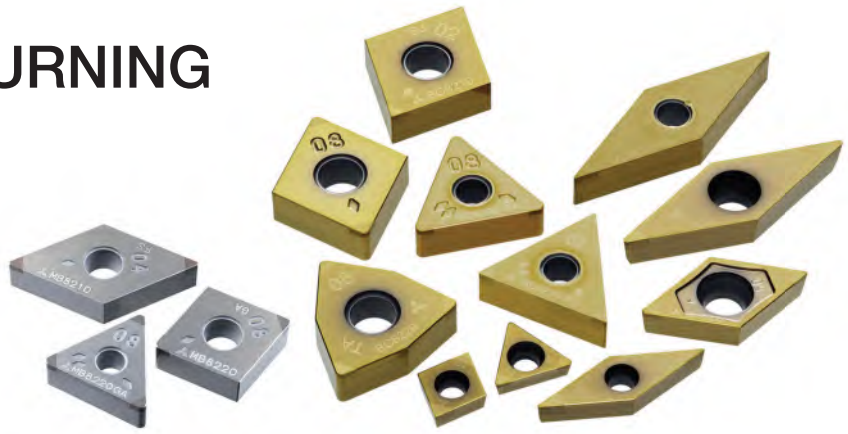
MITSUBISHI MATERIALS

BC8200/MB8200 Series

CBN GRADE FOR TURNING HARDENED STEEL



TOOL NEWS B249A

PVD Coated CBN Grade for Turning Hardened Steel

BC8200 Series

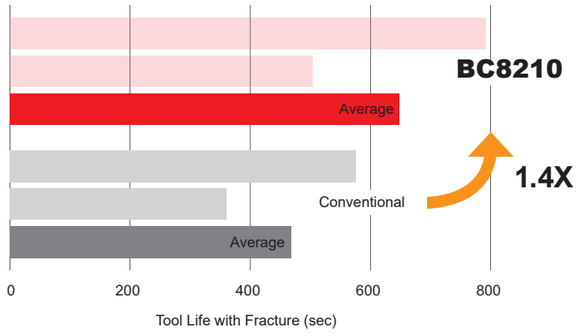
BC8210 For Continuous and Light Interrupted Cutting

Outstanding Tool Life with High-speed Machining

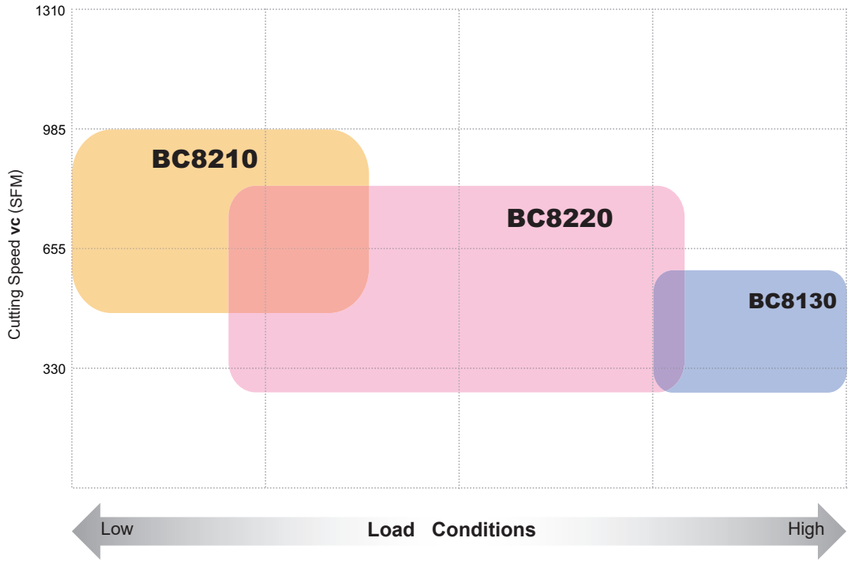
Suitable for continuous cutting and light interrupted cutting. BC8210 exhibits excellent chipping, flank and crater wear resistance, thereby providing a stable machining process at high speed cutting conditions.

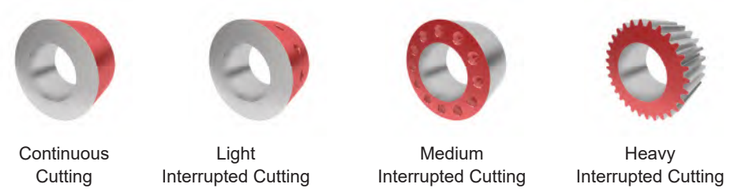
Comparison of Wear Resistance During Continuous Cutting

Defects due to crater wear are suppressed and tool life is improved when compared to conventional products.



<Cutting Conditions>
Material : AISI 5120 (60 HRC)
Inserts : NP-CNGA432-GS2
Cutting Speed : vc=655 SFM
Feed per Rev. : f=.004 IPR
Depth of Cut : ap=.008 inch
Cutting Mode : Dry Cutting



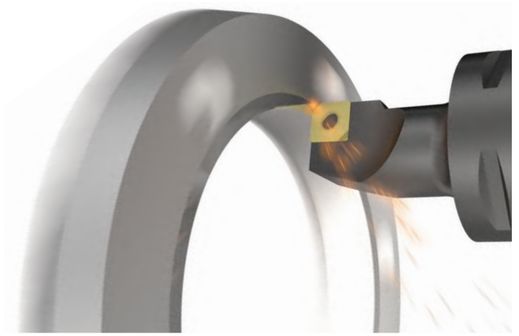


<Cutting Conditions>
Material : AISI 5120 (60 HRC)
Inserts : NP-CNGA432-VA2
Cutting Speed : vc=820 SFM
Feed per Rev. : f=.006 IPR
Depth of Cut : ap=.004 inch
Cutting Mode : Dry Cutting

BC8220 General Applications

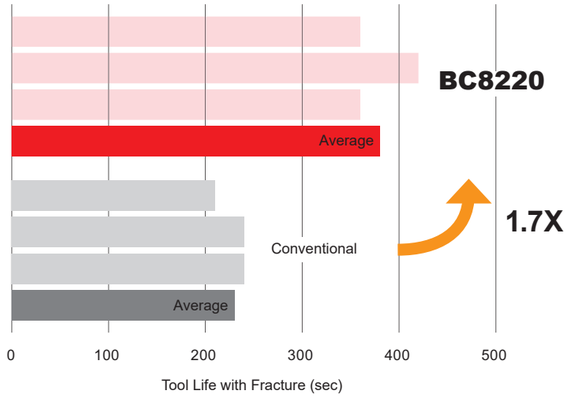
Achieves Impressive Tool Life Over a Wide Range of Cutting Conditions.

Highly suited to a wide application area from continuous through to heavy interrupted cutting. It also has excellent crater wear and fracture resistance due to the new CBN base material combined with a new coating to dramatically extend tool life.



Comparison of Fracture Resistance During Medium Interrupted Cutting

Excelling in suppression of chipping and cracks, it also improves fracture resistance after crater wear providing stable cutting action that improves tool life.



Features

BC8210

The newly developed, impact absorbing, AlCrSiN-base coating combined with the excellent wear-resistant, TiAlSiN-base coating, provides stable wear and chip resistance from continuous through to low interrupted cutting.

Gold color aids easy identification of edge use.

Excellent chipping resistance
Absorbs impact forces

Excellent wear resistance
Abrasion resistant layer

Improved strength of adhesion to the CBN substrate prevents peeling
High adhesion layer for BC8210

Excellent crater wear and chipping resistance
Exclusive BC8210 sintered body

BC8220

TiAlN-base coating, which has excellent wear resistance and a fine multi-layered structure suppresses the growth of cracks in the coating and thereby reduces edge chipping. This allows for stable cutting in a wide variety of applications.

Gold color aids easy identification of edge use.

High wear and chipping resistance
Super Multi-layer

Improved strength of adhesion to the CBN substrate prevents peeling
High adhesion layer for BC8220

Excellent crater wear and chipping resistance
Exclusive BC8220 sintered body

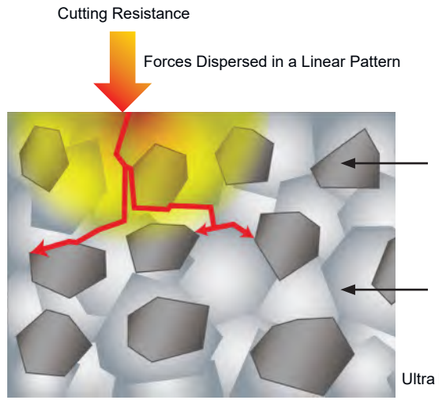
Ultra Micro-particle/ Heat Resistant Binder Technology

The new CBN substrate contains a new ultra micro-particle and heat resistant binder. This suppresses both chipping and crater wear that promote longer tool life.

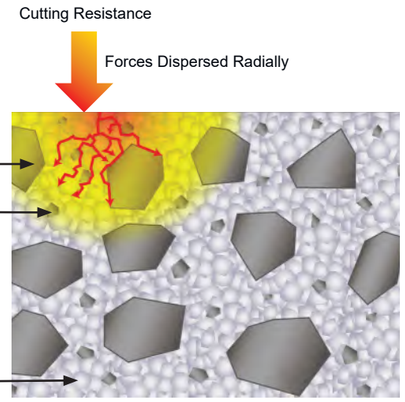
Optimized Substrate Technology with Ultra Micro-particle Binder

The ultra micro-particle binder prevents linear crack development to avoid sudden fracturing.

Conventional



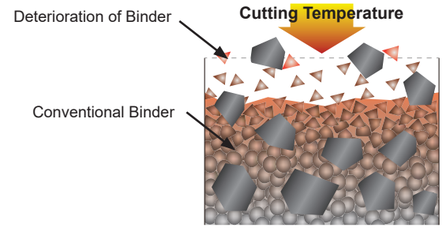
BC8200, MB8200 Series



Positive Effect of the Newly Developed Heat Resistant Binder

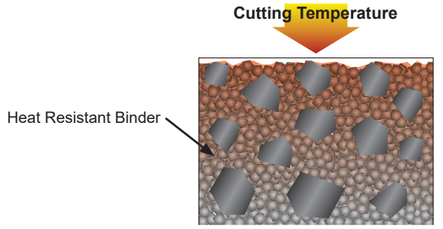
By increasing the heat resistance of the binder, wear resistance due to the deterioration of the binder component is increased, thereby suppressing crater wear, chipping and fracturing.

Conventional

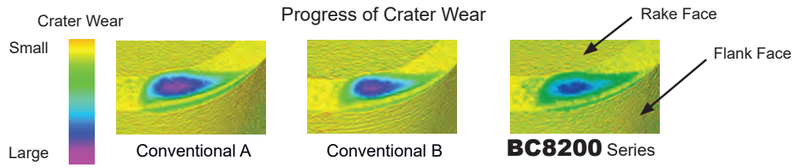


The binder deteriorates due to the heat produced during cutting, which reduces the wear resistance.

BC8200, MB8200 Series



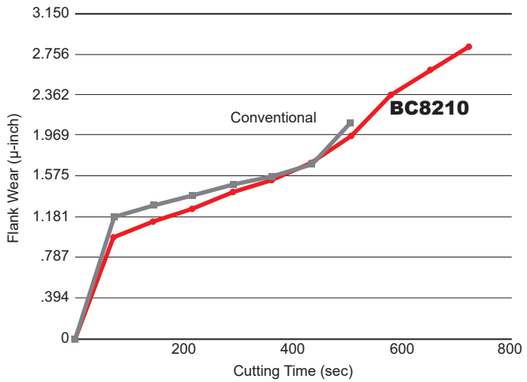
Deterioration of the binder is much reduced.

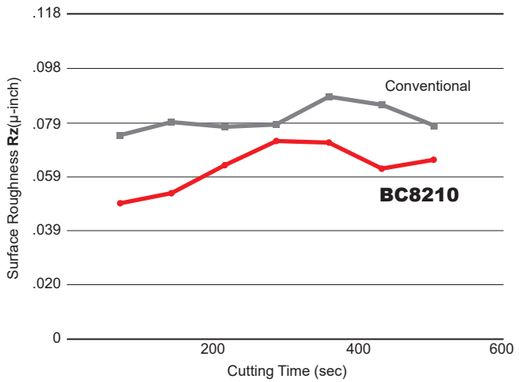


BC8210 For Continuous and Light Interrupted Cutting

Machining 5120(60 HRC):Comparison of Continuous Cutting

BC8210 reduces flank wear and maintains a good surface finish.

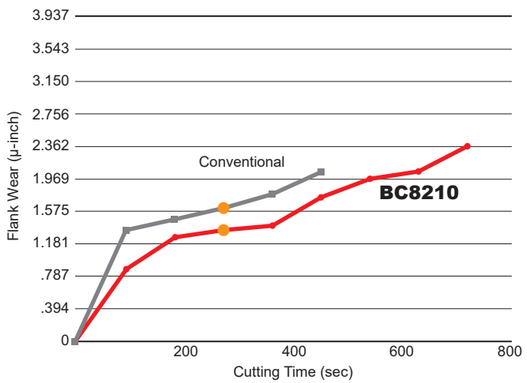




<Cutting Conditions>
Material : AISI 5120 (60 HRC)
Inserts : NP-CNGA432-GS2
Cutting Speed : vc=655 SFM
Feed per Rev. : f=.004 IPR
Depth of Cut : ap=.008 inch
Cutting Mode : Dry Cutting

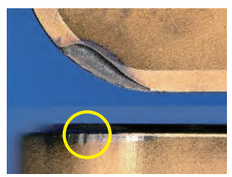
Machining 5120(60 HRC):Comparison of Light Interrupted Cutting

BC8210 provides excellent chipping resistance.



After machining 360 seconds

BC8210



Conventional Product is Chipping

<Cutting Conditions>
Material : AISI 5120 (60 HRC)
Inserts : NP-CNGA432-GS2
Cutting Speed : vc=525 SFM
Feed per Rev. : f=.004 IPR
Depth of Cut : ap=.008 inch
Cutting Mode : Dry Cutting

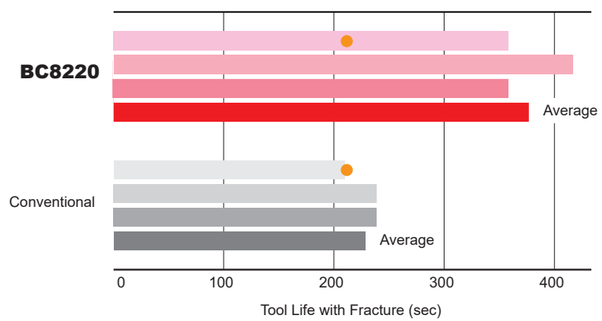
Recommended Cutting Conditions

Grade	Material	Machining Methods	Cutting Speed vc (SFM) 330 490 655 820 985	Feed per Rev. f (IPR)	Depth pf Cut ap (inch)	Cutting Mode
BC8210	Hardened Steel	Continuous Cutting		≤.008	≤.014	Dry, Wet
		Light Interrupted Cutting		≤.008	≤.014	Dry, Wet

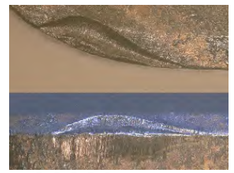
BC8220 General Applications

Machining 5120(60HRC): Comparison of Fracture Resistance During Medium Interrupted Cutting

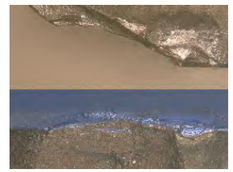
Stable cutting is achieved with excellent fracture resistance in medium interrupted cutting.



After machining 210 seconds



BC8220

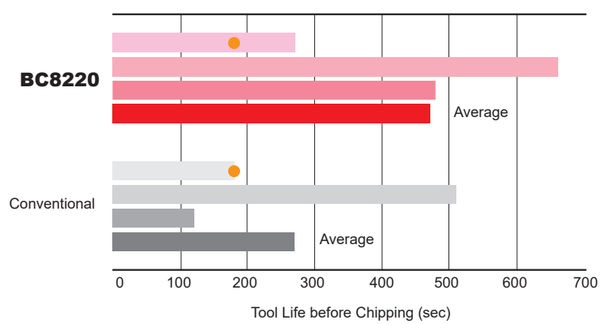


Conventional

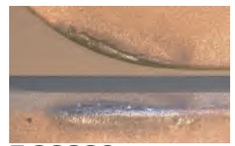
<Cutting Conditions>
Material : AISI 5120 (60 HRC)
Inserts : NP-CNGA432-VA2
Cutting Speed : vc=820 SFM
Feed per Rev. : f=.006 IPR
Depth of Cut : ap=.004 inch
Cutting Mode : Dry Cutting

Machining 5120(60HRC): Comparison of Fracture Resistance During Heavy Interrupted Cutting

Achieves excellent chipping resistance during heavy interrupted cutting.



After machining 180 seconds



BC8220

Conventional Product is Chipping

<Cutting Conditions>
Material : AISI 5120 (60 HRC)
Inserts : NP-CNGA432-VA2
Cutting Speed : vc=655 SFM
Feed per Rev. : f=.002 IPR
Depth of Cut : ap=.004 inch
Cutting Mode : Wet Cutting

Recommended Cutting Conditions

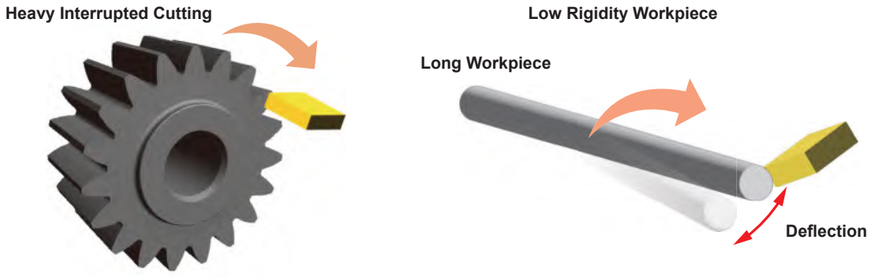
Grade	Material	Machining Methods	Cutting Speed vc (SFM) 330 490 655 820 985	Feed per Rev. f (IPR)	Depth pf Cut ap (inch)	Cutting Mode
BC8220	Hardened Steel	Continuous Cutting		≤.008	≤.020	Dry, Wet
		Light to Medium Interrupted Cutting		≤.008	≤.012	Dry, Wet

CBN Grade for Turning Hardened Steel

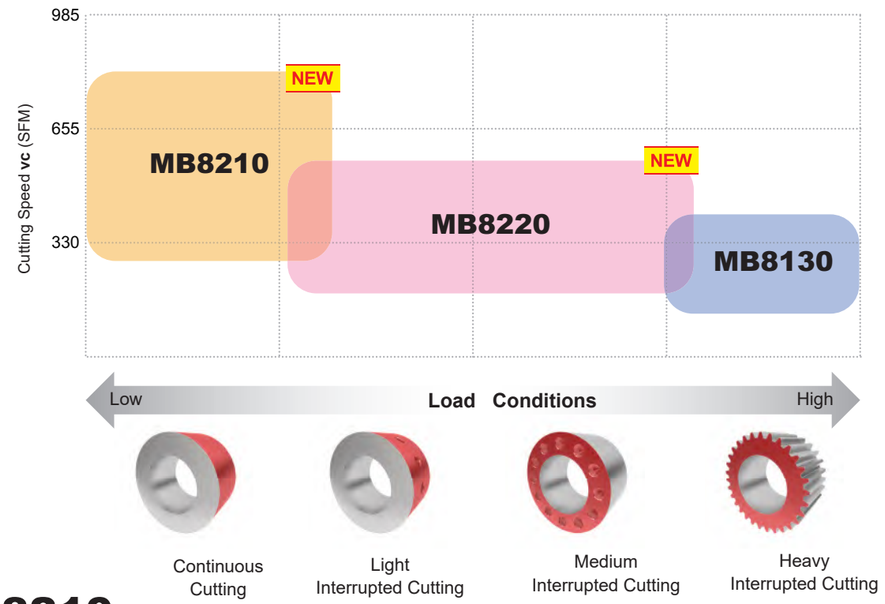
MB8200 Series NEW

Displays excellent cutting performance during medium interrupted machining.

Recommended Machining



Recommended Application Area



MB8210

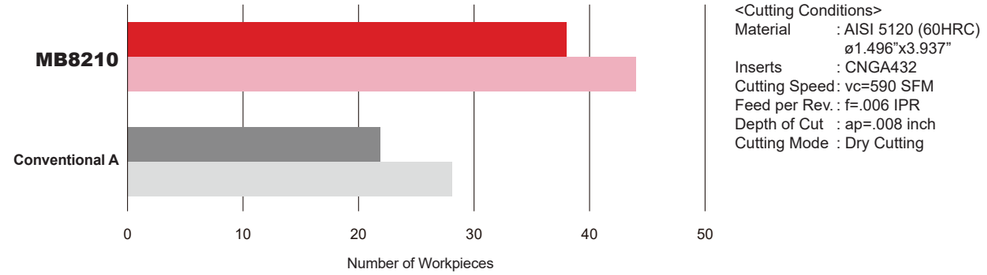
Enables stable machining during continuous and light intermittent cutting of low rigidity applications.

MB8220

Displays excellent cutting performance during medium interrupted machining.

Comparison of Continuous Cutting : 5120 (60HRC)

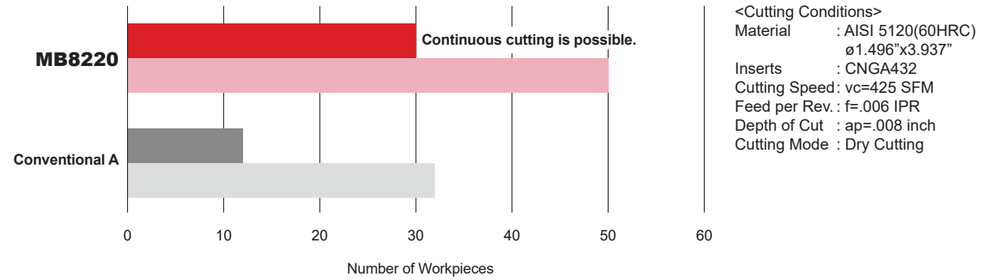
MB8210 achieves stable machining during continuous cutting.



<Cutting Conditions>
Material : AISI 5120 (60HRC) ø1.496"x3.937"
Inserts : CNGA432
Cutting Speed : vc=590 SFM
Feed per Rev. : f=.006 IPR
Depth of Cut : ap=.008 inch
Cutting Mode : Dry Cutting

Comparison of Light Interrupted Cutting : 5120 (60HRC)

MB8220 achieves stable cutting and is ideal for light interrupted cutting.



<Cutting Conditions>
Material : AISI 5120(60HRC) ø1.496"x3.937"
Inserts : CNGA432
Cutting Speed : vc=425 SFM
Feed per Rev. : f=.006 IPR
Depth of Cut : ap=.008 inch
Cutting Mode : Dry Cutting

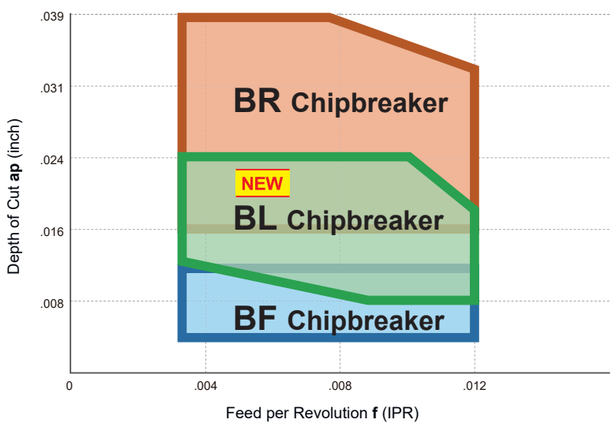
Recommended Cutting Conditions

Grade	Material	Machining Methods	Cutting Speed vc (SFM) 165 330 490 655 820 985	Feed per Rev. f (IPR)	Depth pf Cut ap (inch)	Cutting Mode
MB8210	Hardened Steel (Heat Treated Steel etc.)	External Continuous Cutting		≤.008	≤.012	Dry, Wet
MB8220	Hardened Steel (Heat Treated Steel etc.)	External Interrupted Cutting		≤.008	≤.020	Dry, Wet

Features of the Insert

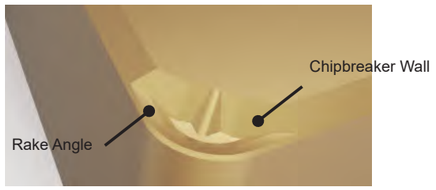
Chipbreaker

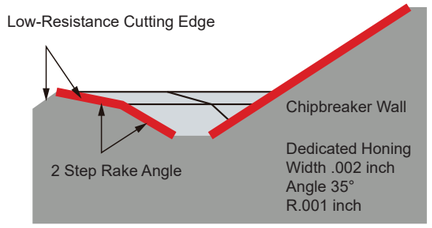
The new BL chipbreaker provides good chip control at medium to light depths of cut.
A versatile range of chipbreakers are available for a wide range of applications.

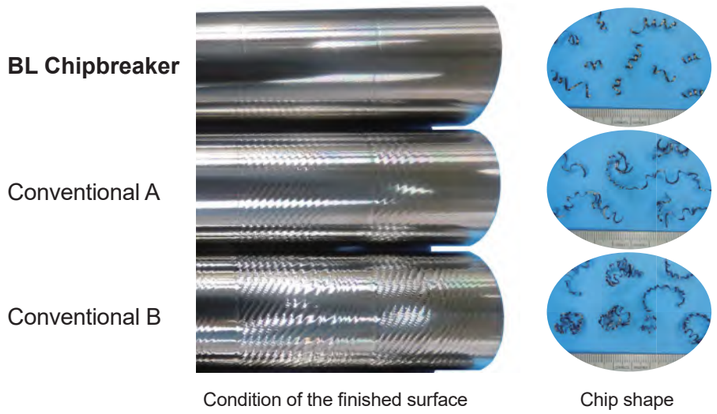


BL Chipbreaker (BC8220) NEW

It exhibits excellent chip control performance at cutting depths of .008 to .024 inches.
Combined with the dedicated honing, a low resistance cutting edge is created that suppresses chatter and vibration.





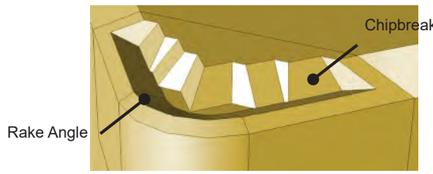


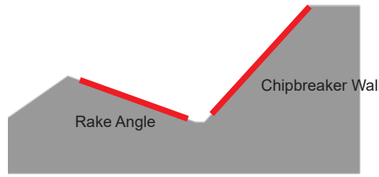
<Cutting Conditions>
Material : AISI 5120 (60HRC)
Inserts : CNGM433
Cutting Speed: vc=490 SFM
Feed per Rev. : f=.008 IPR
Depth of Cut : ap=.016 inch
Cutting Mode : Dry Cutting

BR Chipbreaker (BC8220)

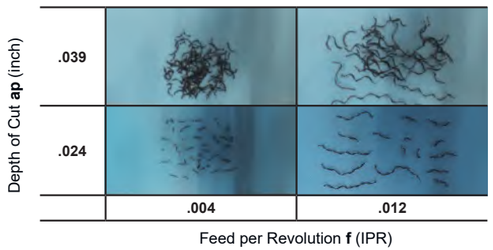
A reduced number of passes needed and improved chip control during high depths of cut.
Chips are formed with the effect from the rake angle, and the multi-stage chipbreaker wall supports a wide range of cuts.

Recommended Cutting Conditions : vc=260-655 SFM, f ≤.012 IPR, ap=.016-.039 inch





Achieves ideal chip control even at high depths of cut.

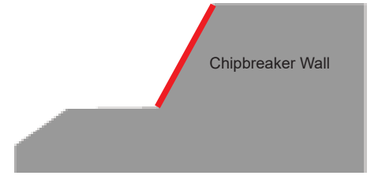


<Cutting Conditions>
Material : AISI 5120 (60 HRC)
Inserts : BR-CNGM432-TA2
Cutting Speed: vc=655 SFM
Feed per Rev. : f=.004 IPR
.012 IPR
Depth of Cut : ap=.024 inch
.039 inch
Cutting Mode : Dry Cutting

BF Chipbreaker (BC8210, BC8220)

Achieves excellent chip control when finish cutting at depths of .012 inch or less.

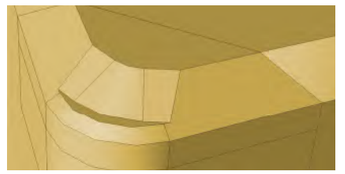
Recommended Cutting Conditions : vc=260-655 SFM, f ≤.012 IPR, ap=.004-.012 inch

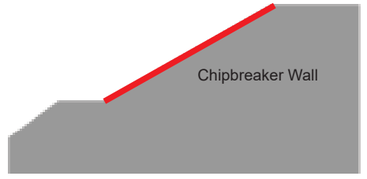


BM Chipbreaker (BC8220)

Great chip control when machining at medium depths of cut. (.012 inch-.031 inch)

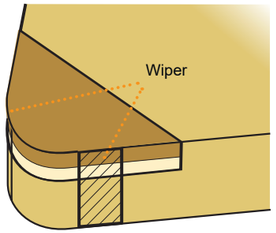
Recommended Cutting Conditions : vc=260-655 SFM, f ≤.012 IPR, ap=.012-.031 inch





Wiper Insert

Features



Improving Surface Finish

Under the same machining conditions as conventional chipbreakers, but with the feed rate increased, the surface finish of the workpiece can be improved.

Improving Efficiency

High feed rates not only shorten machining times but also make it possible to combine roughing and finishing operations.

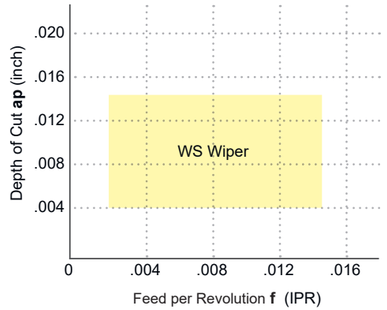
Increased Tool Life

When using at high feed conditions, the time required to cut one component is decreased, thus more parts can be machined with each insert. In addition, the high feed rate prevents rubbing, thereby, delaying the progression of wear and increasing tool life.

Improving Chip Control

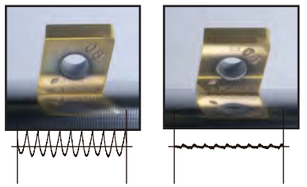
Under high feed conditions, the chips generated become thicker and are more easily broken, thus, chip control is improved.

Recommended Cutting Conditions and Performance



Cutting Speed: vc=490 SFM Feed per Rev.: f = .012 IPR
Depth of Cut: ap=.004 inch Cutting Mode: Dry Cutting

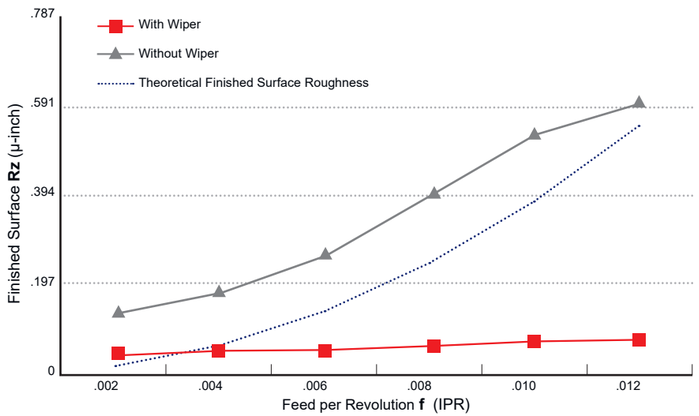
Without Wiper **With Wiper**



Rz=.272 µ-inch Rz=.047 µ-inch

Cutting Performance

WL Wiper (External Turning)

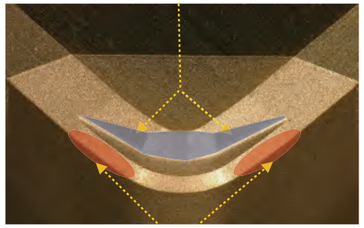


<Cutting Conditions>
Material : Hardened Steel (60HRC)
Insert : NP-CNGA432
Machining Methods : Continuous
Cutting Speed : vc = 395 SFM
Depth of Cut : ap = .004 inch
Cutting Mode : Dry Cutting

Combination of BF Chipbreaker and WS Wiper Insert

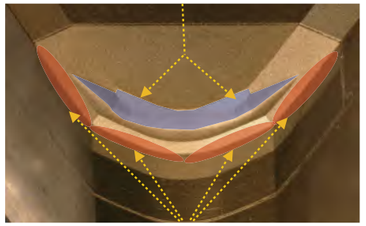
CNGM and DNGM types are now available with new inserts that combine a BF chipbreaker with a WS wiper insert. (BC8210 : BF-○NGM○○○TSWS2, BC8220 : BF-○NGM○○○TAWS2)
It is effective for chip control and improvement of finished surface roughness without concerns about the hand of the tool even when continuous external or internal turning and facing.

BF Chipbreaker



WS Wiper Insert (Neutral)
BF-CNGM432-TSWS2

BF Chipbreaker



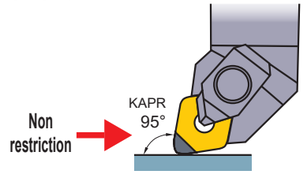
WS Wiper Insert (Neutral)
BF-DNGM433-TAWS2

Notes for Use

When using CNGM type

No Restriction for Holders

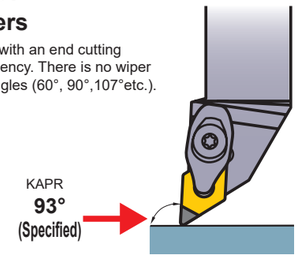
A standard holder can be used.
(*A double clamp, high rigidity tool is recommended.)



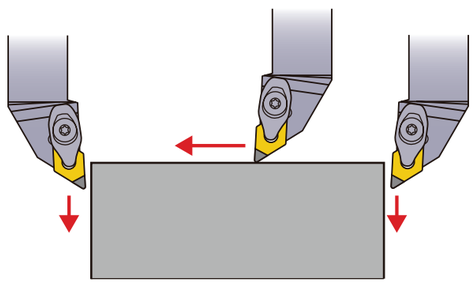
When using DNGM type

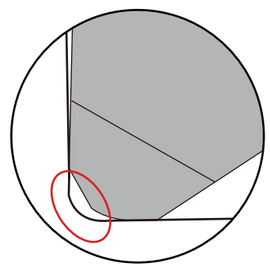
Restriction for Holders

Use PDJN holder or DDJN holder with an end cutting angle 93° for improving wiper efficiency. There is no wiper efficiency with other end cutting angles (60°, 90°,107°etc.).



Displays great wiper efficiency when machining the end face and outer diameter in both right-hand and left-hand machining.



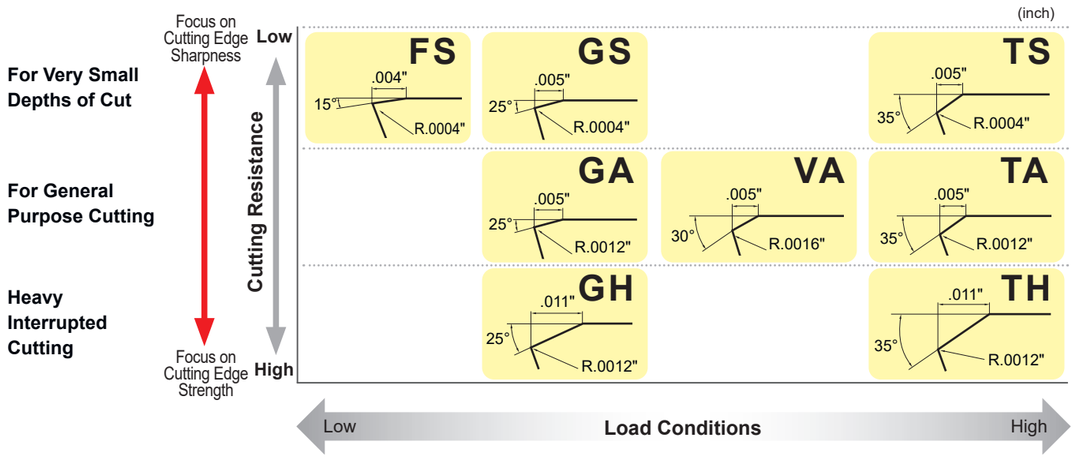


*The DNGM type is not suitable for machining the R that connects the end face and the outer diameter because it will leave uncut parts.

Features of the Insert

Edge Preparation (Honing)

New VA honing type with improved fracture resistance for high speeds and feed.
In addition, a range of different honing types that can be used for various applications is available.



	Continuous Cutting	General Purpose		For Fracture Resistance	Interrupted Cutting	
	General Cutting	General Cutting	High Feed and Depth	High Speeds and Feed	General Cutting	High Feed and Depth
BC8210	FS	GS	GH		TS	
BC8220		GA	GH	VA	TA	TH

Identification

BF - C N G M 4 3 2 - TA WS 2 _ _

Insert Geometry	
BR	For High Depth of Cut Chipbreaker
BL BM	For Medium Depth of Cut Chipbreaker
BF	For Finish Cutting Chipbreaker
NP	New Petit Cut

Edge Preperation	
Symbol	Application
FS	Continuous Cutting
GS GA GH	General Cutting
VA	For High Speed, High Feed Cutting
TS TA TH	Interrupted Cutting

Wiper	
WS	For High Rigidity Workpiece Material
No Mark	Without Wiper

Cutting Direction		
Symbol	Hand	Figure
JR	Right	
JL	Left	
No mark	Neutral	

Memo

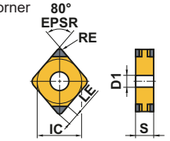
BC8200/MB8200 Series

Negative Inserts (With Hole)

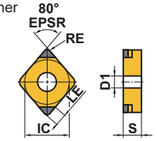
G Class

CNGA, CNGM

4 corner



2 corner



NEW PETIT CUT	NEW PETIT CUT	NEW PETIT CUT	NEW PETIT CUT
NP_○○4	NP_○○WS4	NP_○○2	NP_○○WS2
			
	(With Wiper)		(With Wiper)
NEW PETIT CUT	NEW PETIT CUT		
BF_, BM_	BR_, BL_		
			
(With Chipbreaker)	(With Chipbreaker)		

(inch)

Order Number	Coated CBN		CBN NEW		Cutting Edges	IC	S	RE	D1	LE
	BC8210	BC8220	MB8210	MB8220						
NP-CNGA431-GA4		●			4	.500	.187	.016	.203	.071
NP-CNGA432-GA4		●			4	.500	.187	.031	.203	.079
NP-CNGA433-GA4		●			4	.500	.187	.047	.203	.087
NP-CNGA431-GS4	★				4	.500	.187	.016	.203	.071
NP-CNGA432-GS4	●				4	.500	.187	.031	.203	.079
NP-CNGA433-GS4	★				4	.500	.187	.047	.203	.087
NP-CNGA431-GH4	★	★			4	.500	.187	.016	.203	.071
NP-CNGA432-GH4	●	●			4	.500	.187	.031	.203	.079
NP-CNGA433-GH4	★	★			4	.500	.187	.047	.203	.087
NP-CNGA431-FS4	★				4	.500	.187	.016	.203	.071
NP-CNGA432-FS4	★				4	.500	.187	.031	.203	.079
NP-CNGA433-FS4	★				4	.500	.187	.047	.203	.087
NP-CNGA431-VA4		★			4	.500	.187	.016	.203	.071
NP-CNGA432-VA4		●			4	.500	.187	.031	.203	.079
NP-CNGA433-VA4		●			4	.500	.187	.047	.203	.087
NP-CNGA431-TA4		★			4	.500	.187	.016	.203	.071
NP-CNGA432-TA4		★			4	.500	.187	.031	.203	.079
NP-CNGA433-TA4		★			4	.500	.187	.047	.203	.087
NP-CNGA431-TS4	★				4	.500	.187	.016	.203	.071
NP-CNGA432-TS4	★				4	.500	.187	.031	.203	.079
NP-CNGA433-TS4	★				4	.500	.187	.047	.203	.087
NP-CNGA432-TH4		★			4	.500	.187	.031	.203	.079
NP-CNGA433-TH4		★			4	.500	.187	.047	.203	.087
NP-CNGA431-FSWS4	★				4	.500	.187	.016	.203	.071
NP-CNGA432-FSWS4	●				4	.500	.187	.031	.203	.079
NP-CNGA433-FSWS4	★				4	.500	.187	.047	.203	.087
NP-CNGA431-GAWS4		★			4	.500	.187	.016	.203	.071
NP-CNGA432-GAWS4		●			4	.500	.187	.031	.203	.079
NP-CNGA433-GAWS4		★			4	.500	.187	.047	.203	.087
NP-CNGA431-GSWS4	★				4	.500	.187	.016	.203	.071
NP-CNGA432-GSWS4	★				4	.500	.187	.031	.203	.079
NP-CNGA433-GSWS4	★				4	.500	.187	.047	.203	.087
NP-CNGA430.5-GA2		●			2	.500	.187	.008	.203	.067
NP-CNGA431-GA2	●	●			2	.500	.187	.016	.203	.071
NP-CNGA432-GA2	●	●			2	.500	.187	.031	.203	.079
NP-CNGA433-GA2	●	●			2	.500	.187	.047	.203	.087

Order Number	Coated CBN		CBN NEW		Cutting Edges	IC	S	RE	D1	LE
	BC8210	BC8220	MB8210	MB8220						
NP-CNGA430.5-GS2	●				2	.500	.187	.008	.203	.067
NP-CNGA431-GS2	●	●			2	.500	.187	.016	.203	.071
NP-CNGA432-GS2	●	●			2	.500	.187	.031	.203	.079
NP-CNGA433-GS2	●	●			2	.500	.187	.047	.203	.087
NP-CNGA431-GH2	★	★			2	.500	.187	.016	.203	.071
NP-CNGA432-GH2	●	●			2	.500	.187	.031	.203	.079
NP-CNGA433-GH2	★	★			2	.500	.187	.047	.203	.087
NP-CNGA430.5-FS2	●				2	.500	.187	.008	.203	.067
NP-CNGA431-FS2	●	●		●	2	.500	.187	.016	.203	.071
NP-CNGA432-FS2	●	●		●	2	.500	.187	.031	.203	.079
NP-CNGA433-FS2	★	●		●	2	.500	.187	.047	.203	.087
NP-CNGA431-VA2		●			2	.500	.187	.016	.203	.071
NP-CNGA432-VA2		●			2	.500	.187	.031	.203	.079
NP-CNGA433-VA2		●			2	.500	.187	.047	.203	.087
NP-CNGA431-TA2	●	●			2	.500	.187	.016	.203	.071
NP-CNGA432-TA2	●	●			2	.500	.187	.031	.203	.079
NP-CNGA433-TA2	●	●			2	.500	.187	.047	.203	.087
NP-CNGA431-TS2	★	●			2	.500	.187	.016	.203	.071
NP-CNGA432-TS2	★	●			2	.500	.187	.031	.203	.079
NP-CNGA433-TS2	★	●			2	.500	.187	.047	.203	.087
NP-CNGA432-TH2	●	★			2	.500	.187	.031	.203	.079
NP-CNGA433-TH2	●	●			2	.500	.187	.047	.203	.087
NP-CNGA431-FSWS2	★			●	2	.500	.187	.016	.203	.071
NP-CNGA432-FSWS2	★			●	2	.500	.187	.031	.203	.079
NP-CNGA433-FSWS2	★			●	2	.500	.187	.047	.203	.087
NP-CNGA431-GAWS2		●			2	.500	.187	.016	.203	.071
NP-CNGA432-GAWS2		●			2	.500	.187	.031	.203	.079
NP-CNGA433-GAWS2		●			2	.500	.187	.047	.203	.087
NP-CNGA431-GSWS2	●				2	.500	.187	.016	.203	.071
NP-CNGA432-GSWS2	●				2	.500	.187	.031	.203	.079
NP-CNGA433-GSWS2	★				2	.500	.187	.047	.203	.087
BF-CNGM432-TAWS2		●			2	.500	.187	.031	.203	.079
BF-CNGM433-TAWS2		●			2	.500	.187	.047	.203	.087
BF-CNGM431-TS2	★				2	.500	.187	.016	.203	.071
BF-CNGM432-TS2	★				2	.500	.187	.031	.203	.079
BF-CNGM433-TS2	★				2	.500	.187	.047	.203	.087
BF-CNGM432-TSWS2	★				2	.500	.187	.031	.203	.079
BF-CNGA433-TSWS2	★				2	.500	.187	.047	.203	.087

● = NEW

● : USA Stock ★ : Stocked in Japan
(1 insert in one case)

(inch)

Order Number	Coated CBN		CBN NEW		Cutting Edges	IC	S	RE	D1	LE
	BC8210	BC8220	MB8210	MB8220						
BL-CNGM431-TN2		●			2	.500	.187	.016	.203	.071
BL-CNGM432-TN2		●			2	.500	.187	.031	.203	.079
BL-CNGM433-TN2		●			2	.500	.187	.047	.203	.087
BM-CNGM431-TA2		★			2	.500	.187	.016	.203	.071
BM-CNGM432-TA2		●			2	.500	.187	.031	.203	.079
BM-CNGM433-TA2		●			2	.500	.187	.047	.203	.087
BR-CNGM431-TA2		★			2	.500	.187	.016	.203	.071
BR-CNGM432-TA2		★			2	.500	.187	.031	.203	.079
BR-CNGM433-TA2		★			2	.500	.187	.047	.203	.087

● = NEW

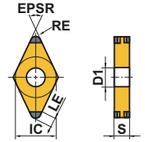
BC8200/MB8200 Series

Negative Inserts (With Hole)

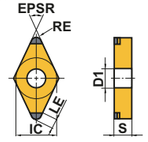
G Class

DNGA, DNGM

4 corner 55° EPSR RE



2 corner 55° EPSR RE



NEW PETIT CUT	NEW PETIT CUT	
NP_○○4	NP_○○2	
		
NEW PETIT CUT	NEW PETIT CUT	NEW PETIT CUT
NP_WS2JR/L	BF_, BM_	BR_, BL_
		
(With Wiper)	(With Chipbreaker)	(With Chipbreaker)

(inch)

Order Number	Coated CBN BC8210	Coated CBN BC8220	CBN NEW MB8210	CBN NEW MB8220	Cutting Edges	IC	S	RE	D1	LE
NP-DNGA431-GA4		●			4	.500	.187	.016	.203	.083
NP-DNGA432-GA4		●			4	.500	.187	.031	.203	.079
NP-DNGA433-GA4		★			4	.500	.187	.047	.203	.071
NP-DNGA441-GA4		★			4	.500	.250	.016	.203	.083
NP-DNGA442-GA4		★			4	.500	.250	.031	.203	.079
NP-DNGA443-GA4		★			4	.500	.250	.047	.203	.071
NP-DNGA431-GS4	★				4	.500	.187	.016	.203	.083
NP-DNGA432-GS4	★				4	.500	.187	.031	.203	.079
NP-DNGA433-GS4	★				4	.500	.187	.047	.203	.071
NP-DNGA441-GS4	★				4	.500	.250	.016	.203	.083
NP-DNGA442-GS4	★				4	.500	.250	.031	.203	.079
NP-DNGA443-GS4	★				4	.500	.250	.047	.203	.071
NP-DNGA431-GH4	★	●			4	.500	.187	.016	.203	.083
NP-DNGA432-GH4	★	★			4	.500	.187	.031	.203	.079
NP-DNGA433-GH4	★	★			4	.500	.187	.047	.203	.071
NP-DNGA441-GH4	★	★			4	.500	.250	.016	.203	.083
NP-DNGA442-GH4	★	★			4	.500	.250	.031	.203	.079
NP-DNGA443-GH4	★	★			4	.500	.250	.047	.203	.071
NP-DNGA431-FS4	★				4	.500	.187	.016	.203	.083
NP-DNGA432-FS4	★				4	.500	.187	.031	.203	.079
NP-DNGA433-FS4	★				4	.500	.187	.047	.203	.071
NP-DNGA441-FS4	★				4	.500	.250	.016	.203	.083
NP-DNGA442-FS4	★				4	.500	.250	.031	.203	.079
NP-DNGA443-FS4	★				4	.500	.250	.047	.203	.071
NP-DNGA431-VA4		★			4	.500	.187	.016	.203	.083
NP-DNGA432-VA4		●			4	.500	.187	.031	.203	.079
NP-DNGA433-VA4		★			4	.500	.187	.047	.203	.071
NP-DNGA441-VA4		★			4	.500	.250	.016	.203	.083
NP-DNGA442-VA4		★			4	.500	.250	.031	.203	.079
NP-DNGA443-VA4		★			4	.500	.250	.047	.203	.071
NP-DNGA431-TA4		★			4	.500	.187	.016	.203	.083
NP-DNGA432-TA4		★			4	.500	.187	.031	.203	.079
NP-DNGA433-TA4		●			4	.500	.187	.047	.203	.071
NP-DNGA441-TA4		★			4	.500	.250	.016	.203	.083
NP-DNGA442-TA4		★			4	.500	.250	.031	.203	.079
NP-DNGA443-TA4		★			4	.500	.250	.047	.203	.071

Order Number	Coated CBN BC8210	Coated CBN BC8220	CBN NEW MB8210	CBN NEW MB8220	Cutting Edges	IC	S	RE	D1	LE
NP-DNGA431-TS4	★				4	.500	.187	.016	.203	.083
NP-DNGA432-TS4	★				4	.500	.187	.031	.203	.079
NP-DNGA433-TS4	★				4	.500	.187	.047	.203	.071
NP-DNGA441-TS4	★				4	.500	.250	.016	.203	.083
NP-DNGA442-TS4	★				4	.500	.250	.031	.203	.079
NP-DNGA443-TS4	★				4	.500	.250	.047	.203	.071
NP-DNGA432-TH4		★			4	.500	.187	.031	.203	.079
NP-DNGA433-TH4		★			4	.500	.187	.047	.203	.071
NP-DNGA442-TH4		★			4	.500	.250	.031	.203	.079
NP-DNGA443-TH4		★			4	.500	.250	.047	.203	.071
NP-DNGA332-GA2		●		●	2	.375	.187	.031	.150	.079
NP-DNGA430.5-GA2		●			2	.500	.187	.008	.203	.087
NP-DNGA431-GA2	●	●		●	2	.500	.187	.016	.203	.083
NP-DNGA432-GA2	●	●		●	2	.500	.187	.031	.203	.079
NP-DNGA433-GA2	●	●		●	2	.500	.187	.047	.203	.071
NP-DNGA441-GA2	●	★			2	.500	.250	.016	.203	.083
NP-DNGA442-GA2	●	★			2	.500	.250	.031	.203	.079
NP-DNGA443-GA2	●	★			2	.500	.250	.047	.203	.071
NP-DNGA430.5-GS2	●				2	.500	.187	.008	.203	.087
NP-DNGA431-GS2	●	●			2	.500	.187	.016	.203	.083
NP-DNGA432-GS2	●	●			2	.500	.187	.031	.203	.079
NP-DNGA433-GS2	★	●			2	.500	.187	.047	.203	.071
NP-DNGA441-GS2	★	●			2	.500	.250	.016	.203	.083
NP-DNGA442-GS2	★	●			2	.500	.250	.031	.203	.079
NP-DNGA443-GS2	★	●			2	.500	.250	.047	.203	.071
NP-DNGA431-GH2	★	★			2	.500	.187	.016	.203	.083
NP-DNGA432-GH2	★	★			2	.500	.187	.031	.203	.079
NP-DNGA433-GH2	★	★			2	.500	.187	.047	.203	.071
NP-DNGA441-GH2	★	★			2	.500	.250	.016	.203	.083
NP-DNGA442-GH2	★	★			2	.500	.250	.031	.203	.079
NP-DNGA443-GH2	★	★			2	.500	.250	.047	.203	.071
NP-DNGA430.5-FS2	●			●	2	.500	.187	.008	.203	.087
NP-DNGA431-FS2	●	●		●	2	.500	.187	.016	.203	.083
NP-DNGA432-FS2	●	●		●	2	.500	.187	.031	.203	.079
NP-DNGA433-FS2	●	●		●	2	.500	.187	.047	.203	.071
NP-DNGA441-FS2	★	●			2	.500	.250	.016	.203	.083
NP-DNGA442-FS2	★	●			2	.500	.250	.031	.203	.079
NP-DNGA443-FS2	★	●			2	.500	.250	.047	.203	.071

● : USA Stock ★ : Stocked in Japan
(1 insert in one case)

● = NEW

(inch)

Order Number	Coated CBN BC8210	Coated CBN BC8220	CBN NEW MB8210	CBN NEW MB8220	Cutting Edges	IC	S	RE	D1	LE
NP-DNGA431-VA2		●			2	.500	.187	.016	.203	.083
NP-DNGA432-VA2		●			2	.500	.187	.031	.203	.079
NP-DNGA433-VA2		●			2	.500	.187	.047	.203	.071
NP-DNGA441-VA2		★			2	.500	.250	.016	.203	.083
NP-DNGA442-VA2		★			2	.500	.250	.031	.203	.079
NP-DNGA443-VA2		★			2	.500	.250	.047	.203	.071
NP-DNGA431-TA2	●	●			2	.500	.187	.016	.203	.083
NP-DNGA432-TA2	●	●			2	.500	.187	.031	.203	.079
NP-DNGA433-TA2	●	●			2	.500	.187	.047	.203	.071
NP-DNGA441-TA2	●	★			2	.500	.250	.016	.203	.083
NP-DNGA442-TA2	●	★			2	.500	.250	.031	.203	.079
NP-DNGA443-TA2	●	★			2	.500	.250	.047	.203	.071
NP-DNGA431-TS2	★	●			2	.500	.187	.016	.203	.083
NP-DNGA432-TS2	★	●			2	.500	.187	.031	.203	.079
NP-DNGA433-TS2	★	●			2	.500	.187	.047	.203	.071
NP-DNGA441-TS2	★	●			2	.500	.250	.016	.203	.083
NP-DNGA442-TS2	★	●			2	.500	.250	.031	.203	.079
NP-DNGA443-TS2	★	●			2	.500	.250	.047	.203	.071
NP-DNGA432-TH2	●	★			2	.500	.187	.031	.203	.079
NP-DNGA433-TH2	●	★			2	.500	.187	.047	.203	.071
NP-DNGA442-TH2	●	★			2	.500	.250	.031	.203	.079
NP-DNGA443-TH2	●	★			2	.500	.250	.047	.203	.071
NP-DNGA431-GAWS2JR		★			2	.500	.187	.016	.203	.071
NP-DNGA431-GAWS2JL		★			2	.500	.187	.016	.203	.071
NP-DNGA432-GAWS2JR		●			2	.500	.187	.031	.203	.067
NP-DNGA432-GAWS2JL		●			2	.500	.187	.031	.203	.067
NP-DNGA441-GAWS2JR		★			2	.500	.250	.016	.203	.071
NP-DNGA441-GAWS2JL		★			2	.500	.250	.016	.203	.071
NP-DNGA442-GAWS2JR		★			2	.500	.250	.031	.203	.067
NP-DNGA442-GAWS2JL		●			2	.500	.250	.031	.203	.067
NP-DNGA431-GSWS2JR	★				2	.500	.187	.016	.203	.071
NP-DNGA431-GSWS2JL	★				2	.500	.187	.016	.203	.071
NP-DNGA432-GSWS2JR	★				2	.500	.187	.031	.203	.067
NP-DNGA432-GSWS2JL	★				2	.500	.187	.031	.203	.067
NP-DNGA441-GSWS2JR	★				2	.500	.250	.016	.203	.071
NP-DNGA441-GSWS2JL	★				2	.500	.250	.016	.203	.071
NP-DNGA442-GSWS2JR	★				2	.500	.250	.031	.203	.067
NP-DNGA442-GSWS2JL	★				2	.500	.250	.031	.203	.067

Order Number	Coated CBN BC8210	Coated CBN BC8220	CBN NEW MB8210	CBN NEW MB8220	Cutting Edges	IC	S	RE	D1	LE
BF-DNGM432-TAWS2		●			2	.500	.187	.031	.203	.094
BF-DNGM433-TAWS2		●			2	.500	.187	.047	.203	.102
BF-DNGM431-TS2	★				2	.500	.187	.016	.203	.083
BF-DNGM432-TS2	★				2	.500	.187	.031	.203	.079
BF-DNGM433-TS2	●				2	.500	.187	.047	.203	.071
BF-DNGM432-TSWS2	★				2	.500	.187	.031	.203	.094
BF-DNGM433-TSWS2	★				2	.500	.187	.047	.203	.102
BL-DNGM431-TN2		●			2	.500	.187	.016	.203	.083
BL-DNGM432-TN2		●			2	.500	.187	.031	.203	.079
BL-DNGM433-TN2		●			2	.500	.187	.047	.203	.071
BM-DNGM431-TA2		●			2	.500	.187	.016	.203	.083
BM-DNGM432-TA2		★			2	.500	.187	.031	.203	.079
BM-DNGM433-TA2		●			2	.500	.187	.047	.203	.071
BR-DNGM431-TA2		★			2	.500	.187	.016	.203	.083
BR-DNGM432-TA2		★			2	.500	.187	.031	.203	.079
BR-DNGM433-TA2		★			2	.500	.187	.047	.203	.071
BR-DNGM441-TA2		★			2	.500	.250	.016	.203	.083
BR-DNGM442-TA2		★			2	.500	.250	.031	.203	.079
BR-DNGM443-TA2		★			2	.500	.250	.047	.203	.071

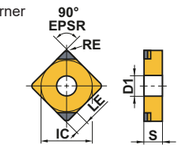
● = NEW

BC8200/MB8200 Series

Negative Inserts (With Hole)
G Class
SNGA

NEW PETIT CUT
NP_○○2

2 corner



(inch)

Order Number	Coated CBN BC8210	Coated CBN BC8220		CBN NEW MB8210	CBN NEW MB8220	Cutting Edges	IC	S	RE	D1	LE
NP-SNGA432-GA2		★			●	2	.500	.187	.031	.203	.087
NP-SNGA433-GA2		★			●	2	.500	.187	.047	.203	.098

● = NEW

Negative Inserts (With Hole)
G Class
WNGA

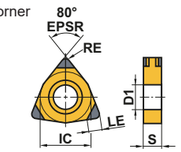
NEW PETIT CUT
NP_○○6

NEW PETIT CUT
NP_○○3

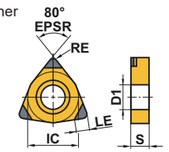
NEW PETIT CUT
NP_○○WS3

(With Wiper)

6 corner



3 corner



(inch)

Order Number	Coated CBN BC8210	Coated CBN BC8220		CBN NEW MB8210	CBN NEW MB8220	Cutting Edges	IC	S	RE	D1	LE
NP-WNGA432-GS6	★					6	.500	.187	.031	.203	.079
NP-WNGA432-FS6	★					6	.500	.187	.031	.203	.079
NP-WNGA432-TS6	★					6	.500	.187	.031	.203	.079
NP-WNGA432-GA3		●				3	.500	.187	.031	.203	.079
NP-WNGA432-GS3	●					3	.500	.187	.031	.203	.079
NP-WNGA432-FS3	★					3	.500	.187	.031	.203	.079
NP-WNGA432-TA3		★				3	.500	.187	.031	.203	.079
NP-WNGA432-TS3	★					3	.500	.187	.031	.203	.079
NP-WNGA432-GSWS3	★					3	.500	.187	.031	.203	.079

● : USA Stock ★ : Stocked in Japan
(1 insert in one case)

Negative Inserts (With Hole)
G Class
TNGA, TNGM

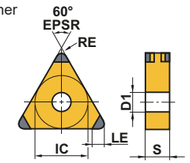
NEW PETIT CUT
NP_○○6

NEW PETIT CUT
NP_○○3

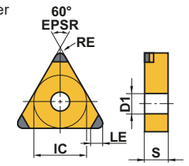
NEW PETIT CUT
BL_

(With Chipbreaker)

6 corner



3 corner



(inch)

Order Number	Coated CBN BC8210	Coated CBN BC8220		CBN NEW MB8210	CBN NEW MB8220	Cutting Edges	IC	S	RE	D1	LE
NP-TNGA331-GA6		★				6	.375	.187	.016	.150	.063
NP-TNGA332-GA6		★				6	.375	.187	.031	.150	.067
NP-TNGA333-GA6		★				6	.375	.187	.047	.150	.075
NP-TNGA331-GS6	●					6	.375	.187	.016	.150	.063
NP-TNGA332-GS6	★					6	.375	.187	.031	.150	.067
NP-TNGA333-GS6	★					6	.375	.187	.047	.150	.075
NP-TNGA331-GH6		★				6	.375	.187	.016	.150	.063
NP-TNGA332-GH6		★				6	.375	.187	.031	.150	.067
NP-TNGA333-GH6		★				6	.375	.187	.047	.150	.075
NP-TNGA331-FS6	★					6	.375	.187	.016	.150	.063
NP-TNGA332-FS6	★					6	.375	.187	.031	.150	.067
NP-TNGA333-FS6	★					6	.375	.187	.047	.150	.075
NP-TNGA331-VA6		★				6	.375	.187	.016	.150	.063
NP-TNGA332-VA6		★				6	.375	.187	.031	.150	.067
NP-TNGA333-VA6		★				6	.375	.187	.047	.150	.075
NP-TNGA331-TA6		★				6	.375	.187	.016	.150	.063
NP-TNGA332-TA6		★				6	.375	.187	.031	.150	.067
NP-TNGA333-TA6		★				6	.375	.187	.047	.150	.075
NP-TNGA331-TS6	★					6	.375	.187	.016	.150	.063
NP-TNGA332-TS6	★					6	.375	.187	.031	.150	.067
NP-TNGA333-TS6	★					6	.375	.187	.047	.150	.075
NP-TNGA332-TH6		★				6	.375	.187	.031	.150	.067
NP-TNGA333-TH6		★				6	.375	.187	.047	.150	.075
NP-TNGA330.5-GA3		★				3	.375	.187	.008	.150	.059
NP-TNGA331-GA3		●			●	3	.375	.187	.016	.150	.063
NP-TNGA332-GA3		●			●	3	.375	.187	.031	.150	.067
NP-TNGA333-GA3		●			●	3	.375	.187	.047	.150	.075
NP-TNGA330.5-GS3	★					3	.375	.187	.008	.150	.059
NP-TNGA331-GS3	★					3	.375	.187	.016	.150	.063
NP-TNGA332-GS3	★					3	.375	.187	.031	.150	.067
NP-TNGA333-GS3	★					3	.375	.187	.047	.150	.075
NP-TNGA331-GH3		●				3	.375	.187	.016	.150	.063
NP-TNGA332-GH3		★				3	.375	.187	.031	.150	.067
NP-TNGA333-GH3		★				3	.375	.187	.047	.150	.075

(inch)

Order Number	Coated CBN BC8210	Coated CBN BC8220		CBN NEW MB8210	CBN NEW MB8220	Cutting Edges	IC	S	RE	D1	LE
NP-TNGA330.5-FS3	★					3	.375	.187	.008	.150	.059
NP-TNGA331-FS3	★			●		3	.375	.187	.016	.150	.063
NP-TNGA332-FS3	★			●		3	.375	.187	.031	.150	.067
NP-TNGA333-FS3	★			●		3	.375	.187	.047	.150	.075
NP-TNGA331-VA3		●				3	.375	.187	.016	.150	.063
NP-TNGA332-VA3		●				3	.375	.187	.031	.150	.067
NP-TNGA333-VA3		●				3	.375	.187	.047	.150	.075
NP-TNGA331-TA3		★				3	.375	.187	.016	.150	.063
NP-TNGA332-TA3		★				3	.375	.187	.031	.150	.067
NP-TNGA333-TA3		★				3	.375	.187	.047	.150	.075
NP-TNGA331-TS3	★					3	.375	.187	.016	.150	.063
NP-TNGA332-TS3	★					3	.375	.187	.031	.150	.067
NP-TNGA333-TS3	★					3	.375	.187	.047	.150	.075
NP-TNGA332-TH3		★				3	.375	.187	.031	.150	.067
NP-TNGA333-TH3		★				3	.375	.187	.047	.150	.075
BL-TNGM331-TN3		●				3	.375	.187	.016	.150	.063
BL-TNGM332-TN3		●				3	.375	.187	.031	.150	.067
BL-TNGM333-TN3		●				3	.375	.187	.047	.150	.075

● = NEW

BC8200/MB8200 Series

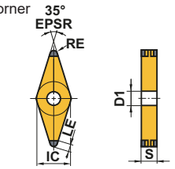
Negative Inserts (With Hole)

G Class

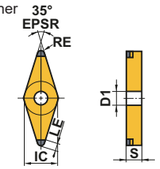
VNGA, VNGM

NEW PETIT CUT	NEW PETIT CUT	NEW PETIT CUT
NP_○○4	NP_○○2	BL_
		(With Chipbreaker)

4 corner



2 corner



(inch)

Order Number	Coated CBN BC8210	Coated CBN BC8220	CBN NEW MB8210	CBN NEW MB8220	Cutting Edges	IC	S	RE	D1	LE
NP-VNGA331-GA4		★			4	.375	.187	.016	.150	.098
NP-VNGA332-GA4		★			4	.375	.187	.031	.150	.079
NP-VNGA333-GA4		★			4	.375	.187	.047	.150	.059
NP-VNGA331-GS4	★				4	.375	.187	.016	.150	.098
NP-VNGA332-GS4	★				4	.375	.187	.031	.150	.079
NP-VNGA333-GS4	★				4	.375	.187	.047	.150	.059
NP-VNGA331-GH4		★			4	.375	.187	.016	.150	.098
NP-VNGA332-GH4		★			4	.375	.187	.031	.150	.079
NP-VNGA331-FS4	★				4	.375	.187	.016	.150	.098
NP-VNGA332-FS4	★				4	.375	.187	.031	.150	.079
NP-VNGA331-VA4		★			4	.375	.187	.016	.150	.098
NP-VNGA332-VA4		★			4	.375	.187	.031	.150	.079
NP-VNGA333-VA4		★			4	.375	.187	.047	.150	.059
NP-VNGA331-TA4		★			4	.375	.187	.016	.150	.098
NP-VNGA332-TA4		★			4	.375	.187	.031	.150	.079
NP-VNGA331-TS4	★				4	.375	.187	.016	.150	.098
NP-VNGA332-TS4	★				4	.375	.187	.031	.150	.079
NP-VNGA331-TH4		★			4	.375	.187	.016	.150	.098
NP-VNGA332-TH4		★			4	.375	.187	.031	.150	.079
NP-VNGA330.5-GA2		●			2	.375	.187	.008	.150	.098
NP-VNGA331-GA2		●		●	2	.375	.187	.016	.150	.098
NP-VNGA332-GA2		●		●	2	.375	.187	.031	.150	.079
NP-VNGA333-GA2		●		●	2	.375	.187	.047	.150	.059
NP-VNGA330.5-GS2	●				2	.375	.187	.008	.150	.098
NP-VNGA331-GS2	●				2	.375	.187	.016	.150	.098
NP-VNGA332-GS2	●				2	.375	.187	.031	.150	.079
NP-VNGA333-GS2	★				2	.375	.187	.047	.150	.059
NP-VNGA331-GH2		★			2	.375	.187	.016	.150	.098
NP-VNGA332-GH2		★			2	.375	.187	.031	.150	.079
NP-VNGA330.5-FS2	★		●		2	.375	.187	.008	.150	.098
NP-VNGA331-FS2	●		●		2	.375	.187	.016	.150	.098
NP-VNGA332-FS2	●		●		2	.375	.187	.031	.150	.079
NP-VNGA331-VA2		●			2	.375	.187	.016	.150	.098
NP-VNGA332-VA2		★			2	.375	.187	.031	.150	.079
NP-VNGA333-VA2		★			2	.375	.187	.047	.150	.059

Order Number	Coated CBN BC8210	Coated CBN BC8220	CBN NEW MB8210	CBN NEW MB8220	Cutting Edges	IC	S	RE	D1	LE
NP-VNGA331-TA2		★			2	.375	.187	.016	.150	.098
NP-VNGA332-TA2		★			2	.375	.187	.031	.150	.079
NP-VNGA331-TS2	★				2	.375	.187	.016	.150	.098
NP-VNGA332-TS2	★				2	.375	.187	.031	.150	.079
NP-VNGA331-TH2		★			2	.375	.187	.016	.150	.098
NP-VNGA332-TH2		★			2	.375	.187	.031	.150	.079
BL-VNGM331-TN2		●			2	.375	.187	.016	.150	.098
BL-VNGM332-TN2		●			2	.375	.187	.031	.150	.079

● = NEW

● : USA Stock ★ : Stocked in Japan
(1 insert in one case)

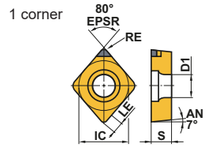
Positive Inserts (With Hole)

G Class

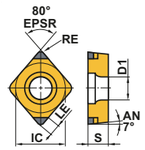
CCGW, CCGT AN=7°

CPGB AN=11°

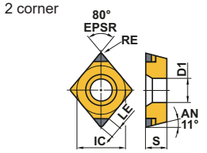
1 corner



2 corner



2 corner



NEW PETIT CUT	NEW PETIT CUT	NEW PETIT CUT	NEW PETIT CUT
NP_○○2	NP_○○WS2	BF_, BM_	BL_
	(With Wiper)	(With Chipbreaker)	(With Chipbreaker)
NEW PETIT CUT			
NP			
*			
(Non-ISO)			

(inch)

Order Number	Coated CBN BC8210	Coated CBN BC8220	CBN NEW MB8210	CBN NEW MB8220	Cutting Edges	IC	S	RE	D1	LE
NP-CCGW21.50.5-GA2		●			2	.250	.094	.008	.110	.067
NP-CCGW21.51-GA2		●		●	2	.250	.094	.016	.110	.071
NP-CCGW21.52-GA2		●		●	2	.250	.094	.031	.110	.079
NP-CCGW32.50.5-GA2		●			2	.375	.156	.008	.173	.067
NP-CCGW32.51-GA2	●	●		●	2	.375	.156	.016	.173	.071
NP-CCGW32.52-GA2	●	●		●	2	.375	.156	.031	.173	.079
NP-CCGW21.50.5-GS2	●				2	.250	.094	.008	.110	.067
NP-CCGW21.51-GS2	●				2	.250	.094	.016	.110	.071
NP-CCGW21.52-GS2	●				2	.250	.094	.031	.110	.079
NP-CCGW32.50.5-GS2	●				2	.375	.156	.008	.173	.067
NP-CCGW32.51-GS2	●	●			2	.375	.156	.016	.173	.071
NP-CCGW32.52-GS2	●	●			2	.375	.156	.031	.173	.079
NP-CCGW21.50.5-FS2	●		●		2	.250	.094	.008	.110	.067
NP-CCGW21.51-FS2	●		●		2	.250	.094	.016	.110	.071
NP-CCGW21.52-FS2	★		●		2	.250	.094	.031	.110	.079
NP-CCGW32.50.5-FS2	●		●		2	.375	.156	.008	.173	.067
NP-CCGW32.51-FS2	●	●	●		2	.375	.156	.016	.173	.071
NP-CCGW32.52-FS2	●	●	●		2	.375	.156	.031	.173	.079
NP-CCGW32.51-VA2		●			2	.375	.156	.016	.173	.071
NP-CCGW32.52-VA2		●			2	.375	.156	.031	.173	.079
NP-CCGW32.51-TA2	●	★			2	.375	.156	.016	.173	.071
NP-CCGW32.52-TA2	●	★			2	.375	.156	.031	.173	.079
NP-CCGW32.51-FSWS2	★		●		2	.375	.156	.016	.173	.071
NP-CCGW32.52-FSWS2	★		●		2	.375	.156	.031	.173	.079
NP-CCGW32.51-GAWS2		●		●	2	.375	.156	.016	.173	.071
NP-CCGW32.52-GAWS2		●		●	2	.375	.156	.031	.173	.079
NP-CCGW32.51-GSWS2	●				2	.375	.156	.016	.173	.071
NP-CCGW32.52-GSWS2	★				2	.375	.156	.031	.173	.079
BF-CCGT32.51-TS2	★				2	.375	.156	.016	.173	.071
BF-CCGT32.52-TS2	●				2	.375	.156	.031	.173	.079
BL-CCGT32.51-TN2		●			2	.375	.156	.016	.173	.071
BL-CCGT32.52TN2		●			2	.375	.156	.031	.173	.079
BM-CCGT32.51-TA2		★			2	.375	.156	.016	.173	.071
BM-CCGT32.52-TA2		★			2	.375	.156	.031	.173	.079
NP-CCGW03S102FS	●		●		1	.156*	.055	.008	.079	.043
NP-CCGW03S104FS	●		●		1	.156*	.055	.016	.079	.039
NP-CCGW04T002FS	●		●		1	.187*	.070	.008	.094	.059
NP-CCGW04T004FS	●		●		1	.187*	.070	.016	.094	.055

Order Number	Coated CBN BC8210	Coated CBN BC8220	CBN NEW MB8210	CBN NEW MB8220	Cutting Edges	IC	S	RE	D1	LE
NP-CPGB2.51.51-GA2		★			2	.313	.094	.016	.138	.071
NP-CPGB2.51.52-GA2		★			2	.313	.094	.031	.138	.079
NP-CPGB2.51.53-GA2		★			2	.313	.094	.047	.138	.087
NP-CPGB320.5-GA2		★			2	.375	.125	.008	.177	.067
NP-CPGB321-GA2		★			2	.375	.125	.016	.177	.071
NP-CPGB322-GA2		★			2	.375	.125	.031	.177	.079
NP-CPGB323-GA2		●			2	.375	.125	.047	.177	.087
NP-CPGB2.51.51-GS2	●				2	.313	.094	.016	.138	.071
NP-CPGB2.51.52-GS2	★				2	.313	.094	.031	.138	.079
NP-CPGB320.5-GS2	★				2	.375	.125	.008	.177	.067
NP-CPGB321-GS2	★				2	.375	.125	.016	.177	.071
NP-CPGB322-GS2	★				2	.375	.125	.031	.177	.079
NP-CPGB321-VA2		★			2	.375	.125	.016	.177	.071
NP-CPGB322-VA2		★			2	.375	.125	.031	.177	.079
NP-CPGB323-VA2		★			2	.375	.125	.047	.177	.087
NP-CPGB321-TA2		★			2	.375	.125	.016	.177	.071
NP-CPGB322-TA2		★			2	.375	.125	.031	.177	.079
NP-CPGB323-TA2		★			2	.375	.125	.047	.177	.087

● = NEW

* Diameter of inscribed circle is non-ISO standard. (For SCLC type)

BC8200/MB8200 Series

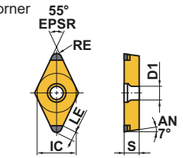
Positive Inserts (With Hole)

G Class

DCGW, DCGT AN=7°

NEW PETIT CUT	NEW PETIT CUT	NEW PETIT CUT
NP_○○2	BF_, BM_	BL_
		
	(With Chipbreaker)	(With Chipbreaker)

2 corner



(inch)

Order Number	Coated CBN BC8210	Coated CBN BC8220	CBN NEW MB8210	CBN NEW MB8220	Cutting Edges	IC	S	RE	D1	LE
NP-DCGW21.50.5-GA2		★			2	.250	.094	.008	.110	.087
NP-DCGW21.51-GA2		★		●	2	.250	.094	.016	.110	.083
NP-DCGW21.52-GA2		★			2	.250	.094	.031	.110	.079
NP-DCGW32.50.5-GA2		★			2	.375	.156	.008	.173	.087
NP-DCGW32.51-GA2	●	●		●	2	.375	.156	.016	.173	.083
NP-DCGW32.52-GA2	●	●		●	2	.375	.156	.031	.173	.079
NP-DCGW21.50.5-GS2	★				2	.250	.094	.008	.110	.087
NP-DCGW21.51-GS2	●				2	.250	.094	.016	.110	.083
NP-DCGW21.52-GS2	★				2	.250	.094	.031	.110	.079
NP-DCGW32.50.5-GS2	★				2	.375	.156	.008	.173	.087
NP-DCGW32.51-GS2	★	●			2	.375	.156	.016	.173	.083
NP-DCGW32.52-GS2	●	●			2	.375	.156	.031	.173	.079
NP-DCGW21.50.5-FS2	★		●		2	.250	.094	.008	.110	.087
NP-DCGW21.51-FS2	●		●		2	.250	.094	.016	.110	.083
NP-DCGW21.52-FS2	★		●		2	.250	.094	.031	.110	.079
NP-DCGW32.50.5-FS2	★		●		2	.375	.156	.008	.173	.087
NP-DCGW32.51-FS2	●	●	●		2	.375	.156	.016	.173	.083
NP-DCGW32.52-FS2	●	●	●		2	.375	.156	.031	.173	.079
NP-DCGW32.51-VA2		★			2	.375	.156	.016	.173	.083
NP-DCGW32.52-VA2		●			2	.375	.156	.031	.173	.079
NP-DCGW32.51-TA2	●	★			2	.375	.156	.016	.173	.083
NP-DCGW32.52-TA2	●	★			2	.375	.156	.031	.173	.079
BF-DCGT32.51-TS2	★				2	.375	.156	.016	.173	.083
BF-DCGT32.52-TS2	★				2	.375	.156	.031	.173	.079
BL-DCGT32.51-TN2		●			2	.375	.156	.016	.173	.083
BL-DCGT32.52-TN2		●			2	.375	.156	.031	.173	.079
BM-DCGT32.51-TA2		●			2	.375	.156	.016	.173	.083
BM-DCGT32.52-TA2		●			2	.375	.156	.031	.173	.079

● = NEW

● : USA Stock ★ : Stocked in Japan
(1 insert in one case)

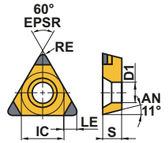
Positive Inserts (With Hole)

G Class

TPGB AN=11°

NEW PETIT CUT
NP_○○3


3 corner



(inch)

Order Number	Coated CBN BC8210	Coated CBN BC8220	CBN NEW MB8210	CBN NEW MB8220	Cutting Edges	IC	S	RE	D1	LE
NP-TPGB1.81.51-GA3		★		●	3	.219	.094	.016	.114	.063
NP-TPGB1.81.52-GA3		★		●	3	.219	.094	.031	.114	.067
NP-TPGB220.5-GA3		★			3	.250	.125	.008	.134	.059
NP-TPGB221-GA3		●		●	3	.250	.125	.016	.134	.063
NP-TPGB222-GA3		●		●	3	.250	.125	.031	.134	.067
NP-TPGB321-GA3		●		●	3	.375	.125	.016	.173	.063
NP-TPGB322-GA3		★		●	3	.375	.125	.031	.173	.067
NP-TPGB1.51.51-GS3	★				3	.187	.094	.016	.094	.063
NP-TPGB1.51.52-GS3	★				3	.187	.094	.031	.094	.067
NP-TPGB1.81.51-GS3	●				3	.219	.094	.016	.114	.063
NP-TPGB1.81.52-GS3	★				3	.219	.094	.031	.114	.067
NP-TPGB220.5-GS3	●				3	.250	.125	.008	.134	.059
NP-TPGB221-GS3	★				3	.250	.125	.016	.134	.063
NP-TPGB222-GS3	★				3	.250	.125	.031	.134	.067
NP-TPGB321-GS3	●				3	.375	.125	.016	.173	.063
NP-TPGB322-GS3	★				3	.375	.125	.031	.173	.067
NP-TPGB220.5-FS3	★		●		3	.250	.125	.008	.134	.059
NP-TPGB221-FS3	★		●		3	.250	.125	.016	.134	.063
NP-TPGB222-FS3	★		●		3	.250	.125	.031	.134	.067
NP-TPGB221-VA3		★			3	.250	.125	.016	.134	.063
NP-TPGB222-VA3		●			3	.250	.125	.031	.134	.067
NP-TPGB221-TA3		★			3	.250	.125	.016	.134	.063
NP-TPGB222-TA3		●			3	.250	.125	.031	.134	.067

● = NEW

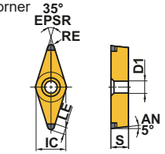
BC8200/MB8200 Series

Positive Inserts (With Hole)

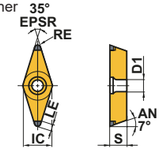
G Class
VBGW, VBGT AN=5°
VCGW AN=7°

NEW PETIT CUT	NEW PETIT CUT
NP_○○2	BL_
	
	(With Chipbreaker)

2 corner 35° EPSR RE



2 corner 35° EPSR RE



(inch)

Order Number	Coated CBN BC8210	Coated CBN BC8220	CBN NEW MB8210	CBN NEW MB8220	Cutting Edges	IC	S	RE	D1	LE
NP-VBGW220.5-GA2		★			2	.250	.125	.008	.114	.098
NP-VBGW221-GA2		●		●	2	.250	.125	.016	.114	.098
NP-VBGW222-GA2		●		●	2	.250	.125	.031	.114	.079
NP-VBGW330.5-GA2		★			2	.375	.187	.008	.173	.098
NP-VBGW331-GA2		●		●	2	.375	.187	.016	.173	.098
NP-VBGW332-GA2		★		●	2	.375	.187	.031	.173	.079
NP-VBGW220.5-GS2	●				2	.250	.125	.008	.114	.098
NP-VBGW221-GS2	★				2	.250	.125	.016	.114	.098
NP-VBGW222-GS2	★				2	.250	.125	.031	.114	.079
NP-VBGW330.5-GS2	●				2	.375	.187	.008	.173	.098
NP-VBGW331-GS2	●				2	.375	.187	.016	.173	.098
NP-VBGW332-GS2	●				2	.375	.187	.031	.173	.079
NP-VBGW220.5-FS2	★		●		2	.250	.125	.008	.114	.098
NP-VBGW221-FS2	●		●		2	.250	.125	.016	.114	.098
NP-VBGW222-FS2	★		●		2	.250	.125	.031	.114	.079
NP-VBGW330.5-FS2	●		●		2	.375	.187	.008	.173	.098
NP-VBGW331-FS2			●		2	.375	.187	.016	.173	.098
NP-VBGW332-FS2			●		2	.375	.187	.031	.173	.079
NP-VBGW331-VA2		★			2	.375	.187	.016	.173	.098
NP-VBGW332-VA2		★			2	.375	.187	.031	.173	.079
NP-VBGW331-TA2		★			2	.375	.187	.016	.173	.098
NP-VBGW332-TA2		★			2	.375	.187	.031	.173	.079
BL-VBGT221-TN2		●			2	.250	.125	.016	.114	.098
BL-VBGT222-TN2		●			2	.250	.125	.031	.114	.079
BL-VBGT331-TN2		●			2	.375	.187	.016	.173	.098
BL-VBGT332-TN2		●			2	.375	.187	.031	.173	.079

Order Number	Coated CBN BC8210	Coated CBN BC8220	CBN NEW MB8210	CBN NEW MB8220	Cutting Edges	IC	S	RE	D1	LE
NP-VCGW331-GA2		●			2	.375	.187	.016	.173	.098
NP-VCGW332-GA2		★			2	.375	.187	.031	.173	.079
NP-VCGW331-GS2	●				2	.375	.187	.016	.173	.098
NP-VCGW332-GS2	●				2	.375	.187	.031	.173	.079
NP-VCGW331-VA2		★			2	.375	.187	.016	.173	.098
NP-VCGW332-VA2		★			2	.375	.187	.031	.173	.079
NP-VCGW331-TA2		★			2	.375	.187	.016	.173	.098
NP-VCGW332-TA2		★			2	.375	.187	.031	.173	.079

● = NEW

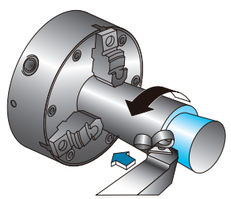
● : USA Stock ★ : Stocked in Japan
(1 insert in one case)

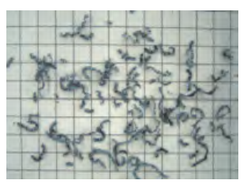
Memo

Chip Control with BF Chipbreaker

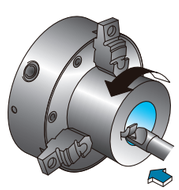
Achieves excellent chip control when finish machining.

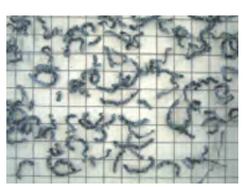
External Turning





Boring





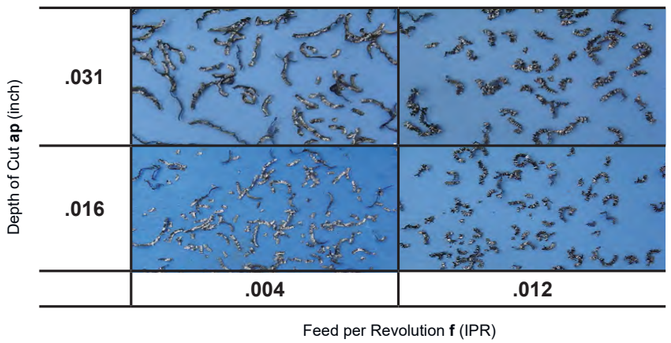
<Cutting Conditions>
Material : JIS SCM415 (60 HRC)
Inserts : BF-CNGM432-TS2
Cutting Mode : Dry Cutting

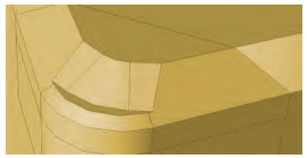
External Turning
Cutting Speed : vc=330 SFM
Feed per Rev. : f=.008 IPR
Depth of Cut : ap=.012 inch

Boring
Cutting Speed : vc=395 SFM
Feed per Rev. : f=.008 IPR
Depth of Cut : ap=.012 inch

Chip Control with BM Chipbreaker

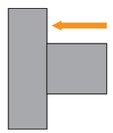
Achieves excellent chip control during medium machining applications.

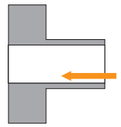




<Cutting Conditions>
Material : JIS SCM415 (60 HRC)
Inserts : BM-CNGM432-TA2
Cutting Speed : vc=525 SFM
Feed per Rev. : f=.004 IPR
.012 IPR
Depth of Cut : ap=.016 inch
.031 inch
Cutting Mode : Dry Cutting

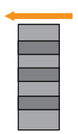
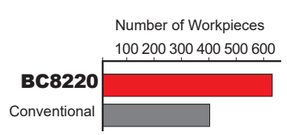
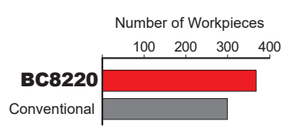
Examples of Usage

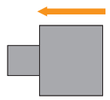
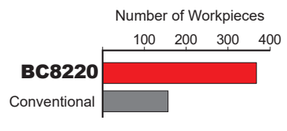
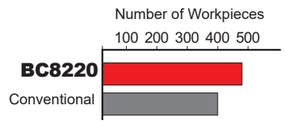
Insert		NP-CNGA433-GSWS2	NP-DCGW32.51-GS2
Workpiece		Non-microalloyed Steel 	16MnCr5 
Component		Automobile Parts	Automobile Parts
Application		External Continuous Cutting	Internal Continuous Cutting
Cutting Conditions	Cutting Speed vc (SFM)	850	785
	Feed per Rev. f (IPR)	.008	.003
	Depth of Cut ap (inch)	.006	.008
Cutting Mode		Dry Cutting	Dry Cutting
Results		Number of Workpieces 200 400 600 800 1000 **BC8210** Conventional In continuous cutting, it was possible to maintain good surface finish and to achieve a tool life extension of 1.6 X or more compared to conventional products.	Number of Workpieces 10 20 30 40 50 **BC8210** Conventional The same tool life as continuous cutting was achieved. Good surface finish compared to conventional products was maintained.

Insert		NP-CCGW32.52-GS2	NP-CCGW32.51-FS2
Workpiece		16MnCr5 	Alloy Steel 
Component		Automobile Parts	Automobile Parts
Application		Internal Continuous Cutting	Internal Continuous Cutting
Cutting Conditions	Cutting Speed vc (SFM)	460	920
	Feed per Rev. f (IPR)	.003	.003
	Depth of Cut ap (inch)	.004	.004
Cutting Mode		Dry Cutting	Dry Cutting
Results		Number of Workpieces 200 400 600 800 1000 **BC8210** Conventional By significantly suppressing the deterioration of the surface of the insert, tool life was extended 1.8 X longer than that of conventional products in continuous cutting.	Number of Workpieces 50 100 150 200 250 **BC8210** Conventional Tool life is 4 X longer than that of conventional products during continuous cutting in high speeds.

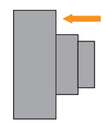
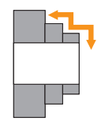
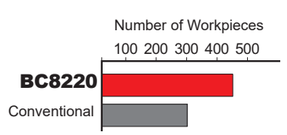
The application examples are from customers workpieces and can therefore differ from the recommended cutting conditions.

Examples of Usage

Insert		NP-TNGA333-TA3	NP-TNGA33 (RE.079)-TA3
Workpiece		16MnCr5 	16MnCr5 
Component		Automobile Parts	Automobile Parts
Application		Heavy Interrupted Boring	Heavy Interrupted Turning
Cutting Conditions	Cutting Speed vc (SFM)	395	425
	Feed per Rev. f (IPR)	.007	.005
	Depth of Cut ap (inch)	.006-.010	.010
Cutting Mode		Dry Cutting	Dry Cutting
Results		 BC8220, which has excellent fracture resistance, has a tool life 1.5 times longer than that of conventional products.	 BC8220, which has excellent fracture resistance, has a tool life 1.25 times longer than that of conventional products.

Insert		NP-CNGA431-TA2	NP-DNGA334-GA2
Workpiece		JIS SCM415 	AISI 1050 (58HRC) 
Component		Automobile Parts	Automobile Parts
Application		External Continuous Cutting	External Continuous Cutting
Cutting Conditions	Cutting Speed vc (SFM)	490	460
	Feed per Rev. f (IPR)	Rough .005 Finish .004	.006
	Depth of Cut ap (inch)	Rough .004 Finish .002	.006
Cutting Mode		Dry Cutting	Dry Cutting
Results		 Tool life for continuous cutting is 2.5 times longer than that of conventional products.	 Tool life for continuous cutting is 1.2 times longer than that of conventional products.

The application examples are from customers workpieces and can therefore differ from the recommended cutting conditions.

Insert		BR-CNGM432-TA2	BR-DNGM432-TA2
Workpiece		Steel (62-64HRC) 	JIS SMnC420 (59-63HRC) 
Component		Gear	Gear
Application		External Continuous Cutting	External Continuous Interrupted Turning
Cutting Conditions	Cutting Speed vc (m/min)	490-560	590
	Feed per Rev. f (mm/rev)	.004-.008	.001→.005
	Depth of Cut ap (mm)	.028	.039-.043
Cutting Mode		Dry Cutting	Dry Cutting
Results		 While conventional products can machine up to 300 pieces, BC8220 can machine up to 450 pieces.	 The BR chipbreaker removed the required material in one pass compared to a conventional product that took 4 passes. This gave the BR chipbreaker a tool life 1.5 times greater than the conventional product.

MITSUBISHI MATERIALS U.S.A.

MITSUBISHI MATERIALS U.S.A. CORPORATION

California Office
(Headquarters)

3535 Hyland Avenue, Suite 200
Costa Mesa, CA 92626
Customer Service: 800.523.0800
Technical Service: 800.486.2341

Chicago Office
(Engineering)

300 N. Martingale Road, Suite 500
Schaumburg, IL 60173
Main: 847.252.6300
Fax: 847.519.1732

MMC Metal de Mexico, S.A. DE C.V.

Av. La Cañada No.16,
Parque Industrial Bernardo
Quintana, El Marques,
Queretaro C.P. 76246 MEXICO
Main: +52.442.221.61.36
Fax: +52.442.221.61.34

North Carolina-MTEC
(Marketing & Technical Center)

105 Corporate Center Drive, Suite A
Mooresville, NC 28117
Main: 980.312.3100
Fax: 704.746.9292

Toronto Office
(Canada Branch)

600 Matheson Blvd. Unit 5 (Office)
Mississauga, ON L5R 4C1
Main: 905.814.0240
Fax: 905.814.0245

Detroit Office
(Moldino CS)

41700 Gardenbrook Road, Suite 120
Novi, MI 48375
Main: 248.308.2620
Fax: 248.308.2627

FOR YOUR SAFETY

- Don't handle inserts and chips without gloves.
- Please machine within the recommended application range and exchange expired tools with new ones in advance of breakage.
- Please use safety covers and wear safety glasses.
- When using compounded cutting oils, please take fire precautions.
- When attaching inserts or spare parts, please use only the correct wrench or driver.
- When using rotating tools, please make a trial run to check run-out, vibration and abnormal sounds etc.

www.mmc-carbide.com/us

Tools specifications subject to change without notice.

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