

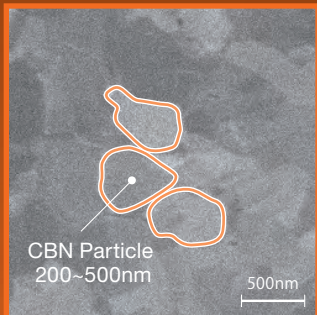
Sumitomo Exclusive 100% Pure  
CBN Content With No Impurities

# BINDERLESS CBN **NCB100**

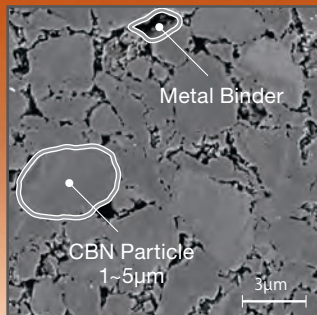
## WORLDS FIRST BINDERLESS CBN

Directly bonded nano-submicron CBN particles

Directly bonded  
structure (SEM image)

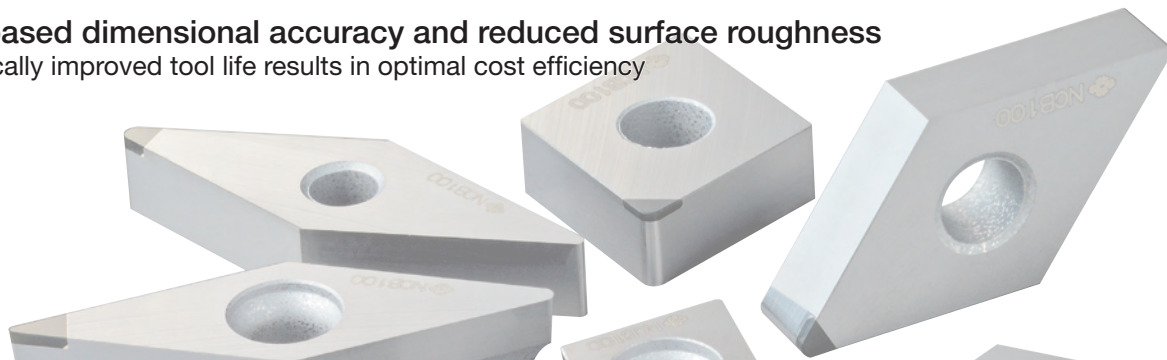


Sumiboron Binderless

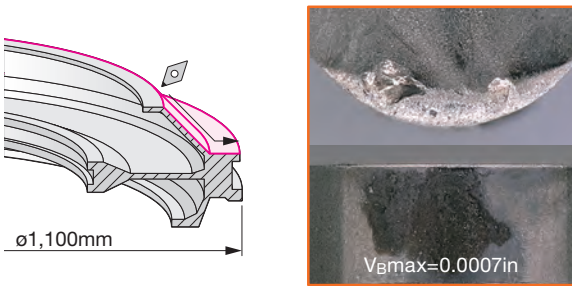
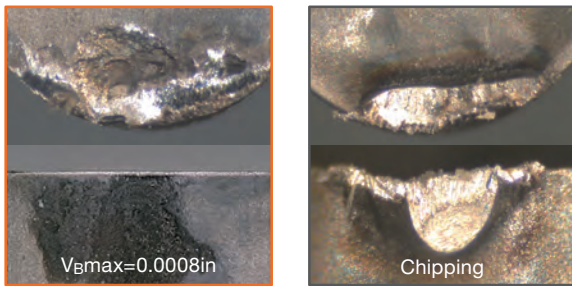


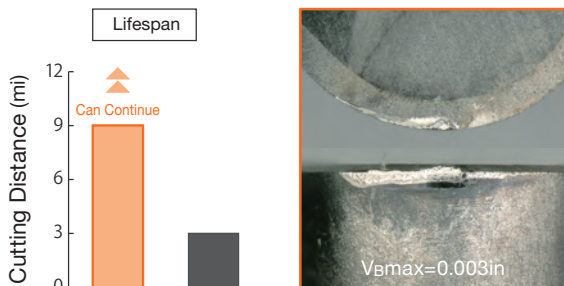
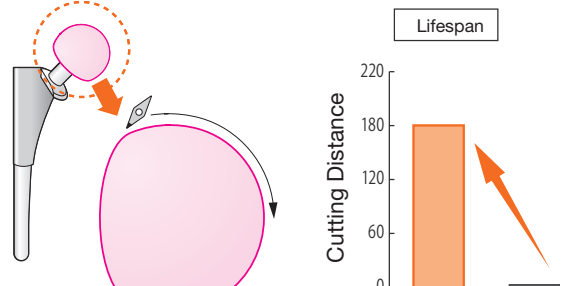
Conventional CBN  
sintered body

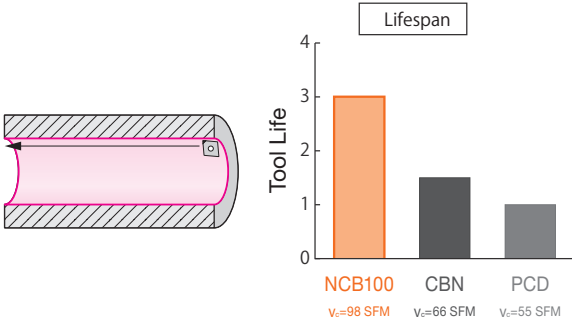
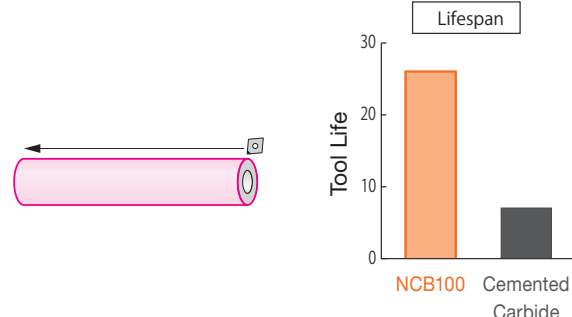
- **Ideal for high-efficiency finishing of Titanium alloy, Co-Cr alloy, Cemented Carbide and other difficult-to-cut materials**  
Abrasion resistance is demonstrated by excellent hardness and thermal conductivity of Binderless CBN
- **Unsurpassed dimensional accuracy and reduced surface roughness**  
Drastically improved tool life results in optimal cost efficiency



● Application Examples

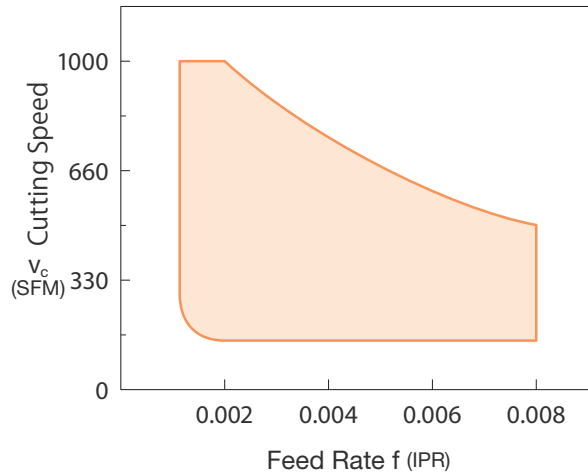
Ti-6Al-4V Turbine Disk	Ti-5Al-5V-5Mo-3Cr Aircraft Leg Parts	
<p>NCB100 Good wear resistance</p>  <p style="text-align: center;"><math>V_{Bmax}=0.0007in</math></p> <p style="text-align: center;"><b>NCB100</b> 185min (16.2mi)</p>	<p>NCB100 Crater wear resistance</p>  <p style="text-align: center;"><math>V_{Bmax}=0.0008in</math></p> <p style="text-align: center;"><b>NCB100</b> 33min (3.1mi)</p> <p style="text-align: center;">Conventional 2min (0.12mi)</p> <p style="text-align: center;">Chipping</p>	
<p>Tool Used : NU-CNGA432 NCB100 Finishing Cutting Conditions : <math>v_c=460</math> SFM <math>f=0.004</math> IPR <math>a_p=0.008in</math> Wet</p>	<p>Tool Used : NU-CNGA432 NCB100 Cutting Conditions : <math>v_c=492</math> SFM <math>f=0.004</math> IPR <math>a_p=0.015in</math> Wet (High Pressure Coolant)</p>	

Pure Titanium PVD Target Material	Co-Cr Artificial alloy hip joint head	
<p>NCB100 High wear resistance</p>  <p style="text-align: center;"><math>V_{Bmax}=0.003in</math></p> <p style="text-align: center;"><b>NCB100</b> 69min (9.3mi)</p>	<p>NCB100 Over double the tool life</p> 	
<p>Tool Used : NU-DCGA32.52 NCB100 Cutting Conditions : <math>v_c=700</math> SFM <math>f=0.004</math> IPR <math>a_p=0.010in</math> Wet (High Pressure Coolant)</p>	<p>Tool Used : NU-VNGA332 NCB100 Cutting Conditions : <math>v_c=213</math> SFM <math>f=0.006</math> IPR <math>a_p=0.008in</math> Wet</p>	

Cemented Carbide (WC-20Co)	Cermets Material: Injection molded parts	
<p>Excellent wear resistance</p> 	<p>High hardness cermet material processing</p> 	
<p>Tool Used : NU-CCGA32.51 NCB100 Cutting Conditions : <math>v_c=98</math> SFM <math>f=0.004</math> IPR <math>a_p=0.004in</math> Dry</p>	<p>Tool Used : NU-CNGA433 NCB100 Cutting Conditions : <math>v_c=105</math> SFM <math>f=0.005</math> IPR <math>a_p=0.001in</math> Dry</p>	



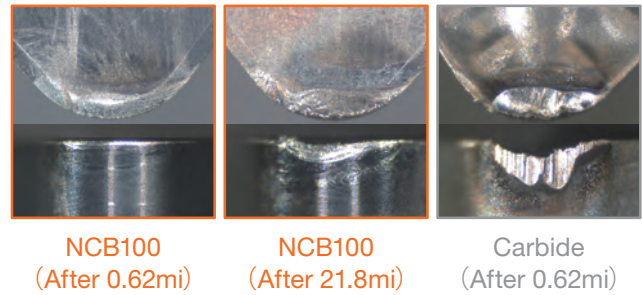
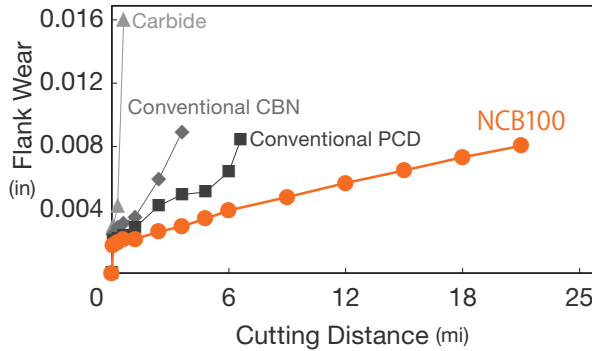
● Application area (Titanium Alloy processing)



**Titanium Alloy**

● Wear resistance (Titanium Alloy processing)

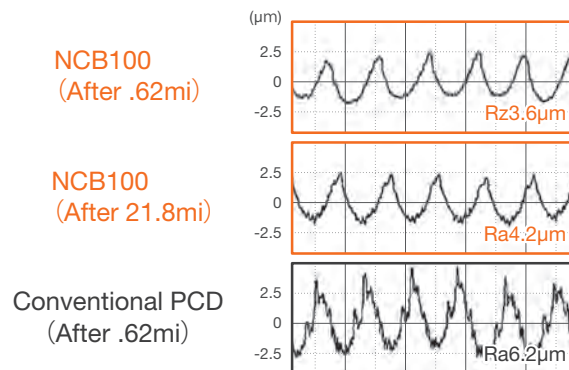
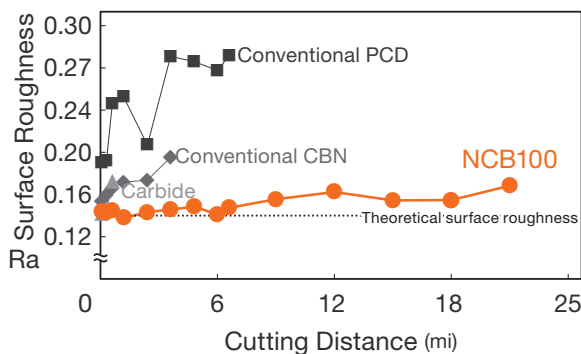
Easy tool life management with abrasion resistance 53 times longer than a cemented carbide tool, constant wear progression when machining at high speed



Part material: Titanium alloy (Ti-6Al-4V), Tool used: NU-CNGA432  
Cutting Conditions :  $v_c=492$  SFM,  $f=0.006$  IPR,  $a_p=0.020$ in Wet (High Pressure Coolant)

● Processed surface roughness (Titanium Alloy processing)

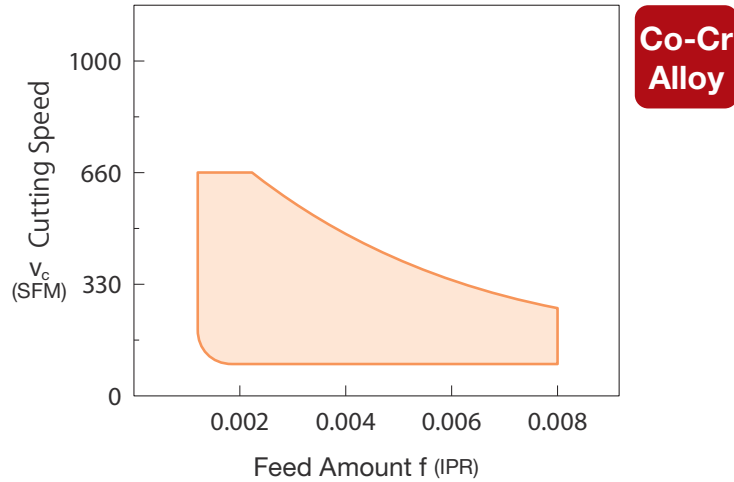
NCB100 maintains a stable surface roughness profile, a value close to the theoretical surface roughness maintained for a long time



Part material: Titanium alloy (Ti-6Al-4V), Tool used: NU-CNGA432  
Cutting Conditions :  $v_c=492$  SFM,  $f=0.006$  IPR,  $a_p=0.020$ in Wet (High Pressure Coolant)

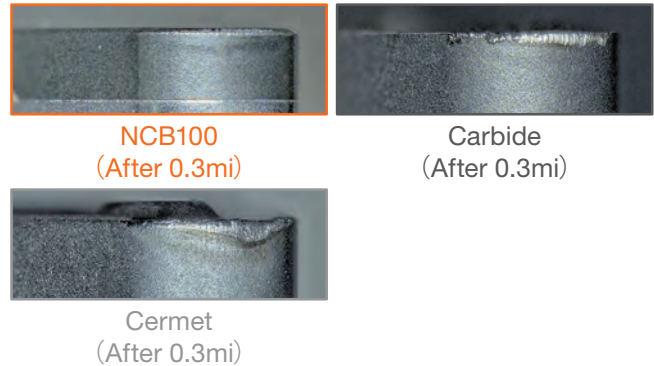
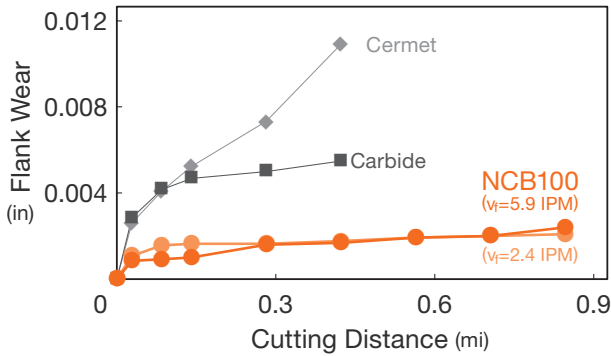


● Application area (Co - Cr alloy processing)



● Wear resistance (Co - Cr alloy processing)

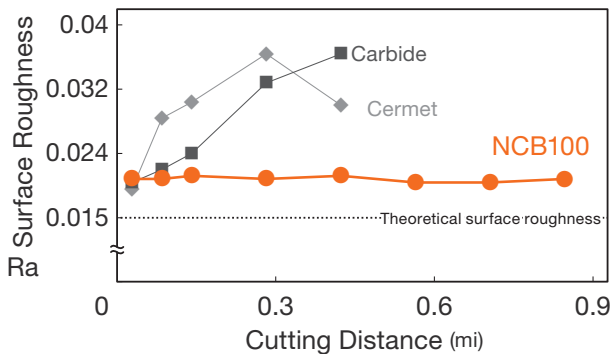
The NCB100 can maintain equivalent wear resistance and high efficiency while machining at high speeds



Part material: Co - Cr alloy (forged material), tool used: NU-VNGA332  
 Cutting Conditions: v<sub>c</sub>=197 SFM, f=0.004 IPR, a<sub>p</sub>=0.020in Wet (v<sub>f</sub>=2.4 IPM)  
 Cutting Conditions: v<sub>c</sub>=492 SFM, f=0.004 IPR, a<sub>p</sub>=0.020in Wet (v<sub>f</sub>=5.9 IPM)

● Processed surface roughness (Co - Cr alloy processing)

NCB100 maintains stable machined surface roughness



Cutting Image

Part material: Co - Cr alloy (forged material), tool used: NU-VNGA332  
 Cutting Conditions: v<sub>c</sub>=197 SFM, f=0.004 IPR, a<sub>p</sub>=0.020in Wet  
 Cutting Conditions: v<sub>c</sub>=492 SFM, f=0.004 IPR, a<sub>p</sub>=0.020in Wet





## ● Recommended Cutting Conditions

### ■ Titanium Alloy

Lower limit - Recommended value - Upper limit

Part Material		Grade	Cutting Conditions		
Composition	Hardness (HRC)		D.O.C. $a_p$ (in)	Feed $f$ (IPR)	Speed $v_c$ (SFM)
Ti-6Al-4V	30 - 35	NCB100	0.004-0.012-0.019	0.002-0.006-0.008	150- 650 -1000
Ti-5Al-5V-5Mo-3Cr	32 - 38	NCB100	0.004-0.012-0.019	0.002-0.004-0.008	150- 500 - 800
Ti-10V-2Fe-3Al	32 - 38	NCB100	0.004-0.012-0.019	0.002-0.004-0.008	150- 500 - 800

### ■ Co-Cr Alloy

Lower limit - Recommended value - Upper limit

Part Material		Grade	Cutting Conditions		
Composition	Hardness (HRC)		D.O.C. $a_p$ (in)	Feed $f$ (IPR)	Speed $v_c$ (SFM)
Co-30Cr-5Mo	35 - 45	NCB100	0.004-0.006-0.012	0.002-0.004-0.008	150- 650 -1000

### ■ Cemented Carbide

Lower limit - Recommended value - Upper limit

Part Material		Grade	Cutting Conditions		
Composition	Hardness (HRA)		D.O.C. $a_p$ (in)	Feed $f$ (IPR)	Speed $v_c$ (SFM)
WC-20Co	<88	NCB100	0.001-0.004-0.008	0.001-0.004-0.008	16- 65 -130

※SumiDia Binderless NPD10 is recommended for machining of cemented carbide with a hardness of 88 HRA or more.

### ■ Other

Lower limit - Recommended value - Upper limit

Part Material		Grade	Cutting Conditions		
Composition	Hardness (HV)		D.O.C. $a_p$ (in)	Feed $f$ (IPR)	Speed $v_c$ (SFM)
Pure Titanium	130 - 230	NCB100	0.004-0.012 -0.020	0.001-0.004-0.008	330- 820 -1300
Cermet Material (Iron-based metal is included in the binder)	1,000 - 1,500	NCB100	0.004-0.008 -0.012	0.001-0.004-0.008	32- 100 -160

## ● Stock Table

One use / negative (with hole)

Image	Cat. Number	Stock NCB100	Cutting Edges	Size (in)				
				Cutting Edge Length	I.C.	Thickness	Hole Diameter	Nose Radius
	NU-CNGA431	★	1	0.10				0.0156
	NU-CNGA432	★	1	0.95	0.5	0.1875	0.2031	0.031
	NU-CNGA433	★	1	0.90				0.047
	NU-DNGA431	★	1	0.10				0.0156
	NU-DNGA432	★	1	0.83	0.5	0.1875	0.2031	0.031
	NU-DNGA433	★	1	0.79				0.047
	NU-VNGA331	★	1	0.098	0.375	0.1875	0.15	0.0156
	NU-VNGA332	★	1	0.063				0.031

### ● Specification of cutting edge

Standard	
T01215	

One use / positive (with hole)

Image	Relief	Cat. Number	Stock NCB100	Cutting Edges	Size (in)				
					Cutting Edge Length	I.C.	Thickness	Hole Diameter	Nose Radius
	7°	NU-CCGA21.51	★	1	0.090	0.25	0.094	0.11	0.0156
	7°	NU-CCGA32.51	★	1	0.098	0.375	0.156	0.17	0.0156
		NU-CCGA32.52	★	1	0.095	0.25			0.031
	7°	NU-DCGA21.51	★	1	0.098		0.094	0.11	0.0156
	7°	NU-DCGA32.51	★	1	0.098	0.375	0.156	0.17	0.0156
		NU-DCGA32.52	★	1	0.083	0.25			0.031
	5°	NU-VBGA221	★	1	0.098	0.25	0.125	0.11	0.0156
		NU-VBGA222	★	1	0.063				0.031
	5°	NU-VBGA331	★	1	0.098	0.375	0.1875	0.17	0.0156
		NU-VBGA332	★	1	0.063				0.031
	7°	NU-VCGA331	★	1	0.098	0.375	0.1875	0.17	0.0156
		NU-VCGA332	★	1	0.063				0.031

★ : Worldwide Warehouse Item





# SUMITOMO

**CARBIDE - CBN - DIAMOND**

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