

CBN Grade for Sintered Alloy and Cast Iron

# MB4020

Series  
Expansion

**Prevents burr formation and stabilizes dimensional accuracy of finished components.**



# CBN Grade for Sintered Alloy and Cast Iron

# **MB4020**

**Increasing the CBN particle content and bonding strength makes it suitable for machining various sintered materials.**

## High Cutting Edge Strength

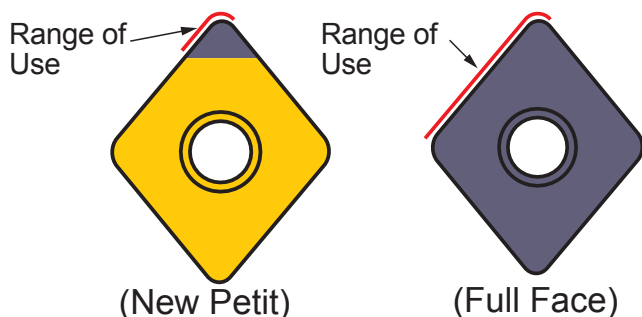
Special binder and the particle-activated sintering method promotes binding of the CBN particles, leading to higher cutting edge strength. MB4020 has high cutting edge strength properties with a sharper edge geometry that is ideal for preventing burrs.

## Excellent Welding Resistance

A chemically stable, high CBN content reduces welding of the work material on the cutting edge and stabilizes dimensional accuracy of finished components.

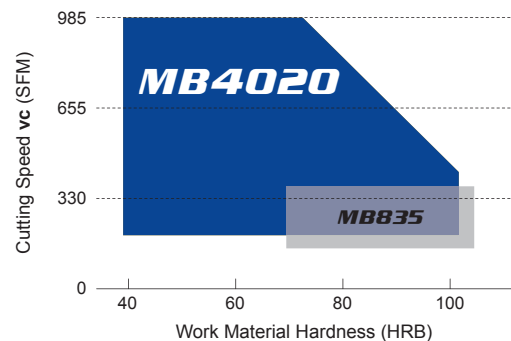
## Full Face CBN

Full face and solid CBN can be used for higher depths of cut and chamfering when conventional brazed tip CBN inserts are not suitable.



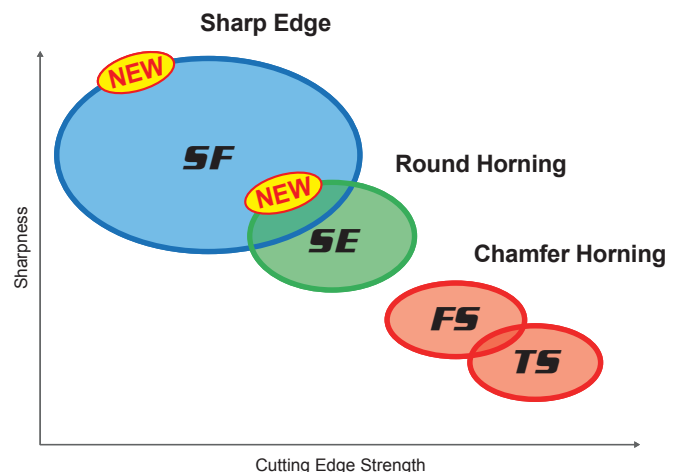
Refer to the cutting conditions on page 9 for the maximum recommended depth of cut.

## Application Range



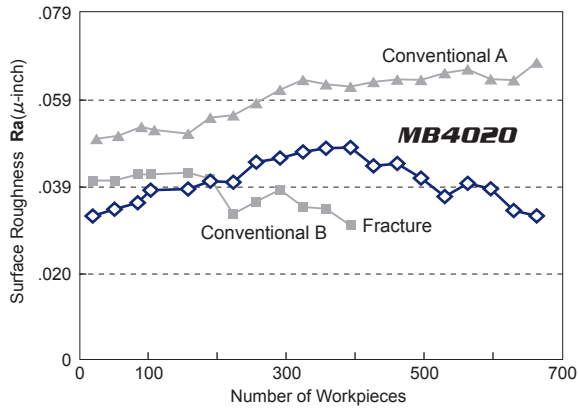
## A Wide Range of Honing Types

MB4020 with wide range of hones including the SF and SE. The SF hone is able to control burrs with the increased insert hone sharpness. The sharpness of the SF hone reduces cutting forces with reduced cutting resistance and helps control burrs that otherwise may occur. The SF hone is the first recommendation for precision surface finish requirements. If insert chipping occurs then use SE, FS and TS hones recommended for the balance of hone edge strength and the reduction of insert chipping.



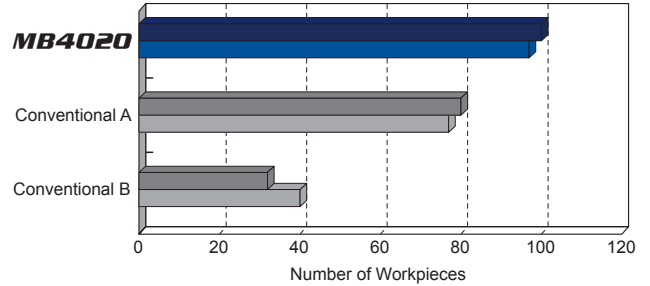
# Cutting Performance

Continuous Machining of High Strength Sintered Alloys



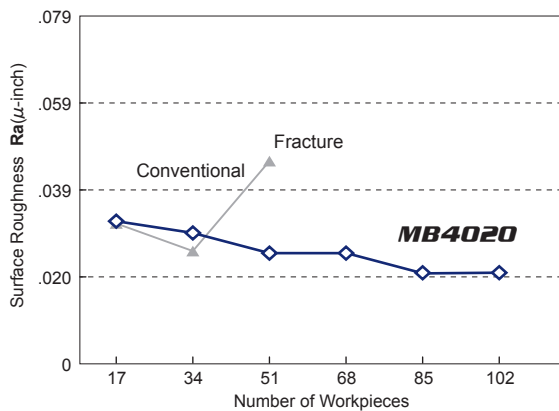
<Cutting Conditions>  
 Work Material : High Strength Sintered Alloys (75 HRB)  
 Insert : NP-CNGA432-FS2  
 Cutting Speed : 625 SFM  
 Feed Rate : .006 IPR  
 Depth of Cut : .004 inch  
 Cutting Mode : Wet Cutting

Interrupted Machining of High Strength Sintered Alloys



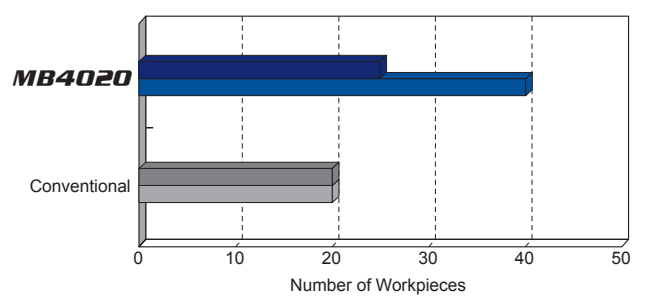
<Cutting Conditions>  
 Work Material : High Strength Sintered Alloys (75 HRB)  
 Insert : NP-CNGA432-FS2  
 Cutting Speed : 625 SFM  
 Feed Rate : .006 IPR  
 Depth of Cut : .004 inch  
 Cutting Mode : Wet Cutting

Continuous Machining of Hardened Sintered Alloys



<Cutting Conditions>  
 Work Material : Hardened Sintered Alloys (40 HRB)  
 Insert : NP-CNGA432-FS2  
 Cutting Speed : 330 SFM  
 Feed Rate : .006 IPR  
 Depth of Cut : .004 inch  
 Cutting Mode : Wet Cutting

Interrupted Machining of Hardened Sintered Alloys

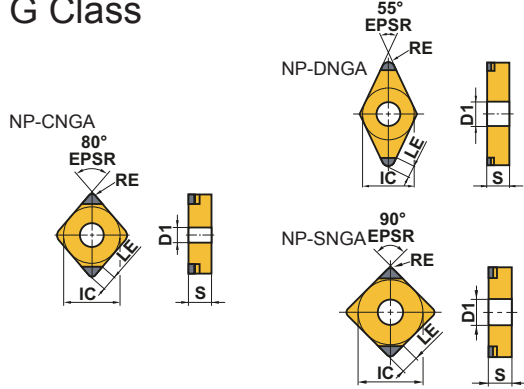


<Cutting Conditions>  
 Work Material : Hardened Sintered Alloys (40 HRB)  
 Insert : NP-CNGA432-FS2  
 Cutting Speed : 330 SFM  
 Feed Rate : .006 IPR  
 Depth of Cut : .004 inch  
 Cutting Mode : Wet Cutting

# CBN Grade for Sintered Alloy and Cast Iron

## Negative Inserts (with hole)

### G Class



NEW PETIT CUT	NEW PETIT CUT	NEW PETIT CUT
NP_002	NP_002	NP_002

(inch)

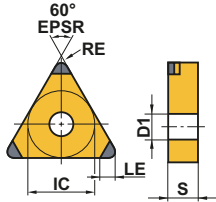
Order Number	MB4020	Cutting Edges	IC	S	RE	D1	LE
NEW NP-CNGA431-SF2	●	2	.500	.187	.016	.203	.075
NEW NP-CNGA432-SF2	●	2	.500	.187	.031	.203	.083
NEW NP-CNGA433-SF2	●	2	.500	.187	.047	.203	.091
NEW NP-CNGA431-SE2	●	2	.500	.187	.016	.203	.075
NEW NP-CNGA432-SE2	●	2	.500	.187	.031	.203	.083
NEW NP-CNGA433-SE2	●	2	.500	.187	.047	.203	.091
NP-CNGA431-GS2	●	2	.500	.187	.016	.203	.075
NP-CNGA432-GS2	●	2	.500	.187	.031	.203	.083
NP-CNGA433-GS2	●	2	.500	.187	.047	.203	.091
NP-CNGA431-FS2	●	2	.500	.187	.016	.203	.075
NP-CNGA432-FS2	●	2	.500	.187	.031	.203	.083
NP-CNGA433-FS2	●	2	.500	.187	.047	.203	.091
NP-CNGA431-TS2	●	2	.500	.187	.016	.203	.075
NP-CNGA432-TS2	●	2	.500	.187	.031	.203	.083
NP-CNGA433-TS2	●	2	.500	.187	.047	.203	.091
NEW NP-DNGA431-SF2	●	2	.500	.187	.016	.203	.083
NEW NP-DNGA432-SF2	●	2	.500	.187	.031	.203	.079
NEW NP-DNGA433-SF2	●	2	.500	.187	.047	.203	.075
NEW NP-DNGA431-SE2	●	2	.500	.187	.016	.203	.083
NEW NP-DNGA432-SE2	●	2	.500	.187	.031	.203	.079
NEW NP-DNGA433-SE2	●	2	.500	.187	.047	.203	.075
NP-DNGA431-FS2	●	2	.500	.187	.016	.203	.083
NP-DNGA432-FS2	●	2	.500	.187	.031	.203	.079
NP-DNGA433-FS2	●	2	.500	.187	.047	.203	.075
NP-DNGA431-TS2	●	2	.500	.187	.016	.203	.083
NP-DNGA432-TS2	●	2	.500	.187	.031	.203	.079
NP-DNGA433-TS2	●	2	.500	.187	.047	.203	.075
NEW NP-SNGA431-SF2	●	2	.500	.187	.016	.203	.083
NEW NP-SNGA432-SF2	●	2	.500	.187	.031	.203	.091
NEW NP-SNGA433-SF2	●	2	.500	.187	.047	.203	.098
NEW NP-SNGA431-SE2	●	2	.500	.187	.016	.203	.083
NEW NP-SNGA432-SE2	●	2	.500	.187	.031	.203	.091
NEW NP-SNGA433-SE2	●	2	.500	.187	.047	.203	.098
NP-SNGA431-FS2	●	2	.500	.187	.016	.203	.083
NP-SNGA432-FS2	●	2	.500	.187	.031	.203	.091
NP-SNGA433-FS2	●	2	.500	.187	.047	.203	.098
NP-SNGA431-TS2	●	2	.500	.187	.016	.203	.083
NP-SNGA432-TS2	●	2	.500	.187	.031	.203	.091
NP-SNGA433-TS2	●	2	.500	.187	.047	.203	.098

● : Inventory maintained.

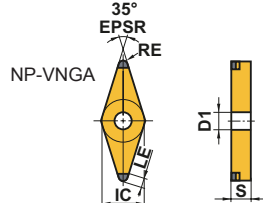
# Negative Inserts (with hole)

## G Class

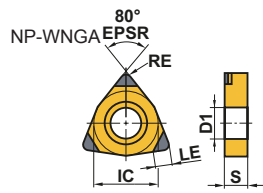
NP-TNGA



NP-VNGA



NP-WNGA



NEW PETIT CUT	NEW PETIT CUT	NEW PETIT CUT	
NP_003	NP_002	NP_003	

(inch)

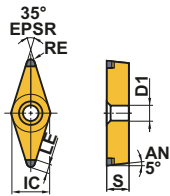
Order Number	MB4020	Cutting Edges	IC	S	RE	D1	LE
NEW NP-TNGA331-SF3	●	3	.375	.187	.016	.150	.063
NEW NP-TNGA332-SF3	●	3	.375	.187	.031	.150	.071
NEW NP-TNGA333-SF3	●	3	.375	.187	.047	.150	.075
NEW NP-TNGA331-SE3	●	3	.375	.187	.016	.150	.063
NEW NP-TNGA332-SE3	●	3	.375	.187	.031	.150	.071
NEW NP-TNGA333-SE3	●	3	.375	.187	.047	.150	.075
NP-TNGA331-FS3	●	3	.375	.187	.016	.150	.063
NP-TNGA332-FS3	●	3	.375	.187	.031	.150	.071
NP-TNGA333-FS3	●	3	.375	.187	.047	.150	.075
NP-TNGA331-TS3	●	3	.375	.187	.016	.150	.063
NP-TNGA332-TS3	●	3	.375	.187	.031	.150	.071
NP-TNGA333-TS3	●	3	.375	.187	.047	.150	.075
NEW NP-VNGA331-SF2	●	2	.375	.187	.016	.150	.098
NEW NP-VNGA332-SF2	●	2	.375	.187	.031	.150	.079
NEW NP-VNGA331-SE2	●	2	.375	.187	.016	.150	.098
NEW NP-VNGA332-SE2	●	2	.375	.187	.031	.150	.079
NP-VNGA331-GS2	●	2	.375	.187	.016	.150	.098
NP-VNGA332-GS2	●	2	.375	.187	.031	.150	.079
NP-VNGA331-FS2	●	2	.375	.187	.016	.150	.098
NP-VNGA332-FS2	●	2	.375	.187	.031	.150	.079
NP-VNGA331-TS2	●	2	.375	.187	.016	.150	.098
NP-VNGA332-TS2	●	2	.375	.187	.031	.150	.079
NEW NP-WNGA432-SF3	●	3	.500	.187	.031	.203	.083
NEW NP-WNGA432-SE3	●	3	.500	.187	.031	.203	.083
NP-WNGA432-FS3	●	3	.500	.187	.031	.203	.083
NP-WNGA432-TS3	●	3	.500	.187	.031	.203	.083

# CBN Grade for Sintered Alloy and Cast Iron

## Positive Inserts (with hole)

### G Class

NP-VBGW



NEW PETIT CUT			
NP_002			

(inch)

Order Number	MB4020	Cutting Edges	IC	S	RE	D1	LE
<b>NEW</b> NP-VBGW221-SF2	●	2	.250	.125	.016	.112	.098
<b>NEW</b> NP-VBGW222-SF2	●	2	.250	.125	.031	.112	.079
<b>NEW</b> NP-VBGW331-SF2	●	2	.375	.187	.016	.174	.098
<b>NEW</b> NP-VBGW332-SF2	●	2	.375	.187	.031	.174	.079
<b>NEW</b> NP-VBGW221-SE2	●	2	.250	.125	.016	.112	.098
<b>NEW</b> NP-VBGW222-SE2	●	2	.250	.125	.031	.112	.079
<b>NEW</b> NP-VBGW331-SE2	●	2	.375	.187	.016	.174	.098
<b>NEW</b> NP-VBGW332-SE2	●	2	.375	.187	.031	.174	.079
NP-VBGW221-FS2	●	2	.250	.125	.016	.112	.098
NP-VBGW222-FS2	●	2	.250	.125	.031	.112	.079
NP-VBGW331-FS2	●	2	.375	.187	.016	.174	.098
NP-VBGW332-FS2	●	2	.375	.187	.031	.174	.079
NP-VBGW221-TS2	●	2	.250	.125	.016	.112	.098
NP-VBGW222-TS2	●	2	.250	.125	.031	.112	.079
NP-VBGW331-TS2	●	2	.375	.187	.016	.174	.098
NP-VBGW332-TS2	●	2	.375	.187	.031	.174	.079

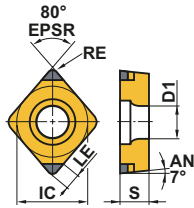
● : Inventory maintained. ★ : Inventory maintained in Japan.





# Positive Inserts (with hole)

## G Class

NP-CCGW or CCGW



FULL FACE	NEW PETIT CUT		
CCGW_FS	NP_002		
			

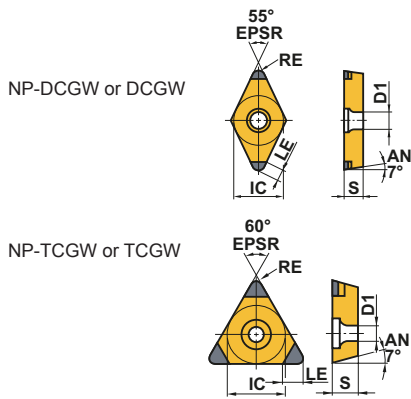
(inch)

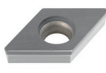
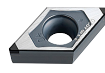


Order Number	MB4020	Cutting Edges	IC	S	RE	D1	LE
CCGW21.50.5FS	★	2	.250	.094	.008	.110	—
CCGW21.51FS	★	2	.250	.094	.016	.110	—
CCGW21.52FS	★	2	.250	.094	.031	.110	—
CCGW32.51FS	★	2	.375	.156	.016	.173	—
CCGW32.52FS	★	2	.375	.156	.031	.173	—
NEW NP-CCGW21.50.5-SF2	●	2	.250	.094	.008	.110	.071
NEW NP-CCGW21.51-SF2	●	2	.250	.094	.016	.110	.075
NEW NP-CCGW21.52-SF2	●	2	.250	.094	.031	.110	.083
NEW NP-CCGW32.50.5-SF2	●	2	.375	.156	.008	.173	.071
NEW NP-CCGW32.51-SF2	●	2	.375	.156	.016	.173	.075
NEW NP-CCGW32.52-SF2	●	2	.375	.156	.031	.173	.083
NEW NP-CCGW21.50.5-SE2	●	2	.250	.094	.008	.110	.071
NEW NP-CCGW21.51-SE2	●	2	.250	.094	.016	.110	.075
NEW NP-CCGW21.52-SE2	●	2	.250	.094	.031	.110	.083
NEW NP-CCGW32.50.5-SE2	●	2	.375	.156	.008	.173	.071
NEW NP-CCGW32.51-SE2	●	2	.375	.156	.016	.173	.075
NEW NP-CCGW32.52-SE2	●	2	.375	.156	.031	.173	.083
NP-CCGW21.50.5-FS2	●	2	.250	.094	.008	.110	.071
NP-CCGW21.51-FS2	●	2	.250	.094	.016	.110	.075
NP-CCGW21.52-FS2	●	2	.250	.094	.031	.110	.083
NP-CCGW32.50.5-FS2	●	2	.375	.156	.008	.173	.071
NP-CCGW32.51-FS2	●	2	.375	.156	.016	.173	.075
NP-CCGW32.52-FS2	●	2	.375	.156	.031	.173	.083
NP-CCGW21.50.5-TS2	●	2	.250	.094	.008	.110	.071
NP-CCGW21.51-TS2	●	2	.250	.094	.016	.110	.075
NP-CCGW21.52-TS2	●	2	.250	.094	.031	.110	.083
NP-CCGW32.50.5-TS2	●	2	.375	.156	.008	.173	.071
NP-CCGW32.51-TS2	●	2	.375	.156	.016	.173	.075
NP-CCGW32.52-TS2	●	2	.375	.156	.031	.173	.083

# CBN Grade for Sintered Alloy and Cast Iron

## Positive Inserts (with hole)

### G Class



FULL FACE	NEW PETIT CUT		
DCGW_FS	NP_002		
TCGW_FS	NP_003		

(inch)

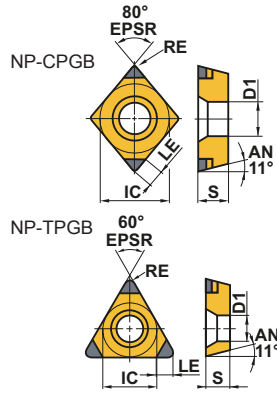
Order Number	MB4020	Cutting Edges	IC	S	RE	D1	LE
DCGW21.51FS	★	2	.250	.094	.016	.110	—
DCGW21.52FS	★	2	.250	.094	.031	.110	—
NEW NP-DCGW21.51-SF2	●	2	.250	.094	.016	.110	.083
NEW NP-DCGW21.52-SF2	●	2	.250	.094	.031	.110	.079
NEW NP-DCGW32.50.5-SF2	●	2	.375	.156	.008	.173	.059
NEW NP-DCGW32.51-SF2	●	2	.375	.156	.016	.173	.083
NEW NP-DCGW32.52-SF2	●	2	.375	.156	.031	.173	.079
NEW NP-DCGW21.51-SE2	●	2	.250	.094	.016	.110	.083
NEW NP-DCGW21.52-SE2	●	2	.250	.094	.031	.110	.079
NEW NP-DCGW32.50.5-SE2	●	2	.375	.156	.008	.173	.059
NEW NP-DCGW32.51-SE2	●	2	.375	.156	.016	.173	.083
NEW NP-DCGW32.52-SE2	●	2	.375	.156	.031	.173	.079
NP-DCGW21.51-FS2	●	2	.250	.094	.016	.110	.083
NP-DCGW21.52-FS2	●	2	.250	.094	.031	.110	.079
NP-DCGW32.50.5-FS2	●	2	.375	.156	.008	.173	.059
NP-DCGW32.51-FS2	●	2	.375	.156	.016	.173	.083
NP-DCGW32.52-FS2	●	2	.375	.156	.031	.173	.079
NP-DCGW21.51-TS2	●	2	.250	.094	.016	.110	.083
NP-DCGW21.52-TS2	●	2	.250	.094	.031	.110	.079
NP-DCGW32.50.5-TS2	●	2	.375	.156	.008	.173	.059
NP-DCGW32.51-TS2	●	2	.375	.156	.016	.173	.083
NP-DCGW32.52-TS2	●	2	.375	.156	.031	.173	.079
TCGW1.81.51FS	★	3	.219	.094	.016	.098	—
TCGW1.81.52FS	★	3	.219	.094	.031	.098	—
TCGW21.51FS	★	3	.250	.094	.016	.110	—
TCGW21.52FS	★	3	.250	.094	.031	.110	—
NEW NP-TCGW21.51-SF3	●	3	.250	.094	.016	.110	.083
NEW NP-TCGW21.52-SF3	●	3	.250	.094	.031	.110	.079
NEW NP-TCGW21.51-SE3	●	3	.250	.094	.016	.110	.083
NEW NP-TCGW21.52-SE3	●	3	.250	.094	.031	.110	.079
NP-TCGW21.51-FS3	●	3	.250	.094	.016	.110	.063
NP-TCGW21.52-FS3	●	3	.250	.094	.031	.110	.071
NP-TCGW21.51-TS3	●	3	.250	.094	.016	.110	.063
NP-TCGW21.52-TS3	●	3	.250	.094	.031	.110	.071
NP-TCGW32.51-FS3	●	3	.375	.156	.016	.173	.063
NP-TCGW32.52-FS3	●	3	.375	.156	.031	.173	.071

● : Inventory maintained. ★ : Inventory maintained in Japan.



# Positive Inserts (with hole)

## G Class



NEW PETIT CUT			
NP_002			
NEW PETIT CUT			
NP_003			

(inch)

Order Number	MB4020	Cutting Edges	IC	S	RE	D1	LE
NEW NP-CPGB2.51.50.5-SE2	●	2	.313	.094	.008	.138	.071
NEW NP-CPGB2.51.51-SE2	●	2	.313	.094	.016	.138	.075
NEW NP-CPGB320.5-SE2	●	2	.375	.125	.008	.177	.071
NEW NP-CPGB321-SE2	●	2	.375	.125	.016	.177	.075
NEW NP-CPGB322-SE2	●	2	.375	.125	.031	.177	.083
NP-CPGB2.51.50.5-FS2	★	2	.313	.094	.008	.138	.071
NP-CPGB2.51.51-FS2	★	2	.313	.094	.016	.138	.075
NP-CPGB320.5-FS2	●	2	.375	.125	.008	.177	.071
NP-CPGB321-FS2	●	2	.375	.125	.016	.177	.075
NP-CPGB322-FS2	●	2	.375	.125	.031	.177	.083
NEW NP-TPGB1.81.50.5-SF3	●	3	.219	.094	.008	.114	.059
NEW NP-TPGB1.81.51-SF3	●	3	.219	.094	.016	.114	.063
NEW NP-TPGB220.5-SF3	●	3	.250	.125	.008	.134	.059
NEW NP-TPGB221-SF3	●	3	.250	.125	.016	.134	.063
NEW NP-TPGB222-SF3	●	3	.250	.125	.031	.134	.071
NEW NP-TPGB1.81.50.5-SE3	●	3	.219	.094	.008	.114	.059
NEW NP-TPGB1.81.51-SE3	●	3	.219	.094	.016	.114	.063
NEW NP-TPGB220.5-SE3	●	3	.250	.125	.008	.134	.059
NEW NP-TPGB221-SE3	●	3	.250	.125	.016	.134	.063
NEW NP-TPGB222-SE3	●	3	.250	.125	.031	.134	.071
NP-TPGB1.81.50.5-FS3	●	3	.219	.094	.008	.114	.059
NP-TPGB1.81.51-FS3	●	3	.219	.094	.016	.114	.063
NP-TPGB220.5-FS3	●	3	.250	.125	.008	.134	.059
NP-TPGB221-FS3	●	3	.250	.125	.016	.134	.063
NP-TPGB222-FS3	●	3	.250	.125	.031	.134	.071

# CBN Grade for Sintered Alloy and Cast Iron

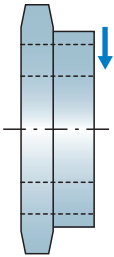

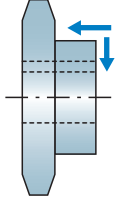
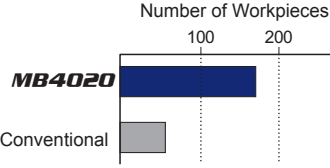
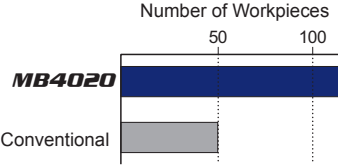
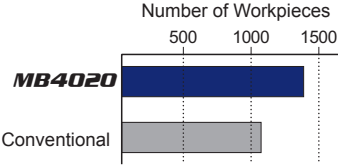
## Recommended Cutting Conditions

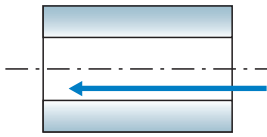
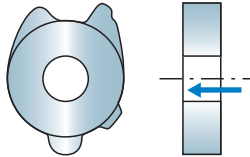
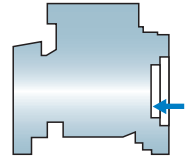
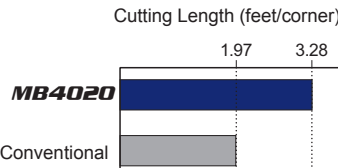
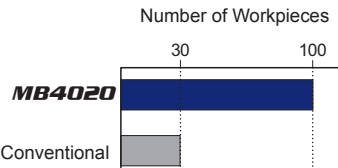
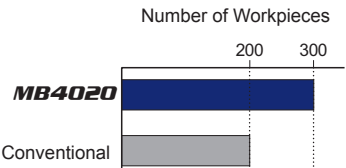
Work Material	Cutting Mode	Cutting Speed $v_c$ (SFM)					Feed Rate $f$ (IPR)	Depth of Cut $a_p$ (inch)	Coolant
		330	490	655	820	985			
General Sintered Alloy	Turning						$\leq .008$	$\leq .012 (\leq .079)^*$	Dry, Wet
High-strength Sintered Alloy	Turning						$\leq .008$	$\leq .012 (\leq .079)^*$	Dry, Wet
Hardened Sintered Alloy	Turning						$\leq .008$	$\leq .012 (\leq .079)^*$	Dry, Wet

Work Material	Cutting Mode	Cutting Speed $v_c$ (SFM)					Feed Rate $f$ (IPR)	Depth of Cut $a_p$ (inch)	Coolant
		820	1640	2460	3280	4100			
Cast Iron	Turning						$\leq .016$	$\leq .020 (\leq .079)^*$	Dry, Wet
	Milling						$\leq .006$	$\leq .020 (\leq .079)^*$	Dry

\* Cutting Conditions for Full Face

## Application Examples

Insert		NP-TNGA331-TS3	NP-TNGA332-TS3	NP-CNGA431-FS2
Workpiece		Carburized and Quenched Alloy Interrupt 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
	Feed Rate (IPR)	.002	.004	.004 – .006
	Depth of Cut (inch)	.006	.002	.008
Cutting Mode		Wet Cutting	Dry Cutting	Dry Cutting
Results		<p>Number of Workpieces</p>  <p>A conventional CBN insert 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.</p>	<p>Number of Workpieces</p>  <p>A conventional grade showed unstable tool life after machining 20 – 50 parts. MB4020 enabled stable machining with longer tool life of over 120 parts.</p>	<p>Number of Workpieces</p>  <p>MB4020 maintained a good surface finish after machining 1400 parts compared with only 1100 parts from a conventional grade.</p>

Insert		CCGW21.51FS	CCGW32.51FS	CCGW21.51FS
Workpiece		Internal Turning (G5 Hv1180) 	Internal Turning (AISI 65-45-12) 	Internal Turning (AISI No35B) 
Component		Carbide Die	Bearing Retainer	Crankcase
Cutting Conditions	Cutting Speed (SFM)	100	820	1300 – 1475
	Feed Rate (IPR)	.002	.005	.012 – .015
	Depth of Cut (inch)	.006	.008	.005
Cutting Mode		Dry Cutting	Wet Cutting	Wet Cutting
Results		<p>Cutting Length (feet/corner)</p>  <p>MB4020 achieved 1.6 times longer tool life per corner compared to conventional products.</p>	<p>Number of Workpieces</p>  <p>Resistance to friction enabled 3 times longer tool life compared to conventional products.</p>	<p>Number of Workpieces</p>  <p>MB4020 achieved high efficiency machining and 1.5 times longer tool life compared to conventional products.</p>



CBN Grade for Sintered Alloy and Cast Iron

***MB4020***

**For your safety**

●Don't touch breakers and chips without gloves. ●Please machine within recommended application range, and exchange expired tools with new parts in advance. ●Please use safety cover and wear safety glasses. ●When using compounded cutting oils, please take fire prevention. ●When attaching inserts or spare parts, please use the attached wrench or driver. ●When using tools in revolution machining, please make a trial run to check run-out, vibration, abnormal sounds etc.

**MITSUBISHI MATERIALS CORPORATION**

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