SUMITOMO
CARBIDE - CBN - DIAMOND

TOOLING NEWS E-152

Nano-polycrystalline CBN Grade

NCB100 SUMIBORON Binderless CBN

Ultimate CBN Grade Achieves Highly Efficient and Precise Finishing of Hard-to-Cut Materials

P M K N S H Cemented Carbide Brittle Materials

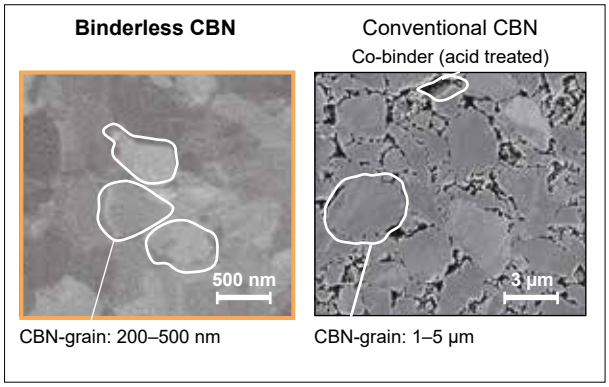
SUMITOMO ELECTRIC GROUP

NCB100

Features

SUMIBORON Binderless is a polycrystalline cubic boron nitrid (CBN) that directly binds nanometer- or sub-micron-level CBN particles without binder materials.
Binderless CBN is harder and has better thermal conductivity. Therefore, it enables higher efficiency and longer tool life in machining of hard-to-cut materials, such as titanium alloy and cobalt-chromium alloy.

Microstructure of Sintered Body



Physical Properties

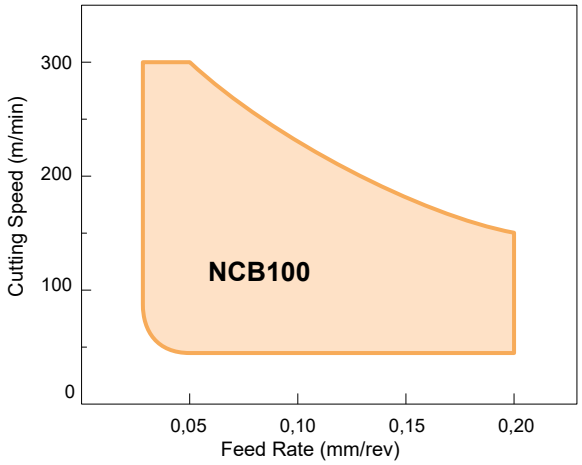
	Binderless CBN	Conventional CBN
CBN Content (%)	100	90–95
Binder Material	–	WC–Co
Hardness (GPa)	51–54	41–44
Thermal Conductivity (W/m·K)	180–200	100–120

SUMIBORON Binderless CBN

Advantages

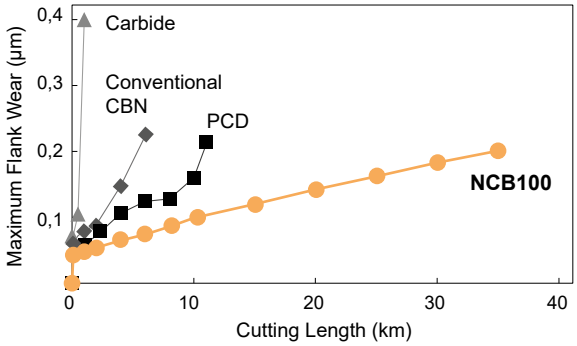
– Higher efficient machining and longer tool life have been realized by the effects of higher hardness and thermal conductivity than conventional CBN grades.
– Achieves high precise machining and better surface integrity because of less adhesion by not containing any binder materials.
– Ideal tool material for high-efficient finishing of hard-to-cut materials, such as titanium alloy and cobalt-chromium alloy, cemented carbides and cermets.
– NBC100 is able to maintain excellent dimensional accuracy and surface roughness for a long period.
– Shows improved work efficiency and cost reduction by less frequency of exchanging inserts compared to conventional tool grades.

Application Range and Performance - Turning of Titanium Alloy (Ti-6Al-4V)



Wear Resistance

In high-speed machining NCB100 shows 35 times better wear resistance compared to carbide, because of its excellent physical properties.

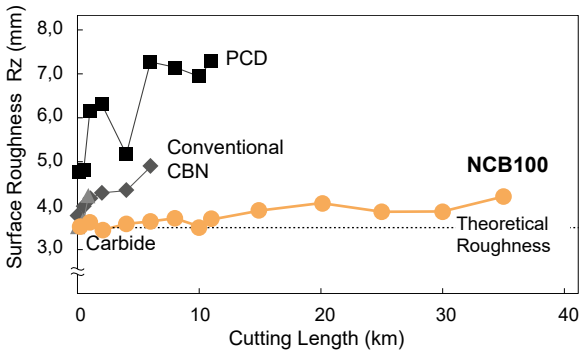


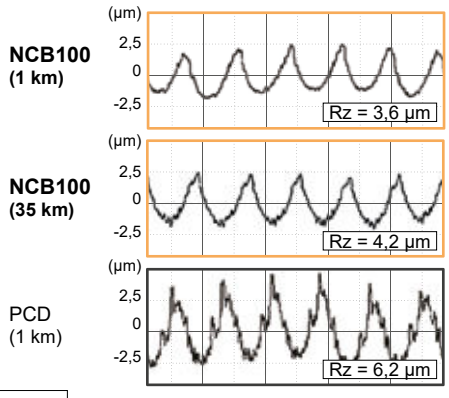
NCB100 (1 km) | **NCB100 (35 km)** | Carbide (1 km)

Work Material:	Ti-6Al-4V
Insert:	CNGA 120408 NU
Cutting Conditions:	v_c = 150 m/min, f = 0,15 mm/rev, a_p = 0,5 mm, wet

Surface Roughness

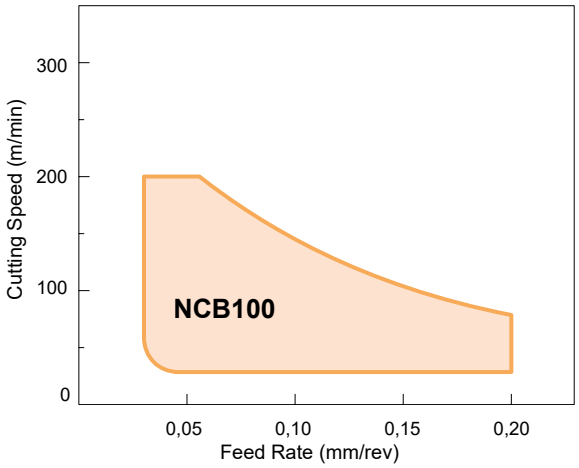
NCB100 keeps a constant surface roughness, which is close to the theoretical (calculated) surface roughness.





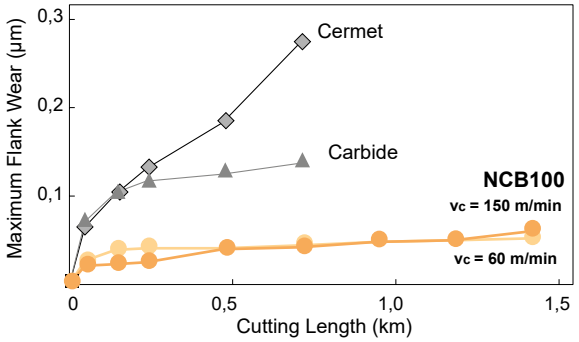
Work Material:	Ti-6Al-4V
Insert:	CNGA 120408 NU
Cutting Conditions:	v_c = 150 m/min, f = 0,15 mm/rev, a_p = 0,5 mm, wet

Application Range and Performance - Turning of Cobalt-Chromium Alloy (Co-Cr)



Wear Resistance

NCB100 shows excellent wear resistance on a cutting speed of 150 m/min and can be used at high efficiency machining.



NCB100
(0,5 km)

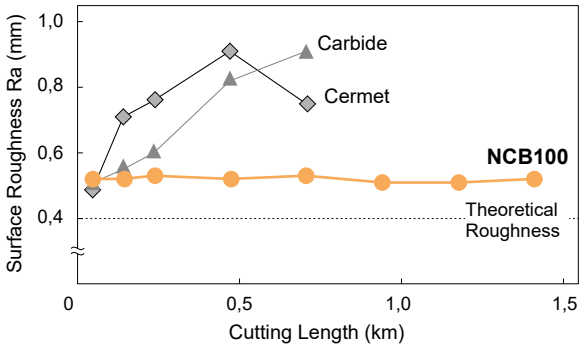
Cermet
(0,5 km)

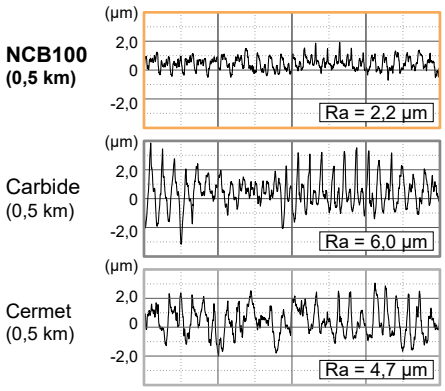
Carbide
(0,5 km)

Work Material:	Co-Cr
Insert:	VNGA 160408 NU
Cutting Conditions:	v_c = 60, 150 m/min, f = 0,1 mm/rev, a_p = 0,4 mm, wet

Surface Roughness

NCB100 keeps stable surface roughness.





Work Material:	Co-Cr
Insert:	VNGA 160408 NU
Cutting Conditions:	v_c = 60, 150 m/min, f = 0,1 mm/rev, a_p = 0,4 mm, wet

Recommended Cutting Conditions

Titanium Alloys

Min. - **Optimum** - Max.

Work Material		Grade	Cutting Conditions		
Composition	Hardness (HRC)		Depth of Cut (mm)	Feed Rate (mm/rev)	Cutting Speed (m/min)
Ti-6Al-4V	30–35	NCB100	0,1–**0,3**–0,5	0,05–**0,15**–0,20	50–**200**–300
Ti-5Al-5V-5Mo-3Cr	32–38	NCB100	0,1–**0,3**–0,5	0,05–**0,10**–0,20	50–**150**–250
Ti-10V-2Fe-3Al	32–38	NCB100	0,1–**0,3**–0,5	0,05–**0,10**–0,20	50–1**50**–250

Cobalt-Chromium Alloys

Min. - **Optimum** - Max.

Work Material		Grade	Cutting Conditions		
Composition	Hardness (HRC)		Depth of Cut (mm)	Feed Rate (mm/rev)	Cutting Speed (m/min)
Co-30Cr-5Mo	35–45	NCB100	0,10–**0,15**–0,30	0,05–**0,15**–0,20	50–**200**–300

Carbides

Min. - **Optimum** - Max.

Work Material		Grade	Cutting Conditions		
Composition	Hardness (HRA)		Depth of Cut (mm)	Feed Rate (mm/rev)	Cutting Speed (m/min)
WC-20Co	<85	NCB100	0,03–**0,10**–0,20	0,03–**0,10**–0,20	5–**20**–40

SUMIDIA BINDERLESS NPD10 is recommended for: > 85 HRA

Other Work Materials

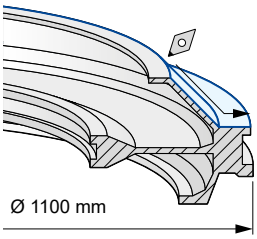
Min. - **Optimum** - Max.

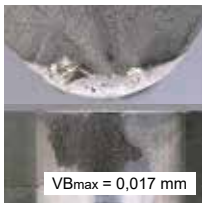
Work Material		Grade	Cutting Conditions		
Composition	Hardness (HV)		Depth of Cut (mm)	Feed Rate (mm/rev)	Cutting Speed (m/min)
Pure Titanium	130–230	NCB100	0,1–**0,3**–0,5	0,05–**0,10**–0,20	100–**250**–400
Cermet	1.000–1.500	NCB100	0,1–**0,2**–0,3	0,05–**0,10**–0,20	10–**30**–50

Application Examples

Ti-6Al-4V, Turbine disk

Excellent wear resistance in high speed finishing.



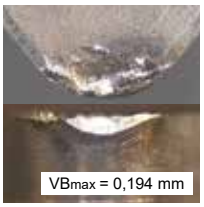


NCB100
(26 km)

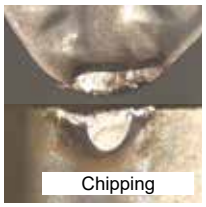
Insert: CNGA 120408 NU
Cutting Conditions: v_c = 140 m/min, f = 0,1 mm/rev, a_p = 0,2 mm, wet

Ti-5Al-5V-5Mo-3Cr, Landing Gear Parts

Excellent flank and crater wear resistance.



NCB100
(5 km)

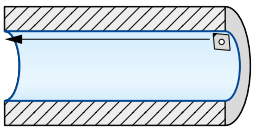


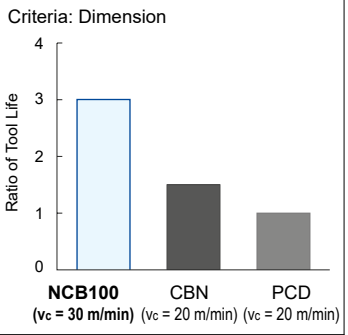
Carbide
(0,3 km)

Insert: CNGA 120408 NU
Cutting Conditions: v_c = 150 m/min, f = 0,1mm/rev, a_p = 0,4 mm, wet

Carbide, Finishing of Inner Diameter

Excellent wear resistance in finishing of Co-rich carbide.

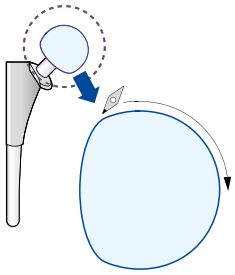


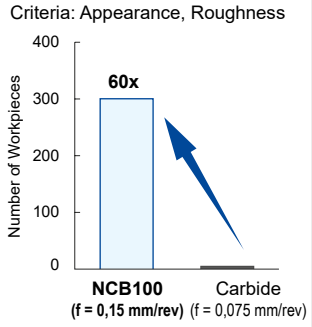


Insert: CCGW 09T304 NU
Cutting Conditions: v_c = 30 m/min, f = 0,1 mm/rev, a_p = 0,1 mm, dry

Cobalt-Chromium Alloy, Head for Artificial Joint

Much longer tool life in double efficiency than carbide.

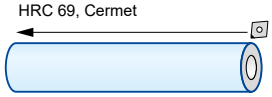


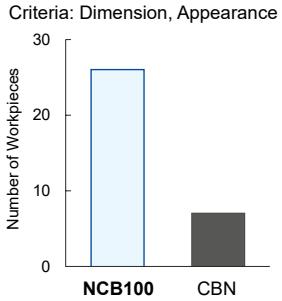


Insert: VNGA 160408 NU
Cutting Conditions: v_c = 65 m/min, f = 0,15 mm/rev, a_p = 0,2 mm, wet

Cermet, Parts for Mold Injection

Better wear resistance in machining of hard cermet.





Insert: CNGA 120412 NU
Cutting Conditions: v_c = 32 m/min, f = 0,12 mm/rev, a_p = 0,25 mm, dry

Negative Type Inserts

Shape	Cat. No.	Stock	No. Cutt. Edges	Dimensions (mm)				
				Cutting Edge Length	Inscribed Circle	Thick-ness	Screw Hole Ø	Nose Radius
	CNGA 120404 NU	❍	1	2,5	12,7	4,76	5,16	0,4
	120408 NU	❍		2,4				0,8
	120412 NU	❍		2,3				1,2
	DNGA 150404 NU	❍	1	2,5	12,7	4,76	5,16	0,4
	150408 NU	❍		2,1				0,8
	150412 NU	❍		2,0				1,2
	VNGA 160404 NU	❍	1	2,5	9,525	4,76	3,81	0,4
	160408 NU	❍		1,6				0,8

❍ Japan stock

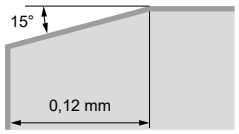
Positive Type Inserts

Shape	Relief Angle	Cat. No.	Stock	No. Cutt. Edges	Dimensions (mm)				
					Cutting Edge Length	Inscribed Circle	Thick-ness	Screw Hole Ø	Nose Radius
	7°	CCGW 060204 NU	❍	1	2,3	6,35	2,38	2,8	0,4
	7°	CCGW 09T304 NU	❍	1	2,5	9,525	3,97	4,4	0,4
		09T308 NU	❍		2,4				0,8
	7°	DCGW 070204 NU	❍	1	2,5	6,35	2,38	2,8	0,4
	7°	DCGW 11T304 NU	❍	1	2,5	9,525	3,97	4,4	0,4
		11T308 NU	❍		2,1				0,8
	5°	VBGW 110304 NU	❍	1	2,5	6,35	3,18	2,8	0,4
		110308 NU	❍		1,6				0,8
	5°	VBGW 160404 NU	❍	1	2,5	9,525	4,76	4,4	0,4
		160408 NU	❍		1,6				0,8
	7°	VCGW 160404 NU	❍	1	2,5	9,525	4,76	4,4	0,4
		160408 NU	❍		1,6				0,8

Cutting Edge Preparation

Standard

T01215



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