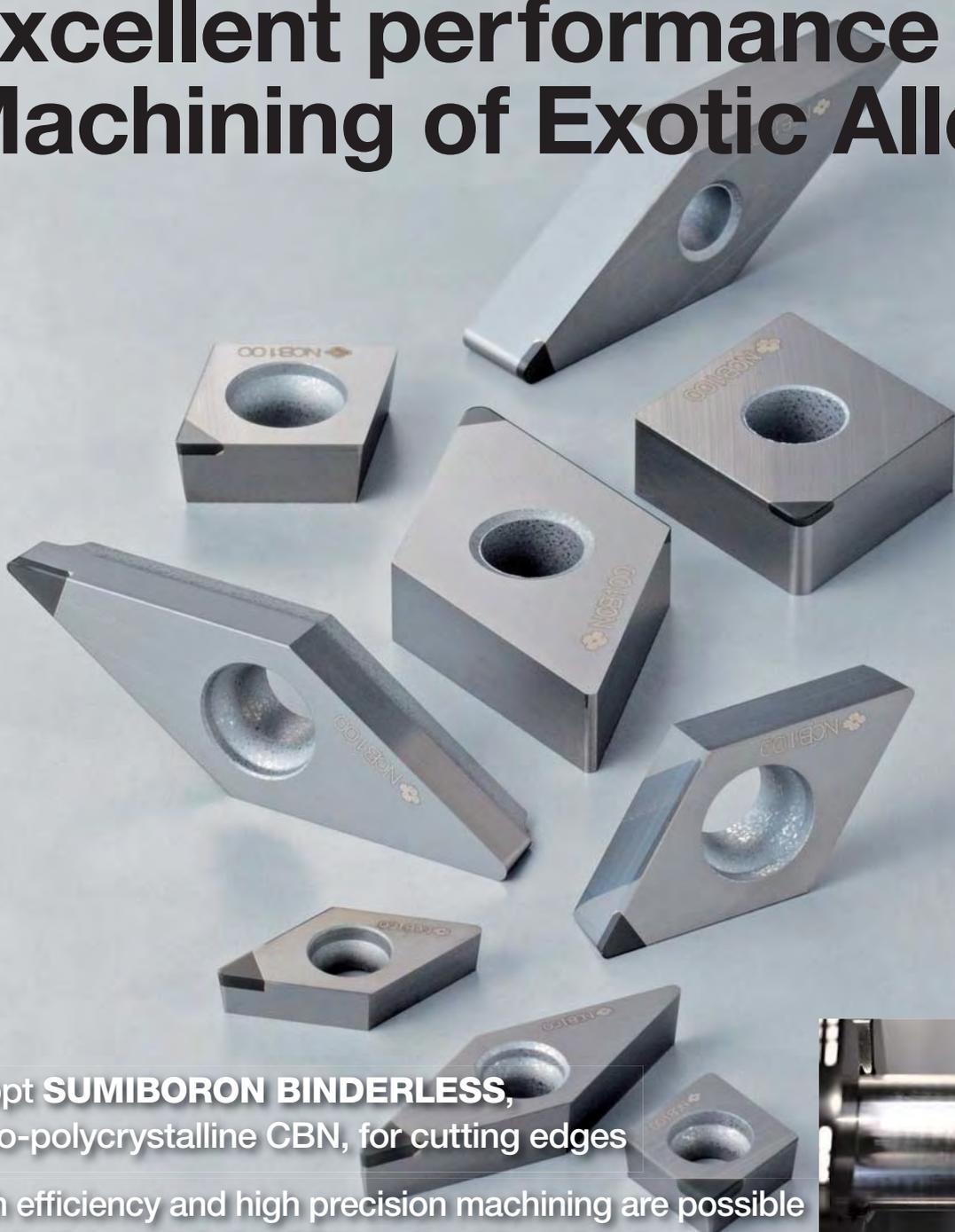


Nano-polycrystalline CBN Grade

SUMIBORON BINDERLESS **NCB100**

Excellent performance for Machining of Exotic Alloys



Adopt **SUMIBORON BINDERLESS**, nano-polycrystalline CBN, for cutting edges

High efficiency and high precision machining are possible due to the use of the CBN tools with no binders



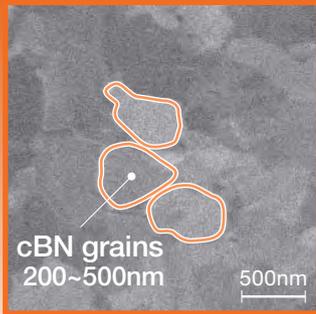
Nano-polycrystalline CBN

SUMIBORON BINDERLESS

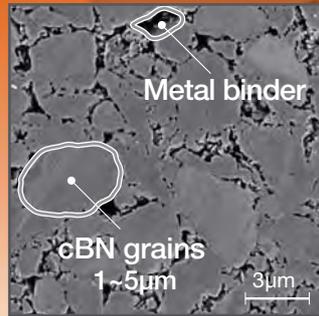
SUMIBORON BINDERLESS are CBN with nano to submicron CBN grains bound tight and no binders.

The higher hardness and improved thermal conductivity compared to conventional CBN grades ensure higher efficiency and longer tool life for use with exotic alloys such as titanium alloy and Co-Cr alloy.

● Comparison of Structure (SEM image)



SUMIBORON BINDERLESS



Conventional CBN

● Characteristic Values

	SUMIBORON BINDERLESS	Conventional CBN
cBN content (vol%)	100	90 ~ 95
Binder	-	WC-Co
Hardness Hv (GPa)	51 ~ 54	41 ~ 44
Thermal conductivity (W/m·K)	180 ~ 200	100 ~ 120

Nano-polycrystalline CBN Grade

SUMIBORON BINDERLESS NCB100

The cutting edge in NCB100 adopts nano-polycrystalline CBN with higher hardness and improved thermal conductivity compared to conventional CBN. This ensures higher efficiency, improved accuracy, and impressively longer tool life for machining exotic alloys such as titanium alloy and Co-Cr alloy.

● Suitable for high efficiency finishing of exotic alloys such as titanium alloy, Co-Cr alloy, etc.

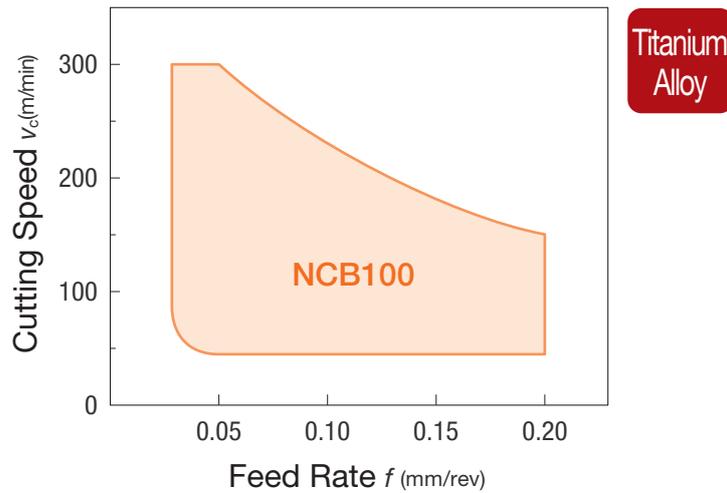
Outstanding wear resistance are achieved by the excellent hardness and thermal conductivity of nano-polycrystalline CBN

● Superior dimensional tolerances and machined surface roughness over many hours

Less tool replacements compared to conventional grades will improve work efficiency and reduce total costs

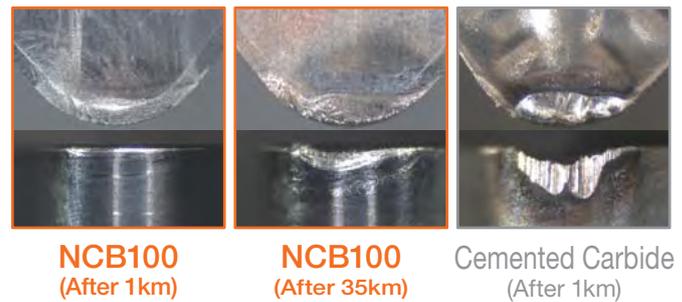
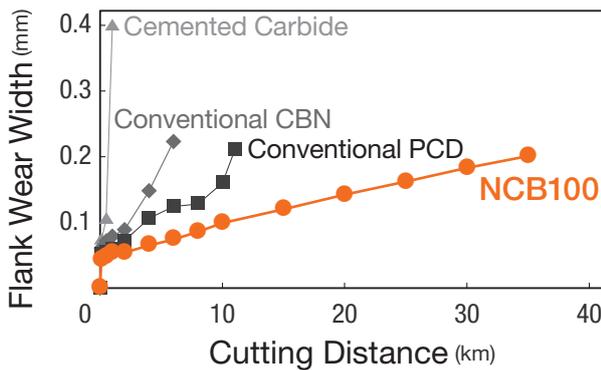


●Application Range (Titanium Alloy Machining)



●Wear Resistance (Titanium Alloy Machining)

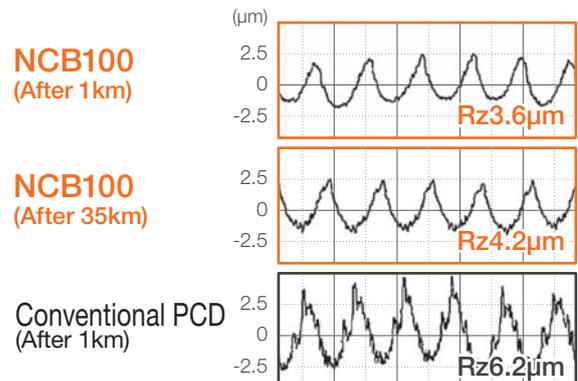
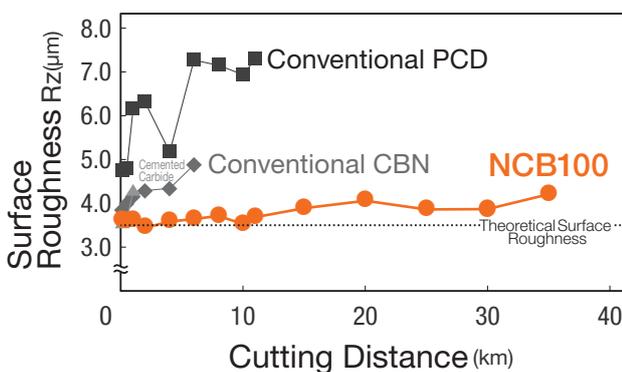
Up to 53 times better wear resistance against cemented carbide tools with high-speed machining, and simple lifetime management with uniform wear progression



Work Material : Titanium Alloy (Ti-6Al-4V) Tool : CNGA120408
Cutting Conditions : $v_c=150\text{m/min}$ $f=0.15\text{mm/rev}$ $a_p=0.5\text{mm}$ Wet (High-pressure coolant)

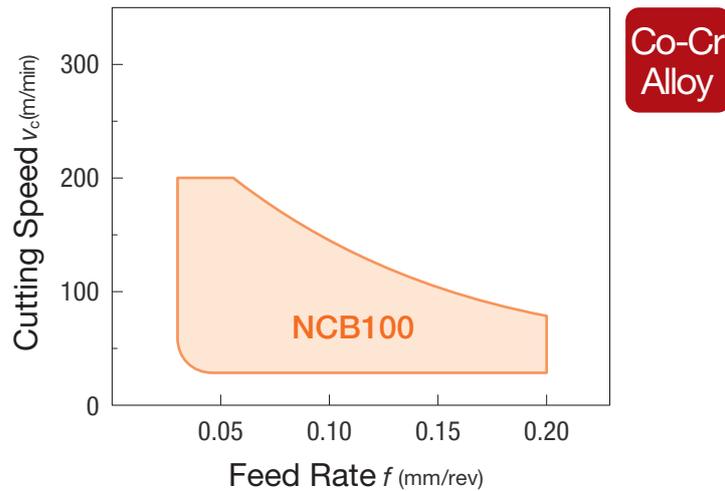
●Machined Surface Roughness (Titanium Alloy Machining)

Stable surface roughness profile with values maintained close to theoretical surface roughness for extended periods



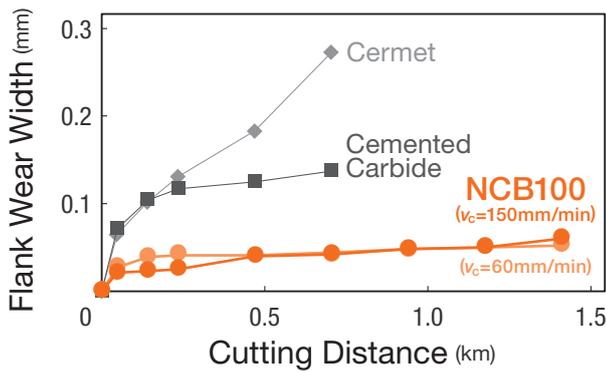
Work Material : Titanium Alloy (Ti-6Al-4V) Tool : CNGA120408
Cutting Conditions : $v_c=150\text{m/min}$ $f=0.15\text{mm/rev}$ $a_p=0.5\text{mm}$ Wet (High-pressure coolant)

●Application Range (Co-Cr Alloy Machining)



●Wear Resistance (Co-Cr Alloy Machining)

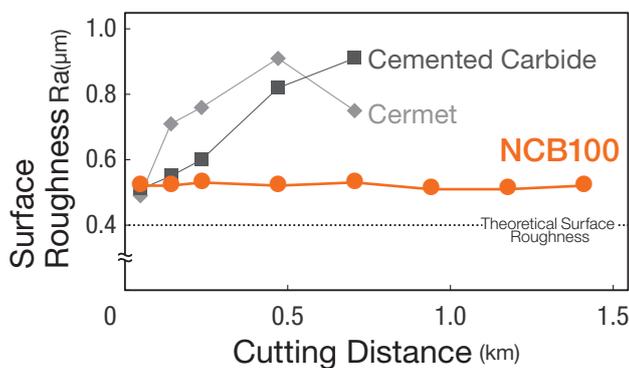
Increased efficiency through consistent wear resistance even with high-speed machining of 150m/min



Work Material : Co-Cr alloy (forged material) Tool : VNGA160408
Cutting Conditions : v_c=60,150m/min f=0.1mm/rev a_p=0.4mm Wet

●Machined Surface Roughness (Co-Cr Alloy Machining)

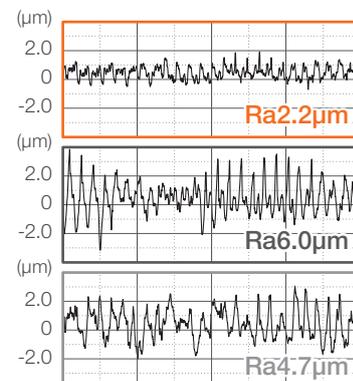
Maintains stable machined surface roughness



NCB100
(After 0.5km)

Cemented Carbide
(After 0.5km)

Cermet
(After 0.5km)



Work Material : Co-Cr alloy (forged material) Tool : VNGA160408
Cutting Conditions : v_c=60m/min f=0.1mm/rev a_p=0.4mm Wet

● Recommended Cutting Conditions

■ Titanium Alloy

Work Material		Grade	Cutting Conditions		
Composition	Hardness(HRC)		Depth of Cut a_p (mm)	Feed Rate f (mm/rev)	Cutting Speed v_c (m/min)
Ti-6Al-4V	30 - 35	NCB100	0.10-0.30-0.50	0.05-0.15-0.20	50 - 200 - 300
Ti-5Al-5V-5Mo-3Cr	32 - 38	NCB100	0.10-0.30-0.50	0.05-0.10-0.20	50 - 150 - 250
Ti-10V-2Fe-3Al	32 - 38	NCB100	0.10-0.30-0.50	0.05-0.10-0.20	50 - 150 - 250

■ Co-Cr Alloy

Work Material		Grade	Cutting Conditions		
Composition	Hardness(HRC)		Depth of Cut a_p (mm)	Feed Rate f (mm/rev)	Cutting Speed v_c (m/min)
Co-30Cr-5Mo	35 - 45	NCB100	0.10-0.15-0.30	0.05-0.15-0.20	50 - 100 - 200

■ Cemented Carbide

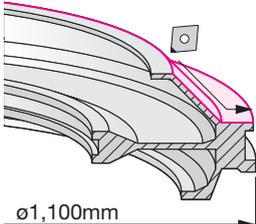
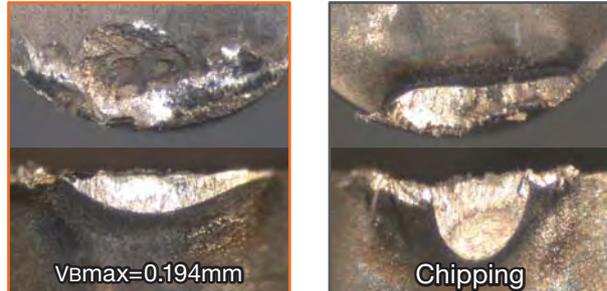
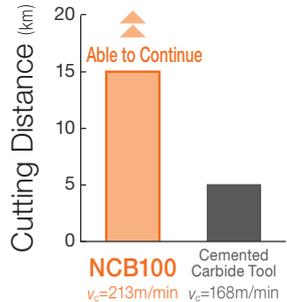
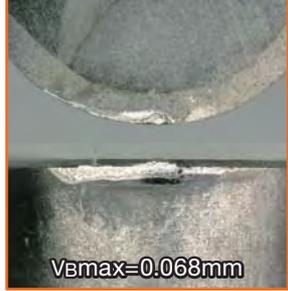
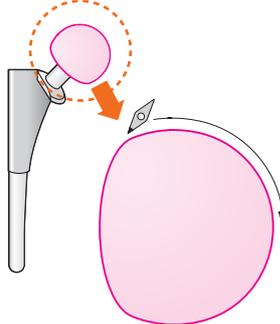
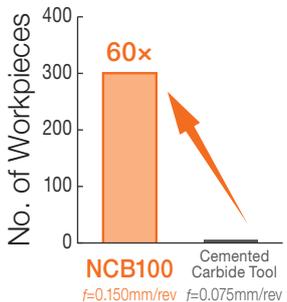
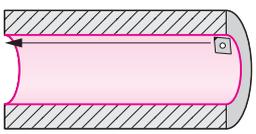
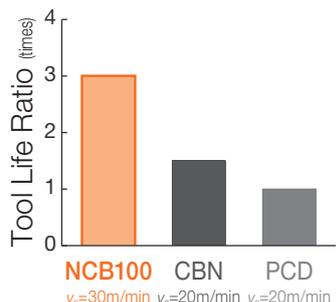
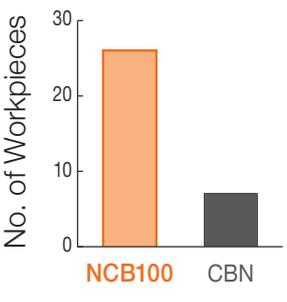
Work Material		Grade	Cutting Conditions		
Composition	Hardness(HRA)		Depth of Cut a_p (mm)	Feed Rate f (mm/rev)	Cutting Speed v_c (m/min)
WC-20Co	Below 85	NCB100	0.03-0.10-0.20	0.03-0.10-0.20	5 - 20 - 40

* SUMIDIA BINDERLESS NPD10 recommended for carbide machining at 85HRA or higher.

■ Others

Work Material		Grade	Cutting Conditions		
Composition/Material	Hardness(HV)		Depth of Cut a_p (mm)	Feed Rate f (mm/rev)	Cutting Speed v_c (m/min)
Pure Titanium	130 - 230	NCB100	0.10-0.30-0.50	0.05-0.10-0.20	100 - 250 - 400
Cermet Material (Iron-based metal included in binder)	1,000 - 1,500	NCB100	0.10-0.20-0.30	0.05-0.10-0.20	10 - 30 - 50

●Application Examples

<p>Ti-6Al-4V Turbine Disc</p> <p>Excellent wear resistance</p>   <p>NCB100 After 185minutes (26km) of machining</p> <p>Tool : CNGA120408 (NCB100) Finishing Cutting Conditions : $v_c=140\text{m/min}$ $f=0.1\text{mm/rev}$ $a_p=0.2\text{mm}$ Wet</p>	<p>Ti-5Al-5V-5Mo-3Cr Aeronautic Leg Components</p> <p>Excellent wear and crater resistance</p>  <p>NCB100 After 33minutes (5km) of machining</p> <p>Chipping Cemented Carbide Tool After 2minutes (0.3km) of machining</p> <p>Tool : CNGA120408 (NCB100) Cutting Conditions : $v_c=150\text{m/min}$ $f=0.1\text{mm/rev}$ $a_p=0.4\text{mm}$ Wet (High-pressure coolant)</p>
<p>Pure Titanium PVD Target Material</p> <p>Excellent wear resistance with high-speed machining</p> <p>Tool life determinant: Appearance of machined surface</p>  <p>NCB100 $v_c=213\text{m/min}$</p> <p>Cemented Carbide Tool $v_c=168\text{m/min}$</p>  <p>NCB100 After 69minutes (15km) of machining</p> <p>Tool : DCGW11T308 (NCB100) Cutting Conditions : $v_c=213\text{m/min}$ $f=0.1\text{mm/rev}$ $a_p=0.25\text{mm}$ Wet (High-pressure coolant)</p>	<p>Co-Cr Alloy Artificial Hip Joint Head</p> <p>Impressive tool life with two times the efficiency</p> <p>Tool life determinant: Appearance, roughness of machined surface</p>   <p>NCB100 $f=0.150\text{mm/rev}$</p> <p>Cemented Carbide Tool $f=0.075\text{mm/rev}$</p> <p>Tool : VNGA160408 (NCB100) Cutting Conditions : $v_c=65\text{m/min}$ $f=0.15\text{mm/rev}$ $a_p=0.2\text{mm}$ Wet</p>
<p>Carbide (WC-20Co) Internal Machining of Die</p> <p>Excellent wear resistance when machining carbides with high Co content</p> <p>Tool life determinant: Dimensions</p>   <p>NCB100 $v_c=30\text{m/min}$</p> <p>CBN $v_c=20\text{m/min}$</p> <p>PCD $v_c=20\text{m/min}$</p> <p>Tool : CCGW09T304 (NCB100) Cutting Conditions : $v_c=30\text{m/min}$ $f=0.1\text{mm/rev}$ $a_p=0.1\text{mm}$ Dry</p>	<p>Cermet Material Injection-Molded Extruded Parts</p> <p>Excellent wear resistance when machining hard cermet material</p> <p>Tool life determinant: Dimensions and appearance of machined surface</p>   <p>NCB100</p> <p>CBN</p> <p>Tool : CNGA120412 (NCB100) Cutting Conditions : $v_c=32\text{m/min}$ $f=0.12\text{mm/rev}$ $a_p=0.25\text{mm}$ Dry</p>

●Stocks

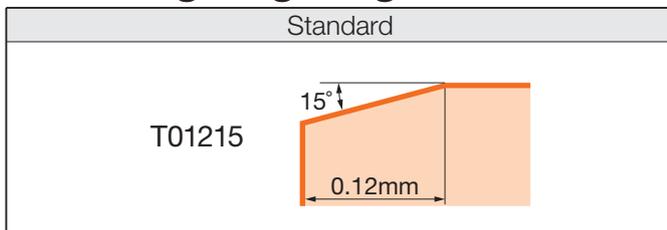
One-use/Negative (With Hole)

Shape	Cat. No.	Stock		Dimensions (mm)				
		NCB100	No. of Corners	Cutting Edge Length	Inscribed Circle	Thickness	Hole Size	Corner Radius
	NU-CNGA 120404	●	1	2.5	12.7	4.76	5.16	0.4
	120408	●		2.4				0.8
	120412	●		2.3				1.2
	NU-DNGA 150404	●	1	2.5	12.7	4.76	5.16	0.4
	150408	●		2.1				0.8
	150412	●		2.0				1.2
	NU-VNGA 160404	●	1	2.5	9.525	4.76	3.81	0.4
	160408	●		1.6				0.8

One-use/Positive (With Hole)

Shape	Relief Angle	Cat. No.	Stock		Dimensions (mm)				
			NCB100	No. of Corners	Cutting Edge Length	Inscribed Circle	Thickness	Hole Size	Corner Radius
	7°	NU-CCGW 060204	●	1	2.3	6.35	2.38	2.8	0.4
			●						
	7°	NU-CCGW 09T304	●	1	2.5	9.525	3.97	4.4	0.4
		09T308	●		2.4				0.8
	7°	NU-DCGW 070204	●	1	2.5	6.35	2.38	2.8	0.4
			●						
	7°	NU-DCGW 11T304	●	1	2.5	9.525	3.97	4.4	0.4
		11T308	●		2.1				0.8
	5°	NU-VBGW 110304	●	1	2.5	6.35	3.18	2.8	0.4
		110308	●		1.6				0.8
	5°	NU-VBGW 160404	●	1	2.5	9.525	4.76	4.4	0.4
		160408	●		1.6				0.8
	7°	NU-VCGW 160404	●	1	2.5	9.525	4.76	4.4	0.4
		160408	●		1.6				0.8

●Cutting Edge Figure





- Very hot or lengthy chips may be discharged while the machine is in operation. Therefore, machine guards, safety goggles or other protective covers must be used. Fire safety precautions must also be considered.

< SAFETY NOTES >

- Please handle with care as this product has sharp edges.
- Improper cutting conditions or mis-handling of the tool may result in breakages or projectiles. Therefore, please use the tool within its recommended conditions.

- When using non-water soluble cutting oil, precautions against fire must be taken and please ensure that a fire extinguisher is placed near the machine.

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