

# cBN & PCD

TOTAL TOOLING SOLUTION





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**BEST TECHNICAL SKILL**



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# cBN Heat-treated Steel

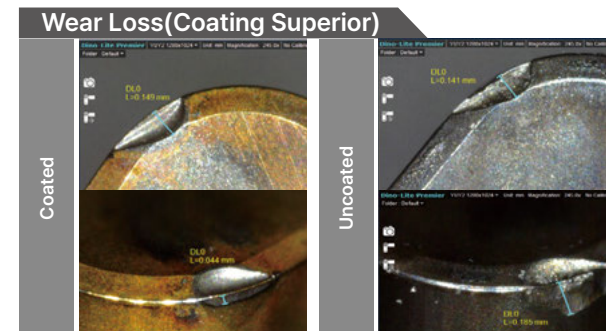
## Features and Cutting Conditions of cBN Grade

Classification	Coating	Grade	Color	Applications	Cutting Conditions												
					Cutting Speed [m/min(feet/min)]							Feed		Depth of Cut			
					0	50(164)	100(328)	150(492)	200(656)	250(820)	300(984)	mm/rev	inch/rev	mm	inch		
<b>H</b> Heat-treated Steel	Coated	DNC100		For High-speed, Continuous Machining					180 (590)		300 (984)	0.03 ~ 0.30	.0011 ~ .0118	0.03 ~ 0.30	.0011 ~ .0118		
		DNC250		For Continuous, Light Interrupted Machining					120 (393)		220 (721)		0.05 ~ 0.30	.0019 ~ .0118	0.05 ~ 0.30	.0019 ~ .0118	
		DNC300		For Light/Medium Interrupted Machining					90 (295)		250 (820)		0.05 ~ 0.20	.0019 ~ .0078	0.05 ~ 0.25	.0019 ~ .0098	
		DNC350		For Medium/Heavy Interrupted Machining					90 (295)		150 (492)		0.05 ~ 0.30	.0019 ~ .0118	0.05 ~ 0.50	.0019 ~ .0196	
		DNC400		For Light/Medium Interrupted Machining					80 (262)		200 (656)		0.05 ~ 0.30	.0019 ~ .0118	0.05 ~ 0.50	.0019 ~ .0196	
	Uncoated	DBNX20		For High-efficiency Machining					120 (393)		150 (492)		0.03 ~ 0.30	.0011 ~ .0118	0.03 ~ 0.50	.0011 ~ .0196	
		DBNX25		For High-speed Interrupted Machining						150 (492)		200 (656)		0.03 ~ 0.30	.0011 ~ .0118	0.03 ~ 0.50	.0011 ~ .0196
		DBN250		For Light/Medium Interrupted Machining					80 (262)		120 (393)		0.03 ~ 0.20	.0011 ~ .0078	0.03 ~ 0.30	.0011 ~ .0118	
		DBN350		For Heavy-interrupted Machining					80 (262)		110 (360)		0.03 ~ 0.20	.0011 ~ .0078	0.03 ~ 0.30	.0011 ~ .0118	
		DB1000		For High-speed, Continuous Machining						130 (426)		250 (820)		0.03 ~ 0.15	.0011 ~ .0059	0.03 ~ 0.20	.0011 ~ .0078
		DB2000		For Light/Medium Interrupted Machining						80 (262)		200 (656)		0.03 ~ 0.20	.0011 ~ .0078	0.03 ~ 0.30	.0011 ~ .0118

## Comparison of Coated and Uncoated cBNs

\* The details may vary according to machining environments.

Machining Information								
Cutting Speed m/min(feet/min)	Feed mm/rev(inch/rev)	Depth mm(inch)	No. of Machining	Cutting Distance(km)	Workpiece	Heat-treated	Hardness	Size mm(inch)
200 (656)	0.1 (.0039)	0.1 (.0039)	20 Times	6	SCM415 Round Bar	Carburizing Heat Treatment	58~62	Ø105×150 (Ø4.13×5.91)
Surface Roughness(Uncoating Superior)								
Surface Roughness								
Grade	8 Times		12 Times		20 Times			
Uncoated cBN	Ra 0.431		Ra 0.477		Ra 0.492			
Coated cBN	Ra 0.579		Ra 0.631		Ra 0.792			



# cBN Heat-treated Steel

## Applicable Area

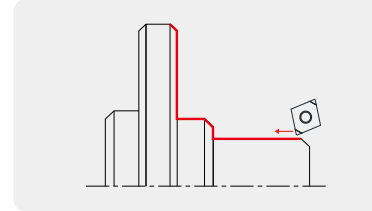
### Coated & Uncoated cBN

- Coated cBN : Suitable for all heat-treated steel machining as it is excellent in high-speed high-efficiency machining.
- Uncoated cBN : Suitable for machining of high-hardness heat-treated steel or parts to which cutting speed is limited.

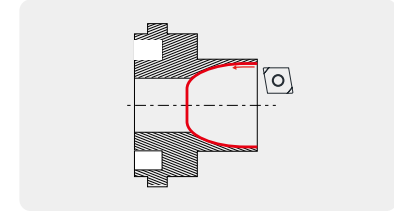
Series	Usable Area
Coated cBN	<ul style="list-style-type: none"> <li>• Ideal for heat-treated steel machining</li> <li>• Machining requiring high-speed and high-precision</li> <li>• Machining requiring high-efficiency such as carburized layer removal</li> </ul>
Uncoated cBN	<ul style="list-style-type: none"> <li>• Small parts not requiring high cutting speed</li> <li>• Machining materials including much hard particles such as mold parts</li> <li>• Applicable even in case of an unstable machine setup</li> </ul>

## Recommended Machining Works

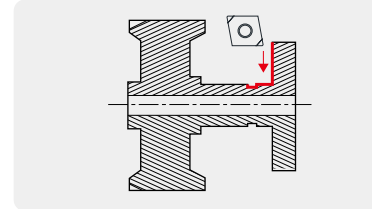
Outside Diameter Machining



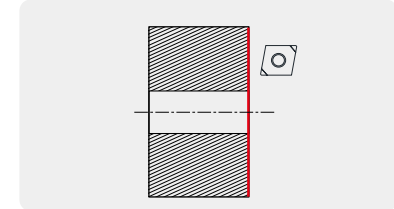
Inside Diameter(Curved) Machining



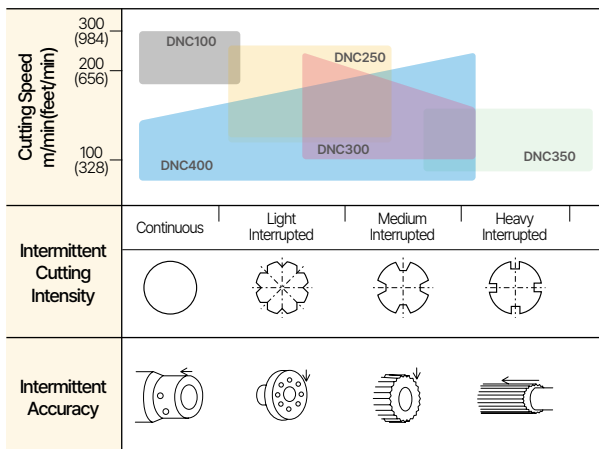
Width Decision Groove Machining



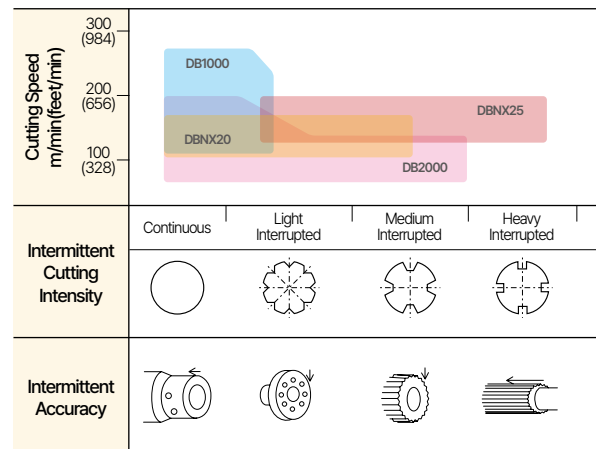
Cross-sectional Machining



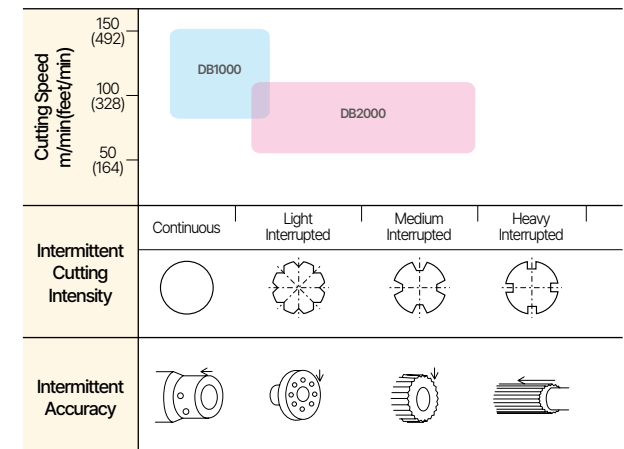
## Coated cBN



## Uncoated cBN



## Dice Steel



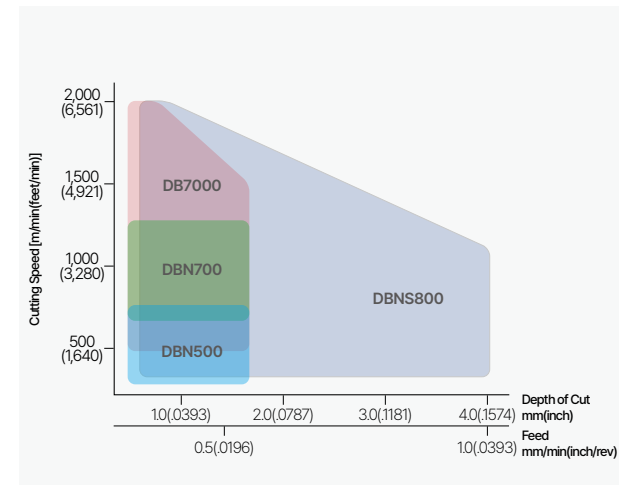
# cBN Cast Iron

## Features and Cutting Conditions of cBN Grade

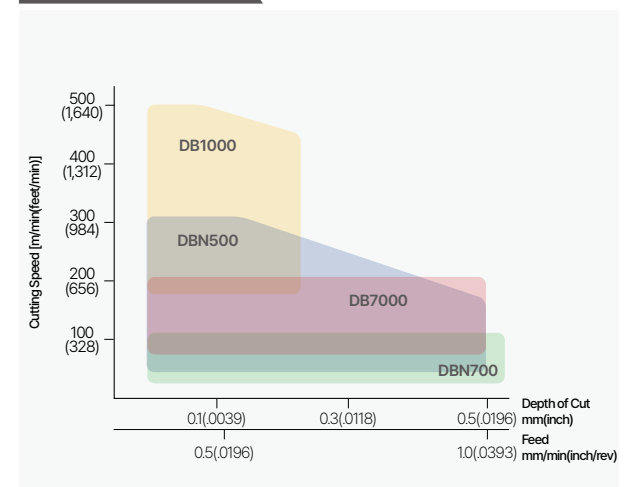
Applications	Workpiece	Grade	Cutting Conditions									
			Cutting Speed [m/min(feet/min)]					Feed		Depth of Cut		
			100(328)	500(1,640)	1,000(3,280)	1,500(4,921)	2,000(6,561)	mm/rev	inch/rev	mm	inch	
Turning	Gray Cast Iron	DBNS800	200 (656)  2,000 (6,561)					0.1 ~ 1.0	.0039 ~ .0393	≤ 4.0	≤ .1574	
		DBN500	200 (656)  700 (2,296)					0.1 ~ 0.5	.0039 ~ .0196	≤ 1.0	≤ .0393	
		DB7000	500 (1,640)  2,000 (6,561)					0.1 ~ 0.5	.0039 ~ .0196	≤ 1.0	≤ .0393	
	Alloy Cast Iron	DBNS800	200 (656)  1,000 (3,280)					0.1 ~ 0.8	.0039 ~ .0314	≤ 2.0	≤ .0787	
		Ductile Cast Iron	DBN500	100 (328)  350 (1,148)					0.1 ~ 0.4	.0039 ~ .0157	≤ 0.5	≤ .0196
			DB1000	200 (656)  500 (1,640)					0.1 ~ 0.2	.0039 ~ .0078	≤ 0.2	≤ .0078
Milling	Gray Cast Iron	DBN700	800 (2,624)  2,000 (6,561)					0.1 ~ 0.5	.0039 ~ .0196	≤ 0.5	≤ .0196	
		DBNS800	800 (2,624)  2,000 (6,561)					0.1 ~ 1.0	.0039 ~ .0393	≤ 4.0	≤ .1574	

## Applicable Area

### Gray Cast Iron

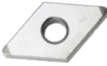



### Ductile Cast Iron



# cBN Cast Iron

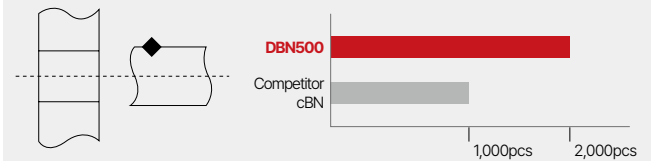
## cBN Grade Feature

Classification	Coating	Grade	Color	Applications	Features
<b>K</b> Cast Iron	Uncoated	DBN500		FC, FCD Cutting, High-hardness VSR Cutting, High-hardness Roll Grinding Cutting	For cast iron cutting, cBN sintered body formation is optimized and wear resistance and damage resistance are excellent
		DBN700		High-speed cutting of FC / cutting of milling of FC, cutting of iron metal heat-treated parts cutting of high-hardness roll / cutting of heat-resistant alloy	Grades whose material strength and thermal conductivity are improved by greatly increasing cBN content and optimizing sintered tissues
		DB7000		Foundry Machining	For cast-iron difficult-to-cut materials machining, wear resistance and damage resistance are excellent
		DBNS800		Large Depth of Cutting, High-precision Grinding Machining	The solid structure capable to be used cutting knife of entire insert, which responds brazing type machining and high-speed grinding unlike conventional brazing type

## Machining Test

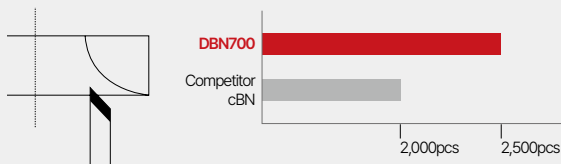
### DBN500 Test Result

Grade	DBN500	Competitor cBN
Insert	SPGN090308(ANSI: SPGN322)	
Workpiece	Crank Bore(FC250 = FCD450 Inside Boring)	
Cutting Speed m/min(feet/min)	150(492)	
Feed mm/rev(inch/rev)	0.15(.005)	
Depth of Cut mm(inch)	0.5(.019)	
Dry/Wet Cutting	Wet Cutting	



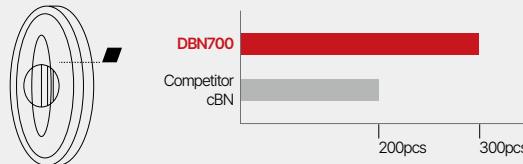
### DBN700 Test Result

Grade	DBN700	Competitor cBN
Insert	Special Bite	
Workpiece	VSR Intake(Hv250-330 Plunge Cutting)	
Cutting Speed m/min(feet/min)	95(311)	
Feed mm/rev(inch/rev)	0.08(.003)	
Depth of Cut mm(inch)	0.2(.007)	
Dry/Wet Cutting	Dry Cutting	



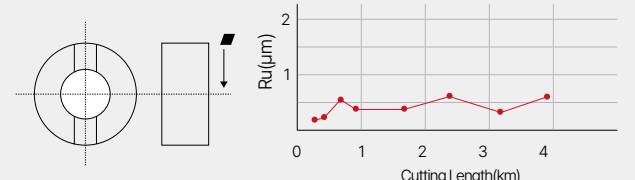
### DBN700 Test Result

Grade	DBN700	Competitor cBN
Insert	SPGN090308(ANSI: SPGN322) TNGA150408(ANSI: TNGA332)	
Workpiece	Fly Wheel(FC300 Facing)	
Cutting Speed m/min(feet/min)	600(1,968)	
Feed mm/rev(inch/rev)	0.15(.005)	
Depth of Cut mm(inch)	0.2(.007)	
Dry/Wet Cutting	Wet Cutting	



### DBN500 Test Result

Grade	DBN500	Competitor cBN
Insert	CNMA120412(ANSI: CNMA433)	
Workpiece	Compressor Comp(FC250 Facing, Interrupted)	
Cutting Speed m/min(feet/min)	400(1,312)	
Feed mm/rev(inch/rev)	0.07(.002)	
Depth of Cut mm(inch)	0.15(.005)	
Dry/Wet Cutting	Wet Cutting	

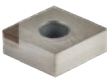
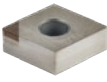




DBN500 : Under 0.00003"; Ceramics : Over 0.00006



# cBN Sintered Alloy

## Features and Cutting Conditions of cBN Grade

\* First Recommended

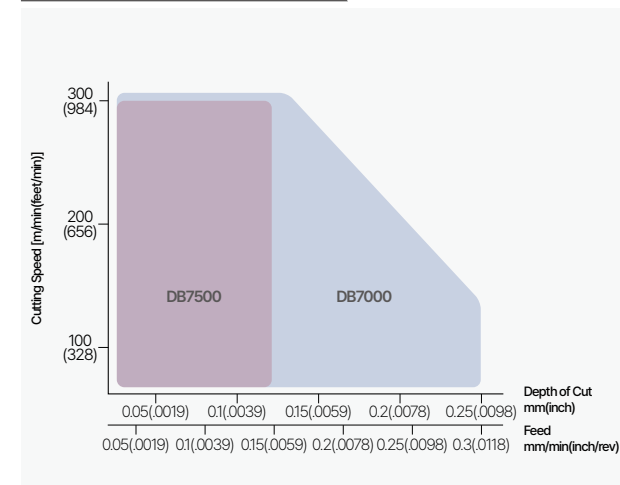
Classification	Coating	Grade	Color	Applications	Features
Sintered Alloy	Uncoated	DB7000		High-density Heat-treated Parts	Features excellent wear resistance and damage resistance in sintered alloy machining to stably implement a long service life
		DB7500*		High-density Heat-treated Parts	Appropriate for sintered alloy deburring machining by maintaining the best cutting performance

Workpiece	Grade	Cutting Conditions									
		Cutting Speed [m/min(feet/min)]					Feed		Depth of Cut		
		100(328)	150(492)	200(656)	250(820)	300(984)	mm/rev	inch/rev	mm	inch	
General Sintered Alloy	DB7000	80 (262)					300 (984)	0.1 ~ 0.3	.0039 ~ .0118	≤ 0.25	≤ .0098
	DB7500*	80 (262)					300 (984)	0.1 ~ 0.15	.0039 ~ .0059	≤ 0.25	≤ .0098

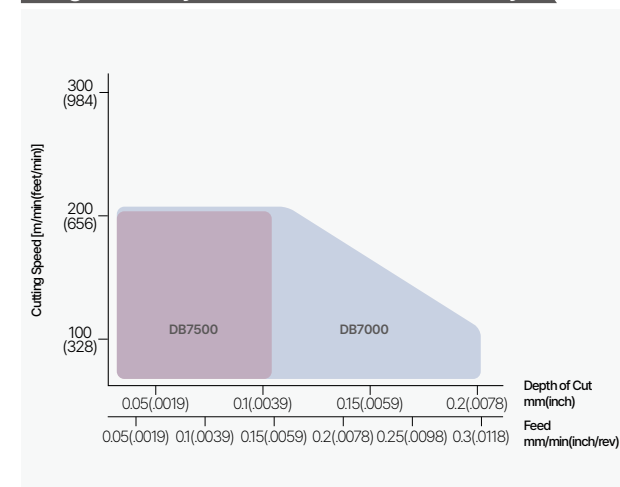
Workpiece	Grade	Cutting Conditions									
		Cutting Speed [m/min(feet/min)]					Feed		Depth of Cut		
		100(328)	150(492)	200(656)	250(820)	300(984)	mm/rev	inch/rev	mm	inch	
High-density Heat-treated Sintered Alloy	DB7000	80 (262)					200 (656)	0.1 ~ 0.3	.0039 ~ .0118	≤ 0.2	≤ .0078
	DB7500*	80 (262)					200 (656)	0.1 ~ 0.15	.0039 ~ .0059	≤ 0.2	≤ .0078

## Applicable Area

### General Sintered Alloy



### High-density Heat-treated Sintered Alloy



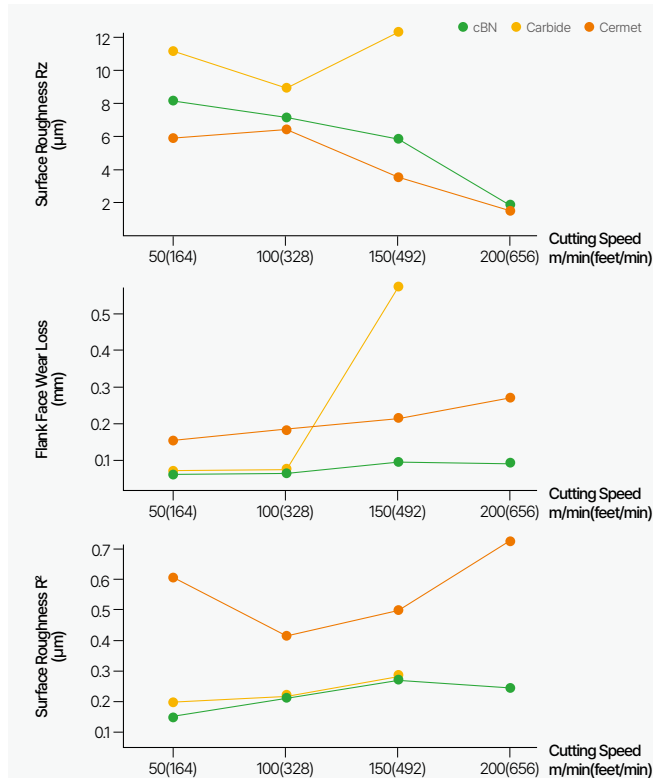
# cBN Sintered Alloy

## cBN Cutting Performance

### Performance by Tool Materials

Workpiece	SMF4040
Details of Machining	High-interrupted cross-sectional machining with a groove, Hole $\varnothing 80 \sim 100 (3.1496'' \sim 3.9370'')$ -after 40 pass machining
Tool Designation	TNGA160404(ANSI: TNGA331) / DB7000
Cutting Condition	f=0.1mm/rev(.003inch/rev), ap=0.1mm(.003inch) Wet Cutting

For general sintered alloys, machining with cemented carbide or cermet-coated tools can be performed at up to  $V_c=100\text{m/min}$ . However, beyond approximately  $V_c=120\text{m/min}$ , wear occurs rapidly, leading to the surface roughness degradation and formation of machining burrs. cBN is excellent in maintaining surface roughness, wear resistance, and burr suppression in high-speed ranges, ensuring stable machining performance.



## Valve Seat Ring(VSR)

VSR is divided into VSR for Intake(IN) and VSR for Exhaust(EX). Generally, VSR for EX is of high-hardness.

### Recommended Grade

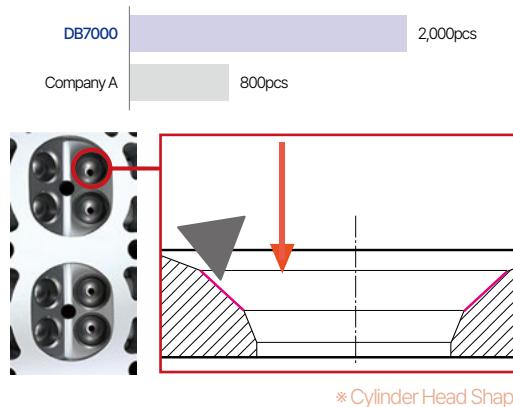
	Gasoline Engine VSR Material	Diesel Engine VSR Material
Flange Cutting	DB7000 DBN350	DB7000 DBN350
Traverse Cutting	DB7000 DBN500	DB7000 DBN500
Workpiece Hardness(HV)	Low ◀ HV300 ▶ High	Low ◀ HV300 ▶ High

### Recommendation Conditions

Cutting Speed m/min(feet/min)	Feed mm/rev(Inch/rev)	Depth of Cut mm(inch)
50 ~ 100 (164 ~ 328)	0.03 ~ 0.2 (.0011 ~ .0078)	0.05 ~ 0.5 (.0019 ~ .0196)

### Cutting Example

The tool service life was increased more than two fold versus conventional one when machining with DB7000 whose damage resistance is excellent.

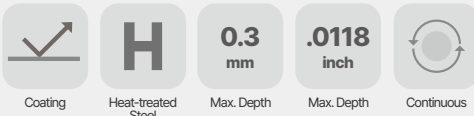


### Recommendation Conditions

Workpiece	Sintered Alloy(150-250HV)
Details of Machining	VSR(IN) 45-face Grinding Machining
Tool Designation	TBGN060104(ANSI: TBGN1.211) / DB7000
Cutting Condition	$V_c=100\text{m/min}(328\text{feet/min})$ Feed=0.08mm/rev(.003inch/rev) Wet Cutting

\* The details may vary according to machining environments.

# DNC100 Coated cBN



## Features

- Primary recommended grade for high-speed, continuous machining
- Excellent heat resistance due to high oxidation temperature
- Coating with high-hardness, oxidation and chipping resistance applied

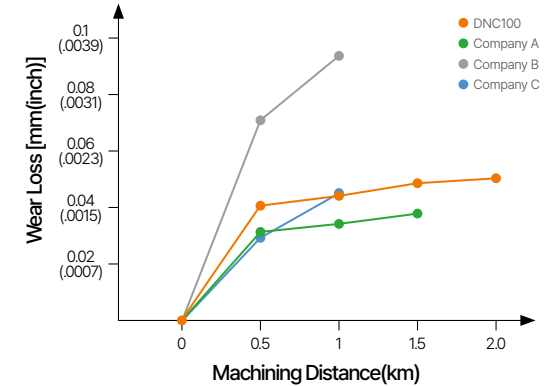
Grade	Texture	Binder	cBN Content(%)	Grain Size (μm)	Hardness (Gpa)
DNC100		TiN	50-55	2	31-34

## Performance Comparison Test

### Cutting Conditions

Insert Model	2NU-CNGA120408(ANSI: 2NU-CNGA432)
Test Holder	DCLNL2525-M12
Workpiece	SCM415 (58-62HrC)
Cutting Speed m/min(feet/min)	300(984)
Feed mm/rev(inch/rev)	0.1(.0039)
Depth of Cut mm(inch)	0.1(.0039)
Dry/Wet Cutting	Dry Cutting

### Wear Loss



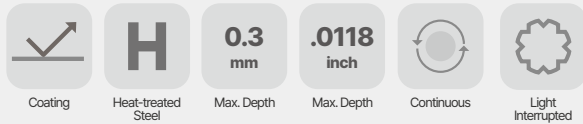
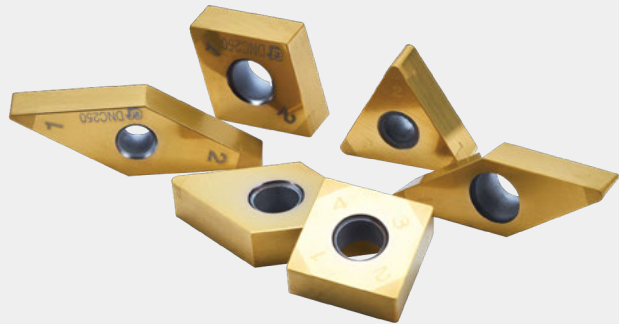
### Applicable Area

Cutting Speed mm/min(feet/min)	<div style="border: 1px solid black; padding: 5px; display: inline-block;">DNC100</div>								
Intermittent Cutting Intensity	<table border="1"> <thead> <tr> <th>Continuous</th> <th>Light Interrupted</th> <th>Medium Interrupted</th> <th>Heavy Interrupted</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Continuous	Light Interrupted	Medium Interrupted	Heavy Interrupted				
Continuous	Light Interrupted	Medium Interrupted	Heavy Interrupted						
Intermittent Accuracy	<table border="1"> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>								

### Recommended Cutting Conditions

Cutting Speed m/min(feet/min)	180 (590) <input type="range" value="300"/> 300 (984)
Feed mm/rev(inch/rev)	0.03 (.0011) <input type="range" value="0.3"/> 0.3 (.0118)
Depth of Cut mm(inch)	0.03 (.0011) <input type="range" value="0.3"/> 0.3 (.0118)

# DNC250 Coated cBN



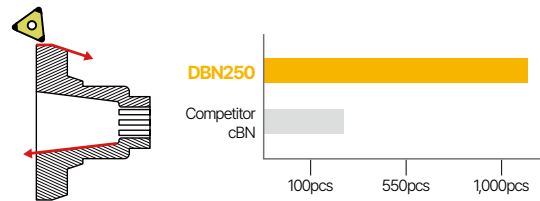
## Features

- Grade first recommended for continuous machining
- General purpose cBN that enables machining ranging from continuous cutting to light interrupted cutting by PVD coating application
- Wear resistance improved

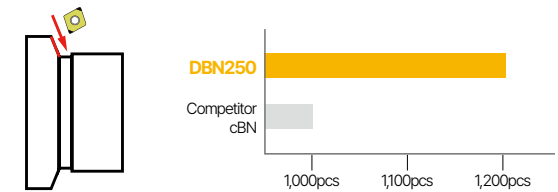
Grade	Texture	Binder	cBN Content(%)	Grain Size (μm)	Hardness (Gpa)
DNC250		TiC	65 - 70	4	32 - 34

## Machining Example

Grade	DNC250	Competitor cBN
Insert	3NU-TNGA160408(ANSI: 3NU-TNGA332)	
Workpiece	Shaft UD Brake(SCR420HB)	
Cutting Speed m/min(feet/min)	160(524)	
Feed mm/rev(inch/rev)	0.08(.0031)	
Depth of Cut mm(inch)	0.425(.0167)	
Dry/Wet Cutting	Wet Cutting	



Grade	DNC250	Competitor cBN
Insert	2NU-CNGA120408(ANSI: 2NU-CNGA432)	
Workpiece	Hardness : Hrc40~50(SCM92 0HVS I)	
Cutting Speed m/min(feet/min)	280(918)	
Feed mm/rev(inch/rev)	0.08 - 0.15(.0031 ~ .0059)	
Depth of Cut mm(inch)	0.2(.0078)	
Dry/Wet Cutting	Wet Cutting	

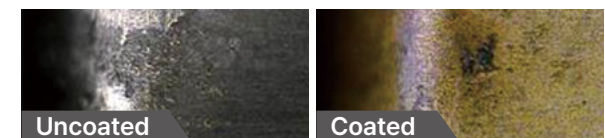


## Applicable Area

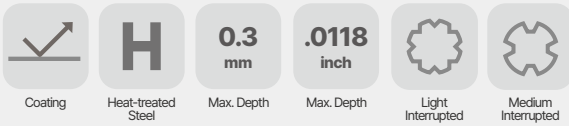
Cutting Speed mm/min(feet/min)	220 (721)	DNC250			
	180 (590)				
Intermittent Cutting Intensity	Continuous	Light Interrupted	Medium Interrupted	Heavy Interrupted	
Intermittent Accuracy					

## Recommended Cutting Conditions

Cutting Speed m/min(feet/min)	120 (393)	<input type="range" value="120"/>	220 (721)
Feed mm/rev(inch/rev)	0.05 (.0019)	<input type="range" value="0.05"/>	0.3 (.0118)
Depth of Cut mm(inch)	0.05 (.0019)	<input type="range" value="0.05"/>	0.3 (.0118)



# DNC300 Coated cBN



## Features

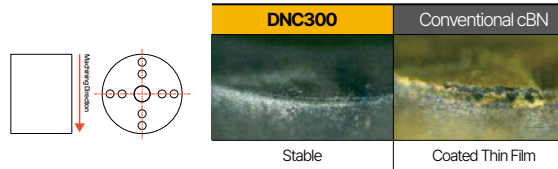
- Grade first recommended for machining ranging from light interrupted to medium interrupted
- Improved resistance to chipping and wear versus rival products
- Minimized coating peeling due to its stable coating

Grade	Texture	Binder	cBN Content(%)	Grain Size (μm)	Hardness (Gpa)
DNC300		TiN	65 - 75	4	29 - 31

## Performance Comparison

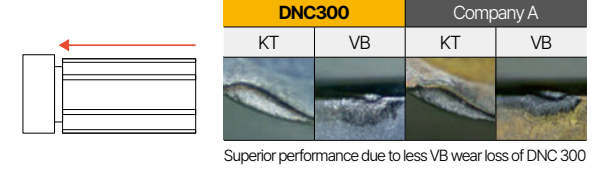
### Interrupted

Vc : 90m/min(295feet/min), F : 0.1mm/rev(.0039inch/rev),  
D : 0.1mm(.0039inch), SCR420H(HrC58~62), Dry(4PATH = 0.21km)

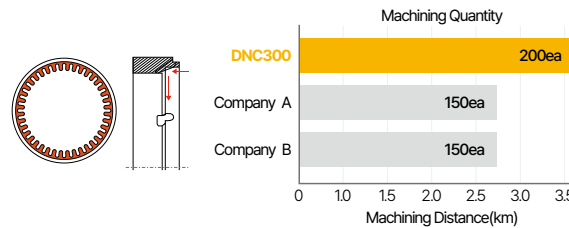


### Interrupted

Vc : 120m/min(393feet/min), F : 0.1mm/rev(.0039inch/rev),  
D : 0.1mm(.0039inch), 9Path



## Machining Example



Grade	DNC300	Company A	Company B
Insert	CNGA120408(ANSI: CNGA432)		
Workpiece	Heat-treated Steel(HrC578)		
Cutting Speed m/min(feet/min)	160(524)		
Feed mm/rev(inch/rev)	0.08(.0031)		
Depth of Cut mm(inch)	0.2 - 0.3(.0078 - .0118)		
Dry/Wet Cutting	Wet Cutting		

## Applicable Area

Cutting Speed mm/min(feet/min)	DNC300			
	Continuous	Light Interrupted	Medium Interrupted	Heavy Interrupted
200 (656)				
90 (295)				
Intermittent Cutting Intensity				
Intermittent Accuracy				

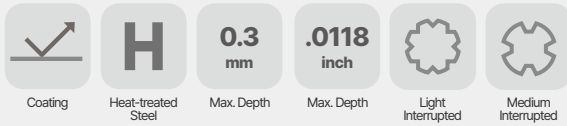
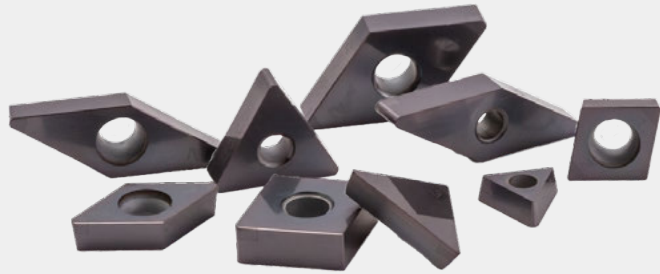
## Recommended Cutting Conditions

- Wear resistance and oxidation resistance are improved with high-hardness thin film adopted
- Significantly improved resistance to chipping, fracture, and wear

Cutting Speed m/min(feet/min)	90 (295) <input checked="" type="checkbox"/> 200 (656)
Feed mm/rev(inch/rev)	0.05 (.0019) <input checked="" type="checkbox"/> 0.3 (.0118)
Depth of Cut mm(inch)	0.05 (.0019) <input checked="" type="checkbox"/> 0.25 (.0098)

\* The details may vary according to machining environments.

# DNC350 Coated cBN



## Features

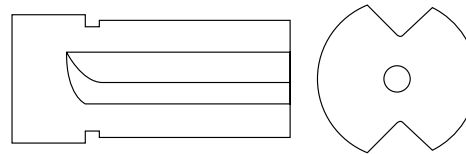
- Grade first recommended for interrupted machining
- Maintains functionality and precision for a long time due to its advanced coating technology
- Economical due to its longer service life

Grade	Texture	Binder	cBN Content(%)	Grain Size (μm)	Hardness (Gpa)
DNC350		TiN	60 - 65	1	33 - 35

## Machining Example

Grade	<b>DNC350</b>	Competitor cBN
Insert	2NU-CNGA120408(ANSI: 2NU-CNGA432)	
Workpiece	SCM415(HRC58-60)	
Cutting Speed m/min(feet/min)	120(393)	
Feed mm/rev(inch/rev)	01(.0039)	
Depth of Cut mm(inch)	01(.0039)	
Dry/Wet Cutting	Dry Cutting	

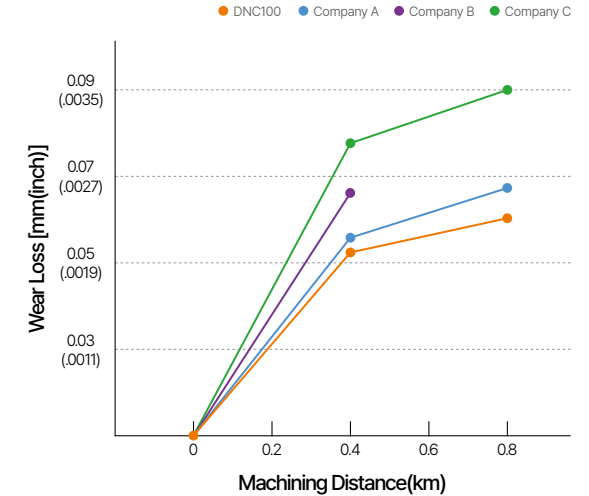
## Workpiece Shape



## Applicable Area

Cutting Speed mm/min(feet/min)				
	Continuous	Light Interrupted	Medium Interrupted	Heavy Interrupted
Intermittent Cutting Intensity				
Intermittent Accuracy				

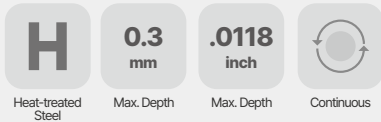
## Wear Loss



## Recommended Cutting Conditions

Cutting Speed m/min(feet/min)	90 (295)  150 (492)
Feed mm/rev(inch/rev)	0.05 (.0019)  0.3 (.0118)
Depth of Cut mm (inch)	0.05 (.0019)  0.25 (.0098)

# DB1000 Uncoated cBN



## Features

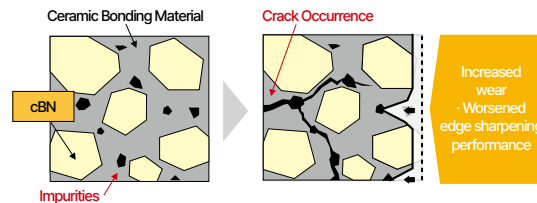
- Grade for high-speed machining with the best wear resistance among non-coated cBNs
- Features an excellent tool service life in the continuous machining~light interrupted machining
- Focuses on wear resistance and improves fracture resistance
- Improves heat resistance and strength by high-purity TiCN ceramic bonding materials

Grade	Texture	Binder	cBN Content(%)	Grain Size (μm)	Hardness (Gpa)
DB1000		TiCN	40 - 45	1	27 - 31

## Newly Developed High-purity Ceramic Bonding Material

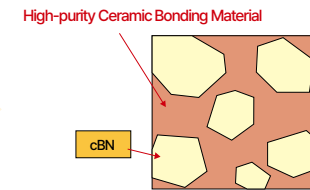
### Existing Grades

Impurities included in the ceramic binders of existing grades leads to a decrease in the strength and heat resistance of the sintered body, resulting in cracks and wear.

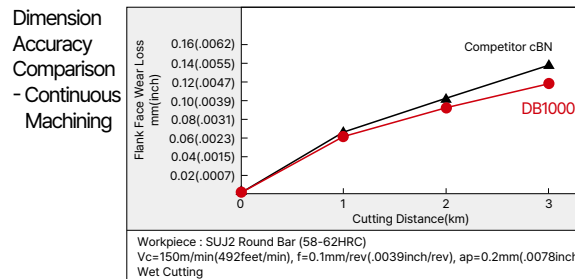


### DB1000

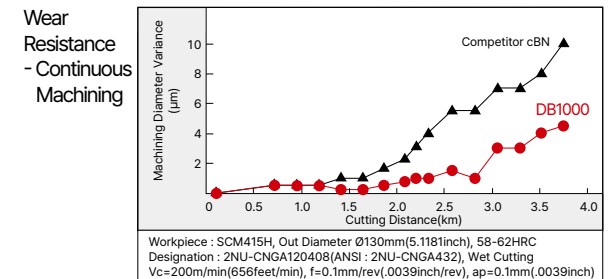
DB1000 enhanced heat resistance and strong tenacity by reducing impurities to the very limit using the newly developed 'high-purity ceramic bonding material'.



## Cutting Performance



## Machining Precision



### Applicable Area

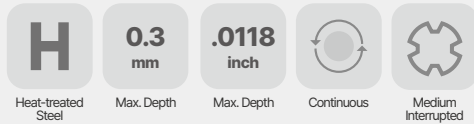
Cutting Speed mm/min(feet/min)	Applicable Area			
	Continuous	Low Interrupted	Medium Interrupted	Heavy Interrupted
300 (984)	DB1000	DB1000	DB1000	DB1000
200 (656)	DB1000	DB1000	DB1000	DB1000
100 (328)	DB1000	DB1000	DB1000	DB1000
	DB2000	DBN20	DBN25	DBN350
Intermittent Cutting Intensity				
Intermittent Accuracy				

### Recommended Cutting Conditions

Cutting Speed m/min(feet/min)	130 (426) <input type="checkbox"/>	250 (820) <input type="checkbox"/>
Feed mm/rev(inch/rev)	0.03 (.0011) <input type="checkbox"/>	0.15 (.0059) <input type="checkbox"/>
Depth of Cut mm(inch)	0.03 (.0011) <input type="checkbox"/>	0.2 (.0078) <input type="checkbox"/>

\* Cutting Oil : Continuous Machining Dry / Wet, Interrupted Machining Dry  
\* The details may vary according to machining environments.

# DB2000 Uncoated cBN



## Features

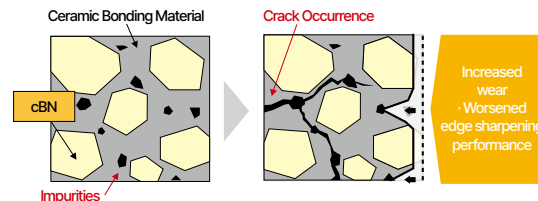
- General purpose grade that responds to overall heat-treated steel (Realizes a stable tool service life ranging from continuous cutting to light/medium interrupted machining)
- Highly compatible with fracture resistance and wear resistance (Both properties greatly improved by the use of the high-purity ceramic bonding material)
- Achieves a stable surface roughness based on edge sharpening performance

Grade	Texture	Binder	cBN Content(%)	Grain Size (μm)	Hardness (Gpa)
DB2000		TiN	50 - 55	2	31 - 34

## Newly Developed High-purity Ceramic Bonding Material

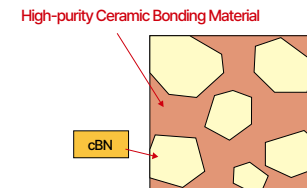
### Existing Grades

Impurities included in the ceramic binders of existing grades leads to a decrease in the strength and heat resistance of the sintered body, resulting in cracks and wear.

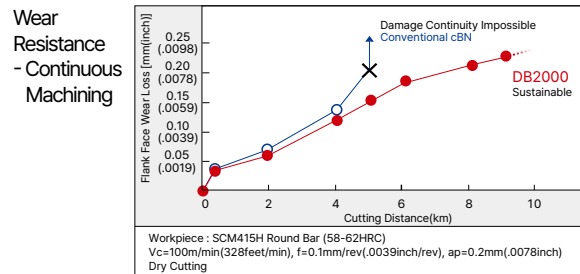


### DB2000

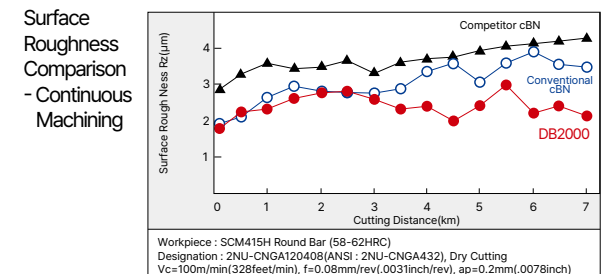
DB1000 enhanced heat resistance and strong tenacity by reducing impurities to the very limit using the newly developed 'high-purity ceramic bonding material'.



## Cutting Performance



## Machining Precision



## Applicable Area

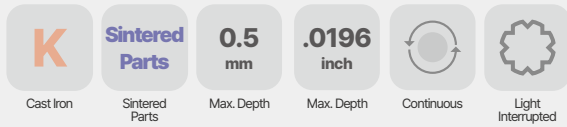
Cutting Speed mm/min(feet/min)	Applicable Area			
	Continuous	Light Interrupted	Medium Interrupted	Heavy Interrupted
300 (984)	DB1000	DBNX20	DBNX25	DBNX350
200 (656)	DB2000	DBNX20	DBNX25	DBNX350
100 (328)	DB2000	DBNX20	DBNX25	DBNX350
Intermittent Cutting Intensity				
Intermittent Accuracy				

## Recommended Cutting Conditions

Cutting Speed m/min(feet/min)	80 (262) <input type="checkbox"/>	200 (656) <input checked="" type="checkbox"/>
Feed mm/rev(inch/rev)	0.03 (.0011) <input type="checkbox"/>	0.2 (.0078) <input checked="" type="checkbox"/>
Depth of Cut mm(inch)	0.03 (.0011) <input type="checkbox"/>	0.3 (.0118) <input checked="" type="checkbox"/>

\* Cutting Oil : Continuous Machining Dry / Wet, Interrupted Machining Dry  
\* The details may vary according to machining environments.

# DB7000 Uncoated cBN

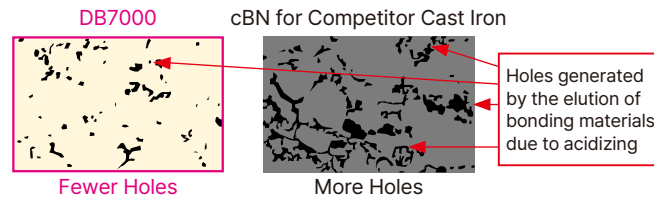


## Features

- Ideal for high-speed grinding machining of cast iron
- Suppresses heat crack and realizes excellent damage resistance by high-speed machining of gray cast iron
- Realizes highly efficient sintered alloy machining
- Provides a stably longer service life in case of machining of sintered alloys with diverse shape hardness by meeting the requirements for cutting edge treated products of high standard+2 types
- Responds to various difficult-to-cut materials
- Features high-performance for difficult-to-cut materials such as rolls, high-speed tools, and heat resistant alloys, etc.

Grade	Texture	Binder	cBN Content(%)	Grain Size (μm)	Hardness (Gpa)
DB7000		CO Compound	90 - 95	2	41 - 44

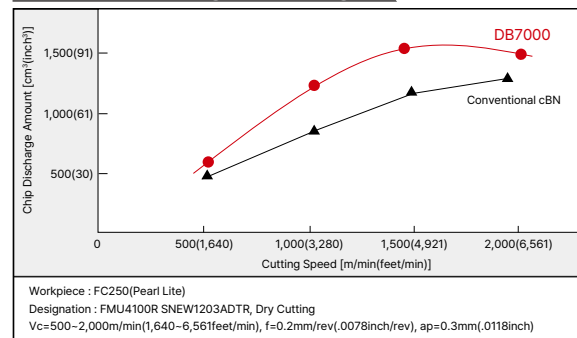
## Newly Developed High-purity Ceramic Bonding Material



Provides an excellent damage resistance and an enhanced inter-cBN particle coherence by sintering intermediate particle cBNs in high-density to realize the best content. Ensures a long service life and stable machining in high-speed grinding of hard-to-cut materials of cast iron sintered alloys.

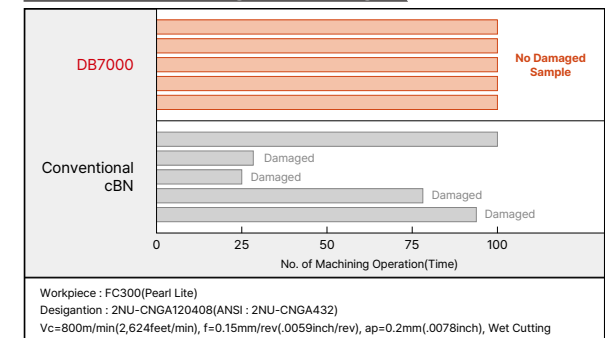
## Cutting Performance

### Cast Iron Milling Machining

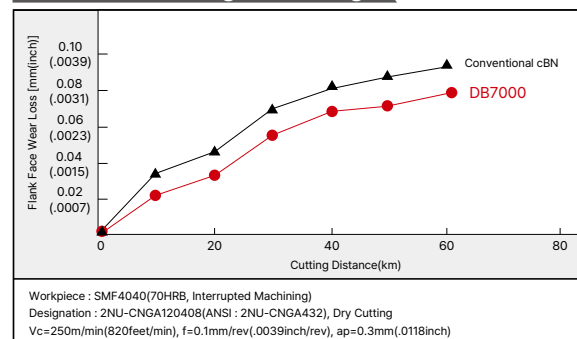


## Machining Precision

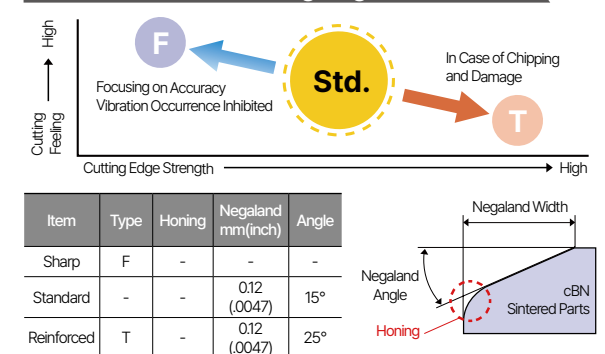
### Cast Iron Turning Machining



### Cast Iron Turning Machining



## Recommended Cutting Edge Treatment



# DB7500 Uncoated cBN



Sintered Parts

Sintered Parts

0.3 mm

Max. Depth

.0118 inch

Max. Depth



Continuous



Light Interrupted

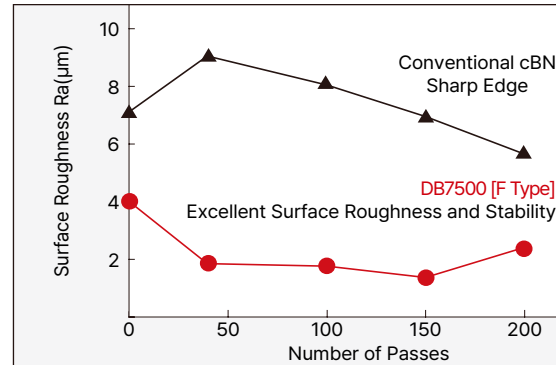
## Features

- Ideal for grinding machining of sintered alloys
- Realizes excellent surface roughness and machined surface quality
- Various shapes of sintered parts can cutting by various cutting edge treatment
- The F type, designed for cutting performance in machining sintered alloys, suppresses burrs and improves machining precision.
- The T type, with reinforced cutting edges, demonstrates stable chipping resistance even during interrupted machining.

Grade	Texture	Binder	cBN Content(%)	Grain Size (μm)	Hardness (Gpa)
DB7500		CO Compound	90 - 95	1	41 - 44

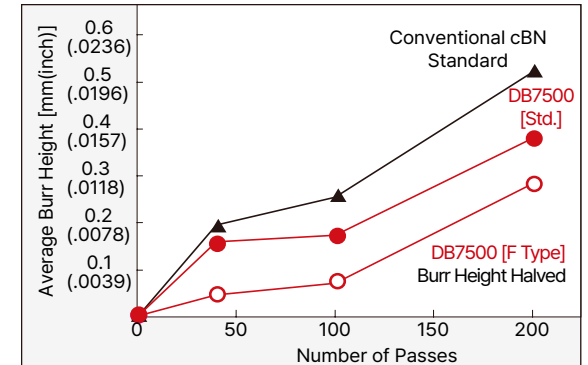
## Cutting Performance

### Surface Roughness



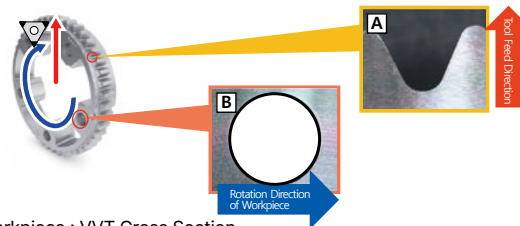
Workpiece : Equivalent to Iron Metal Sintered Alloy SMF4040(70HRB, Continuous Machining)  
 Designation : 2NU-CNGA120408F(ANSI : 2NU-CNGA432F)  
 Vc=200m/min(656feet/min), f=0.1mm/rev(.0039inch/rev), ap=0.1mm(.0039inch), Wet Cutting

### Average Burr Height



Workpiece : Equivalent to Iron Metal Sintered Alloy SMF4040(70HRB, Continuous Machining)  
 Designation : 2NU-CNGA120408F(ANSI : 2NU-CNGA432F)  
 Vc=200m/min(656feet/min), f=0.1mm/rev(.0039inch/rev), ap=0.1mm(.0039inch), Wet Cutting

### Feed-burr Relationship



Workpiece : VVT Cross Section  
 Designation : 3NU-TNGA160404(ANSI : 3NU-TNGA331)  
 Vc=200m/min(656feet/min), f=0.1mm/rev(.0039inch/rev), ap=0.1mm(.0039inch), Wet Cutting

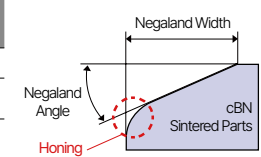
	F Type	Standard	T Type
A			
B			

\* If Feed is more than 0.1mm/rev, the T type is superior to the standard type in terms of cutting taste and burr can be inhibited.

### Recommended Cutting Edge Treatment



Item	Type	Honing	Negaland mm(inch)	Angle
Sharp	F	-	-	-
Standard	-	-	0.12 (.0047)	15°
Reinforced	T	-	0.12 (.0047)	25°



\* The details may vary according to machining environments.

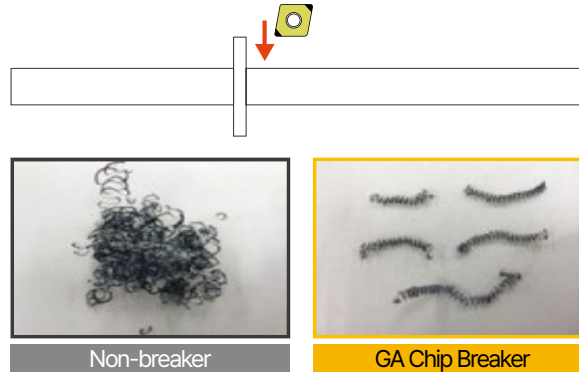
# cBN Chip Breaker(GA, RA)



## Features

- Smooth chip evacuation with the use of chip breakers
- Ideal for unmanned automatic operations of the cutting process
- GA chip breaker suitable for finishing
- RA chip breaker suitable for roughing

## Cutting Performance



## Machining Precision

Grade	DNC350(GA)	Competitor cBN
Insert	2NU-CNGM120412-GA (ANSI: 2NU-CNGM433-GA)	
Workpiece	Input Shaft(SCM920 HVSI)	
SFM m/min(feet/min)	145(475)	
Feed mm/rev(inch/rev)	0.1(.0039)	
Depth of Cut mm(inch)	0.4(.0157) ~ 0.5(.0196)	
Dry/Wet Cutting	Wet Cutting (Excellent Chip Breaking Versus Rival Products)	

	Competitor cBN	DNC350
300pcs	325pcs	350pcs

## Chip Breaker

### GA Type

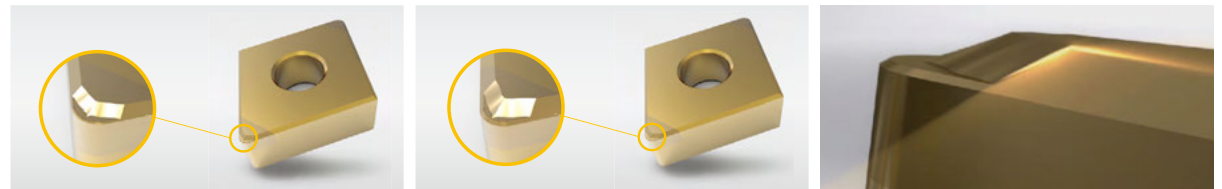
GA chip breaker suitable for finishing

### RA Type

RA chip breaker suitable for roughing

### Chip Breaker Features

Superior design fit for chip breaking to induce easy curling



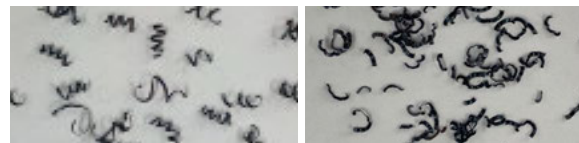
## Chip Breaker Comparison

### GA Type

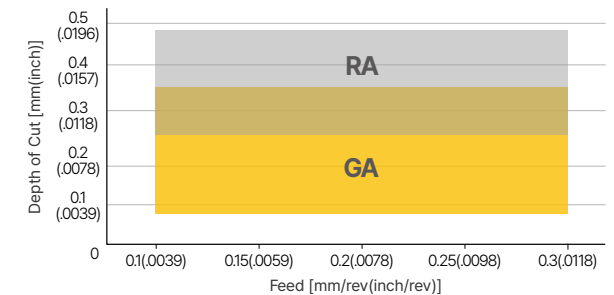
Vc : 150m/min(492feet/min)  
F : 0.15mm/rev(.0059inch/rev)  
Ap : 0.15mm(.0059inch)

### RA Type

Vc : 150m/min(492feet/min)  
F : 0.15mm/rev(.0059inch/rev)  
Ap : 0.3mm(.0118inch)



## Applicable Area



# PCD Chip Breaker(UC)



## Features

- Productivity improved by resolving chip troubles
- Stable capacity to break chips in the large cutting area
- Excellent in machining aluminium and copper alloys
- Provides very high-hardness and excellent wear resistance due to high-density combination of diamond polycrystallines

## Cutting Performance

- Designation : DCMT11T304-UC(ANSI: DCMT32.51-UC)
- Workpiece : AL6061, Ø100mm(3.9370")\*L160mm(6.2992")  
Outside Dia. Machining
- Vc=500m/min(1,640feet/min), f=0.15mm/rev(.0059inch/rev),  
ap=0.2mm(.0078inch)
- Dry Cutting



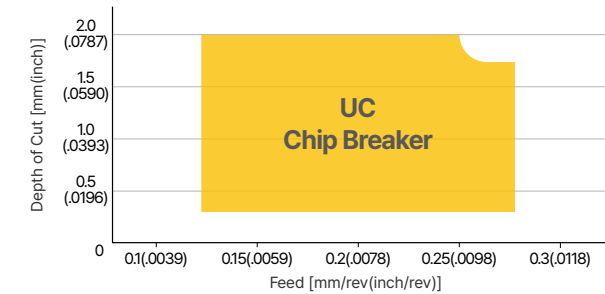
General Type PCD

UC Chip Breaker

## Chip Breaker

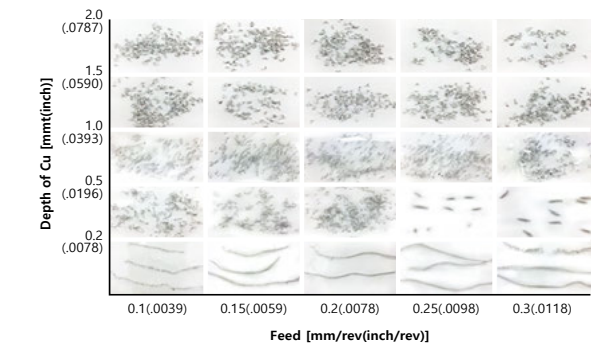


## Machining Precision

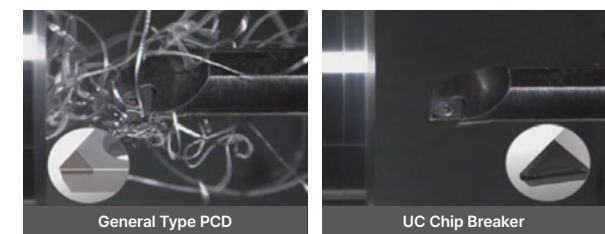


## Shape of Chip

- Designation : DCMT11T304-UC(ANSI: DCMT32.51-UC)
- Workpiece : AL6061, Ø100mm(3.9370")\*L160mm(6.2992")  
Outside Dia. Machining
- Vc=500m/min(1,640feet/min), Dry Cutting



## Comparison of Chip Rear Discharge

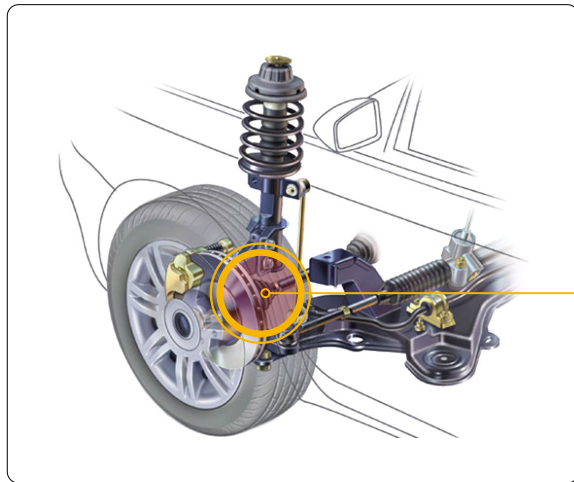


# CV Joint Machining

## Overview of CV Joint

## Constant Velocity Joint

Mechanical coupling which allows the shafts to rotate freely and compensates for the angle between the two shafts, within a certain range, to maintain the same velocity



CV Joint



Outer Race



Cage

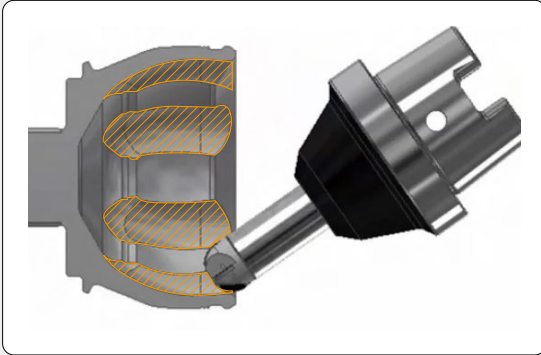


Inner Race

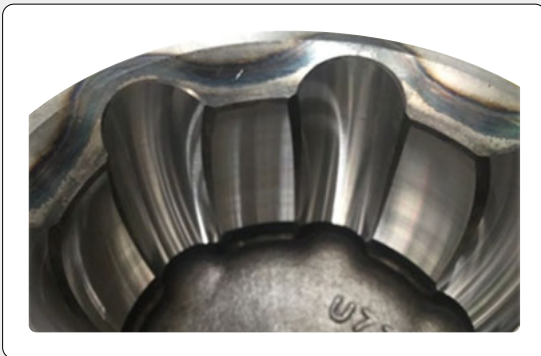
# CV Joint Machining

## Ball Track Milling

A tool that mills the track along which the ball moves inside the CV Joint



## High-efficiency Machining

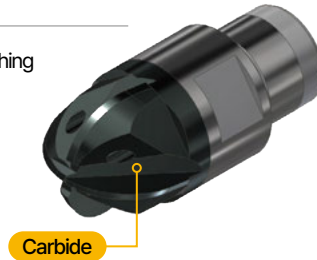


Surface Roughness	Machining Quantity(pcs)
Ra0.8 or below	1,500

- Excellent in Maintaining Surface Roughness
- Excellent Rigidity of High-productivity

## Soft Ball Head

- For Roughing and Semi-finishing
- Carbide Head
- High Wear Resistance
- High-speed Machining

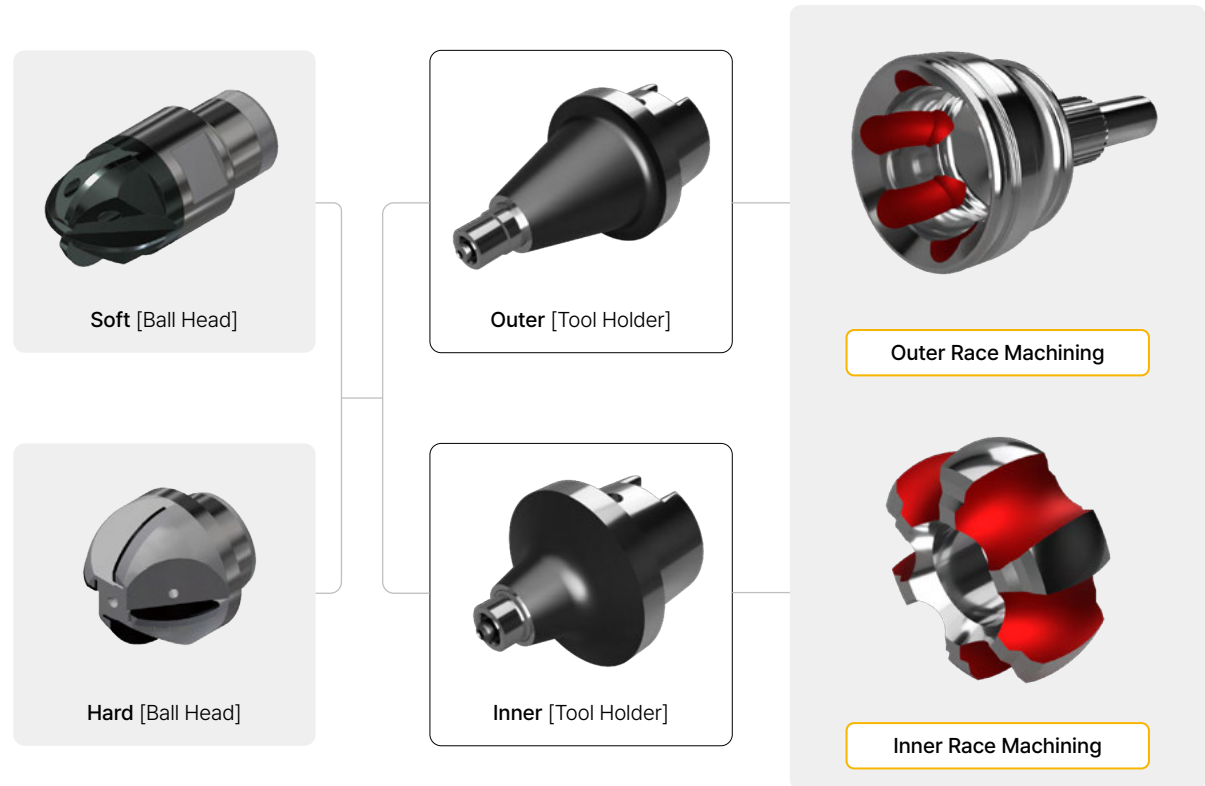


## Hard Ball Head

- For Finishing
- High cBN Contented Cutting Edge
- High-precision Machining When Finishing High-hardness Workpieces
- Mechanical Post-processing Not Needed

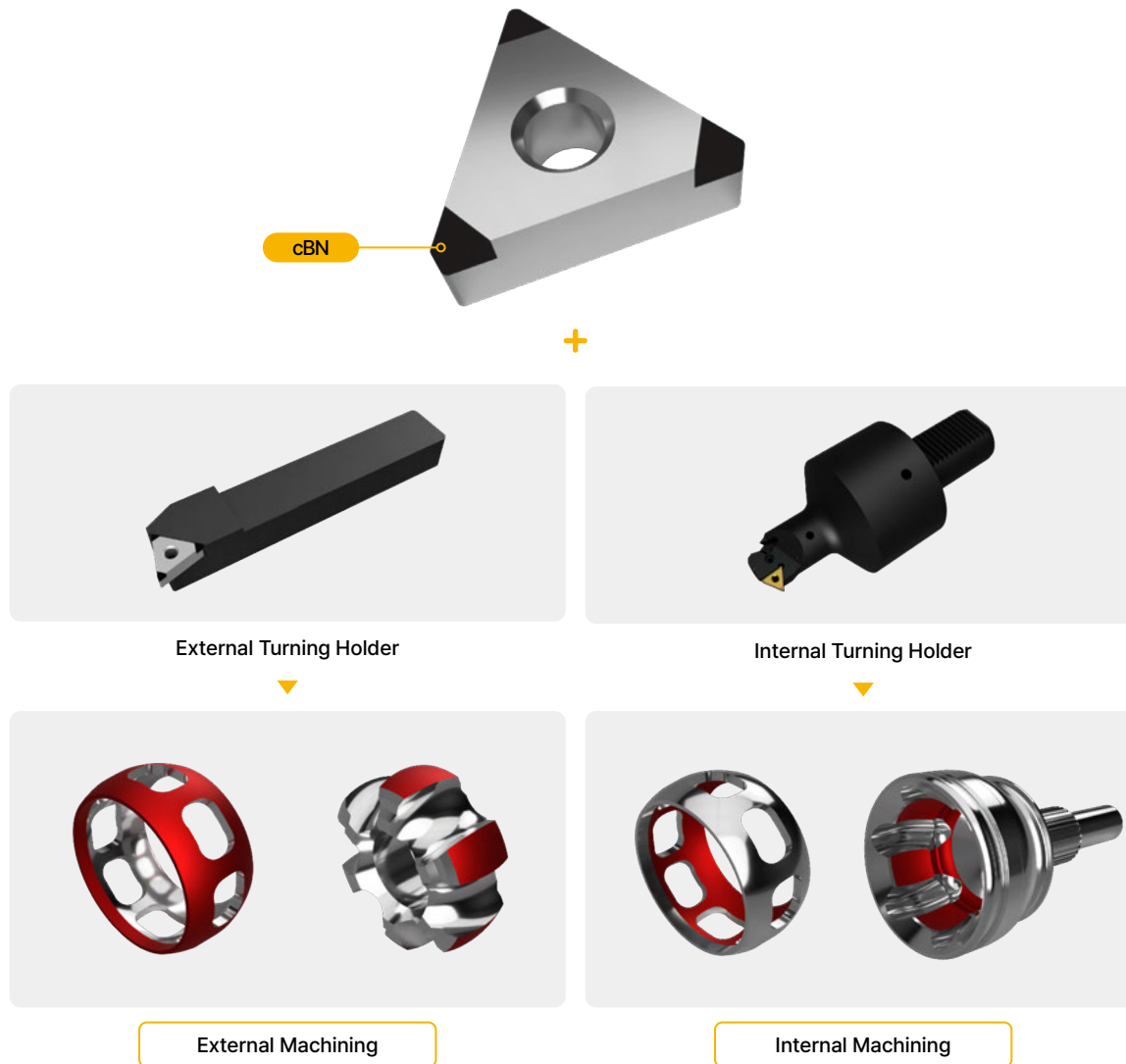


## Application Map

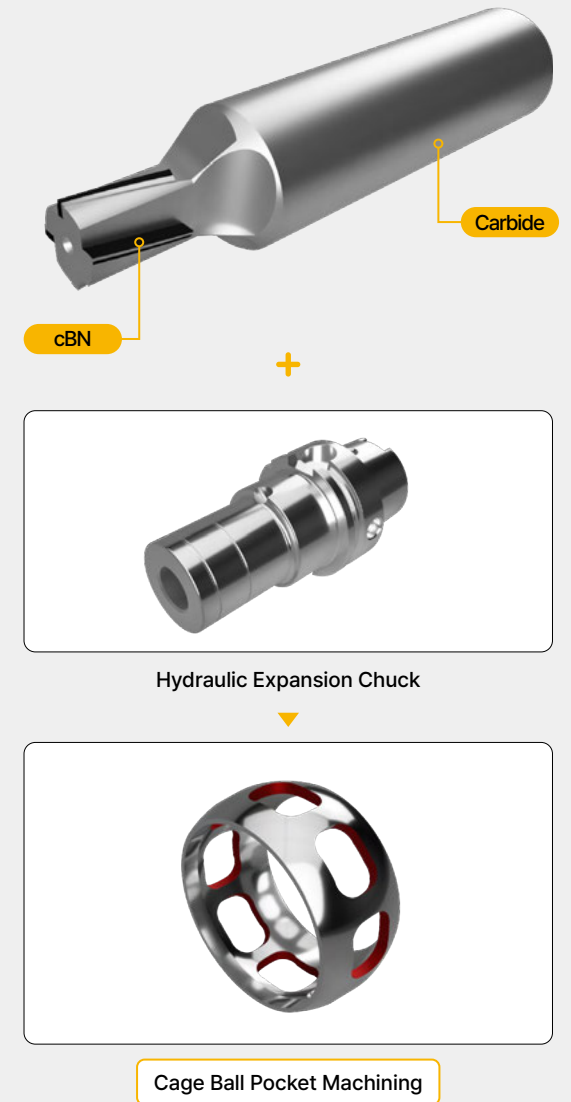


# CV Joint Machining

## cBN Insert for Inside & Outside Diameter



## cBN End Mill

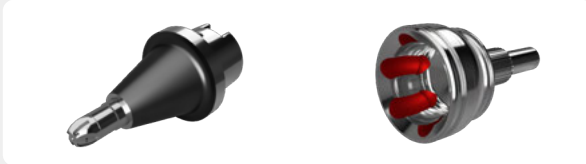


# Feature&Cutting Condition

## Ball Track Milling

- Track milling processing after heat-treatment
- High cBN contented cutting edge applied
- Mechanical post-processing not needed

### Outer Race Tool



### Inner Race Tool

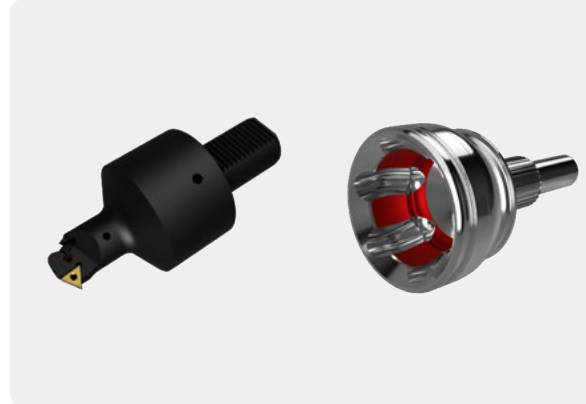


Holder	HSK63-BTM00-00
End Tool	BTM00-HE/ETM00-HE
Grade	cBN
Work Material	Outer Race : CF-53 / Inner Race : 20MnCr5
Hardness	HrC 59~62
Surface	Ra ≤ 0.8

Cutting Speed m/min(feet/min)	150 (492)	<input type="range"/>	230 (754)
Feed mm/rev(inch/rev)	0.08 (.0031)	<input type="range"/>	0.12 (.0047)
Depth of Cut mm(inch)	0.1 (.0039)	<input type="range"/>	0.3 (.0118)

## Outer Race ID Turning

- VDI Type holder applied
- High-precision with stable clamping at two points

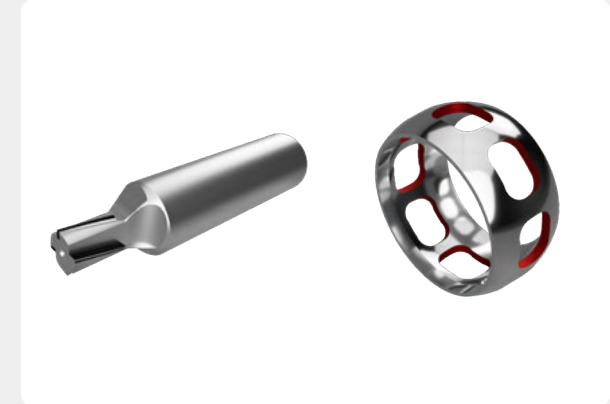


Holder	VDI00-CTT00-00
End Tool	TNGA160400(ANSI: TNGA3300)
Grade	cBN
Work Material	CF-53
Hardness	HrC 59~62
Surface	Ra ≤ 0.8

Cutting Speed m/min(feet/min)	150 (492)	<input type="range"/>	200 (656)
Feed mm/rev(inch/rev)	0.1 (.0039)	<input type="range"/>	0.15 (.0059)
Depth of Cut mm(inch)	0	<input type="range"/>	0.2 (.0078)

## Cage Ball Pocket Machining

- High cBN contented cutting edge applied
- High-precision machining when finishing high-hardness workpieces



Holder	Hydraulic Expansion Chuck
End Tool	EN-4N-0000
Grade	cBN
Work Material	SNCM220H
Hardness	HrC 59~62
Surface	Ra ≤ 0.8

Cutting Speed m/min(feet/min)	150 (492)	<input type="range"/>	200 (656)
Feed mm/rev(inch/rev)	0.08 (.0031)	<input type="range"/>	0.12 (.0047)
Depth of Cut mm(inch)	0.1 (.0039)	<input type="range"/>	0.3 (.0118)



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