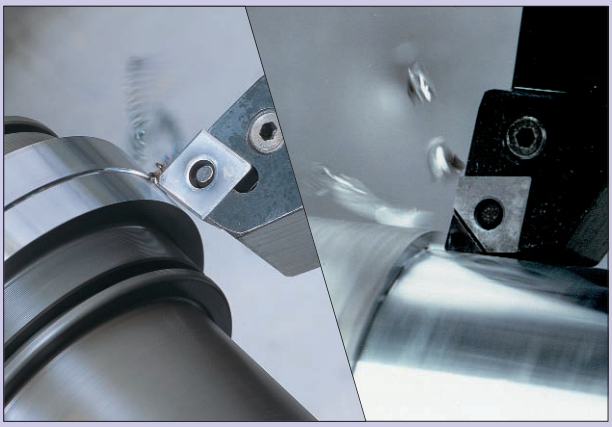
SumiBoron SumiDia

L1 ~ L18



SUMIBORON

Insert Identification

One-Use Type

CNGG 120408 N-SV NC-(W)-4

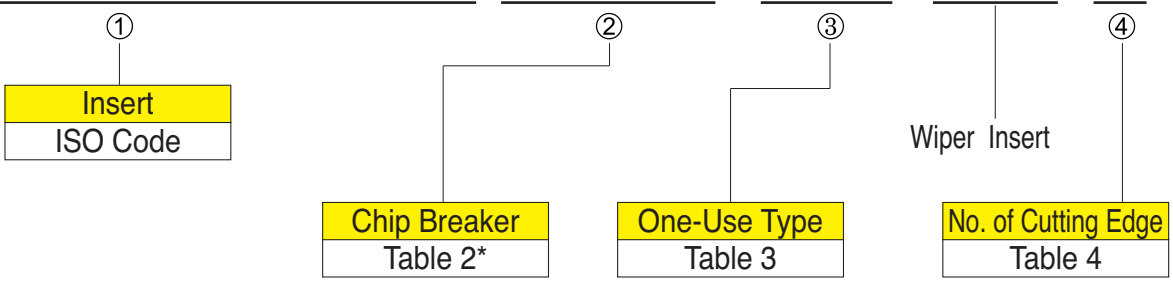


Table 2*

Code	Code Description
–	Standard Type
SV	Chipbreaker Type

*) Additional Information

Table 3

Code	One-Use Type	Grade
NC	Coated SUMIBORON	BNC80, 150 BNC200, 300
NU	Uncoated SUMIBORON	BNX10, 20 BN250, 300 BN500, 700
NS		BNX25

Table 4

Code	No. of Cutting Edges	Type
–	1 cutting edge	Single-corner
2	2 cutting edges	Multi-corner
3	3 cutting edges	
4	4 cutting edges	
6	6 cutting edges	

Regrindable Type

CNMA120408(-) B

Table 1, Additional Information

Code	Code Description
(–) B	Full-top CBN insert

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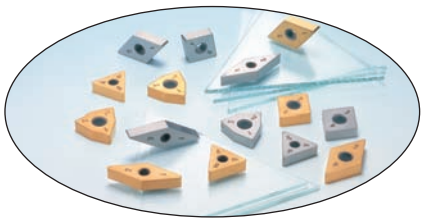
SUMIBORON

CBN Insert Guidance

Insert types and cutting edge geometries

Multi Cornered One-Use Type Inserts



■ Characteristics

- One-use type inserts improve machining efficiency by using each cutting edge to its full potential following the numbering system on each cutting edge then throwing the insert away.
- Multi cornered inserts have a single piece of Sumiboron mounted on every useable corner. Single sided inserts use the top corners whilst double sided inserts use both top and bottom corners. Diamond shaped inserts have 4 corners and triangular inserts have 6 corners.
- A variety of Sumiboron coated grades readily replace expensive grinding operations for high precision tolerances outstanding surface finish, heavy interrupted cutting and efficient cost effective machining of hardened parts.

Cutting Edge Preparation

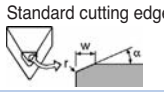
● **LS type - sharper cutting edge**

Improved surface finish

For higher dimensional accuracy

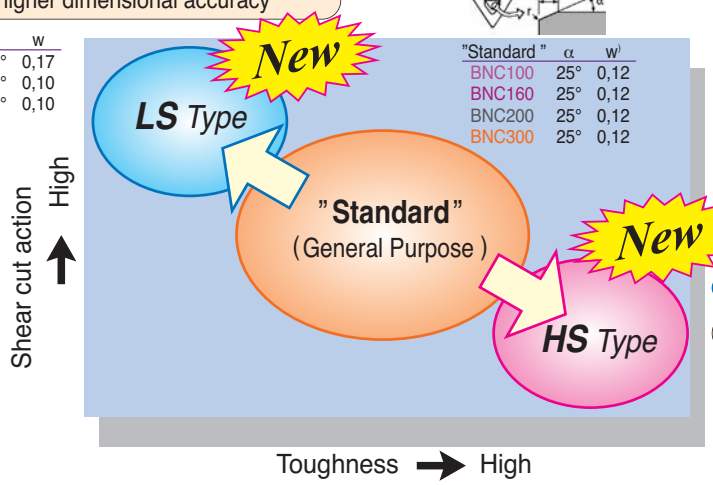
(*) LS	α	w
BNC100	15°	0,17
BNC160	20°	0,10
BNC200	15°	0,10

Standard cutting edge



"Standard"	α	w
BNC100	25°	0,12
BNC160	25°	0,12
BNC200	25°	0,12
BNC300	25°	0,12

PROGRAMME EXPANSION

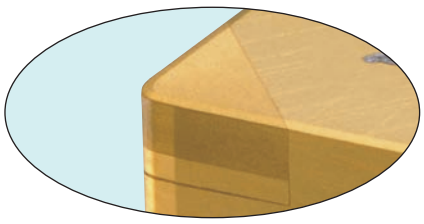


● **HS type - sronger cutting edge**

For higher loads - heavier cuts

(*) HS	α	w
BNC160	30°	0,17
BNC200	35°	0,17
BNC300	35°	0,17

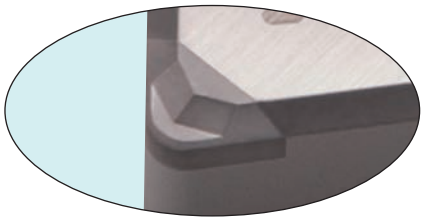
One-Use Wiper Insert



■ Characteristics

- Wiper edge technology is now available on our CBN inserts.
- Double the feed rate at existing surface finish values
- Twice the finish at existing feed rates

Break Master SV Type

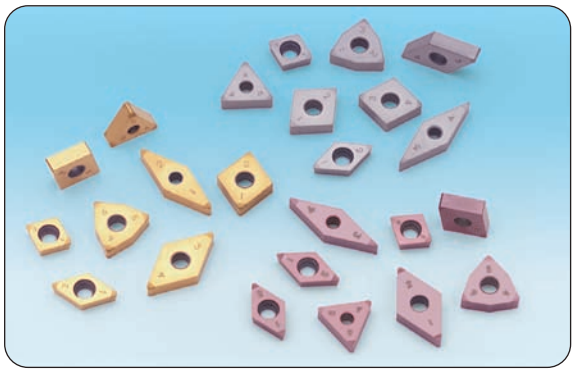


■ Characteristics

- First CBN insert to feature an integral chipbreaker
- Ideal for removing carburised layer - can be used on both hardened and unhardened materals.
- Effective chip control solution protects component from swarf damage.

CBN Tools
SUMIBORON series

Second generation Sumiboron inserts – an even better way to machine hardened steels



■ General

Building on its global success machining hardened steels with Sumiboron inserts the addition of heat and wear resistant coatings to a variety of tough new CBN substrates has resulted in a new generation of high performance inserts. With economy in mind the new inserts are multi cornered.

Choose the coated insert suitable for your application and take your hard part machining operations to the new industry standard.

■ Types and application

Microstructure

Type	Grade	Application	Characteristic	Hardness(Hv) (GPa)	TRS (GPa)
Uncoated CBN	BNX10	High speed Continuous cutting	Best wear resistance grade and suitable for high speed continuous cutting	27 ~ 31	0,80 ~ 0,90
	BNX20	High efficiency cutting (Continuous~Interrupted)	Binder with high heat resistance improves tool life during high speed machining	31 ~ 33	0,95 ~ 1,10
	BNX25	High speed Interrupted cutting	Superior fracture toughness in high speed cutting and suitable for high speed interrupted hard turning	29 ~ 31	1,00 ~ 1,10
	BN250	Continuous and Interrupted cutting (Light~Medium)	Micro-grain CBN with Ceramic binder improves fracture toughness and wear resistance	31 ~ 34	1,00 ~ 1,10
	BN300	Interrupted cutting (Heavy)	Micro-grain CBN with higher fracture toughness that improves cutting edge strength	32 ~ 34	1,10 ~ 1,20
Coated CBN	BNC100	High speed continuous and light interrupted cutting	High speed finishing grade for continuous and light interrupted cutting applications	29 ~ 32	1,00 ~ 1,10
	BNC160	High precision continuous cutting	High precision grade for continuous cutting - ideal when an excellent surface finish is required	31 ~ 33	1,10 ~ 1,20
	BNC200	Continuous and Interrupted cutting (Light-Medium Interrupted)	General purpose grade with low to high speed cutting capability and extended tool life - removes the carburised layer on heat treated components	33 ~ 35	1,10 ~ 1,20
	BNC300	Interrupted cutting (Heavy)	Tough grade for heavy interrupted cutting applications	33 ~ 35	1,15 ~ 1,25

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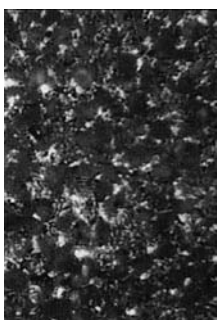
Microstructure



Grade	Application	Characteristic	Hardness(Hv) (GPa)	TRS (GPa)
BN500	GG and GGG machining Hardened VSR cutting (Traverse cut) Continuous finishing of hardened roll	For Cast Iron machining with a good balance of wear and fracture resistance	32 ~ 34	1,00 ~ 1,10
BN700 (BN600)	High speed machining of GG Cast Iron machining Iron based products Rolls of high hardness Heat resistant alloy	First choice for high speed finishing of grey cast iron Less burrs when machining sintered parts due to excellent edge sharpness	40 ~ 43 (38 ~ 41)	1,20 ~ 1,30 (0,95 ~ 1,10)
BNS800	High speed machining of GG Machining rolls of high hardness Sintered component roughing Special cast Iron machining	High thermal impact resistance with high heat transfer ability and higher CBN content ratio	39 ~ 42	0,95 ~ 1,10

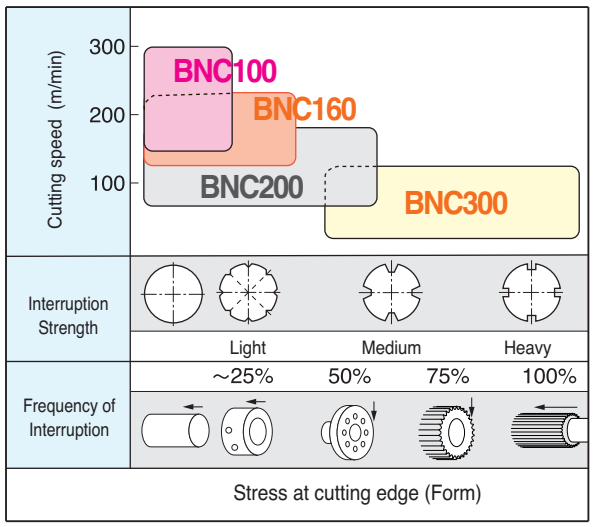
CBN Tools
SUMIBORON series

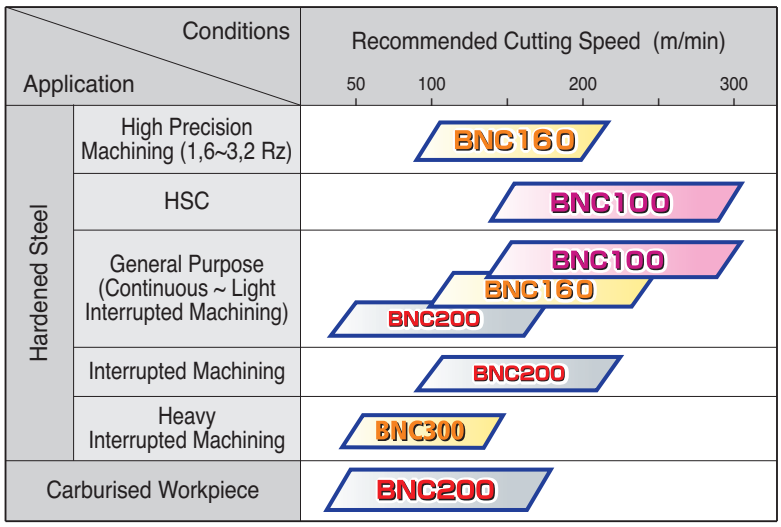
HARDENED STEEL MACHINING

● Advantages of using CBN

In terms of cost investment, it is much lower in machine cost and overhead cost due to the fact that a CNC lathe is cheaper than a grinding machine.
As for the quality of finish, inserts can machine different profiles and the finishing is also commendable as compared to grinding.
Environmentally, sludge treatment for grinding is a hazard to the environment but for turning, the chips can be collected and recycled.

■ Application Range



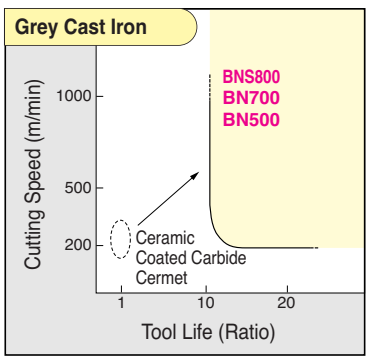


CAST IRON MACHINING

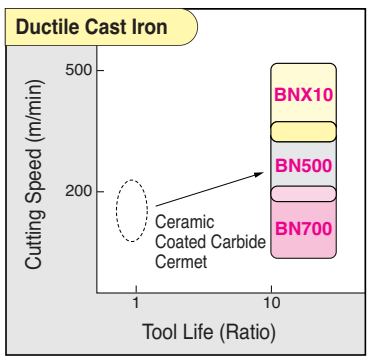
● Advantages of using CBN

Following chart shows merits of using CBN in cast iron machining compared with conventional tool, such as carbide, cermet or ceramics.
SumiBoron performs longer tool life than conventional tools in high speed machining and brings higher efficiency and superior precision.

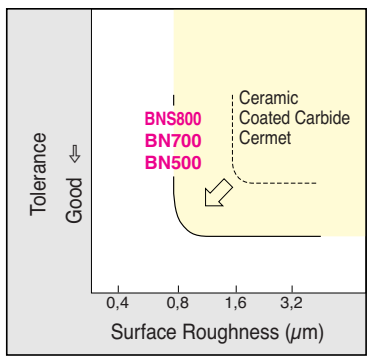
● High Speed Machining



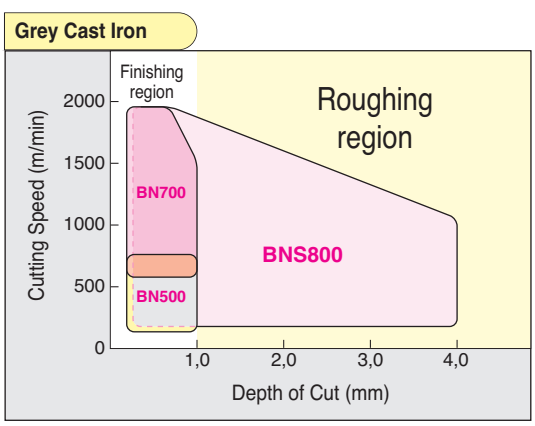
● High Speed Machining

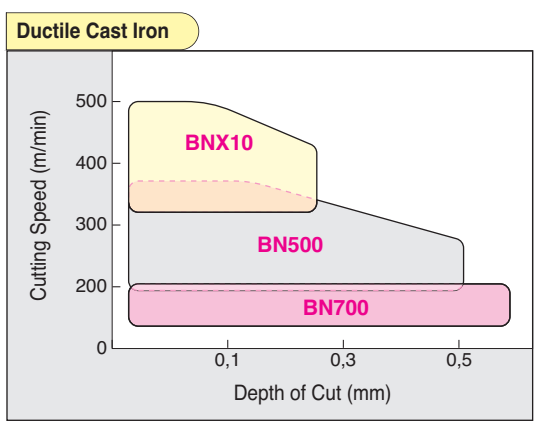


● High Precision Machining



■ Application Range





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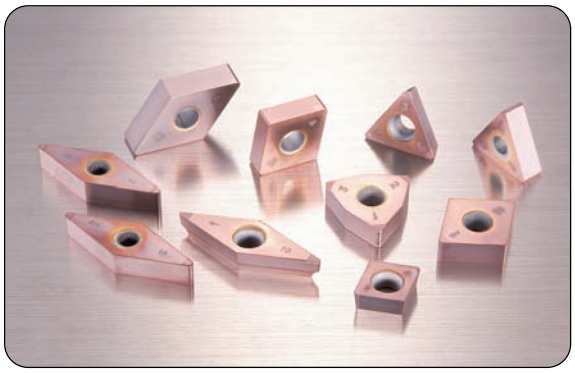
Coated SUMIBORON BNC100

Coated Sumiboron premium grade for high speed machining of hardened steels



■ General

Our copper coloured Sumiboron grade BNC 100 resists premature plastic deformation of the cutting edge by withstanding the high temperatures that occur when machining hardened steels. This new grade features a heat resistant CBN substrate and a special TiCN base ceramic coating to enhance surface finish across a broad range of finishing applications at elevated cutting speeds.

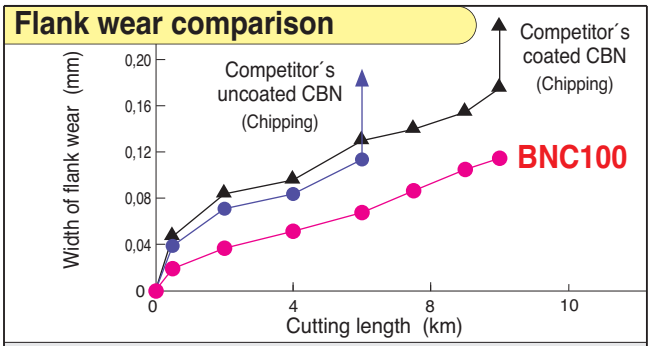
Ideal for higher speed machining and suitable for continuous or light interrupted cuts BNC100 delivers reliable performance and excellent tool life

■ Advantages

- **High speed machining!**
  Suitable for continuous to light interrupted high speed cutting with vc= 150 ~ 300 m/min.
- **Extended tool life!**
  Wear resistant ceramic coating and tough CBN substrate considerably extends tool life.
- **Excellent surface finish!**
  A consistent surface finish to values less than 6.3Rz is easily achieved on both continuous and light interrupted cut applications.

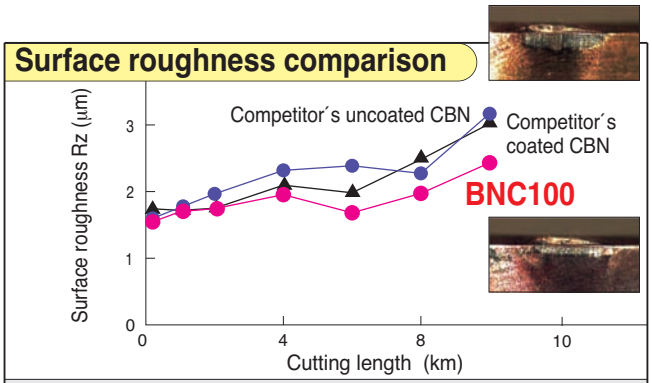
■ Performance

Flank wear comparison



Work material: 15CrMo5 (Curburised steel) $H_RC58-62$
Insert type: CNGA 120408 NC-4
Cutting data: v_c = 250 m/min, f = 0,08 mm/rev, d_{oc} = 0,1 mm, Dry

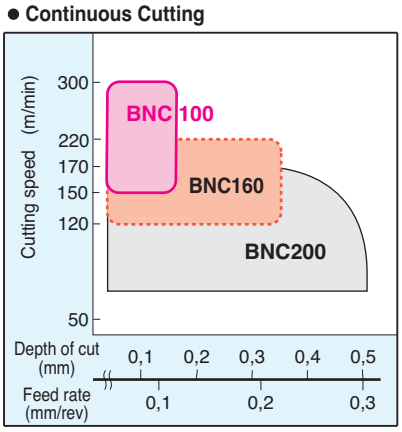
Surface roughness comparison



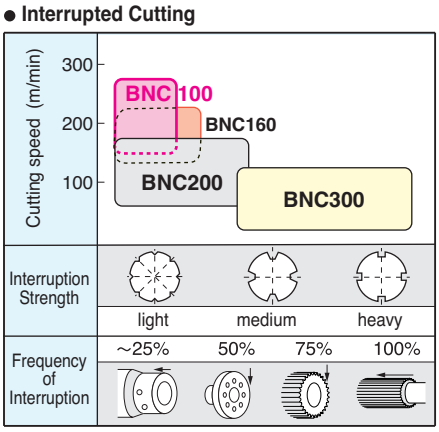
Work material: 15CrMo5 (Curburised steel) $H_RC58-62$
Insert type: CNGA 120408 NC-4
Cutting data: v_c = 250 m/min, f = 0,1 mm/rev, d_{oc} = 0,1 mm, Dry

■ Application Range

● **Continuous Cutting**



● **Interrupted Cutting**



■ Recommended Cutting Conditions

v_c (m/min) 100 150 200 250 300	f (mm/rev)	d_{oc} (mm)
	0,03-0,2	0,03-0,3

❄ Coolant ... Continuous cutting: Dry or Wet
Interrupted cutting: Dry

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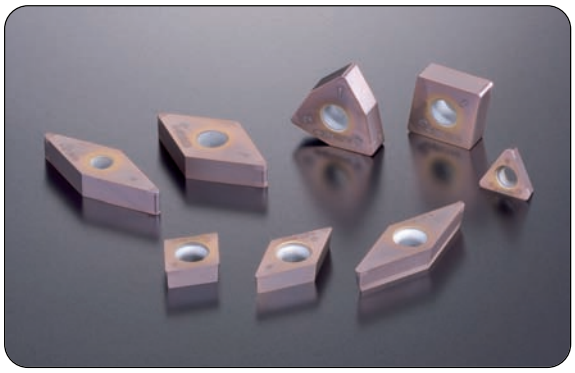
Coated SUMIBORON BNC160

High precision machining with surface finishes down to 1,6 Rz possible thanks to smooth coating!



■ General

Use the copper coloured Sumiboron grade BNC160 to improve surface integrity as well as machining accuracy. The TiCN-base smooth surface ceramic coating and the newly developed Sumiboron substrate enhances edge strength and wear resistance making high precision machining with surface finishes as low as 1,6Rz readily achievable.

This new grade is ideal for turning components that previously relied on precision grinding machines for final machining.

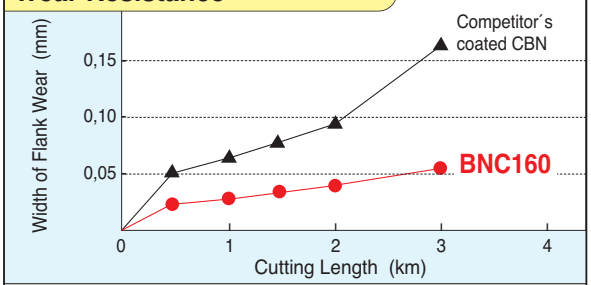
■ Advantages

- **Excellent surface roughness!**
  A consistent surface roughness is maintained for hours because wear at the boundary is so gradual.
- **High Precision Machining**
  High precision work previously ground, can now be turned.
- **Enlarged scope of application!**
  A wider range of hardened steels can be cut using Sumiboron the result being high productivity on close tolerance machining applications.

■ Performance

● **Continuous Cutting**

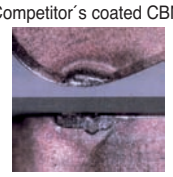
Wear Resistance



Work material: 15CrMo5 (H_RC60)
Insert type: CNGA 120408 NC-4
Cutting data: v_c = 200 m/min, f = 0,1 mm/rev, d_{oc} = 0,1 mm, Dry

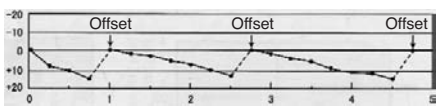
● **Machining Accuracy**

Competitor´s coated CBN



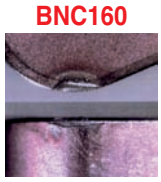
Machining after 3 km

Deviation of machined diameter (µm)

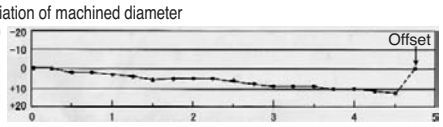


Cutting Length (km)

BNC160



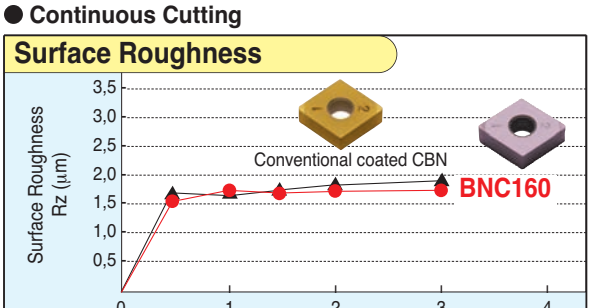
Deviation of machined diameter (µm)



Cutting Length (km)

● **Continuous Cutting**

Surface Roughness



Work material: 15CrMo5 (H_RC60)
Insert type: CNGA 120408 NC-4
Cutting data: v_c = 200 m/min, f = 0,1 mm/rev, d_{oc} = 0,1 mm, Dry

■ Recommended cutting Conditions

v_c (m/min) 120 150 200 220 250	f (mm/rev)	d_{oc} (mm)
	0,03-0,2	0,03-0,35

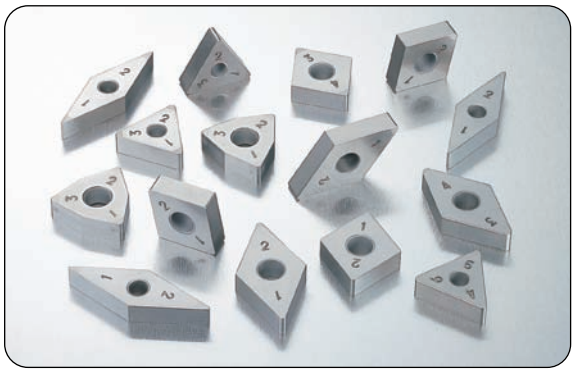
※ Feed rate and nose radius are set such that the theoretical surface roughness is 1/2 to 1/3 of the required surface roughness.

※ Coolant ... Continuous cutting: Dry or Wet
Interrupted cutting: Dry

Most suitable for high speed finishing !

Coated SUMIBORON BNC200

Excellent wear and fracture resistance!
Predictable tool life on a wide range of applications!



■ General

Our silver coloured Sumiboron insert grade BNC200 offers safe reliable cutting and predictable tool life.

The newly developed cutting material with enhanced edge strength is coated with TiAlN-base ceramic for excellent wear resistance and realises extended tool life even when interrupted cutting.
This grade is especially suitable for medium speed machining of carburised surfaces.

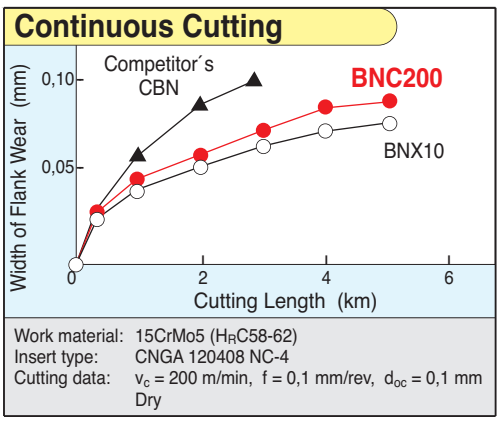
■ Advantages

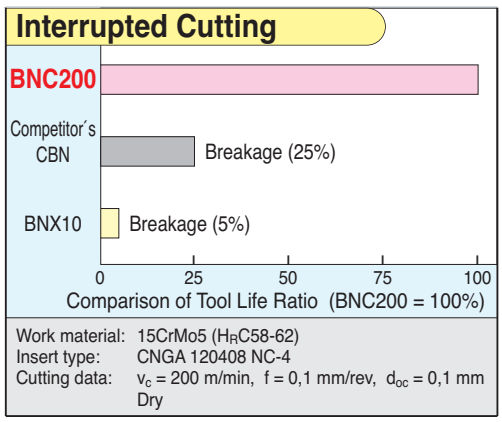
- **Predictable tool life!**
  Extended tool life is realised even when high speed cutting thanks to excellent wear resistance.

- **Wide range of applications!**
  Sumiboron is suitable for a wide range of applications eg. from low to high speed interrupted cutting.

- The newly developed brazing technology maximises edge strength making Sumiboron suitable for interrupted and continuous cutting.

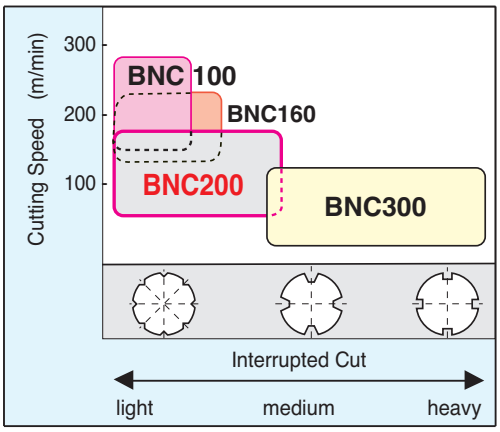
■ Performance





- **BNC200 features excellent wear resistance comparable with BNX10, plus outstanding fracture resistance.**

■ Application Range



■ Recommended Cutting Conditions

vc (m/min) 50 80 170 220	f (mm/rev)	doc (mm)
	0,03-0,25	0,05-0,5

Coolant ... Continuous cutting: Dry or Wet
Interrupted cutting: Dry

Can be used in a wide range of applications from low to high speed operation.

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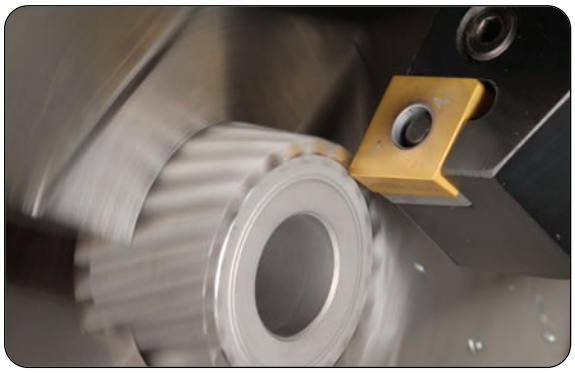
Coated SUMIBORON BNC300

Coated grade BNC300 for heavy interrupted hard turning



■ General

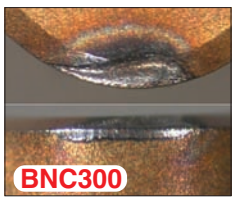
Use our gold coloured Sumiboron grade BNC300 to machine hardened steel parts which have heavy interruptions.

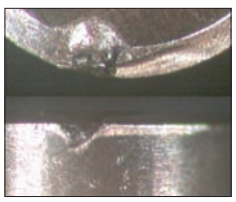
The tough new CBN substrate in combination with the tough wear resistant coating responds well to applications where cuts over surfaces which are heavily interrupted by grooves, cross holes, etc have to be undertaken.

■ Advantages

- **Stable tool life!**
  Tough CBN substrate and wear resistant coating provides stable tool life even when cuts are heavily interrupted.
- **Excellent machining accuracy!**
  The wear resistant coating protects the cutting edge from surface damage maintaining insert shape - sizing accuracy and excellent surface roughness.
- **Expanded application range!**
  BNC 300 extends tool life across a broad application range from continuous to heavy interrupted cutting.

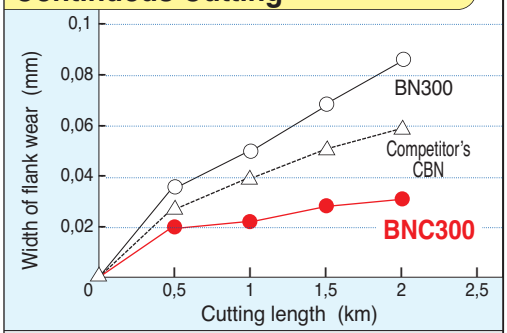
■ Performance





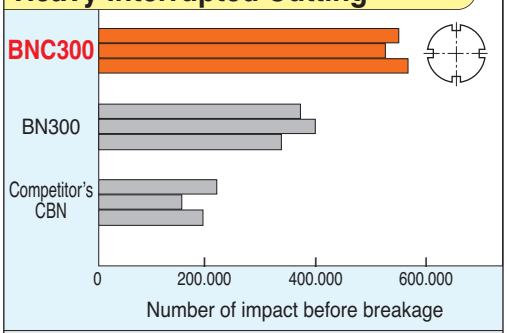
Competitor's CBN

Continuous Cutting



Work material: 20Cr4 (H_RC62-64)
Cutting data: v_c = 120 m/min, f = 0,1 mm/rev, d_{oc} = 0,2 mm
Insert type: CNGA 120408 NC-4 Dry

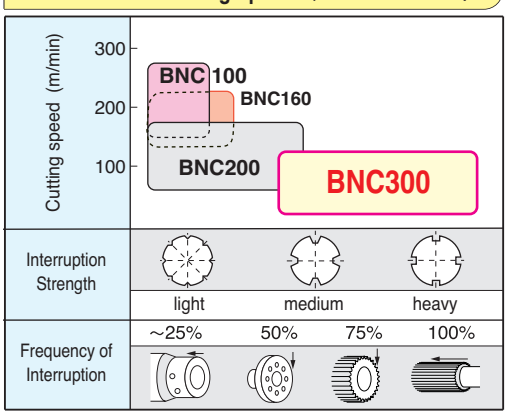
Heavy Interrupted Cutting



Work material: 20Cr4 (H_RC58-62), U grooved
Cutting data: v_c = 100 m/min, f = 0,1 mm/rev, d_{oc} = 0,2 mm
Insert type: CNGA 120408 NC-4 Dry

■ Recommended Cutting Area

Low and Middle Cutting Speed (Vc= ~150 m/min)



Stress at cutting edge (Form)

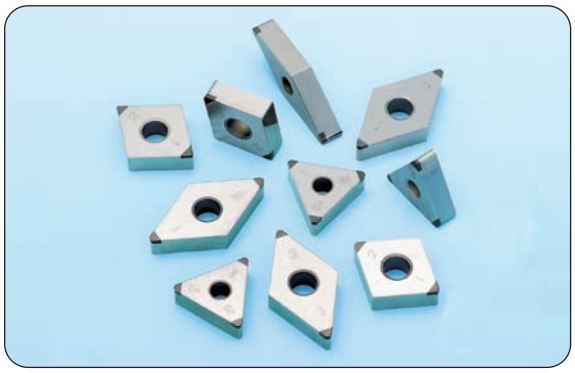
■ Recommended Cutting Conditions

Recommended Conditions			
v_c (m/min) 50 100 120 150	f (mm/rev)	d_{oc} (mm)
	0,03-0,3	0,03-0,2

※ Coolant ... Dry cutting is recommended.

SUMIBORON
BN700

New grade BN700 for cast iron and ferrous powder metal



■ General

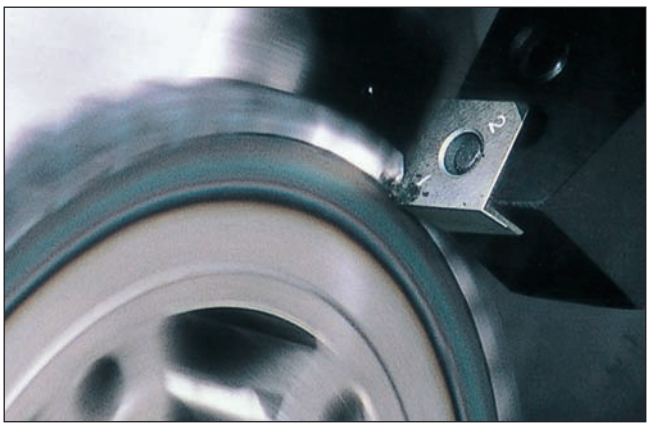
New grade BN700 is suitable for cast iron and ferrous powder metal. BN700 has the highest cBN content of all Sumitomo cBN grades, which provides many advantages, such as high toughness, hardness and thermal conductivity.

BN700 shows excellent performance in high speed machining of gray cast iron with good wear and thermal resistance, also suitable for ferrous powder metal turning with sharp and tough cutting edge.

■ Advantages

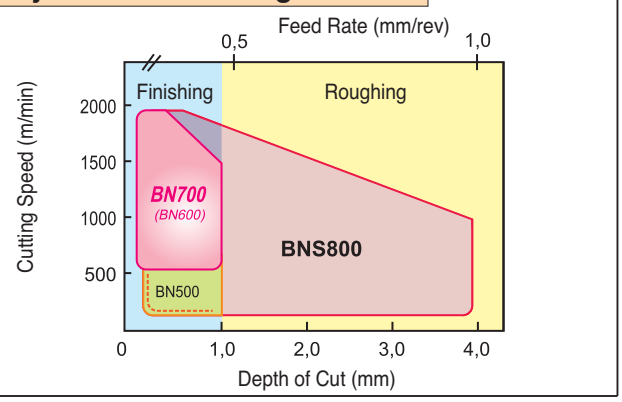
● **Extremely resistant to breakage !**
Suitable for chilled iron, high alloy iron and hard rolls even with a large depth of cut and high feed rates.

● **Extremely resistant to wear !**
Good thermal conductivity and chip adhesion resistance result in a greatly improved tool life.

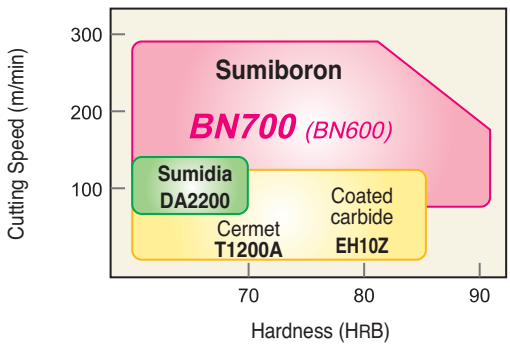


■ Recommended Cutting conditions

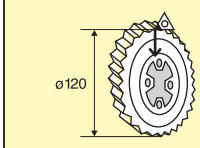
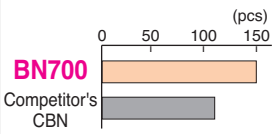
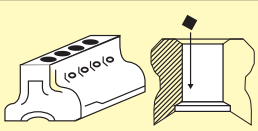
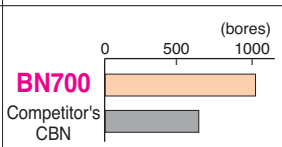
Grey Cast Iron Turning



Ferrous Powder Metal Turning



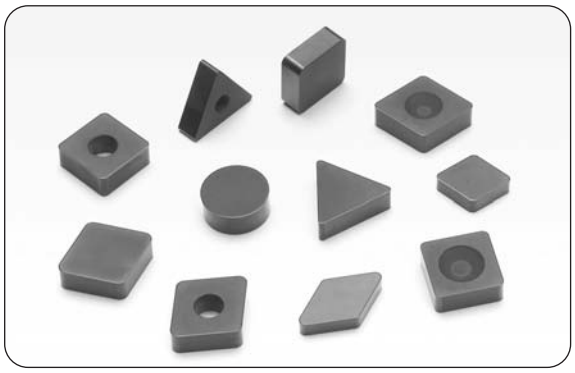
■ Application Example

Tooling	Workpiece Material	Insert Cat. No.	Cutting Conditions v_c (m/min) f (mm/rev) d_{oc} (mm)	Results (machined work pieces / cutting edge)
	Gears Ferrous powder metal H_RC 58~60	TNGA 160404 NU3	v_c = 120 m/min f = 0,15 mm/rev d_{oc} = 0,25 mm Dry	 ● The tool life of BN700 is 30% longer than competitor's CBN
	Cylinder bore GG25	SNGN 090308	v_c = 500 m/min f = 0,2 mm/rev d_{oc} = 0,2 mm Dry	 ● The tool life of BN700 is 50% longer than competitor's CBN

SumiBoron

SUMIBORON BNS800

Solid CBN grade for high speed rough and finish machining of cast cron



General

Solid CBN grade with high content CBN and special binder phase provide high fracture toughness and high thermal conductivity.

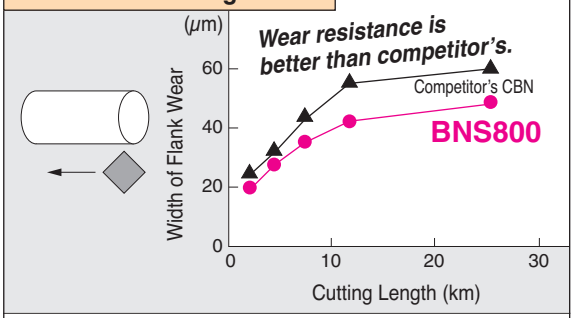
Solid inserts for roughing with high depth of cut and also for finishing of cast iron and alloyed cast iron at wet and dry conditions.

Advantages

- **High wear resistance !**
  High CBN-content and special binder phase provide a excellent wear resistance and a tight dimensional control in finish machining.
- **High edge stability !**
  High thermal conductivity of BNS800 and high edge stability provide a long tool life at wet and dry machining.

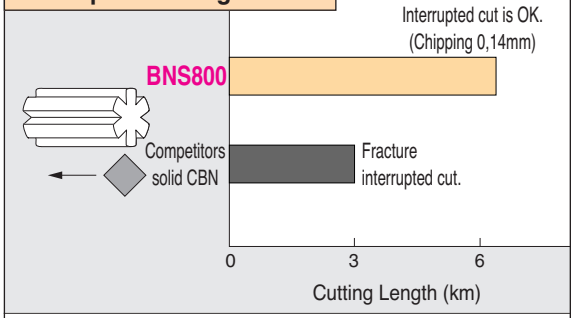
Performance

Continuous Cutting



Work material: Round Bar (GG30)
Insert type: SNGN 090308
Cutting data: v_c = 800 m/min, f = 0,2 mm/rev, d_{oc} = 0,5 mm, Dry

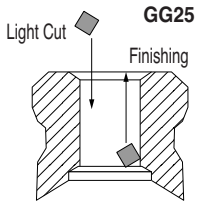
Interrupted Cutting



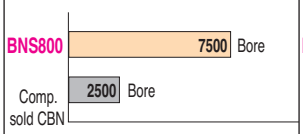
Work material: Round Bar- 6V, grooved (GG30)
Insert type: SNGN 090308
Cutting data: v_c = 600 m/min, f = 0,3 mm/rev, d_{oc} = 0,5 mm, Dry

Application Example

● Cylinder Bore

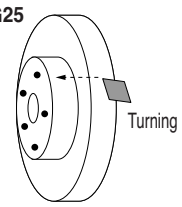


(Tool life criteria : Finishing)

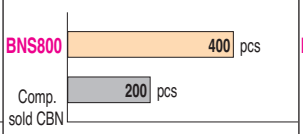


Tooling	Light Cut	Finishing
Grade	BNS800	
Insert	SNGN090308	
v_c	1000m/min	
f	0,3mm/rev	0,25mm/rev
d_{oc}	0,2mm	
Coolant	Wet	

● Brake Disc

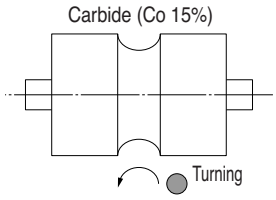


(Tool life criteria : Breakage)

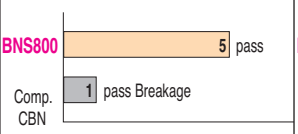


Tooling	Finishing
Grade	BNS800
Insert	DNGN110312
v_c	600m/min
f	0,3mm/rev
d_{oc}	0,5mm
Coolant	Dry

● Carbide Roll

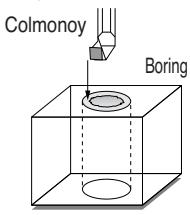


(Tool life criteria : Breakage)

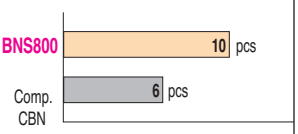


Tooling	Finishing
Grade	
Insert	RNGN090300
v_c	40m/min
f	0,15mm/rev
d_{oc}	0,2mm
Coolant	Wet

● Sprayed Face Bore



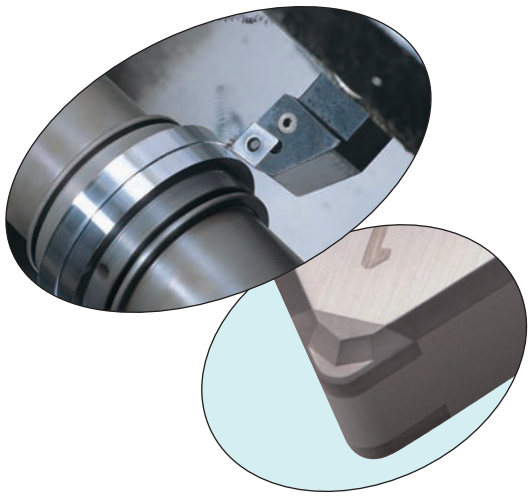
(Tool life criteria : Breakage)



Tooling	Roughing	Finishing
Grade	BNS800	
Insert	SNGN090312	SNGN090308
v_c	80m/min	
f	0,04mm/rev	0,03mm/rev
d_{oc}	~3mm	0,5mm
Coolant	Wet	

SUMIBORON Insert With Chipbreaker

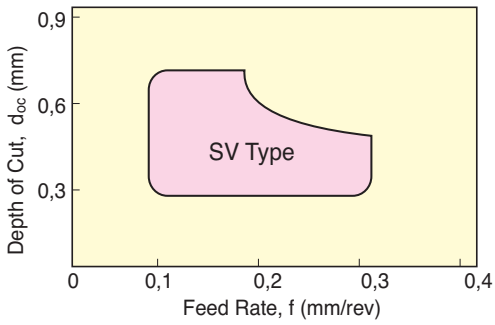
Break Master SV Type

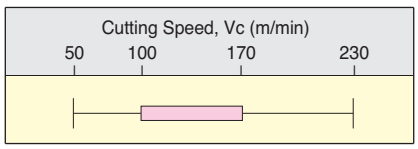


Characteristics

- SumiBoron with chipbreaker! Especially for carburized layer removal.
- Breaker included on the CBN edge, chipbreaking effect can be maintained throughout.
- Unique breaker design can be applied to both hardened and non-hardened parts with effective chip control.
- Used with Coated SumiBoron BNC200 for high efficiency machining.

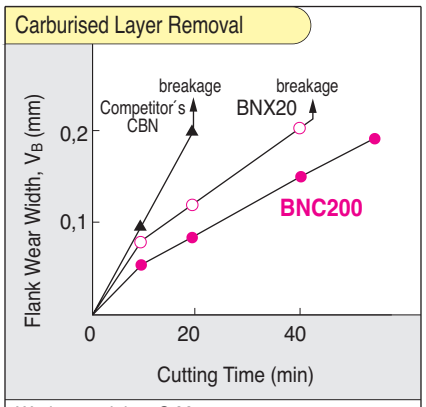
Application Range





* When machining heat treated steel harder than H_RC50 the depth of cut should not exceed 0,5 mm.

Cutting Performance

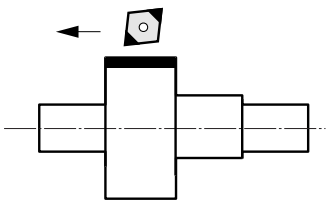


Work material: 42CrMo4
Insert: CNGG120408N-SV NC4
Cutting conditions:
v_c=100m/min, f=0,13mm/rev
d_{oc}=0,4mm, x3 passes, Dry

● Stable tool life with BNC200

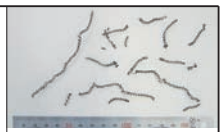
Application Examples

External Carburised Layer Removal

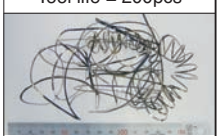


No constant stopages or incorrect part dimention problem and the chips are small.

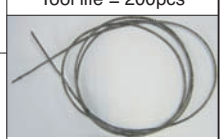
Double the tool life of competitor's CBN



Break Master SV
Tool life = 200pcs



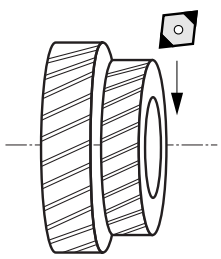
BNC200 (no breaker)
Tool life = 200pcs



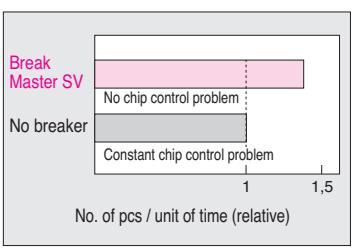
Comp. CBN (no breaker)
Tool life = 100pcs

Work material: 42CrMo4, Carburised steel (shaft)
Insert: CNGG120408N-SV NC4 (BNC200)
Conditions: v_c=150m/min, f=0,15mm/rev, d_{oc}=0,5mm, x 2 passes, Wet

Carburised Face Layer Removal

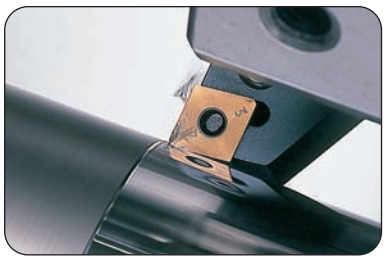


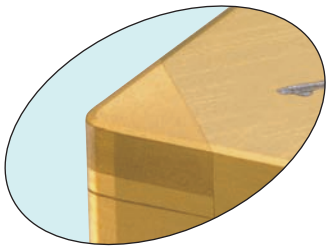
Break Master SV type improves chip control with increased productivity until the pre-set tool life.



Work material: 42CrMo4 (HRC30-62)
Insert: CNGG120408N-SV NC4 (BNC200)
Conditions: v_c=140m/min, f=0,15mm/rev, d_{oc}=0,3mm, Wet

SUMIBORON
One-Use Wiper Inserts

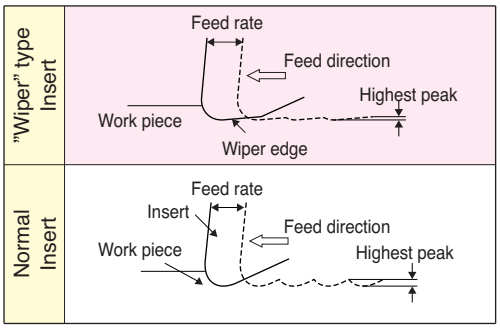




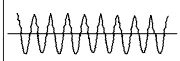
■ Characteristics

- SumiBoron One-Use Insert with wiper flat
- Excellent surface finish similar to grinding
- Improved efficiency with higher speeds and feeds

■ Purpose of Wiper Edge



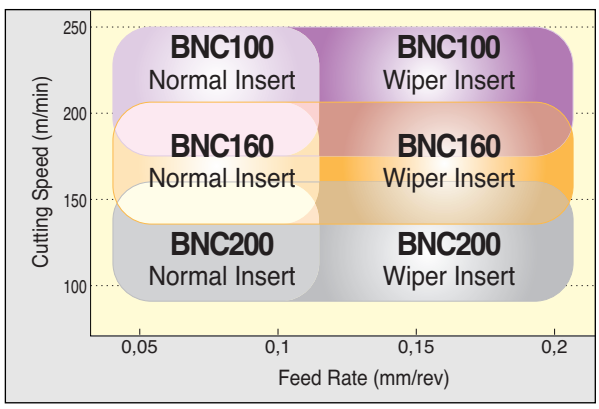
■ Surface Roughness of Wiper Insert

	"Wiper" Insert (r=0,8)		Normal Insert (r=0,8)	
	Finishing (f=0,15mm/rev)	High feed cutting (f=0,25mm/rev)	Finishing (f=0,15mm/rev)	High feed cutting (f=0,25mm/rev)
Surface Roughness Profile				
Surface Roughness R_Z (Highest peak)	0,6μm	1,0μm	3,5μm	9,8μm

■ Recommended Conditions

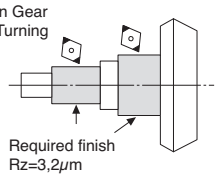
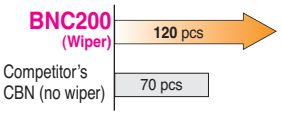
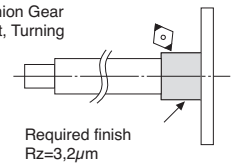
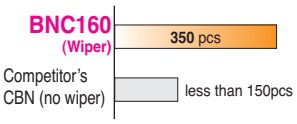
(Surface Roughness Standard: 1,6s ~ 3,2s)

- Wiper insert is recommended for high feed conditions
- For optimum effectiveness, use wiper inserts for continuous cutting.
- For copy turning, inserts with nose-radius is recommended. Chattering and undulation may occur, please use work and machine with high rigidity.

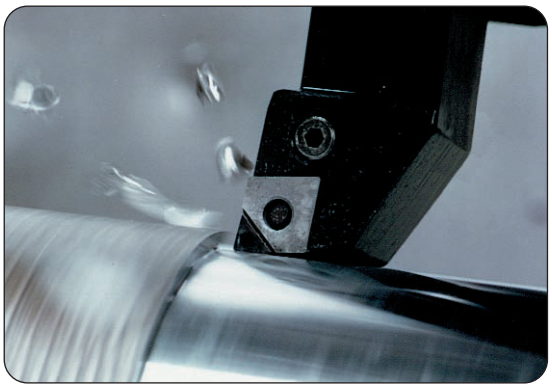


Feed rate can be up to 0,3mm/rev for high-feed machining

■ Application Examples

Process	Work ① Part Name ② Grade	Tool Insert	Cutting Conditions v_c = Cutting speed (m/min) f = Feed rate (mm/rev) d_{oc} = Depth of cut (mm)	Results
Pinion Gear Ext, Turning  Required finish Rz=3,2μm	① Gear ② Hardened Steel H_RC58~62	CNGA 120404 NC-W-4 (BNC200)	v_c = 130 m/min f = 0,18 mm/rev d_{oc} = 0,15 mm Wet	 BNC200 (Wiper) 120 pcs; Competitor's CBN (no wiper) 70 pcs
Pinion Gear Ext, Turning  Required finish Rz=3,2μm	① Shaft ② Carburised Steel H_RC58~62	CNGA 120404 NC-W-4 (BNC160)	v_c = 200 m/min f = 0,11 ~0,15 mm/rev d_{oc} = 0,13 mm Wet	 BNC160 (Wiper) 350 pcs; Competitor's CBN (no wiper) less than 150pcs

SUMIBORON / SUMIDIA
Production Process



General

Since 1970s, Sumitomo has pioneered the development of sintered cubic boron nitride (CBN) and sintered diamond (PCD) tools successfully used in the tool making industries. These tool materials can be epoch-making in a sence of broadening the cutting application range.

Production Process

In the production process of **SUMIBORON / SUMIDIA**, CBN powder / diamond powder is firstly synthesized under the ultra - high pressure, and secondly, the synthesized crystalline grains are sintered.

Fig. 2 shows a diagram of high temperature high pressure apparatus for processing the ultra - high pressure sintering operation.
This apparatus is basically composed of a piston and a cylinder to generate ultra - high pressure as high as 5000 N/mm^2 with a special device. The piston and cylinder are made of cemented carbide.

Fig. 1

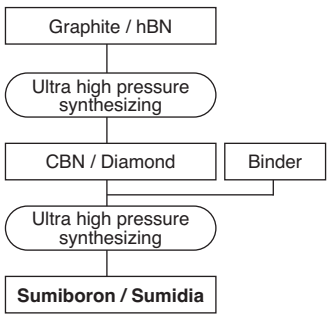
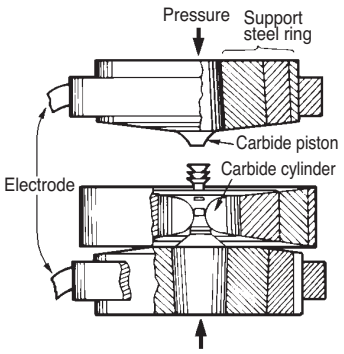
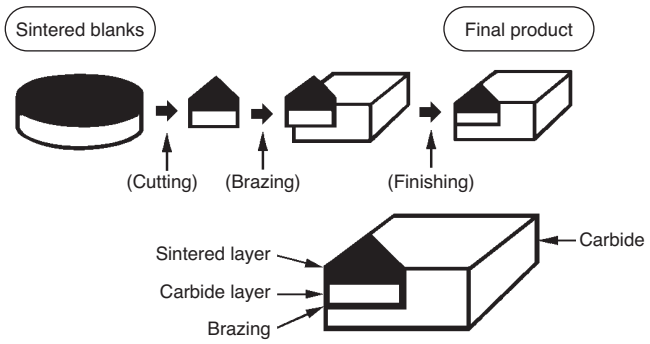


Fig. 2



Production Process

To manufacture final products round discs of SUMIBORON and SUMIDIA material are cut into specific shapes and brazed on to tool bodies made of cemented carbide, or steel, etc., and after that finished by grinding the edge.
In another process the final product can be obtained only by cutting blanks and finishing them.

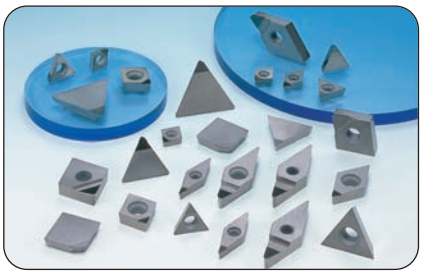


SumiBoron / SumiDia Grinding Method

Items		SumiBoron	SumiDia
Grinding machine	–	1) Carbide grinding machine is applicable. 2) R Pointer should be used. 3) Should be wet grinding.	1) Special-purpose high rigidity grinding machine is desirable. 2) Be sure of applying with wet system.
Wheel	Abrasive	Diamond	Diamond
	Grain size	D 25 - medium, D20 - fine (#400 ~ 800)	Rough grinding: D 35 (#400 mesh) Finish grinding: D 25 (#800 ~ 1500 mesh)
	Bond	Resinoid or vitrified	Special-purpose metal bond for diamond sintered tool or vitrified
	Concentration	100	100 ~ 125
	Dressing	Use # 400 WA stick	Execute dressing with a WA stick of about 400 mesh.
Grinding condition	Wheel speed	800 ~ 1000 m/min.	800 ~ 1000 m/min.
	Table cycle	30 ~ 60 cycles/min.	30 ~ 60 cycles/min.
	Grinding oil	Water soluble grinding coolant oil	Water soluble grinding coolant (Solution type)
Others	–	1) Check chipping of the cutting edge with microscope after finishing. 2) Blank surface cut by EDM should be ground more than 0,05 mm	1) Rake surface is lapped generally 2) Inspect with microscope of magnification of 30-50 times if there is edge chipping. 3) Edge treatment of tool should be sharp for cutting non-ferrous metals. 4) Remove the wire-cut surface of blank by 0,05 mm or more in grinding operation.

SUMIDIA

DA2200 / DA150



DA2200 Features

SumiDia DA2200 is a high density, ultra fine grained sintered PCD with high toughness similar to that of cemented carbides.

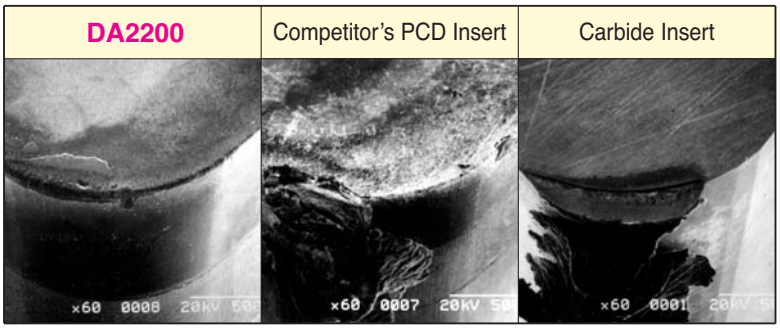
SumiDia DA2200, with its great improvement in fracture resistance, eliminates the breakage problems faced by conventional PCD tools especially during the milling of Aluminium alloys and achieves a longer and more stable tool life.

Furthermore, the NF type inserts maskes it even more cost effective.

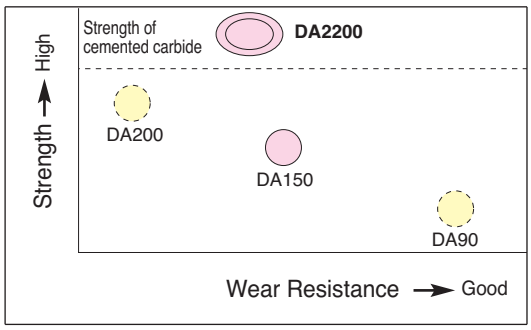
Series • Features • Application

Grade	Features	Application	Average size of Diamond grains (µm)	Hardness Hv	Transverse Rupture Strenghth (kg/mm²)
DA2200	High density sintered material made of ultra-micro diamond particles. Superior hardness and wear resistance with sharp edge.	• Rough, Interrupted and Finishing of Al-alloy • Wood or Wooden Board Cutting	0,5	90 ~ 100	≈ 2,45
DA150	Micro-grained sintered diamond grade with strong diamond-to-diamond bonding. It is suitable for the machining of non-ferrous metals and other very hard materials.	• Non-Ferrous Metal finishing (Aluminium, Copper Alloy) • Green or Semi-Sintered Carbide & Ceramic Roughing • FRP, Hard Rubber & Carbon Cutting • Wooden or Inorganic Material Board Cutting	5	100 ~ 120	≈ 1,95

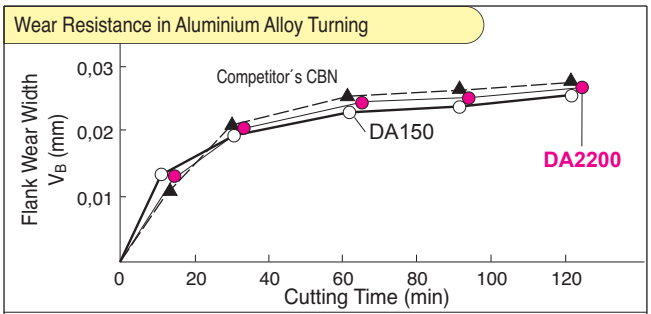
Comparison of cutting edges after machining Aluminum alloy



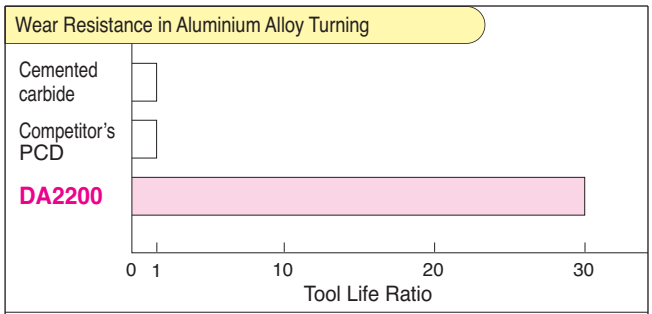
Position of DA2200



Cutting Performance



Work material: AC8A-T6 (Al-12% Si alloy)
Insert used: SPGN 120304
Cutting conditions: v_c=300m/min, f=0,1mm/rev, d_{oc}=0,42mm, Dry



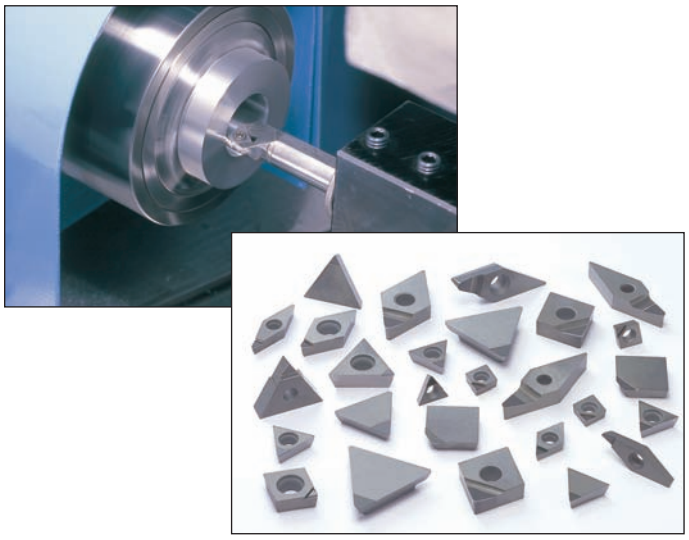
Work material: ADC12 (Al-12% Si alloy)
Insert used: 20° positive milling inserts (12 teeth)
Cutting conditions: v_c= 1.500m/min, f=0,1mm/rev, d_{oc}= ~4,0mm, Wet

Recommended Cutting Conditions

Cutting Conditions \ Work Materials		Aluminium Alloys	Copper Alloy	Reinforced Plastics	Wood or Organic Materials	Carbide	Carbon
Cutting Speed	v_c (m/min)	~ 3.000	~ 1.000	~ 1.000	~ 4.000	10 ~ 30	100 ~ 600
Feed rate	f (mm/rev)	~ 0,2	~ 0,2	~ 0,4	~ 0,4	~ 0,2	~ 1,0
Depth of cut	d_{oc} (mm)	~ 3,0	~ 3,0	~ 2,0	–	~ 0,5	~ 2,0

SumiDia

SUMIDIA Inserts
NF Type



General Features

Total Cost Effectiveness with High Performance and Lower Price

- Long, stable tool life and good fracture resistance with high toughness grade DA2200.
- Optimum design utilizing improved mass production techniques provides a relatively lower cost.
- Regrindable type results in huge total cost reduction.

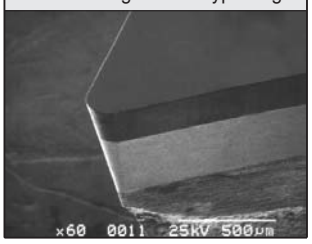
Wide Application Range

- Wide range of stocked items for small hole boring, OD turning to milling processes.
- Nega-posi type inserts that are applicable on standard lever-lock, pin-lock type holders.

Efficiency

SumiDia NF-type inserts uses improved mass production techniques, which maintain the usual good performance yet offering a higher cost efficiency. Coupled with SumiDia DA2200 grade, its exhibits strong cutting edges which gives excellent surfaces finishes.

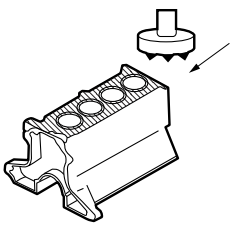
● SEM Image of NF-Type Edge



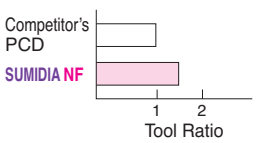
(NF-type is precision ground just like conventional inserts.)

Application Examples

● Milling of Aluminum Cylinder Block

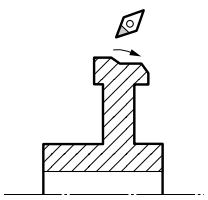


Results:
Burrs are not formed due to the edge sharpness of DA2200.
1,5 times longer tool life than competitor's.

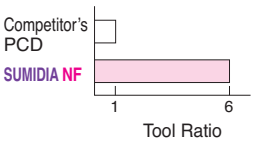


Work material: ADC12 (Al-12% Si alloy)
Insert used: 20° positive milling inserts (12 teeth)
Cutting conditions: v_c= 1.000m/min, f_t = 0,025mm/t, d_{oc}= 1,2mm

● OD Turning of Aluminum Alloy Electronics Part

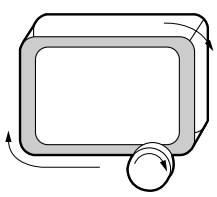


Results:
6 times tool life with relatively no chipping.

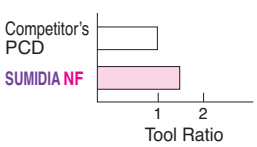


Work material: ADC12 (Al-12% Si alloy)
Insert used: VCMT 110301 NF
Cutting conditions: v_c= 800m/min, f=0,1mm/rev, d_{oc}= 0,02mm

● Milling of Aluminum Oil Pump Cover

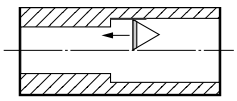


Results:
1,5 times longer tool life than competitor's with higher cost effectiveness.

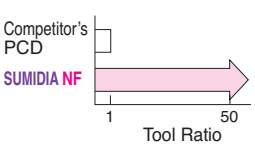


Work material: ADC12 (Al-12% Si alloy)
Insert used: TEEN32R NF
Cutting conditions: v_c= 3.000m/min, f_t = 0,06mm/rev, d_{oc}= 0,2mm

● Boring of Aluminum Valve Bore

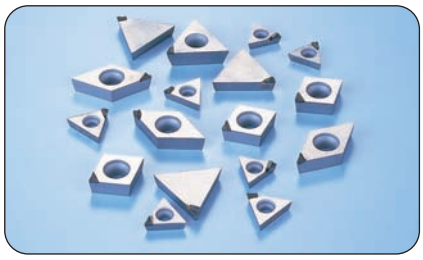


Results:
No initial chipping, tool life is more than 50 times that of carbides.



Work material: ADC12 (Al-12% Si alloy)
Insert used: TPGN 110304 NF
Cutting conditions: v_c= 530m/min, f=0,05mm/rev, d_{oc}= 0,2mm

SUMIDIA One-Use Inserts
Break Master DM Type



General Features

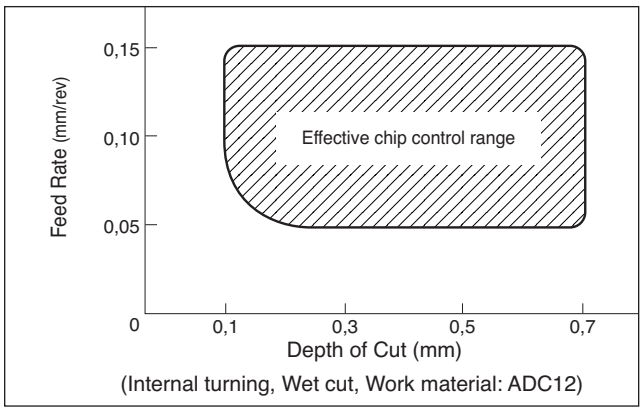
● Economy One-Use Insert
- Similar to SumiBoron One-Use type inserts

● With Built-in Chipbreaker for Effective Chip Removal
- Solving chip control problems and improving efficiency with DM-type chipbreaker.

● Extensive Insert Range for External and Facing Operation
- 80° and 55° diamond shaped inserts are added to expand the application range of this series.

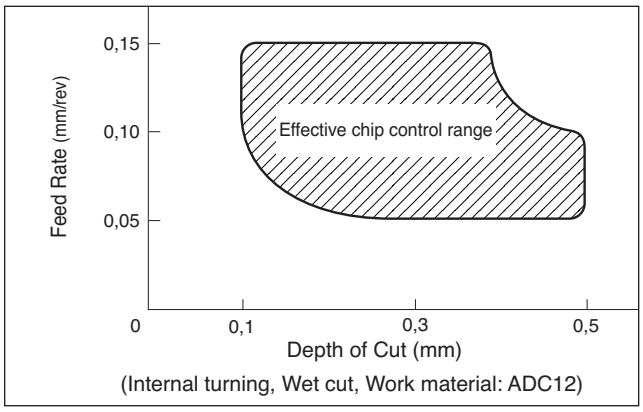
Application Range

● Triangular Type Insert (Boring)

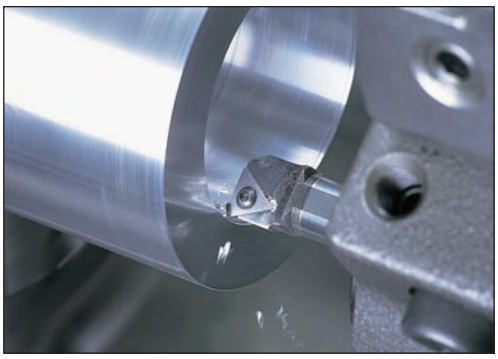


(Internal turning, Wet cut, Work material: ADC12)

● CCMT/DCMT Type (External Turning & Facing)



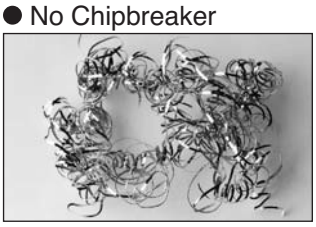
(Internal turning, Wet cut, Work material: ADC12)



Chip Control

● Break Master

● No Chipbreaker



Application

Types of holder	Cutting Conditions	Results
Work Material: AC2A-T6 Operation: Internal Boring	v_c =300 m/min f =0,06 mm/rev d_{oc} =0,35 mm Wet cut	Surface finish of the bore hole was less than Ra=1μm. Chips formed was of a uniform curl of about 2mm in length. There was almost no chips left inside the bore hole.

Recommended Conditions

● Boring (Triangular Insert)

Feed Rate	Depth of Cut	Type
~ 0.15 mm/rev.	~ 0,7 mm	Wet cut

● External Copying (55°, 80° Diamond Shaped Inserts)

Feed Rate	Depth of Cut	Type
~ 0.15 mm/rev.	~ 0,5 mm	Wet cut

For facing process, D.O.C. should be less than 0,4mm

Series

External Turning & Facing		Boring	
	CCMT 0602_ _ L/R-DM NU		TPMT 0802_ _ L/R-DM NU
	CCMT 09T3_ _ L/R-DM NU		TPMT 0902_ _ L/R-DM NU
	DCMT 0702_ _ L/R-DM NU		TPMR 1103_ _ L/R-DM NU (*)
	DCMT 11T3_ _ L/R-DM NU		TPMR 1603_ _ L/R-DM NU (*)

(*) Stock in Japan
Delivery on request

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