

CBN Grade for Sintered Alloy

# MB4020

First recommendation for finishing sintered alloy

## High efficiency, high precision machining of sintered alloy.

- New high CBN content tool grade, developed using a particle activated sintering process, is suitable for machining various sintered alloys.



## CBN Grade for Sintered Alloy

# MB4020

## Features

MB4020 is a general purpose grade suitable for continuous turning through to light interrupted machining of sintered alloy. Increasing the CBN particle content and bonding strength makes it suitable for machining various sintered alloys with different structures and levels of hardness.

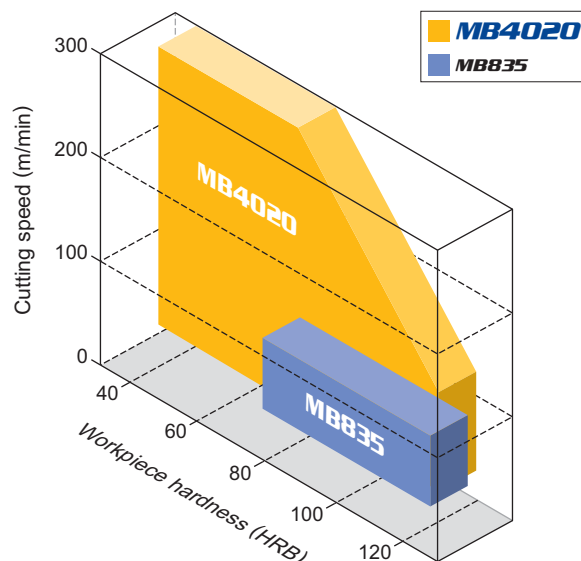
### High cutting edge strength

A newly developed special binder and the particle-activated sintering method promotes binding of the CBN particles, leading to higher cutting edge strength. When machining sintered alloy, reduction of burrs and plastic flow is required even during interrupted machining. MB4020 that offers high cutting edge strength allows a sharper cutting edge to prevent burrs and achieve ideal

### Excellent welding tolerances

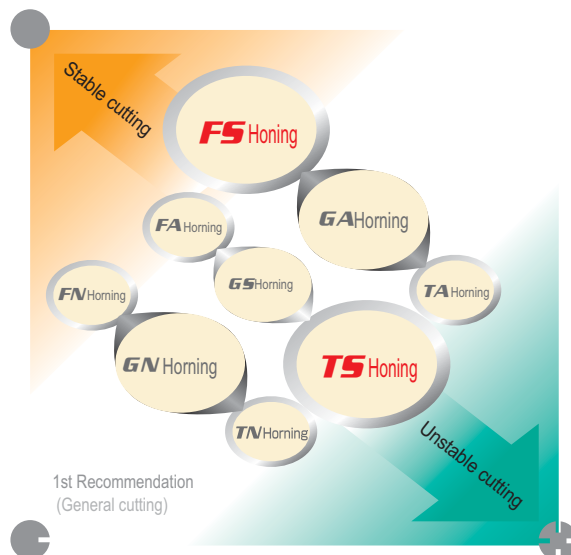
A chemically stable, high CBN content reduces welding of the work material on the cutting edge and stabilizes dimensional accuracy of finished components.

## Application Range



## A Wide Variety of Edge Preparation Forms (Honing types)


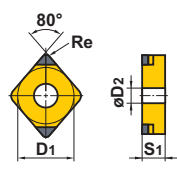

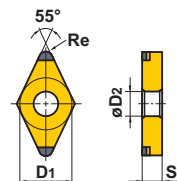

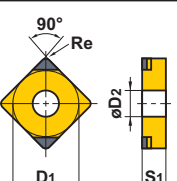

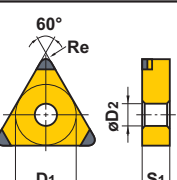

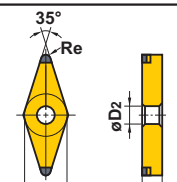

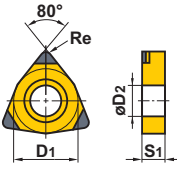
For MB4020, considering tool grade property, machinability of sintered alloy and workpiece properties, FS (for general use) and TS (for interrupted cutting) are offered as standard.




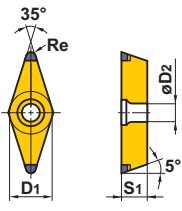

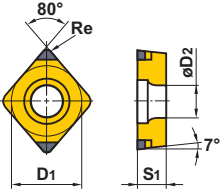
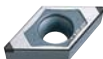
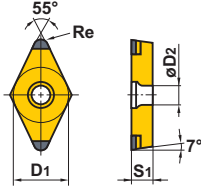

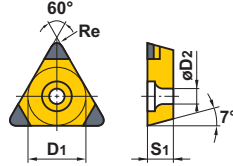

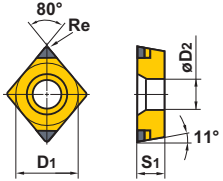

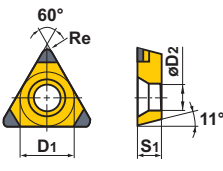
# MB4020

## Inserts

### ● Negative Inserts

| Shape                                                                               | Order Number            | Stock | Dimensions (mm) |      |     |      | Geometry                                                                             | Holders                 |
|-------------------------------------------------------------------------------------|-------------------------|-------|-----------------|------|-----|------|--------------------------------------------------------------------------------------|-------------------------|
|                                                                                     |                         |       | D1              | S1   | Re  | D2   |                                                                                      |                         |
|    | <b>NP-CNGA120404FS2</b> | ●     | 12.7            | 4.76 | 0.4 | 5.16 |    | LL holder               |
|                                                                                     | <b>120408FS2</b>        | ●     | 12.7            | 4.76 | 0.8 | 5.16 |                                                                                      | Double clamp holder     |
|                                                                                     | <b>120412FS2</b>        | ●     | 12.7            | 4.76 | 1.2 | 5.16 |                                                                                      | Double clamp dimple bar |
|                                                                                     | <b>120404TS2</b>        | ●     | 12.7            | 4.76 | 0.4 | 5.16 |                                                                                      | P type boring bar       |
|                                                                                     | <b>120408TS2</b>        | ●     | 12.7            | 4.76 | 0.8 | 5.16 |                                                                                      | D type boring head      |
|                                                                                     | <b>120412TS2</b>        | ●     | 12.7            | 4.76 | 1.2 | 5.16 |                                                                                      | LL cartridge            |
|    | <b>NP-DNGA150404FS2</b> | ●     | 12.7            | 4.76 | 0.4 | 5.16 |    | LL holder               |
|                                                                                     | <b>150408FS2</b>        | ●     | 12.7            | 4.76 | 0.8 | 5.16 |                                                                                      | Double clamp holder     |
|                                                                                     | <b>150412FS2</b>        | ●     | 12.7            | 4.76 | 1.2 | 5.16 |                                                                                      | Double clamp dimple bar |
|                                                                                     | <b>150404TS2</b>        | ●     | 12.7            | 4.76 | 0.4 | 5.16 |                                                                                      | P type boring bar       |
|                                                                                     | <b>150408TS2</b>        | ●     | 12.7            | 4.76 | 0.8 | 5.16 |                                                                                      | D type boring head      |
|                                                                                     | <b>150412TS2</b>        | ●     | 12.7            | 4.76 | 1.2 | 5.16 |                                                                                      |                         |
|    | <b>NP-SNGA120404FS2</b> | ●     | 12.7            | 4.76 | 0.4 | 5.16 |    | LL holder               |
|                                                                                     | <b>120408FS2</b>        | ●     | 12.7            | 4.76 | 0.8 | 5.16 |                                                                                      | Double clamp holder     |
|                                                                                     | <b>120412FS2</b>        | ●     | 12.7            | 4.76 | 1.2 | 5.16 |                                                                                      | ML holder               |
|                                                                                     | <b>120404TS2</b>        | ●     | 12.7            | 4.76 | 0.4 | 5.16 |                                                                                      | Double clamp dimple bar |
|                                                                                     | <b>120408TS2</b>        | ●     | 12.7            | 4.76 | 0.8 | 5.16 |                                                                                      | P type boring bar       |
|                                                                                     | <b>120412TS2</b>        | ●     | 12.7            | 4.76 | 1.2 | 5.16 |                                                                                      | LL cartridge            |
|  | <b>NP-TNGA160404FS3</b> | ●     | 9.525           | 4.76 | 0.4 | 3.81 |  | LL holder               |
|                                                                                     | <b>160408FS3</b>        | ●     | 9.525           | 4.76 | 0.8 | 3.81 |                                                                                      | Double clamp holder     |
|                                                                                     | <b>160412FS3</b>        | ●     | 9.525           | 4.76 | 1.2 | 3.81 |                                                                                      | ML holder               |
|                                                                                     | <b>160404TS3</b>        | ●     | 9.525           | 4.76 | 0.4 | 3.81 |                                                                                      | WP holder               |
|                                                                                     | <b>160408TS3</b>        | ●     | 9.525           | 4.76 | 0.8 | 3.81 |                                                                                      | Double clamp dimple bar |
|                                                                                     | <b>160412TS3</b>        | ●     | 9.525           | 4.76 | 1.2 | 3.81 |                                                                                      | P type boring bar       |
|  | <b>NP-VNGA160404FS2</b> | ●     | 9.525           | 4.76 | 0.4 | 3.81 |  | Double clamp holder     |
|                                                                                     | <b>160408FS2</b>        | ●     | 9.525           | 4.76 | 0.8 | 3.81 |                                                                                      | MP holder               |
|                                                                                     | <b>160404TS2</b>        | ●     | 9.525           | 4.76 | 0.4 | 3.81 |                                                                                      | Double clamp dimple bar |
|                                                                                     | <b>160408TS2</b>        | ●     | 9.525           | 4.76 | 0.8 | 3.81 |                                                                                      | D type boring head      |
|  | <b>NP-WNGA080408FS3</b> | ●     | 12.7            | 4.76 | 0.8 | 5.16 |  | LL holder               |
|                                                                                     | <b>080408TS3</b>        | ●     | 12.7            | 4.76 | 0.8 | 5.16 |                                                                                      | Double clamp holder     |
|                                                                                     |                         |       |                 |      |     |      |                                                                                      | MP holder               |
|                                                                                     |                         |       |                 |      |     |      |                                                                                      | Double clamp dimple bar |
|                                                                                     |                         |       |                 |      |     |      |                                                                                      | D type boring head      |

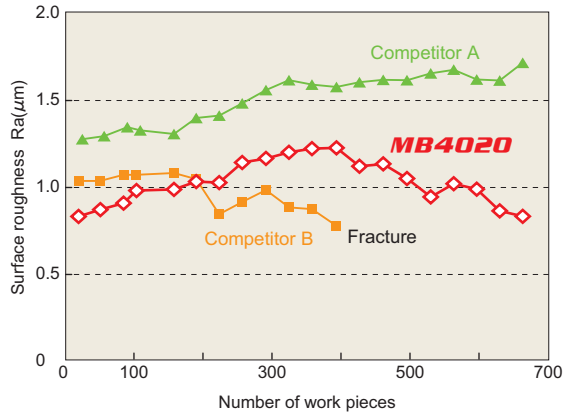
## ● Positive inserts

| Shape                                                                               | Order Number            | Stock | Dimensions (mm) |      |     |      | Geometry                                                                              | Holders                                                     |
|-------------------------------------------------------------------------------------|-------------------------|-------|-----------------|------|-----|------|---------------------------------------------------------------------------------------|-------------------------------------------------------------|
|                                                                                     |                         |       | D1              | S1   | Re  | D2   |                                                                                       |                                                             |
|    | <b>NP-VBGW110304FS2</b> | ●     | 6.35            | 3.18 | 0.4 | 2.85 |    | Dimple bar                                                  |
|                                                                                     | <b>110308FS2</b>        | ●     | 6.35            | 3.18 | 0.8 | 2.85 |                                                                                       |                                                             |
|                                                                                     | <b>110304TS2</b>        | ●     | 6.35            | 3.18 | 0.4 | 2.85 |                                                                                       |                                                             |
|                                                                                     | <b>110308TS2</b>        | ●     | 6.35            | 3.18 | 0.8 | 2.85 |                                                                                       |                                                             |
|                                                                                     | <b>160404FS2</b>        | ●     | 9.525           | 4.76 | 0.4 | 4.43 |                                                                                       |                                                             |
|                                                                                     | <b>160408FS2</b>        | ●     | 9.525           | 4.76 | 0.8 | 4.43 |                                                                                       |                                                             |
|                                                                                     | <b>160404TS2</b>        | ●     | 9.525           | 4.76 | 0.4 | 4.43 |                                                                                       |                                                             |
|    | <b>NP-CCGW060202FS2</b> | ●     | 6.35            | 2.38 | 0.2 | 2.8  |    | Dimple bar                                                  |
|                                                                                     | <b>060204FS2</b>        | ●     | 6.35            | 2.38 | 0.4 | 2.8  |                                                                                       |                                                             |
|                                                                                     | <b>060208FS2</b>        | ●     | 6.35            | 2.38 | 0.8 | 2.8  |                                                                                       |                                                             |
|                                                                                     | <b>060202TS2</b>        | ●     | 6.35            | 2.38 | 0.2 | 2.8  |                                                                                       |                                                             |
|                                                                                     | <b>060204TS2</b>        | ●     | 6.35            | 2.38 | 0.4 | 2.8  |                                                                                       |                                                             |
|                                                                                     | <b>060208TS2</b>        | ●     | 6.35            | 2.38 | 0.8 | 2.8  |                                                                                       |                                                             |
|                                                                                     | <b>09T302FS2</b>        | ●     | 9.525           | 3.97 | 0.2 | 4.4  |                                                                                       |                                                             |
|                                                                                     | <b>09T304FS2</b>        | ●     | 9.525           | 3.97 | 0.4 | 4.4  |                                                                                       |                                                             |
|                                                                                     | <b>09T308FS2</b>        | ●     | 9.525           | 3.97 | 0.8 | 4.4  |                                                                                       |                                                             |
|                                                                                     | <b>09T302TS2</b>        | ●     | 9.525           | 3.97 | 0.2 | 4.4  |                                                                                       |                                                             |
|                                                                                     | <b>09T304TS2</b>        | ●     | 9.525           | 3.97 | 0.4 | 4.4  |                                                                                       |                                                             |
| <b>09T308TS2</b>                                                                    | ●                       | 9.525 | 3.97            | 0.8  | 4.4 |      |                                                                                       |                                                             |
|  | <b>NP-DCGW070204FS2</b> | ●     | 6.35            | 2.38 | 0.4 | 2.8  |  | SP holder<br>Small tools<br>Dimple bar<br>S type boring bar |
|                                                                                     | <b>070208FS2</b>        | ●     | 6.35            | 2.38 | 0.8 | 2.8  |                                                                                       |                                                             |
|                                                                                     | <b>070204TS2</b>        | ●     | 6.35            | 2.38 | 0.4 | 2.8  |                                                                                       |                                                             |
|                                                                                     | <b>070208TS2</b>        | ●     | 6.35            | 2.38 | 0.8 | 2.8  |                                                                                       |                                                             |
|                                                                                     | <b>11T302FS2</b>        | ●     | 9.525           | 3.97 | 0.2 | 4.4  |                                                                                       |                                                             |
|                                                                                     | <b>11T304FS2</b>        | ●     | 9.525           | 3.97 | 0.4 | 4.4  |                                                                                       |                                                             |
|                                                                                     | <b>11T308FS2</b>        | ●     | 9.525           | 3.97 | 0.8 | 4.4  |                                                                                       |                                                             |
|                                                                                     | <b>11T302TS2</b>        | ●     | 9.525           | 3.97 | 0.2 | 4.4  |                                                                                       |                                                             |
|                                                                                     | <b>11T304TS2</b>        | ●     | 9.525           | 3.97 | 0.4 | 4.4  |                                                                                       |                                                             |
| <b>11T308TS2</b>                                                                    | ●                       | 9.525 | 3.97            | 0.8  | 4.4 |      |                                                                                       |                                                             |
|  | <b>NP-TCGW110204FS3</b> | ●     | 6.35            | 2.38 | 0.4 | 2.8  |  | SP holder<br>S type boring bar                              |
|                                                                                     | <b>110208FS3</b>        | ●     | 6.35            | 2.38 | 0.8 | 2.8  |                                                                                       |                                                             |
|                                                                                     | <b>110204TS3</b>        | ●     | 6.35            | 2.38 | 0.4 | 2.8  |                                                                                       |                                                             |
|                                                                                     | <b>110208TS3</b>        | ●     | 6.35            | 2.38 | 0.8 | 2.8  |                                                                                       |                                                             |
|  | <b>NP-CPGB080202FS2</b> | ●     | 7.94            | 2.38 | 0.2 | 3.5  |  | Dimple bar                                                  |
|                                                                                     | <b>080204FS2</b>        | ●     | 7.94            | 2.38 | 0.4 | 3.5  |                                                                                       |                                                             |
|                                                                                     | <b>090302FS2</b>        | ●     | 9.525           | 3.18 | 0.2 | 4.5  |                                                                                       |                                                             |
|                                                                                     | <b>090304FS2</b>        | ●     | 9.525           | 3.18 | 0.4 | 4.5  |                                                                                       |                                                             |
|                                                                                     | <b>090308FS2</b>        | ●     | 9.525           | 3.18 | 0.8 | 4.5  |                                                                                       |                                                             |
|  | <b>NP-TPGB090202FS3</b> | ●     | 5.56            | 2.38 | 0.2 | 2.9  |  | Dimple bar                                                  |
|                                                                                     | <b>090204FS3</b>        | ●     | 5.56            | 2.38 | 0.4 | 2.9  |                                                                                       |                                                             |
|                                                                                     | <b>110302FS3</b>        | ●     | 6.35            | 3.18 | 0.2 | 3.4  |                                                                                       |                                                             |
|                                                                                     | <b>110304FS3</b>        | ●     | 6.35            | 3.18 | 0.4 | 3.4  |                                                                                       |                                                             |
|                                                                                     | <b>110308FS3</b>        | ●     | 6.35            | 3.18 | 0.8 | 3.4  |                                                                                       |                                                             |

● : Inventory maintained

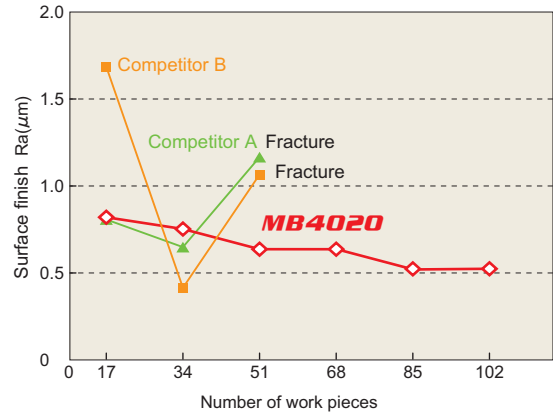
# Cutting Performance

## Continuous machining of high strength sintered alloy



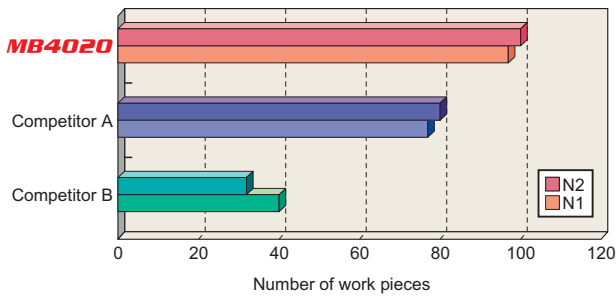
<Cutting conditions>  
 Workpiece : High strength sintered alloy (75HRB)  
 Insert : NP-CNGA120408FS2 Feed : 0.15mm/rev  
 Cutting speed: 190m/min Depth of cut: 0.1mm  
 Dry cutting

## Continuous machining of hardened sintered alloy



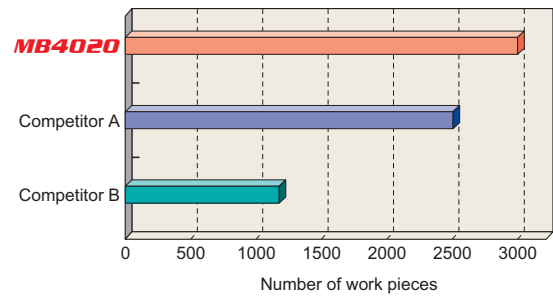
<Cutting conditions>  
 Workpiece : Hardened sintered alloy (40HRC)  
 Insert : NP-CNGA120408FS2 Feed : 0.15mm/rev  
 Cutting speed: 100m/min Depth of cut: 0.1mm  
 Wet cutting

## Interrupted machining of high strength sintered alloy



<Cutting conditions>  
 Workpiece : High strength sintered alloy (75HRB)  
 Insert : NP-CNGA120408FS2 Feed : 0.15mm/rev  
 Cutting speed: 190m/min Depth of cut: 0.1mm  
 Wet cutting

## Interrupted machining of general sintered alloy



<Cutting conditions>  
 Workpiece : General sintered alloy (45HRB)  
 Insert : NP-CNGA120408FS2 Feed : 0.15mm/rev  
 Cutting speed: 270m/min Depth of cut: 0.1mm  
 Wet cutting

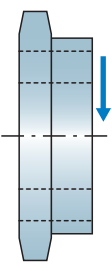
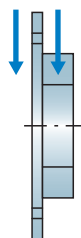
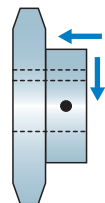
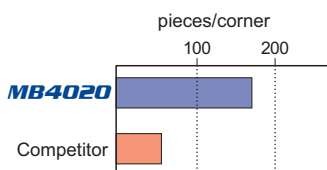
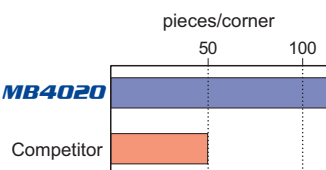
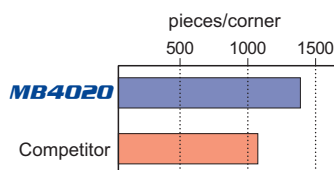
## Recommended Cutting Conditions

| Work Material           | Cutting Mode                      | Cutting Speed (m/min)                                               |     |     |     | Feed (mm/rev) | Depth of Cut (mm) | Coolant  |
|-------------------------|-----------------------------------|---------------------------------------------------------------------|-----|-----|-----|---------------|-------------------|----------|
|                         |                                   | 50                                                                  | 100 | 200 | 300 |               |                   |          |
| General sintered alloy  | Continuous to Interrupted cutting | [Bar chart showing recommended speed range from ~100 to ~250 m/min] |     |     |     | -0.2          | -0.3              | Wet, Dry |
| Hardened sintered alloy | Continuous to Interrupted cutting | [Bar chart showing recommended speed range from ~100 to ~250 m/min] |     |     |     | -0.2          | -0.3              |          |
| Sintered alloy          | Continuous to Interrupted cutting | [Bar chart showing recommended speed range from ~100 to ~250 m/min] |     |     |     | -0.2          | -0.3              |          |



# MB4020

## Application Examples

| Insert             |                       | NP-TNGA160404TS3                                                                                                                                                                                                                                                                           | NP-TNGA160408TS3                                                                                                                                                                                                                                                                                      | NP-CNGA120404FS2                                                                                                                                                                                                                                                 |
|--------------------|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Workpiece          |                       | Carburized and quenched alloy<br>Interrupted facing                                                                                                                                                                                                                                        | Carburized and quenched alloy<br>Interrupted machining of flange end faces                                                                                                                                                                                                                            | General sintered alloy (equivalent to SMF4040)<br>External interrupted facing                                                                                                                                                                                    |
|                    |                       |                                                                                                                                                                                                           |                                                                                                                                                                                                                      |                                                                                                                                                                               |
| Component          |                       | Variable valve parts                                                                                                                                                                                                                                                                       | Variable valve parts                                                                                                                                                                                                                                                                                  | Sprocket parts                                                                                                                                                                                                                                                   |
| Cutting Conditions | Cutting Speed (m/min) | 140                                                                                                                                                                                                                                                                                        | 110                                                                                                                                                                                                                                                                                                   | 150                                                                                                                                                                                                                                                              |
|                    | Feed (mm/rev)         | 0.05                                                                                                                                                                                                                                                                                       | 0.1                                                                                                                                                                                                                                                                                                   | 0.1-0.15                                                                                                                                                                                                                                                         |
|                    | Depth of Cut (mm)     | 0.15                                                                                                                                                                                                                                                                                       | 0.05                                                                                                                                                                                                                                                                                                  | 0.2                                                                                                                                                                                                                                                              |
| Coolant            |                       | Wet cutting                                                                                                                                                                                                                                                                                | Dry cutting                                                                                                                                                                                                                                                                                           | Dry cutting                                                                                                                                                                                                                                                      |
| Results            |                       | <p>pieces/corner</p> <p>100 200</p>  <p>A competitor's 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.</p> | <p>pieces/corner</p> <p>50 100</p>  <p>A competitor's 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.</p> | <p>pieces/corner</p> <p>500 1000 1500</p>  <p>MB4020 maintained a good surface finish after machining 1400 parts compared with only 1100 parts from a competitor's grade.</p> |

**For Your Safety**

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

## MITSUBISHI MATERIALS CORPORATION



The Scope of the Registration:  
Design, Development and  
Production of Cemented  
Carbide Tools and Carbide  
Blanks



The Scope of the Registration:  
Design, Development and  
Production of Cutting Tools,  
Wear-resistant Tools, Drill  
Drilling Tools, Cemented  
Carbide Blanks and Coated  
Products



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(Tools specifications subject to change without notice.)