MITSUBISHI
MITSUBISHI MATERIALS

TOOL NEWS 2011.4 Update B084A

CBN Insert Series

Insert Expansions

High speed, accuracy and efficiency

- The combination of Mitsubishi's CBN sintering technology and unique edge preparations give excellent performance when machining hardened steels, cast iron and sintered alloys.
- BC8020, the new CBN grade using MIRACLE coating technology for a wider application range.

CBN Insert Series

Overview

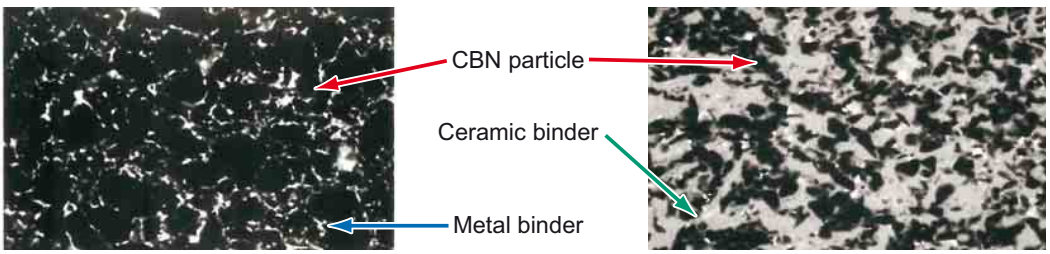
Mitsubishi CBN inserts

Mitsubishi CBN inserts were launched in 1982.
Mitsubishi Materials is one of the few tool manufacturer's producing it's own sintered CBN for use in CBN tools. The original CBN material, honing, brazing and other technologies translates to CBN inserts that are especially effective for efficient, high speed and accurate machining of hardened steels, cast irons and sintered metal.

Features

Features of sintered CBN

- CBN tool material is produced by mixing the primary component CBN (cubic boron nitride), which has a hardness second only to diamond, with a special ceramic or metal binder. It is then sintered at a pressure of over 5GPa and temperature of 1200°C or higher.
- CBN has lower affinity to iron than diamond. The low affinity and high hardness properties means that sintered CBN delivers superior cutting performance especially during high speed machining of materials such as hardened steels, cast irons and sintered alloys.

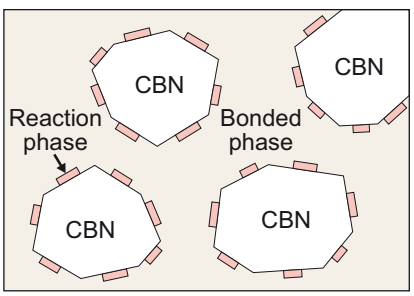


Sintered CBN using a metal binder
MB730

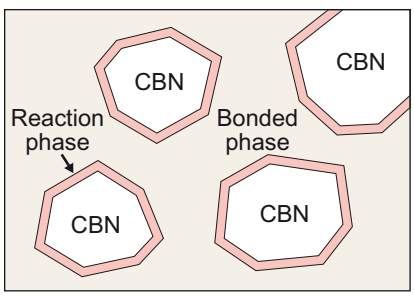
Sintered CBN using a ceramic binder
MB8025

Particle-activated Sintering Method

The Particle-activated Sintering Method is an innovative sintered CBN manufacturing process developed by Mitsubishi Materials in 2001.



Previous technology
Reaction phases partially segregated



New technology
Uniform reaction phases

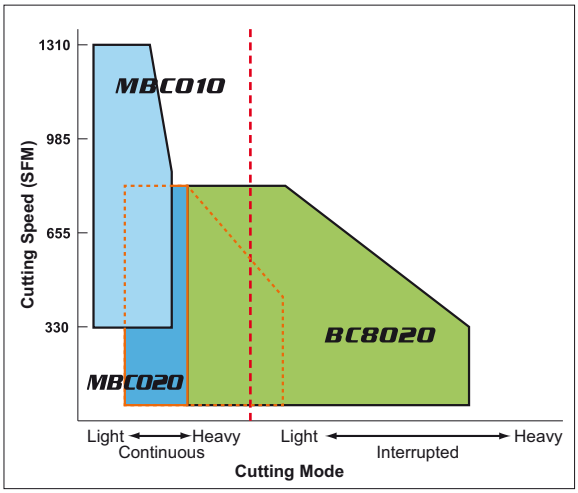
1. Impurities that inhibit CBN sintering were eliminated.
2. Reaction phases with the binder can now be formed evenly on the surface of the CBN particles. Simultaneously, this method is the best way to control the amount of reaction phases that are formed.

Coated CBN Series NEW BC8020 / MBC010 / MBC020

Features

With the expansion of BC8020, Mitsubishi can offer 3 coated CBN grades for machining of hardened steels. These 3 coated CBN grades cover a wide range of applications.

To achieve longer tool life, Mitsubishi uses a unique "Particle-activated Sintering Method", combined with increased cutting edge strength. With high crater wear resistance CBN grades and a wear resistant ceramic coatings, longer tool life and improved machine efficiency are obtained.

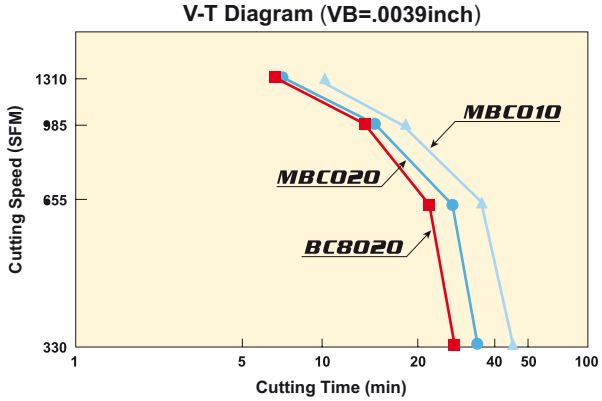


Grade	Grade Features and Application	Main Component	Coating Layer
NEW BC8020	High efficiency coated CBN Incleased cutting edge strength and high crater wear resistant CBN grade in combination with a highly wear resistant TiAlN coating, results in longer tool life and improved machining efficiency under heavy duty or interrupting cutting.	CBN(Medium Grain) TiN Al_2O_3	TiAlN
MBC020	Coated CBN for general cutting Uses a CBN substrate that has high cutting edge toughness. The TiAlN based coating delivers superb wear resistance. It covers a wide range of applications from continuous to light interrupted cutting.	CBN (Micro Grain) TiN Al_2O_3	TiAlN
MBC010	Coated CBN for High Speed Continuous Cutting MBC010 makes the best use of special ceramic binder structure, resulting in high wear resistance. This enables continuous machining at high speed of over 985 SFM.	CBN (Micro Grain) TiN Al_2O_3	TiN

Cutting Performance

■ Continuous Cutting

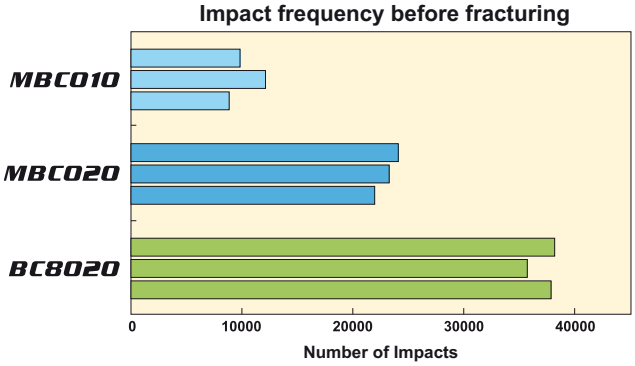
V-T Diagram (VB=.0039inch)



<Cutting Condition>
Workpiece : Hardened Steel (60HRC)
External Continuous Cutting
Insert : NP-CNGA432GA
Feed : .004IPR
Depth of Cut : .0039inch
Wet Cutting

■ Interrupted Cutting

Impact frequency before fracturing



<Cutting Condition>
Workpiece : Hardened Steel (60HRC)
External Interrupted Cutting. 8 Grooves
Insert : NP-CNGA432GA
Cutting Speed : 490SFM
Feed : .008IPR
Depth of Cut : .0079inch
Dry Cutting

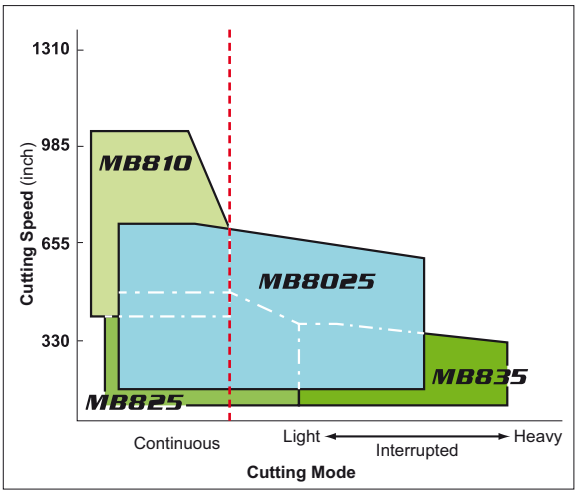
Non-Coated CBN series

Outline

Mitsubishi Materials is one of the few tool manufacturers producing it's own sintered CBN for use in CBN tools. The original CBN material, honing, brazing and other technologies translates to CBN inserts that are especially effective for efficient, high speed and accurate machining of hardened steel and cast iron.

Features

- CBN tool material is produced by mixing the primary component CBN (cubic boron nitride), which has a hardness second only to diamond, with a special ceramic or metal binder. It is then sintered at a pressure of over 5GPa and at a temperature of 2192°F or higher.
- CBN has lower affinity to iron than diamond. The low affinity and high hardness properties means that sintered CBN delivers superior cutting performance especially during high speed machining of materials such hardened steel, cast iron and sintered alloys.



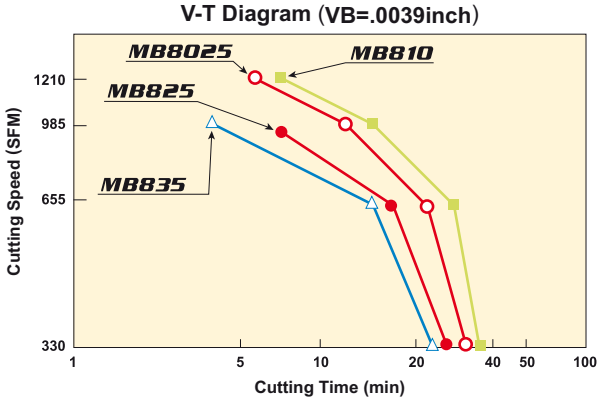
Hardened Steel Machining

Grade	Grade Features and Application	Main Component
MB8025	General Purpose Turning By employing a "Particle-activated Sintering Method", the new sintered CBN technology is recommended for continuous cutting from medium to high speeds.	CBN (Micro Grain) TiN Al_2O_3
MB810	For High Speed Continuous Cutting It features improved wear resistance due to impregnation with larger CBN particles.	CBN TiN Al_2O_3
MB825	For Continuous to Medium Interrupted Cutting Excellent balance of wear resistance and fracture resistance due to introduction of micro-grain CBN particles.	CBN (Micro Grain) TiC Al_2O_3
MB835	For Heavy Interrupted Cutting Improved grade employing micro-grain CBN particles. Excellent fracture resistance for use in heavy interrupted cutting.	CBN (Micro Grain) TiN Al_2O_3

Cutting Performance

■Continuous Cutting

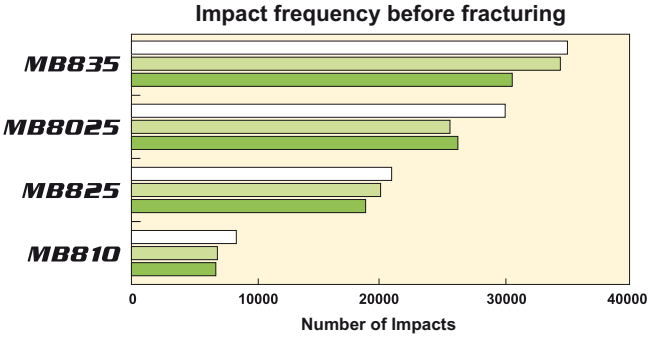
V-T Diagram (VB=.0039inch)



<Cutting Condition>
Workpiece: Hardened steel (60HRC)
Feed : .004IPR
Depth of Cut : .0039inch
Wet Cutting

■Interrupted Cutting

Impact frequency before fracturing



<Cutting Condition>
Workpiece : Hardened steel (60HRC)
External Interrupted Cutting 8 Groove
Cutting Speed : 490SFM
Feed : .004IPR
Depth of Cut : .0078inch
Dry Cutting

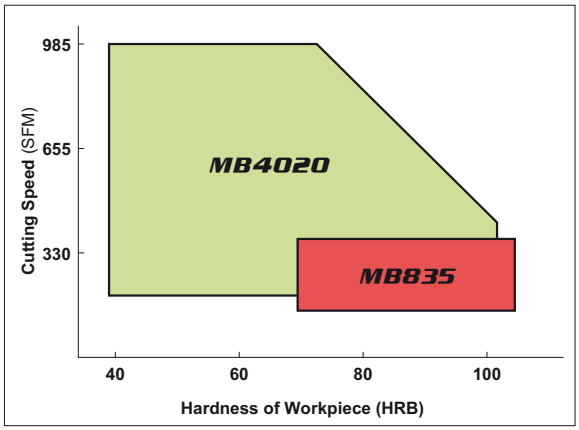
Sintered Alloy Machining *MB4020*

Features and Recommended Cutting Conditions

For General Cutting

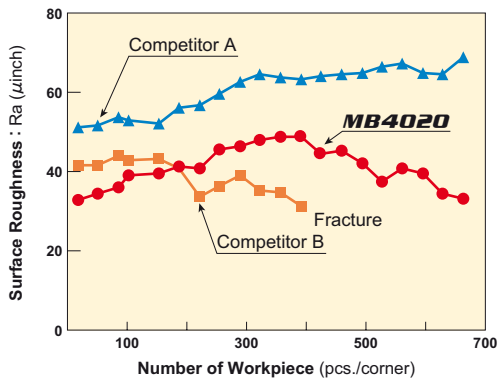
High CBN content and a special binder to bind CBN particles allows MB4020 to deliver long tool life for the machining of sintered alloys. A general-purpose grade suitable for the machining of various sintered alloys with different hardness, structures and varied workpiece geometries.

Work Material	Cutting Speed (SFM)	Feed (inch/rev)	Depth of Cut (inch)
General Sintered Alloy	260 – 985	–.008	–.012
High Density Sintered Alloy	260 – 820	–.008	–.012
Continuous Cutting of High Density Sintered Alloy	260 – 490	–.008	–.012



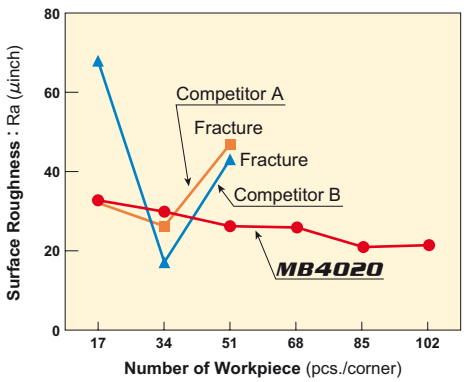
Cutting Performance

Continuous Cutting of High Density Sintered Alloy



<Cutting Conditions>
Workpiece : High Density Sintered Alloy Insert : NP-CNGA432
Cutting Speed : 620SFM Feed : .006IPR
Depth of Cut : .004inch
Wet Cutting

Continuous Cutting of Sintered Alloy



<Cutting Conditions>
Workpiece : Sintered Alloy Insert : NP-CNGA432
Cutting Speed : 330SFM Feed : .006IPR
Depth of Cut : .004inch
Wet Cutting

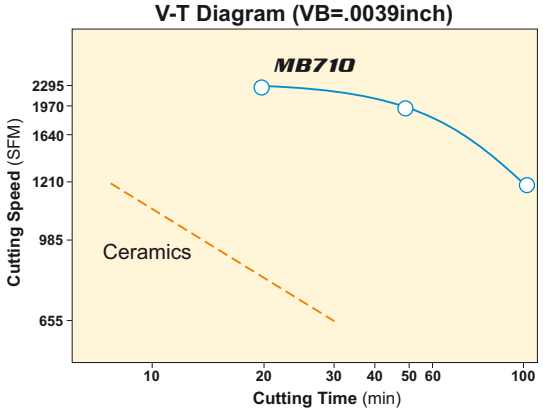
Cast Iron Machining

Grade	Grade Features and Application	Main Component
MB710	For General Cutting General purpose grade with well balanced wear and fracture resistance.	CBN TiC Al_2O_3
MB730	For High Speed Continuous Through Interrupted Cutting Uses a metallic binder improving the overall fracture resistance.	CBN (High Content) Co Base Alloy
MB5140	Large Depth of Cutting High Efficiency Solid CBN therefore no restriction on depth of cut enabling high machining efficiency.	CBN AlN (Solid)
BC5030	High-speed machining at large depths of cut High-speed interrupted machining at large depths of cut High CBN content and high thermal conductivity. The whole insert is composed of sintered CBN. This enables high speed, high efficiency machining at larger depths of cut. The coating is for recognition of spent corners.	CBN AlN TiN Coating

Cutting Performance

Continuous Cutting

V-T Diagram (VB=.0039inch)



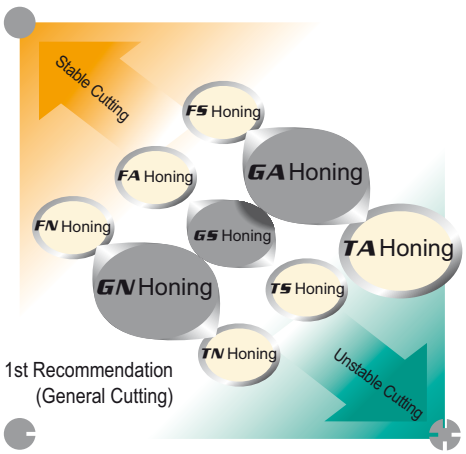
<Cutting Condition of ***MB710***>
Workpiece : AISI-35
Insert : TNGA332
Feed : .004IPR
Depth of Cut : .0059inch
Wet Cutting

<Cutting Condition of Ceramics>
Workpiece : AISI-35
Insert : TNGA332
Feed : .004IPR
Depth of Cut : .0039inch
Dry Cutting

Honing

New Honing Types

For the CBN **BC8020, MBC010** and **MBC020** coated grades, **MB4020** and **MB710/MB730** a wide range of edge honing styles are available to cover a large range of applications and to represent Mitsubishi Materials' unique cutting tool technology.



●General cutting
GA honing is the first recommendation.
GS honing if the depth of cut is .004 inch or more.
GN honing if crater wear is too large.

●Continuous cutting, stable cutting
FA honing to improve the initial machining performance.
FS honing is the first recommendation.
FN honing if crater wear is too large.

●Medium and heavy interrupted cutting, unstable cutting
TA honing is the first recommendation.
TS honing if the depth of cut is .004 inch or more.
TN honing if crater wear is too large.

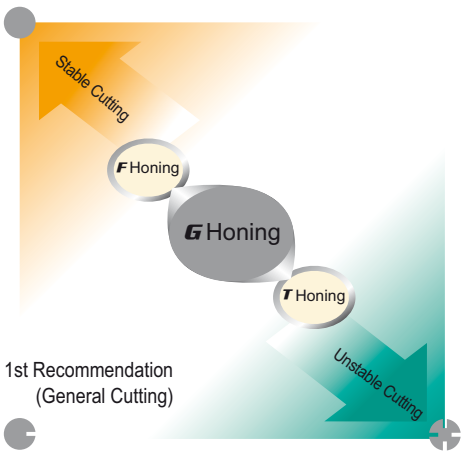
NP-CNGA431-GAW2
Main Application — Edge Honing Type

MAIN APPLICATION \ EDGE HONING TYPE	A — For General Purpose Machining (1st recommendation)	S — For Anti Chatter (Sharp anti-burr type)	N — For Small Depth of Cut (Crater wear resistant)
F — For Continuous Machining	FA Honing: .004", 15°, R0	FS Honing: .004", 15°, R.0006"	FN Honing: .002", 15°, R.0006"
G — For Continuous – Light Interrupted Machining	GA Honing: .005", 25°, R.0012"	GS Honing: .005", 25°, R.0006"	GN Honing: .002", 25°, R.0006"
T — For Interrupted Machining	TA Honing: .005", 35°, R.0012"	TS Honing: .005", 35°, R.0006"	TN Honing: .002", 35°, R.0006"

(Note) First, select the insert edge type from the main application area (F,G,T) then choose honing (A,S,N) that compliments the machining requirement.

Conventional Honing Types

Other than the new honing types, the three conventional honing types, **F**, **G** and **T** types are available for use in accordance to the machining application.



NP-CNMA431-G2
Honing Type

F Honing For stable continuous cutting.	.004", 15°, R0
G Honing For general purpose cutting. (Including light to medium interrupted cutting).	.005", 25°, R.0012
T Honing For medium to heavy interrupted cutting.	.005", 35°, R.0012

Provide the optimum insert for the material and cutting mode required (TOOL NAVI system).

CBN Inserts for Hardened Steel (Gear Steel)

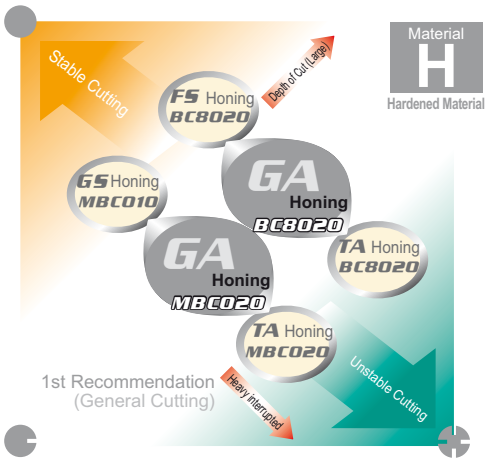
Coated CBN Grade (1st recommendation)

NEW **BC8020** Coated CBN for General Purpose Cutting
1st recommendation for hardened steel.

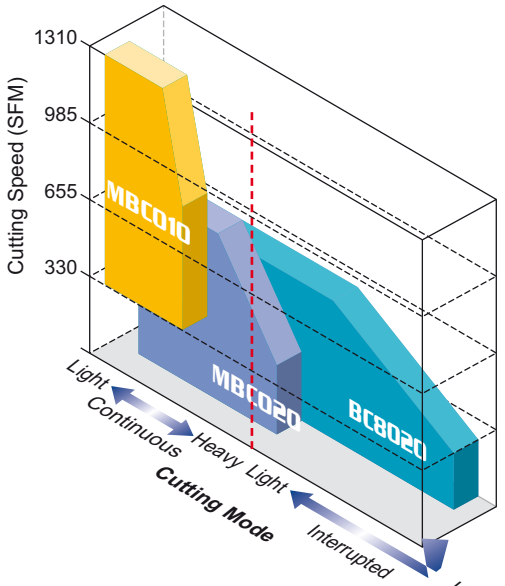
MBC010 Coated CBN for High Speed Continuous Cutting
Hard grade with the use of micro-grain CBN.
For good surface finishes.

MBC020 Coated CBN for Continuous Cutting

●Selecting the insert grade and honing type



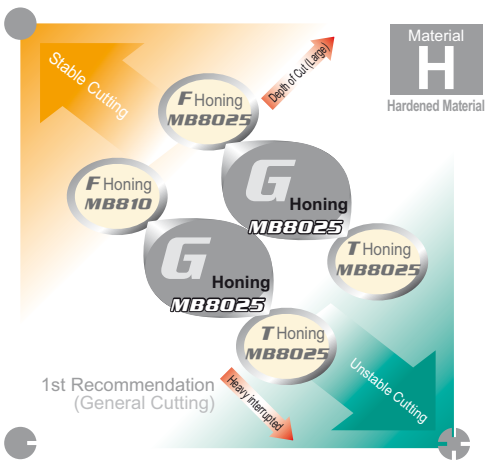
●Grade application area



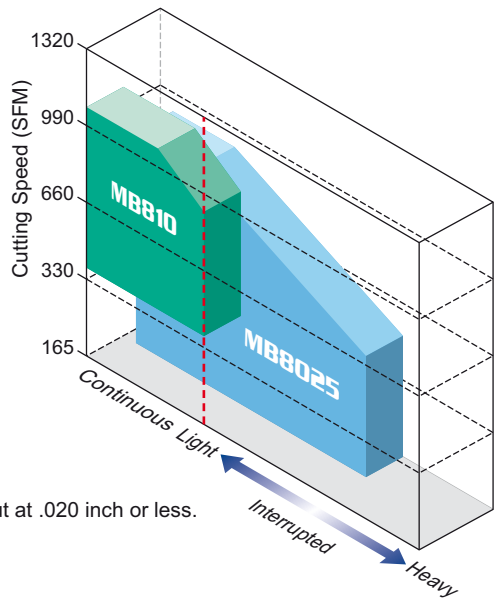
Non Coated CBN Grade

MB810 For High Speed Continuous Cutting
MB8025 For General Purpose Cutting

●Selecting the insert grade and honing type



●Grade application area



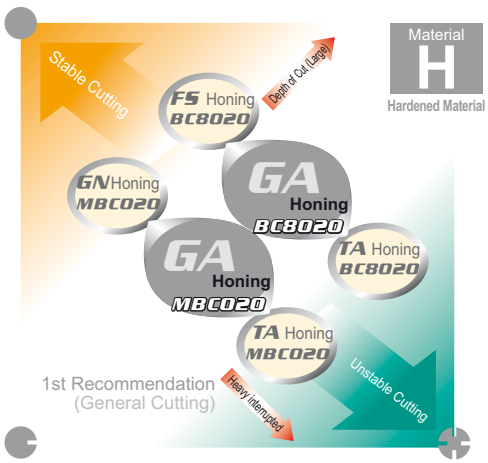
(Note 1) Please refer to page 5 for honing details.
(Note 2) For NEW PETIT CUT inserts, please set the depth of cut at .020 inch or less.

Provide the optimum insert for the material and cutting mode required (TOOL NAVI system).

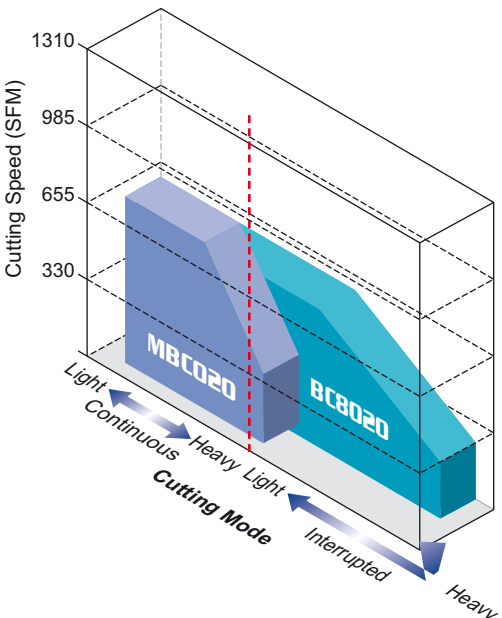
CBN Inserts for Hardened Steel (Hardened Steel Mold / Bearing Steel Machining)

Coated CBN Grade (1st recommendation)

Selecting the insert grade and honing type

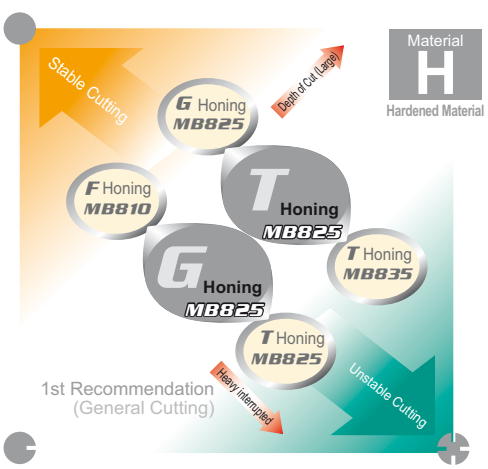


Grade application area

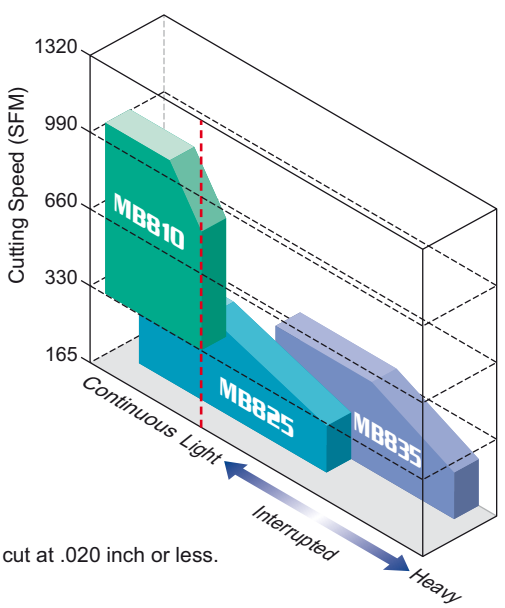


Non Coated CBN Grade

Selecting the insert grade and honing type



Grade application area



(Note 1) Please refer to page 5 for honing details.
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CBN Inserts for Cast Iron

MBS140 **For Highly Efficient Machining at Large Depths of Cut**

Inserts made entirely of CBN do not limit the depth of cut in the same way as conventional brazed type tools. High efficiency machining.

MB730 **For High Speed Continuous to Interrupted Cutting**

High fracture-resistant grade with a high CBN brazing strength due to the use of a metal binder.

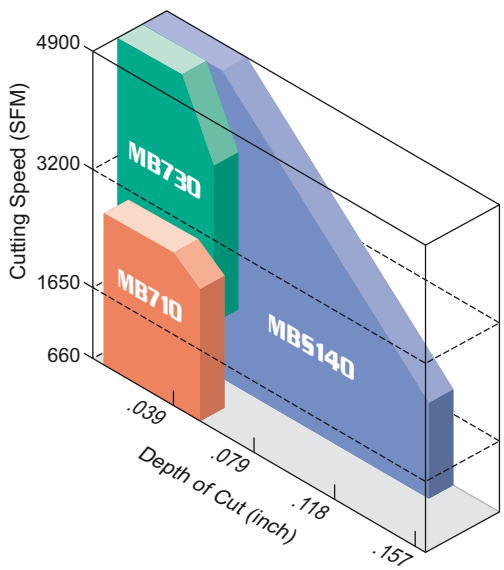
MB710 **For General Cutting**

General purpose grade with well balanced wear and fracture resistance.

General Cast Iron Machining

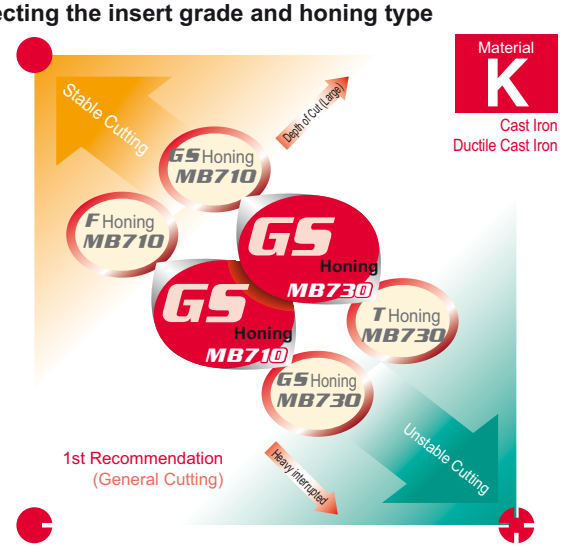
Selecting the insert grade and honing type

Grade application area

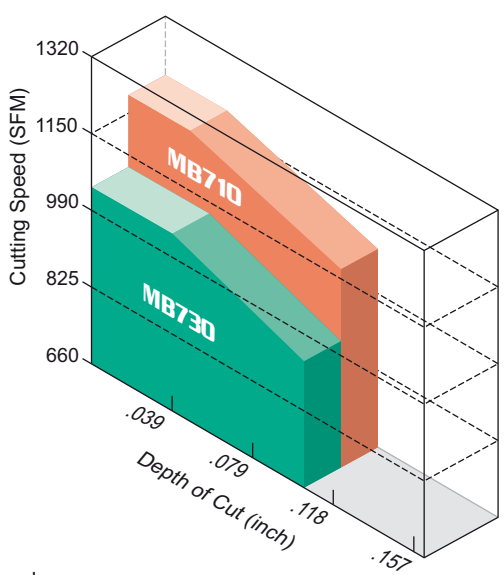


Ductile Cast Iron Machining

Selecting the insert grade and honing type



Grade application area



(Note 1) Please refer to page 5 for honing details.
(Note 2) For NEW PETIT CUT inserts, please set the depth of cut at .020 inch or less.

CBN Inserts for Sintered Parts

MB4020 For General Cutting

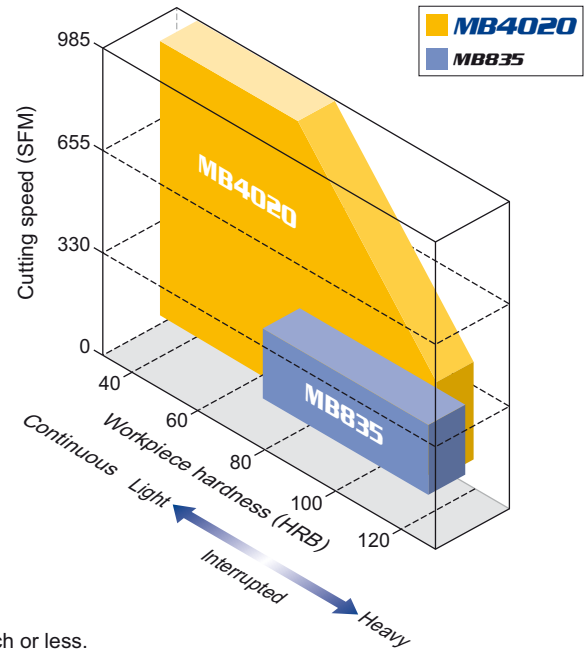
MB835 For Interrupted Cutting

Sintered Parts Machining

●Selecting the insert grade and honing type

For MB4020, considering tool grade property, machinability of sintered alloy and workpiece properties, FS (for general use) and TS (for interrupted cutting) are offered as standard.

●Grade application area



(Note 1) Please refer to page 5 for honing details.
(Note 2) For NEW PETIT CUT inserts, please set the depth of cut at .020 inch or less.

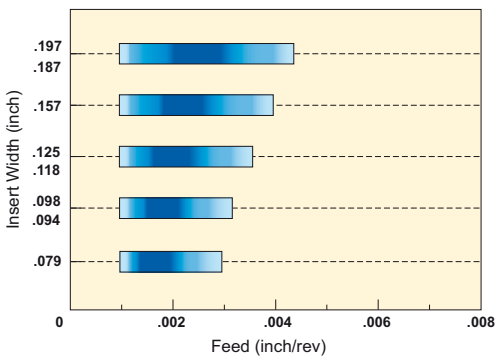
CBN Grooving Series (GY Series)

Features

●Combined with a High-rigidity Holder Ensures High Accuracy and Long Tool Life.

Holder rigidity is essential when grooving hardened steel.
The GY series Tri Lock system offers high rigidity equivalent to a 1-piece type despite being a modular system.

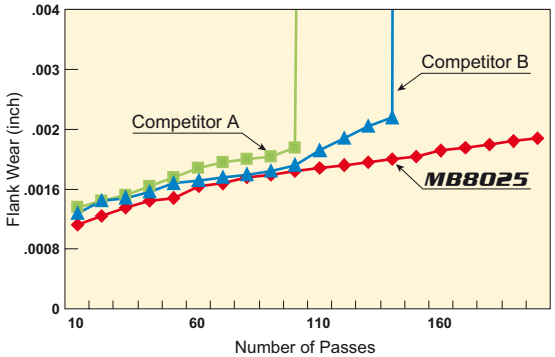
Recommended Cutting Conditions



Work Material		Hardness	Grade	Cutting Speed (SFM)	Coolant
H	Hardened Steel	35—65HRC	**MB8025**	330 (195—390)	Dry,Wet

Cutting Performance

■Tool life



<Cutting Conditions>
Workpiece : Hardened Steel (HRC60)
Cutting Speed : 390SFM
Feed : .004IPR
Depth of Cut : .014inch
Dry Cutting

CBN Breaker Insert

Features

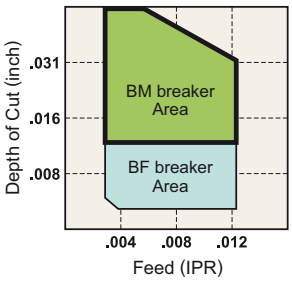
●Chip breaker geometry designed for excellent chip control

Radial chip breaker ensures optimization of the cutting point and the chip breaker position.
Enables effective chip discharge even when copy machining and prevents the chips from wrapping around the holder under finish cutting conditions.

●Long life coated CBN grade

Combination of Coating grade & Breaker, high efficiency and long tool life in wide variety of applications.

Application Area



NEW

Deep Cutting Depth

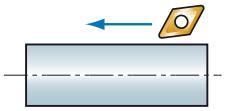
BM Breaker

Good for deep depth cutting of carburized layer.

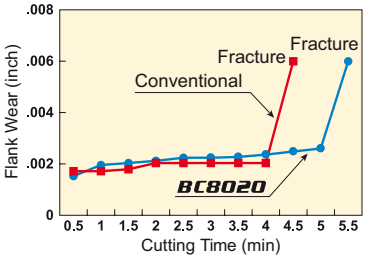
Recommend and under ap=.024 inch

※Available in BC8020 grade.

Cutting Performance



<Cutting Conditions>
Workpiece : Hardened Steel(60HRC)
Insert : BM-CNGM432TA
Cutting Speed : 590SFM
Feed : .008IPR
Depth of Cut : .020inch
Dry Cutting



Light Cutting Depth

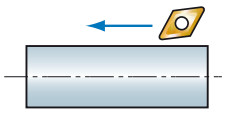
BF Breaker

Good for chip removal under light depth and feed cutting.

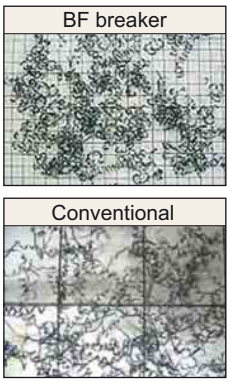
Recommend and under ap=.012 inch

※Available in MBC020 grade.

Cutting Performance



<Cutting Conditions>
Workpiece : Hardened Steel(55HRC)
Insert : BF-CNGG432-TA4
Cutting Speed : 330SFM
Feed : .008IPR
Depth of Cut : .004inch
Dry Cutting



MULTI-CORNER TYPE INSERTS

●A single sided, multi-corner type insert has no cutting edges on the 2nd side.
The type of grade is stamped on the 1st side.

Double Sided, multi-corner type insert, ex.

NP-CNGA120408GA4

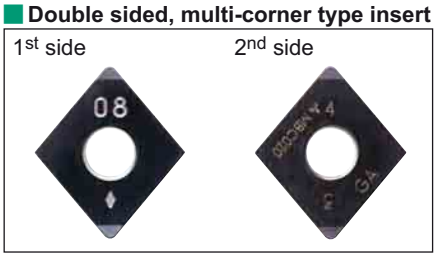
No. of Cutting Edges

Single Sided, multi-corner type insert, ex.

NP-CNGA120408GA2

No. of Cutting Edges

Double sided, multi-corner type insert

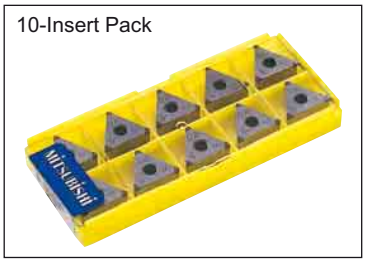


10-Inserts Packs

Two types of packs for Multi-corner type inserts are available.
A single insert pack and a ten insert pack, for easy storage.

TNP-CNGA120404G2

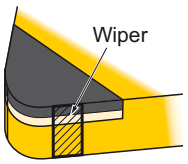
10-Insert Pack Symbol



Wiper Insert

What is a Wiper Insert?

- The wiper insert is designed with a wiper edge that is situated where the straight edge meets the corner radius.
- In comparison to conventional inserts, the surface finish does not deteriorate even if the feed rate is doubled.
- Machining at high feed rates improves machining efficiency.



NP-CNGA432-GAWS2

New Wiper Symbol

Improving Surface Finish

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

Improving Efficiency

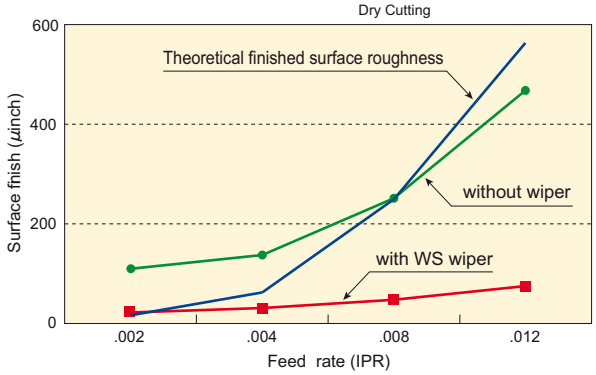
High feed rates not only shorten machining times but also make it possible to combine roughing and finishing operations.

Increased Tool Life

When changing to 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, therefore, delaying the progression of wear and increasing the tool life of the insert.

Cutting Performance

<Cutting Conditions>
Workpiece : Hardened steel (HRC60)
Insert : NP-CNGA432-○○○
Cutting Speed : 395 SFM
Depth of Cut : .004 inch
Dry Cutting



Wiper insert + machining at high feed rates

- Reduced machining time
- Increased production rate
- Improved chip control

Wiper insert + machining at conventional feed rates

- Eliminating the finishing step
  (Combine roughing and finishing into single pass.)

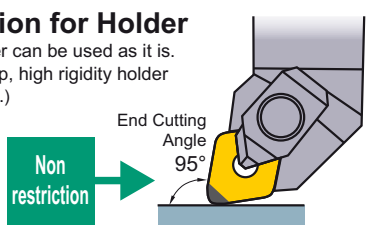
- Reducing cost
- Increased productivity
- Reduced machine down time

<Real cost reduction!!>

Special attention is not necessary when using C-style and W-style inserts

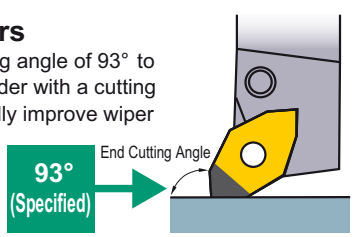
No Restriction for Holder

The standard holder can be used as it is.
(*The double clamp, high rigidity holder is recommended.)

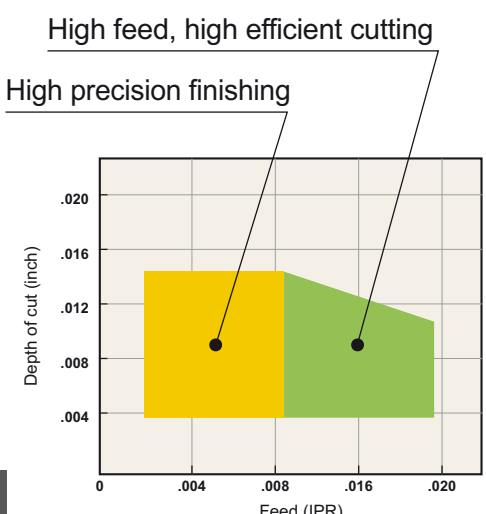


Restriction for Holders

Use a holder with an end cutting angle of 93° to improve wiper efficiency. A holder with a cutting edge angle of 91° can marginally improve wiper efficiency (see the figure below), however, there is no wiper efficiency with other end cutting angles (60°, 90°, 107° etc.).

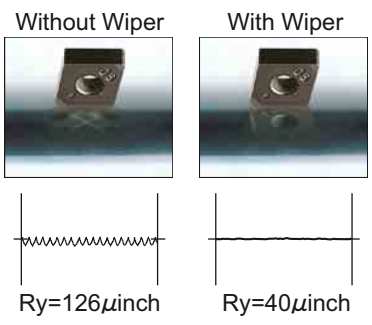


Cutting Conditions and Performance



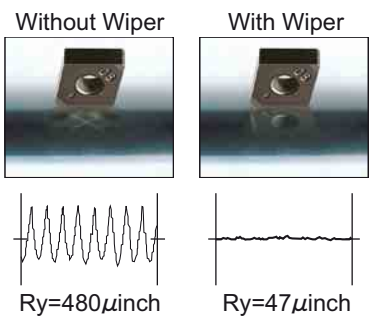
High precision finishing

Cutting speed : 330 SFM Feed : .004 IPR
Depth of cut : .004 inch Dry cutting



High feed, highly efficient cutting

Cutting speed : 330 SFM Feed : .012 IPR
Depth of cut : .004 inch Dry cutting



CBN Recommended Cutting Condition

- Suitable for high speed finishing of heat treated steel, sintered ferrous alloy and cast iron.
- Low affinity to iron, thus good surface finishes are possible.
- Present grinding processes can now be machined reducing cost and time.

Selection Standard

● Heat Treated Steel

Work Material		Type	Cutting Mode	Recommended Grade	Recommended Cutting Condition		
					Cutting Speed (SFM)	Feed (IPR)	Depth of Cut (inch)
Structural Steel High Alloy Steel	35—65 HRC	Coated	High speed finish cutting	**MBC010**	820 (490—1310)	—.008	—.008
			Continuous cutting for general purpose	**MBC020**	655 (260—820)	—.008	—.012
			Heavy interrupted cutting for general purpose	**BC8020**	655 (260—820)	—.012	—.030
			Interrupted cutting for general purpose		490 (195—655)	—.008	—.012
		Non-coated	Continuous cutting	**MB8025**	590 (260—820)	—.012	—.020
			Light interrupted cutting		390 (195—490)	—.008	—.012
			High speed finish cutting	**MB810**	655 (490—985)	—.006	—.006
			Continuous to medium interrupted cutting	**MB825**	390 (230—490)	—.012	—.020
			Interrupted cutting	**MB835**	330 (165—390)	—.012	—.020

● Cast Iron (Turning)

Work Material		Workpiece Structure	Cutting Speed (SFM)	Feed (IPR)	Depth of Cut (inch)	Coolant
			820 1640 2460 3280 4100			
Gray Cast Iron		—	MBS140	—.020	—.039 MBS140 —.197	Dry,Wet
Alloy Cast Iron		Pearlitic	MB710 MB730	—.016	—.020	Dry,Wet
Ductile Cast Iron	**60-40-18**	Ferritic	MB710	—.016	—.020	Dry,Wet
	100-70-03	Ferritic + Pearlitic Pearlitic	MB730			

● Cast Iron (Milling)

Work Material	Structure	Cutting Speed (SFM)	Feed (inch/rev)	Depth of Cut (inch)	Coolant
		820 1640 2460 3280 4100 4920 5740 6560			
(Finishing) Gray Cast Iron	Ferritic + Pearilitic Pearilitic	MB710 MB730	—.012	—.020	Dry
(Roughing) Gray Cast Iron	Pearilitic	BC5030	—.006	—.118	Dry

● Sintered Alloy

Work Material	Recommended Grade	Recommended Cutting Condition		
		Cutting Speed (SFM)	Feed (IPR)	Depth of Cut (inch)
General Sintered Alloy	**MB4020**	820 (260—985)	—.008	—.012
High Density Sintered Alloy	**MB4020**	490 (260—820)	—.008	—.012
Sintered Alloy	**MB4020, MB835**	330 (260—490)	—.008	—.012

● Valve Seat

Amount of Hard Particles	None or small ← → Large			
Hardness of Workpiece (HV)	150	250	300	350
Plunge Cut	MB730	MB825	MB835	
Traverse Cut	MB730	MB710	MB825	

● Roll

Work Material	Grade	Recommended Cutting Condition		
		Cutting Speed (SFM)	Feed (IPR)	Depth of Cut (inch)
Cast Steel Adamite Cast Steel	**MB825, MB8025**	260 (100—425)	.012 (.004—.020)	.008—.118
Ductile Cast Iron Granular Cast Iron Chilled Cast Iron	**MB710**	260 (100—425)	.012 (.004—.020)	.008—.118
High Chromium Steel High Alloy Steel	**MB825, MB8025**	260 (100—425)	.012 (.004—.020)	.008—.118
High Speed Steel	**MB730**	165 (65—230)	.010 (.004—.020)	.004—.118
Cemented Carbide	**MB730, MBS140**	65 (30—100)	—.020	—.008

● Heat Resistant Alloy

Work Material	Grade	Recommended Cutting Condition		
		Cutting Speed (SFM)	Feed (IPR)	Depth of Cut (inch)
Ni Base Alloy	**MB730**	390 (330—490)	—.008	—.020
Co Base Alloy	**MB730**	230 (165—330)	—.008	—.020

IDENTIFICATION

Symbol	Insert Shape
S	Square
T	Triangular
C	Rhombic 80°
D	Rhombic 55°
V	Rhombic 35°
W	Trigon
R	Round

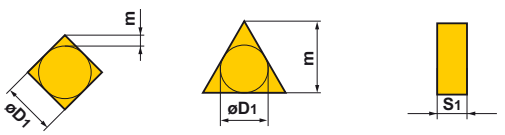
③ Symbol for Insert Shape

BM	With Breaker
BF	With Breaker
NP	New Petit Cut
No mark	Standard Type

② Insert Geometry

T	10-inserts Package
No mark	1-insert Package

① Insert Case



Triangular insert with a facet (Secondary Cutting Edge)

⑤ Symbol for Tolerance Class

Symbol	Tolerance of Nose Height **m** (inch)	Tolerance of Inscribed Circle **ϕD1** (inch)	Tolerance of Thickness **S1** (inch)
G	±.001	±.001	±.005
M*	±.003 – ±.0063	±.002 – ±.003	±.005

*As a rule, the sides of these inserts are as sintered. Tolerance differs with insert size. For the accuracy of class M, refer to the table on the right.

Detail of M Class Insert Tolerance

● Tolerance of Nose Height **m** (inch)

I.C.	Triangular	Square	Rhombic 80°	Rhombic 55°	Rhombic 35°	Round
.250	±.003	±.003	±.003	±.004	±.0063	–
.375	±.003	±.003	±.003	±.004	±.0063	–
.500	±.005	±.005	±.005	±.006	–	–

● Tolerance of Inscribed Circle **ϕD1** (inch)

I.C.	Triangular	Square	Rhombic 80°	Rhombic 55°	Rhombic 35°	Round
.250	±.002	±.002	±.002	±.002	±.002	–
.375	±.002	±.002	±.002	±.002	±.002	±.002
.500	±.003	±.003	±.003	±.003	–	±.003

⑤ Symbol for Tolerance Class

	①	②	③		⑤	
INCH	T	NP	- C	N	G	A
METRIC	T	NP	- C	N	G	A
				④		⑥

④ Symbol for Relief Angle

Symbol	Relief Angle
B	5°
C	7°
D	15°
E	20°
N	0°
P	11°

⑥ Symbol for Chipbreaker and Clamping System

Inch			Metric									
Figure	I.C. .250" and over	I.C. under .250"	Symbol	Hole	Hole Configuration	Chip Breaker	Figure	Symbol	Hole	Hole Configuration	Chip Breaker	Figure
	A	D	W	With Hole	Cylindrical Hole + One Countersink (40—60°)	No		A	With Hole	Cylindrical Hole	No	
	M	P	T	With Hole		One Sided		M	With Hole	Cylindrical Hole	One Sided	
	N	E	B	With Hole	Cylindrical Hole + One Countersink (70—90°)	No		N	Without Hole	–	No	
Special Design	X	X	H	With Hole		One Sided		X	–	–	–	Special Design

Inch		Diameter of Inscribed Circle (inch)	Metric						
I.C. .250" and over	I.C. under .250"		R	W	V	D	C	S	T
	1.2 (5)	.156		**02**		**04**	**03**	**03**	**06**
	1.5 (6)	.187		**L3**	**08**	**05**	**04**	**04**	**08**
	1.8 (7)	.219		**03**	**09**	**06**	**05**	**05**	**09**
2		.250		**04**	**11**	**07**	**06**	**06**	**11**
2.5		.313		**05**	**13**	**09**	**08**	**07**	**13**
3		.375	**09**	**06**	**16**	**11**	**09**	**09**	**16**
4		.500	**12**	**08**	**22**	**15**	**12**	**12**	**22**

⑦ Symbol for Insert Size

Thickness is from the bottom of the insert to the top of the cutting edge.

Inch		Thickness (inch)	Metric
I.C. .250" and over	I.C. under .250"		
–	**0.9**	.055	**S1**
–	**1**	.063	**01**
–	**1.1**	.070	**T0**
–	**1.5**	.094	**02**
–	**1.8**	.109	**T2**
2	–	.125	**03**
2.5	–	.156	**T3**
3	–	.187	**04**

⑧ Symbol for Insert Thickness

⑦	⑧						
4	3	1	G	WS	2	J	R
12	04	04	G	WS	2	J	R
		⑨	⑩	⑪	⑫	⑬	⑭

⑨ Symbol for Insert Corner Configuration

Inch	Corner Radius (inch)	Metric
0.5	.008	**02**
1	.016	**04**
2	.031	**08**
3	.047	**12**
4	.063	**16**

⑩ Application (Honing)

F FA FS FN FP	Continuous Cutting
G GA GN GS	General Cutting
T TA TS TN	Interrupted Cutting

Please refer to page 5 for further information.

⑪ Wiper

WS	With Wiper (For low rigidity work)
No mark	Without Wiper

⑫ Number of Teeth

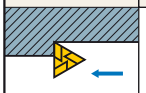
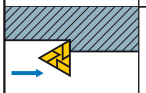
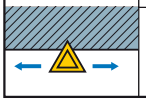
2	2
3	3
⋮	⋮
No mark	1

⑬ Cutting Edge Angle

F	91°
J	93°
No mark	Non Restriction

Please pay special attention when using an indexable insert.
Please refer to page 11 for further information.

⑭ Symbol for Cutting Direction

Figure	Hand	Symbol
	Right	**R**
	Left	**L**
	Neutral	**N**

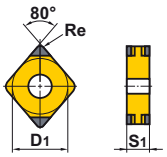
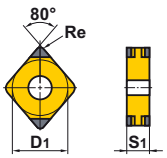
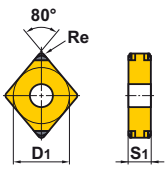
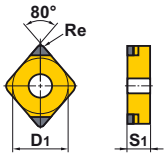
CBN TURNING INSERTS

Inserts

●Negative Inserts (With hole)

Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

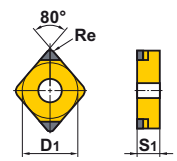
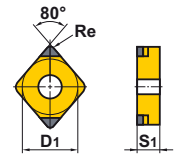
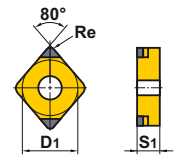
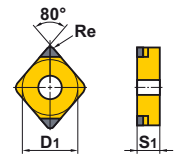
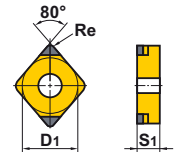
Cutting Conditions (Guide) :
●: Stable Cutting ◐: General Cutting
✱: Unstable Cutting

Shape	Order Number	(ISO) Number	Coated CBN			CBN							Dimensions (inch)			Geometry
			MBC010	MBC020	BC8020 (NEW)	MB810	MB8025	MB825	MB835	MB710	MB730	MB4020	D1	S1	Re	
NEW PETIT CUT 	NP-CNGA431-GA4	NP-CNGA120404GA4		●	●								.500	.187	.016	
	432-GA4	120408GA4		●	●								.500	.187	.031	
	433-GA4	120412GA4		●	★								.500	.187	.047	
	431-GN4	120404GN4		★									.500	.187	.016	
	432-GN4	120408GN4		★									.500	.187	.031	
	433-GN4	120412GN4		★									.500	.187	.047	
	NEW 431-FS4	120404FS4			★								.500	.187	.016	
	NEW 432-FS4	120408FS4			★								.500	.187	.031	
	NEW 433-FS4	120412FS4			★								.500	.187	.047	
	431-TA4	120404TA4		★	★								.500	.187	.016	
	432-TA4	120408TA4		★	★								.500	.187	.031	
	433-TA4	120412TA4		★	★								.500	.187	.047	
NEW PETIT CUT (With Wiper) NEW 	✱2 NP-CNGA431-GAWS4	NP-CNGA120404GAWS4			★								.500	.187	.016	
	✱2 432-GAWS4	120408GAWS4			●								.500	.187	.031	
	✱2 433-GAWS4	120412GAWS4			●								.500	.187	.047	
NEW PETIT CUT (With Breaker) 	BF-CNGG431-TA4	BF-CNGG120404TA4		★									.500	.187	.016	
	432-TA4	120408TA4		★									.500	.187	.031	
	433-TA4	120412TA4		★									.500	.187	.047	
NEW PETIT CUT 	NP-CNGA431-GA2	NP-CNGA120404GA2		●	●								.500	.187	.016	
	432-GA2	120408GA2		●	●								.500	.187	.031	
	433-GA2	120412GA2		●	●								.500	.187	.047	
	431-GS2	120404GS2	●							●	●		.500	.187	.016	
	432-GS2	120408GS2	●							●	●		.500	.187	.031	
	433-GS2	120412GS2	●							●	●		.500	.187	.047	
	431-GN2	120404GN2		●									.500	.187	.016	
	432-GN2	120408GN2		●									.500	.187	.031	
	433-GN2	120412GN2		●									.500	.187	.047	
	431-FS2	120404FS2			★							●	.500	.187	.016	
	432-FS2	120408FS2			★							●	.500	.187	.031	
	433-FS2	120412FS2			★							●	.500	.187	.047	
	431-TA2	120404TA2		●	★						●		.500	.187	.016	
	432-TA2	120408TA2		●	★						●		.500	.187	.031	
	433-TA2	120412TA2		●	★						●		.500	.187	.047	

✱1 The order number is for the 10-insert package. Please specify insert number, grade and quantity.
✱2 Please refer to page 11 before using the wiper insert.

● : Inventory maintained. ★ : Inventory maintained in Japan. □ : Non stock, produced to order only.
<1 insert in one case>

Work Material															Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✱: Unstable Cutting
	H	Hardened Materials	●	◐	◐	●	◐	◐	✱	●	◐	◐			
	K	Cast Iron													
	S	Heat-resistant Alloy, Titanium Alloy													
		Sintered Alloy											◐		

Shape	Order Number	(ISO) Number	Coated CBN		NEW	CBN							Dimensions (inch)			Geometry
			MBC010	MBC020	BC8020	MB810	MB8025	MB825	MB835	MB710	MB730	MB4020	D1	S1	Re	
NEW PETIT CUT	NP-CNGA431-TS2	NP-CNGA120404TS2										●	.500	.187	.016	
	432-TS2	120408TS2										●	.500	.187	.031	
	433-TS2	120412TS2										●	.500	.187	.047	
	431-G2	120404G2					●						.500	.187	.016	
	432-G2	120408G2					★						.500	.187	.031	
	433-G2	120412G2					★						.500	.187	.047	
	431-T2	120404T2					●						.500	.187	.016	
	432-T2	120408T2					★						.500	.187	.031	
	433-T2	120412T2					●						.500	.187	.047	
NEW PETIT CUT	✱1 TNP-CNGA432-GS2	TNP-CNGA120408GS2	●										.500	.187	.031	
	✱1 433-GS2	120412GS2	●										.500	.187	.047	
	✱1 431-G2	120404G2					★						.500	.187	.016	
	✱1 432-G2	120408G2					★						.500	.187	.031	
	✱1 433-G2	120412G2					★						.500	.187	.047	
	✱1 431-T2	120404T2					★						.500	.187	.016	
	✱1 432-T2	120408T2					★						.500	.187	.031	
	✱1 433-T2	120412T2					★						.500	.187	.047	
NEW PETIT CUT	NP-CNMA431-G2	NP-CNMA120404G2					●	●		●			.500	.187	.016	
	432-G2	120408G2					●	●		●			.500	.187	.031	
	433-G2	120412G2					●	●					.500	.187	.047	
	431-T2	120404T2							□				.500	.187	.016	
	432-T2	120408T2							●				.500	.187	.031	
	433-T2	120412T2							●				.500	.187	.047	
NEW PETIT CUT	✱1 TNP-CNMA431-G2	TNP-CNMA120404G2					●	●		●			.500	.187	.016	
	✱1 432-G2	120408G2					●	●		●			.500	.187	.031	
	✱1 433-G2	120412G2					●	□					.500	.187	.047	
	✱1 432-T2	120408T2							●				.500	.187	.031	
	✱1 433-T2	120412T2							●				.500	.187	.047	
NEW PETIT CUT	✱2 NP-CNGA431-GAWS2	NP-CNGA120404GAWS2		●			★						.500	.187	.016	
	✱2 432-GAWS2	120408GAWS2		●			★						.500	.187	.031	
	✱2 433-GAWS2	120412GAWS2		●			★						.500	.187	.047	
	✱2 431-GSWS2	120404GSWS2	★										.500	.187	.016	
	✱2 432-GSWS2	120408GSWS2	●										.500	.187	.031	
	✱2 433-GSWS2	120412GSWS2	★										.500	.187	.047	

✱1 The order number is for the 10-insert package. Please specify insert number, grade and quantity.
✱2 Please refer to page 11 before using the wiper insert.

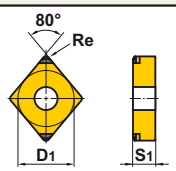
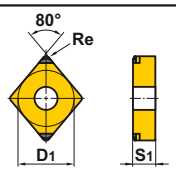
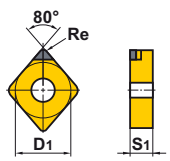
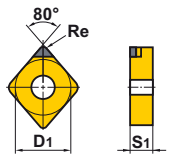
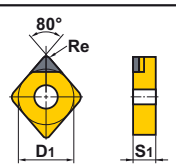
CBN TURNING INSERTS

Inserts

●Negative Inserts (With hole)

Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

Cutting Conditions (Guide) :
●: Stable Cutting ◐: General Cutting
✤: Unstable Cutting

Shape	Order Number	(ISO) Number	Coated CBN			CBN							Dimensions (inch)			Geometry
			MBC010	MBC020	BC8020 (NEW)	MB810	MB8025	MB825	MB835	MB710	MB730	MB4020	D1	S1	Re	
NEW PETIT CUT (With Breaker) 	BF-CNGM431-TA2	BF-CNGM120404TA2		●									.500	.187	.016	
	432-TA2	120408TA2		●									.500	.187	.031	
	433-TA2	120412TA2		●									.500	.187	.047	
NEW PETIT CUT (With Breaker) NEW 	BM-CNGM432-TA2	BF-CNGM120408TA2			★								.500	.187	.031	
	433-TA2	120412TA2			★								.500	.187	.047	
NEW PETIT CUT 	NP-CNGA431GA	NP-CNGA120404GA		●									.500	.187	.016	
	432GA	120408GA		●									.500	.187	.031	
	433GA	120412GA		●									.500	.187	.047	
	431GN	120404GN		●									.500	.187	.016	
	432GN	120408GN		●									.500	.187	.031	
	433GN	120412GN		●									.500	.187	.047	
	431TA	120404TA		●									.500	.187	.016	
	432TA	120408TA		●									.500	.187	.031	
	433TA	120412TA		●									.500	.187	.047	
NEW PETIT CUT 	NP-CNMA431GS	NP-CNMA120404GS								●	●		.500	.187	.016	
	432GS	120408GS						●		●	●		.500	.187	.031	
	433GS	120412GS								●	●		.500	.187	.047	
	431G	120404G					●	●		●			.500	.187	.016	
	432G	120408G					●	●		●	●		.500	.187	.031	
	433G	120412G					●	●		●	●		.500	.187	.047	
	431F	120404F				●	□			●			.500	.187	.016	
	432F	120408F				●	□			●			.500	.187	.031	
	433F	120412F				●	□			●			.500	.187	.047	
	431T	120404T					□	★	●		●		.500	.187	.016	
	432T	120408T					□	★	●		●		.500	.187	.031	
	433T	120412T					□	★	●		●		.500	.187	.047	
	CNMA431	CNMA120404				★		★		●	●		.500	.187	.016	
	432	120408				★	●	★		●	●		.500	.187	.031	
	433	120412						★		●	●		.500	.187	.047	

● : Inventory maintained. ★ : Inventory maintained in Japan. □ : Non stock, produced to order only.
<1 insert in one case>

Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

Cutting Conditions (Guide) :
●: Stable Cutting ◐: General Cutting
✤: Unstable Cutting

Shape	Order Number	(ISO) Number	Coated CBN			CBN							Dimensions (inch)			Geometry
			MBC010	MBC020 NEW	BC8020	MB810	MB8025	MB825	MB835	MB710	MB730	MB4020	D1	S1	Re	
NEW PETIT CUT	NP-DNGA431-GA4	NP-DNGA150404GA4		●	★								.500	.187	.016	
	432-GA4	150408GA4		●	★								.500	.187	.031	
	433-GA4	150412GA4		●	★								.500	.187	.047	
	431-GN4	150404GN4		★									.500	.187	.016	
	432-GN4	150408GN4		★									.500	.187	.031	
	433-GN4	150412GN4		★									.500	.187	.047	
	NEW 431-FS4	150404FS4			★								.500	.187	.016	
	NEW 432-FS4	150408FS4			★								.500	.187	.031	
	NEW 433-FS4	150412FS4			★								.500	.187	.047	
	431-TA4	150404TA4		★	★								.500	.187	.016	
	432-TA4	150408TA4		★	★								.500	.187	.031	
	433-TA4	150412TA4		★	★								.500	.187	.047	
NEW PETIT CUT	BF-DNGG431-TA4	BF-DNGG150404TA4		★									.500	.187	.016	
	432-TA4	150408TA4		★									.500	.187	.031	
	433-TA4	150412TA4		★									.500	.187	.047	
NEW PETIT CUT	NP-DNGA332-GA2	NP-DNGA110408GA2		●									.375	.187	.031	
	431-GA2	150404GA2		●	●								.500	.187	.016	
	432-GA2	150408GA2		●	●								.500	.187	.031	
	433-GA2	150412GA2		●	●								.500	.187	.047	
	332-GS2	110408GS2	●										.375	.187	.031	
	431-GS2	150404GS2	●							●	●		.500	.187	.016	
	432-GS2	150408GS2	●							●	●		.500	.187	.031	
	433-GS2	150412GS2	●							●	●		.500	.187	.047	
	332-GN2	110408GN2		●									.375	.187	.031	
	431-GN2	150404GN2		●									.500	.187	.016	
	432-GN2	150408GN2		●									.500	.187	.031	
	433-GN2	150412GN2		●									.500	.187	.047	
	431-FS2	150404FS2			★							●	.500	.187	.016	
	432-FS2	150408FS2			★							●	.500	.187	.031	
	433-FS2	150412FS2			★							●	.500	.187	.047	
	332-TA2	110408TA2		●									.375	.187	.031	
	431-TA2	150404TA2		●	★								.500	.187	.016	
	432-TA2	150408TA2		●	★								.500	.187	.031	
	433-TA2	150412TA2		●	★								.500	.187	.047	
	431-TS2	150404TS2										●	.500	.187	.016	
	432-TS2	150408TS2										●	.500	.187	.031	
	433-TS2	150412TS2										●	.500	.187	.047	
	431-G2	150404G2					●						.500	.187	.016	
	432-G2	150408G2					●						.500	.187	.031	
	433-G2	150412G2					●						.500	.187	.047	
	431-T2	150404T2					●						.500	.187	.016	
	432-T2	150408T2					●						.500	.187	.031	
	433-T2	150412T2					●						.500	.187	.047	

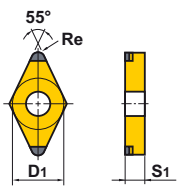
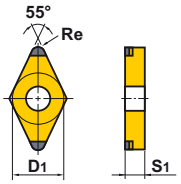
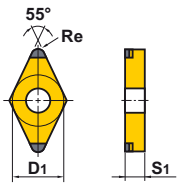
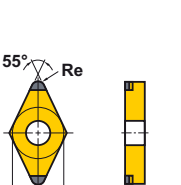
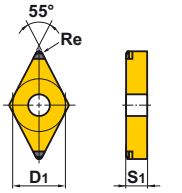
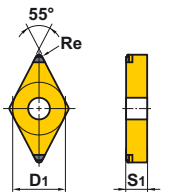
CBN TURNING INSERTS

Inserts

●Negative Inserts (With hole)

Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

Cutting Conditions (Guide) :
●: Stable Cutting ◐: General Cutting
✠: Unstable Cutting

Shape	Order Number	(ISO) Number	Coated CBN		NEW	CBN						Dimensions (inch)			Geometry
			MBC010	MBC020	BC8020	MB810	MB8025	MB825	MB835	MB710	MB730	MB4020	D1	S1	Re	
NEW PETIT CUT	✱1 TNP-DNGA431-GS2	TNP-DNGA150404GS2	●										.500	.187	.016	
	✱1 432-GS2	150408GS2	●										.500	.187	.031	
	✱1 433-GS2	150412GS2	●										.500	.187	.047	
	✱1 431-G2	150404G2					★						.500	.187	.016	
	✱1 432-G2	150408G2					★						.500	.187	.031	
	✱1 433-G2	150412G2					★						.500	.187	.047	
	✱1 431-T2	150404T2					★						.500	.187	.016	
	✱1 432-T2	150408T2					★						.500	.187	.031	
	✱1 433-T2	150412T2					★						.500	.187	.047	
NEW PETIT CUT	NP-DNMA431-G2	NP-DNMA150404G2					●	●		●			.500	.187	.016	
	432-G2	150408G2					●	●		●			.500	.187	.031	
	433-G2	150412G2					●	●		●			.500	.187	.047	
	431-F2	150404F2				□							.500	.187	.016	
	432-T2	150408T2							□				.500	.187	.031	
NEW PETIT CUT	✱1 TNP-DNMA431-G2	TNP-DNMA150404G2					●	●		●			.500	.187	.016	
	✱1 432-G2	150408G2					●	●		●			.500	.187	.031	
	✱1 433-G2	150412G2					●	●		●			.500	.187	.047	
NEW PETIT CUT (With Wiper)	✱2 NP-DNGA431-GAWS2JR	NP-DNGA150404GAWS2JR		●			★						.500	.187	.016	
	✱2 431-GAWS2JL	150404GAWS2JL		●			★						.500	.187	.016	
	✱2 432-GAWS2JR	150408GAWS2JR		●			★						.500	.187	.031	
	✱2 432-GAWS2JL	150408GAWS2JL		●			★						.500	.187	.031	
	✱2 431-GSWS2JR	150404GSWS2JR	★										.500	.187	.016	
	✱2 431-GSWS2JL	150404GSWS2JL	★										.500	.187	.016	
	✱2 432-GSWS2JR	150408GSWS2JR	★										.500	.187	.031	
	✱2 432-GSWS2JL	150408GSWS2JL	★										.500	.187	.031	
NEW PETIT CUT (With Breaker)	BF-DNGM431-TA2	BF-DNGM150404TA2		●									.500	.187	.016	
	432-TA2	150408TA2		●									.500	.187	.031	
	433-TA2	150412TA2		●									.500	.187	.047	
NEW PETIT CUT (With Breaker) NEW	BM-DNGM432-TA2	BM-DNGM150408TA2			★								.500	.187	.031	
	433-TA2	150412TA2			★								.500	.187	.047	

Right hand is shown.

✱1 The order number is for the 10-insert package. Please specify insert number, grade and quantity. ✱2 Please refer to page 11 before using the wiper insert.

● : Inventory maintained. ★ : Inventory maintained in Japan. □ : Non stock, produced to order only.
<1 insert in one case>

Work Material			Coated CBN			CBN							Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✱: Unstable Cutting
	H	Hardened Materials	●	◐	◐	●	◐	◐	✱	● ◐	◐	◐	
	K	Cast Iron											
	S	Heat-resistant Alloy, Titanium Alloy											
		Sintered Alloy										◐	

Shape	Order Number	(ISO) Number	MBC010	MBC020 NEW	BC8020	MB810	MB8025	MB825	MB835	MB710	MB730	MB4020	D1	S1	Re	Geometry
NEW PETIT CUT	NP-DNGA431GA	NP-DNGA150404GA		●									.500	.187	.016	
	432GA	150408GA		●									.500	.187	.031	
	433GA	150412GA		●									.500	.187	.047	
	431GN	150404GN		●									.500	.187	.016	
	432GN	150408GN		●									.500	.187	.031	
	433GN	150412GN		●									.500	.187	.047	
	431TA	150404TA		●									.500	.187	.016	
	432TA	150408TA		●									.500	.187	.031	
	433TA	150412TA		●									.500	.187	.047	
NEW PETIT CUT	NP-DNMA431GS	NP-DNMA150404GS								●	●		.500	.187	.016	
	432GS	150408GS						●		●	●		.500	.187	.031	
	332G	110408G					●	●					.375	.187	.031	
	431G	150404G					●	●		●			.500	.187	.016	
	432G	150408G					●	●		●	●		.500	.187	.031	
	433G	150412G					●	●		●			.500	.187	.047	
	431F	150404F				●	□			●			.500	.187	.016	
	432F	150408F				●	□			●			.500	.187	.031	
	433F	150412F				●	□						.500	.187	.047	
	431T	150404T					□	★	●		●		.500	.187	.016	
	432T	150408T					□	★	●		●		.500	.187	.031	
	433T	150412T					□		●				.500	.187	.047	
	DNGA431	DNGA150404						★		□	□		.500	.187	.016	
	432	150408					●	★		□	□		.500	.187	.031	
	433	150412						★		□	□		.500	.187	.047	
NEW PETIT CUT	NP-SNGA431-GA4	NP-SNGA120404GA4		★									.500	.187	.016	
	432-GA4	120408GA4		●									.500	.187	.031	
	433-GA4	120412GA4		★									.500	.187	.047	
NEW PETIT CUT	✱1 TNP-SNGA431-G2	TNP-SNGA120404G2					★						.500	.187	.016	
	✱1 432-G2	120408G2					★						.500	.187	.031	
	✱1 433-G2	120412G2					★						.500	.187	.047	
	✱1 431-T2	120404T2					★						.500	.187	.016	
	✱1 432-T2	120408T2					★						.500	.187	.031	
	✱1 433-T2	120412T2					★						.500	.187	.047	

✱1 The order number is for the 10-insert package. Please specify insert number, grade and quantity.

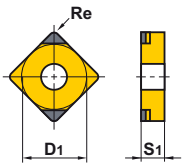
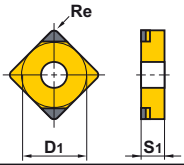
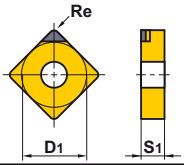
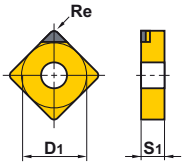
CBN TURNING INSERTS

Inserts

●Negative Inserts (With hole)

Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

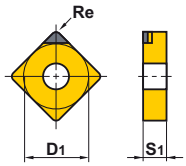
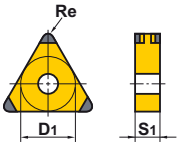
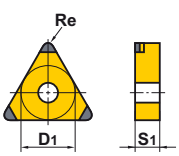
Cutting Conditions (Guide) :
●: Stable Cutting ◐: General Cutting
✠: Unstable Cutting

Shape	Order Number	(ISO) Number	Coated CBN			CBN							Dimensions (inch)			Geometry
			MBC010	MBC020 (NEW)	BC8020	MB810	MB8025	MB825	MB835	MB710	MB730	MB4020	D1	S1	Re	
NEW PETIT CUT	NP-SNGA431-GA2	NP-SNGA120404GA2		●									.500	.187	.016	
	432-GA2	120408GA2		●									.500	.187	.031	
	433-GA2	120412GA2		●									.500	.187	.047	
	431-GS2	120404GS2	●										.500	.187	.016	
	432-GS2	120408GS2	●							●	●		.500	.187	.031	
	433-GS2	120412GS2	●							●	●		.500	.187	.047	
	431-FS2	120404FS2										●	.500	.187	.016	
	432-FS2	120408FS2										●	.500	.187	.031	
	433-FS2	120412FS2										●	.500	.187	.047	
	431-TS2	120404TS2										●	.500	.187	.016	
	432-TS2	120408TS2										●	.500	.187	.031	
	433-TS2	120412TS2										●	.500	.187	.047	
	431-G2	120404G2					★						.500	.187	.016	
	432-G2	120408G2					★						.500	.187	.031	
	433-G2	120412G2					★						.500	.187	.047	
	431-T2	120404T2					★						.500	.187	.016	
	432-T2	120408T2					★						.500	.187	.031	
	433-T2	120412T2					★						.500	.187	.047	
NEW PETIT CUT	NP-SNMA433-G2	NP-SNMA120412G2								●			.500	.187	.047	
																
NEW PETIT CUT	NP-SNGA431GA	NP-SNGA120404GA		●									.500	.187	.016	
	432GA	120408GA		●									.500	.187	.031	
	433GA	120412GA		●									.500	.187	.047	
NEW PETIT CUT	NP-SNMA431GS	NP-SNMA120404GS								●	●		.500	.187	.016	
	432GS	120408GS								●	●		.500	.187	.031	
	431G	120404G					★	★					.500	.187	.016	
	432G	120408G					●	★					.500	.187	.031	
	433G	120412G					★						.500	.187	.047	
	431F	120404F				●	□			●			.500	.187	.016	
	432F	120408F				●	□			●			.500	.187	.031	
	433F	120412F				★	□			●			.500	.187	.047	
	431T	120404T					□	★	●		●		.500	.187	.016	
	432T	120408T					□	★	●		●		.500	.187	.031	
	433T	120412T					□	★	★		●		.500	.187	.047	

● : Inventory maintained. ★ : Inventory maintained in Japan. □ : Non stock, produced to order only.
<1 insert in one case>

Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

Cutting Conditions (Guide) :
●: Stable Cutting ◐: General Cutting
✤: Unstable Cutting

Shape	Order Number	(ISO) Number	Coated CBN		NEW	CBN							Dimensions (inch)			Geometry
			MBC010	MBC020	BC8020	MB810	MB8025	MB825	MB835	MB710	MB730	MB4020	D1	S1	Re	
	SNGA431	SNGA120404						□		□	□		.500	.187	.016	
	432	120408						●		●	●		.500	.187	.031	
	433	120412						★		●	●		.500	.187	.047	
NEW PETIT CUT	NP-TNGA331-GA6	NP-TNGA160404GA6		●	★								.375	.187	.016	
	332-GA6	160408GA6		●	★								.375	.187	.031	
	333-GA6	160412GA6		●	★								.375	.187	.047	
	331-GN6	160404GN6		★									.375	.187	.016	
	332-GN6	160408GN6		★									.375	.187	.031	
	333-GN6	160412GN6		★									.375	.187	.047	
	NEW 331-FS6	160404FS6			★								.375	.187	.016	
	NEW 332-FS6	160408FS6			★								.375	.187	.031	
	NEW 333-FS6	160412FS6			★								.375	.187	.047	
	331-TA6	160404TA6		★	★								.375	.187	.016	
	332-TA6	160408TA6		★	★								.375	.187	.031	
	333-TA6	160412TA6		★	★								.375	.187	.047	
NEW PETIT CUT	NP-TNGA330.5-GA3	NP-TNGA160402GA3		●									.375	.187	.008	
	331-GA3	160404GA3		●	●								.375	.187	.016	
	332-GA3	160408GA3		●	●								.375	.187	.031	
	333-GA3	160412GA3		●	●								.375	.187	.047	
	331-GS3	160404GS3	●										.375	.187	.016	
	332-GS3	160408GS3	●							●	●		.375	.187	.031	
	333-GS3	160412GS3	●							●	●		.375	.187	.047	
	330.5-GN3	160402GN3		●									.375	.187	.008	
	331-GN3	160404GN3		●									.375	.187	.016	
	332-GN3	160408GN3		●									.375	.187	.031	
	333-GN3	160412GN3		●									.375	.187	.047	

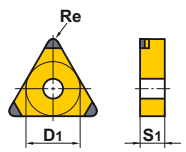
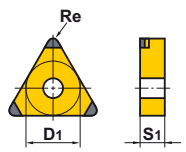
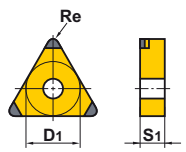
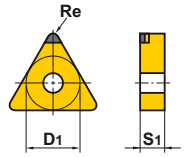
CBN TURNING INSERTS

Inserts

●Negative Inserts (With hole)

Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

Cutting Conditions (Guide) :
●: Stable Cutting ◐: General Cutting
✱: Unstable Cutting

Shape	Order Number	(ISO) Number	Coated CBN			CBN							Dimensions (inch)			Geometry
			MBC010	MBC020	BC8020 (NEW)	MB810	MB8025	MB825	MB835	MB710	MB730	MB4020	D1	S1	Re	
NEW PETIT CUT	NP-TNGA331-FS3	NP-TNGA160404FS3			★							●	.375	.187	.016	
	332-FS3	160408FS3			★							●	.375	.187	.031	
	333-FS3	160412FS3			★							●	.375	.187	.047	
	331-TA3	160404TA3		●	★								.375	.187	.016	
	332-TA3	160408TA3		●	★								.375	.187	.031	
	333-TA3	160412TA3		●	★								.375	.187	.047	
	331-TS3	160404TS3										●	.375	.187	.016	
	332-TS3	160408TS3										●	.375	.187	.031	
	333-TS3	160412TS3										●	.375	.187	.047	
	331-G3	160404G3				★							.375	.187	.016	
	332-G3	160408G3				★							.375	.187	.031	
	333-G3	160412G3				★							.375	.187	.047	
	331-T3	160404T3				★							.375	.187	.016	
	332-T3	160408T3				★							.375	.187	.031	
	333-T3	160412T3				★							.375	.187	.047	
NEW PETIT CUT	✱1 TNP-TNGA331-G3	TNP-TNGA160404G3				★							.375	.187	.016	
	✱1 332-G3	160408G3				★							.375	.187	.031	
	✱1 333-G3	160412G3				★							.375	.187	.047	
	✱1 331-T3	160404T3				★							.375	.187	.016	
	✱1 332-T3	160408T3				★							.375	.187	.031	
	✱1 333-T3	160412T3				★							.375	.187	.047	
NEW PETIT CUT (With Breaker) (NEW)	BM-TNGM332-TA3	BM-TNGM160408TA3			★								.375	.187	.016	
	333-TA3	160412TA3			★								.375	.187	.047	
NEW PETIT CUT	NP-TNGA331GA	NP-TNGA160404GA	●										.375	.187	.016	
	332GA	160408GA	●										.375	.187	.031	
	333GA	160412GA	●										.375	.187	.047	
	331GN	160404GN	●										.375	.187	.016	
	332GN	160408GN	●										.375	.187	.031	
	333GN	160412GN	●										.375	.187	.047	
	331TA	160404TA	●										.375	.187	.016	
	332TA	160408TA	●										.375	.187	.031	
	333TA	160412TA	●										.375	.187	.047	

✱1 The order number is for the 10-insert package. Please specify insert number, grade and quantity.

● : Inventory maintained. ★ : Inventory maintained in Japan. □ : Non stock, produced to order only.
<1 insert in one case>

Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

Cutting Conditions (Guide) :
●: Stable Cutting ◐: General Cutting
✤: Unstable Cutting

Shape	Order Number	(ISO) Number	Coated CBN			CBN							Dimensions (inch)			Geometry
			MBC010	MBC020	BC8020 (NEW)	MB810	MB8025	MB825	MB835	MB710	MB730	MB4020	D1	S1	Re	
NEW PETIT CUT	NP-TNMA331GS	NP-TNMA160404GS								●	●		.375	.187	.016	
	332GS	160408GS								●	●		.375	.187	.031	
	333GS	160412GS								●	●		.375	.187	.047	
	331G	160404G					●	★					.375	.187	.016	
	332G	160408G					●	★					.375	.187	.031	
	333G	160412G					●	★					.375	.187	.047	
	331F	160404F				●	□			●			.375	.187	.016	
	332F	160408F				●	□			●			.375	.187	.031	
	333F	160412F				●	□			●			.375	.187	.047	
	331T	160404T					□	●	●		●		.375	.187	.016	
	332T	160408T					□	●	●		●		.375	.187	.031	
	333T	160412T					□	●	●		□		.375	.187	.047	
	TNGA331	TNGA160404				★		●		●	●		.375	.187	.016	
	332	160408				★		★		●	●		.375	.187	.031	
	431	220404						□		●	□		.375	.187	.016	
	432	220408						●		●	□		.375	.187	.031	
	433	220412						●		●	□		.375	.187	.047	
NEW PETIT CUT	NP-VNGA331-GA4	NP-VNGA160404GA4		●	★								.375	.187	.016	
	332-GA4	160408GA4		●	★								.375	.187	.031	
NEW	333-GA4	160412GA4			★								.375	.187	.047	
NEW	331-FS4	160404FS4			★								.375	.187	.016	
NEW	332-FS4	160408FS4			★								.375	.187	.031	
NEW	333-FS4	160412FS4			★								.375	.187	.047	
NEW	331-TA4	160404TA4			★								.375	.187	.016	
NEW	332-TA4	160408TA4			★								.375	.187	.031	
NEW	333-TA4	160412TA4			★								.375	.187	.047	
NEW PETIT CUT	NP-VNGA330.5-GA2	NP-VNGA160402GA2		●									.375	.187	.008	
	331-GA2	160404GA2		●	●								.375	.187	.016	
	332-GA2	160408GA2		●	●								.375	.187	.031	
	331-GS2	160404GS2	●										.375	.187	.016	
	332-GS2	160408GS2	●										.375	.187	.031	
	330.5-GN2	160402GN2		●									.375	.187	.008	
	331-FS2	160404FS2			★							●	.375	.187	.016	
	332-FS2	160408FS2			★							●	.375	.187	.031	
NEW	331-TA2	160404TA2			★								.375	.187	.016	
NEW	332-TA2	160408TA2			★								.375	.187	.031	
	331-TS2	160404TS2										●	.375	.187	.016	
	332-TS2	160408TS2										●	.375	.187	.031	
	331-G2	160404G2					●						.375	.187	.016	
	332-G2	160408G2					●						.375	.187	.031	
	331-T2	160404T2					●						.375	.187	.016	
	332-T2	160408T2					●						.375	.187	.031	

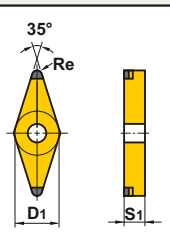
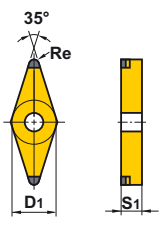
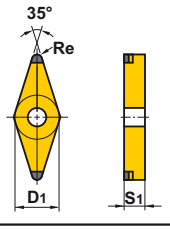
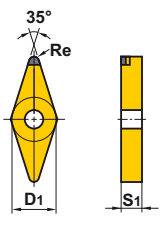
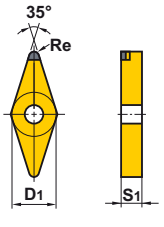
CBN TURNING INSERTS

Inserts

●Negative Inserts (With hole)

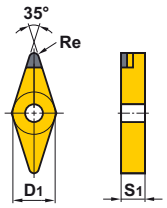
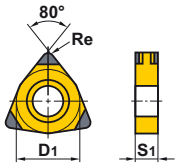
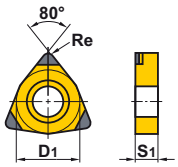
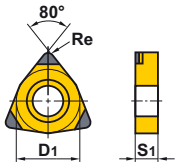
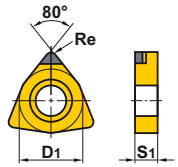
Work Material		
H	Hardened Materials	
K	Cast Iron	
S	Heat-resistant Alloy, Titanium Alloy	
	Sintered Alloy	

Cutting Conditions (Guide) :
●: Stable Cutting ◐: General Cutting
✱: Unstable Cutting

Shape	Order Number	(ISO) Number	Coated CBN			CBN							Dimensions (inch)			Geometry
			MBC010	MBC020 NEW	BC8020	MB810	MB8025	MB825	MB835	MB710	MB730	MB4020	D1	S1	Re	
NEW PETIT CUT	✱1 TNP-VNGA331-GS2	TNP-VNGA160404GS2	●										.375	.187	.016	
	✱1 332-GS2	160408GS2	●										.375	.187	.031	
	✱1 331-G2	160404G2					★						.375	.187	.016	
	✱1 332-G2	160408G2					★						.375	.187	.031	
	✱1 331-T2	160404T2					★						.375	.187	.016	
	✱1 332-T2	160408T2					★						.375	.187	.031	
NEW PETIT CUT	NP-VNMA331-G2	NP-VNMA160404G2					●	●		●			.375	.187	.016	
	332-G2	160408G2					●	●		●			.375	.187	.031	
	331-F2	160404F2				●							.375	.187	.016	
	332-F2	160408F2				●							.375	.187	.031	
	331-T2	160404T2							□				.375	.187	.016	
NEW PETIT CUT	✱1 TNP-VNMA331-F2	TNP-VNMA160404F2				□							.375	.187	.016	
	✱1 332-F2	160408F2				□							.375	.187	.031	
	✱1 331-G2	160404G2					●	●		●			.375	.187	.016	
	✱1 332-G2	160408G2					●	●		●			.375	.187	.031	
NEW PETIT CUT	NP-VNGA331GA	NP-VNGA160404GA		●									.375	.187	.016	
	332GA	160408GA		●									.375	.187	.031	
NEW PETIT CUT	NP-VNMA331GS	NP-VNMA160404GS								●	●		.375	.187	.016	
	332GS	160408GS								●	●		.375	.187	.031	
	331G	160404G					●	●					.375	.187	.016	
	332G	160408G					●	●		●	●		.375	.187	.031	
	331F	160404F				●	□			●			.375	.187	.016	
	332F	160408F				●	□			●			.375	.187	.031	
	331T	160404T					□	★	●		●		.375	.187	.016	
	332T	160408T					□	★	●		●		.375	.187	.031	

✱1 The order number is for the 10-insert package. Please specify insert number, grade and quantity.
✱2 Please refer to page 11 before using the wiper insert.

● : Inventory maintained. ★ : Inventory maintained in Japan. □ : Non stock, produced to order only.
<1 insert in one case>

Work Material			Coated CBN			CBN							Dimensions (inch)			Geometry
					NEW											
Shape	Order Number	(ISO) Number	MBC010	MBC020	BC8020	MB810	MB8025	MB825	MB835	MB710	MB730	MB4020	D1	S1	Re	
	VNGA331	**VNGA160404**						★		□	□		.375	.187	.016	
	332	**160408**					●	★		□	□		.375	.187	.031	
NEW PETIT CUT	**NP-WNGA432-GA6**	**NP-WNGA080408GA6**		★	★								.500	.187	.031	
NEW PETIT CUT	**NP-WNGA432-GA3**	**NP-WNGA080408GA3**		●	●								.500	.187	.031	
	432-FS3	**080408FS3**										●	.500	.187	.031	
	432-TS3	**080408TS3**										●	.500	.187	.031	
NEW PETIT CUT (With Wiper)	⁎2 **NP-WNGA432-GAWS3**	**NP-WNGA080408GAWS3**		●			★						.500	.187	.031	
	⁎2 **432-GSWS3**	**080408GSWS3**	★										.500	.187	.031	
NEW PETIT CUT	**NP-WNGA432GA**	**NP-WNGA080408GA**		●									.500	.187	.031	

H Hardened Materials
K Cast Iron
S Heat-resistant Alloy, Titanium Alloy
Sintered Alloy

Cutting Conditions (Guide) :
●: Stable Cutting ◐: General Cutting
✤: Unstable Cutting

⁎1 The order number is for the 10-insert package. Please specify insert number, grade and quantity.
⁎2 Please refer to page 11 before using the wiper insert.

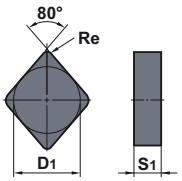
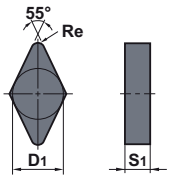
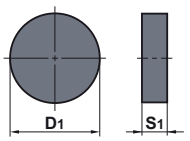
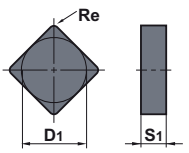
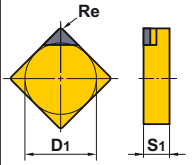
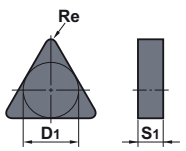
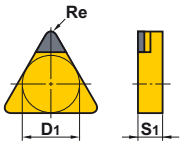
CBN TURNING INSERTS

Inserts

●Negative Inserts (Without hole)

Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

Cutting Conditions (Guide) :
●: Stable Cutting ◐: General Cutting
✣: Unstable Cutting

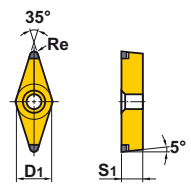
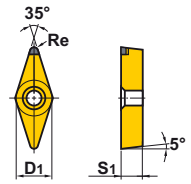
Shape	Order Number	(ISO) Number	Coated CBN			CBN							Solid CBN	Dimensions (inch)			Geometry
			MBC010	MBC020 NEW	BC8020	MB810	MB8025	MB825	MB835	MB710	MB730	MB4020	MBS140	D1	S1	Re	
	CNG431	CNGN120404											★	.500	.187	.016	
	432	120408											●	.500	.187	.031	
	433	120412											●	.500	.187	.047	
	DNG322	DNGN110308											★	.375	.125	.031	
	323	110312											★	.375	.125	.047	
	RNG32	RNGN090300											●	.375	.125	–	
	42	120300											●	.500	.125	–	
	43	120400											●	.500	.187	–	
	SNG322	SNGN090308											●	.375	.125	.031	
	323	090312											●	.375	.125	.047	
	324	090316											●	.375	.125	.063	
	432	120408											●	.500	.187	.031	
	433	120412											★	.500	.187	.047	
	434	120416											●	.500	.187	.063	
	SNG321	SNGN090304						□		□	□			.375	.125	.016	
	322	090308						□		□	□			.375	.125	.031	
	431	120404						□		□	□			.500	.187	.016	
	432	120408						●		●	□			.500	.187	.031	
	433	120412						●		●	□			.500	.187	.047	
	TNG332	TNGN160408											●	.375	.187	.031	
	333	160412											●	.375	.187	.047	
	334	160416											●	.375	.187	.063	
	TNG331	TNGN160404						●		●	□			.375	.187	.016	
	332	160408						●		●	□			.375	.187	.031	

● : Inventory maintained. ★ : Inventory maintained in Japan. □ : Non stock, produced to order only.
<1 insert in one case>

●5° Positive Inserts (With hole)

Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

Cutting Conditions (Guide) :
●: Stable Cutting ◐: General Cutting
✤: Unstable Cutting

Shape	Order Number	(ISO) Number	Coated CBN			CBN							Dimensions (inch)			Geometry
			MBC010	MBC020	BC8020 (NEW)	MB810	MB8025	MB825	MB835	MB710	MB730	MB4020	D1	S1	Re	
NEW PETIT CUT	NP-VBGW331-GA2	NP-VBGW160404GA2		●	●								.375	.187	.016	
	332-GA2	160408GA2		●	●								.375	.187	.031	
	221-GS2	110304GS2									●		.250	.125	.016	
	222-GS2	110308GS2									●		.250	.125	.031	
	331-GS2	160404GS2								●	●		.375	.187	.016	
	332-GS2	160408GS2								●	●		.375	.187	.031	
	221-FS2	110304FS2										●	.250	.125	.016	
	222-FS2	110308FS2										●	.250	.125	.031	
	331-FS2	160404FS2			★							●	.375	.187	.016	
	332-FS2	160408FS2			★							●	.375	.187	.031	
	221-TS2	110304TS2										●	.250	.125	.016	
	222-TS2	110308TS2										●	.250	.125	.031	
	331-TS2	160404TS2										●	.375	.187	.016	
	332-TS2	160408TS2										●	.375	.187	.031	
NEW PETIT CUT	NP-VBGW331GA	NP-VBGW160404GA		●									.375	.187	.016	
	332GA	160408GA		●									.375	.187	.031	
	331G	160404G					●						.375	.187	.016	
	332G	160408G					●						.375	.187	.031	

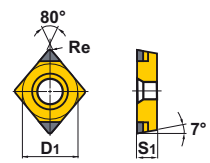
CBN TURNING INSERTS

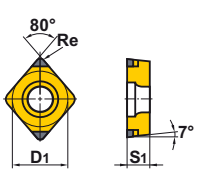
Inserts

●7° Positive Inserts (With hole)

Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

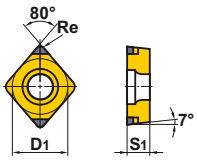
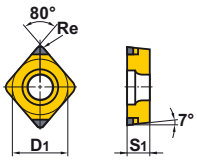
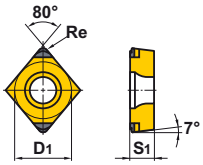
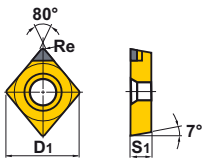
Cutting Conditions (Guide) :
●: Stable Cutting ◐: General Cutting
✤: Unstable Cutting

Shape	Order Number	(ISO) Number	Coated CBN			CBN							Dimensions (inch)			Geometry
			MBC010	MBC020 NEW	BC8020	MB810	MB8025	MB825	MB835	MB710	MB730	MB4020	D1	S1	Re	
NEW PETIT CUT	NP-CCGB21.51-GA2	NP-CCGB060204GA2		★									.250	.094	.016	
NEW PETIT CUT	NP-CCGW21.50.5-GA2	NP-CCGW060202GA2		●	●								.250	.094	.008	
	21.51-GA2	060204GA2		●	●								.250	.094	.016	
	21.52-GA2	060208GA2		●									.250	.094	.031	
	32.50.5-GA2	09T302GA2		●	●								.375	.156	.008	
	32.51-GA2	09T304GA2		●	●								.375	.156	.016	
	32.52-GA2	09T308GA2		●	●								.375	.156	.031	
	21.50.5-GS2	060202GS2								●	●		.250	.094	.008	
	21.51-GS2	060204GS2	●							●	●		.250	.094	.016	
	21.52-GS2	060208GS2								●	●		.250	.094	.031	
	32.51-GS2	09T304GS2	●							●	●		.375	.156	.016	
	32.52-GS2	09T308GS2	●							●	●		.375	.156	.031	
	32.50.5-GN2	09T302GN2		●									.375	.156	.008	
	32.51-GN2	09T304GN2		●									.375	.156	.016	
	32.52-GN2	09T308GN2		●									.375	.156	.031	
	21.50.5-FA2	060202FA2								●	●		.250	.094	.008	
	21.51-FA2	060204FA2								●	●		.250	.094	.016	
	21.52-FA2	060208FA2								●	●		.250	.094	.031	
	32.51-FA2	09T304FA2								●	●		.375	.156	.016	
	32.52-FA2	09T308FA2								●	●		.375	.156	.031	
	21.50.5-FS2	060202FS2			★							●	.250	.094	.008	
	21.51-FS2	060204FS2			★							●	.250	.094	.016	
	21.52-FS2	060208FS2										●	.250	.094	.031	
	32.50.5-FS2	09T302FS2			★							●	.375	.156	.008	
	32.51-FS2	09T304FS2			★							●	.375	.156	.016	
	32.52-FS2	09T308FS2			★							●	.375	.156	.031	
	21.50.5-TS2	060202TS2										●	.250	.094	.008	
	21.51-TS2	060204TS2										●	.250	.094	.016	
	21.52-TS2	060208TS2										●	.250	.094	.031	
	32.50.5-TS2	09T302TS2										●	.375	.156	.008	
	32.51-TS2	09T304TS2										●	.375	.156	.016	
	32.52-TS2	09T308TS2										●	.375	.156	.031	
	32.51-G2	09T304G2					●						.375	.156	.016	
	32.52-G2	09T308G2					●	●		□			.375	.156	.031	
	32.52-T2	09T308T2							□				.375	.156	.031	



● : Inventory maintained. ★ : Inventory maintained in Japan. □ : Non stock, produced to order only.
<1 insert in one case>

Work Material																
	H	Hardened Materials	●	◐	◐	●	◐	◐	✣	●	◐	◐	◐	**Cutting Conditions (Guide) :** ●: Stable Cutting ◐: General Cutting ✣: Unstable Cutting		
	K	Cast Iron														
	S	Heat-resistant Alloy, Titanium Alloy														
		Sintered Alloy											◐			

Shape	Order Number	(ISO) Number	Coated CBN		NEW	CBN							Dimensions (inch)			Geometry
			MBC010	MBC020	BC2020	MB810	MB8025	MB825	MB835	MB710	MB730	MB4020	D1	S1	Re	
NEW PETIT CUT 	✱1 TNP-CCGW32.52-GS2	TNP-CCGW09T308GS2	●										.375	.156	.031	
	✱1 32.51-G2	09T304G2					●						.375	.156	.016	
	✱1 32.52-G2	09T308G2					●	●					.375	.156	.031	
NEW PETIT CUT (With Wiper) 	✱2 NP-CCGW32.52-GAWS2	NP-CCGW09T308GAWS2		●			★						.375	.156	.031	
	32.52-GSWS2	09T308GSWS2	●										.375	.156	.031	
NEW PETIT CUT 	BF-CCGT32.51-TA2	BF-CCGT09T304TA2		●									.375	.156	.016	
	32.52-TA2	09T308TA2		●									.375	.156	.031	
NEW PETIT CUT 	NP-CCMB21.51G	NP-CCMB060204G						●					.250	.094	.016	

✱1 The order number is for the 10-insert package. Please specify insert number, grade and quantity.
✱2 Please refer to page 11 before using the wiper insert.

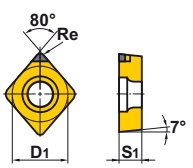
CBN TURNING INSERTS

Inserts

●7° Positive Inserts (With hole)

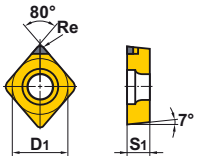
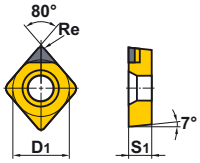
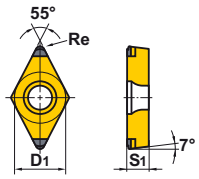
Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

Cutting Conditions (Guide) :
●: Stable Cutting ◐: General Cutting
✤: Unstable Cutting

Shape	Order Number	(ISO) Number	Coated CBN			CBN							Dimensions (inch)			Geometry
			MBC010	MBC020 (NEW)	BC8020	MB810	MB8025	MB825	MB835	MB710	MB730	MB4020	D1	S1	Re	
NEW PETIT CUT	NP-CCGW21.50.5GA	NP-CCGW060202GA		●									.250	.094	.008	
	21.51GA	060204GA		●									.250	.094	.016	
	21.52GA	060208GA		●									.250	.094	.031	
	32.50.5GA	09T302GA		●									.375	.156	.008	
	32.51GA	09T304GA		●									.375	.156	.016	
	32.52GA	09T308GA		●									.375	.156	.031	
	32.50.5GS	09T302GS								●	●		.375	.156	.008	
	32.51GS	09T304GS								●	●		.375	.156	.016	
	32.50.5GN	09T302GN		●									.375	.156	.008	
	32.51GN	09T304GN		●									.375	.156	.016	
	32.52GN	09T308GN		●									.375	.156	.031	
	21.50.5G	060202G					●	●					.250	.094	.008	
	21.51G	060204G					●	●					.250	.094	.016	
	21.52G	060208G					●						.250	.094	.031	
	32.50.5G	09T302G					●	●					.375	.156	.008	
	32.51G	09T304G					●	●		●			.375	.156	.016	
	32.52G	09T308G					●	●		●			.375	.156	.031	
	21.50.5F	060202F				●							.250	.094	.008	
	21.51F	060204F				●							.250	.094	.016	
	32.50.5F	09T302F				●							.375	.156	.008	
	32.51F	09T304F				●	□						.375	.156	.016	
	32.52F	09T308F					□						.375	.156	.031	
	21.50.5T	060202T							●				.250	.094	.008	
	21.51T	060204T							●				.250	.094	.016	
	32.50.5T	09T302T							●				.375	.156	.008	
	32.51T	09T304T					□		●				.375	.156	.016	
	32.52T	09T308T					□						.375	.156	.031	

● : Inventory maintained. □ : Non stock, produced to order only.
<1 insert in one case>

Work Material															Cutting Conditions (Guide) : ●: Stable Cutting ◐: General Cutting ✤: Unstable Cutting			
	H	Hardened Materials	●	◐	◐	●	◐	◐	✤	●	◐	◐						
	K	Cast Iron																
	S	Heat-resistant Alloy, Titanium Alloy																
		Sintered Alloy											◐					

Shape	Order Number	(ISO) Number	Coated CBN		NEW	CBN							Dimensions (inch)			Geometry
			MBC010	MBC020	BC8020	MB810	MB8025	MB825	MB835	MB710	MB730	MB4020	D1	S1	Re	
NEW PETIT CUT 	NP-CCMW03S102F	NP-CCMW03S102F				●							.156	.055	.008	
	03S104F	03S104F				●							.156	.055	.016	
	04T002F	04T002F				●							.187	.071	.008	
	04T004F	04T004F				●							.187	.071	.016	
	CCMW21.50.5	CCMW060202						□		□	□		.250	.094	.008	
	21.51	060204						□		□	□		.250	.094	.016	
	32.50.5	09T302						□		□	□		.375	.156	.008	
	32.51	09T304					●	●		□	□		.375	.156	.016	
	32.52	09T308					●	●		□	□		.375	.156	.031	
	431	120404						□		□	□		.500	.187	.016	
	432	120408						●		□	□		.500	.187	.031	
	433	120412						□		□	□		.500	.187	.047	
NEW PETIT CUT (With Breaker) 	BF-DCGT32.51-TA2	BF-DCGT11T304TA2		●									.375	.156	.016	
	32.52-TA2	11T308TA2		●									.375	.156	.031	

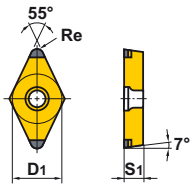
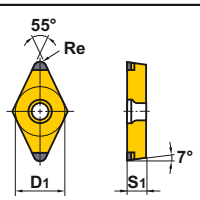
CBN TURNING INSERTS

Inserts

●7° Positive Inserts (With hole)

Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

Cutting Conditions (Guide) :
●: Stable Cutting ◐: General Cutting
✠: Unstable Cutting

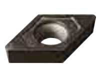
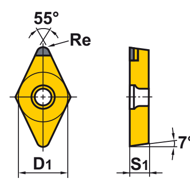
Shape	Order Number	(ISO) Number	Coated CBN		NEW	CBN							Dimensions (inch)			Geometry
			MBC010	MBC020	BC8020	MB810	MB8025	MB825	MB835	MB710	MB730	MB4020	D1	S1	Re	
NEW PETIT CUT	NP-DCGW21.50.5-GA2	NP-DCGW070202GA2		●	★								.250	.094	.008	
	21.51-GA2	070204GA2		●	●								.250	.094	.016	
	21.52-GA2	070208GA2		●	●								.250	.094	.031	
	32.50.5-GA2	11T302GA2		●	★								.375	.156	.008	
	32.51-GA2	11T304GA2		●	●								.375	.156	.016	
	32.52-GA2	11T308GA2		●	●								.375	.156	.031	
	21.51-GS2	070204GS2	●										.250	.094	.016	
	32.50.5-GS2	11T302GS2	★										.375	.156	.008	
	32.51-GS2	11T304GS2	●							●	●		.375	.156	.016	
	32.52-GS2	11T308GS2	●							●	●		.375	.156	.031	
	21.50.5-GN2	070202GN2		●									.250	.094	.008	
	21.51-GN2	070204GN2		●									.250	.094	.016	
	21.52-GN2	070208GN2		●									.250	.094	.031	
	32.50.5-GN2	11T302GN2		●									.375	.156	.008	
	32.51-GN2	11T304GN2		●									.375	.156	.016	
	32.52-GN2	11T308GN2		●									.375	.156	.031	
	32.51-FA2	11T304FA2								●	●		.375	.156	.016	
	32.52-FA2	11T308FA2								●	●		.375	.156	.031	
NEW	21.50.5-FS2	070202FS2			★								.250	.094	.008	
	21.51-FS2	070204FS2			★							●	.250	.094	.016	
	21.52-FS2	070208FS2			★							●	.250	.094	.031	
	32.50.5-FS2	11T302FS2			★							●	.375	.156	.008	
	32.51-FS2	11T304FS2			★							●	.375	.156	.016	
	32.52-FS2	11T308FS2			★							●	.375	.156	.031	
	21.51-TS2	070204TS2										●	.250	.094	.016	
	21.52-TS2	070208TS2										●	.250	.094	.031	
	32.50.5-TS2	11T302TS2										●	.375	.156	.008	
	32.51-TS2	11T304TS2										●	.375	.156	.016	
	32.52-TS2	11T308TS2										●	.375	.156	.031	
	32.51-G2	11T304G2					●						.375	.156	.016	
	32.52-G2	11T308G2					●						.375	.156	.031	
	32.52-F2	11T308F2								●			.375	.156	.031	
NEW PETIT CUT	✱1 TNP-DCGW32.51-G2	TNP-DCGW11T304G2					●						.375	.156	.016	
	✱1 32.52-G2	11T308G2					●						.375	.156	.031	

✱1 The order number is for the 10-insert package. Please specify insert number, grade and quantity.

● : Inventory maintained. ★ : Inventory maintained in Japan. □ : Non stock, produced to order only.
<1 insert in one case>

Cutting Conditions (Guide) :
●: Stable Cutting ◐: General Cutting
✤: Unstable Cutting

Work Material				MBC010	MBC020	BC8020	MB810	MB8025	MB825	MB835	MB710	MB730	MB4020
	H	Hardened Materials		●	◐	◐	●	◐	◐	✤			
	K	Cast Iron									●	◐	
	S	Heat-resistant Alloy, Titanium Alloy										◐	
		Sintered Alloy											◐

Shape	Order Number	(ISO) Number	Coated CBN: MBC010	Coated CBN: MBC020	Coated CBN: BC8020	CBN: MB810	CBN: MB8025	CBN: MB825	CBN: MB835	CBN: MB710	CBN: MB730	CBN: MB4020	Dimensions (inch): D1	S1	Re	Geometry
NEW PETIT CUT 	NP-DCGW21.50.5GA	NP-DCGW070202GA		●									.250	.094	.008	
	21.51GA	070204GA		●									.250	.094	.016	
	21.52GA	070208GA		●									.250	.094	.031	
	32.50.5GA	11T302GA		●									.375	.156	.008	
	32.51GA	11T304GA		●									.375	.156	.016	
	32.52GA	11T308GA		●									.375	.156	.031	
	32.50.5GS	11T302GS								●	●		.375	.156	.008	
	32.51GS	11T304GS								●	●		.375	.156	.016	
	21.50.5GN	070202GN		●									.250	.094	.008	
	21.51GN	070204GN		●									.250	.094	.016	
	21.52GN	070208GN		●									.250	.094	.031	
	32.50.5GN	11T302GN		●									.375	.156	.008	
	32.51GN	11T304GN		●									.375	.156	.016	
	32.52GN	11T308GN		●									.375	.156	.031	
	21.50.5G	070202G					●						.250	.094	.008	
	21.51G	070204G					●						.250	.094	.016	
	21.52G	070208G					●						.250	.094	.031	
	32.50.5G	11T302G					●	●					.375	.156	.008	
	32.51G	11T304G					●	●					.375	.156	.016	
	32.52G	11T308G					●	●					.375	.156	.031	
	21.50.5F	070202F				●							.250	.094	.008	
	21.51F	070204F				●							.250	.094	.016	
	32.50.5F	11T302F				●							.375	.156	.008	
	32.51F	11T304F				●	□						.375	.156	.016	
	32.52F	11T308F				□	□			□			.375	.156	.031	
	21.50.5T	070202T							●				.250	.094	.008	
	21.51T	070204T							●				.250	.094	.016	
	32.50.5T	11T302T							●				.375	.156	.008	
	32.51T	11T304T					□		●				.375	.156	.016	
	32.52T	11T308T					□		●				.375	.156	.031	

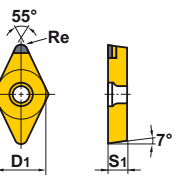
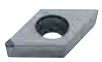
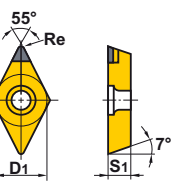
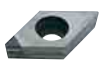
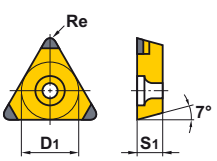
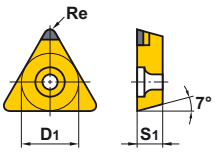
CBN TURNING INSERTS

Inserts

●7° Positive Inserts (With hole)

Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

Cutting Conditions (Guide) :
●: Stable Cutting ●: General Cutting
✤: Unstable Cutting

Shape	Order Number	(ISO) Number	Coated CBN			CBN						Dimensions (inch)			Geometry
			MBC010	MBC020 NEW	BC8020	MB810	MB8025	MB825	MB835	MB710	MB730	MB4020	D1	S1	Re	
NEW PETIT CUT	NP-DCMW21.51G	NP-DCMW070204G						★					.250	.094	.016	
	32.51G	11T304G						★					.375	.156	.016	
	DCMW21.50.5	DCMW070202						□		□	□		.250	.094	.008	
	21.51	070204						□		□	□		.250	.094	.016	
	32.50.5	11T302						□		□	□		.375	.156	.008	
	32.51	11T304					●	★		□	□		.375	.156	.016	
NEW PETIT CUT	NP-TCGW1.81.50.5-GA3	NP-TCGW090202GA3		●									.219	.094	.008	
	1.81.51-GA3	090204GA3		●									.219	.094	.016	
	1.81.52-GA3	090208GA3		●									.219	.094	.031	
	21.50.5-GA3	110202GA3		●									.250	.094	.008	
	21.51-GA3	110204GA3		●	●								.250	.094	.016	
	21.52-GA3	110208GA3		●	●								.250	.094	.031	
	2.521-GA3	130304GA3		★									.313	.125	.016	
	2.522-GA3	130308GA3		★									.313	.125	.031	
	32.51-GA3	16T304GA3		●	●								.375	.156	.016	
	32.52-GA3	16T308GA3		●									.375	.156	.031	
	21.51-FA3	110204FA3								●	●		.250	.094	.016	
	21.52-FA3	110208FA3								●	●		.250	.094	.031	
	21.51-FS3	110204FS3										●	.250	.094	.016	
	21.52-FS3	110208FS3										●	.250	.094	.031	
	21.51-TS3	110204TS3										●	.250	.094	.016	
	21.52-TS3	110208TS3										●	.250	.094	.031	
NEW PETIT CUT	NP-TCGW21.51GA	NP-TCGW110204GA		●									.250	.094	.016	
	21.52GA	110208GA		●									.250	.094	.031	
	32.51GA	16T304GA		●									.375	.156	.016	
	32.52GA	16T308GA		●									.375	.156	.031	

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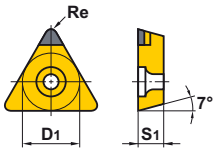
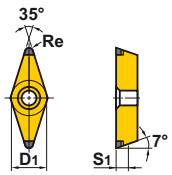
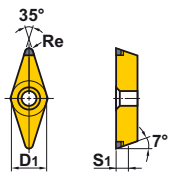
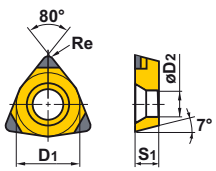
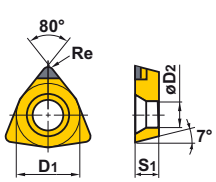
<1 insert in one case>

Work Material																		
	H	Hardened Materials	●	◐	◐	●	◐	◐	✣	●	◐	◐	●	◐				
	K	Cast Iron																
	S	Heat-resistant Alloy, Titanium Alloy																
		Sintered Alloy																

Cutting Conditions (Guide) :
●: Stable Cutting ◐: General Cutting
✣: Unstable Cutting

Shape	Order Number	(ISO) Number	Coated CBN		NEW	CBN							Dimensions (inch)			Geometry
			MBC010	MBC020	BC8020	MB810	MB8025	MB825	MB835	MB710	MB730	MB4020	D1	S1	Re	
	TCMW21.50.5	TCMW110202								□	□		.250	0.94	.008	
	21.51	110204								□	□		.250	0.94	.016	
NEW PETIT CUT 	NP-VCGW331-GA2	NP-VCGW160404GA2		●	★								.375	.187	.016	
	332-GA2	160408GA2		●	★								.375	.187	.031	
	NEW 331-FS2	160404FS2			★								.375	.187	.016	
	NEW 332-FS2	160408FS2			★								.375	.187	.031	
NEW PETIT CUT 	NP-VCGW331GA	NP-VCGW160404GA		●									.375	.187	.016	
	332GA	160408GA		●									.375	.187	.031	
NEW PETIT CUT 	NP-WCGW1.51.50.5-GA3	NP-WCGWL30202GA3		●									.187	.094	.008	
	1.51.51-GA3	L30204GA3		●									.187	.094	.016	
	21.50.5-GA3	040202GA3		●									.250	.094	.008	
	21.51-GA3	040204GA3		●									.250	.094	.016	
	32.51-GA3	06T304GA3		●									.375	.156	.016	
	32.52-GA3	06T308GA3		●									.375	.156	.031	
	1.51.50.5-GS3	L30202GS3	●										.187	.094	.008	
	1.51.51-GS3	L30204GS3	●										.187	.094	.016	
	21.50.5-GS3	040202GS3	●										.250	.094	.008	
	21.51-GS3	040204GS3	●										.250	.094	.016	
	32.51-GS3	06T304GS3	●										.375	.156	.016	
	32.52-GS3	06T308GS3	●										.375	.156	.031	
NEW PETIT CUT 	NP-WCMW1.51.51FA	NP-WCMWL30204FA									●		.187	.094	.016	
	1.51.52FA	L30208FA									●		.187	.094	.031	
	1.51.50.5G	L30202G					●	●					.187	.094	.008	
	1.51.51G	L30204G					●	●					.187	.094	.016	
	21.50.5G	040202G					●	●					.250	.094	.008	
	21.51G	040204G					●	●					.250	.094	.016	
	32.51G	06T304G					●	●					.375	.156	.016	
	32.52G	06T308G					●	●					.375	.156	.031	

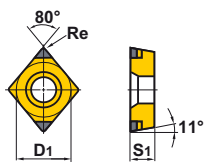
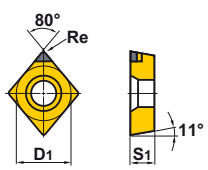
CBN TURNING INSERTS

Inserts

●11° Positive Inserts (With hole)

Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

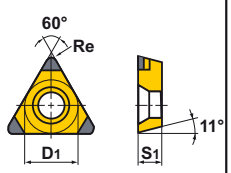
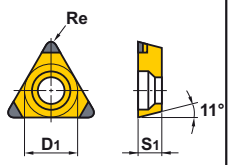
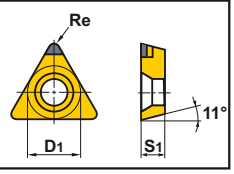
Cutting Conditions (Guide) :
●: Stable Cutting ◐: General Cutting
✤: Unstable Cutting

Shape	Order Number	(ISO) Number	Coated CBN			CBN							Dimensions (inch)			Geometry
			MBC010	MBC020	BC8020 (NEW)	MB810	MB8025	MB825	MB835	MB710	MB730	MB4020	D1	S1	Re	
NEW PETIT CUT	NP-CPGB2.51.51-GA2	NP-CPGB080204GA2		★	★								.313	.094	.016	
	2.51.52-GA2	080208GA2		★	★								.313	.094	.031	
	321-GA2	090304GA2		★									.375	.125	.016	
	322-GA2	090308GA2		★									.375	.125	.031	
	2.51.50.5-FS2	080202FS2										★	.313	.094	.008	
	2.51.51-FS2	080204FS2			★							★	.313	.094	.016	
	NEW 2.51.52-FS2	080208FS2			★								.313	.094	.031	
	320.5-FS2	090302FS2										●	.375	.125	.008	
	321-FS2	090304FS2										●	.375	.125	.016	
	322-FS2	090308FS2										●	.375	.125	.031	
NEW PETIT CUT	NP-CPMB2.51.51G	NP-CPMB080204G						●					.313	.094	.016	
	321G	090304G						●					.375	.125	.016	
																

● : Inventory maintained. ★ : Inventory maintained in Japan. □ : Non stock, produced to order only.
<1 insert in one case>

Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

Cutting Conditions (Guide) :
●: Stable Cutting ◐: General Cutting
✤: Unstable Cutting

Shape	Order Number	(ISO) Number	Coated CBN		NEW	CBN							Dimensions (inch)			Geometry
			MBC010	MBC020	BC8020	MB810	MB8025	MB825	MB835	MB710	MB730	MB4020	D1	S1	Re	
NEW PETIT CUT	NP-TPGB1.51.51-GA3	NP-TPGB080204GA3		●									.187	.094	.016	
	1.51.52-GA3	080208GA3		●									.187	.094	.031	
	1.81.51-GA3	090204GA3		●									.219	.094	.016	
	1.81.52-GA3	090208GA3		●									.219	.094	.031	
	221-GA3	110304GA3		★	★								.250	.125	.016	
	222-GA3	110308GA3		★	★								.250	.125	.031	
	321-GA3	160304GA3		★	★								.375	.125	.016	
	322-GA3	160308GA3		★	●								.375	.125	.031	
	1.81.50.5-FS3	090202FS3										●	.219	.094	.008	
	1.81.51-FS3	090204FS3										●	.219	.094	.016	
	220.5-FS3	110302FS3										●	.250	.125	.008	
	221-FS3	110304FS3			★							●	.250	.125	.016	
	222-FS3	110308FS3			★							●	.250	.125	.031	
	NEW 321-FS3	160304FS3			★								.375	.125	.016	
	NEW 322-FS3	160308FS3			★								.375	.125	.031	
NEW PETIT CUT	NP-TPGX1.51.50.5-GS3	NP-TPGX080202GS3	★										.187	.094	.008	
	1.51.51-GS3	080204GS3	★										.187	.094	.016	
	1.81.50.5-GS3	090202GS3	★										.219	.094	.008	
	1.81.51-GS3	090204GS3	★										.219	.094	.016	
	221-GS3	110304GS3	★										.250	.125	.016	
	222-GS3	110308GS3	★										.250	.125	.031	
NEW PETIT CUT	NP-TPMB1.51.51G	NP-TPMB080204G						●					.187	.094	.016	
	1.81.51G	090204G						●					.219	.094	.016	
	221G	110304G						★					.250	.125	.016	
	321G	160304G						●					.375	.125	.016	

CBN TURNING INSERTS

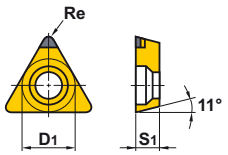
Inserts

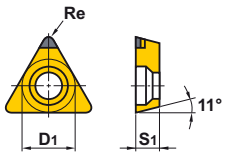
●11° Positive Inserts (With hole)

Work Material		
	H	Hardened Materials
	K	Cast Iron
	S	Heat-resistant Alloy, Titanium Alloy
		Sintered Alloy

Cutting Conditions (Guide) :
●: Stable Cutting ●: General Cutting
✤: Unstable Cutting

Shape	Order Number	(ISO) Number	Coated CBN			CBN							Dimensions (inch)			Geometry
			MBC010	MBC020	BC8020 (NEW)	MB810	MB8025	MB825	MB835	MB710	MB730	MB4020	D1	S1	Re	
NEW PETIT CUT	NP-TPGX1.81.51G	NP-TPGX090204G					●						.219	.094	.016	
	1.81.52G	090208G					●						.219	.094	.031	
	221G	110304G					●	●		●			.250	.125	.016	
	222G	110308G					●	●		●			.250	.125	.031	
	1.51.50.5F	080202F				★							.187	.094	.008	
	1.51.51F	080204F				★							.187	.094	.016	
	1.81.50.5F	090202F				★							.219	.094	.008	
	1.81.51F	090204F				★							.219	.094	.016	
	221F	110304F				●				●			.250	.125	.016	
	222F	110308F				●				●			.250	.125	.031	
	1.51.50.5T	080202T							★				.187	.094	.008	
	1.51.51T	080204T							★				.187	.094	.016	
	1.81.50.5T	090202T							★				.219	.094	.008	
	1.81.51T	090204T							★				.219	.094	.016	
	221T	110304T						●	●		●		.250	.125	.016	
	222T	110308T						●	●		●		.250	.125	.031	
	TPGX1.51.50.5	TPGX080202						□		★	★		.187	.094	.008	
	1.51.51	080204				★		★		★	★		.187	.094	.016	
	1.51.52	080208						□		□	□		.187	.094	.031	
	1.81.50.5	090202						□		★	★		.219	.094	.008	
	1.81.51	090204				★		★		★	★		.219	.094	.016	
	1.81.52	090208						□		□	□		.219	.094	.031	
	220.5	110302						□		□	□		.250	.125	.008	
	221	110304				●		●		●	●		.250	.125	.016	
	222	110308				●		★		●	●		.250	.125	.031	
	321	160304						●		●	□		.375	.125	.016	
	322	160308						★		●	□		.375	.125	.031	
	331	160404						★		□	□		.375	.187	.016	
	332	160408						★		□	□		.375	.187	.031	

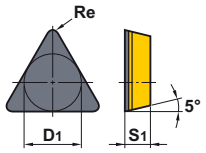
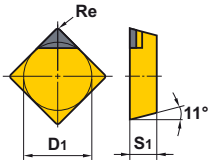
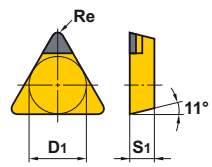
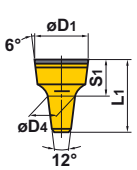
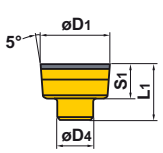




● : Inventory maintained. ★ : Inventory maintained in Japan. □ : Non stock, produced to order only.
<1 insert in one case>

Work Material		
H	Hardened Materials	
K	Cast Iron	
S	Heat-resistant Alloy, Titanium Alloy	
	Sintered Alloy	

Cutting Conditions (Guide) :
●: Stable Cutting ◐: General Cutting
✠: Unstable Cutting

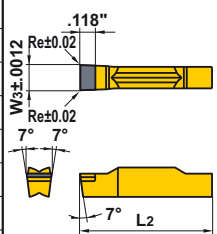
Shape	Order Number	(ISO) Number	Coated CBN (NEW)			CBN							Dimensions (inch)							Geometry
			MBC010	MBC020	BC8020	MB810	MB8025	MB825	MB835	MB710	MB730	MB4020	D1	S1	Re	W3	L1	L2	D4	
	TBG1.211	TBGN060104				★		★		★	□		.156	.063	.016	—	—	—	—	
	1.212	060108				★		★		★	□		.156	.063	.031	—	—	—	—	
	SPG320.5	SPGN090302						□		□	□		.375	.125	.008	—	—	—	—	
	321	090304						★		●	□		.375	.125	.016	—	—	—	—	
	322	090308						★		●	□		.375	.125	.031	—	—	—	—	
	323	090312						★		□	□		.375	.125	.047	—	—	—	—	
	421	120304						□		●	★		.500	.125	.016	—	—	—	—	
	422	120308						★		●	★		.500	.125	.031	—	—	—	—	
	423	120312						★		□	□		.500	.125	.047	—	—	—	—	
	432	120408						□		□	□		.500	.187	.031	—	—	—	—	
	433	120412						□		□	□		.500	.187	.047	—	—	—	—	
	TPG1.81.51	TPGN090204						★		□	□		.219	.094	.016	—	—	—	—	
	220.5	110302						□		□	□		.250	.125	.008	—	—	—	—	
	221	110304						●		●	●		.250	.125	.016	—	—	—	—	
	222	110308						□		□	□		.250	.125	.031	—	—	—	—	
	321	160304						●		●	●		.375	.125	.016	—	—	—	—	
	322	160308					●	●		●	●		.375	.125	.031	—	—	—	—	
	323	160312						□		□	□		.375	.125	.047	—	—	—	—	
	332	160408						●		□	□		.375	.187	.031	—	—	—	—	
	432	220408						★		□	□		.500	.187	.031	—	—	—	—	
	RTG05A	RTG05A						★					.197	.138	—	—	.295	—	.098	
	06A	06A						★					.236	.138	—	—	.295	—	.138	
	07A	07A						★					.276	.197	—	—	.433	—	.138	
	08A	08A						★					.315	.197	—	—	.433	—	.177	
	10A	10A						★					.394	.256	—	—	.551	—	.217	
	RBG10	RBG10								★			.394	.197	—	—	.354	—	.197	
	12	12								★			.472	.236	—	—	.433	—	.236	
	16	16								★			.630	.315	—	—	.512	—	.315	

CBN TURNING INSERTS

Inserts

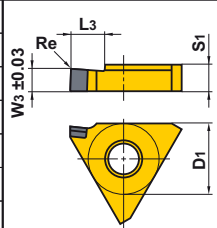
Work Material		
H	Hardened Materials	
K	Cast Iron	
S	Heat-resistant Alloy, Titanium Alloy	
	Sintered Alloy	

Cutting Conditions (Guide) :
●: Stable Cutting ◐: General Cutting
✠: Unstable Cutting

Shape	Order Number	(ISO) Number	Coated CBN (NEW)			CBN							Dimensions (inch)							Geometry
			MBC010	MBC020	BC8020	MB810	MB8025	MB825	MB835	MB710	MB730	MB4020	D1	S1	Re	W3	L1	L2	L3	
	GY1G0200D020N-GFGS	GY1G0200D020N-GFGS					●						—	—	.008	.079	—	.815	—	
	0239E020N-GFGS	0239E020N-GFGS					●						—	—	.008	.094	—	.815	—	
	0250E020N-GFGS	0250E020N-GFGS					●						—	—	.008	.098	—	.815	—	
	0300F020N-GFGS	0300F020N-GFGS					●						—	—	.008	.118	—	.815	—	
	0318F020N-GFGS	0318F020N-GFGS					●						—	—	.008	.125	—	.815	—	
	0400G020N-GFGS	0400G020N-GFGS					●						—	—	.008	.157	—	1.010	—	
	0475H020N-GFGS	0475H020N-GFGS					●						—	—	.008	.187	—	1.010	—	
	0500H020N-GFGS	0500H020N-GFGS					●						—	—	.008	.197	—	1.010	—	

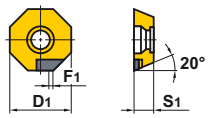
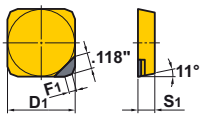
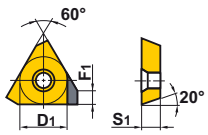
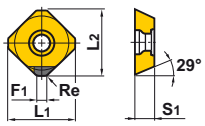
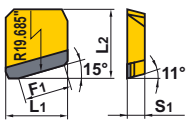
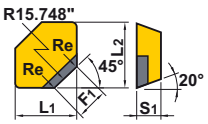
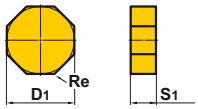
Work Material		
H	Hardened Materials	
K	Cast Iron	
S	Heat-resistant Alloy, Titanium Alloy	
	Sintered Alloy	

Cutting Conditions (Guide) :
●: Stable Cutting ◐: General Cutting
✠: Unstable Cutting

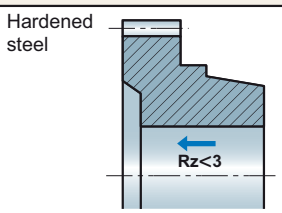
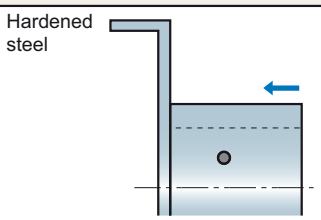
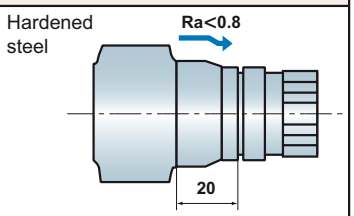
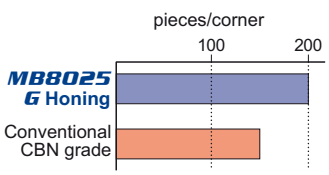
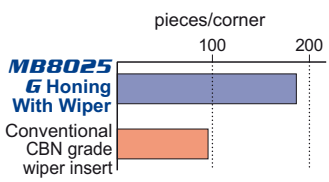
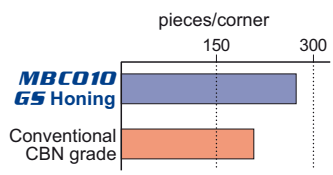
Shape	Order Number	(ISO) Number	Coated CBN (NEW)			CBN							Dimensions (mm)							Geometry
			MBC010	MBC020	BC8020	MB810	MB8025	MB825	MB835	MB710	MB730	MB4020	D1	S1	Re	W3	L1	L2	L3	
	MGTR43125	MGTR43125					★						12.7	4.76	0.2	1.25	—	—	1.2	
	43150	43150					★						12.7	4.76	0.2	1.5	—	—	3	
	43200	43200					★						12.7	4.76	0.2	2	—	—	3	
	43250	43250					★						12.7	4.76	0.3	2.5	—	—	4.5	
	43300	43300					★						12.7	4.76	0.3	3	—	—	4.5	
	43350	43350					★						12.7	4.76	0.3	3.5	—	—	4.5	
	43400	43400					★						12.7	4.76	0.3	4	—	—	4.5	

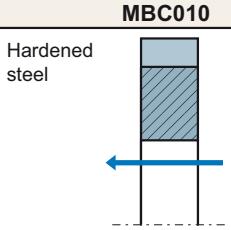
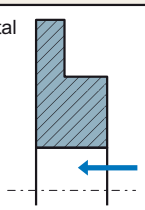
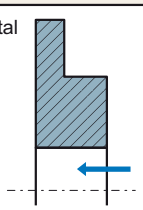
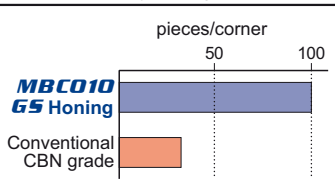
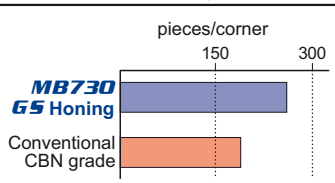
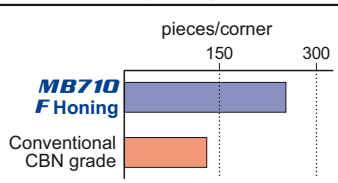
Right hand insert only.

● : Inventory maintained. ★ : Inventory maintained in Japan. □ : Non stock, produced to order only.

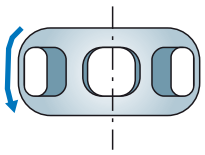
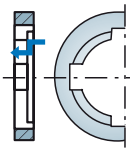
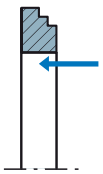
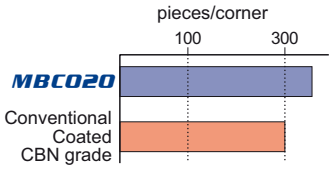
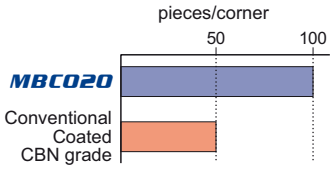
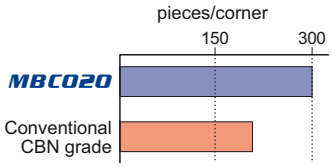
Geometry	Order Number	(ISO) Number	Class	CBN				Dimensions(inch)					
				MB710	MB730	MB835	BC5030	L_1	L_2	D_1	S_1	F_1	Re
BOE	**OEMX12T3ETR1**	**OEMX12T3ETR1**	M		●	●		—	—	.500	.156	.039	—
	**12T3ETR5**	**12T3ETR5**	M		●	●		—	—	.500	.156	.197	—
FBP415	**SPEN42EETR1**	**SPEN1203EETR1**	E	★				—	—	.500	.125	.055	—
													
PMF	**TPEW1303ZPTR2**	**TPEW1303ZPTR2**	E	●				—	—	.313	.125	.079	—
													
ASX445	**NP-WEEW13T3AGTR3C**	**NP-WEEW13T3AGTR3C**	E	●				.649	.651	—	.156	.130	.059
													
FBP415	**WPC42EETR10C**	**WPC42EETR10C**	C	●				.500	.597	—	.125	.394	—
													
SE445	**WEC42AFTR5C**	**WEC42AFTR5C**	C	●				.500	.604	—	.125	.197	.039
													
AOX445	**SL-ONEN120404ASN**	**SL-ONEN120404ASN**	E				★	—	—	.500	.187	—	.016
													

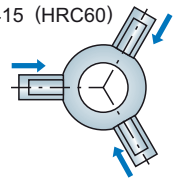
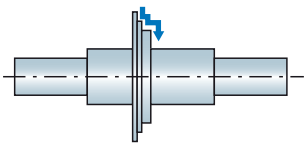
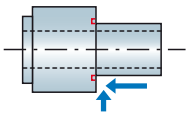
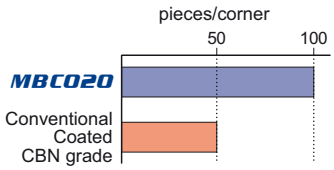
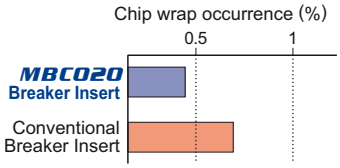
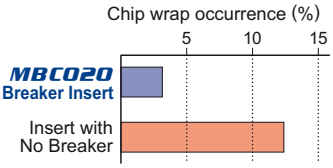
Application Examples

Insert	NP-CCGW32.52-G2	NP-CNGA432-GW2	NP-DNGA432-GS2
CBN Grade	MB8025	MB8025	MBC010
Workpiece			
Component	Gear	Gear	Axle component
Cutting Conditions: Cutting Speed (SFM)	655	425	755
Cutting Conditions: Feed (IPR)	.002	.007	.003
Cutting Conditions: Depth of Cut (inch)	.003	.004	.004
Cutting Conditions: Coolant	Dry cutting	Wet cutting	Wet cutting
Results	 MB8025 with G honing could machine 200 parts, an increase of 30% compared to a conventional grade.	 An MB8025 wiper insert with G honing gave double tool life.	 CBN, MBC010 with GS honing. 250 components machined compared to 190 with a conventional grade.

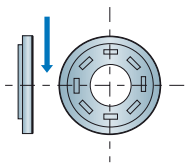
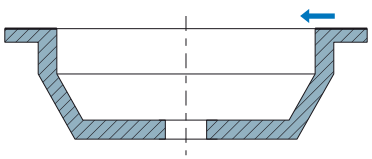
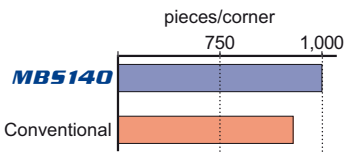
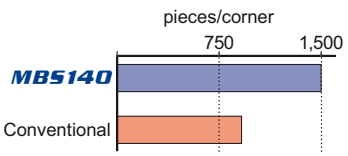
Insert	NP-DNGA432-GS2	NP-TNMA332GS	NP-DCGW32.52-F2
CBN Grade	MBC010	MB730	MB710
Workpiece			
Component	Gear	Sintered part	Sintered part
Cutting Conditions: Cutting Speed (SFM)	525	175	490
Cutting Conditions: Feed (IPR)	.004	.002	.003
Cutting Conditions: Depth of Cut (inch)	.008	.005	.004
Cutting Conditions: Coolant	Dry cutting	Wet cutting	Dry cutting
Results	 MBC010 with a GS honing gave a 300% increase in tool life.	 MB730 with GS honing allowed machining up to 250 parts before changing, an increase of 25%.	 MB710 with F honing gave double tool life compared to a conventional tool grade.

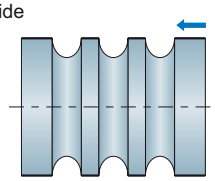
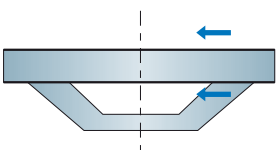
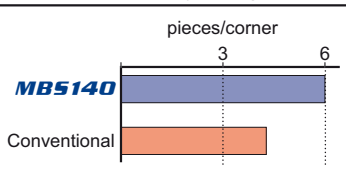
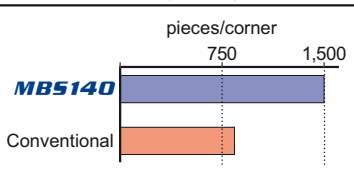
Application Examples

Insert		NP-TNGA333-TA6	NP-TNGA332-TA6	NP-CNGA432-GA4
CBN Grade		MBC020	MBC020	MBC020
Workpiece		DIN16MnCr5 (HRC60) 	DIN 20MoCrS4 (HRC60) 	JIS SUJ2 (HRC60) 
Component		Joint parts	Gear parts	Gear parts
Cutting Conditions	Cutting Speed (SFM)	390	460	425
	Feed (IPR)	.005	.003	.006
	Depth of Cut (inch)	.006	.028	.008
	Coolant	Dry cutting	Dry cutting	Dry cutting
Results		pieces/corner  A conventional grade gave unstable tool life, machining between 100-300 pieces, whilst MBC020 displayed a more stable and extended tool life by machining up to 350 pieces.	pieces/corner  MBC020 doubled the components machined compared to a conventional grade.	pieces/corner  A conventional grade reached the end of tool life after machining 150 pieces, MBC020 doubled tool life by machining up to 300 pieces.

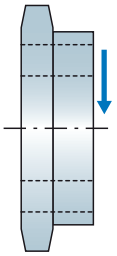
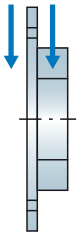
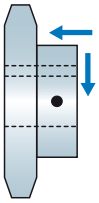
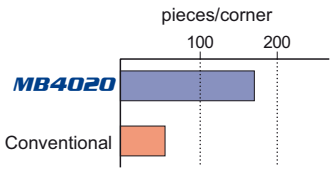
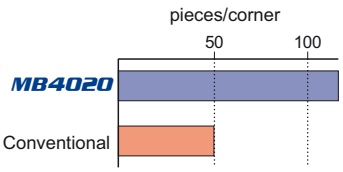
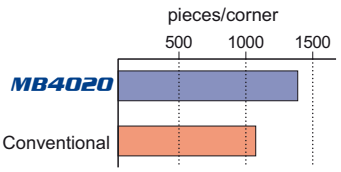
Insert		NP-CNGA432-GAW2	BF-CNGG431-TA4	BF-DCGT32.51-TA2
CBN Grade		MBC020	MBC020	MBC020
Workpiece		JIS SCM415 (HRC60) 	Hardened steel (HRC60) 	Hardened steel (HRC60) 
Component		Joint parts	Shaft	Gear parts
Cutting Conditions	Cutting Speed (SFM)	330	395	490
	Feed (IPR)	.010	.003	.008
	Depth of Cut (inch)	.008	.004 – .006	.006
	Coolant	Dry cutting	Wet cutting	Wet cutting
Results		pieces/corner  MBC020 doubled the components machined compared to a conventional grade.	Chip wrap occurrence (%)  Lower chip wrap occurance and longer insert life when machining 400 pieces per corner.	Chip wrap occurrence (%)  Lower chip wrap occurance and longer insert life when machining 240 pieces per corner.

Application Examples

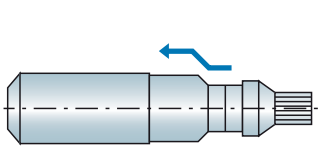
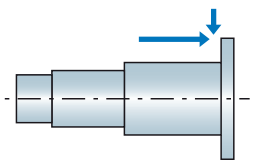
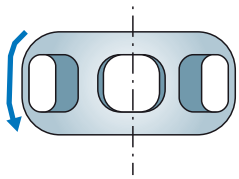
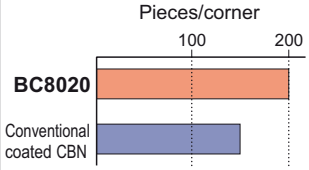
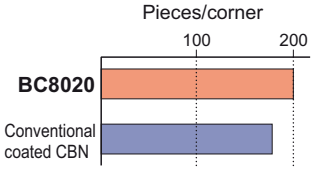
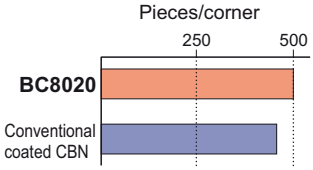
Insert	RNGN42	SNGN432
CBN Grade	MBS140	MBS140
Workpiece	Cast iron 	Cast iron 
Component	Clutch parts	Brake drum
Cutting Conditions: Cutting Speed (SFM)	1640	2300
Cutting Conditions: Feed (IPR)	.012	.012
Cutting Conditions: Depth of Cut (inch)	.138	.118
Cutting Conditions: Coolant	Dry cutting	Dry cutting
Results	 A conventional solid CBN tool life was 900 parts due to large wear. MBS140 could extend the tool life to 1000 parts.	 A conventional solid CBN tool life was 850 parts due to large wear. MBS140 could extend the tool life to 1500 parts.

Insert	RNGN43	SNGN434
CBN Grade	MBS140	MBS140
Workpiece	Tungsten carbide 	Cast iron 
Component	Tungsten carbide roll	Brake disc
Cutting Conditions: Cutting Speed (SFM)	50	2300
Cutting Conditions: Feed (IPR)	.006	.012
Cutting Conditions: Depth of Cut (inch)	.004	.118
Cutting Conditions: Coolant	Dry cutting	Dry cutting
Results	 Longer tool life than a conventional single-sided CBN insert. The economical double-sided MBS140 insert reduced tool costs.	 A conventional solid CBN had a tool life of 800 parts. MBS140 could lengthen the tool life to 1500 parts.

Application Examples

Insert	NP-TNGA331-TS3	NP-TNGA332-TS3	NP-CNGA431-FS2
CBN Grade	**MB4020**	**MB4020**	**MB4020**
Workpiece	Carburized and quenched alloy Interrupted facing 	Carburized and quenched alloy Interrupted machining of flange end faces 	General sintered alloy External interrupted facing 
Component	Variable valve parts	Variable valve parts	Sprocket parts
Cutting Conditions: Cutting Speed (SFM)	460	360	490
Cutting Conditions: Feed (IPR)	.002	.004	.004–.006
Cutting Conditions: Depth of Cut (inch)	.006	.002	.008
Cutting Conditions: Coolant	Wet cutting	Dry cutting	Dry cutting
Results	 A conventional CBN reached the end of tool life after machining 50 parts due to burr formation. MB4020 enabled longer tool life by machining up to 170 parts.	 A conventional grade showed unstable tool life after machining 20 – 50 parts due to the defect. MB4020 enabled stable machining with longer tool life up over 120 parts.	 MB4020 maintained a good surface finish after machining 1400 parts compared with only 1100 parts from a conventional grade.

Application Examples

Insert		BM-DNGM432-TA2	NP-CNGA432-GA2	NP-CNGA432-GA2
Workpiece		Hardened steel (60HRC) 	Hardened steel (60HRC) 	Hardened steel (60HRC) 
Component		Shaft	Shaft	Joint parts
Cutting Conditions	Cutting Speed (SFM)	425	425	395
	Feed (IPR)	.005	.006	.006
	Depth of Cut (inch)	.010	.020	.006
Coolant		Dry	Wet	Dry
Results		Pieces/corner  Conventional CBN tool life was reached at 500 parts, whereas BC8020 offered stable machining of up to 1000 parts.	Pieces/corner  Conventional coated CBN resulted in 180 parts, whereas the BC8020 was able to machine up to 200 parts with high stability.	Pieces/corner  Conventional CBN tool life was reached at 450 parts, whereas BC8020 could machine up to 500 parts.

For your safety
●Do not touch sharp parts or chips without wearing gloves. ●Use tools under recommended cutting conditions, and exchange tools before excessive wear occurs. ●Chips become extremely hot, scattered over and may be stretched. Ensure safety guards and goggles are used. ●In case of using non-water soluble oil, make sure to have a fire prevention countermeasure. ●Use the provided wrench, and ensure the inserts and spare parts are damped securely.

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