
V	●	●	●	●	-
W	-	●	●	●	●

● : New product

Edge preparations

For expanded application range.



New MiniForce-Turn CBN inserts are available with SP (S01310) style edge preparation, which is designed to form a high rake angle identical to standard ISO positive insert when positioned on the toolholder for smooth cutting.

New ISO negative inserts are offered with LF (S00515) and LC (S00535) styles for wider application coverage.

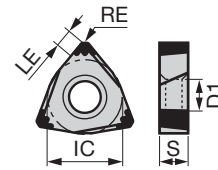
STANDARD CUTTING CONDITIONS


ISO	Grade	Shape	Workpiece condition	Cutting speed Vc (sfm)	Depth of cut ap (in)	Feed f (ipr)
H	BXA10	ISO Negative type	Continuous	328 - 755	0.002 - 0.031	0.001 - 0.012
			Light interrupted	328 - 755	0.002 - 0.031	0.001 - 0.008
		MINIFURN	Continuous	328 - 755	0.002 - 0.020	0.001 - 0.012
			Light interrupted	328 - 755	0.002 - 0.020	0.001 - 0.008
	BXA20	ISO Negative type	Continuous	197 - 591	0.002 - 0.031	0.001 - 0.012
			Interrupted	197 - 591	0.002 - 0.031	0.001 - 0.008
		MINIFURN	Continuous	197 - 591	0.002 - 0.020	0.001 - 0.012
			Interrupted	197 - 591	0.002 - 0.020	0.001 - 0.008

CBN INSERTS POSITIVE TYPE **MINIFURN**

- : Continuous cutting
- : Light interrupted cutting
- ✱ : Heavy interrupted cutting

P	Steel				
M	Stainless				
K	Cast iron				
N	Non-ferrous				
S	Superalloy				
H	Hard material	●	●		



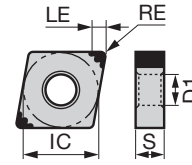
Shape	Designation		BXA10	BXA20	No. of corners	Dimension (in)					Edge prep.					Wiper	Chipbreaker
	Inch	Metric				LE	RE	IC	S	D1	Standard	SP	L	LFLC	H		
																	
6QS-WXGQ	6QS-WXGQ 220.5SPR	6QS-WXGQ040302SPR	●	●	6	0.071	0.008	0.250	0.125	0.106	○						
	6QS-WXGQ 220.5SPL	6QS-WXGQ040302SPL	●	●	6	0.071	0.008	0.250	0.125	0.106	○						
	6QS-WXGQ 221SPR	6QS-WXGQ040304SPR	●	●	6	0.071	0.016	0.250	0.125	0.106	○						
	6QS-WXGQ 221SPL	6QS-WXGQ040304SPL	●	●	6	0.071	0.016	0.250	0.125	0.106	○						
	6QS-WXGQ 222SPR	6QS-WXGQ040308SPR	●	●	6	0.067	0.031	0.250	0.125	0.106	○						
	6QS-WXGQ 222SPL	6QS-WXGQ040308SPL	●	●	6	0.067	0.031	0.250	0.125	0.106	○						







● : New product

CBN INSERTS NEGATIVE TYPE

- : Continuous cutting
- : Light interrupted cutting
- ✱ : Heavy interrupted cutting

P	Steel				
M	Stainless				
K	Cast iron				
N	Non-ferrous				
S	Superalloy				
H	Hard material	●	●		



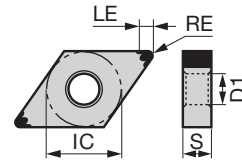
Shape	Designation		BXA10	BXA20	No. of corners	Dimension (in)					Edge prep.					Wiper	Chipbreaker
	Inch	Metric				LE	RE	IC	S	D1	Standard	SP	L	LFLC	H		
																	
4QS-CNGA	4QS-CNGA 431	4QS-CNGA120404	●	●	4	0.063	0.016	0.500	0.187	0.203	○						
	4QS-CNGA 432	4QS-CNGA120408	●	●	4	0.059	0.031	0.500	0.187	0.203	○						
	4QS-CNGA 433	4QS-CNGA120412	●	●	4	0.067	0.047	0.500	0.187	0.203	○						
																	
4QS-CNGA**-LF	4QS-CNGA 431-LF	4QS-CNGA120404-LF	●	●	4	0.063	0.016	0.500	0.187	0.203				○			
	4QS-CNGA 432-LF	4QS-CNGA120408-LF	●	●	4	0.059	0.031	0.500	0.187	0.203				○			
	4QS-CNGA 433-LF	4QS-CNGA120412-LF	●	●	4	0.067	0.047	0.500	0.187	0.203				○			
																	
4QS-CNGA**-LC	4QS-CNGA 431-LC	4QS-CNGA120404-LC	●	●	4	0.063	0.016	0.500	0.187	0.203				○			
	4QS-CNGA 432-LC	4QS-CNGA120408-LC	●	●	4	0.059	0.031	0.500	0.187	0.203				○			
	4QS-CNGA 433-LC	4QS-CNGA120412-LC	●	●	4	0.067	0.047	0.500	0.187	0.203				○			
																	
4QS-CNGA**-H	4QS-CNGA 431-H	4QS-CNGA120404-H	●	●	4	0.063	0.016	0.500	0.187	0.203							○
	4QS-CNGA 432-H	4QS-CNGA120408-H	●	●	4	0.059	0.031	0.500	0.187	0.203							○
	4QS-CNGA 433-H	4QS-CNGA120412-H	●	●	4	0.067	0.047	0.500	0.187	0.203							○
																	
4QS-CNGA**WL	4QS-CNGA 431 WL	4QS-CNGA120404WL	●	●	4	0.063	0.016	0.500	0.187	0.203							○
	4QS-CNGA 432 WL	4QS-CNGA120408WL	●	●	4	0.071	0.031	0.500	0.187	0.203							○
	4QS-CNGA 433 WL	4QS-CNGA120412WL	●	●	4	0.083	0.047	0.500	0.187	0.203							○
																	
4QS-CNGG**-HM	4QS-CNGG432-HM	4QS-CNGG120408-HM	●		4	0.059	0.031	0.500	0.187	0.203							○
	4QS-CNGG433-HM	4QS-CNGG120412-HM	●		4	0.067	0.047	0.500	0.187	0.203							○

● : New product
● : Line up

CBN INSERTS NEGATIVE TYPE

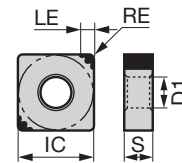
- : Continuous cutting
- ◐ : Light interrupted cutting
- ◑ : Heavy interrupted cutting

P	Steel				
M	Stainless				
K	Cast iron				
N	Non-ferrous				
S	Superalloy				
H	Hard material	●	●	●	●



Shape	Designation		BXA10	BXA20	No. of corners	Dimension (in)					Edge prep.					Wiper	Chipbreaker	
	Inch	Metric				LE	RE	IC	S	D1	Standard	SP	L	LF	LC			H
	4QS-DNGA	4QS-DNGA 430.5	4QS-DNGA150402	●	●	4	0.087	0.008	0.500	0.187	0.203	○						
		4QS-DNGA 431	4QS-DNGA150404	●	●	4	0.079	0.016	0.500	0.187	0.203	○						
		4QS-DNGA 432	4QS-DNGA150408	●	●	4	0.063	0.031	0.500	0.187	0.203	○						
		4QS-DNGA 433	4QS-DNGA150412	●	●	4	0.063	0.047	0.500	0.187	0.203	○						
	4QS-DNGA**	4QS-DNGA 430.5-LF	4QS-DNGA150402-LF	●	●	4	0.087	0.008	0.500	0.187	0.203				○			
		4QS-DNGA 431-LF	4QS-DNGA150404-LF	●	●	4	0.079	0.016	0.500	0.187	0.203				○			
		4QS-DNGA 432-LF	4QS-DNGA150408-LF	●	●	4	0.063	0.031	0.500	0.187	0.203				○			
		4QS-DNGA 433-LF	4QS-DNGA150412-LF	●	●	4	0.063	0.047	0.500	0.187	0.203				○			
	4QS-DNGA**	4QS-DNGA 430.5-LC	4QS-DNGA150402-LC	●	●	4	0.087	0.008	0.500	0.187	0.203					○		
		4QS-DNGA 431-LC	4QS-DNGA150404-LC	●	●	4	0.079	0.016	0.500	0.187	0.203					○		
		4QS-DNGA 432-LC	4QS-DNGA150408-LC	●	●	4	0.063	0.031	0.500	0.187	0.203					○		
		4QS-DNGA 433-LC	4QS-DNGA150412-LC	●	●	4	0.063	0.047	0.500	0.187	0.203					○		
	4QS-DNGA**	4QS-DNGA 431-H	4QS-DNGA150404-H	●	●	4	0.079	0.016	0.500	0.187	0.203						○	
		4QS-DNGA 432-H	4QS-DNGA150408-H	●	●	4	0.063	0.031	0.500	0.187	0.203						○	
		4QS-DNGA 433-H	4QS-DNGA150412-H	●	●	4	0.063	0.047	0.500	0.187	0.203						○	
	4QS-DNGG**	4QS-DNGG 432-HM	4QS-DNGG150408-HM	●		4	0.063	0.031	0.500	0.187	0.203							○

P	Steel				
M	Stainless				
K	Cast iron				
N	Non-ferrous				
S	Superalloy				
H	Hard material	●	●	●	●



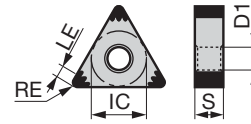
Shape	Designation		BXA10	BXA20	No. of corners	Dimension (in)					Edge prep.					Wiper	Chipbreaker	
	Inch	Metric				LE	RE	IC	S	D1	Standard	SP	L	LF	LC			H
	4QS-SNGA	4QS-SNGA 431	4QS-SNGA120404	●	●	4	0.071	0.016	0.500	0.187	0.203	○						
		4QS-SNGA 432	4QS-SNGA120408	●	●	4	0.071	0.031	0.500	0.187	0.203	○						
		4QS-SNGA 433	4QS-SNGA120412	●	●	4	0.071	0.047	0.500	0.187	0.203	○						

- : New product
- : Line up

CBN INSERTS NEGATIVE TYPE

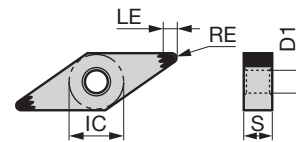
- : Continuous cutting
- ◐ : Light interrupted cutting
- ✱ : Heavy interrupted cutting

P	Steel				
M	Stainless				
K	Cast iron				
N	Non-ferrous				
S	Superalloy				
H	Hard material	●	●	●	●



Shape	Designation		BXA10	BXA20	No. of corners	Dimension (in)					Edge prep.					Wiper	Chipbreaker	
	Inch	Metric				LE	RE	IC	S	D1	Standard	SP	L	LF	LC			H
	6QS-TNGA	6QS-TNGA 331	6QS-TNGA160404	●	●	6	0.075	0.016	0.375	0.187	0.150	○						
		6QS-TNGA 332	6QS-TNGA160408	●	●	6	0.063	0.031	0.375	0.187	0.150	○						
		6QS-TNGA 333	6QS-TNGA160412	●	●	6	0.071	0.047	0.375	0.187	0.150	○						
	6QS-TNGA**-LF	6QS-TNGA 331-LF	6QS-TNGA160404-LF	●	●	6	0.075	0.016	0.375	0.187	0.150							
		6QS-TNGA 332-LF	6QS-TNGA160408-LF	●	●	6	0.063	0.031	0.375	0.187	0.150							
		6QS-TNGA 333-LF	6QS-TNGA160412-LF	●	●	6	0.071	0.047	0.375	0.187	0.150							
	6QS-TNGA**-LC	6QS-TNGA 331-LC	6QS-TNGA160404-LC	●	●	6	0.075	0.016	0.375	0.187	0.150							
		6QS-TNGA 332-LC	6QS-TNGA160408-LC	●	●	6	0.063	0.031	0.375	0.187	0.150							
		6QS-TNGA 333-LC	6QS-TNGA160412-LC	●	●	6	0.071	0.047	0.375	0.187	0.150							
	6QS-TNGA**-H	6QS-TNGA 331-H	6QS-TNGA160404-H	●	●	6	0.075	0.016	0.375	0.187	0.150							
		6QS-TNGA 332-H	6QS-TNGA160408-H	●	●	6	0.063	0.031	0.375	0.187	0.150							
		6QS-TNGA 333-H	6QS-TNGA160412-H	●	●	6	0.071	0.047	0.375	0.187	0.150							
	6QS-TNGG**-HM	6QS-TNGG 332-HM	6QS-TNGG160408-HM	●		6	0.063	0.031	0.375	0.187	0.150							

P	Steel				
M	Stainless				
K	Cast iron				
N	Non-ferrous				
S	Superalloy				
H	Hard material	●	●	●	●



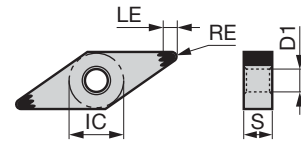
Shape	Designation		BXA10	BXA20	No. of corners	Dimension (in)					Edge prep.					Wiper	Chipbreaker	
	Inch	Metric				LE	RE	IC	S	D1	Standard	SP	L	LF	LC			H
	4QS-VNGA	4QS-VNGA 330.5	4QS-VNGA160402	●	●	4	0.118	0.008	0.375	0.187	0.150	○						
		4QS-VNGA 331	4QS-VNGA160404	●	●	4	0.102	0.016	0.375	0.187	0.150	○						
		4QS-VNGA 332	4QS-VNGA160408	●	●	4	0.067	0.031	0.375	0.187	0.150	○						
		4QS-VNGA 333	4QS-VNGA160412	●	●	4	0.067	0.047	0.375	0.187	0.150	○						
	4QS-VNGA**-LF	4QS-VNGA 330.5-LF	4QS-VNGA160402-LF	●	●	4	0.118	0.008	0.375	0.187	0.150							
		4QS-VNGA 331-LF	4QS-VNGA160404-LF	●	●	4	0.102	0.016	0.375	0.187	0.150							
		4QS-VNGA 332-LF	4QS-VNGA160408-LF	●	●	4	0.067	0.031	0.375	0.187	0.150							
		4QS-VNGA 333-LF	4QS-VNGA160412-LF	●	●	4	0.067	0.047	0.375	0.187	0.150							

- : New product
- : Line up

CBN INSERTS NEGATIVE TYPE

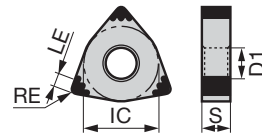
- : Continuous cutting
- ◐ : Light interrupted cutting
- ◑ : Heavy interrupted cutting

P	Steel				
M	Stainless				
K	Cast iron				
N	Non-ferrous				
S	Superalloy				
H	Hard material	●	●	●	●



Shape	Designation		BXA10	BXA20	No. of corners	Dimension (in)					Edge prep.					Wiper	Chipbreaker			
						Inch	Metric	LE	RE	IC	S	D1	Standard	SP	L			LF	LC	H
	4QS-VNGA** -LC	4QS-VNGA 330.5-LC	4QS-VNGA160402-LC	●	●	4	0.118	0.008	0.375	0.187	0.150									
		4QS-VNGA 331-LC	4QS-VNGA160404-LC	●	●	4	0.102	0.016	0.375	0.187	0.150									
		4QS-VNGA 332-LC	4QS-VNGA160408-LC	●	●	4	0.067	0.031	0.375	0.187	0.150									
		4QS-VNGA 333-LC	4QS-VNGA160412-LC	●	●	4	0.067	0.047	0.375	0.187	0.150									
	4QS-VNGA** -H	4QS-VNGA 331-H	4QS-VNGA160404-H	●	●	4	0.102	0.016	0.375	0.187	0.150								○	
		4QS-VNGA 332-H	4QS-VNGA160408-H	●	●	4	0.067	0.031	0.375	0.187	0.150								○	
		4QS-VNGA 333-H	4QS-VNGA160412-H	●	●	4	0.067	0.047	0.375	0.187	0.150								○	
	4QS-VNGG** -HM	4QS-VNGG 332-HM	4QS-VNGG160408-HM	●		4	0.067	0.031	0.375	0.187	0.150								○	



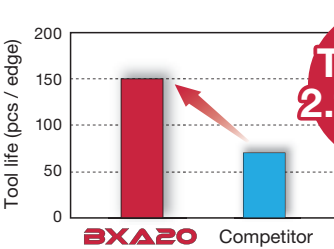
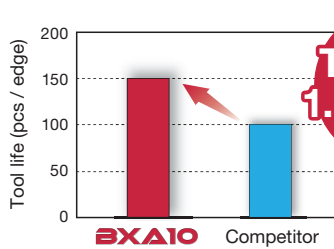
P	Steel				
M	Stainless				
K	Cast iron				
N	Non-ferrous				
S	Superalloy				
H	Hard material	●	●	●	●



Shape	Designation		BXA10	BXA20	No. of corners	Dimension (in)					Edge prep.					Wiper	Chipbreaker			
						Inch	Metric	LE	RE	IC	S	D1	Standard	SP	L			LF	LC	H
	6QS-WNGA	6QS-WNGA 431	6QS-WNGA080404	●	●	6	0.063	0.016	0.500	0.187	0.203	○								
		6QS-WNGA 432	6QS-WNGA080408	●	●	6	0.059	0.031	0.500	0.187	0.203	○								
		6QS-WNGA 433	6QS-WNGA080412	●	●	6	0.067	0.047	0.500	0.187	0.203	○								
	6QS-WNGA** -LF	6QS-WNGA 432-LF	6QS-WNGA080408-LF	●	●	6	0.059	0.031	0.500	0.187	0.203								○	
	6QS-WNGA** -H	6QS-WNGA 432-H	6QS-WNGA080408-H	●	●	6	0.059	0.031	0.500	0.187	0.203								○	
	6QS-WNGA** WL	6QS-WNGA 432 WL	6QS-WNGA080408WL	●	●	6	0.071	0.031	0.500	0.187	0.203								○	

- : New product
- : Line up

PRACTICAL EXAMPLES

Workpiece type		Machine part	Gear part
Insert		6QS-WXGQ 221SPL	6QS-WXGQ 221SPL
Grade		BXA20	BXA10
		4140 (60HRC)	4140 (60HRC)
Workpiece material		 H	 H
Cutting conditions	Cutting speed: V_c (sfm)	295	230
	Feed : f (ipr)	0.002	0.001
	Depth of cut : a_p (in)	0.003	0.004
	Coolant	Dry	Dry
Results		 <p>Tool life 2.1 times!</p> <p>Strong cutting edge design of MiniForce-Turn insert provided fracture resistance, prolonging tool life by 2.1 times over the competitor's positive insert.</p>	 <p>Tool life 1.5 times!</p> <p>MiniForce-Turn insert provided 1.5 times longer tool life over competitor's positive insert, while also eliminated chatter during machining.</p>



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