

Tungaloy

Member IMC Group

Keeping the Customer First

Tungaloy Report No. 388-E

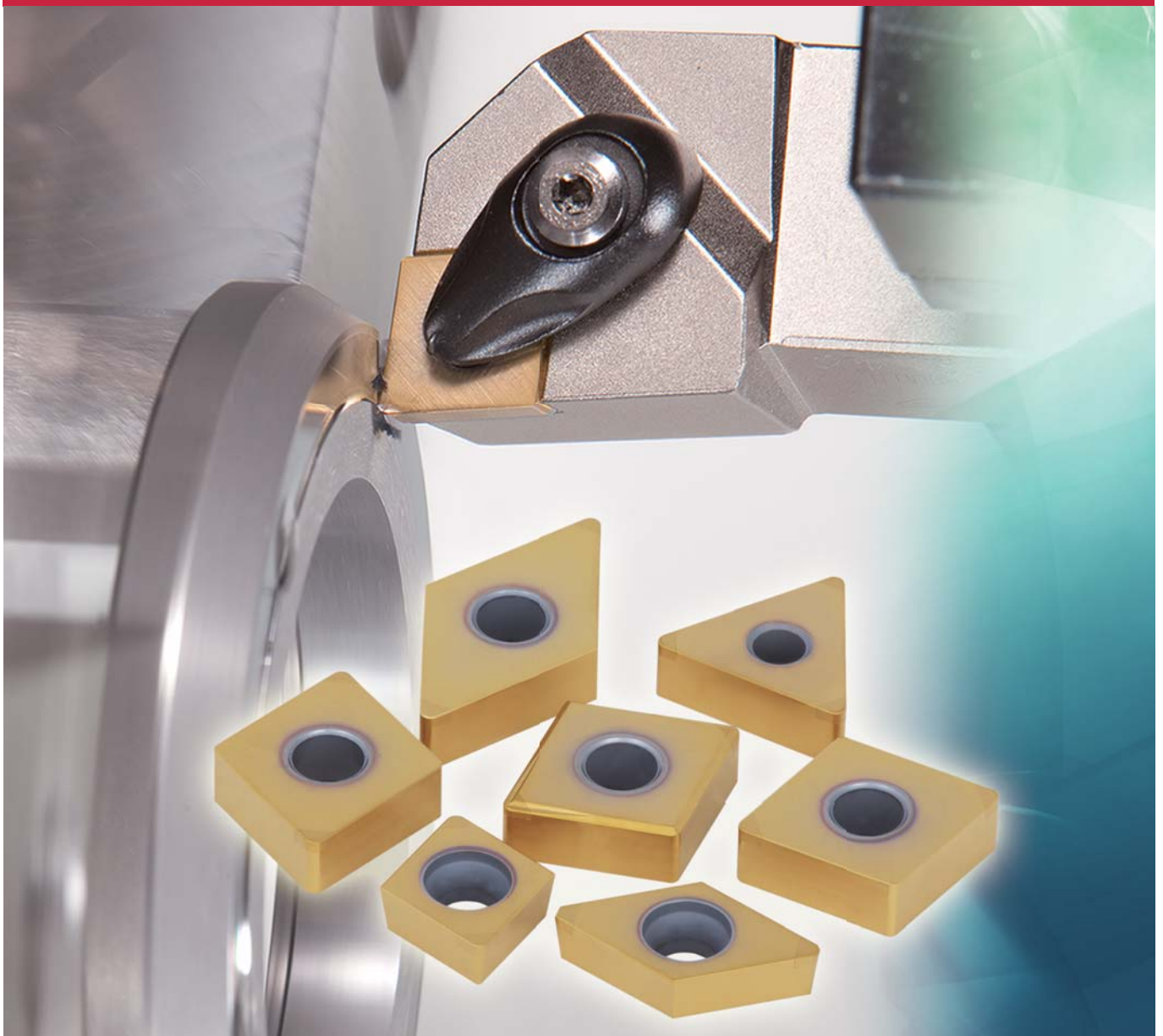
T-CBN

New coated CBN grade for hardened steel turning

BXM SERIES

NEW

The new standard for hardened steel machining



New coated CBN grades

BXM series

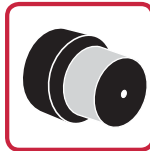
Applicable for all types of hard

NEW For high speed machining

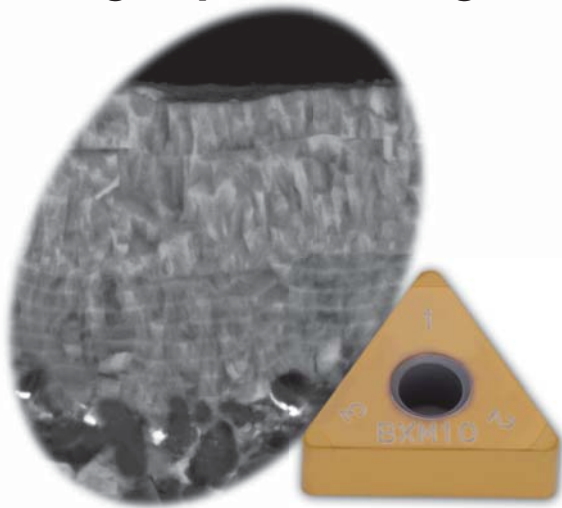
BXM10

Excellent crater wear resistance !

Newly developed CBN substrate for high speed cutting !

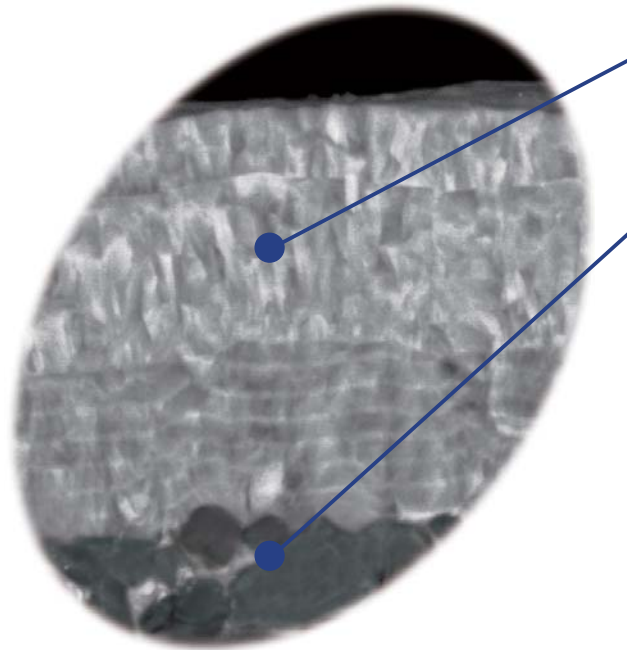


Continuous cutting




NEW All-round

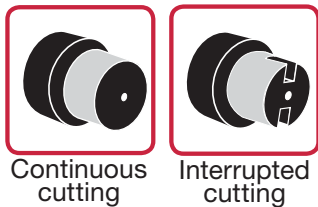
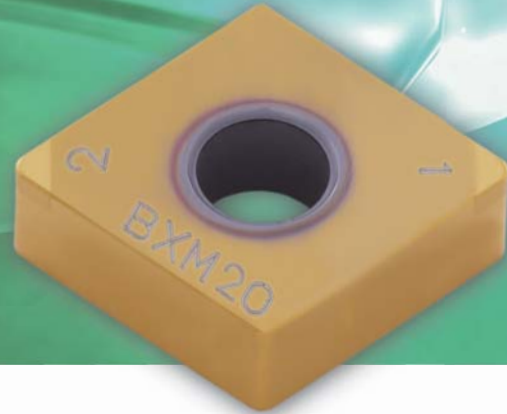
BXM20



● Standard cutting condition

Application	Grades	Machining Mode	Cutting speed Vc (m/min)	Depth of cut ap (mm)	Feed f (mm/rev)
	BXM10	Continuous	200 (150 - 350)	0.1 (0.05 - 0.30)	0.1 (0.03 - 0.18)
		Light interrupted	170 (150 - 250)	0.1 (0.05 - 0.30)	0.1 (0.03 - 0.15)
	BXM20	Continuous	150 (70 - 220)	0.2 (0.05 - 0.30)	0.1 (0.05 - 0.25)
		Interrupted	150 (70 - 220)	0.1 (0.05 - 0.30)	0.1 (0.05 - 0.15)

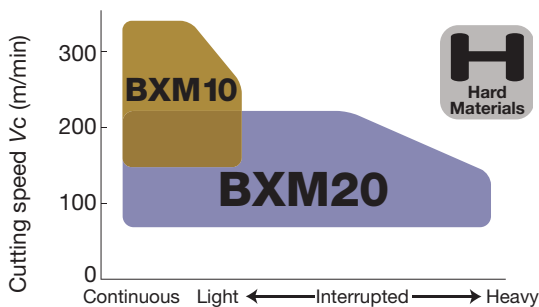
ened steel turning



New coating layer
 Remarkable adhesion strength

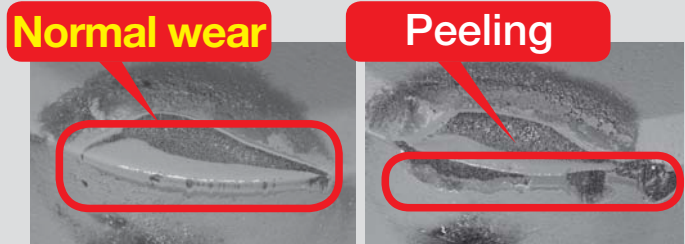
Unique CBN substrate
 High chipping resistance !!
 Extremely tough Substrate !!

● Application range



● Comparison of damage

BMX20 has normal wear pattern without peeling

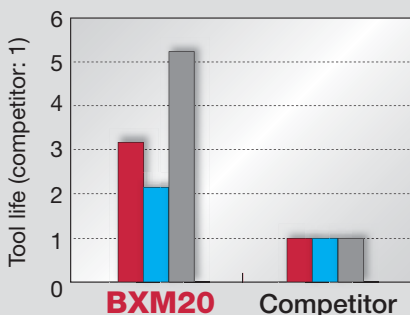


BXM20

Competitor

Insert : 2QP-CNGA120408
 Work material : SCM415H (60HRC)
 Cutting speed : $V_c = 130$ m/min
 Feed : $f = 0.15$ mm/rev
 Depth of cut : $a_p = 0.15$ mm
 Coolant : Water soluble

● Cutting performance



5 times longer tool life !

■ Interrupted cutting $V_c = 130$ m/min $f = 0.15$ mm/rev $a_p = 0.15$ mm
 ■ Removing carburized layer $V_c = 110$ m/min $f = 0.12$ mm/rev $a_p = 0.6$ mm
 ■ Continuous cutting $V_c = 130$ m/min $f = 0.15$ mm/rev $a_p = 0.15$ mm

Insert : 2QP-CNGA120408
 Work material : SCM415H
 Coolant : Water soluble

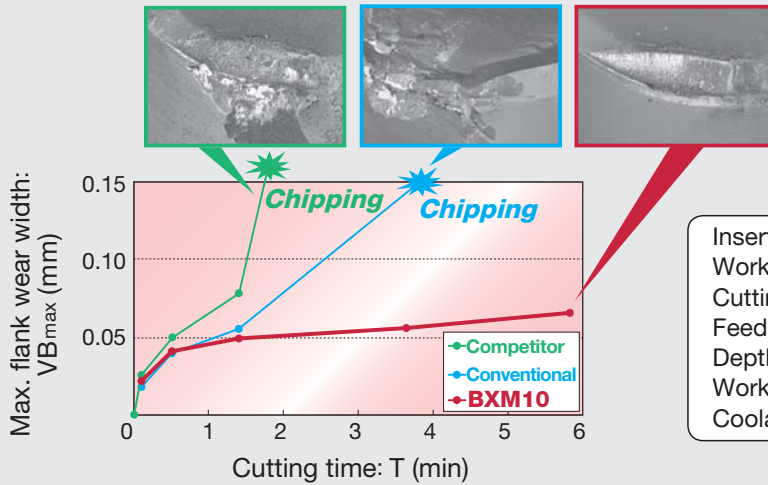
Cutting performance

BXM10

High speed machining comparisons ($V_c = 300$ m/min)



Continuous cutting



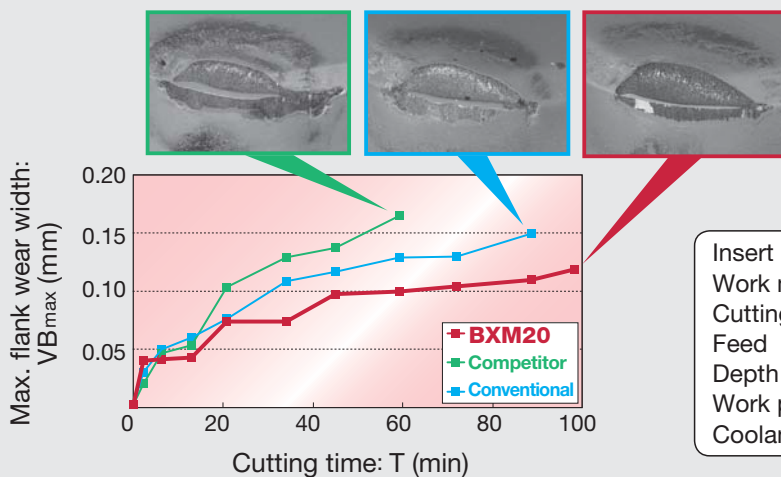
Insert : 2QP-CNGA120408
 Work material : SCM415H (59 ~ 61HRC)
 Cutting speed : $V_c = 300$ m/min
 Feed : $f = 0.1$ mm/rev
 Depth of cut : $a_p = 0.25$ mm
 Work process : Continuous cutting
 Coolant : Dry

BXM20

Comparison of wear resistance



Continuous cutting



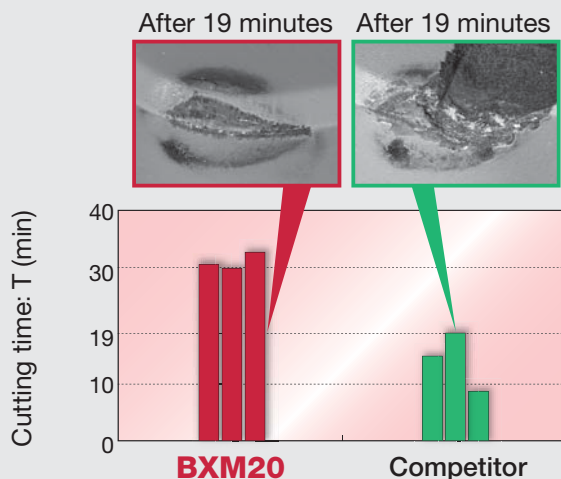
Insert : 2QP-CNGA120408
 Work material : SCM415H (59 ~ 61HRC)
 Cutting speed : $V_c = 130$ m/min
 Feed : $f = 0.15$ mm/rev
 Depth of cut : $a_p = 0.15$ mm
 Work process : Continuous cutting
 Coolant : Water soluble

BXM20

Comparison of toughness



Light interrupted cutting

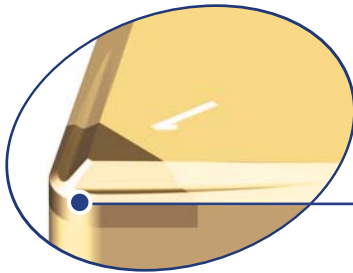


Insert : 2QP-CNGA120408
 Work material : SCM415H (59 ~ 61HRC)
 Cutting speed : $V_c = 130$ m/min
 Feed : $f = 0.15$ mm/rev
 Depth of cut : $a_p = 0.15$ mm
 Work process : Light interrupted cutting
 Coolant : Water soluble

“Hard Breakers” for removing the carburized layer

Two types of chipbreaker provide excellent chip control in a wide application range !

HF type For finishing

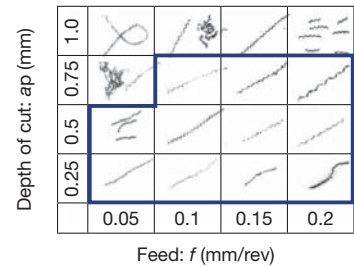


Single sided CBN insert provides higher stability in heavy machining.

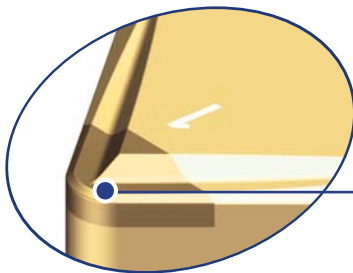
Excellent chip control in small DoC due to the high functional nose. Delivers exceptional surface finishes.

Example of chips

HF Chipbreaker



HM type For medium cutting

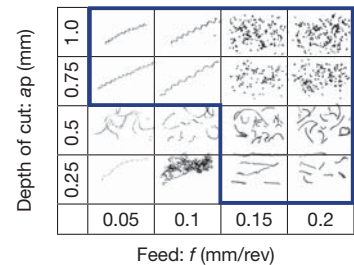


Single sided CBN insert provides higher stability in heavy machining.

Providing ideal chip control in large DoC by the well designed chipbreaker. Suitable for medium cutting or roughing.

Example of chips

HF Chipbreaker



Standard cutting condition (for removing the carburized layer)

Application	Grades	Chipbreaker	Cutting speed Vc (m/min)	Depth of cut ap (mm)	Feed f (mm/rev)
	BXM20	HF	150 (70 - 220)	0.4 (0.2 - 0.75)	0.1 (0.05 - 0.20)
		HM	150 (70 - 200)	0.7 (0.5 - 1.0)	0.1 (0.05 - 0.20)

Wiper edge inserts

A finishing edge (wiper edge) is formed at the point of intersection between the corner radius and the straight cutting edge.

Effect of wiper edge

Doubles the productivity → Reduced machining time

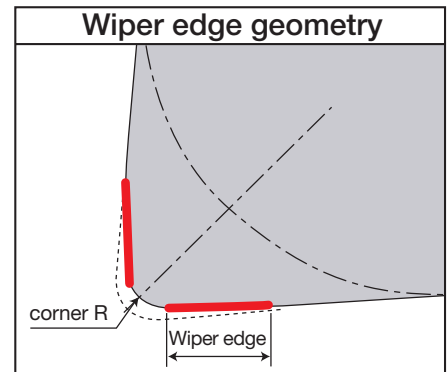
The wiper edge can double the feed rate and suppresses deterioration of the surface finish.

* $f \leq 0.3$ mm/rev

Superior surface finishes

→ By integrating roughing and finishing into one process, the productivity can be increased.

Compared with conventional inserts, surface roughness can be improved with the wiper edge.



■ Comparison of surface finish with hardened steel at 60 - 62 HRC

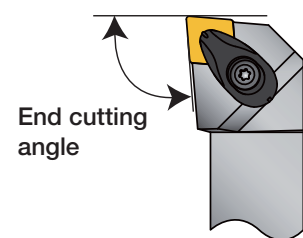
Without wiper	 Ra: 0.83 μ m, Rz: 4.11 μ m
With wiper edge	 Ra: 0.10 μ m, Rz: 1.03 μ m

Insert	: 2QP-CNGA120408WL
Work material	: SCM415 (62HRC)
Cutting speed	: $V_c = 150$ m/min
Feed	: $f = 0.1$ mm/rev
Depth of cut	: $a_p = 0.15$ mm
Coolant	: Dry

Note for using of wiper edge

The wiper edge needs to contact the work piece at a right angle.

- For the wiper edge, the toolholder should have an end cutting angle as shown in the illustration.
- In using the wiper edge a high rigidity toolholder like the Turning-A or D-type is recommended. In the table below, recommended toolholders are shown.



● End cutting angle, recommended toolholders

	2QP-CNGA1204**WL	3QP-WNGA080408WL	2QP-DNGA1504**WJ	3QP-TNGA1604**WG
End cutting angle	95°		93°	91°
External toolholder	ACLNR/L****12-A	AWLNR/L****08-A	ADJNR/L****15-A	ATGNR/L****16-A
				ATFNR/L****16-A
Internal toolholder	DCLNR/L****12	DWLNR/L****08	DDJNR/L****15	DTGNR/L****16
				DTFNR/L****16
Internal toolholder	A***-ACLNR/L12-D***	A***-AWLNR/L08-D***	A***-ADUNR/L15-D***	A***-ATFNR/L16-D***

Designation System



1 Number of edge	
2	One side multi-corner type
3	type

2 Type	
QP	T-CBN TAC insert

3 ISO symbols
(Based on ISO standard)

4 Additional symbol	
Without	Standard honing
-L	Light honing for low cutting force
-H	Heavy honing for toughness
WG	Wiper edge, 91° end cutting angle
WJ	Wiper edge, 93° end cutting angle
WL	Wiper edge, 95° end cutting angle

4 Chipbreaker symbol	
-HF	For finishing
-HM	For medium cutting to roughing

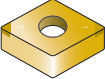
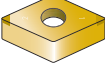


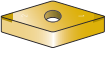
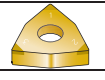
Honing specification

Standard honing	: 0.13 mm × 25° +R-honing
“-L” honing	: 0.13 mm × 15° +R-honing
“-H” honing	: 0.13 mm × 35° +R-honing

Smaller honing angle makes the edge sharper with lower cutting forces.









Larger honing angle makes edge tougher.

Inserts (Negative type)





Features	Shape	Cat. No.	Grades		No. of corners	Dimensions (mm)						
			BXM10	BXM20		I.C.dia ød	Thickness s	Hole dia ød1	Corner R rε	CBN length a		
Standard		2QP-CNGA120404	●	●	2	12.7	4.76	5.16	0.4	2.3		
		2QP-CNGA120408	●	●					0.8	2.2		
		2QP-CNGA120412		●					1.2	2.4		
Light honing			2QP-CNGA120404-L		●	2	12.7	4.76	5.16	0.4	2.3	
		2QP-CNGA120408-L		●	0.8					2.2		
		2QP-CNGA120412-L		●	1.2					2.4		
Heavy honing			2QP-CNGA120404-H		★	2	12.7	4.76	5.16	0.4	2.3	
		2QP-CNGA120408-H		★	0.8					2.2		
		2QP-CNGA120412-H		★	1.2					2.4		
Wiper edge			2QP-CNGA120404WL	●	●	2	12.7	4.76	5.16	0.4	2.3	
		2QP-CNGA120408WL	●	●	0.8					2.2		
		2QP-CNGA120412WL		●	1.2					2.4		
Standard		2QP-DNGA150404	●	●	2	12.7	4.76	5.16	0.4	2.5		
		2QP-DNGA150408	●	●					0.8	2.1		
		2QP-DNGA150412	●	●					1.2	2.0		
		Light honing		2QP-DNGA150604	●	●	2	12.7	6.35	5.16	0.4	2.5
			2QP-DNGA150608	●	●	0.8					2.1	
			2QP-DNGA150612	●	●	1.2					2.0	
Heavy honing				2QP-DNGA150404-L		●	2	12.7	4.76	5.16	0.4	2.5
			2QP-DNGA150408-L		●	0.8					2.1	
			2QP-DNGA150412-L		●	1.2					2.0	
Wiper edge			2QP-DNGA150404-H		★	2	12.7	4.76	5.16	0.4	2.5	
		2QP-DNGA150408-H		★	0.8					2.1		
		2QP-DNGA150412-H		★	1.2					2.0		
Standard		2QP-DNGA150404WJ	●	●	2	12.7	4.76	5.16	0.4	2.4		
		2QP-DNGA150408WJ	●	●					0.8	2.1		
Standard			2QP-SNGA120404		●	2	12.7	6.35	5.16	0.4	2.4	
		2QP-SNGA120408		●	0.8					2.4		
		2QP-SNGA120412		●	1.2					2.4		
Light honing			2QP-SNGA120408-L		●	2	12.7	6.35	5.16	0.8	2.4	
		2QP-SNGA120412-L		●	1.2					2.4		
Heavy honing			2QP-SNGA120408-H		★	2	12.7	6.35	5.16	0.8	2.4	
		2QP-SNGA120412-H		★	1.2					2.4		
Standard			3QP-TNGA160404	●	●	3	9.525	4.76	3.81	0.4	2.2	
			3QP-TNGA160408	●	●					0.8	1.9	
			3QP-TNGA160412	●	●					1.2	2.4	
	Light honing			3QP-TNGA160404-L		●	3	9.525	4.76	3.81	0.4	2.2
			3QP-TNGA160408-L		●	0.8					1.9	
			3QP-TNGA160412-L		●	1.2					2.4	
Heavy honing			3QP-TNGA160404-H		★	3	9.525	4.76	3.81	0.4	2.2	
	3QP-TNGA160408-H			★	0.8					1.9		
	3QP-TNGA160412-H			★	1.2					2.4		
Wiper edge			3QP-TNGA160404WG		●	3	9.525	4.76	3.81	0.4	2.4	
	3QP-TNGA160408WG			●	0.8					2.2		
Standard			2QP-VNGA160404	●	●	2	9.525	4.76	3.81	0.4	3.1	
		2QP-VNGA160408	●	●	0.8					2.2		
		2QP-VNGA160412		●	0.8					3.0		
Light honing			2QP-VNGA160404-L		●	2	9.525	4.76	3.81	0.4	3.1	
		2QP-VNGA160408-L		●	0.8					2.2		
Heavy honing			2QP-VNGA160404-H		★	2	9.525	4.76	3.81	0.4	3.1	
		2QP-VNGA160408-H		★	0.8					2.2		
Standard			3QP-WNGA080408	●	●	3	12.7	4.76	5.16	0.8	2.2	
Wiper edge			3QP-WNGA080408WL	●	●					0.8	2.2	

● : Stocked items
★ : Coming soon

Inserts (Negative type with chipbreaker)

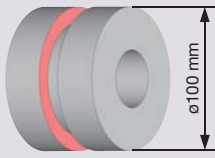
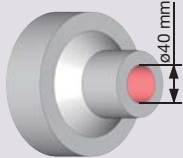
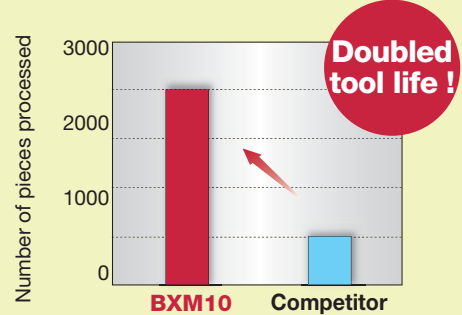
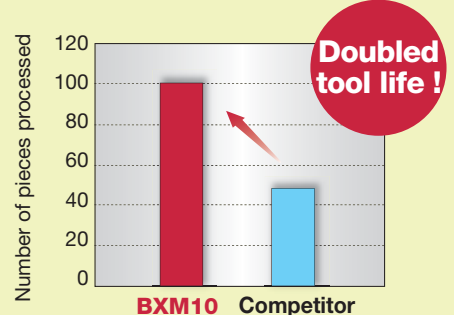
Features	Shape	Cat. No.	Grades		No. of corners	Dimensions (mm)				
			BXM10	BXM20		I.C.dia ϕd	Thickness s	Hole dia ϕd_1	Corner R r ϵ	CBN length a
With chipbreaker		2QP-CNGM120408-HF		●	2	12.7	4.76	5.16	0.8	2.2
		2QP-CNGM120412-HF		●	2	12.7	4.76	5.16	1.2	2.4
		2QP-DNGM150408-HF		●	2	12.7	4.76	5.16	0.8	2.1
		2QP-DNGM150412-HF		●	2	12.7	4.76	5.16	1.2	2.0
		3QP-TNGM160408-HF		●	3	9.525	4.76	3.81	0.8	1.9
		3QP-TNGM160412-HF		●	3	9.525	4.76	3.81	1.2	2.4
		2QP-VNGM160408-HF		●	2	9.525	4.76	3.81	0.8	2.2
With chipbreaker		2QP-CNGM120408-HM		●	2	12.7	4.76	5.16	0.8	2.2
		2QP-CNGM120412-HM		●	2	12.7	4.76	5.16	1.2	2.4
		2QP-DNGM150408-HM		●	2	12.7	4.76	5.16	0.8	2.1
		2QP-DNGM150412-HM		●	2	12.7	4.76	5.16	1.2	2.0
		3QP-TNGM160408-HM		●	3	9.525	4.76	3.81	0.8	1.9
		3QP-TNGM160412-HM		●	3	9.525	4.76	3.81	1.2	2.4
		2QP-VNGM160408-HM		●	2	9.525	4.76	3.81	0.8	2.2

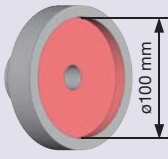
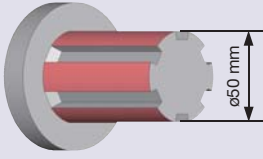
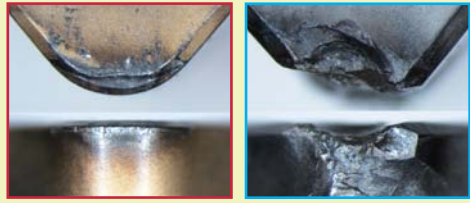
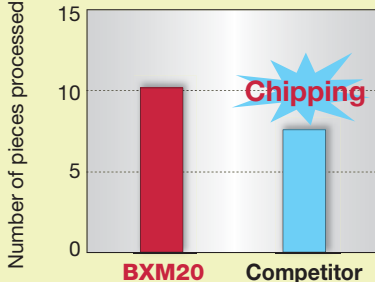
Inserts (Positive type)

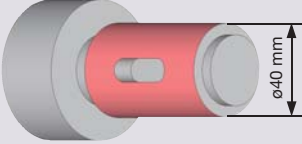
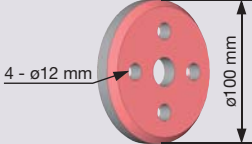
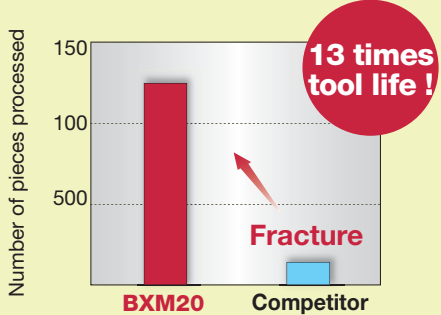
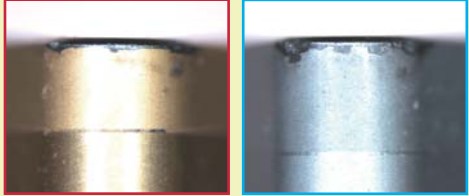
Features	Shape	Cat. No.	Grades		No. of corners	Dimensions (mm)					
			BXM10	BXM20		Relief angle ϕd	I.C.dia ϕd	Thickness s	Hole dia ϕd_1	Corner R r ϵ	CBN length a
Standard		2QP-CCGW060202	●	●	2	7°	6.35	2.38	2.8	0.2	2.3
		2QP-CCGW060204	●	●	2	7°	6.35	2.38	2.8	0.4	2.3
		2QP-CCGW09T304	●	●	2	7°	9.525	3.97	4.4	0.4	2.3
		2QP-CCGW09T308	●	●	2	7°	9.525	3.97	4.4	0.8	2.2
		2QP-DCGW070202	●	●	2	7°	6.35	2.38	2.8	0.2	2.7
		2QP-DCGW070204	●	●	2	7°	6.35	2.38	2.8	0.4	2.5
		2QP-DCGW11T302	●	●	2	7°	9.525	3.97	4.4	0.2	2.7
		2QP-DCGW11T304	●	●	2	7°	9.525	3.97	4.4	0.4	2.5
		2QP-DCGW11T308	●	●	2	7°	9.525	3.97	4.4	0.8	2.1
		3QP-TPGW080204	●	●	3	11°	4.76	2.38	2.3	0.4	2.2
		3QP-TPGW090202		●	3	11°	4.76	2.38	2.3	0.2	2.3
		3QP-TPGW090204	●	●	3	11°	4.76	2.38	2.3	0.4	2.2
		3QP-TPGW110202		●	3	11°	6.35	2.38	2.8	0.2	2.3
		3QP-TPGW110204	●	●	3	11°	6.35	2.38	2.8	0.4	2.2
		3QP-TPGW110302		●	3	11°	6.35	3.18	3.4	0.2	2.3
		3QP-TPGW110304	●	●	3	11°	6.35	3.18	3.4	0.4	2.2
		3QP-TPGW110308	●	●	3	11°	6.35	3.18	3.4	0.8	2.0
		3QP-TPGW130302		●	3	11°	7.94	3.18	3.4	0.2	2.3
		3QP-TPGW130304	●	●	3	11°	7.94	3.18	3.4	0.4	2.2
		3QP-TPGW16T304	●	●	3	11°	9.525	3.97	4.4	0.4	2.2
		3QP-TPGW16T308	●	●	3	11°	9.525	3.97	4.4	0.8	1.9
		3QP-TPGW160404	●	●	3	11°	9.525	4.76	4.4	0.4	2.2
		3QP-TPGW160408		●	3	11°	9.525	4.76	4.4	0.8	2.0
		2QP-VBGW110304	●	●	2	5°	6.35	3.18	2.8	0.4	3.1
		2QP-VBGW110308	●	●	2	5°	6.35	3.18	2.8	0.8	2.2
		2QP-VBGW160404	●	●	2	5°	9.525	4.76	4.4	0.4	3.1
			●	●	2	5°	9.525	4.76	4.4	0.8	2.2
		●	●	2	7°	9.525	4.76	4.4	0.4	3.1	

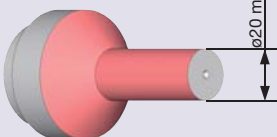
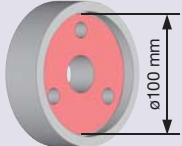
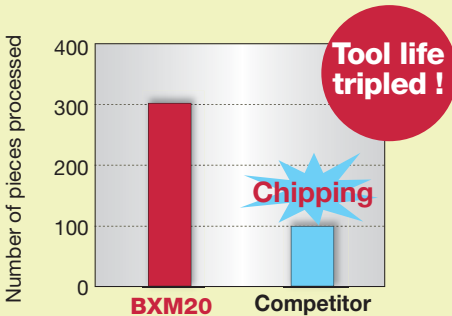
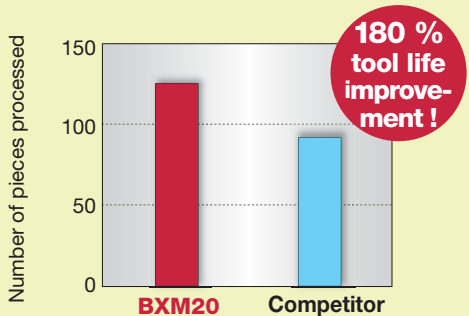
● : Stocked items
★ : Coming soon

Practical Examples

Work piece type		Automotive parts	Automotive parts
Insert		2QP-VNGA160408	2QP-DNGA150404
Grade		BXM10	BXM10
Work material		SCr420, 20Cr4(H) (60 ~ 65HRC)	SCM420H (58 ~ 60HRC)
			
Cutting conditions	Cutting speed: V_c (m/min)	150	200
	Feed : f (mm/rev)	0.05 ~ 0.07	0.1
	Depth of cut: a_p (mm)	0.15	0.25
	Machining	Continuous cutting	Continuous cutting
	Coolant	Dry	Dry
Results		 <p>Excellent surface roughness.</p>	 <p>Doubled tool life due to higher wear resistance.</p>

Work piece type		Automotive parts	Automotive parts
Insert		2QP-CNGA120408	2QP-CNGA120408
Grade		BXM20	BXM20
Work material		SCr420, 20Cr4(H)	SKH54, HS6-5-4 (63 ~ 64HRC)
			
Cutting conditions	Cutting speed: V_c (m/min)	90 ~ 120	100
	Feed : f (mm/rev)	0.12	0.1
	Depth of cut: a_p (mm)	0.2 ~ 0.5	0.05
	Machining	Continuous cutting	Heavy interrupted cutting
	Coolant	Water soluble	Water soluble
Results		<p>■ After machining 200 pcs.</p>  <p>BXM20 has normal wear and stable tool life.</p>	 <p>140% tool life improvement !</p>

Work piece type		Automotive parts	Machine parts (Wear parts)
Insert		2QP-DNGA150408	2QP-DNGA150404
Grade		BXM20	BXM20
Work material		SCr420, 20CrS4 (60 ~ 65HRC)	SKH51, HS6-5-2 (64HRC)
			
Cutting conditions	Cutting speed: V_c (m/min)	80	45
	Feed : f (mm/rev)	0.08	0.07
	Depth of cut: a_p (mm)	0.1	0.05
	Machining	Continuous to interrupted cutting	Continuous to interrupted cutting
	Coolant	Dry	Dry
Results		 <p>13 times tool life !</p> <p>BXM20 has 13 times longer tool life than competitors.</p>	<p>■ After machining 5 pcs.</p>  <p>BXM20 is stable, even in heavy interrupted. Still available.</p>

Work piece type		Automotive parts	Truck parts
Insert		2QP-CNGA120408	2QP-CNGA120408
Grade		BXM20	BXM20
Work material		SCr420H, 20Cr4(H)	SCM420 (59 ~ 63HRC)
			
Cutting conditions	Cutting speed: V_c (m/min)	180	140
	Feed : f (mm/rev)	0.15 ~ 0.2	0.12
	Depth of cut: a_p (mm)	0.2	0.1 ~ 0.15
	Machining	Continuous cutting	Continuous to interrupted cutting
	Coolant	Water soluble	Dry (Air)
Results		 <p>Tool life tripled !</p> <p>No chippings. Tripled tool life, and more stable.</p>	 <p>180% tool life improvement !</p> <p>Tool life is 180% longer than competitors with stability, even when interrupted machining.</p>



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