

Coated SUMIBORON Series for Hardened Steel

The Pinnacle of High Accuracy/ High-efficiency Cutting



Lineup _____

General Machining

New **BNC2125** 

BNC2020 

High-precision Machining

New **BNC2115** 

BNC2010 

Heavy Interrupted Machining

BNC300 

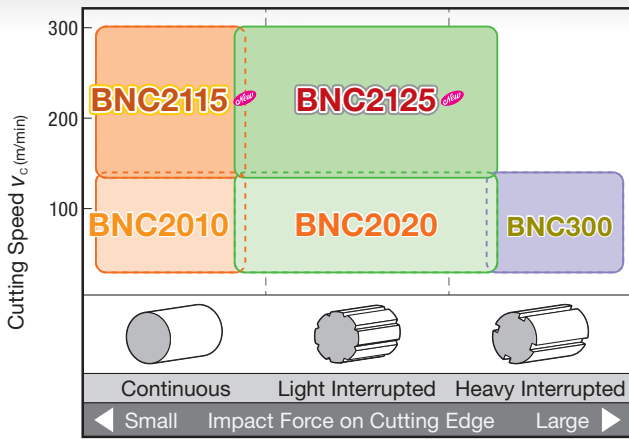
Coated SUMIBORON

BNC2115/BNC2125

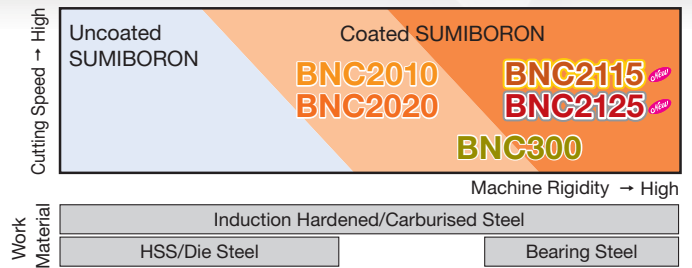
BNC2010/BNC2020/BNC300

The Pinnacle of High Accuracy/High-efficiency Cutting

Application Range



Differentiation



Features

BNC2115

The definitive grade in high-accuracy machining

Realises long tool life with excellent surface roughness and stable machining

Further maintains excellent surface roughness

Maintains excellent surface roughness thanks to a coating with high notch wear resistance and tough CBN substrate

BNC2125

First recommendation for hardened steel machining

Superb wear and fracture resistance

Achieves long, stable tool life even in high-efficiency and interrupted machining

Along with a tough CBN substrate, the coating combines wear resistance and toughness to achieve high-precision stable machining

BNC2010

Grade for high-precision machining with excellent surface roughness and finished surface accuracy

Grade ideal for high-precision machining, with highly wear-resistant CBN substrate and coating.

BNC2020

General-purpose grade suitable for typical hardened steel machining applications

Achieves further stability in machining of a wide range of hardened steel components

BNC300

Achieves long, stable tool life even in machining with heavy interrupted cutting

Achieves long, stable tool life even on work pieces with both continuous and interrupted cutting

BNC2115/BNC2125/BNC2010/BNC2020/BNC300

CBN Substrate and Coating Structure

BNC2115 *New* High-precision Machining (Medium- to High-speed)

Coating Thickness: 3µm

- Crater Wear Suppressed
- Notch Wear Suppressed
- Surface Roughness Maintained
- Improved Adhesion Strength
- Tough CBN Substrate

Thick layers of high-strength TiAlSiN super multi-layered coating and highly heat-resistant TiCN coating are applied to a tough substrate to realise excellent surface finish quality

BNC2125 *New* General Machining (Medium- to High-speed)

Coating Thickness: 3µm

- Improved Wear Resistance
- Improved Chipping Resistance
- Improved Adhesion Strength
- Tough CBN Substrate

Thick layer of super multi-layered ultra-fine TiAlBN coating with high strength and high hardness coupled with a tough substrate achieve high performance on a wide range of applications

BNC2010 High-precision Machining (Low- to Medium-speed)

Coating Thickness: 2µm

- Improved Wear Resistance
- Notch Wear Suppressed
- High Wear Resistance CBN Substrate

Laminated high-strength AlCrN multi-layered coating and highly heat-resistant TiCN coating are applied to a highly wear-resistant substrate to maintain excellent surface finish quality

BNC2020 General-purpose Machining (Low- to Medium-speed, Unstable Cutting)

Coating Thickness: 2µm

- Improved Wear Resistance
- Improved Adhesion Strength
- Tough CBN Substrate

Application of highly wear-resistant TiAlN coating to a tough substrate dramatically improves machining stability in low-rigidity setups and high-load cutting

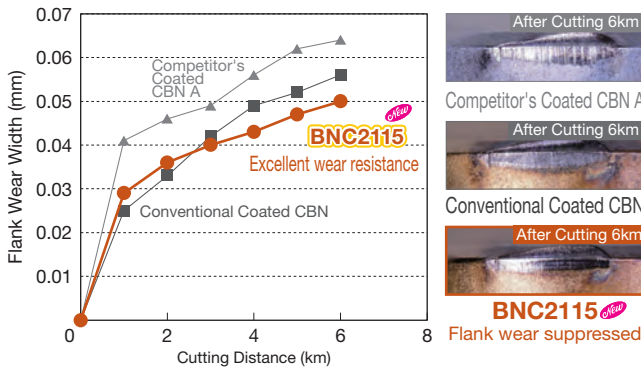
Recommended Cutting Conditions

Work Material	Grade	Recommended Cutting Conditions Min. - Optimum - Max.		
		Cutting Speed v_c (m/min)	Feed Rate f (mm/rev)	Depth of Cut a_p (mm)
Hardened Steel	BNC2115	110 - 180 - 300	0.03-0.10-0.20	0.03-0.20-0.35
	BNC2125	110 - 160 - 300	0.05-0.20-0.40	0.05-0.30-0.50
	BNC2010	50 - 140 - 180	0.03-0.10-0.20	0.03-0.20-0.35
	BNC2020	50 - 120 - 180	0.03-0.20-0.40	0.05-0.30-0.50
	BNC300	50 - 100 - 150	0.03-0.10-0.20	0.03-0.20-0.30

BNC2115/BNC2125/BNC2010/BNC2020/BNC300

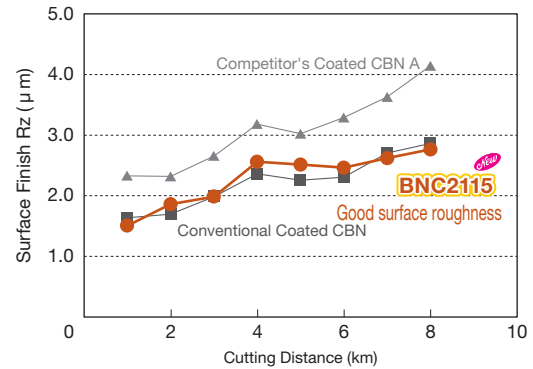
Cutting Performance

BNC2115 ^{New} Continuous Cutting (Wear Resistance)



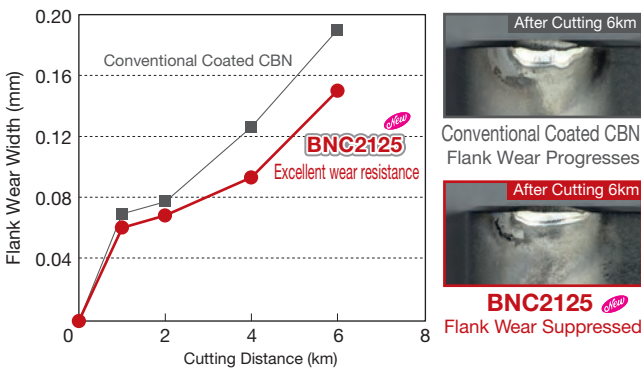
Work Material : SCM415H (58 to 62HRC)
 Tool Cat. No. : 4NC-DNGA150408
 Cutting Conditions : $v_c = 200\text{m/min}$ $f = 0.1\text{mm/rev}$ $a_p = 0.15\text{mm}$ Wet

BNC2115 ^{New} Continuous Cutting (Machined Surface Roughness)



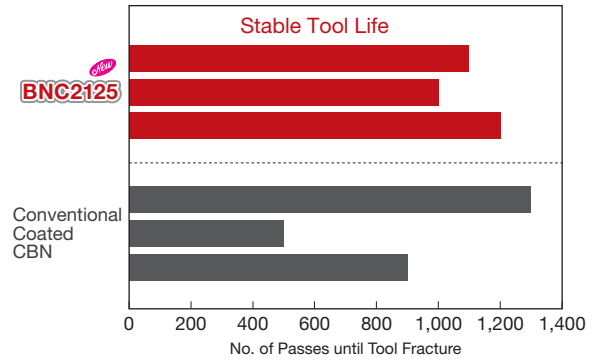
Work Material : SCM415H (58 to 62HRC)
 Tool Cat. No. : 4NC-DNGA150408
 Cutting Conditions : $v_c = 200\text{m/min}$ $f = 0.1\text{mm/rev}$ $a_p = 0.15\text{mm}$ Wet

BNC2125 ^{New} Continuous Cutting (Wear Resistance)



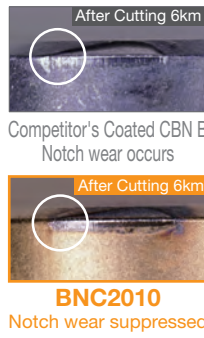
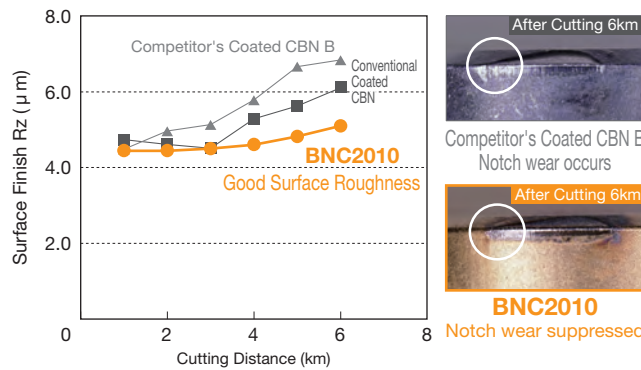
Work Material : SUJ2 (58 to 62HRC)
 Tool Cat. No. : 4NC-DNGA150408
 Cutting Conditions : $v_c = 150\text{m/min}$ $f = 0.1\text{mm/rev}$ $a_p = 0.2\text{mm}$ Wet

BNC2125 ^{New} High-load Cutting (Fracture Resistance)



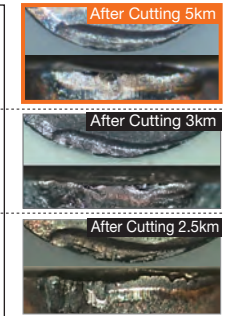
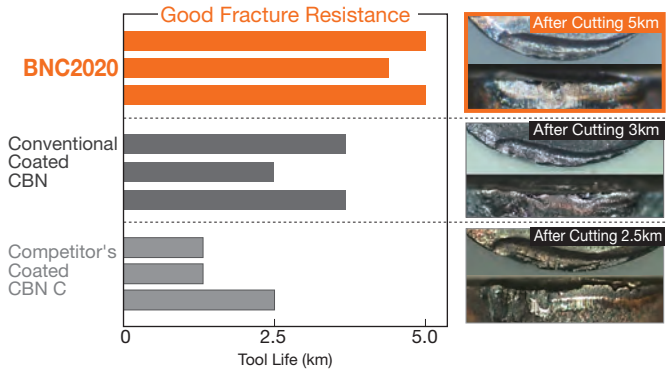
Work Material : SUJ2 (58 to 62HRC)
 Tool Cat. No. : 4NC-DNGA150408
 Cutting Conditions : $v_c = 150\text{m/min}$ $f = 0.15\text{mm/rev}$ $a_p = 0.5\text{mm}$ 63m/times Wet

BNC2010 Continuous Cutting (Machined Surface Roughness)



Work Material : SCM415H (58 to 62HRC)
 Tool Cat. No. : 4NC-DNGA150408
 Cutting Conditions : $v_c = 120\text{m/min}$ $f = 0.14\text{mm/rev}$ $a_p = 0.15\text{mm}$ Wet

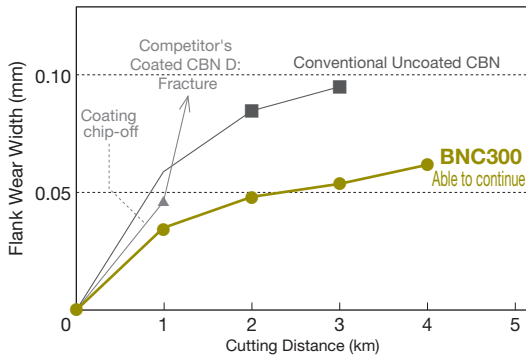
BNC2020 Interrupted Cutting (Fracture Resistance)



Work Material : SCM415H with 5 grooves (58 to 62HRC)
 Tool Cat. No. : 4NC-CNGA120412
 Cutting Conditions : $v_c = 130\text{m/min}$ $f = 0.1\text{mm/rev}$ $a_p = 0.6\text{mm}$ Dry

Cutting Performance

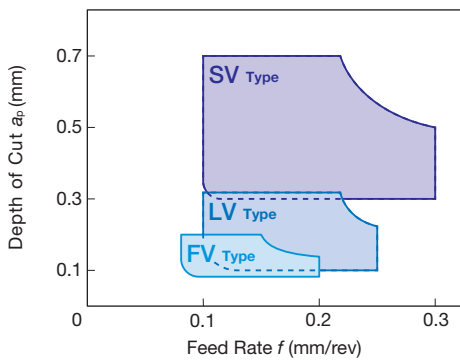
BNC300 Interrupted Cutting (Fracture Resistance)



Work Material : Grooved SCR420 (58 to 62 HRC)
 Tool Cat. No. : 4NC-CNGA120408
 Cutting Conditions: $v_c = 120\text{m/min}$ $f = 0.1\text{mm/rev}$ $a_p = 0.2\text{mm}$ Dry

One-Use Insert with Chipbreaker BREAK MASTER

Application Range



SV Type For Carburised Layer Removal (mm)
 Ideal for carburised layer removal
 Eliminates short stoppages and dimensional defects



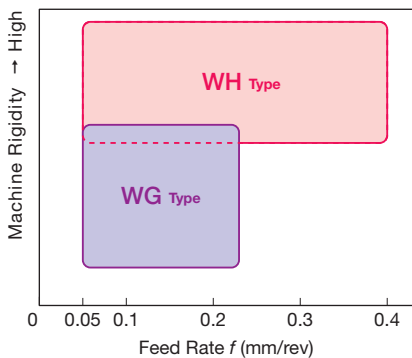
LV Type For Light Cutting (mm)
 Excellent chip evacuation
 under conditions with depth of cut at 0.3mm or below



FV Type For Finishing (mm)
 Excellent chip evacuation under finishing conditions with depth of cut at 0.2mm or below

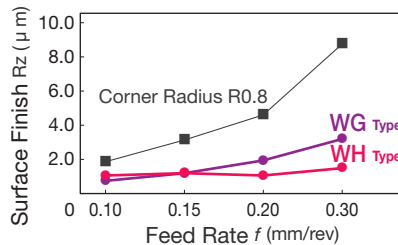
One-Use Wiper Insert

Application Range



Use WH Type for high-rigidity workpieces and equipment, and WG Type for issues of undulation or chatter.

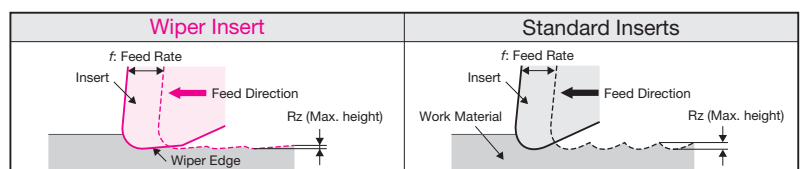
Finished Surface Roughness



The wiper insert offers good finished surface roughness and higher efficiency

Work Material : SCM415H (58 to 60HRC)
 Tool Cat. No. : 4NC-CNGA120408
 Cutting Conditions : $v_c=135\text{m/min}$ $a_p=0.1\text{mm}$ Dry

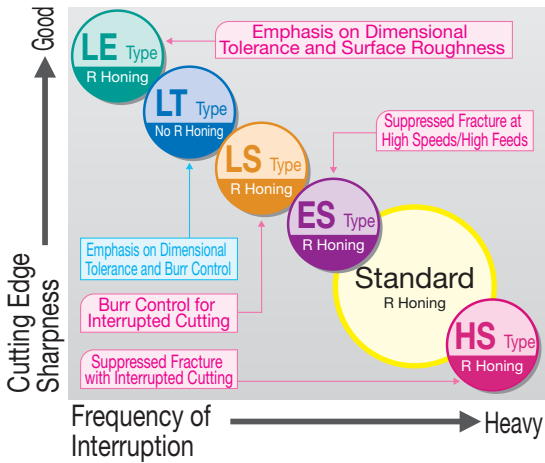
Wiper Insert Operation



BNC2115/BNC2125/BNC2010/BNC2020/BNC300

Cutting Edge Treatment Specification

Optimum cutting edge preparation applied to various grades and geometries, avoids cutting edge fracture caused by the heavy loads generated during the machining of hardened steel and other high-hardness materials.



High-precision Type **LE** **LT** **LS**

World's smallest class edge treatment of coated CBN for hardened steel machining. Minimises cutting force

High-efficiency Type **ES**

Suppresses crater wear and its resultant edge chipping. Stabilises tool life in high-speed, high-feed machining

Strong Edge Type **HS**

Suppresses cutting edge chipping and fracture. Stabilises tool life in interrupted machining

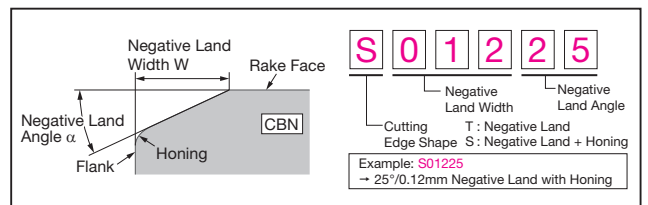
● Cutting Edge Specification List

Work Material	Grade	Neg./Pos.	Standard			Low Cutting Force L / High-efficiency Type E			Strong Edge Type H							
			Edge Specification Identification Code	α	W	Honing	Notation	Edge Specification Identification Code	α	W	Honing	Notation	Edge Specification Identification Code	α	W	Honing
Hardened Steel	BNC2115	Neg./Pos.	S01225	25°	0.12	Yes	LS	S00515	15°	0.05	Yes	HS	S01730	30°	0.17	Yes
	BNC2125	Neg./Pos.	S01225	25°	0.12	Yes	LS	S00515	15°	0.05	Yes	HS	S02735	35°	0.27	Yes
	BNC2010	Neg./Pos.	S01225	25°	0.12	Yes	LE	Sharp Edge	0°	0	Yes	HS	S01730	30°	0.17	Yes
	BNC2020	Neg./Pos.	S01225	25°	0.12	Yes	LT	T00515	15°	0.05	No	HS	S02735	35°	0.27	Yes
	BNC300	Neg./Pos.	S01225	25°	0.12	Yes	ES	S00535	35°	0.05	Yes	HS	S01735	35°	0.17	Yes

● Edge Specification of Wiper/Chipbreaker Inserts (Common)

Type	Notation	Neg./Pos.	Edge Specification Identification Code	α	W	Honing
Wiper Insert	WG	Neg./Pos.	S01215	15°	0.12	Yes
	WH	Neg./Pos.	S01215	15°	0.12	Yes
Insert with Chipbreaker	N-FV	Neg./Pos.	—	0°	0	Yes
	N-LV	Neg./Pos.	S00535	35°	0.05	Yes
	N-SV	Neg.	S01235	35°	0.12	Yes

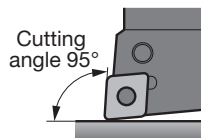
● Edge Specification Identification Code



Precautions when Using Wiper Inserts

When using CNGA Type / CCGW Type / WNGA Type Wiper Inserts

Use a holder with a cutting angle of 95°. Machining program **modification is required**. CNGA Type/CCGW Type/WNGA Type wiper inserts do not comply with the ISO standard. Correct the cutting edge position (tool offset) as explained on the right.



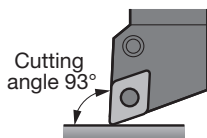
Cutting Edge Position Correction for CNGA Type / CCGW Type / WNGA Type (WG Type / WH Type)

External Turning

Corner Radius	Type	X-axis direction	Z-axis direction
R0.4	WG Type	-0.02	-0.02
	WH Type	-0.06	-0.06
R0.8/R1.2	WG Type	-0.01	-0.01
	WH Type	-0.06	-0.06

When using DNGA Type / DCGW Type Wiper Inserts

Use a holder with a cutting angle of 93°. Machining program **modification is required**. DNGA Type/DCGW Type wiper inserts do not comply with the ISO standard. Correct the cutting edge position (tool offset) as explained on the right.



Cutting Edge Position Correction for DNGA Type / DCGW Type (WG Type / WH Type)

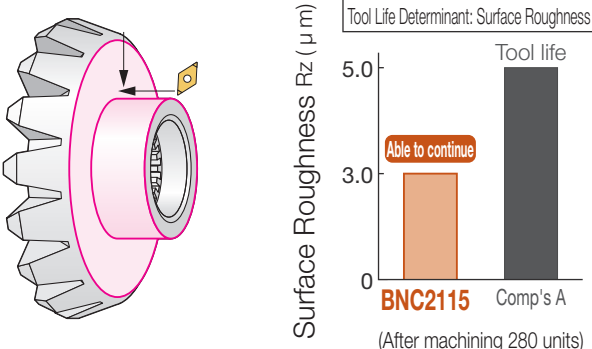
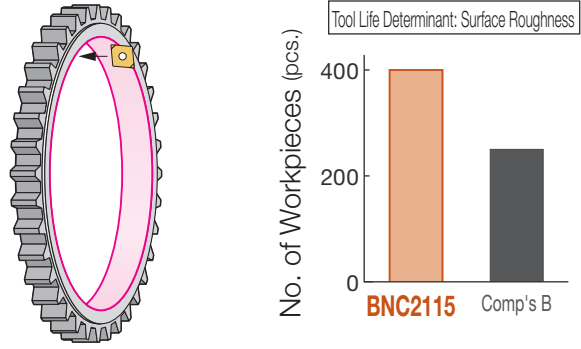
External Turning

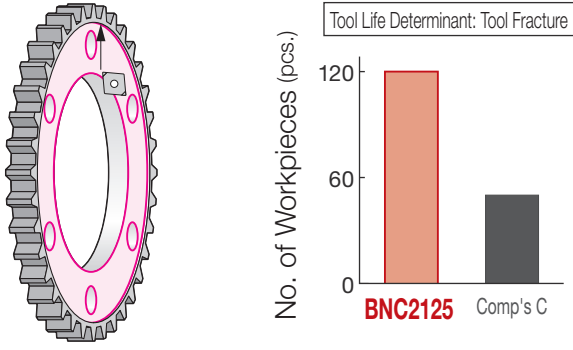
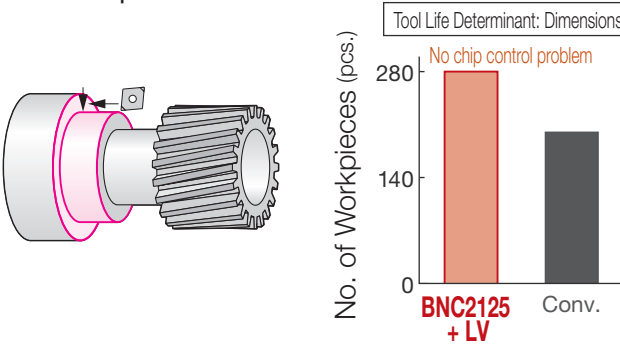
Corner Radius	Type	X-axis direction	Z-axis direction
R0.4	WG Type	-0.17	-0.01
	WH Type	-0.70	-0.06
R0.8	WG Type	-0.05	0
	WH Type	-0.58	-0.05

Note: Unlike other contour shapes, the DNGA/DCGW Type can only exhibit wiper effect for outer and inner diameter machining, and cannot be used for facing.

BNC2115/BNC2125/BNC2010/BNC2020/BNC300

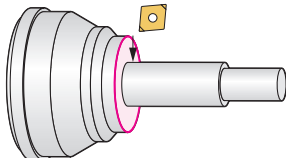
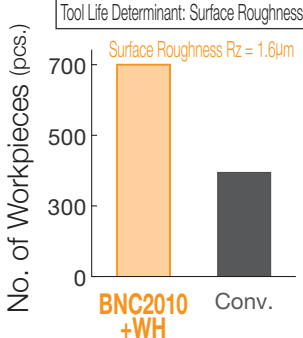
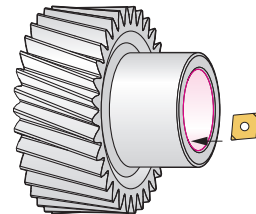
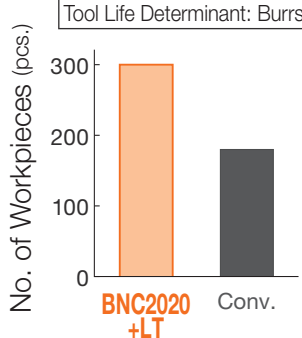
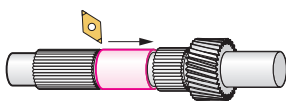
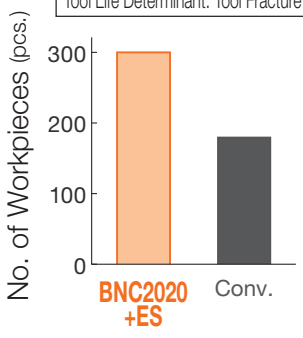
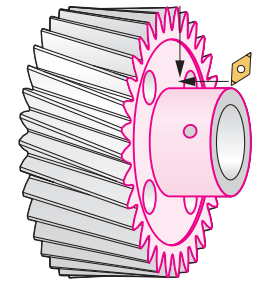
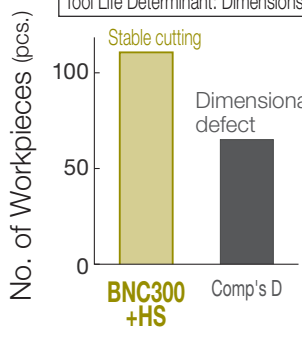
Application Examples of BNC2115/BNC2125

<p>SCM415H Hardened Steel Gear (60HRC) H</p> <p>Compared to competitors' coated CBN, BNC2115 reduces flank wear width by 30%, able to continue with good surface roughness</p>  <p>Surface Roughness Rz (µm)</p> <p>Tool Life Determinant: Surface Roughness</p> <p>5.0 3.0 0</p> <p>BNC2115 Comp's A</p> <p>(After machining 280 units)</p> <p>Tool: 4NC-DNGA150404 (BNC2115) Cutting Conditions: $v_c = 160\text{m/min}$ $f = 0.10\text{mm/rev}$ $a_p = 0.25\text{mm}$ Wet</p>	<p>SCr440H Hardened Steel Ring Gear (60HRC) H</p> <p>BNC2115 with a WH type wiper insert maintains excellent surface roughness for a long time compared to competitors' coated CBN (wiper insert)</p>  <p>No. of Workpieces (pcs.)</p> <p>Tool Life Determinant: Surface Roughness</p> <p>400 200 0</p> <p>BNC2115 Comp's B</p> <p>Tool: 2NC-CCGW09T308WH (BNC2115) Cutting Conditions: $v_c = 150\text{m/min}$ $f = 0.12\text{mm/rev}$ $a_p = 0.10\text{mm}$ Wet</p>
--	--

<p>SCr420H Hardened Steel Ring Gear (60HRC) H</p> <p>BNC2125 suppresses fractures due to crater wear and realises at least double the tool life</p>  <p>No. of Workpieces (pcs.)</p> <p>Tool Life Determinant: Tool Fracture</p> <p>120 60 0</p> <p>BNC2125 Comp's C</p> <p>Tool: 4NC-CNGA120412 (BNC2125) Cutting Conditions: $v_c = 150\text{m/min}$ $f = 0.2\text{mm/rev}$ $a_p = 0.3\text{mm}$ Dry</p>	<p>S15C Hardened Steel Sun Gear (60HRC) H</p> <p>BNC2125 BREAK MASTER LV Type offers long tool life and resolves chip control problems</p>  <p>No. of Workpieces (pcs.)</p> <p>Tool Life Determinant: Dimensions</p> <p>280 140 0</p> <p>BNC2125 + LV Conv.</p> <p>Tool: 4NC-CNGG120408N-LV (BNC2125) Cutting Conditions: $v_c = 190\text{m/min}$ $f = 0.13\text{mm/rev}$ $a_p = 0.30\text{mm}$ Wet</p>
--	--

BNC2115/BNC2125/BNC2010/BNC2020/BNC300

Application Examples of BNC2010/BNC2020/BNC300

<p>S45C Hardened Steel CVJ Outer Race (60HRC) [H]</p> <p>BNC2010 with a WH type wiper insert maintains excellent surface roughness for a long time</p>  <p>Tool Life Determinant: Surface Roughness</p> <p>Surface Roughness Rz = 1.6µm</p>  <table border="1"> <caption>No. of Workpieces (pcs.)</caption> <thead> <tr> <th>Method</th> <th>No. of Workpieces (pcs.)</th> </tr> </thead> <tbody> <tr> <td>BNC2010 +WH</td> <td>700</td> </tr> <tr> <td>Conv.</td> <td>400</td> </tr> </tbody> </table> <p>Tool: 2NC-CNGA120412WH (BNC2010) Cutting Conditions: $v_c = 150\text{m/min}$ $f = 0.2\text{mm/rev}$ $a_p = 0.2\text{mm}$ Dry</p>	Method	No. of Workpieces (pcs.)	BNC2010 +WH	700	Conv.	400	<p>SCr420H Hardened Steel Gear (60HRC) [H]</p> <p>BNC2020 high-precision LT Type cutting edge treatment suppresses burrs and improves tool life</p>  <p>Tool Life Determinant: Burrs</p>  <table border="1"> <caption>No. of Workpieces (pcs.)</caption> <thead> <tr> <th>Method</th> <th>No. of Workpieces (pcs.)</th> </tr> </thead> <tbody> <tr> <td>BNC2020 +LT</td> <td>300</td> </tr> <tr> <td>Conv.</td> <td>180</td> </tr> </tbody> </table> <p>Tool: 2NC-CNGA120408LT (BNC2020) Cutting Conditions: $v_c = 100\text{m/min}$ $f = 0.10\text{mm/rev}$ $a_p = 0.15\text{mm}$ Dry</p>	Method	No. of Workpieces (pcs.)	BNC2020 +LT	300	Conv.	180
Method	No. of Workpieces (pcs.)												
BNC2010 +WH	700												
Conv.	400												
Method	No. of Workpieces (pcs.)												
BNC2020 +LT	300												
Conv.	180												
<p>SCr420H Hardened Steel Shaft (60HRC) [H]</p> <p>BNC2020 high-efficiency ES Type cutting edge treatment suppresses fractures due to crater wear and offers long tool life</p>  <p>Tool Life Determinant: Tool Fracture</p>  <table border="1"> <caption>No. of Workpieces (pcs.)</caption> <thead> <tr> <th>Method</th> <th>No. of Workpieces (pcs.)</th> </tr> </thead> <tbody> <tr> <td>BNC2020 +ES</td> <td>300</td> </tr> <tr> <td>Conv.</td> <td>180</td> </tr> </tbody> </table> <p>Tool: 4NC-DNGA150408ES (BNC2020) Cutting Conditions: $v_c = 150\text{m/min}$ $f = 0.15\text{mm/rev}$ $a_p = 0.10\text{mm}$ Dry</p>	Method	No. of Workpieces (pcs.)	BNC2020 +ES	300	Conv.	180	<p>SCM420H Hardened Steel Gear (62HRC) [H]</p> <p>BNC300 strong edged HS Type cutting edge treatment enables stable machining without fractures in interrupted cutting</p>  <p>Tool Life Determinant: Dimensions</p>  <table border="1"> <caption>No. of Workpieces (pcs.)</caption> <thead> <tr> <th>Method</th> <th>No. of Workpieces (pcs.)</th> </tr> </thead> <tbody> <tr> <td>BNC300 +HS</td> <td>100 (Stable cutting)</td> </tr> <tr> <td>Comp's D</td> <td>60 (Dimensional defect)</td> </tr> </tbody> </table> <p>Tool: 4NC-DNGA150408HS (BNC300) Cutting Conditions: $v_c = 100\text{m/min}$ $f = 0.1\text{mm/rev}$ $a_p = 0.3\text{mm}$ Dry</p>	Method	No. of Workpieces (pcs.)	BNC300 +HS	100 (Stable cutting)	Comp's D	60 (Dimensional defect)
Method	No. of Workpieces (pcs.)												
BNC2020 +ES	300												
Conv.	180												
Method	No. of Workpieces (pcs.)												
BNC300 +HS	100 (Stable cutting)												
Comp's D	60 (Dimensional defect)												

Sumitomo Electric Cutting Tools Official Apps for iOS/Android



Cutting calculation App

SumiTool Calculator



Grade & chipbreaker comparison App

SumiTool Converter



< SAFETY NOTES >



- 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.

- 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.

 Sumitomo Electric Industries, Ltd.

Hardmetal Division

Global Marketing Department : 1-1-1, Koyakita, Itami, Hyogo 664-0016, Japan

<https://www.sumitool.com/global>