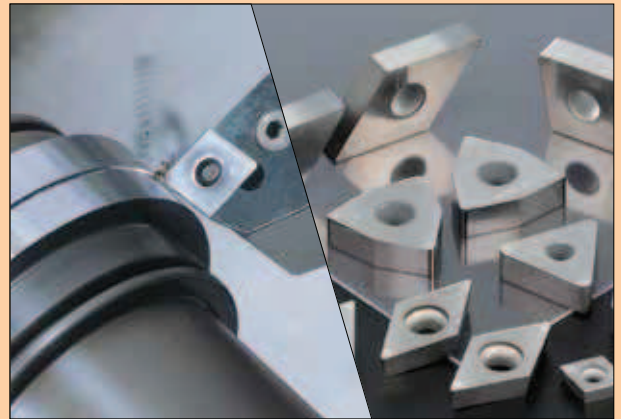


SUMIBORON SUMIDIA

L1 ~ L26



CBN Grades	SUMIBORON Series	L2
	Recommended Grades	L3
	ISO Identification	L4
Insert types and cutting edge geometries	LF / LS / HS Types	L5
SUMIBORON Chipbreaker "Break Master" Type	FV / LV & SV Types	L6
One-Use "Wiper" Insert Type	WG / WH & W Types	L7
Uncoated SUMIBORON Grades	BN1000 / BN2000	L8-9
	BN350	L13
Coated SUMIBORON Grades	BNC2010 / BNC2020 New	L10-L13
	BNC100	L14
	BNC160	L15
	BNC200	L16
	BNC300	L17
	BNC500	L18
Uncoated SUMIBORON Grades	BN7000	L19
	BN7500	L20
	BNS800	L21
SUMIBORON / SUMIDIA	Production Process	L22
SUMIDIA PCD Grades	DA1000 / DA2200 / DA150	L23
SUMIDIA Insert	NF Type	L24
SUMIDIA Chipbreaker "Break Master"	LD / GD Type New	L25
	DM Type	L26

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



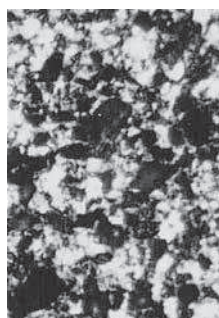
■ General

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.

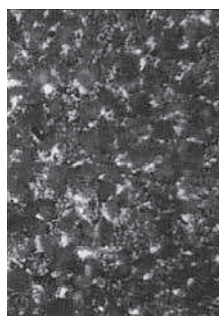
■ Types and application

Microstructure



Type	ISO	Grade	Application	Characteristic	Hardness(Hv) (GPa)	TRS (GPa)
Uncoated CBN	H	BN1000	High speed Continuous cutting	Best wear resistance grade and suitable for high speed continuous cutting	27 ~ 31	0,90 ~ 1,00
		BN2000	Continuous and Interrupted cutting	Micro-grain CBN with Ceramic binder improves fracture toughness and wear resistance	31 ~ 34	1,05 ~ 1,15
		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
		BN350	Interrupted cutting (Heavy)	Micro-grain CBN with higher fracture toughness that improves cutting edge strength	33 ~ 35	1,20 ~ 1,30
Coated CBN	H	New BNC2010	High precision continuous cutting	New generation TiCN layer improves notch wear resistance and provides an excellent surface finish.	30 ~ 32	1,10 ~ 1,20
		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
		New BNC2020	High efficiency general purpose	New coating technology offers excellent adhesion during both continuous and interrupted cut applications.	34 ~ 36	1,20 ~ 1,30
		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
		BNC500	GG and GGG machining	For Cast Iron machining with a good balance of wear and fracture resistance	32 ~ 34	1,00 ~ 1,10

Microstructure



Type	ISO	Grade	Application	Characteristic	Hardness(Hv) (GPa)	TRS (GPa)
Uncoated CBN	S PM	BN7000	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	41 ~ 44	1,25 ~ 1,35
		BN7500	High efficiency machining of powdered metal	Less burrs when machining sintered parts due to excellent edge sharpness	41 ~ 44	1,40 ~ 1,50
		K S 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

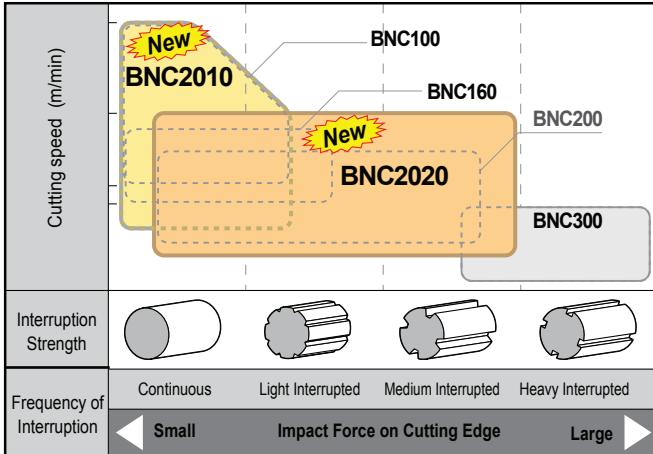
H

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



Application	Conditions	Recommended Cutting Speed (m/min)			
		100	200	300	400
Hardened Steel	General Purpos (Continuous to Light interrupted Rz = above 3,2)	BNC2020 / BNC2010		BNC200 / BNC100	
		BNC300			
	Heavy Interrupted	BNC2010			
	High Precision (Rz = 1,6 to 3,2)	BNC160			
	High Efficiency (Carburized layer removal)	BNC2020		BNC200	
Cast Iron	Ductile Cast Iron	BNC500			

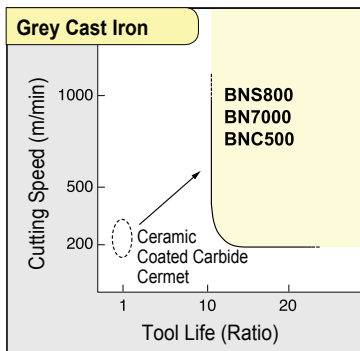
K

CAST IRON MACHINING

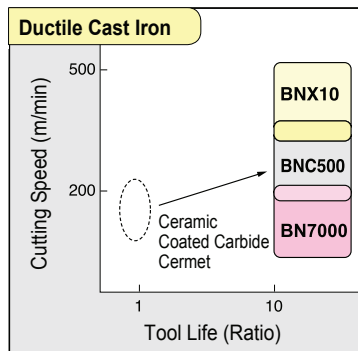
● Advantages of using CBN

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.

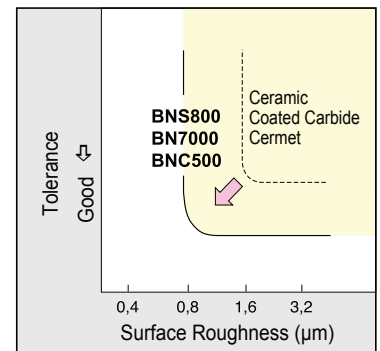
● High Speed Machining



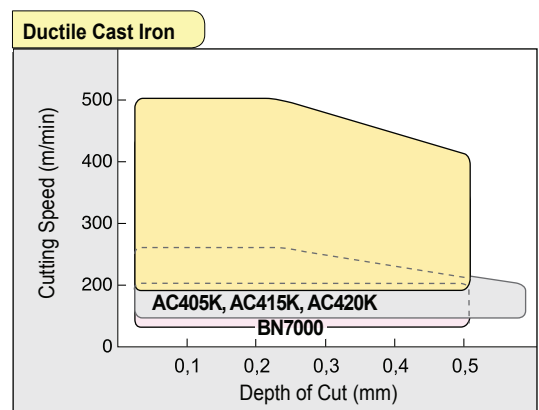
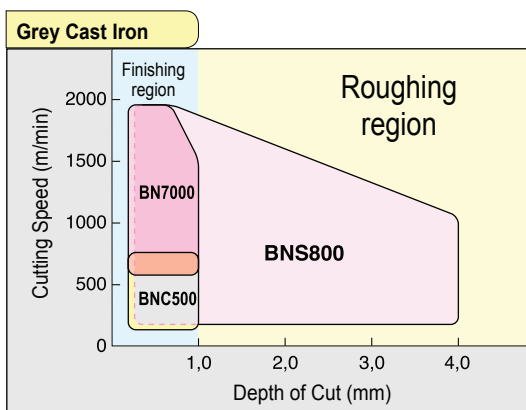
● High Speed Machining



● High Precision Machining



■ Application Range




SUMIBORON

Insert Identification

Regrindable Type

CNMA120408(-) B

①

Insert Identification
ISO  C2/C3

②

Additional Information
Table 2

Table 2, Additional Information

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

One-Use Type

CNGG 120408 N-SV NC-WG-4

①

Chip Breaker
Table 2*

*) Additional Information

Table 2*

Code	Code Description
—	Standard Type
LF	Sharp cutting edge
LS	Low cutting force
HS	Strong cutting edge
N-FV N-LV N-SV	Chipbreaker Type

②

One-Use Type
Table 3

Table 3

Code	One-Use Type	Grade
NC	Coated SUMIBORON	BNC2010, 2020 BNC100, 160 BNC200, 300 BNC500
NU	Uncoated CBN	BNX10, 20 BN1000, 2000 BN350, 700 BN7000, 7500
NS		BNX25

③

Wiper Insert
Table 4

Table 4

Code	Wiper Insert
WG	Finishing $0,05 \leq f \leq 0,20$
WH	High feed cutting $0,20 \leq f < 0,40$
W	Surface Roughness Standard: $R_z 1,6\text{--}3,2\mu\text{m}$

f : Feed Rate (mm/rev)

④

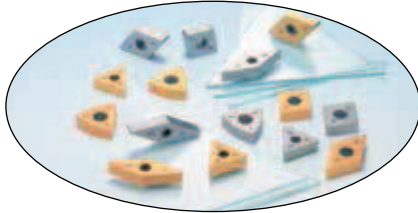
No. of Cutting Edge
Table 5

Table 5

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

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

● LF type: Sharp cutting edge

For cutting non-ferrous metals

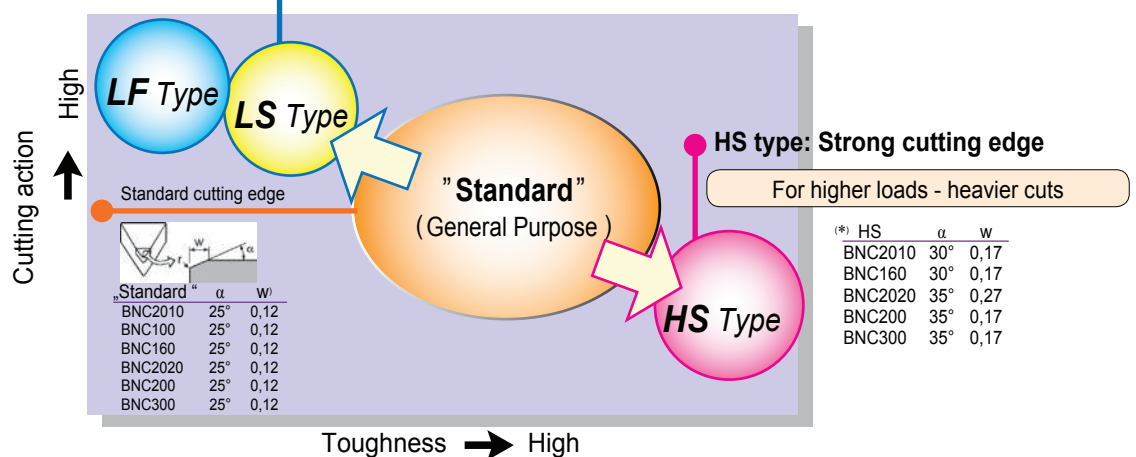
(*) LF	α	W
BN7500	0°	-

● LS type: Low cutting force (Negative land + Honing)

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

Improved surface finish

For higher dimensional accuracy

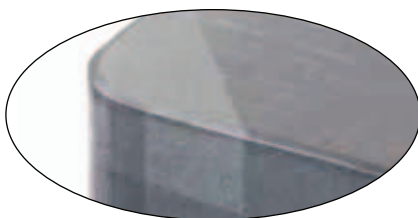


● HS type: Strong cutting edge

For higher loads - heavier cuts

(*) HS	α	W
BNC2010	30°	0,17
BNC160	30°	0,17
BNC2020	35°	0,27
BNC200	35°	0,17
BNC300	35°	0,17

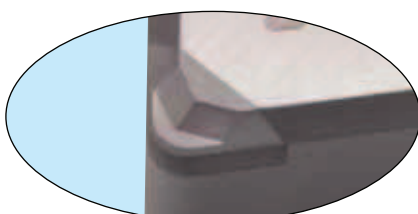
One-Use Wiper Insert



■ Characteristics

- New lineup includes:
 - WG Type ⇨ for low-feed cutting
 - WH Type ⇨ for high-feed cutting
- SUMIBORON one-use insert with wiper edge for hardened steel machining
- Excellent surface finish similar to grinding
- Improved efficiency with higher speeds and feeds

Break Master N-FV, N-LV



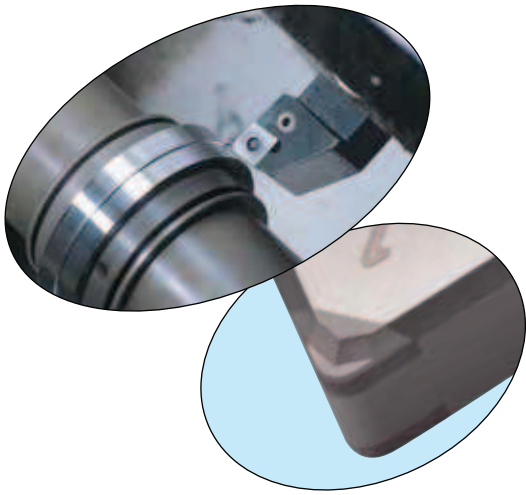
Break Master N-SV Type

■ Characteristics

- N-SV type is perfect for carburised layer removal while N-FV / N-LV types are best suited to finishing of hardened steel.
- First CBN insert to feature an integral chipbreaker
- Ideal for removing carburised layer - can be used on both hardened and unhardened materials.
- Effective chip control solution protects component from swarf damage.

SUMIBORON Insert With Chipbreaker Break Master N-FV /-LV /-SV

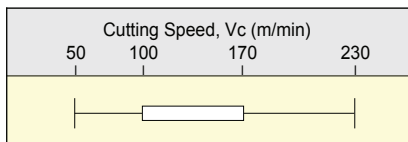
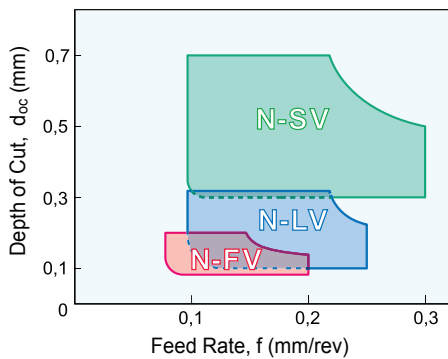
H Hardened Steel



■ Characteristics

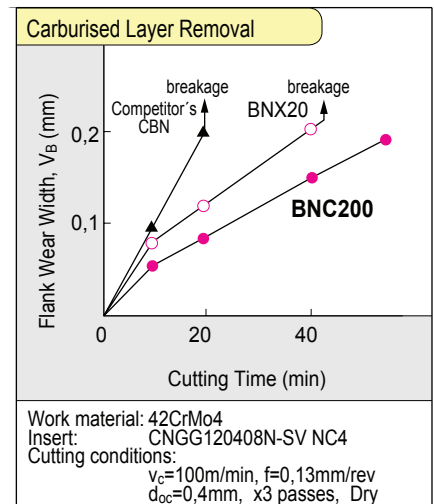
- SUMIBORON one-use insert with chipbreaker.
- N-SV type is perfect for carburised layer removal while N-FV / N-LV types are best suited to finishing of hardened steel.
- Breaker included on the CBN edge, chipbreaking effect can be maintained throughout machining process.
- Unique breaker design can be applied to both hardened and non-hardened parts with effective chip control.
- SV type lineup now includes BNC2010 / BNC160 for good wear resistance, while Coated SUMIBORON BNC2020 / BNC200 allows high efficiency machining.
- In addition to general purpose Coated SUMIBORON BNC2020 / BNC200, the N-FV / N-LV type lineup includes BNC2010 / BNC160 for excellent wear resistance and general purpose uncoated SUMIBORON BN2000.

■ Application Range



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

■ Cutting Performance



- Stable tool life with BNC200

■ Application Examples

External Carburised Layer Removal

Break Master N-SV
Tool life = 200pcs

BNC200 (no breaker)
Tool life = 200pcs

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

No constant stopages or incorrect part dimension problem and the chips are small.
Double the tool life of competitor's CBN

Work material: 42CrMo4, Carburised steel (shaft)
Insert: CNGG 120408 N-SV NC4 (BNC200)
Conditions: $v_c=150$ m/min, $f=0,15$ mm/rev, $d_{oc}=0,5$ mm, x 2 passes, Wet

Carburised Face Layer Removal

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

Break Master N-SV: No chip control problem (relative productivity 1.5)
No breaker: Constant chip control problem (relative productivity 1.0)

No. of pcs / unit of time (relative)

Work material: 42CrMo4 (HRC30-62)
Insert: CNGG 120408 N-SV NC4 (BNC200)
Conditions: $v_c=140$ m/min, $f=0,15$ mm/rev, $d_{oc}=0,3$ mm, Wet

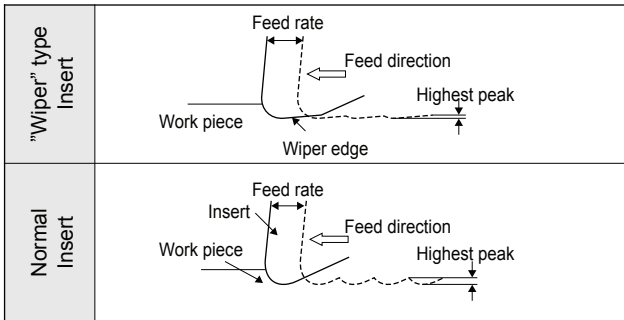


■ Characteristics

- SUMIBORON one-use insert with wiper edge for hardened steel machining
- Excellent surface finish similar to grinding
- Improved efficiency with higher speeds and feeds
- New lineup includes:
 - WG** type ⇨ for low-feed cutting
 - WH** type ⇨ for high-feed cutting



■ Purpose of Wiper Edge



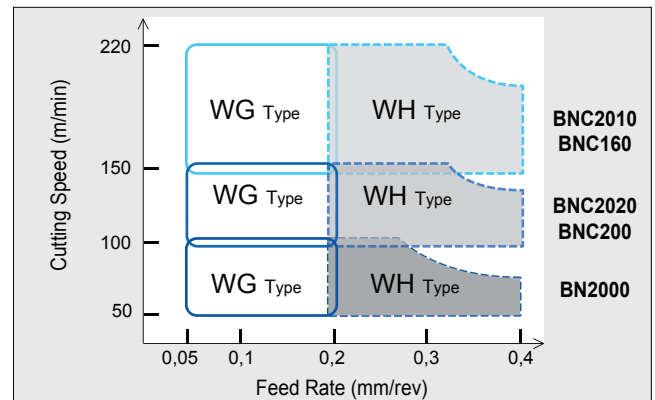
■ Surface Roughness of Wiper Insert

	"Wiper" Insert (r=0,8)		Standard Insert (r=0,8)	
	Finishing (f=0,10mm/rev)	High feed cutting (f=0,30mm/rev)	Finishing (f=0,10mm/rev)	High feed cutting (f=0,30mm/rev)
Surface Roughness Profile	WG Type	WH Type		
Surface Roughness Rz	0,63µm	1,39µm	1,98µm	9,20µm

■ Recommended Cutting Conditions (Surface Roughness Standard: $R_z = 1,6 \sim 3,2\mu\text{m}$)

- 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.

Two types are available depending on the feed rate:
WG type: Recommended feed rate: less than $f \leq 0,20\text{mm/rev}$
WH type: Recommended feed rate: more than $f \geq 0,20\text{mm/rev}$
 Range of good surface roughness: $R_z=1,6\mu\text{m}$ to $3,2\mu\text{m}$
 Available grades: BN2000, BNC2010, BNC160, BNC2020, BNC200

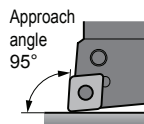


■ Tool-Setup WG / WH Wiper

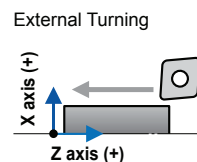
CNGA / CCGW / WNGA Type Wiper

1. Use a holder with a 95° approach angle.
2. Tool **compensation** required.

CNGA / CCGW / WNGA type wiper inserts do not follow the ISO standard. Correction of the tool offset of the cutting edge as explained on the right.



Cutting Edge Position Compensation, Outer Processing



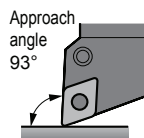
Nose Radius	Type	X-Direction	Z-Direction
R0,4	WG	-0,02	-0,02
	WH	-0,06	-0,06
R0,8/R1,2	WG	-0,01	-0,01
	WH	-0,06	-0,06

DNGA / DCGW Type Wiper

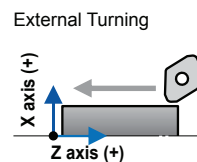
1. Use a holder with a 93° approach angle.
2. Tool **compensation** required.

DNGA / DCGW type wiper inserts do not follow the ISO standard. Correction of the tool offset of the cutting edge as explained on the right.

Note: DNGA/DCGW type wiper inserts are only possible for external and internal turning, not for facing.



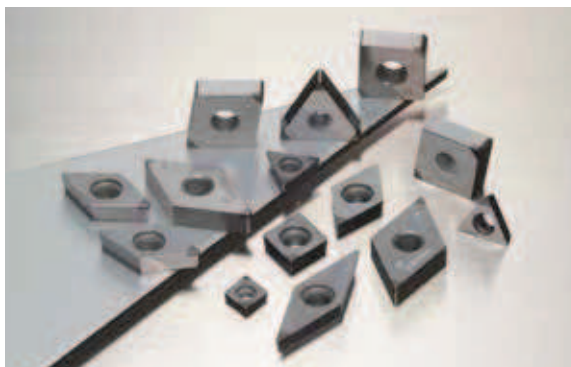
Cutting Edge Position Compensation, Outer Processing



Nose Radius	Type	X-Direction	Z-Direction
R0,4	WG	-0,17	-0,01
	WH	-0,70	-0,06
R0,8	WG	-0,05	0
	WH	-0,58	-0,05

Uncoated SUMIBORON BN1000/BN2000

H Hardened Steel



Uncoated CBN grades for hardened steel machining

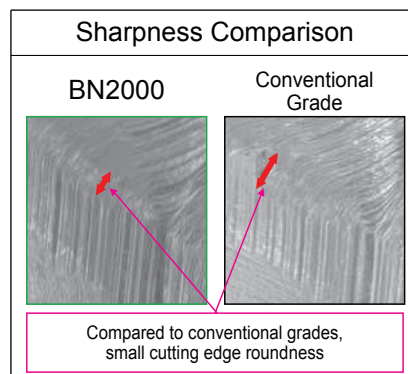
General Features

A new uncoated type of SUMIBORON that has a newly developed high-purity ceramic binder. Both fracture and wear resistance are combined to achieve a stable tool life in a wide variety of hardened steel machining.

Available in single corner and multi-corner type inserts.

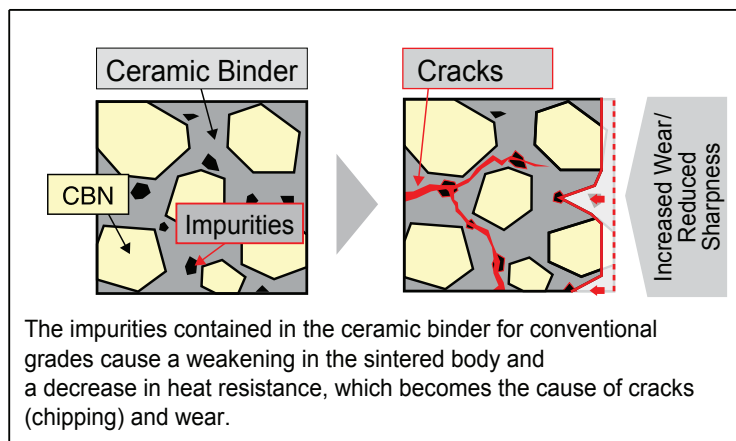
Characteristics

- **BN1000** - Superior high-speed machining grade with the highest wear resistance of any uncoated SUMIBORON.
Delivers excellent tool life in continuous cutting to light-interrupted cutting.
- Improved fracture resistance while also emphasizing wear resistance.
Improved hardness and heat resistance from the high-purity TiCN ceramic binder.
- **BN2000** - General purpose grade suitable for typical hardened steel machining applications.
Provides stable tool life in everything from continuous cutting to light-to-medium interrupted cutting.
- High degrees of both fracture resistance and wear resistance.
Significant improvements in the performance of both by employing a high-purity ceramic binder.
- Stable surface roughness by increasing sharpness (Figure on right).

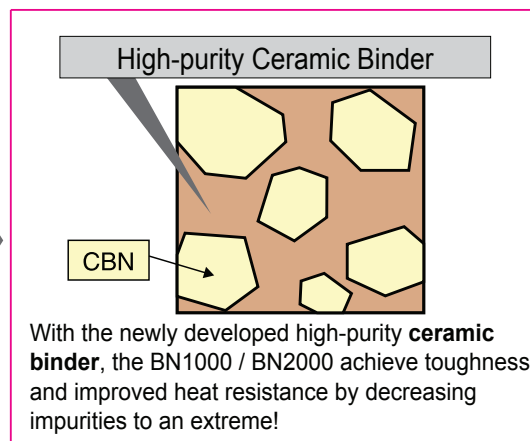


Newly Developed High-Purity Ceramic Binder

Conventional Grade

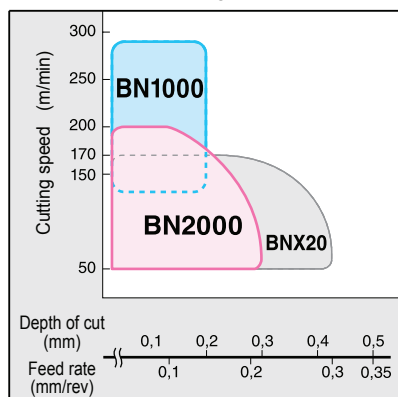


BN1000 / BN2000

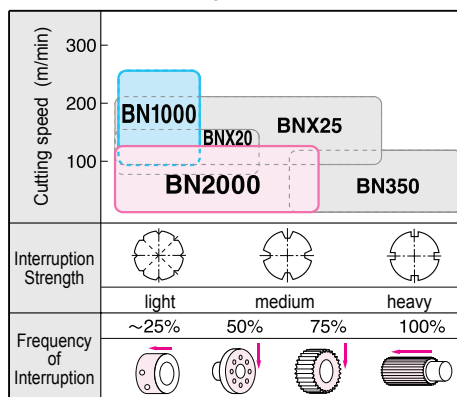


Recommended Application Range

Continuous Cutting



Interrupted Cutting



Cutting Conditions

BN1000

v_c (m/min)	f (mm/rev)	d_{oc} (mm)
100 150 200 250 300		
120	0,03-0,15	0,03-0,2

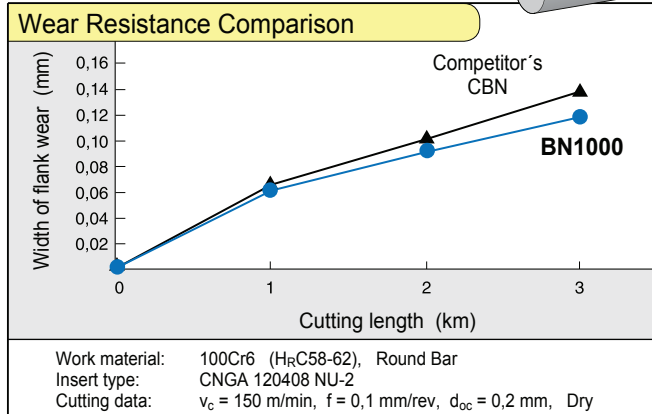
BN2000

v_c (m/min)	f (mm/rev)	d_{oc} (mm)
50 100 150 200 250		
80 120	0,03-0,2	0,03-0,3

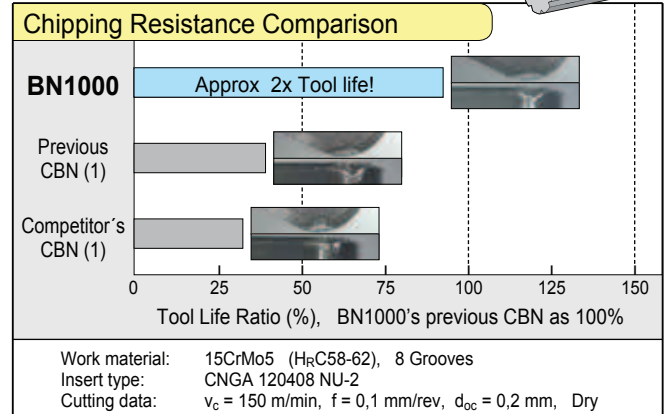
* Coolant ... Continuous cutting: Dry or Wet
Interrupted cutting: Dry

■ Cutting Performance

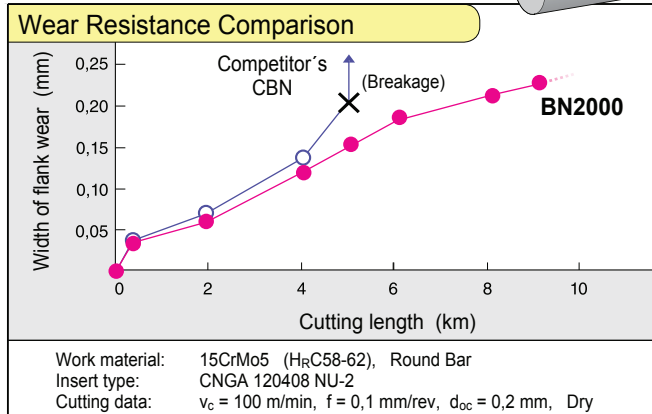
● **BN1000**



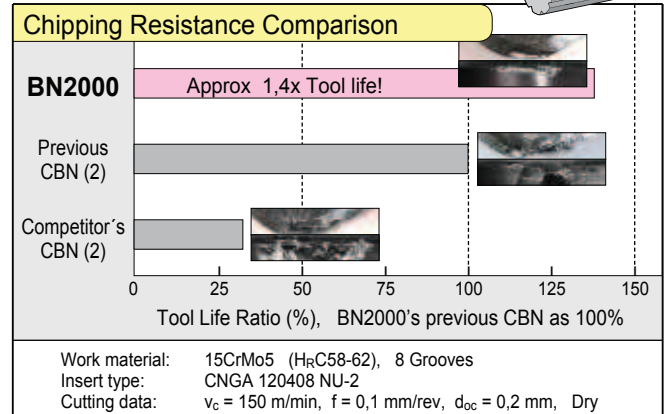
● **BN1000**



● **BN2000**

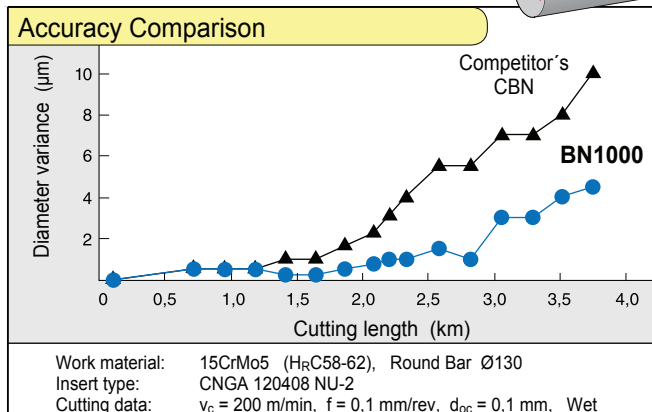


● **BN2000**

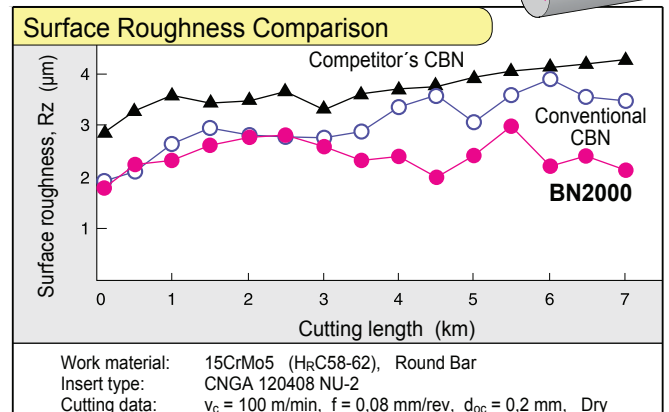


■ Machining Precision

● **BN1000**



● **BN2000**



Coated SUMIBORON Characteristics

H Hardened Steel



BNC2010

BNC2020



BNC100

BNC160

BNC200

BNC300

BNC500

New Coated SUMIBORON Series, achieving higher speed, higher efficiency and higher precision.

General Features

Using a high heat resistant and tough CBN substrate coupled with a special ceramic coating, this series caters to a wide variety of applications with improved precision and longer tool life as compared to conventional CBN.

There is a comprehensive lineup of economical and easy-to-use insert selection, such as the cost effective double-sided, multi-cornered, one-use type inserts.

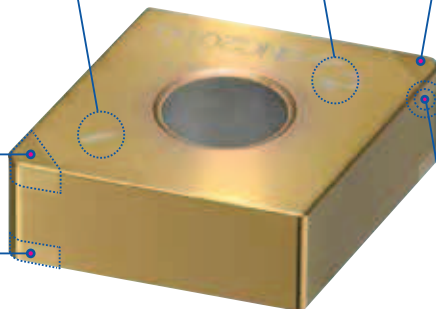
BNC2010 and BNC2020 are the latest additions to the Coated SUMIBORON series, to provide even better stability and longer tool life for hardened steel machining.

Characteristics

Double sided, Multi-cornered One-use Insert
More cost effective than conventional one-use inserts.

Easy Edge Management
Numbering of cutting edges.

Strong Brazing
Utilizing a new brazing method with improved strength.



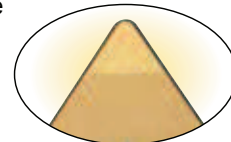
Special Ceramic Coating and Newly Developed CBN Substrate
Provides longer tool life.

Cutting Performance

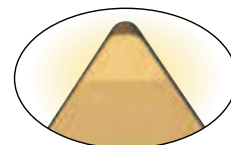
Application		Conditions	Recommended Cutting Speed (m/min)			
			100	200	300	400
Hardened Steel	Finishing	General Purpos (Continuous to Light interrupted Rz = above 3,2)	BNC2020 / BNC2010		BNC200 / BNC100	
		Heavy Interrupted	BNC300			
		High Precision (Rz = 1,6 to 3,2)	BNC2010		BNC160	
	High Efficiency (Carburized layer removal)	BNC2020		BNC200		
Cast Iron	Ductile Cast Iron	BNC500				

Cutting Edge Management

Before use

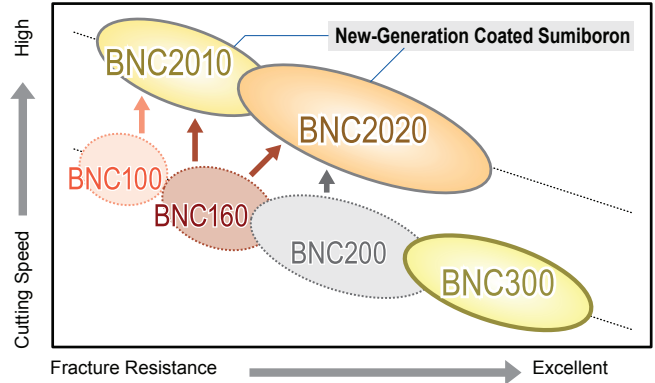
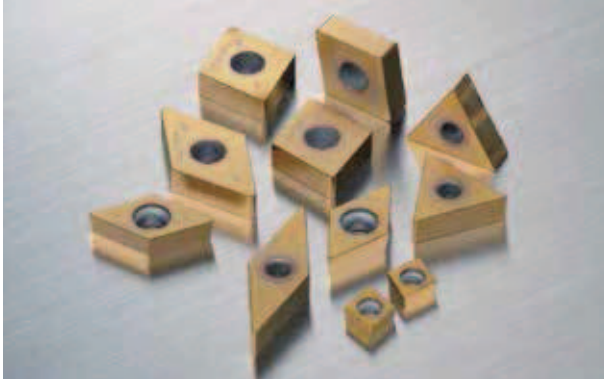


After use



The edge numbers are still visible after machining, which makes the management of used cutting edges easy.

BNC2010 and BNC2020 are coated in gold, which makes it easy to distinguish used edges.

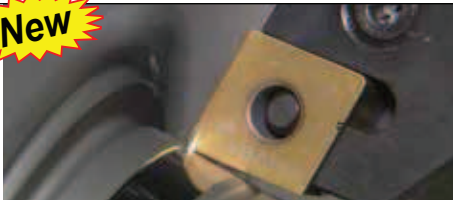


Characteristics of Grades

BNC2010



Carbon Content: 50~55%
Grain Size: 2 μ m
Hardness HV: 30~32GPa
TRS: 1,10~1,20GPa
Main Coating Components: Multi-layered TiCN
Coating Thickness: 1,5 μ m



High Precision Machining

Newly developed CBN substrate with high crater wear resistance coated with special multi-layered TiCN, which exhibits excellent notch wear resistance. Ideal for finishing of hardened steel requiring excellent accuracy or surface roughness. Able to stably maintain 1,6R_z finishing.

BNC2020



Carbon Content: 70~75%
Grain Size: 5 μ m
Hardness HV: 34~36GPa
TRS: 1,20~1,30GPa
Main Coating Components: Multi-layered TiAlN
Coating Thickness: 1,5 μ m



General and High Efficiency Cutting

Newly developed tough CBN substrate with highly wear resistant TiAlN coating. Provides improved stability by inserting a highly adhesive layer between the substrate and the TiAlN layer. Ideal for general machining including finishing and interrupted cutting as well as high-efficiency machining such as carburised layer removal.

BNC100

Carbon Content: 40~45%
Grain Size: 1 μ m
Hardness HV: 29~32GPa
TRS: 1,05~1,15GPa
Main Coating Components: TiAlN/TiCN
Coating Thickness: 2,5 μ m



High Speed Cutting

BNC160

Carbon Content: 60~65%
Grain Size: 3 μ m
Hardness HV: 31~33GPa
TRS: 1,10~1,20GPa
Main Coating Components: TiAlN/TiCN
Coating Thickness: 2,0 μ m



High Precision Machining

BNC200

Carbon Content: 65~70%
Grain Size: 4 μ m
Hardness HV: 33~35GPa
TRS: 1,15~1,25GPa
Main Coating Components: TiAlN
Coating Thickness: 2,0 μ m



General and High Efficiency Cutting

BNC300

Carbon Content: 60~65%
Grain Size: 1 μ m
Hardness HV: 33~35GPa
TRS: 1,15~1,25GPa
Main Coating Components: TiAlN
Coating Thickness: 1,0 μ m

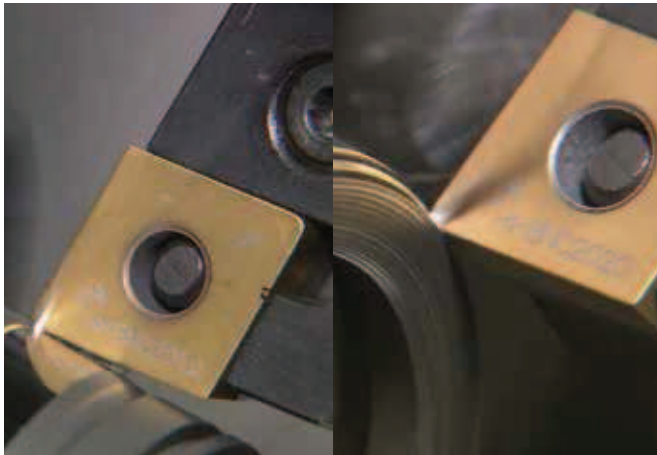


Heavy Interrupted Cutting

Recommended Cutting Conditions

Grade	Cutting Speed v_c (m/min)								
	50	100	(120)	150	(180)	200	(220)	250	300
BNC2010									
BNC2020									
BNC300									
BNC100									
BNC160									
BNC200									

Grade	Feed Rate (mm/rev)		Depth of Cut (mm)			
	0	0,1	0,2	0,3	0,4	0,5
BNC2010	0,03	0,03	0,25			0,35
BNC2020	0,03	0,03	0,40			0,50
BNC300	0,03	0,03	0,20			0,30
BNC100	0,03	0,03	0,20			0,30
BNC160	0,03	0,03	0,20			0,35
BNC200	0,05	0,05	0,35			0,50



Characteristics

BNC2010 - High Precision

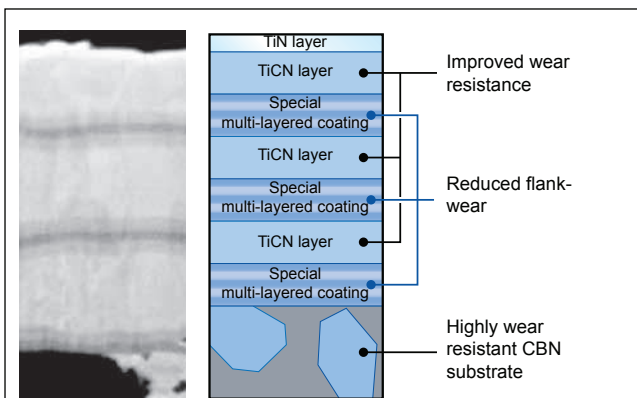
A grade for high-precision machining applicable for finishing requiring good surface roughness and dimensional accuracy. Provides further improved wear resistance thanks to a newly developed CBN substrate coated with a TiCN layer. Reduces flank wear and achieves excellent surface finish thanks to newly developed special stable multi-layered coating.

BNC2020 - General Purpose & High Efficiency

A general-purpose grade applicable to general hardened steel machining. A newly developed tough CBN-substrate coated with a highly wear-resistant TiAlN layer. Achieves more stable machining and longer tool life by employing a highly adhesive layer for high chipping resistance.

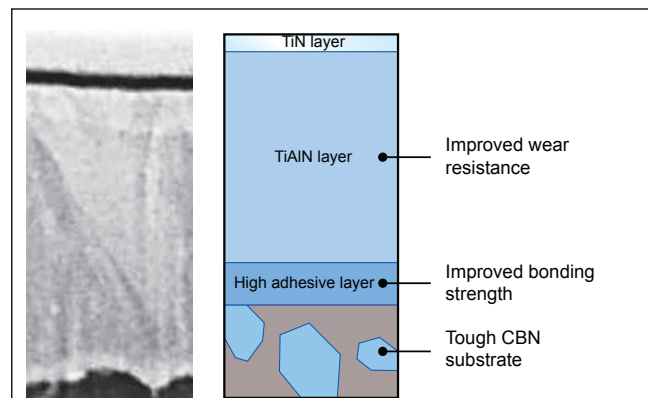
CBN-Substrate and Coating Structure of BNC2010 and BNC2020

BNC2010



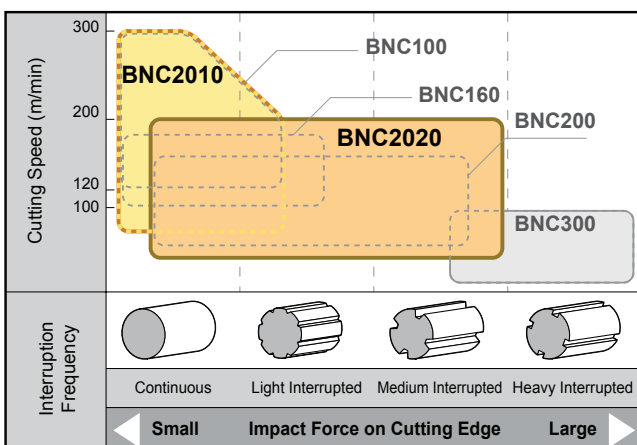
Achieves excellent flank wear resistance thanks to a laminated structure of a TiCN-layer and special multi-layer coating.

BNC2020



Achieves further stability thanks to TiAlN coating layers with high bonding strength.

Application Range



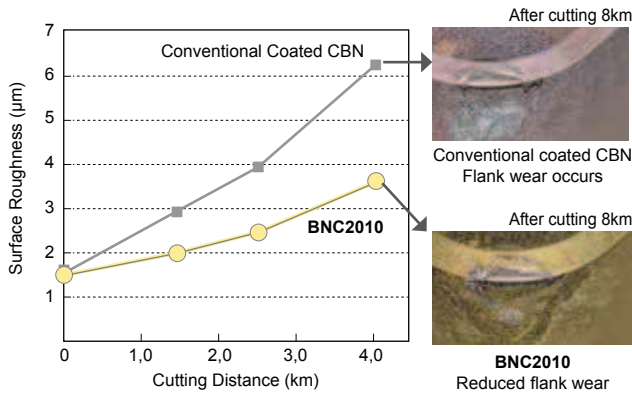
Recommended Cutting Conditions

BNC2010		BNC2020	
Cutting Speed (m/min)		Cutting Speed (m/min)	
120	150	200	250
120 150 200 250 300		50 100 150 200 220	
Feed Rate (mm/rev)		Depth of Cut (mm)	
0,03 ~ 0,25		0,03 ~ 0,35	
0,03 ~ 0,40		0,03 ~ 0,50	



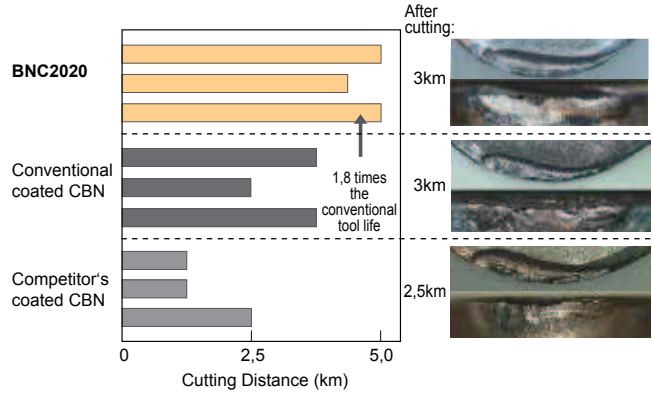
Cutting Performance

BNC2010



Work Material: 15CrMo5, 58-62HRC, Continuous
 Insert: DNGA150408NC4 (BNC2010)
 Cutting Edge Treatment: S01225
 Cutting Conditions: $v_c=160\text{m/min}$, $f=0,08\text{mm/rev}$, $a_p=0,1\text{mm}$, Wet

BNC2020

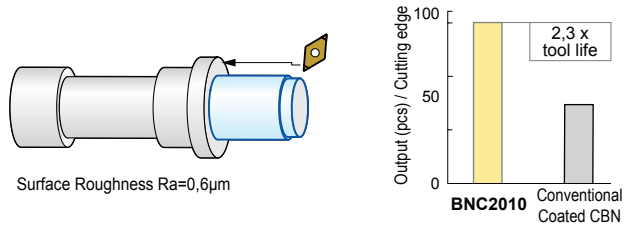


Work Material: SCM415-5V, 58-62HRC, Interrupted
 Insert: CNGA120412NC4 (BNC2020)
 Cutting Edge Treatment: S01225
 Cutting Conditions: $v_c=130\text{m/min}$, $f=0,1\text{mm/rev}$, $a_p=0,6\text{mm}$, Dry

Application Example

Continuous External Turning of Main Shaft

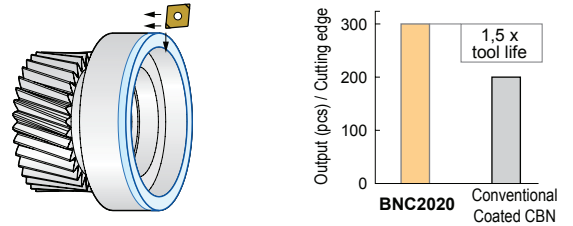
BNC2010 provides excellent wear resistance and achieves excellent surface roughness.



Insert: DNGA150408NC4 (BNC2010)
 Cutting Conditions: $v_c=200\text{m/min}$, $f=0,10\text{mm/rev}$, $a_p=0,35\text{mm}$, Dry

Carburised Layer Removal for Sun Gears

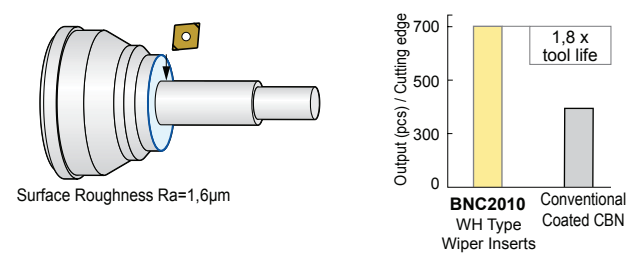
BNC2020 achieves a longer tool life in high load cutting.



Insert: DNGA120408NC4 (BNC2020)
 Cutting Conditions: $v_c=100\text{m/min}$, $f=0,15\text{mm/rev}$, $a_p=0,5\text{mm}$, Wet

Facing of CVJ Outer Race

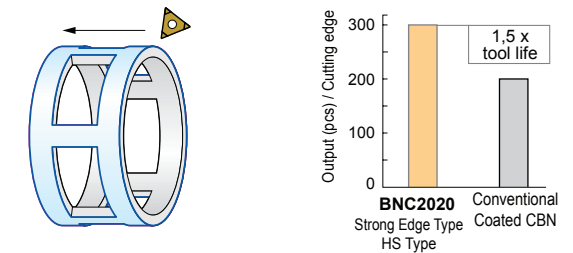
BNC2010 with a WH type wiper insert maintains excellent surface finish for an extended time.



Insert: CNGA120412NCWH2 (BNC2010)
 Cutting Conditions: $v_c=150\text{m/min}$, $f=0,2\text{mm/rev}$, $a_p=0,2\text{mm}$, Dry

Interrupted Machining of CVJ Cage Window

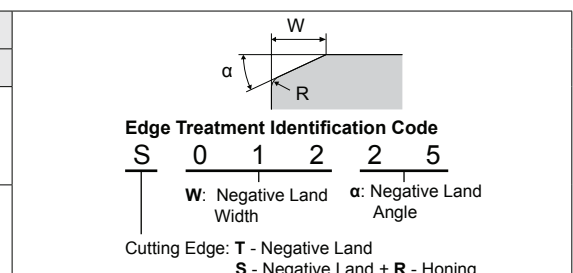
BNC2020 strong edge HS type provides stable performance in interrupted cutting.



Insert: TNGA160420HSNC3 (BNC2020)
 Cutting Conditions: $v_c=120\text{m/min}$, $f=0,10\text{mm/rev}$, $a_p=0,15\text{mm}$, Dry

Cutting Edge Preparation

Grade	General Edge Treatment	Strong Edge Type: HS
	Edge Treatment	Edge Treatment
BNC2010	S01225	S01730
BNC2020	S01225	S02735



SUMIBORON

Coated Sumiboron premium grade for high speed machining of hardened steels



General Features

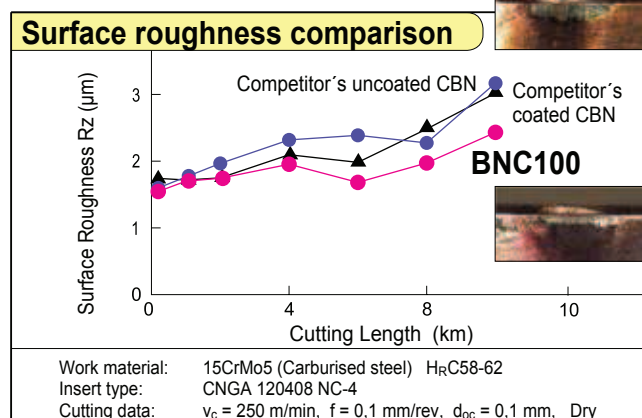
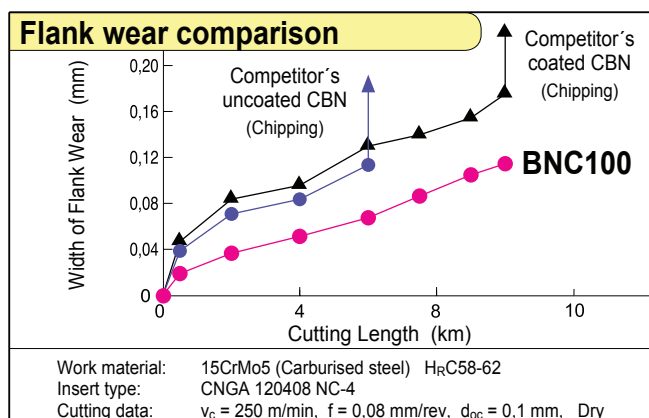
Our copper coloured Sumiboron grade BNC 100 resists premature plastic deformation of the cutting edge by withstanding the high temperatures that occur when machining hardened steels. This new grade features a heat resistant CBN substrate and a special TiCN based ceramic coating to enhance surface finish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

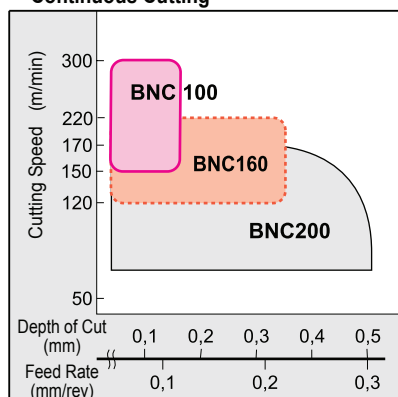
- High speed machining!**
 Suitable for continuous to light interrupted high speed cutting with $v_c = 150 \sim 300$ m/min.
- Extended tool life!**
 Wear resistant ceramic coating and tough CBN substrate considerably extends tool life.
- Excellent surface finish!**
 A consistent surface finish to values less than 6,3 Rz is easily achieved on both continuous and light interrupted cut applications.

Performance

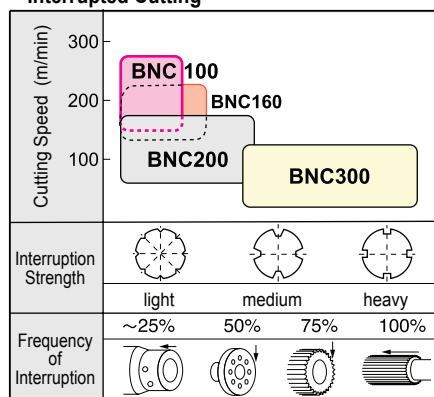


Application Range

Continuous Cutting



Interrupted Cutting



Recommended Cutting Conditions

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

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

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 based 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**

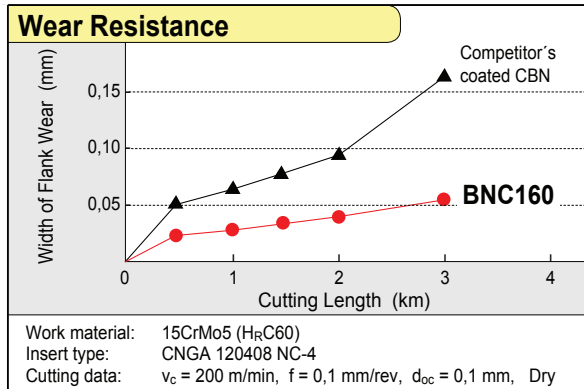
High precision work previously ground, can now be turned.

● **Enlarged scope of application!**

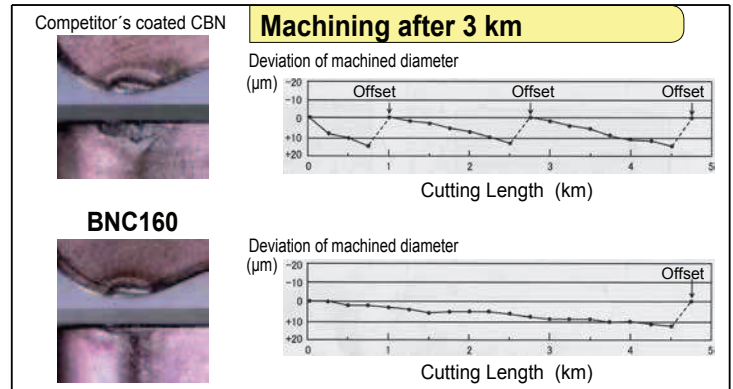
A wider range of hardened steels can be cut using Sumiboron the result being high productivity on close tolerance machining applications.

■ Performance

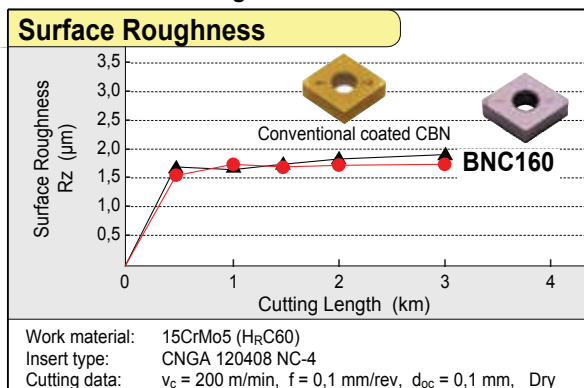
● Continuous Cutting



● Machining Accuracy



● Continuous Cutting



■ Recommended cutting Conditions

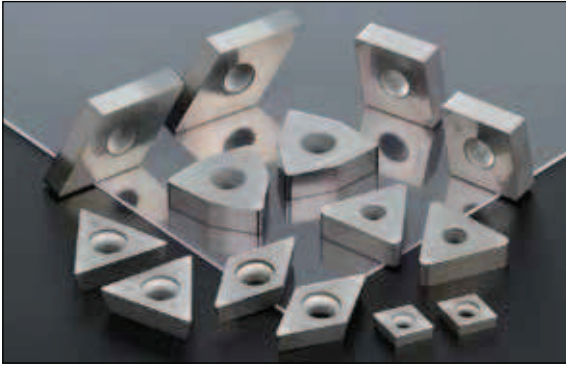
v _c (m/min)					f (mm/rev)	d _{oc} (mm)
120	150	200	220	250		
----- ----- ----- -----					0,03-0,2	0,03-0,35

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 !

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.

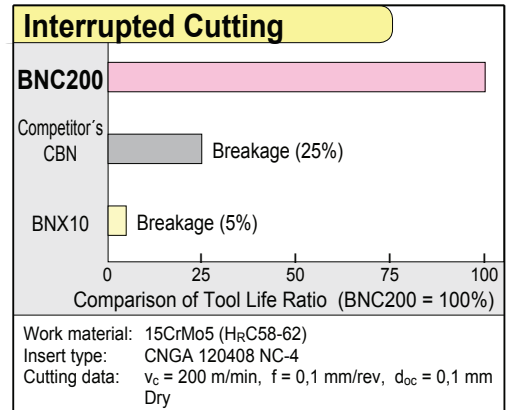
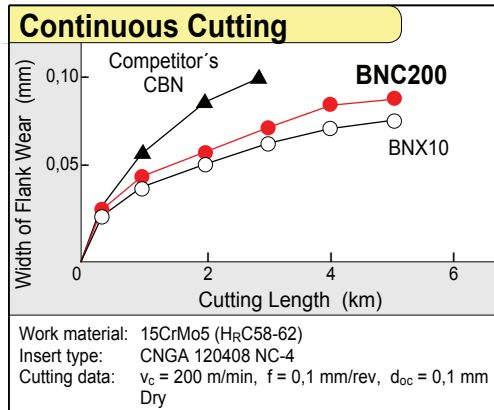
The newly developed cutting material with enhanced edge strength is coated with TiAlN based ceramic for excellent wear resistance and realises extended tool life even when interrupted cutting.

This grade is especially suitable for medium speed machining of carburised surfaces.

Advantages

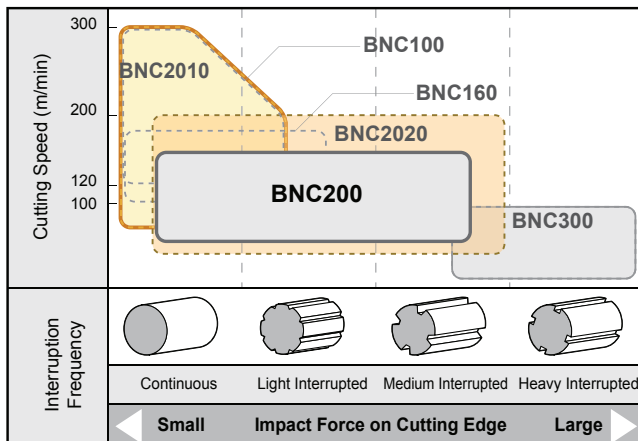
- **Predictable tool life!**
Extended tool life is realised even when high speed cutting thanks to excellent wear resistance.
- **Wide range of applications!**
Sumiboron is suitable for a wide range of applications eg. from low to high speed interrupted cutting.
- The newly developed brazing technology 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



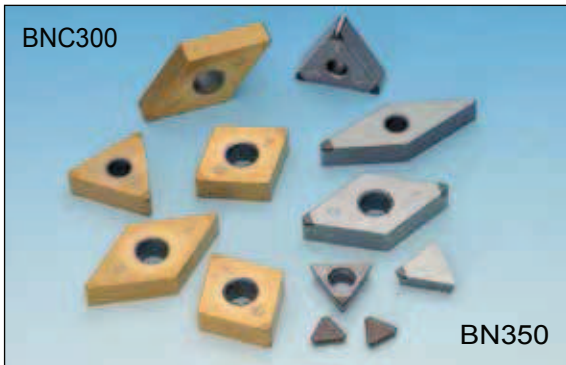
Recommended Cutting Conditions

v _c (m/min)	f (mm/rev)	d _{oc} (mm)
50 80 170 220	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.

The ultimate grades BNC300 and BN350 in interrupted machining of hardened steel



General Features

- **BNC300**
Newly developed CBN substrate that emphasizes on toughness coupled with a highly wear resistant TiAlN based coating layer that has improved adhesion strength. With a good balance of fracture and wear resistance, stable and longer tool life can be achieved in interrupted cut or in a mixture of continuous and interrupted cutting.
- **BN350**
SUMIBORON series highest fracture resistance and toughest CBN. Reliable grade for achieving stable tool life in heavy interrupted cutting conditions.

Characteristics

BNC300 ● Stable and long tool life in interrupted cutting

Achieving stable and long tool life in heavy interrupted cutting, with superior fracture resistance.

● **Superior dimensional precision**

Good adhesion strength, TiAlN based, high wear resistance coating. Achieving superior dimensional precision even in interrupted cutting.

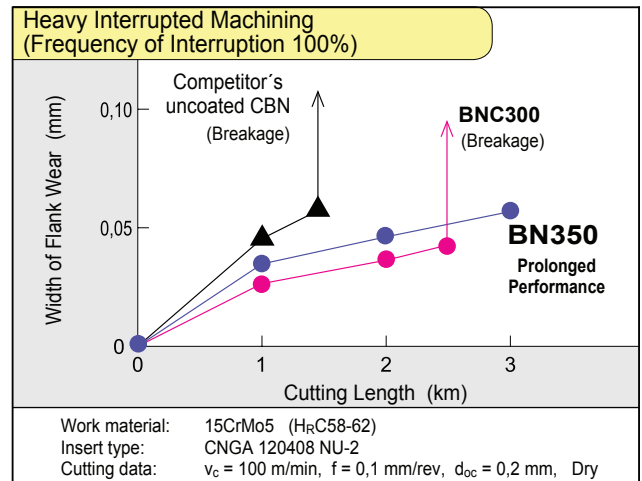
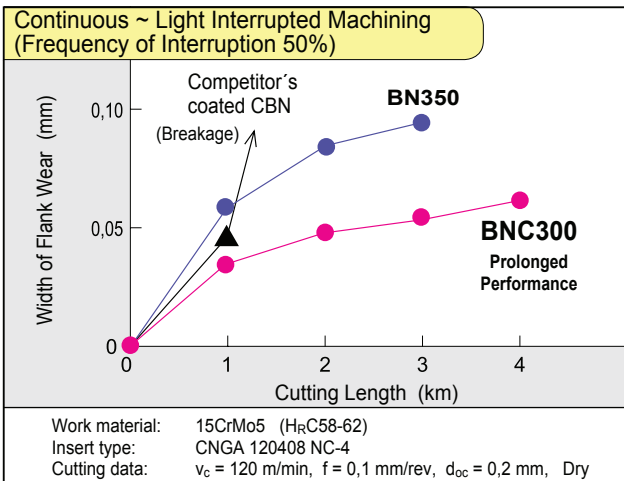
● **Suitable for different types of workpieces**

Achieving significantly longer tool life even on workpieces that have a mixture of continuous and interrupted cutting.

BN350 ● Stable and long tool life in interrupted cutting

Stable and long tool life with superior fracture resistance, that prevents fractures which commonly occurs during interrupted cutting.

Performance



Recommended Application Range

● **Coated SUMIBORON**

Cutting speed (m/min)	Application Range		
	light	medium	heavy
300	BNC 100	BNC 160	BNC 200
200	BNC 100	BNC 160	BNC 200
100	BNC 100	BNC 160	BNC 200
	BNC300		
Frequency of Interruption	~25%	50%	75%
Frequency of Interruption	~25%	50%	75%

● **Uncoated SUMIBORON**

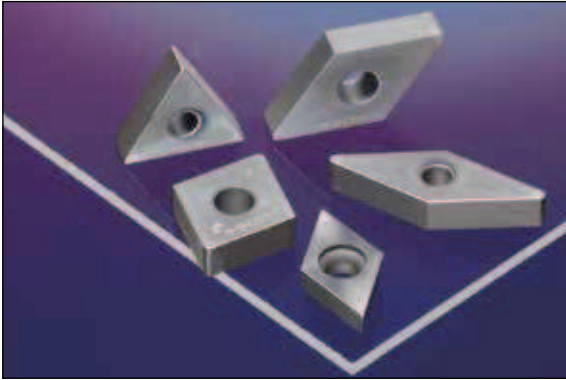
Cutting speed (m/min)	Application Range		
	light	medium	heavy
300	BN1000	BNX25	BN2000
200	BN1000	BNX25	BN2000
100	BN1000	BNX25	BN2000
	BN350		
Frequency of Interruption	~25%	50%	75%
Frequency of Interruption	~25%	50%	75%

Recommended Cutting Conditions (BNC300, BN350)

v _c (m/min)	f (mm/rev)	d _{oc} (mm)
50	80	0,03-0,2
100	120	0,03-0,3
150		
200		

● **Coolant ... Interrupted cutting: Dry**

Coated CBN grade for ductile cast iron machining

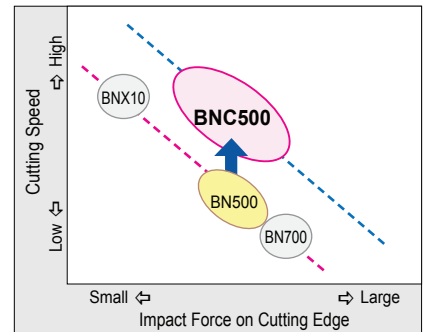


General Features

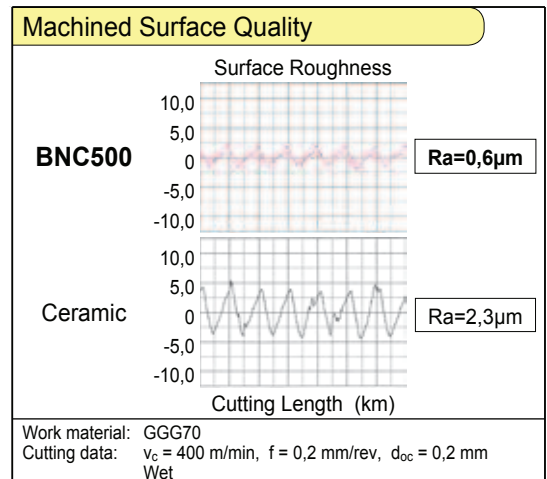
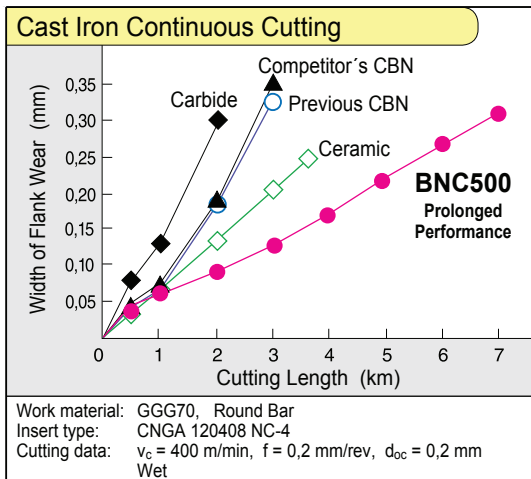
Further improvements in the toughness of the sintered CBN and wear resistance from the application of a newly developed high-purity TiC binder. In addition, it demonstrates exceptional wear resistance by combining a ceramic coating with excellent heat resistance. High-speed and high-precision machining is achieved when finishing ductile cast iron. It also provides a long, stable tool life in machining high-strength ductile cast iron, special cast irons such as vermicular cast iron, and centrifugal cast iron.

Characteristics

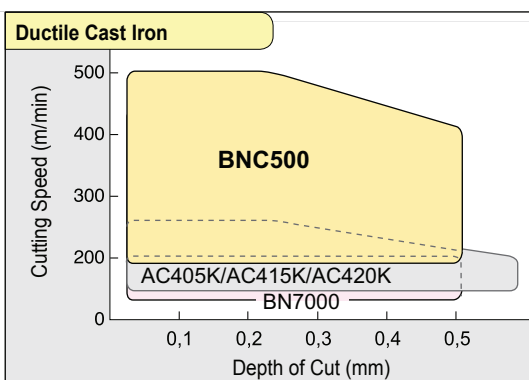
- **Achieves a Long, Stable Tool Life at $v_c=400$ m/min**
Superior wear resistance, makes stable machining possible under high-speed conditions.
- **Supports High-precision Machining**
Can maintain excellent dimensional tolerance and surface roughness.



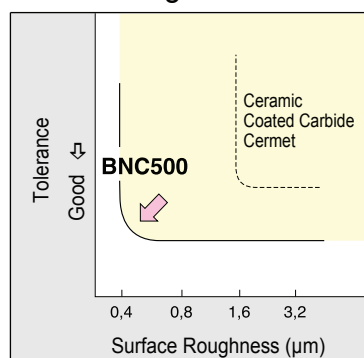
Cutting Performance



Application Range



High Precision Machining

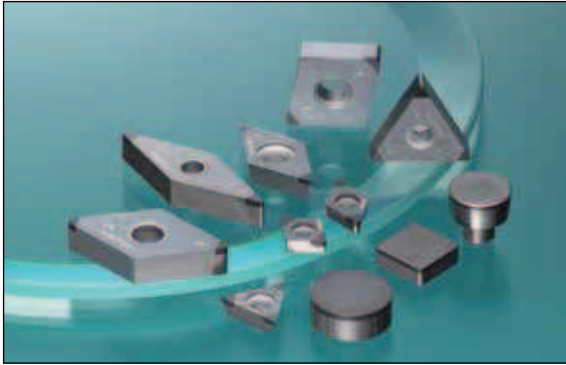


Recommended Cutting Conditions

v_c (m/min)	
100	200
f (mm/rev)	d_{oc} (mm)
0,1 - 0,4	0,03 - 0,5

* Coolant ... Wet

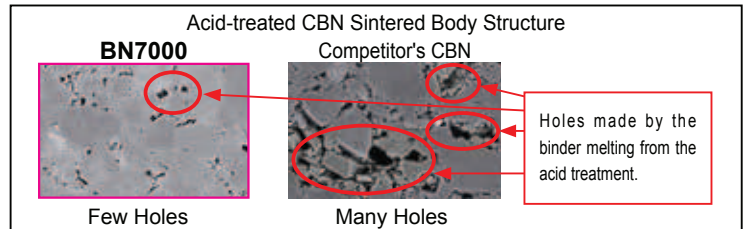
Uncoated CBN grade for high-speed finishing of cast iron, powdered metals, and difficult-to-machine materials!



General Features

Medium-grain CBN sintered to a high density to achieve the maximum content percentage.

Also delivers superior fracture resistance by increasing the binding strength between CBN particles. Provides stable, long tool life for high-speed finishing work with cast iron, powdered metals, and difficult-to-machine materials.



Characteristics

● Excellent for high speed finishing of Cast Iron!

Good wear and fracture resistance in high speed machining of Grey Cast Iron.

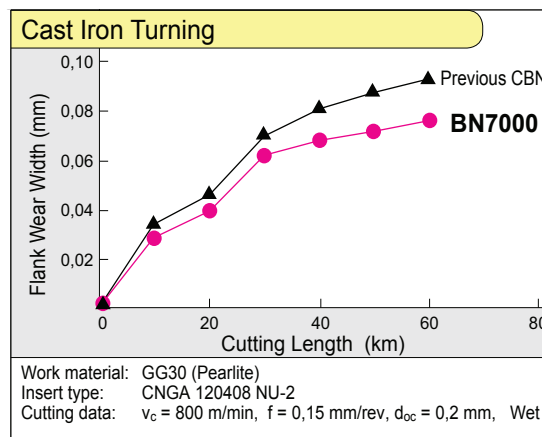
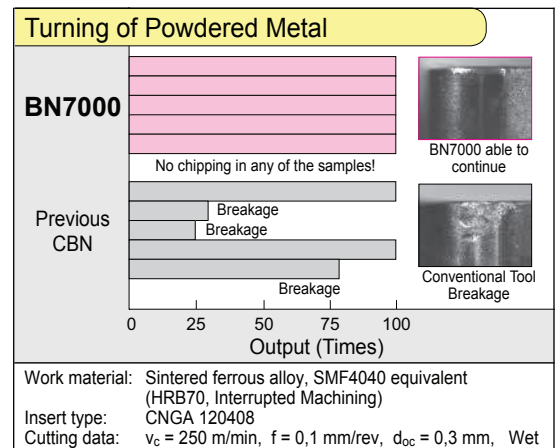
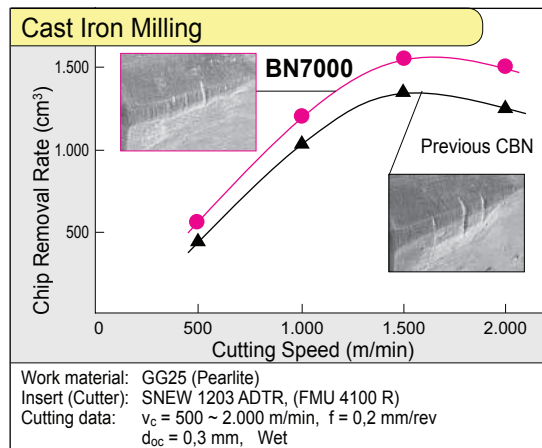
● High efficiency machining of powdered metal

With 4 different types of edge treatment, stable and long tool life can be achieved from machining of Sintered Alloys of any shape or hardness.

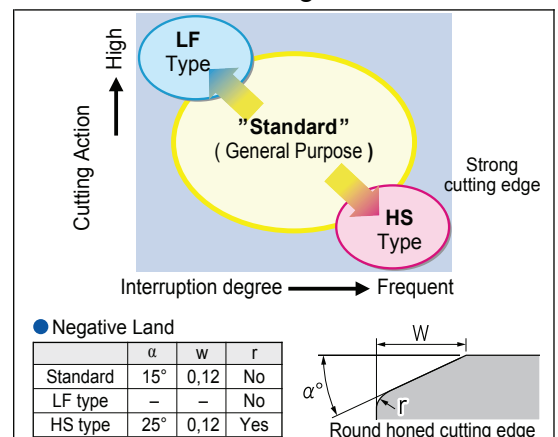
● Able to machine any Exotic Metals.

Long tool life can also be achieved for the machining of exotic materials such as Roll, HSS and Heat-Resistive Alloy etc.

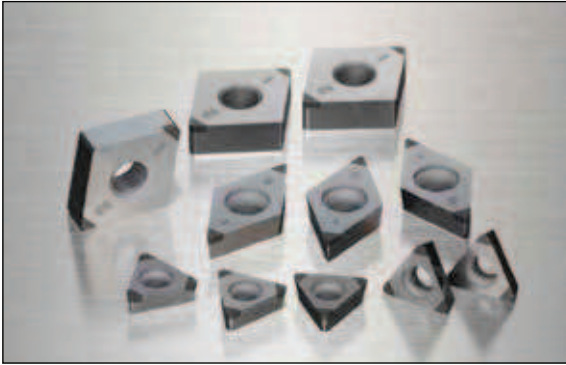
Cutting Performance



Recommended Edge Treatment

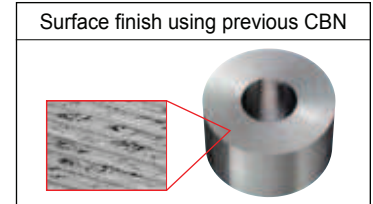
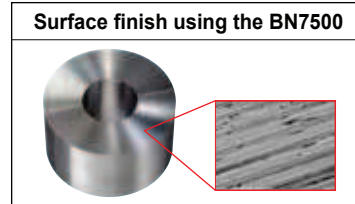


Uncoated CBN grade for high precision and high efficiency machining of powdered metal



General Features

High density sintered material made of micro-grained CBN grains provide excellent sharpness and wear resistance for high quality surfaces in sintered alloy finishing.



The previous CBN left white blanches on the finished surface whereas the BN7500 leaves a better, glossy surface finish.

Characteristics

Excellent for finishing of powdered metal

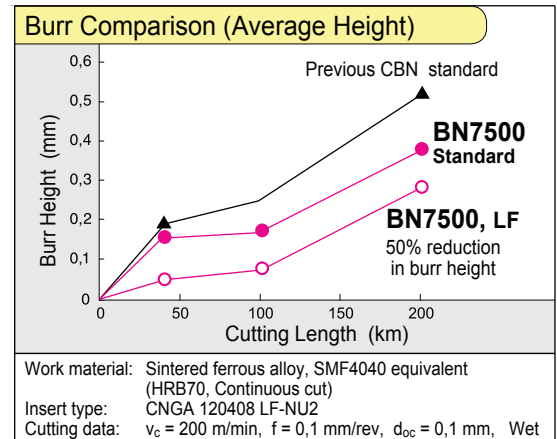
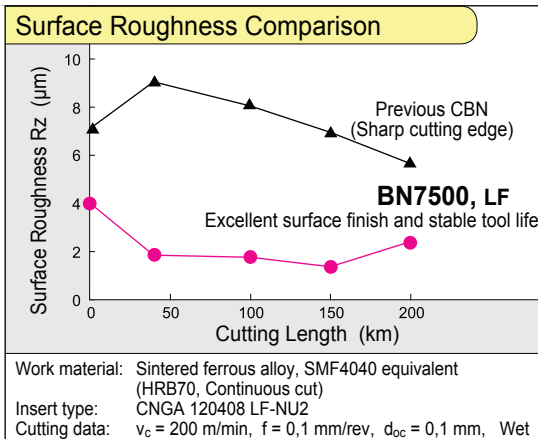
Excellent machined surface finish and surface appearance.

Available with 3 different types of edge treatment for machining sintered alloys of any shape or hardness

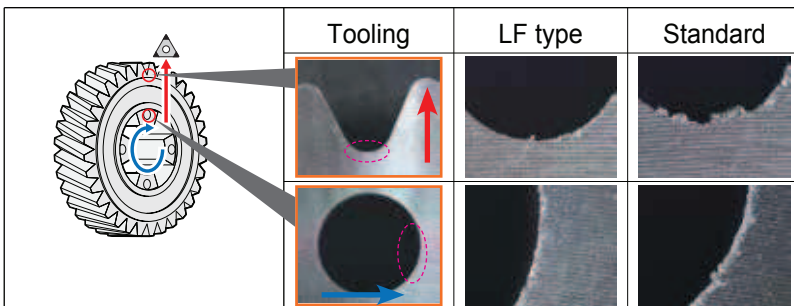
The LF type has a sharper edge designed specifically for machining sintered alloys with minimal burr and improved machining precision.

The HS Type has a strengthened cutting edge for stable chipping resistance during interrupted cutting and finishing.

Cutting Performance



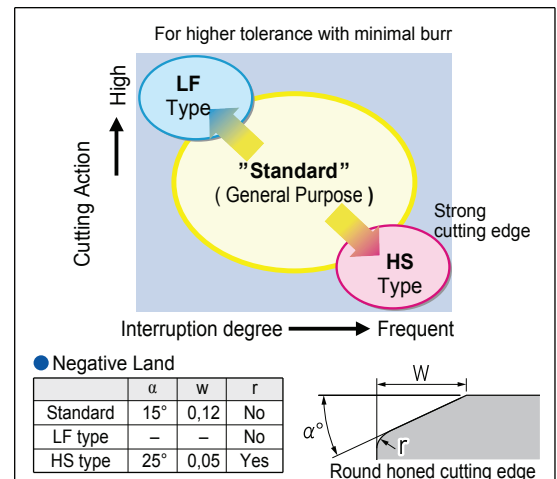
Feed and Burr Relationship



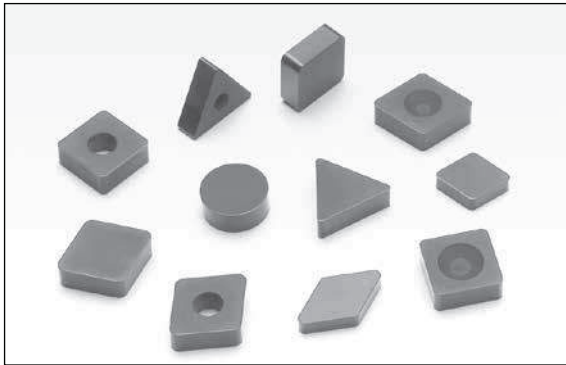
The LF Type without negative land has a cutting edge sharpness superior to the standard type and can control burrs better.

Work material: VVT Facing
 Insert type: TNGA 160404 NU3
 Cutting data: $v_c = 200$ m/min, $f = 0,1$ mm/rev, $d_{oc} = 0,1$ mm, Wet

Recommended Edge Treatment



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



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

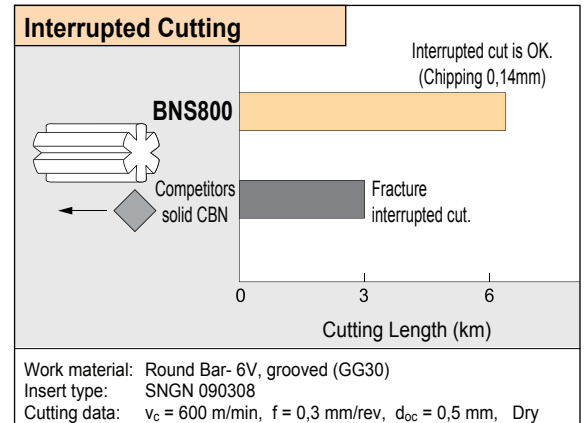
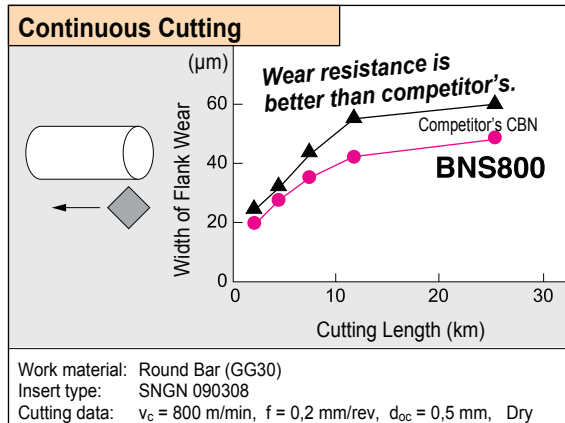
High wear resistance !

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.

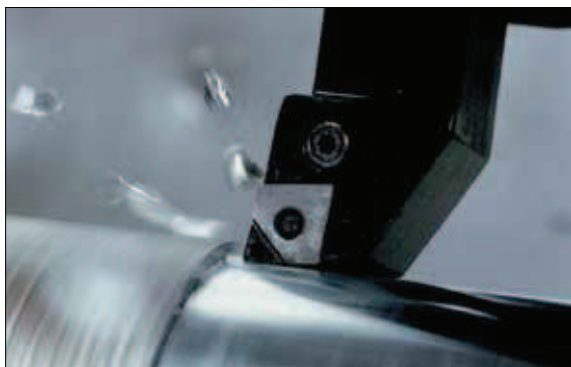
Performance



Application Example

Application	Material	Operation	Tooling	Grade	Insert	v_c	f	d_{oc}	Coolant
● Cylinder Bore	GG25	Light Cut / Finishing	Tooling	BNS800	SNGN090308	1000m/min	0,3mm/rev / 0,25mm/rev	0,2mm	Wet
● Brake Disc	GG25	Turning	Tooling	BNS800	DNGN110312	600m/min	0,3mm/rev	0,5mm	Dry
● Carbide Roll	Carbide (Co 15%)	Turning	Tooling	BNS800	RNGN090300	40m/min	0,15mm/rev	0,2mm	Wet
● Sprayed Face Bore	Colmonoy	Boring	Tooling	BNS800	SNGN090312 / SNGN090308	80m/min	0,04mm/rev / 0,03mm/rev	~3mm / 0,5mm	Wet

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 sense 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/mm² with a special device. The piston and cylinder are made of cemented carbide.

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.

Fig. 1

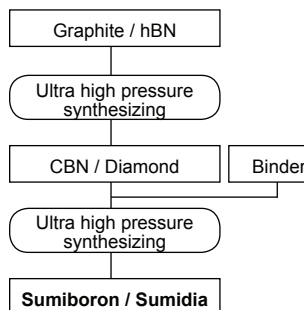
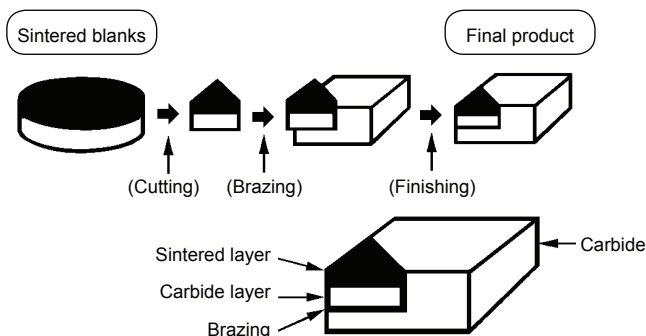
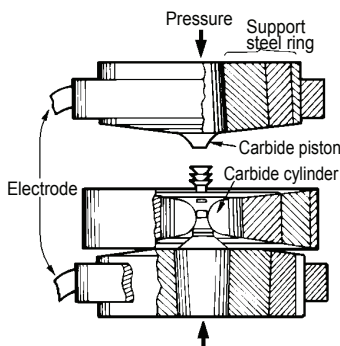


Fig. 2



■ 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.



General Features

SumiDia DA1000 is a high density, ultra fine grained sintered PCD with high toughness similar to that of cemented carbides.

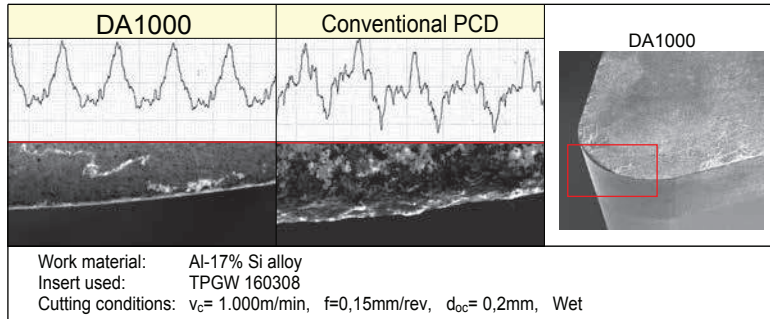
SumiDia DA1000, with its great improvement in fracture resistance, eliminates the breakage problems faced by conventional PCD tools especially during the milling of Aluminium alloys and achieves a longer and more stable tool life.

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

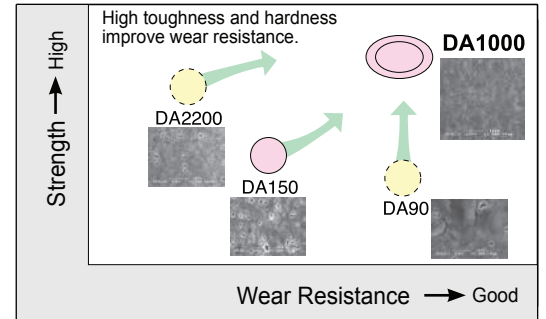
Series • Features • Application

Grade	Features	Application	Average size of Diamond grains (µm)	Hardness Hv	Transverse Rupture Strength (kg/mm ²)
DA1000	High density sintered material made of ultra-fine diamond particles that demonstrates optimum wear resistance, and excellent edge sharpness.	<ul style="list-style-type: none"> High Silicon Aluminum Alloy Cutting Rough, Interrupted and Finishing of Al-alloy Wood or Wooden Board Cutting Non-Ferrous Metal finishing (Aluminium, Copper Alloy) 	~ 0,5	110 ~ 120	≈ 2,6
DA2200	Sintered material made of ultra-micro diamond particles. Superior hardness and wear resistance with sharp edge.	<ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> 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

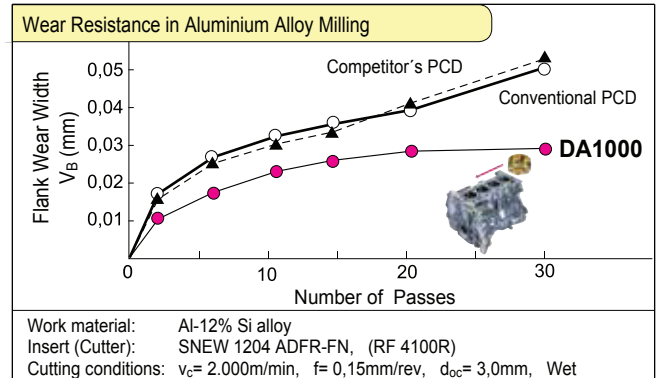
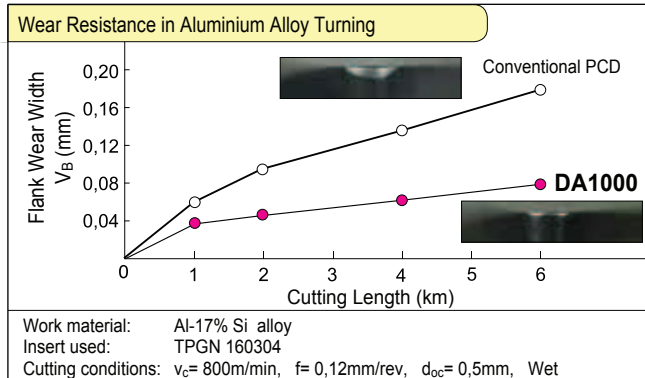
Comparison of cutting edges after machining Aluminum alloy



Position of DA1000



Cutting Performance

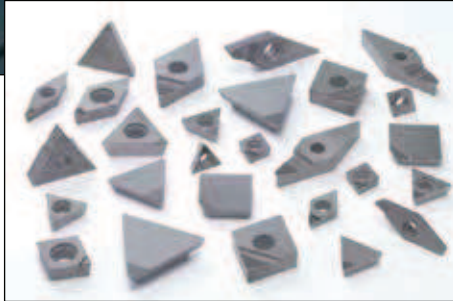


Recommended Cutting Conditions

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 Inserts NF Type

N Non-ferrous Metal



General Features

Total Cost Effectiveness with High Performance and Lower Price

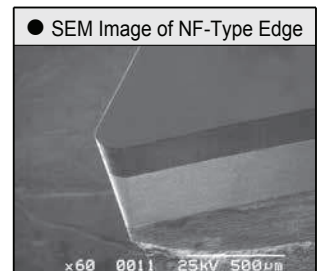
- Long, stable tool life and good fracture resistance with high toughness grade DA2200.
- Optimum design utilizing improved mass production techniques provides a relatively lower cost.
- Regrindable type results in huge total cost reduction.

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

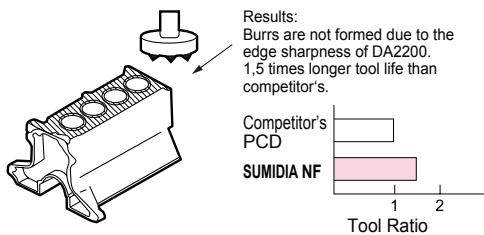
SumiDia NF-type inserts uses improved mass production techniques, which maintain the usual good performance yet offering a higher cost efficiency. Coupled with SumiDia DA2200 grade, its exhibits strong cutting edges which gives excellent surfaces finishes.



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

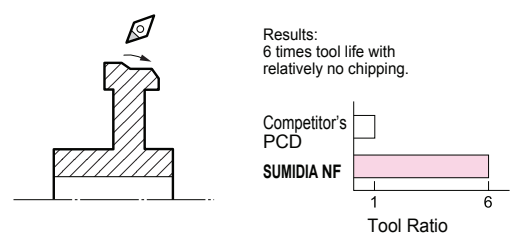
Application Examples

Milling of Aluminum Cylinder Block



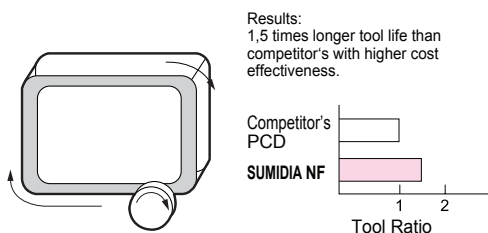
Work material: ADC12 (Al-12% Si alloy)
Insert used: 20° positive milling inserts (12 teeth)
Cutting conditions: $v_c=1.000\text{m/min}$, $f_t=0.025\text{mm/t}$, $d_{oc}=1.2\text{mm}$

OD Turning of Aluminum Alloy Electronics Part



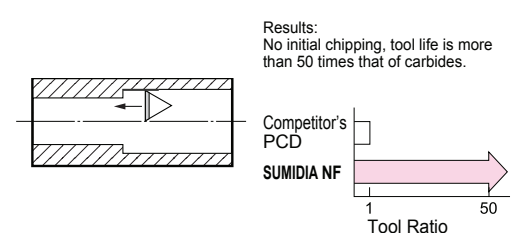
Work material: ADC12 (Al-12% Si alloy)
Insert used: VCMT 110301 NF
Cutting conditions: $v_c=800\text{m/min}$, $f=0.1\text{mm/rev}$, $d_{oc}=0.02\text{mm}$

Milling of Aluminum Oil Pump Cover



Work material: ADC12 (Al-12% Si alloy)
Insert used: TEEN32R NF
Cutting conditions: $v_c=3.000\text{m/min}$, $f_t=0.06\text{mm/rev}$, $d_{oc}=0.2\text{mm}$

Boring of Aluminum Valve Bore



Work material: ADC12 (Al-12% Si alloy)
Insert used: TPGN 110304 NF
Cutting conditions: $v_c=530\text{m/min}$, $f=0.05\text{mm/rev}$, $d_{oc}=0.2\text{mm}$

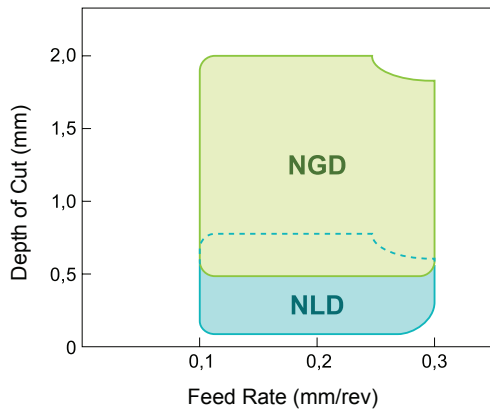


■ Characteristics

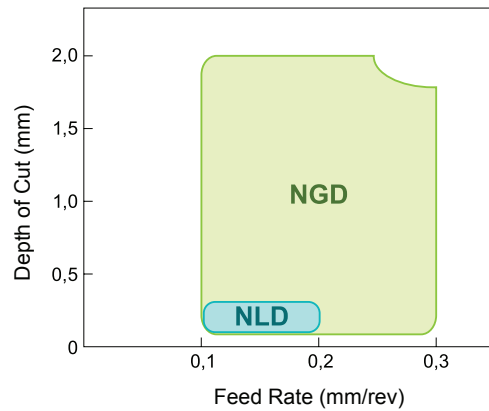
- Provides excellent chip control in semi finishing and finishing of aluminium alloy.
- Solves chip control problems and dramatically improves work efficiency.
- Achieves stable tool life by employing high toughness grade DA1000.

■ Applications Range

- Wrought Aluminium Alloy (A6061)



- Casted Aluminium Alloy (ADC12)

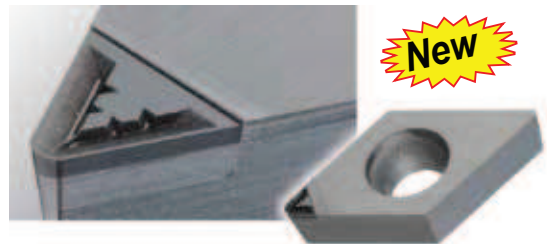
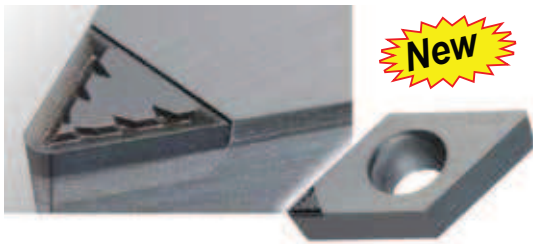


NLD Type Chipbreaker

Achieves excellent chip control for finishing.

NGD Type Chipbreaker

Achieves excellent chip control for semi finishing.



■ Application Examples

Internal Turning of Machine Component

Provides good chip control in small-depth cutting of wrought Al alloy.

Breakmaster **NLD** type Without chip breaker

Work Material: A6061
 Insert: VCMT110302 **NLD** NF (DA1000)
 Cutting Conditions: $v_c=200\text{m/min}$, $f=0,20\text{mm/rev}$, $a_p=0,10\text{mm}$, wet

Internal Turning of Transmission Component

Offers good chip control in casted material. Small chips - easy to remove.

Breakmaster **NGD** type Without chip breaker

Work Material: ADC12
 Insert: TPMT110304 **NGD** NF (DA1000)
 Cutting Conditions: $v_c=400\text{m/min}$, $f=0,23\text{mm/rev}$, $a_p=1,20\text{mm}$, wet

SUMIDIA One-Use Inserts Break Master DM Type

N Non-ferrous Metal



General Features

Economy One-Use Insert

- Similar to SumiBoron One-Use type inserts

With Built-in Chipbreaker for Effective Chip Removal

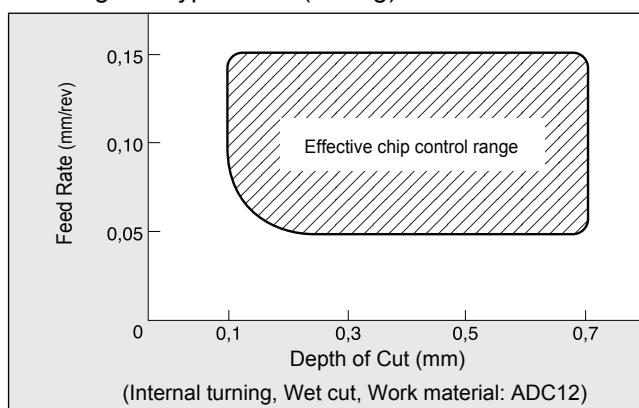
- Solving chip control problems and improving efficiency with DM-type chipbreaker.

Extensive Insert Range for External and Facing Operation

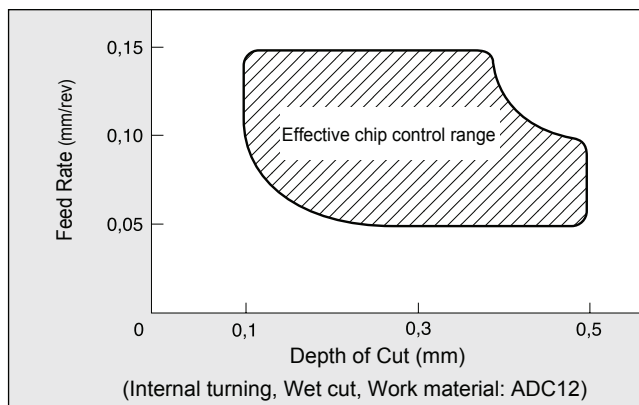
- 80° and 55° diamond shaped inserts are added to expand the application range of this series.

Application Range

Triangular Type Insert (Boring)



CCMT/DCMT Type (External Turning & Facing)



Chip Control

Break Master



No Chipbreaker



Application

Types of holder	Cutting Conditions	Results
Work Material: AC2A-T6	$v_c = 300$ m/min $f = 0,06$ mm/rev $d_{oc} = 0,35$ mm Wet cut	Surface finish of the bore hole was less than $Ra=1\mu m$.
Operation: Internal Boring		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

SUMIBORON / SUMIDIA Indexable Inserts & Tools

M1 ~ M46

M



SUMIBORON / SUMIDIA Insert

C / 80° Diamond

CC__ 7° pos. Type M2 - 5

CN__ neg. Type M6 - 8

CP__ 11° pos. Type M8

D / 55° Diamond

DC__ 7° pos. Type M9 -11

DN__ neg. Type M12-14

R / Round

RN__ neg. Type M14

S / Square

SC__ 7° pos. Type M14

T / Triangle

SN__ neg. Type M15-16

TB__ 5° pos. Type M16

TC__ 7° pos. Type M17

TN__ neg. Type M18-19

TP__ 11° pos. Type (Without Hole) M19

TP__ 11° pos. Type (With Hole) M20-21

V / 35° Diamond

VB__ 5° pos. Type M22

VC__ 7° pos. Type M23

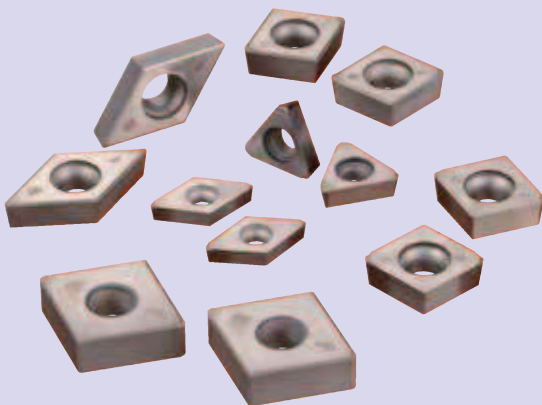
VN__ neg. Type M24

W / Polygon

WN__ neg. Type M25

Special

ZNEX neg.-pos. Type M25



SUMIBORON / SUMIDIA Precision Tools

SUMIBORON

Guidance..... M26-27

BSME / SEXC Type Small Hole Boring Bars..... M28-31

BNBB Type Small Hole Boring Bars..... M32

BNZ / BNB Type Small Hole Boring Bars..... M33

GNB Type Grooving Holder M34-35

SUMIDIA

BNGG Type Threading Holder..... M36

DABB Type Small Hole Boring Bars..... M37

RF Type Face Mill M38

SRF Type Face Mill..... M39

SUMIBORON "BN Finish Mill"

FMU Type Face Mill M40-41

"Helical Master"

BNES Type Endmill M42

"Mould Finish Master"

SUMIDIA

BNBP Type Micro Ball Nose Endmill M43

DAL / DDL / DML Type Drills..... M44-45



Sumiboron / Sumidia
Inserts/Tools

SUMIBORON / SUMIDIA Indexable Inserts

CC-- Type 7° pos. Inserts

80° Diamond Type 7° Relief
With Insert Hole

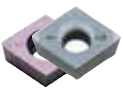
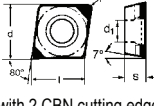

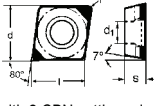




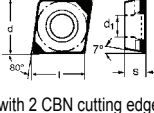
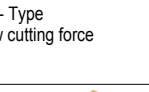
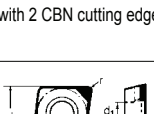

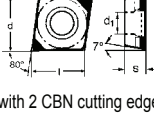
Coated

Dimensions (mm)				
CC--	ℓ	ød _(IC)	s	d ₁
0602--	6,45	6,35	2,38	2,8
09T3--	9,7	9,525	3,97	4,4

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Component

CCGT / CCGW

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	r	H		K		H		K		N														
			Coated		Uncoated		Uncoated		Uncoated		Uncoated														
			CBN																						
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BNX50	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200	
Break Master - FV, LV  CBN with chipbreaker  with 2 CBN cutting edges	CCGT 060204 N-FV NC2	0,4	●	●	●	●																			
	CCGT 09T304 N-FV NC2	0,4	●	●																					
	CCGT 09T308 N-FV NC2	0,8	●	●																					
	CCGT 09T304 N-LV NC2	0,4	●	●																					
 Standard - Normal cut geometry  with 2 CBN cutting edges	CCGW 060202 NC-2	0,2	●	●	●	●																			
	CCGW 060204 NC-2	0,4	●	●	●	●																			
	CCGW 060208 NC-2	0,8	●	●																					
	CCGW 09T302 NC-2	0,2	●	●																					
	CCGW 09T304 NC-2	0,4	●	●	●	●	●																		
	CCGW 09T308 NC-2	0,8	●	●																					
 Wiper (Wiper Type)	CCGW 09T304 NC-W2	0,4			●	●	●																		
	CCGW 09T308 NC-W2	0,8			●	●	●																		
 Wiper (Wiper Type)	CCGW 09T304 NC-WG2	0,4	●	●																					
	CCGW 09T308 NC-WG2	0,8	●	●																					
 Wiper (Wiper Type)	CCGW 09T304 NC-WH2	0,4	●	●																					
	CCGW 09T308 NC-WH2	0,8	●	●																					
 LS - Type Low cutting force  with 2 CBN cutting edges	CCGW 060202 LS-NC2	0,2			●	●	●																		
	CCGW 060204 LS-NC2	0,4			●	●	●																		
 LS - Type Low cutting force  with 2 CBN cutting edges	CCGW 09T304 LS-NC2	0,4			●	●	●																		
	CCGW 09T308 LS-NC2	0,8			●	●	●																		
 HS - Type Strong cutting edge  with 2 CBN cutting edges	CCGW 09T304 HS-NC2	0,4		●																					
	CCGW 09T308 HS-NC2	0,8		●																					

● = Euro stock
○ = Stock item in Japan
▲ = To be replaced by new item

80° Diamond Type 7° Relief
With Insert Hole




Uncoated

Dimensions (mm)				
CC--	ℓ	∅d _(IC)	s	d ₁
0602--	6,45	6,35	2,38	2,8
09T3--	9,7	9,525	3,97	4,4

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Component

CCGT / CCGW

● G-Class SumiBoron (CBN, Regrindable Type)

Shape	ISO Cat. No.	r	H		K		H		K		N														
			Coated		Uncoated		Uncoated		K		N														
			CBN																						
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200	
Break Master - FV, LV  CBN with chipbreaker with 2 CBN cutting edges	CCGT 060204 N-FV NU2	0,4									●														
	CCGT 09T304 N-FV NU2	0,4									●														
	CCGT 09T308 N-FV NU2	0,8									●														
	CCGT 09T304 N-LV NU2	0,4									●														
CCGT 09T308 N-LV NU2	0,8									●															
 with 2 CBN cutting edges	CCGW 060204 NU-2	0,4																			●				
	CCGW 060208 NU-2	0,8																			●				
	CCGW 09T304 NU-2	0,4								●	●	▲	●	▲	●	●	●				●				
	CCGW 09T308 NU-2	0,8								●	●		●	▲	●	●	●				●				
 (Wiper Type)	CCGW 09T304 NU-WG2	0,4									●														
	CCGW 09T308 NU-WG2	0,8									●														
CCGW 09T304 NU-WH2 CCGW 09T308 NU-WH2	0,4										●														
	0,8										●														
LF - Type Sharp cutting edge with 2 CBN cutting edges	CCGW 09T304 LF-NU2	0,4																			○				
	CCGW 09T308 LF-NU2	0,8																				○			
HS - Type Strong cutting edge with 2 CBN cutting edges	CCGW 09T304 HS-NU2	0,4																			○				
	CCGW 09T308 HS-NU2	0,8																				○			

● = Euro stock
○ = Stock item in Japan
▲ = To be replaced by new item

C
D
R
S
T
V
W
Z

Sumiboron / Sumidia
Inserts

SUMIBORON / SUMIDIA Indexable Inserts

CC-- Type 7° pos. Inserts

80° Diamond Type 7° Relief
With Insert Hole

Uncoated

Dimensions (mm)				
CC--	ℓ	∅d _(IC)	s	d ₁
0602--	6,45	6,35	2,38	2,8
09T3--	9,7	9,525	3,97	4,4
1204--	12,9	12,7	4,76	5,5

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Component

CCGW

● G-Class SumiBoron (CBN, Regrindable Type)

Shape	ISO Cat. No.	r	H		K		H		K		N														
			Coated		Uncoated		Uncoated		Uncoated		PCD														
			CBN																						
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200	
	CCGW 09T304 CCGW 09T308	0,4 0,8											●			●									

● G-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	r	H		K		H		K		N														
			Coated		Uncoated		Uncoated		Uncoated		PCD														
			CBN																						
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200	
	CCGW 060204 NS CCGW 060208 NS	0,4 0,8												●											
	CCGW 09T304 NS CCGW 09T308 NS	0,4 0,8											●												
	CCGW 060202 NU CCGW 060204 NU CCGW 060208 NU	0,2 0,4 0,8								●	●	▲	●	●	▲	●	●	●	●	●	●				
	CCGW 09T302 NU CCGW 09T304 NU CCGW 09T308 NU	0,2 0,4 0,8								●	●	▲	●	●	▲	●	●	●	●	●	●				
	CCGW 120408 NU	0,8								●	▲	●													

● = Euro stock
○ = Stock item in Japan
▲ = To be replaced by new item

C
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Sumiboron / SumiDia
Inserts

80° Diamond Type 7° Relief
With Insert Hole

Uncoated

Dimensions (mm)				
CC--	ℓ	∅d _(IC)	s	d ₁
0602--	6,45	6,35	2,38	2,8
09T3--	9,7	9,525	3,97	4,4

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Component

CCMT

● M-Class SumiDia (PCD, Regrindable Type)

Shape	ISO Cat. No.	r	H		K		H		K		N	
			Coated		Uncoated		Uncoated		K		N	
			CBN									
	CCMT 060202	0,2										
	CCMT 060204	0,4										
	CCMT 09T302	0,2										

● M-Class SumiDia (PCD, NF Type)

	CCMT 060201 NF	0,1											
	CCMT 060202 NF	0,2											
	CCMT 060204 NF	0,4											
	CCMT 09T301 NF	0,1											
	CCMT 09T302 NF	0,2											
	CCMT 09T304 NF	0,4											
	CCMT 09T308 NF	0,8											

● M-Class SumiDia (PCD, One-Use "Break Master" Type)

Break Master - DM 	CCMT 060202 L-DM NU	0,2												
	CCMT 060204 L-DM NU	0,4												
Break Master - DM 	CCMT 09T302 L-DM NU	0,2												
	CCMT 09T304 L-DM NU	0,4												
Break Master - DM 	CCMT 060202 R-DM NU	0,2												
	CCMT 060204 R-DM NU	0,4												
Break Master - DM 	CCMT 09T302 R-DM NU	0,2												
	CCMT 09T304 R-DM NU	0,4												
Break Master - LD New 	CCMT 060202 N-LD NF	0,2												
	CCMT 060204 N-LD NF	0,4												
	CCMT 09T302 N-LD NF	0,2												
	CCMT 09T304 N-LD NF	0,4												
Break Master - LD 	CCMT 09T308 N-LD NF	0,8												
	Break Master - GD New 	CCMT 060202 N-GD NF	0,2											
		CCMT 060204 N-GD NF	0,4											
		CCMT 09T302 N-GD NF	0,2											
CCMT 09T304 N-GD NF		0,4												
Break Master - GD 	CCMT 09T308 N-GD NF	0,8												

● = Euro stock
○ = Stock item in Japan
▲ = To be replaced by new item

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Sumiboron / Sumidia Inserts

SUMIBORON / SUMIDIA Indexable Inserts

CN- Type neg. Inserts

80° Diamond Type 0° Relief
With Insert Hole

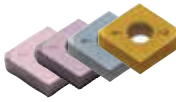
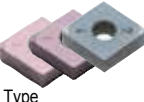
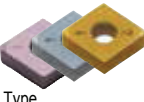
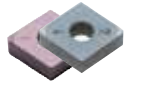
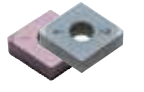
Coated

Dimensions (mm)				
CN- ₁	ℓ	∅d _(IC)	s	d ₁
1204-	12,9	12,7	4,76	5,16

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Component

CNGA / CNGG

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	r	H		K										N										
			Coated		Uncoated										PCD										
			CBN																						
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200	
 Standard - Normal cut geometry with 4 CBN cutting edges	CNGA 120404 NC-4 CNGA 120408 NC-4 CNGA 120412 NC-4	0,4 0,8 1,2	●	●	●	●	●	●	○																
	CNGA 120404 NC-W4 CNGA 120408 NC-W4 CNGA 120412 NC-W4	0,4 0,8 1,2			●	●	●		○																
	CNGA 120404 NC-WG4 CNGA 120408 NC-WG4 CNGA 120412 NC-WG4	0,4 0,8 1,2	●	●		●	●																		
	CNGA 120404 NC-WH4 CNGA 120408 NC-WH4 CNGA 120412 NC-WH4	0,4 0,8 1,2	●	●		●	●																		
 LS - Type Low cutting force with 2 CBN cutting edges	CNGA 120404 LS-NC2 CNGA 120408 LS-NC2 CNGA 120412 LS-NC2	0,4 0,8 1,2			●	●	●																		
	 HS - Type Strong cutting edge with 2 CBN cutting edges	CNGA 120404 HS-NC2 CNGA 120408 HS-NC2 CNGA 120412 HS-NC2	0,4 0,8 1,2	●	●		●	●	●																
		 Break Master - FV, LV, SV with 4 CBN cutting edges	CNGG 120404 N-FV NC4 CNGG 120408 N-FV NC4 CNGG 120412 N-FV NC4	0,4 0,8 1,2	●	●		●	●																
 CBN with chipbreaker with 4 CBN cutting edges	CNGG 120404 N-LV NC4 CNGG 120408 N-LV NC4 CNGG 120412 N-LV NC4	0,4 0,8 1,2	●	●		●	●																		
	CNGG 120404 N-SV NC4 CNGG 120408 N-SV NC4 CNGG 120412 N-SV NC4	0,4 0,8 1,2	●	○			●																		

● = Euro stock
○ = Stock item in Japan
▲ = To be replaced by new item

80° Diamond Type 0° Relief
With Insert Hole

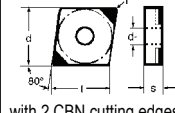
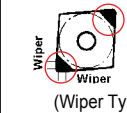



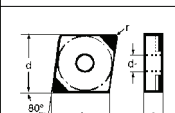
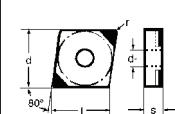
Uncoated

Dimensions (mm)				
CN_	ℓ	∅d _(IC)	s	d ₁
1204-	12,9	12,7	4,76	5,16

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Component

CNGA / CNGM

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	r	H		K		H		K		N															
			Coated		Uncoated		Uncoated		K		N															
			CBN																							
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BN5800	DA150	DA1000	DA2200		
 with 2 CBN cutting edges	CNGA 120404 NS-2	0,4													●											
	CNGA 120408 NS-2	0,8													●											
	CNGA 120412 NS-2	1,2													●											
	CNGA 120404 NU-2	0,4									●	●	●	●		▲	●	●	●	●	○					
	CNGA 120408 NU-2	0,8									●	●	▲	●			●	●	●	●	○					
 (Wiper Type)	CNGA 120404 NU-W2	0,4								●	●															
	CNGA 120408 NU-W2	0,8								●	●															
 CNGA 120404 NU-WG2 CNGA 120408 NU-WG2 CNGA 120408 NU-WG2	CNGA 120404 NU-WG2	0,4								●	●															
	CNGA 120408 NU-WG2	0,8								●	●															
	CNGA 120408 NU-WG2	1,2								●	●															
 CNGA 120404 NU-WH2 CNGA 120408 NU-WH2 CNGA 120412 NU-WH2	CNGA 120404 NU-WH2	0,4								●	●															
	CNGA 120408 NU-WH2	0,8								●	●															
	CNGA 120412 NU-WH2	1,2								●	●															
 LF - Type Sharp cutting edge	CNGA 120404 LF-NU2	0,4																			○					
	CNGA 120408 LF-NU2	0,8																			○					
 HS - Type Strong cutting edge	CNGA 120408 HS-NU2	0,8																		●						
 Break Master - LV CBN with chipbreaker	CNGM 120404 N-LV NU2	0,4								●	●															
	CNGM 120408 N-LV NU2	0,8								●	●															
	CNGM 120412 N-LV NU2	1,2								●	●															

● = Euro stock
○ = Stock item in Japan
▲ = To be replaced by new item

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Sumiboron / Sumidia
Inserts

SUMIBORON / SUMIDIA Indexable Inserts

CN-- neg. Type and CP-- Type 11° pos. Inserts

80° Diamond Type 0° & 11°

Dimensions (mm)				
CN/CP--	ℓ	ød (IC)	s	d ₁
06	6,45	6,35	2,38	2,8
0903--	9,7	9,525	3,18	4,4
12	12,9	12,7	4,76	5,16

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Component

CNGN / CNGX

● G-Class SumiBoron (Solid CBN Type)

Shape	ISO Cat. No.	r	Coated		Uncoated																			
			CBN												PCD									
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200
	CNGN 090308 CNGN 090312	0,8 1,2																						
	CNGN 120412 CNGN 120416	1,2 1,6																						

● G-Class SumiBoron (Solid CBN, "Dimple" Type)

Shape	ISO Cat. No.	r	Coated		Uncoated																		
			CBN												PCD								
BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200		
	CNGX 120412 CNGX 120416	1,2 1,6																					

CNMA / CNMX

● M-Class SumiBoron (CBN, Regrindable Type)

Shape	ISO Cat. No.	r	Coated		Uncoated																		
			CBN												PCD								
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000
	CNMA 120404	0,4																					
	CNMA 120408	0,8																					
	CNMA 120412	1,2																					

● M-Class SumiBoron (CBN, One-use Type)

Shape	ISO Cat. No.	r	Coated		Uncoated																		
			CBN												PCD								
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000
	CNMA 120404 NS	0,4																					
	CNMA 120408 NS	0,8																					
	CNMA 120412 NS	1,2																					
	CNMA 120404 NU	0,4																					
	CNMA 120408 NU	0,8																					
	CNMA 120412 NU	1,2																					
	CNMA 120408 NU-W	0,8																					

● M-Class SumiDIA (PCD, NF Type)

Shape	ISO Cat. No.	r	Coated		Uncoated																		
			CBN												PCD								
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000
	CNMX 120402 NF	0,2																					
	CNMX 120404 NF	0,4																					
	CNMX 120408 NF	0,8																					

CPMW

● M-Class SumiDIA (PCD, NF Type)

Shape	ISO Cat. No.	r	Coated		Uncoated																		
			CBN												PCD								
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000
	CPMW 060202 NF	0,2																					
	CPMW 060204 NF	0,4																					
	CPMW 060208 NF	0,8																					

● = Euro stock
 ○ = Stock item in Japan
 ▲ = To be replaced by new item

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Sumiboron / SumiDIA Inserts

55° Diamond Type 7° Relief
With Insert Hole



Coated

Dimensions (mm)				
DC--	ℓ	∅d _(IC)	s	d ₁
0702--	7,75	6,35	2,38	2,8
11T3--	11,6	9,525	3,97	4,4

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Component

DCGT / DCGW

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	r	H		K		H		K		N			
			Coated		Uncoated		Uncoated		PCD					
			BN2010	BN2020	BN100	BN160	BN200	BN300	BN350	BN700	BN7000	BN7500	BN8000	DA150
Break Master - FV, LV  CBN with chipbreaker with 2 CBN cutting edges	DCGT 070204 N-FV NC2	0,4	●	●	●	●								
	DCGT 11T304 N-FV NC2	0,4	●	●	●	●								
	DCGT 11T308 N-FV NC2	0,8	●	●	●	●								
DCGT 11T304 N-LV NC2 DCGT 11T308 N-LV NC2	0,4	●	●	●	●									
	0,8	●	●	●	●									
Standard - Normal cut geometry  with 2 CBN cutting edges Wiper (Wiper Type)	DCGW 070202 NC-2	0,2	●	●	●	●								
	DCGW 070204 NC-2	0,4	●	●	●	●								
	DCGW 070208 NC-2	0,8	●	●	●	●								
	DCGW 11T302 NC-2	0,2	●	●	●	●								
	DCGW 11T304 NC-2	0,4	●	●	●	●	●							
	DCGW 11T308 NC-2	0,8	●	●	●	●	●							
DCGW 11T304 NC-WG2 DCGW 11T308 NC-WG2	0,4	●	●	●	●									
	0,8	●	●	●	●									
DCGW 11T304 NC-WH2 DCGW 11T308 NC-WH2	0,4	●	●	●	●									
	0,8	●	●	●	●									
LS - Type Low cutting force with 2 CBN cutting edges	DCGW 070202 LS-NC2	0,2			●	●								
	DCGW 070204 LS-NC2	0,4			●	●								
DCGW 11T304 LS-NC2 DCGW 11T308 LS-NC2	0,4			●	●									
	0,8			●	●									
HS - Type Strong cutting edge with 2 CBN cutting edges	DCGW 11T304 HS-NC2	0,4		●		●								
	DCGW 11T308 HS-NC2	0,8		●		●								

● = Euro stock
 ○ = Stock item in Japan
 ▲ = To be replaced by new item

C
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Sumiboron / Sumidia
 Inserts

SUMIBORON / SUMIDIA Indexable Inserts

DC-- Type 7° pos. Inserts

55° Diamond Type 7° Relief
With Insert Hole





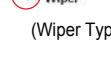


Uncoated

Dimensions (mm)				
DC--	ℓ	ød (IC)	s	d ₁
0702--	7,75	6,35	2,38	2,8
11T3--	11,6	9,525	3,97	4,4




H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Component

DCGT / DCGW

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	r	H		K										N										
			Coated		Uncoated										PCD										
			CBN																						
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200	
Break Master - FV, LV  CBN with chipbreaker with 2 CBN cutting edges	DCGT 070204 N-FV NU2	0,4									●														
	DCGT 11T304 N-FV NU2	0,4									●														
	DCGT 11T308 N-FV NU2	0,8									●														
 with 2 CBN cutting edges	DCGW 070202 NU-2	0,2								●	●														
	DCGW 070204 NU-2	0,4								●	●	▲	●		▲	●									
	DCGW 070208 NU-2	0,8								●	●	▲	●		▲	●									
 with 2 CBN cutting edges	DCGW 11T304 NU-2	0,4								●	●	▲	●		▲	●									
	DCGW 11T308 NU-2	0,8								●	●	▲	●		▲	●									
	 (Wiper Type)	DCGW 11T304 NU-WG2	0,4								●														
DCGW 11T308 NU-WG2		0,8								●															
 (Wiper Type)	DCGW 11T304 NU-WH2	0,4								●															
	DCGW 11T308 NU-WH2	0,8								●															
	 LF - Type Sharp cutting edge with 2 CBN cutting edges	DCGW 070204 LF-NU2	0,4																						
DCGW 070208 LF-NU2		0,8																							
DCGW 11T304 LF-NU2		0,4																							
DCGW 11T308 LF-NU2	0,8																								
 HS - Type Strong cutting edge with 2 CBN cutting edges	DCGW 070204 HS-NU2	0,4																							
	DCGW 070208 HS-NU2	0,8																							
	DCGW 11T304 HS-NU2	0,4																							
DCGW 11T308 HS-NU2	0,8																								

● G-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	r	H		K										N								
 with 2 CBN cutting edges	DCGW 11T304 NS	0,4																					
	DCGW 11T308 NS	0,8																					
	 with 2 CBN cutting edges	DCGW 070202 NU	0,2								●	●	▲	●		▲	●						
DCGW 070204 NU		0,4								●	●	▲	●		▲	●							
DCGW 070208 NU		0,8								●	●	▲	●		▲	●							
 with 2 CBN cutting edges	DCGW 11T302 NU	0,2								●	●	▲	●		▲	●							
	DCGW 11T304 NU	0,4								●	●	▲	●		▲	●							
	DCGW 11T308 NU	0,8								●	●	▲	●		▲	●							

● = Euro stock
○ = Stock item in Japan
▲ = To be replaced by new item

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SumiBoron / SumiDia
Inserts

55° Diamond Type 7° Relief
With Insert Hole

Uncoated

Dimensions (mm)				
DC--	ℓ	∅d _(IC)	s	d ₁
0702--	7,75	6,35	2,38	2,8
11T3--	11,6	9,525	3,97	4,4

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Component

DCMT

● M-Class SumiDia (PCD, Regrindable Type)

Shape	ISO Cat. No.	r	H		K		H		K		N													
			Coated		Uncoated		Uncoated		Uncoated		PCD													
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200
	DCMT 070202 DCMT 070204	0,2 0,4																				●		
	DCMT 11T302 DCMT 11T304 DCMT 11T308	0,2 0,4 0,8																					●	

● M-Class SumiDia (PCD, NF Type)

	DCMT 070201 NF DCMT 070202 NF DCMT 070204 NF DCMT 070208 NF	0,1 0,2 0,4 0,8																					●	▲
	DCMT 11T301 NF DCMT 11T302 NF DCMT 11T304 NF DCMT 11T308 NF	0,1 0,2 0,4 0,8																					●	▲

● M-Class SumiDIA (PCD, One-Use "Break Master" Type)

Break Master - DM 	DCMT 070202 L-DM NU DCMT 070204 L-DM NU	0,2 0,4																					○	
	DCMT 11T302 L-DM NU DCMT 11T304 L-DM NU	0,2 0,4																					●	
Break Master - DM 	DCMT 070202 R-DM NU DCMT 070204 R-DM NU	0,2 0,4																					○	
	DCMT 11T302 R-DM NU DCMT 11T304 R-DM NU	0,2 0,4																					●	
Break Master - LD 	DCMT 070202 N-LD NF DCMT 070204 N-LD NF	0,2 0,4																					○	
	DCMT 11T302 N-LD NF DCMT 11T304 N-LD NF DCMT 11T308 N-LD NF	0,2 0,4 0,8																					○	
Break Master - GD 	DCMT 070202 N-GD NF DCMT 070204 N-GD NF	0,2 0,4																					○	
	DCMT 11T302 N-GD NF DCMT 11T304 N-GD NF DCMT 11T308 N-GD NF	0,2 0,4 0,8																					○	

● = Euro stock
 ○ = Stock item in Japan
 ▲ = To be replaced by new item

C
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Sumiboron / Sumidia Inserts

SUMIBORON / SUMIDIA Indexable Inserts

DN_ - Type neg. Inserts

55° Diamond Type 0° Relief
With Insert Hole





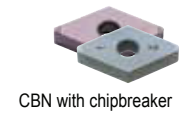
Coated

Dimensions (mm)				
DN_	ℓ	ød _(IC)	s	d ₁
1104--	11,6	9,525	4,76	3,81
1504--	15,5	12,7	4,76	5,16
1506--	15,5	12,7	6,35	5,16

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Component

DNGA / DNGG

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	r	H		K		H		K		N															
			Coated		Uncoated		CBN		PCD																	
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200		
 Standard - Normal cut geometry with 2 CBN cutting edges	DNGA 110404 NC-2	0,4	●																							
	DNGA 110408 NC-2	0,8	●																							
	DNGA 150604 NC-2	0,4					●																			
 Standard - Normal cut geometry (Wiper Type)	DNGA 150404 NC-4	0,4	○	○																						
	DNGA 150408 NC-4	0,8	○	○																						
	DNGA 150412 NC-4	1,2	○	○																						
	DNGA 150604 NC-4	0,4	●	●	●	●	●																			
	DNGA 150608 NC-4	0,8	●	●	●	●	●																			
	DNGA 150612 NC-4	1,2	●	●	●	●	●	●																		
	DNGA 150404 NC-WG4	0,4			○	○																				
	DNGA 150408 NC-WG4	0,8			○	○																				
	DNGA 150604 NC-WG4	0,4	●	●	●	●																				
	DNGA 150608 NC-WG4	0,8	●	●	●	●																				
	DNGA 150612 NC-WG4	1,2	●	●	●	●																				
	 LS - Type Low cutting force with 2 CBN cutting edges	DNGA 150604 LS-NC2	0,4			●	●	●																		
DNGA 150608 LS-NC2		0,8			●	●	●																			
DNGA 150612 LS-NC2		1,2			●	●	●																			
 HS - Type Strong cutting edge with 2 CBN cutting edges	DNGA 150604 HS-NC2	0,4	●	●	●	●	●																			
	DNGA 150608 HS-NC2	0,8	●	●	●	●	●																			
	DNGA 150612 HS-NC2	1,2	●	●	●	●	●																			
 Break Master - FV, LV, SV CBN with chipbreaker with 4 CBN cutting edges	DNGG 150404 N-FV NC4	0,4	○	○	○	○																				
	DNGG 150408 N-FV NC4	0,8	○	○	○	○																				
	DNGG 150412 N-FV NC4	1,2	○	○	○	○																				
	DNGG 150604 N-FV NC4	0,4	●	●	●	●																				
	DNGG 150608 N-FV NC4	0,8	●	●	●	●																				
	DNGG 150612 N-FV NC4	1,2	●	●	●	●																				
	DNGG 150404 N-LV NC4	0,4	○	○	○	○																				
	DNGG 150408 N-LV NC4	0,8	○	○	○	○																				
	DNGG 150412 N-LV NC4	1,2	○	○	○	○																				
	DNGG 150604 N-LV NC4	0,4	●	●	●	●																				
	DNGG 150608 N-LV NC4	0,8	●	●	●	●																				
	DNGG 150612 N-LV NC4	1,2	●	●	●	●																				
DNGG 150408 N-SV NC4	0,4	○	○																							
DNGG 150412 N-SV NC4	1,2	○	○																							
DNGG 150608 N-SV NC4	0,8	●																								
DNGG 150612 N-SV NC4	1,2	●																								

● = Euro stock
○ = Stock item in Japan
▲ = To be replaced by new item

55° Diamond Type 0° Relief
With Insert Hole

Dimensions (mm)				
DN_ _	ℓ	ød (IC)	s	d ₁
1504--	15,5	12,7	4,76	5,16
1506--	15,5	12,7	6,35	5,16

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Component

DNGA / DNGM

Uncoated

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	r	H		K		H		K		N															
			Coated		Uncoated		Uncoated		PCD																	
			CBN																							
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200		
<p>with 2 CBN cutting edges</p>	DNGA 150604 NU-2	0,4								●	●				▲	●	●			●						
	DNGA 150608 NU-2	0,8								●	●	▲	●			●	●				●					
	DNGA 150612 NU-2	1,2								●	●					●	●									
	<p>(Wiper Type)</p>	DNGA 150404 NU-WG2	0,4									○														
		DNGA 150408 NU-WG2	0,8									○														
		DNGA 150604 NU-WG2	0,4									●														
		DNGA 150608 NU-WG2	0,8									●														
	DNGA 150612 NU-WG2	1,2									●															
	<p>(Wiper Type)</p>	DNGA 150404 NU-WH2	0,4									○														
		DNGA 150408 NU-WH2	0,8									○														
		DNGA 150604 NU-WH2	0,4									●														
		DNGA 150608 NU-WH2	0,8									●														
DNGA 150612 NU-WH2	1,2									●																
<p>Break Master - LV</p>	DNGM 150404 N-LV NU2	0,4									○															
	DNGM 150408 N-LV NU2	0,8									○															
	DNGM 150412 N-LV NU2	1,2									○															
	DNGM 150604 N-LV NU2	0,4									●															
	DNGM 150608 N-LV NU2	0,8									●															
	DNGM 150612 N-LV NU2	1,2									●															

● = Euro stock
○ = Stock item in Japan
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Sumiboron / Sumidia Inserts

SUMIBORON / SUMIDIA Indexable Inserts

DN--, RN-- neg. Type and SC-- Type 7° pos. Inserts

55° Diamond Type 0° Relief
With Insert Hole

Dimensions (mm)				
DN--	ℓ	ød (IC)	s	d ₁
1506--	15,5	12,7	6,35	5,16

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Component

DNMA

● M-Class SumiBoron (CBN, Regrindable Type)

Shape	ISO Cat. No.	r	Coated		Uncoated																			
			CBN												PCD									
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200
	DNMA 150604	0,4																						
	DNMA 150608	0,8																						
	DNMA 150612	1,2																						

● M-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	r	Uncoated																							
			CBN												PCD											
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200		
	DNMA 150604 NS	0,4																								
	DNMA 150608 NS	0,8																								
	DNMA 150604 NU	0,4																								
DNMA 150608 NU	0,8																									
DNMA 150612 NU	1,2																									

Dimensions (mm)

RN--	ℓ	ød (IC)	s	d ₁
0903--	9,525	9,525	3,18	-
1203--	12,7	12,7	3,18	-
1204--	12,7	12,7	4,76	-

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Component

Round Type 0° Relief
Without Insert Hole

RNGN

● G-Class SumiBoron (Solid CBN Type)

Shape	ISO Cat. No.	r	Coated		Uncoated																		
			CBN												PCD								
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000
	RNGN 090300	-																					
	RNGN 120300	-																					
	RNGN 120400	-																					

● G-Class SumiBoron (CBN, Full Top Type)

Shape	ISO Cat. No.	r	Uncoated																							
			CBN												PCD											
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200		
	RNGN 090300 B	-																								

Square Type 7° Relief
With Insert Hole

Dimensions (mm)				
SC--	ℓ	ød (IC)	s	d ₁
09T3--	9,525	9,525	3,97	4,4

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Component

SCGW

● G-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	r	Coated		Uncoated																		
			CBN												PCD								
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000
	SCGW 09T304 NU	0,4																					
	SCGW 09T308 NU	0,8																					

● = Euro stock
○ = Stock item in Japan
▲ = To be replaced by new item

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Sumiboron / Sumidia
Inserts


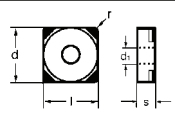
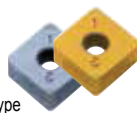
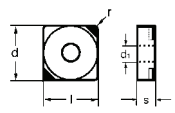

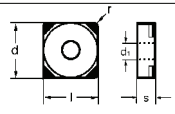
Square Type 0° Relief
With Insert Hole

Dimensions (mm)				
SN--	ℓ	ød (IC)	s	d ₁
1204--	12,7	12,7	4,76	5,16

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Component

SNGA

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	r	H		K		H		K		N														
			Coated		Uncoated		Coated		Uncoated		PCD														
			CBN																						
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200	
 Standard - Normal cut geometry with 4 CBN cutting edges	 SNGA 120408 NC-4 SNGA 120412 NC-4	0,8	●			●	●																		
		1,2	●			●	●																		
 HS - Type Strong cutting edge with 2 CBN cutting edges	 SNGA 120408 HS-NC2 SNGA 120412 HS-NC2	0,8				●	●																		
		1,2				●	●																		
 HS - Type Strong cutting edge with 4 CBN cutting edges	 SNGA 120408 HS-NC4 SNGA 120412 HS-NC4	0,8	○																						
		1,2	○																						


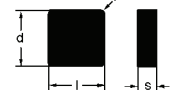

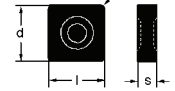
Square Type 0° Relief
Without Insert Hole

Dimensions (mm)				
SN--	ℓ	ød (IC)	s	d ₁
0903--	9,525	9,525	3,18	-
1204--	12,7	12,7	4,76	-


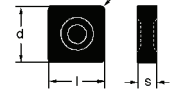
H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Component

SNGN / SNGX

● G-Class SumiBoron (Solid CBN Type)

Shape	ISO Cat. No.	r	H		K		H		K		N														
			Coated		Uncoated		Coated		Uncoated		PCD														
			CBN																						
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200	
 SNGN 090308 SNGN 090312	 SNGN 120412 SNGN 120416	0,8																							
		1,2																							
 SNGX 120412 SNGX 120416	 SNGX 120412 SNGX 120416	1,2																							
		1,6																							

● G-Class SumiBoron (Solid CBN, "Dimple" Type)

Shape	ISO Cat. No.	r	H		K		H		K		N														
			Coated		Uncoated		Coated		Uncoated		PCD														
			CBN																						
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200	
 SNGX 120412 SNGX 120416	 SNGX 120412 SNGX 120416	1,2																							
		1,6																							

● = Euro stock
○ = Stock item in Japan
▲ = To be replaced by new item

SUMIBORON / SUMIDIA Indexable Inserts

SN-- neg. Type and TB-- Type 5° pos. Inserts

Square Type


0° Relief
With Insert Hole

Dimensions (mm)				
SN--	ℓ	ød _(IC)	s	d ₁
1204--	12,7	12,7	4,76	5,16

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Component

SNMA

● M-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	r	Material																						
			Coated								Uncoated														
			CBN								PCD														
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200	
	SNMA 120408 NS SNMA 120412 NS	0,8 1,2												●											
	SNMA 120408 NU SNMA 120412 NU	0,8 1,2								●	●	●	●	▲	●	●	●	●	●	●					

60° Triangle Type


5° Relief

Dimensions (mm)				
TBGN	ℓ	ød _(IC)	s	d ₁
0601--	6,9	3,97	1,59	-
TBGW				
0601--	6,9	3,97	1,59	2,8


H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Component

TBGN / TBGW


● G-Class SumiBoron (CBN, Full Top Type)

Shape	ISO Cat. No.	r	Material																						
			Coated								Uncoated														
			CBN								PCD														
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200	
	TBGN 060102 B TBGN 060104 B	0,2 0,4					●				●	▲	●												

● G-Class SumiDIA (PCD, NF Type)

Shape	ISO Cat. No.	r	Material																						
			Coated								Uncoated														
			CBN								PCD														
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200	
	TBGN 060102 NF TBGN 060104 NF	0,2 0,4																					●	▲	

● G-Class SumiDIA (PCD, NF Type)

Shape	ISO Cat. No.	r	Material																						
			Coated								Uncoated														
			CBN								PCD														
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200	
	TBGW 060102 NF TBGW 060104 NF	0,2 0,4																					●	▲	

● = Euro stock
○ = Stock item in Japan
▲ = To be replaced by new item

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SumiBoron / SumiDIA Inserts

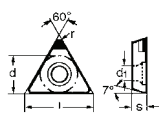
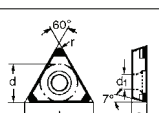

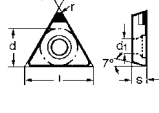

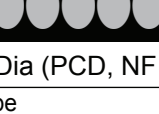
60° Triangle Type 7° Relief With Insert Hole

Dimensions (mm)				
TC--	ℓ	∅d _(IC)	s	d ₁
0902--	9,62	5,56	2,38	2,5
1102--	11,0	6,35	2,38	2,8
16T3--	16,5	9,525	3,97	4,3

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Component

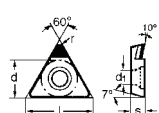

TCGW

● G-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	r	Coated		Uncoated																		
			CBN					K					N										
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000
 TCGW 090204 NC TCGW 090208 NC		0,4	●	●	●	●																	
		0,8	●			●																	
 TCGW 110202 NC TCGW 110204 NC TCGW 110208 NC		0,2	●			●																	
		0,4	●			●			●														
 TCGW 16T304 NC-3 TCGW 16T308 NC-3 with 3 CBN cutting edges		0,4	●			●																	
		0,8	●			●																	
 TCGW 090204 NU TCGW 090208 NU		0,4														●	●						
		0,8															●	●					
 TCGW 110202 NU TCGW 110204 NU TCGW 110208 NU		0,2						●		▲	●					●	●						
		0,4						●		▲	●						●	●					
 TCGW 16T304 NU TCGW 16T308 NU		0,4					●		▲	●						●	●						
		0,8						●		▲	●						●	●					

TCMT

● M-Class SumiDia (PCD, NF Type)

Shape	ISO Cat. No.	r	Coated		Uncoated																			
			CBN					K					N											
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200
 TCMT 090202 NF TCMT 090204 NF		0,2																			●	▲		
		0,4																				●	▲	
 TCMT 110201 NF TCMT 110202 NF TCMT 110204 NF		0,1																			●	▲		
		0,2																				●	▲	
		0,4																				●	▲	

● = Euro stock
○ = Stock item in Japan
▲ = To be replaced by new item

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SumiBoron / SumiDia
Inserts

SUMIBORON / SUMIDIA Indexable Inserts

TN-- Type neg. Inserts



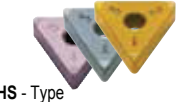
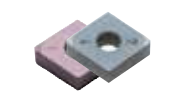


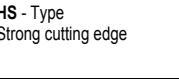

60° Triangle Type 0° Relief
With Insert Hole

Dimensions (mm)				
TN--	ℓ	ød _(IC)	s	d ₁
1604--	16,5	9,525	4,76	3,81

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Component

TNGA / TNGG / TNGM

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	r	H		K										N										
			Coated		Uncoated										PCD										
			CBN																						
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200	
 Standard - Normal cut geometry with 6 CBN cutting edges	TNGA 160404 NC-6	0,4	●	●	●	●	●	●																	
	TNGA 160408 NC-6	0,8	●	●	●	●	●	●																	
	TNGA 160412 NC-6	1,2	●	●	●	●	●	●																	
 LS - Type Low cutting force with 3 CBN cutting edges	TNGA 160404 LS-NC3	0,4			●	●	●																		
	TNGA 160408 LS-NC3	0,8			●	●	●																		
	TNGA 160412 LS-NC3	1,2			●	●	●																		
 HS - Type Strong cutting edge with 3 CBN cutting edges	TNGA 160404 HS-NC3	0,4	●	●		●	●																		
	TNGA 160408 HS-NC3	0,8	●	●		●	●																		
	TNGA 160412 HS-NC3	1,2	●	●		●	●	●																	
 Break Master - FV, LV, SV CBN with chipbreaker with 6 CBN cutting edges	TNGG 160404 N-FV NC6	0,4	●	●		●	●																		
	TNGG 160408 N-FV NC6	0,8	●	●		●	●																		
	TNGG 160412 N-FV NC6	1,2	●	●		●	●																		
	TNGG 160404 N-LV NC6	0,4	●	●		●	●																		
	TNGG 160408 N-LV NC6	0,8	●	●		●	●																		
	TNGG 160412 N-LV NC6	1,2	●	●		●	●																		
	TNGG 160408 N-SV NC6	0,8		●																					
	TNGG 160412 N-SV NC6	1,2		●			●																		
 with 3 CBN cutting edges	TNGA 160404 NU-3	0,4																			○	○	○	○	
	TNGA 160408 NU-3	0,8																				○	○	○	
	TNGA 160412 NU-3	1,2																				○	○	○	
 LF - Type Sharp cutting edge	TNGA 160404 LF-NU3	0,4																				○	○		
	TNGA 160408 LF-NU3	0,8																					○	○	
 HS - Type Strong cutting edge	TNGA 160404 HS-NU3	0,4																				○	○		
	TNGA 160408 HS-NU3	0,8																					○	○	
 Break Master - LV with 3 CBN cutting edges	TNGM 160404 N-LV NU3	0,4								●															
	TNGM 160408 N-LV NU3	0,8								●															
	TNGM 160412 N-LV NU3	1,2								●															

● = Euro stock
○ = Stock item in Japan
▲ = To be replaced by new item

C
D
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Z
Sumiboron / SumiDia Inserts

TN_ Type neg. Inserts

TP_ Type 11° pos. Inserts

SUMIBORON / SUMIDIA Indexable Inserts

60° Triangle Type 0° Relief
With Insert Hole

Dimensions (mm)				
TN_	ℓ	∅d (IC)	s	d ₁
1604--	16,5	9,525	4,76	3,81

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Component

TNMA

● M-Class SumiBoron (CBN, Regrindable Type)

Shape	ISO Cat. No.	r	Material																						
			Coated							Uncoated															
			CBN							K			PM	PCD											
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200	
	TNMA 160404 TNMA 160408	0,4 0,8											●												

● M-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	r	Material																						
			Coated							Uncoated															
			CBN							K			PM	PCD											
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200	
	TNMA 160404 NU TNMA 160408 NU TNMA 160412 NU	0,4 0,8 1,2									●	●	●		▲		●								

60° Triangle Type 11° Relief
Without Insert Hole

Dimensions (mm)				
TP_	ℓ	∅d (IC)	s	d ₁
1103--	11,0	6,35	3,18	-
1603--	16,5	9,525	3,18	-

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Component

TPGN

● G-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	r	Material																						
			Coated							Uncoated															
			CBN							K			PM	PCD											
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200	
	TPGN 110304 NU TPGN 110308 NU	0,4 0,8											●					●	●						
	TPGN 160304 NU TPGN 160308 NU	0,4 0,8											●					●	●						

● G-Class SumiDia (PCD, NF Type)

Shape	ISO Cat. No.	r	Material																						
			Coated							Uncoated															
			CBN							K			PM	PCD											
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200	
	TPGN 110304 NF TPGN 110308 NF	0,4 0,8																					●	▲	
	TPGN 160302 NF TPGN 160304 NF TPGN 160308 NF	0,2 0,4 0,8																					●	▲	▲

● = Euro stock
○ = Stock item in Japan
▲ = To be replaced by new item

C
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SumiBoron / SumiDia
Inserts

SUMIBORON / SUMIDIA Indexable Inserts

TP_ _ Type 11° pos. Inserts

60° Triangle Type 11° Relief
With Insert Hole



Dimensions (mm)



TP_ _	ℓ	∅d (IC)	s	d ₁
0802--	8,2	4,76	2,39	2,3
0902--	9,62	5,56	2,38	2,5
1102--	11,0	6,35	2,38	2,8
1103--			3,18	3,4
1604--	16,5	9,525	4,76	4,3

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Component


TPGT / TPGW

● G-Class SumiBoron (CBN, One-Use Type)


Shape	ISO Cat. No.	r	H		H										K		N								
			Coated		Uncoated										K		N								
			CBN										PCD												
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200	
Break Master - FV  CBN with chipbreaker	TPGT 110304 N-FV NC3 TPGT 110308 N-FV NC3	0,4	●	●	●	●																			
		0,8	●	●	●	●																			
Standard - Normal cut geometry 	TPGW 080202 NC TPGW 080204 NC	0,2		●																					
		0,4		●																					
	TPGW 110304 NC TPGW 110308 NC	0,4																							
		0,8		●		●																			

Shape	ISO Cat. No.	r	H		H										K		N								
			Coated		Uncoated										K		N								
			CBN										PCD												
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200	
Break Master - FV  CBN with chipbreaker	TPGT 110304 N-FV NU3 TPGT 110308 N-FV NU3	0,4																							
		0,8																							
Standard - Normal cut geometry 	TPGW 080202 NU TPGW 080204 NU	0,2																							
		0,4																							
	TPGW 110304 NU TPGW 110308 NU	0,4																							
		0,8																							

● M-Class SumiBoron (CBN, Regrindable Type)

Shape	ISO Cat. No.	r	H		H										K		N								
			Coated		Uncoated										K		N								
			CBN										PCD												
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200	
Standard - Normal cut geometry 	TPGW 110304 TPGW 110308	0,4																							
		0,8																							

● G-Class SumiDia (PCD, NF Type)

Shape	ISO Cat. No.	r	H		H										K		N									
			Coated		Uncoated										K		N									
			CBN										PCD													
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200		
Standard - Normal cut geometry 	TPGW 080202 NF TPGW 080204 NF TPGW 110202 NF TPGW 110204 NF TPGW 110208 NF TPGW 110302 NF TPGW 110304 NF TPGW 110308 NF TPGW 160402 NF TPGW 160404 NF TPGW 160408 NF	0,2																						●	▲	
		0,4																							●	▲
		0,2																							●	▲
		0,4																							●	▲
		0,8																							●	▲
		0,2																							●	▲
		0,4																							●	▲
		0,8																							●	▲
		0,2																							●	▲
		0,4																							●	▲
0,8																							●	▲		

● = Euro stock
○ = Stock item in Japan
▲ = To be replaced by new item

60° Triangle Type 11° Relief
With Insert Hole

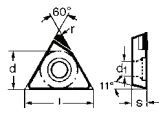
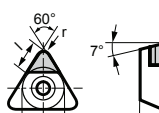
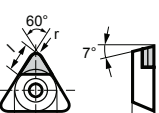
Dimensions (mm)

TP--	ℓ	ød (IC)	s	d ₁
0802--	8,2	4,76	2,39	2,3
0902--	9,62	5,56	2,38	2,5
1102--	11,0	6,35	2,38	2,8
1103--			3,18	3,4
1604--	16,5	9,525	4,76	4,3

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Component

TPMT

● M-Class SumiDia (PCD, One-Use "Break Master" Type)

Shape	ISO Cat. No.	r	H		K		H		K		N													
			Coated				Uncoated				PCD													
			CBN																					
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200
Break Master - DM 	TPMT 080204 L-DM NU	0,4																				●		
	TPMT 090204 L-DM NU	0,4																				●		
Break Master - LD New 	TPMT 080202 N-LD NF	0,2																					○	
	TPMT 080204 N-LD NF	0,4																					○	
	TPMT 090202 N-LD NF	0,2																					○	
	TPMT 090204 N-LD NF	0,4																					○	
	TPMT 110202 N-LD NF	0,2																					○	
	TPMT 110204 N-LD NF	0,4																					○	
	TPMT 110302 N-LD NF	0,2																					○	
TPMT 110304 N-LD NF	0,4																					○		
TPMT 110308 N-LD NF	0,8																					○		
Break Master - GD New 	TPMT 080202 N-GD NF	0,2																				○		
	TPMT 080204 N-GD NF	0,4																					○	
	TPMT 090202 N-GD NF	0,2																					○	
	TPMT 090204 N-GD NF	0,4																					○	
	TPMT 110202 N-GD NF	0,2																					○	
TPMT 110204 N-GD NF	0,4																					○		
TPMT 110302 N-GD NF TPMT 110304 N-GD NF TPMT 110308 N-GD NF	0,2																					○		
	0,4																						○	
	0,8																						○	
TPMT 160402 N-GD NF TPMT 160404 N-GD NF TPMT 160408 N-GD NF	0,2																					○		
	0,4																						○	
	0,8																						○	

● = Euro stock
○ = Stock item in Japan
▲ = To be replaced by new item



SUMIBORON / SUMIDIA Indexable Inserts

VB_ _ Type 5° pos. Inserts

35° Diamond Type 5° Relief
With Insert Hole

Dimensions (mm)				
VB_ _	ℓ	ød _(IC)	s	d ₁
1102--	11,0	6,35	2,38	2,8
1103--			3,18	
1604--	16,6	9,525	4,76	4,4

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Component

VBGW

● G-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	r	H		K													N							
			Coated		Uncoated													PCD							
			CBN																						
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200	
Standard - Normal cut geometry	VBGW 110202 NC VBGW 110204 NC VBGW 110208 NC	0,2 0,4 0,8		●			●																		
	VBGW 110202 NU VBGW 110204 NU VBGW 110208 NU	0,2 0,4 0,8									●		●												
	VBGW 160402 NU VBGW 160404 NU VBGW 160408 NU	0,2 0,4 0,8								●	●	▲	●		▲	●	●	●	●						

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	r	H		K													N							
			Coated		Uncoated													PCD							
			CBN																						
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200	
Standard - Normal cut geometry	VBGW 160404 NC-2 VBGW 160408 NC-2	0,4	●	●	●	●	●	●	●																
		0,8	●	●	●	●	●	●	●																
LS - Type Low cutting force	VBGW 160404 LS-NC2 VBGW 160408 LS-NC2	0,4			●	●	●																		
		0,8			●	●																			
HS - Type Strong cutting edge	VBGW 160404 HS-NC2 VBGW 160408 HS-NC2	0,4			●		●	●																	
		0,8			●		●	●																	
Standard - Normal cut geometry	VBGW 160404 NU-2 VBGW 160408 NU-2	0,4								●	●	▲	●		▲										
		0,8								●	●	▲	●		▲										

● = Euro stock
○ = Stock item in Japan
▲ = To be replaced by new item


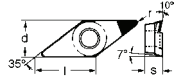

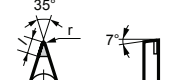

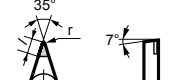

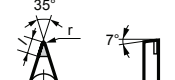
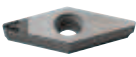
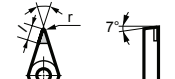
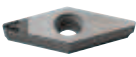
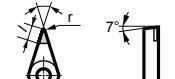
35° Diamond Type 7° Relief
With Insert Hole

Dimensions (mm)				
VB--	ℓ	∅d _(IC)	s	d ₁
1102--	11,0	6,35	2,38	2,8
1103--			3,18	
1604--	16,6	9,525	4,76	4,4

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Component

VCMT

● M-Class SumiDia (PCD, NF Type)

Shape	ISO Cat. No.	r	H		K		H		K		N														
			Coated		Uncoated		Uncoated		K		N														
			CBN																						
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200	
 	VCMT 110301 NF	0,1																					●	▲	
	VCMT 110302 NF	0,2																						●	▲
	VCMT 110304 NF	0,4																						●	▲
 	VCMT 160404 NF	0,4																					●	▲	
	VCMT 160408 NF	0,8																						●	▲
	VCMT 160412 NF	1,2																						●	▲
 	VCMT 110302 N-LD NF	0,2																					○		
	VCMT 110304 N-LD NF	0,4																						○	
	VCMT 160404 N-LD NF	0,4																						○	
 	VCMT 160408 N-LD NF	0,8																					○		
	VCMT 160412 N-LD NF	1,2																						○	
	VCMT 110302 N-GD NF	0,2																						○	
 	VCMT 110304 N-GD NF	0,4																					○		
	VCMT 160404 N-GD NF	0,4																						○	
	VCMT 160408 N-GD NF	0,8																						○	
 	VCMT 160412 N-GD NF	1,2																					○		

● = Euro stock
 ○ = Stock item in Japan
 ▲ = To be replaced by new item

C
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Sumiboron / Sumidia
 Inserts


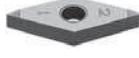

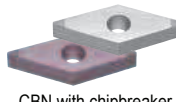
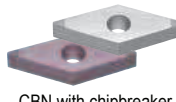
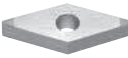
35° Diamond Type **0° Relief**
With Insert Hole

Dimensions (mm)				
VN_	ℓ	∅d _(IC)	s	d ₁
1604--	16,6	9,525	4,76	3,81


H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Component

VNGA / VNGG / VNMA


● **G-Class SumiBoron (CBN, One-Use Multi-Corner Type)**

Shape	ISO Cat. No.	r	H		K		H		K		N														
			Coated		Uncoated		Uncoated		Uncoated		PCD														
			CBN																						
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200	
 with 2 CBN cutting edges	VNGA 160404 NU-2	0,4																							
	VNGA 160408 NU-2	0,8								●	●										○				
 with 2 CBN cutting edges	VNGA 160404 NC2	0,4		●																					
	VNGA 160408 NC2	0,8		●																					
 with 4 CBN cutting edges	VNGA 160404 NC4	0,4		●																					
	VNGA 160408 NC4	0,8		●																					
Break Master - FV, - LV  CBN with chipbreaker with 4 CBN cutting edges	VNGG 160404 N-FV NC4	0,4	●	●		●	●																		
	VNGG 160408 N-FV NC4	0,8	●	●		●	●																		
 CBN with chipbreaker with 4 CBN cutting edges	VNGG 160404 N-LV NC4	0,4	●	●		●	●																		
	VNGG 160408 N-LV NC4	0,8	●	●		●	●																		
Break Master - LV  CBN with chipbreaker with 2 CBN cutting edges	VNGM 160404 N-LV NU2	0,4									●	●													
	VNGM 160408 N-LV NU2	0,8									●	●													

● **M-Class SumiBoron (CBN, Regrindable Type)**


Shape	ISO Cat. No.	r	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200
 with 2 CBN cutting edges	VNMA 160404	0,4											●	●										
	VNMA 160408	0,8											●	●										

● **M-Class SumiBoron (CBN, One-Use Type)**

Shape	ISO Cat. No.	r	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200
 with 2 CBN cutting edges	VNMA 160404 NU	0,4								●	●	▲	●	▲	●	●								
	VNMA 160408 NU	0,8								●	●	▲	●	▲	●	●								

VNMX

● **M-Class SumiDia (PCD, Regrindable Type)**

Shape	ISO Cat. No.	r	H		K		H		K		N													
			Coated		Uncoated		Uncoated		Uncoated		PCD													
			CBN																					
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	DA2200
 with 2 CBN cutting edges	VNMX 160404 NF	0,4																					●	▲
	VNMX 160408 NF	0,8																					●	▲

● = Euro stock
 ○ = Stock item in Japan
 ▲ = To be replaced by new item

C
D
R
S
T
W
Z

SumiBoron / SumiDia
Inserts



New

BSME M28-30

Very small boring bar - brazed type

- Solid carbide shank boring bar with brazed CBN tip and inner coolant supply.
- For tiny hole diameter boring in hardened steel.
- Min. boring dia. is \varnothing 2,5 mm.

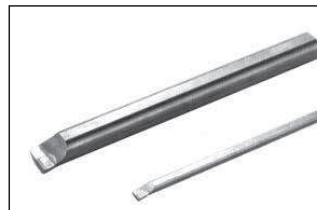


New

SEXC M28-31

CBN boring tool for small diameter boring

- Solid carbide shank boring bar with indexable CBN insert and inner coolant supply.
- For small hole diameter boring in hardened steel.
- Min. boring dia. is \varnothing 4,0 mm.



BNBB M32

Small hole boring tools

- CBN cutting edge is brazed on to a solid carbide shank.
- Small hole boring for hardened steels.
- Min. boring dia. is \varnothing 3,5 mm.



BNZ M33

Small hole boring bars

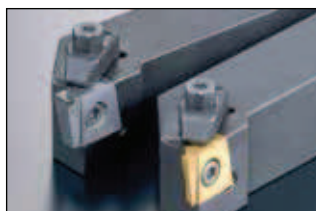
- Solid carbide boring bars with economical CBN insert.
- Small hole boring for hardened steels.
- Min. boring dia. is \varnothing 7,0 mm.



BNB M33

Small hole boring bars

- Solid carbide boring bars with economical CBN and PCD insert.
- Min. boring dia. is \varnothing 10,0 mm.



GWB M34-35

CBN Grooving System for Hardened Steels

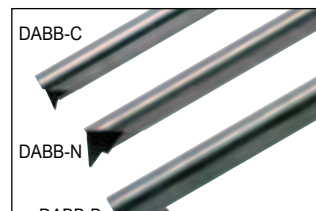
- Tangential Inserts – Double clamp holder
- Groove Widths from 1,5 – 6,0mm
- New CBN grade for interrupted grooving



BNGG M36

Threading holders

- CBN cutting edge for hardened steel
- Adjustable threading after regrinding.



DABB M37

Small hole boring tools

- PCD cutting edge for finishing of small non-ferrous parts
- Min. boring dia. is \varnothing 3,0 mm.
- DABB-C for boring
- DABB-N for profiling and corner grooving
- DABB-B for back boring



DAL / DDL / DML M44-45

High precision SUMIDIA Drills

- PCD cutting edge is brazed on to a solid carbide shank.
- From general to high precision drilling of Aluminium alloys
- DML type is suitable for chamfering and stepped drilling



RF M38

High speed face mill for Aluminium

- Finishing and roughing aluminium alloys and non-ferrous materials
- High precision and highspeed machining $vc=5000$ m/min
- Aluminium alloy body
- Run-out less than $10\mu\text{m}$
- Easy assembling



SRF M39

High speed face mill for Aluminium

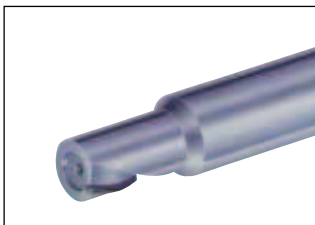
- Small diameter cutter for small machines
- High speed roughing and finishing with SumiDia DA2200
- High speed capability of $\text{rpm} = 20.000$
- Economical PCD insert NF type



FMU M40-41

"BN Finish Mill" for finishing grey cast iron

- High speed machining $vc=1500$ m/min
- Excellent surface roughness $Rz=3,2$
- Run-out less than $10\mu\text{m}$
- Easy assembling



BNES M42

"Helical Master" SUMIBORON Endmill

- Spiral CBN brazed cutting edge for super finishing hardened steel (HRC50~60)
- Dry machining
- Stable cutting
- High accuracy
- Excellent swarf evacuation



BNBP M43

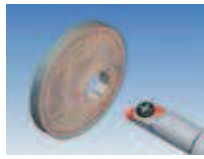
"Mould Finish Master" Micro Ball Nose Endmills

- High precision machining of hardened steels $< \text{HRC}70$ with long tool life
- Super tough grade SUMIBORON BN350 prevents chipping of the cutting edge
- R accuracy : $\pm 0,005\text{mm}$

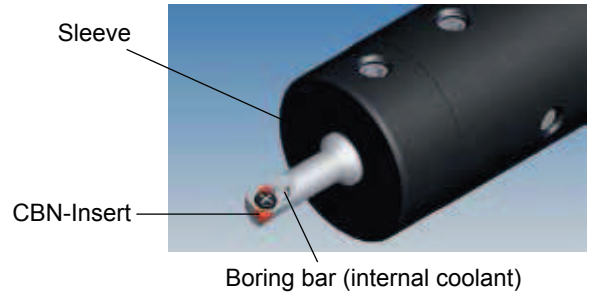


■ Features

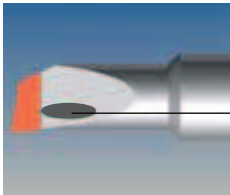

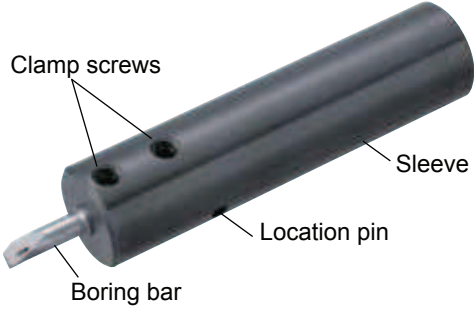
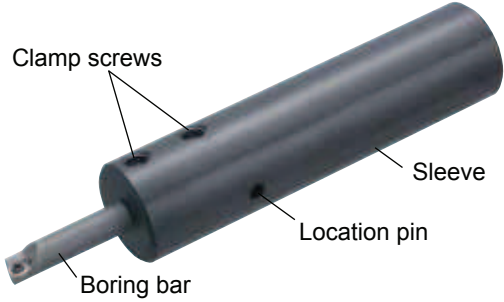
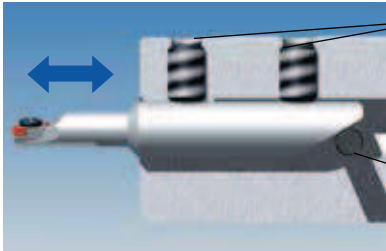
- New ultra small boring bar with CBN cutting edge
- Internal coolant
- Easy setting and handling
- High accuracy
- Carbide body for high rigidity
- One sleeve for different diameters



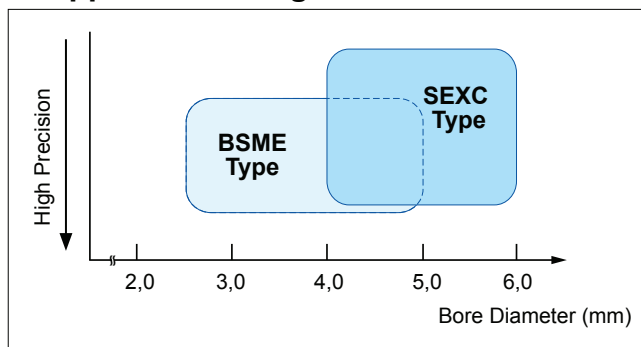
■ Basic System



■ 2 Types of CBN Small Hole Boring Bar System

BSME - CBN Brazed Cutting Edge Type	SEXC - Indexable CBN Insert Type
Min. bore diameter: $\varnothing 2,5-5,0\text{mm}$	Min. bore diameter: $\varnothing 4,0-6,0\text{mm}$
<p>Unique cutting edge shape with high quality and sharpness</p>  <p>Internal coolant hole (standard)</p>	<p>2 corner inserts</p>  <p>Internal coolant hole (standard)</p>
 <p>Clamp screws Sleeve Location pin Boring bar</p>	 <p>Clamp screws Sleeve Location pin Boring bar</p>
<p>Excellent repeatability of boring bar (deviation within 0,020mm)</p>  <p>Clamp screws Location pin for controlled cutting edge position</p>	

■ Application Range

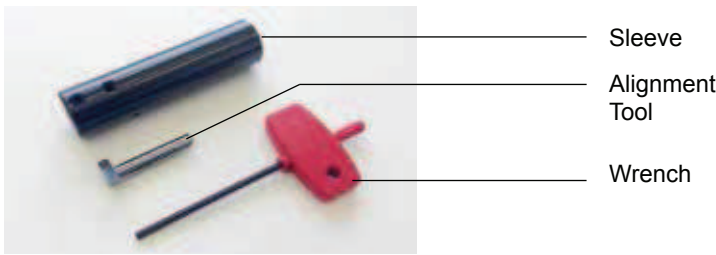


■ Recommended Cutting Conditions

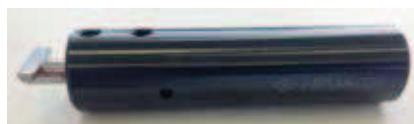
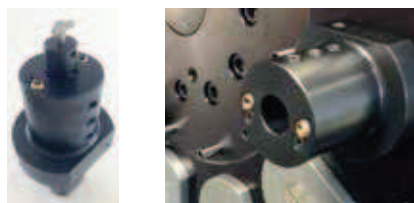


Spindle Speed (n)	$>2000\text{min}^{-1}$	Low speed may cause chattering and chipping on the cutting edge.
Depth of Cut (a_p)	0,01 - 0,15mm	Excessive depth of cut may cause larger tool deflection resulting in deterioration of bore accuracy.
Feed Rate (f)	0,01 - 0,1mm/rev	-



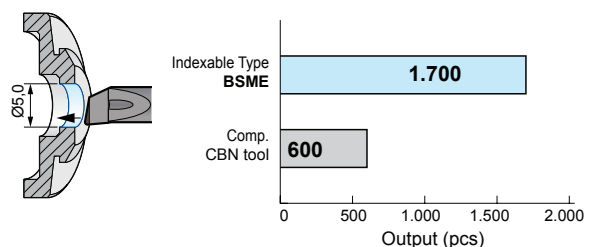
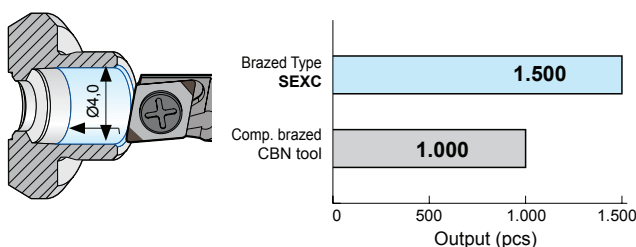
Accessories



Mounting Instruction

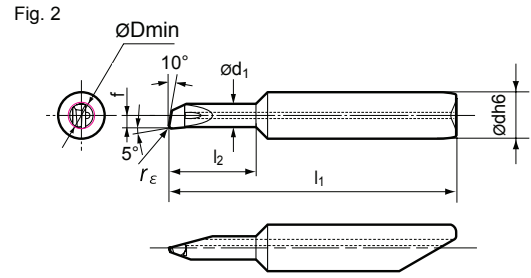
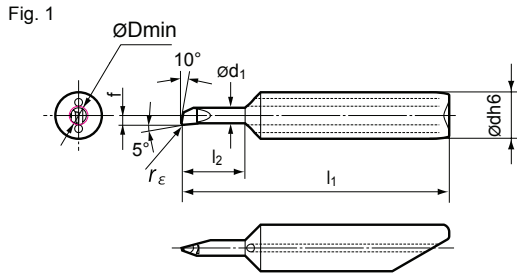
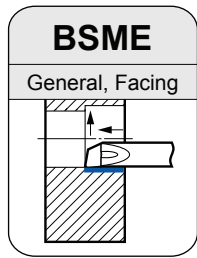
<p>1. Insert alignment tool into the sleeve until you connect with the pin inside. Gently lock the screws to hold.</p>	
<p>2. Locate the sleeve into your tool-holding system. Gently lock the screws to hold.</p>	
<p>3. Clock the flat of the alignment tool into a straight position.</p> 	<p>After adjustment, equipped boring bar has automatically cutting peak height of zero on the center of tool.</p> 
<p>4. Use pre setting machine to set the diameter of the boring bar.</p>	

Application Example

BSME Hardened Alloy Steel Valve Component	SEXC Bearing Steel Small Automotive Component
<p>The BSME type provides stable machining. Tool life is over 2 times longer than competitor's CBN tool.</p> 	<p>The SEXC type provides drastically reduced tool costs. Tool life is 1,5 times longer than competitor's brazed CBN tool.</p> 
<p>Work Material: Hardened alloy steel valve component (automotive component) Tool: BSME R50020D2S6 Grade: BN2000 Cutting Conditions: $v_c = 135\text{m/min}$ $f = 0,02\text{mm/rev}$ $a_p = 0,10\text{mm}$ Dry</p>	<p>Work Material: Bearing steel small automotive component (60HRC) Holder: E06D2 SEXC R/L03-04P Insert: ECXA 030X02LF (BN2000) Cutting Conditions: $v_c = 50\text{m/min}$ (4.000rpm) $f = 0,02\text{mm/rev}$ $a_p = 0,02\text{mm}$ Wet</p>



BSME-Type with Internal Coolant



Sharp edge (no honing)

■ Boring Bar

Description	Grade		Dimensions (mm)							Fig.	Applicable Sleeve
	BN2000		$\varnothing D_{min}$	$\varnothing d_1$	f	l_2	l_1	$\varnothing dh6$	r_ϵ		
	R	L									
BSMER/L 25020D2S6	●	●	2,5	2,0	1,20	5,3	32,0	6,0	0,2	1	HBSM6020
BSMER/L 25020D3S6	●	●									
BSMER/L 25020D4S6	□	□									
BSMER/L 30020D2S6	●	●	3,0	2,5	1,45	6,3	32,8				
BSMER/L 30020D3S6	●	●									
BSMER/L 30020D4S6	□	□									
BSMER/L 35020D2S6	●	●	3,5	3,0	1,70	7,3	33,5				
BSMER/L 35020D3S6	●	●									
BSMER/L 35020D4S6	□	□									
BSMER/L 40020D2S6	●	●	4,0	3,5	1,95	8,3	33,9				
BSMER/L 40020D3S6	●	●									
BSMER/L 40020D4S6	□	□									
BSMER/L 45020D2S6	●	●	4,5	4,0	2,20	9,3	35,0				
BSMER/L 45020D3S6	●	●									
BSMER/L 45020D4S6	□	□									
BSMER/L 50020D2S6	●	●	5,0	4,5	2,45	10,3	35,8				
BSMER/L 50020D3S6	●	●									
BSMER/L 50020D4S6	□	□									

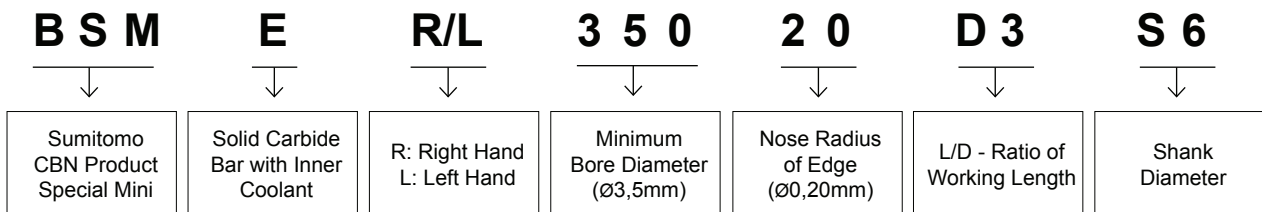
■ Adapter Sleeve and Parts

Description	Stock	Dimensions (mm)		Sleeve Screw	Wrench
		$\varnothing D_s$	l_1		
HBSM6020	●	6,0	80	BT0506	TH025

■ Alignment Tool

Description	Stock
AFBSM60	●

■ Identification

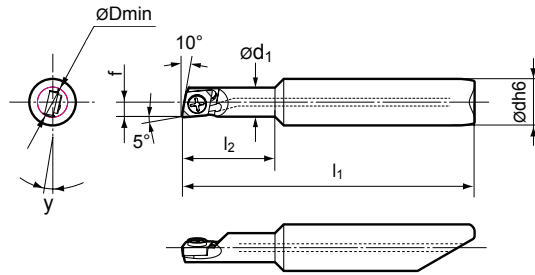
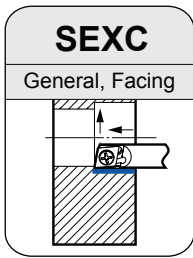


● = Eurostock
□ = Delivery on request



SEXC Series

SEXC-Type with Internal Coolant



Spare Parts

Applicable Sleeve	Insert Screw	Tightening Torque (N·m)	Wrench
HBSM6020	MIB1,6-2,0	0,2	SDBSM
	MIB1,6-2,5		
	MIB1,6-3,0		

Boring Bar

Description	Stock		Dimensions (mm)							Applicable Sleeve	Insert Screw	Tightening Torque (N·m)	Wrench
	R	L	ØDmin	ød1	f	l2	l1	ødh6	y				
E06D2 SEXCR/L03-04P	●	●	4,0	3,75	1,95	8	33,75	6,0	13°	HBSM6020	0,2	SDBSM	
E06D3 SEXCR/L03-04P	●	●				12	37,75						
E06D2 SEXCR/L03-05P	●	●	5,0	4,75	2,45	10	35,25						
E06D3 SEXCR/L03-05P	●	●				15	40,25						
E06D2 SEXCR/L03-06P	●	●	6,0	5,75	2,95	12	36,75	11°					
E06D3 SEXCR/L03-06P	●	●				18	42,75						

Adapter Sleeve and Parts

Description	Stock	Dimensions (mm)		Sleeve Screw	Wrench
HBSM6020	●	ØDs	l1	BT0506	TH025

Alignment Tool

Description	Stock
AFBSM60	●

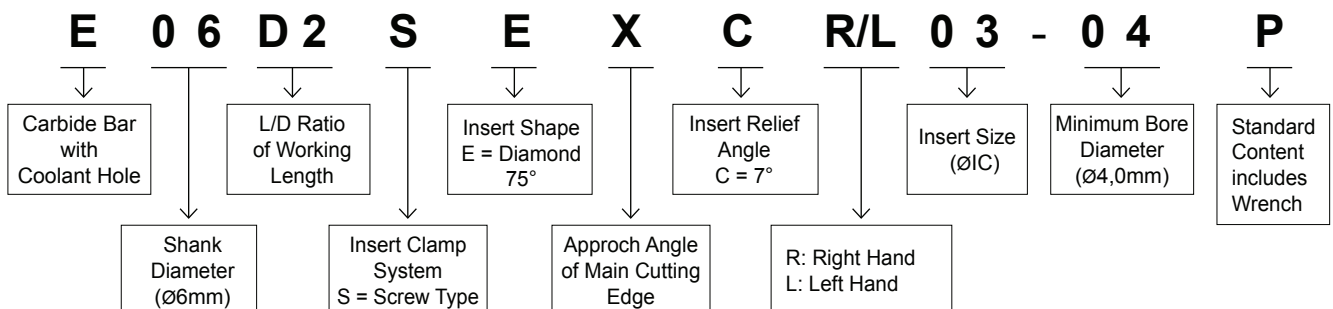
CBN Insert

Description	Grade		Nose Radius r _ε (mm)	Cutting Edge Preparation
ECXA030X02LE NU2	●		0,2	sharp + hone
ECXA030X02LF NU2	●	●	0,2	sharp

Notes:

Applicable wrench SDBSM is recommended when fastening the insert screw. Please check insert screw occasionally and replace it in time.

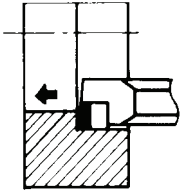
Identification



SUMIBORON Small Hole Boring Tools BNBB Type

For Hardened Steel

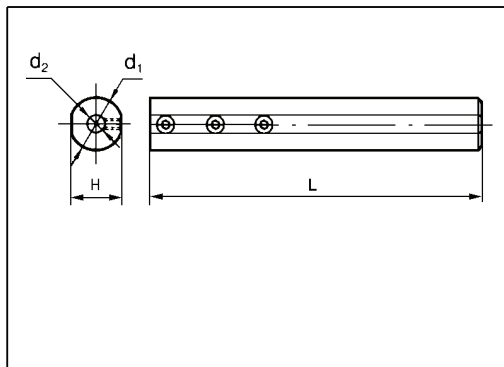
BNBB type small hole boring tools for hardened work pieces up to diameter 3,5 mm



■ „Sumiboron“ Brazed Boring Tools for Small Hole Boring

	Cat. No.	Stock	Dimensions (mm)					Applicable holder	Grade of brazed cutting edge
			D _{min}	d	l ₁	h	r		
BNBB (Carbide shank) 	BNBB 03 R	●	3,5	3	60	2,4	0,2	HBB 316	SUMIBORON (CBN) BN250
	BNBB 04 R	●	4,5	4	60	3,4	0,2	HBB 416	
	BNBB 05 R	●	5,5	5	80	4,4	0,2	HBB 516	
	BNBB 06 R	●	6,5	6	80	5,4	0,2	HBB 616	
	BNBB 08 R	●	8,5	8	100	7,4	0,2	HBB 816	

■ Holder



Cat. No.	Stock	Dimensions (mm)			
		d ₁	L	d ₂	H
HBB 316	●	16	100	3	15
HBB 416	●			4	
HBB 516	●			5	
HBB 616	●			6	
HBB 816	●			8	

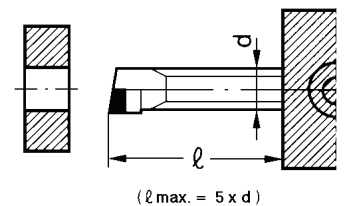
■ Spare Parts

Screw	Wrench
BT 0404	TH 020

■ Recommended Cutting Conditions

Work material	SUMIBORON BN250		Notes
Hardened steels (H_RC45~68)	Cutting speed (v _c)	30 ~ 150 / min	Low speed may cause chattering in cutting process and chipping occurrence on the cutting edge.
	Feed rate (f)	0,03 ~ 0,1 mm/rev	-
	Depth of cut (d _{oc})	0,03 ~ 0,2 mm	Excessive depth of cut may cause larger deformation of tool, resulting in deterioration of bore accuracy.

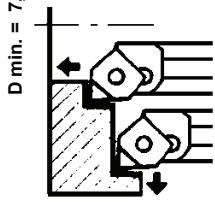
■ Precaution On Use



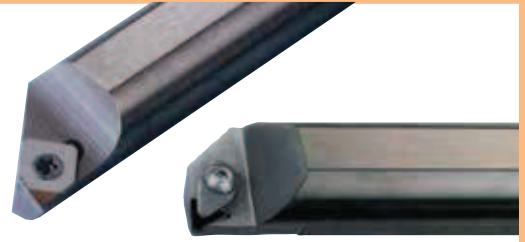
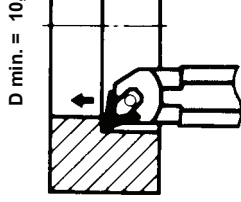
- Adjust overhang to achieve absolute minimum.
- For use of a small diameter brazed boring tool, select high speed and small feed rate, as much as possible.

● = Eurostock

BNZ type



BNB type



■ Boring Bars for Small Hole Boring

	Cat. No.	Stock	Dimensions (mm)					Applicable insert	
			D _{min}	d	l ₁	h	γ		
BNZ (Carbide shank) 	BNZ 606 R	●	7	6	80	5,5	-14°	ZNEX 040100	 ZNEX (CBN)
	BNZ 608 R	●	9	8	100	7,5	-12°		
	BNZ 610 R	●	11	10	125	9,5	-10°		
	BNZ 612 R	●	13	12	130	11	-8°		
Holder "HBB616" for BNZ606 (ød=6mm) 									
BNB (Carbide shank) 	BNB 508 R/L	● ●	10	8	140	7	-9°	TBGN 060100	 TBGN (CBN)
	BNB 512 R/L	● ●	14	12	160	11	-6°		
	BNB 516 R/L	● ●	18	16	180	14	-5°		
	BNB 520 R/L	● ●	22	20	180	18	-4°		

■ Spare Parts for BNZ

Holder	Screw	Wrench
BNZ 606 R		
BNZ 608 R	BFTX 0204 N	TRX 06
BNZ 610 R	0,5 (Nm)	

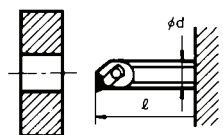
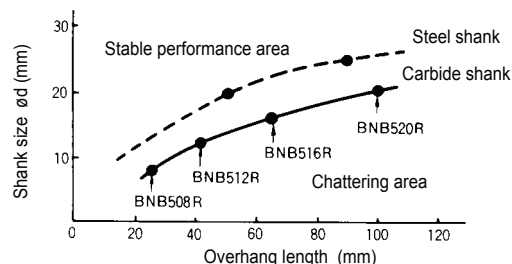
■ Spare Parts for BNB

Holder	Clamp	Clamp bolt	Nut	Wrench
BNB 508 R/L	BNBC	BH 0306	BNBW-2	TH 020
BNB 512 R/L	BNBC	FBUP-3-A0-9	BNBW-4	TH 020
BNB 516 R/L	BNBC	BH 0310	BNBW-4	TH 020
BNB 520 R/L	BNBC	BH 0310	BNBW-7	TH 020

■ Recommended Cutting Conditions

Cutting speed	80 ~ 120 m/min
Feed rate	0,03 ~ 0,1 mm/rev
Depth of cut	0,03 ~ 0,2 mm

■ Holders Performance Area



Work material: Alloy steel (H_RC 60)
 Cutting conditions: v_c = 100 m/min
 f = 0,1 mm/rev
 d_{0c} = 0,2 mm

SUMIBORON Grooving Tool Holder GWB Type



New CBN Grooving System for Hardened Steels

■ Features

Tangential insert

80 degree tangentially mounted insert improves rigidity

New coated CBN grade BNC30G

Tough new coated CBN grade for interrupted hard grooving




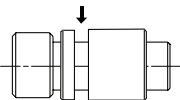

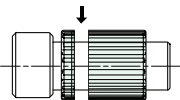
Double clamping system

The double clamping system increases stability so even axial feeds are possible.

Wide insert range 1,5 – 6,0mm

Wide range of width's and grades for continuous and interrupted cut grooving operations

■ Grades

Grade	Application	Features
BN250 	Continuous grooving 	Uncoated CBN grade for continuous cut grooving applications
BNC30G 	Interrupted grooving 	Tough new CBN coated grade developed for interrupted cut grooving applications

■ Recommended cutting Conditions

Material	Hardened steel
Cutting speed (m/min)	60 — 80 — 120 — 150
Feed rate (mm/rev)	0,03 — 0,04 — 0,08 — 0,1
Grade	BN250, BNC30G

Coolant:

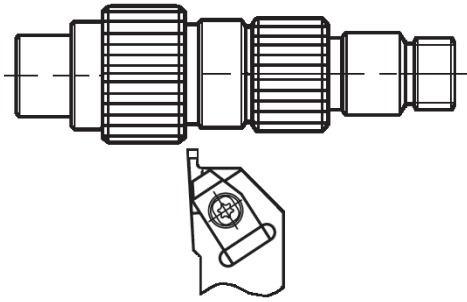
Dry / Wet (for continuous cut)
Dry only (for interrupted cut)

Remarks:

To avoid thermal cracking of the cutting edge when interrupted cutting please ensure workpiece remains dry.

- = Eurostock
- = Delivery on request

SUMIBORON Grooving Tool Holder GWB Type



■ Holders

	Cat. No.	Stock		Dimensions (mm)							Applicable Insert	
		R	L	h	h ₁	b	f	l ₁	t ^(*)	ℓ		
	GWB R/L 2020 - 45	☐	☐	20	20	20	24	150	1,5 < t ≤ 2,0	3,5	CGA R/L 1504 ○○○	
									2,0 < t ≤ 3,0	4,0		
	GWB R/L 2525 - 45	●	●	25	25	25	30	150	1,5 < t ≤ 2,0	3,5		
									2,0 < t ≤ 3,0	4,0		
	GWB R/L 2525 - 60	●	●	25	25	25	30	151	4,5 < t ≤ 6,0	5,0		CGA R/L 1506 ○○○
									3,0 < t ≤ 4,5	5,0		

Right handed tool holders are applicable with right handed inserts.

Remark: Inserts are not included.

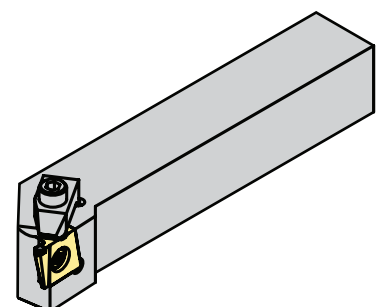
■ Inserts

	Cat. No.	Stock				Dimensions (mm)					Applicable Holder
		BN250		BNC30G		t ^(*)	ℓ	r	I.C.	T	
		R	L	R	L						
	CGA R/L 1504 150	●	●	●	●	1,5	3,5	0,2	15,875	4,76	GWB R/L 2020 - 45 GWB R/L 2525 - 45
	CGA R/L 1504 200	●	●	●	●	2,0					
	CGA R/L 1504 250	●	●	●	●	2,5					
	CGA R/L 1504 300	●	●	●	●	3,0					
	CGA R/L 1504 350	●	●	●	●	3,5					
	CGA R/L 1504 400	●	●	●	●	4,0					
	CGA R/L 1504 450	●	●	●	●	4,5					
	CGA R/L 1506 500	●	●	●	●	5,0					
	CGA R/L 1506 550	●	●	●	●	5,5					
	CGA R/L 1506 600	●	●	●	●	6,0	6,35			GWB R/L 2525 - 60	

* Special widths available on request

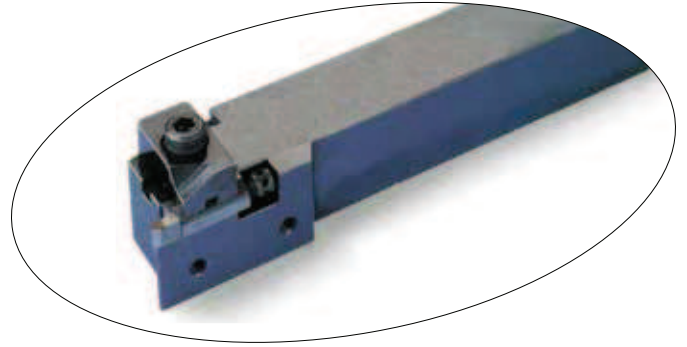
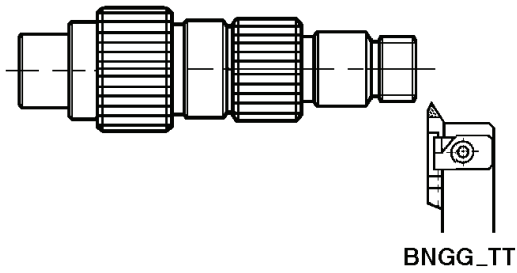
■ Spare Parts

Holder	Clamp finger	Clamp screw	Insert screw	Spring	Wrench
GWB R/L 2020 - 45					
GWB R/L 2525 - 45	TF 72 (Right handed)	BX 0520 T	BFTX 0511 N	GSP 6	TRX 20
GWB R/L 2525 - 60	TF 73 (Left handed)		5,0		



SUMIBORON Threading Tool Holder BNGG Type

For Hardened Steel



„Sumiboron“ Holders

	Cat. No.	Stock		Dimensions (mm)			Applicable Insert
		R	L	f	l ₂	l ₁	
	BNGG R/L 2525-TT	●	□	28,5	5	150	BNTT 1020 R/L BNTT 1530 R/L

Inserts

	Cat. No.	Stock						Dimensions (mm)				Applicable Holder
		BN250		BN300		BNX20		Pitch	r	l ₁	s	
		R	L	R	L	R	L					
BNTT 1020 R/L	●	□			●	□	1,0 ~ 2,0	0,13	25	6,0	BNGG R/L 2525 - TT	
BNTT 1530 R/L	●	□			●	□	1,5 ~ 3,0	0,13	25	6,0		

● Inserts also suitable for existing BNG2525R type holders

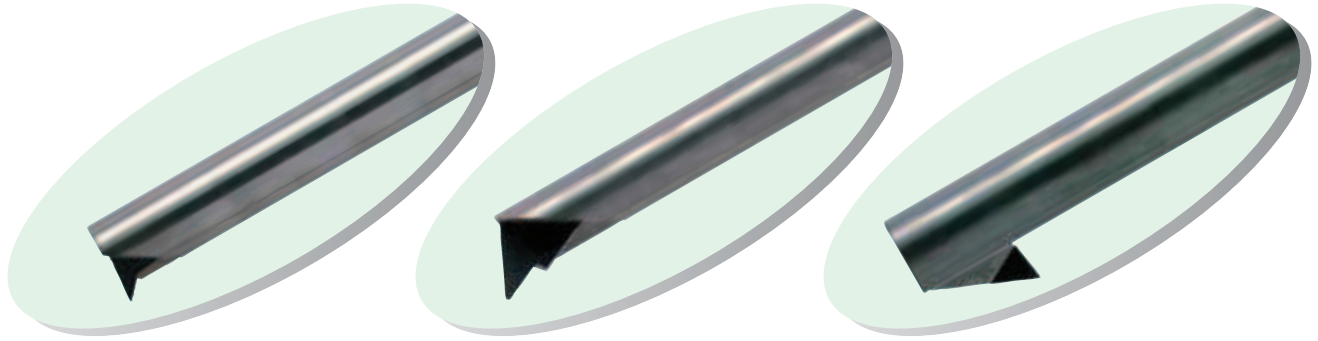
Spare Parts

Holder	Support	Clamp	Adjust screw	Spring	Screw	Wrench	
BNGG R/L 2525 - TT	BNGS R/L TT	BNGC R/L	FMJ	GSP 6	BX 0615 BX 0414 (for Clamp) (for support)	LH 050 LH 030	ø1,8x45

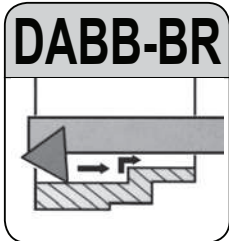
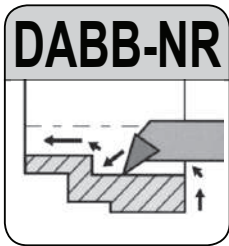
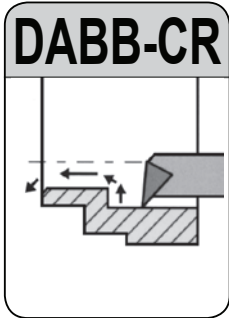
Recommended Cutting Conditions

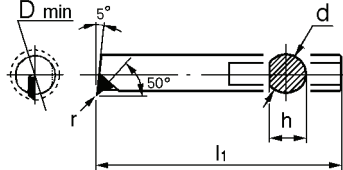
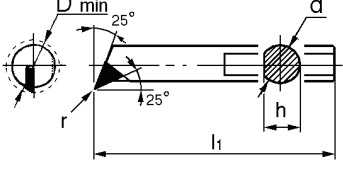
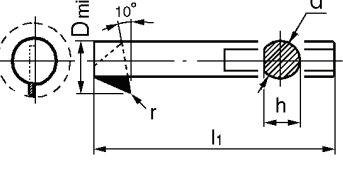
● Threading

Cutting speed (v _c)	80 ~ 120 m/min
Feed rate (f)	Max. pitch: 3,0 mm



■ „Sumidia“ Brazed Boring Tools for Small Hole Boring

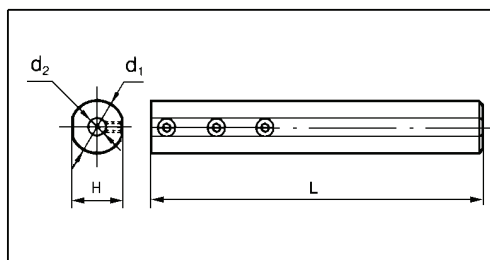


DABB (Solid carbide shank)	Cat. No.	Stock	Dimensions (mm)					Applicable Holder
		DA2200	D _{min}	d	l ₁	h	r	
For small boring 	DABB 025 CR	●	3,0	2,5	60	2,2	0,1	HBB 2516
	DABB 035 CR	□	4,0	3,5	60	3,2	0,1	HBB 3516
	DABB 045 CR	●	5,0	4,5	80	4,1	0,1	HBB 4516
	DABB 060 CR	□	7,0	6,0	80	5,2	0,1	HBB 616
For profiling and corner grooving 	DABB 025 NR	□	3,0	2,5	60	2,2	0,1	HBB 2516
	DABB 035 NR	●	4,0	3,5	60	3,2	0,1	HBB 3516
	DABB 045 NR	□	5,0	4,5	80	4,1	0,1	HBB 4516
	DABB 060 NR	□	7,0	6,0	80	5,2	0,1	HBB 616
For back boring 	DABB 045 BR	□	7,0	4,5	80	4,0	0,1	HBB 4516
	DABB 060 BR		9,0	6,0	80	5,5	0,1	HBB 616

■ Recommended Cutting Conditions


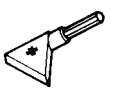
Spindle revolution	Feed rate	Depth of cut	Coolant
> 2000 rpm	0,03 ~ 0,1 mm/rev	0,03 ~ 0,2 mm	Wet

■ Holder



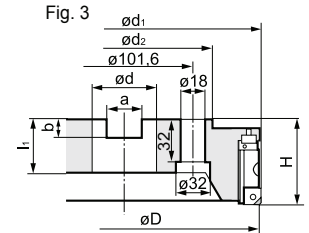
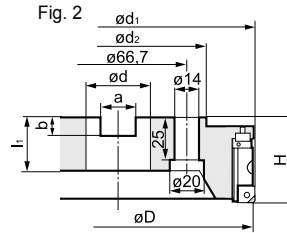
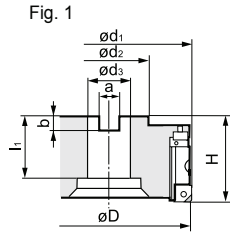
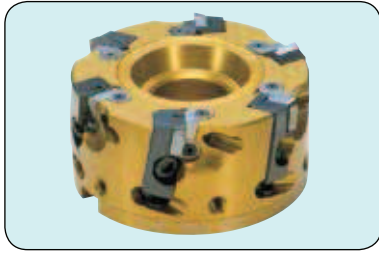
Cat. No.	Stock	Dimensions (mm)			
		d ₁	L	d ₂	H
HBB 2516	●	16	100	2,5	15
HBB 3516	●			3,5	
HBB 4516	●			4,5	
HBB 616	●			6,0	

■ Spare Parts

Screw	Wrench
 BT 0404	 TH 020

SUMIDIA Face Mill RF Type

High Speed Finishing of Aluminium Alloy



Body

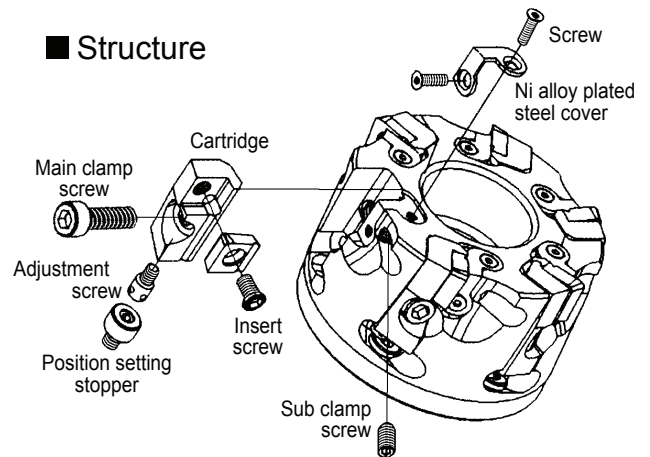
Type	Cat. No.	Stock	Dimensions (mm)				Mounting				Number of teeth	max. depth of cut	Weight (Kg)	Fig.
			ϕD	ϕd_1	ϕd_2	H	ϕd_3	a	b	l_1				
RF 4000	RF 4080 R-S	●	80	82	60	50	27	12,4	7,0	29	6	3,0	0,7	1.
	RF 4100 R-S	●	100	102	75	50	32	14,4	8,5	29	6		1,0	
	RF 4125 R-S	●	125	127	75	63	40	16,4	9,5	29	8		1,6	
	RF 4160 R-S	□	160	162	100	63	40	16,4	9,5	29	10	2,6	2.	
	RF 4200 R-S	□	200	202	130	63	60	25,7	14,0	38	12	3,6	3.	
	RF 4250 R-S	□	250	252	130	63	60	25,7	14,0	38	16	6,0		
	RF 4315 R-S	□	315	317	240	80	60	25,7	14,0	40	18	11,0		

Remark: PCD blades and inserts are not included.

Insert for Roughing and Finishing

Shape	Cat. No.	Grade	Stock
	Carbide insert SDET 1204 ZDFR	H1	●
	PCD insert SNEW 1204 ADFR-NF	DA1000 DA2200	● ▲
	PCD insert wiper type SNEW 1204 ADFR-W-NF	DA1000 DA2200	● ▲

Structure



"Sumidia" Blade

PCD grade DA2200	Cat. No.	Stock
Standard type	RFB	▲
Wiper type	RFBW	▲

Cartridge

Shape	Cat. No.	Stock
For carbide insert	RFR	●
For Sumidia insert	RFF	●

Cutting Insert Selection

For easy assembling:

PCD blade **RFB**
PCD blade **RFB** (wiper type)

For finishing:

Cartridge **RFF**
PCD insert SNEW 1204 ADFR-NF (standard type)
SNEW 1204 ADFR-W-NF (wiper type)
PCD grade: DA2200

For roughing:

Cartridge **RFR**
Uncoated carbide insert
SDET 1204 ZDFR, grade: H1

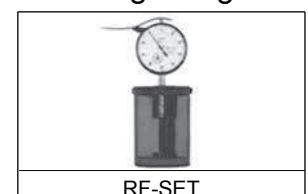
Dummy Blade

Shape	Cat. No.	Stock
	RFD	□

Spare Parts

RFC	RFS	BX0620	BTD0510	FBUP2-A0-8	RFJ	BFTX0509N	TH050 TH015, TH025 TH050	TTX20

Setting Gauge



Dial-gauge is not included.

● = Eurostock
□ = Delivery on request

▲ = To be replaced by new item

SUMIDIA Face Mill SRF Type

High Speed Finishing of Aluminium Alloy

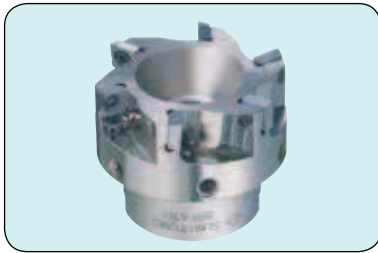


Fig. 1

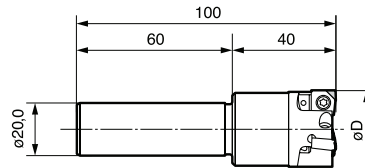
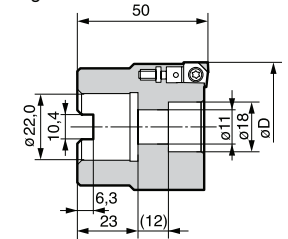


Fig. 2

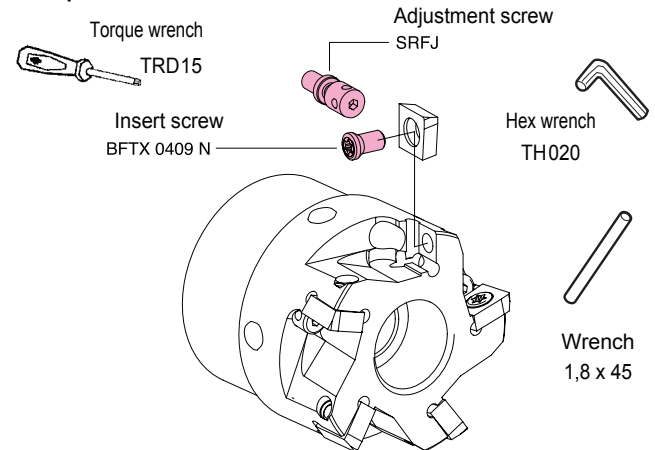


Body

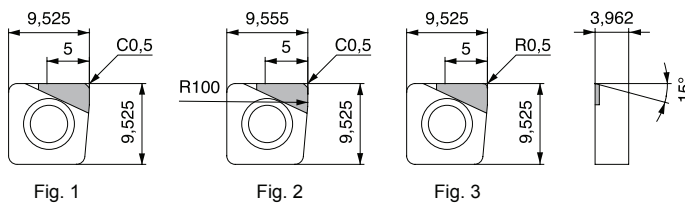
Cat. No.	Stock	ϕD (mm)	No. of teeth	Fig.	Weight (Kg)
SRF 30 R-ST	<input type="checkbox"/>	30	3	1	0,34
SRF 40 R-ST	<input type="checkbox"/>	40	4	1	0,50
SRF 50 RS	<input type="checkbox"/>	50	5	2	0,59
SRF 63 RS	<input type="checkbox"/>	63	6	2	0,67

Inserts are sold separately.

Spare Parts



Insert



Maximum D.O.C. Guide (SRF50RS, 5 teeth)

The contains guidelines on the maximum D.O.C., determined from internal tests. "O" mark indicates the possible application range. Actual cutting conditions should be set, based on actual machine and work characteristics.

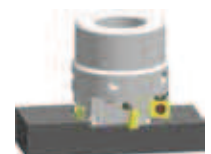
Cat. No.	Cutting Edge	SUMIDIA	Fig
		DA2200	
SNEW 09T3 ADTR-NF	Standard	▲	1
SNEW 09T3 ADTR-U-NF	Wiper	▲	2
SNEW 09T3 ADTR-R-NF	Nose Radius	▲	3

Feed	Feed Speed, v_f (mm/min)		
	2.500	4.000	5.000
	Feed Rate, f_t (mm/tooth)		
D.O.C. (mm)	0,05	0,08	0,10
0,5	○	○	○
1,0	○	○	○
1,5	○	○	○
2,0	○	○	○
2,5	○	○	○
3,0	○	○	○
3,5	○	○	-
4,0	○	-	-
4,5	○	-	-
5,0	○	-	-

- Standard inserts and Wiper inserts can be used on the same cutter body.
- Standard inserts with nose radius should be used where vibration is present. As such, Wiper-inserts will not be applicable.
- Inserts can be regrind 3 times (up to minimum IC diameter 9,225mm).
- When using reground inserts, it is advisable to reconfirm insert height and cutting diameter with a tool pre-setter.
- Do not mix new and reground inserts, or even inserts with different regrind amount on the same cutter.

Cutting Conditions

Cutter: SRF 50 RS
 Insert: SNEW 09T3 ADFR-NF (DA2200)
 n : 10.000 rpm
 Width: 35mm at D.O.C. indicated above

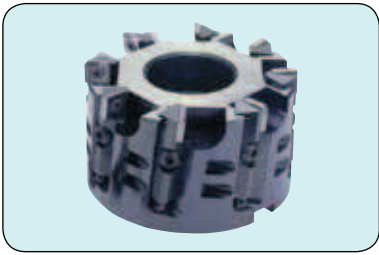


Recommended Cutting Conditions for RF and SRF Type Cutters

Work Material		Process	Grade	Cutting Speed (m/min)		Feed Rate (mm/tooth)	Depth of Cut (mm)	
				RF Type	SRF Type		RF Type	SRF Type
Aluminium Alloy	Si < 13%	Finishing	DA2200 (PCD)	2.000 ~ 5.000	~ 4.000	0,05 ~ 0,2	~ 3,0	~ 5,0
		Roughing	H1 (Carbide)	1.000 ~ 2.500	-			
	Si ≥ 13%	Finishing	DA2200 (PCD)	400 ~ 800	~ 800			
		Roughing	H1 (Carbide)	200 ~ 400	-			

SUMIBORON "BN Finish Mill" FMU Type

High Speed Finishing of Grey Cast Iron



■ Features

- High speed machining $v_c = 1.500$ m/min
- Excellent surface roughness $Rz=3,2$ ($Ra=1,0$)
- Safety structure for the centrifugal force under high speed cutting conditions
- Run-out is less than $10\mu m$
- Easy assembling method using the setting gauge
- Running cost is reduced because of economical insert

■ Application

GG25~GG30 (HB200~250) grey cast iron with pearlite matrix, and ferrite matrix (HB130~160)

Application examples: engine block, cylinder block, etc

■ Specifications

FMU Type: $\varnothing 80 \sim \varnothing 315$ mm
 Insert: SNEW1203ADTR/L
 Low cutting force type: SNEW1203ADTR/L-S

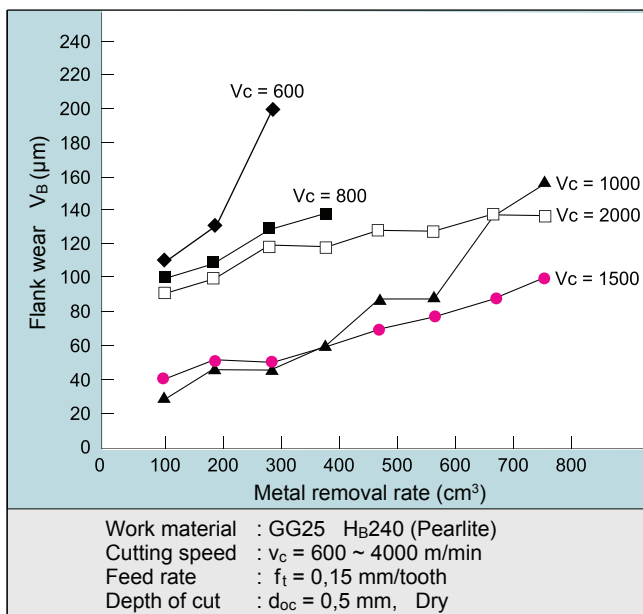
■ Recommended Cutting Conditions

Speed: $v_c = 800 \sim 2000$ m/min
 Feed: $f_t = 0,1 \sim 0,3$ mm/tooth
 Depth: $d_{oc} = 0,5$ mm or less
 Dry cutting

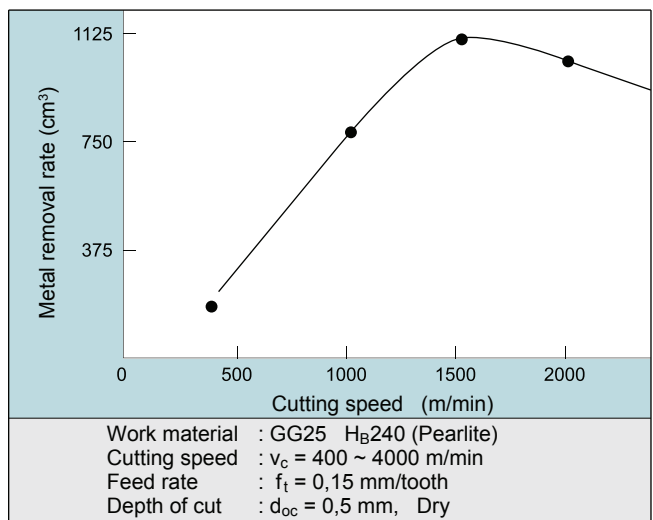


■ Performance

● Tool Life Diagram



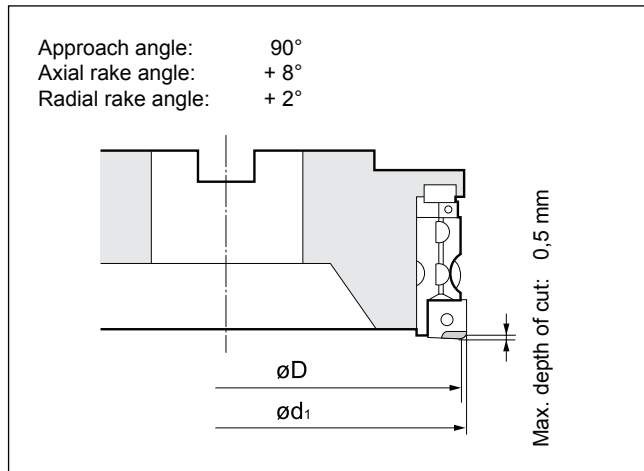
● Estimated Tool Life



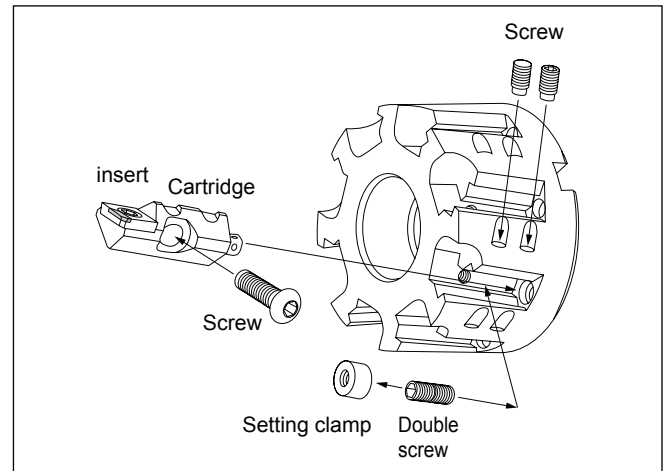
- Milling of ductile cast iron and alloy steel casting do not produce the best results.
- Dry cutting is recommended. Wet cutting will result in chipping of cutting edges in the early stages due to thermal cracking.

SUMIBORON "BN Finish Mill" FMU Type

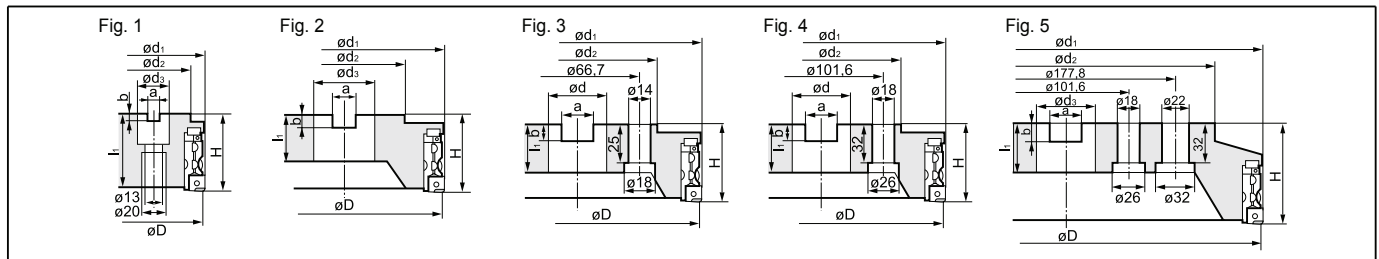
Specifications



Structure

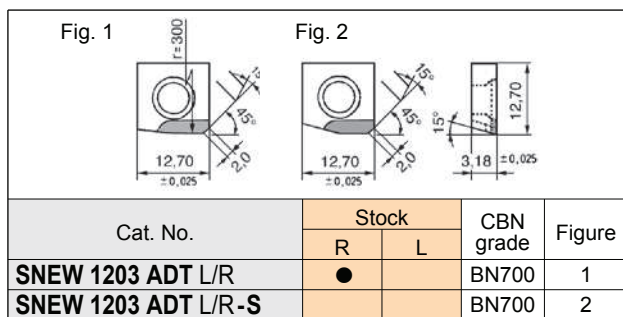


Body

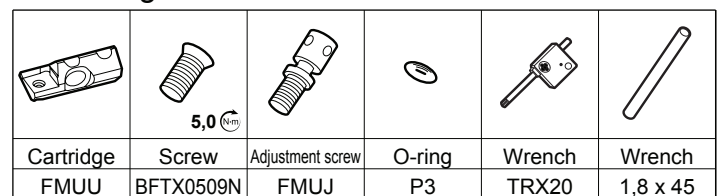


Type	Cat. No.	Stock		Dimensions (mm)				Mounting				Number of teeth	max. depth of cut	Weight (Kg)	Fig.		
		R	L	ø D	ø d ₁	ø d ₂	H	ø d ₃	a	b	l ₁						
FMU 4000	FMU 4080 R-S	●		80	82,8	60	63	27	12,4	7,0	25	6	0,5	1,6	1.		
	FMU 4100 R-S	●		100	102,8	76	63	32	14,4	8,5	29			2,4			
	FMU 4125 R-S	□		125	127,8	75	63	40	16,4	9,5	29			3,4		2.	
	FMU 4160 R-S	□		160	162,8	100	63	40	16,4	9,5	29			5,6			
	FMU 4200 R-S	□		200	202,8	130	63	60	25,7	14,0	38			16		9,2	4.
	FMU 4250 R-S	□		250	252,8	130	63	60	25,7	14,0	38			20		14,3	
	FMU 4315 R-S			315	317,8	240	80	60	25,7	14,0	40	24	27,8	5.			

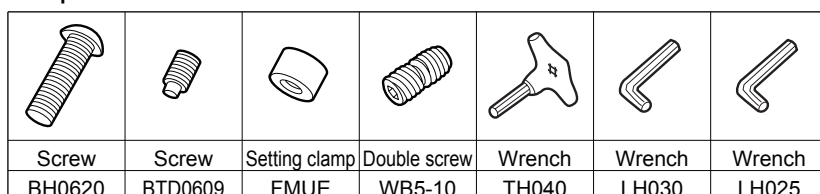
Inserts



Cartridge

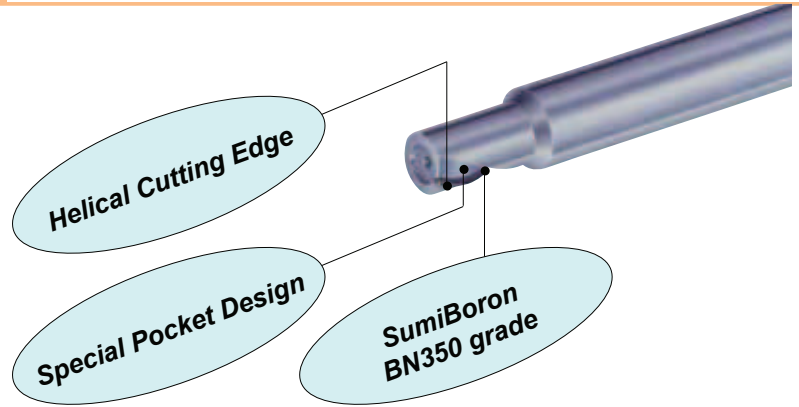


Spare Parts



Gauge





■ Endmills BNES Type with 1 Spiral Flute

	Cat. No.	Stock	Dimensions (mm)				
		BN350	ϕD	ϕd	l_1	l_2	L
	BNES 1060	☐	6,0	10	7,0	11	60
	BNES 1080	☐	8,0	10	10,0	14	70
	BNES 1100	☐	10,0	12	12,0	17	75
	BNES 1120	☐	12,0	12	14,0	20	80
	BNES 1140	☐	14,0	16	16,0	21,5	80
	BNES 1160	☐	16,0	16	18,0	24	80

Helix angle : 15°
right-hand cut, right-hand helix

■ Recommended Cutting Conditions

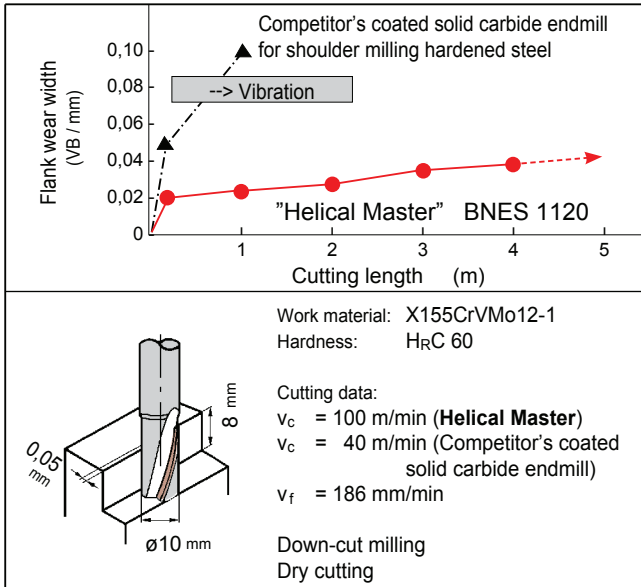
Cutting speed: v_c (m/min), Spindle revolutions: n (rpm), Feed per tooth: f_t (mm/tooth), Feed speed: v_f (mm/min)

Tooling example	ϕD	Hardened steel (HRC 50 ~ 57)			Hardened steel (HRC 58 ~ 65)		
		$v_c = 100 \sim 170$ m/min			$v_c = 80 \sim 150$ m/min		
<p>Depth of cut : $d_{oc} \leq D$</p>	$\phi 6 \sim 8$	$W_{oc} \leq 0,1$ mm	$n = 4000 \sim 9000$	V_f (mm/min) = 240 ~ 540	$W_{oc} \leq 0,08$ mm	$n = 3200 \sim 8000$	V_f (mm/min) = 150 ~ 370
	$\phi 10 \sim 12$	$W_{oc} \leq 0,15$ mm	$n = 2700 \sim 5400$	V_f (mm/min) = 180 ~ 360	$W_{oc} \leq 0,12$ mm	$n = 2100 \sim 4800$	V_f (mm/min) = 120 ~ 270
	$\phi 14 \sim 16$	$W_{oc} \leq 0,2$ mm	$n = 2000 \sim 3800$	V_f (mm/min) = 140 ~ 260	$W_{oc} \leq 0,15$ mm	$n = 1600 \sim 3400$	V_f (mm/min) = 110 ~ 230

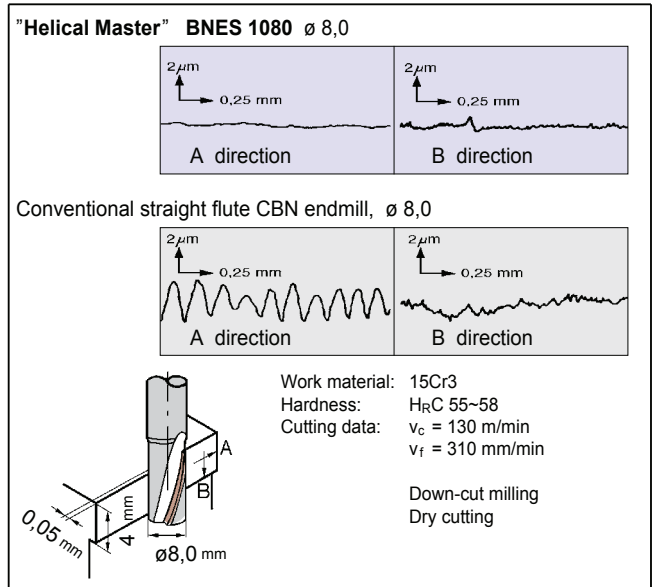
Recommendation: Dry cutting (Air coolant)
Down-cut milling
Minimise the overhang
Use a rigid machine

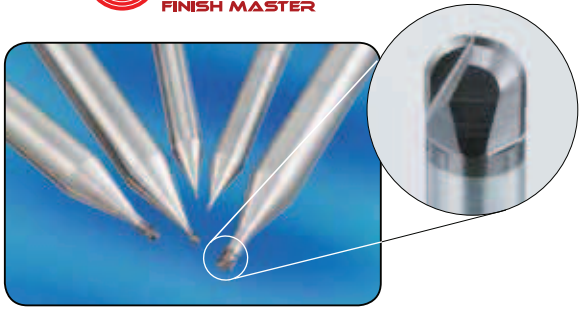
■ Performance

● Long Tool Life and High Efficiency



● Excellent Surface Roughness





Characteristics / Application

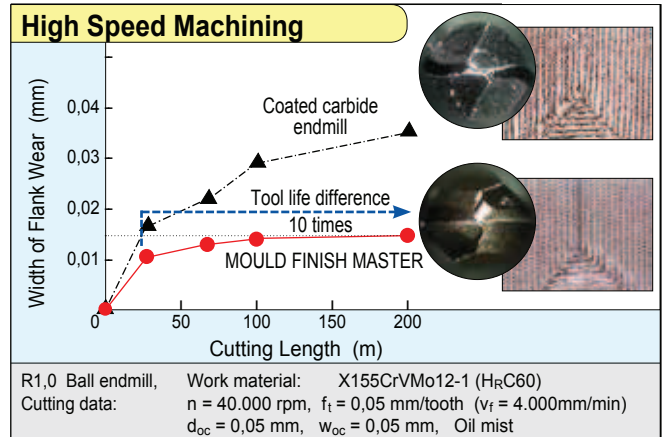
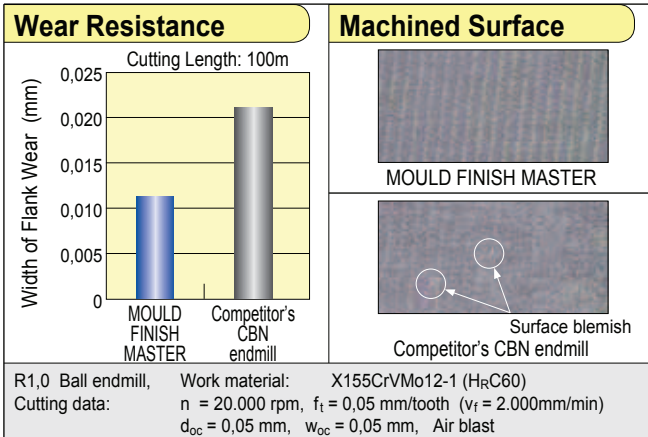
- High precision machining of hardened steels < HRC70 with long tool life
- Super tough grade SUMIBORON BN350 prevents chipping of the cutting edge
- R accuracy : $\pm 0,005\text{mm}$

Endmills

	Cat. No.	Stock	Dimensions (mm)						
		BN350	R	ØD	L	Ød ₁	Ød	ℓ ₁	ℓ ₂
4,0 mm (Shank Diam.)	BNBP 2 R020-012 4	●	0,2	0,4	50	0,37	4	0,3	1,2
	BNBP 2 R030-015 4	●	0,3	0,6	50	0,57	4	0,4	1,5
	BNBP 2 R050-025 4	●	0,5	1,0	50	0,97	4	0,6	2,5
	BNBP 2 R075-040 4	●	0,75	1,5	50	1,47	4	0,9	4,0
	BNBP 2 R100-055 4	●	1,0	2,0	50	1,97	4	1,4	5,5
6,0 mm (Shank Diam.)	BNBP 2 R020-012 6	●	0,2	0,4	50	0,37	6	0,3	1,2
	BNBP 2 R030-015 6	●	0,3	0,6	50	0,57	6	0,4	1,5
	BNBP 2 R050-025 6	●	0,5	1,0	50	0,97	6	0,6	2,5
	BNBP 2 R075-040 6	●	0,75	1,5	50	1,47	6	0,9	4,0
	BNBP 2 R100-055 6	●	1,0	2,0	50	1,97	6	1,4	5,5

✳ Endmill Identification: **BNBP 2 R020-012 4**
 MOULD FINISH MASTER (Number of teeth), Shank Diam., Neck length (ℓ₂), Radius of ball nose

Performance



- Excellent surface finish compared with competitor's CBN and coated carbide endmills

Recommended Cutting Conditions

Spindle revolutions: N (rpm), Feed rate per tooth: f_t (mm/tooth), Depth of cut: d_{oc} (mm), Wide of cut: w_{oc} (mm)

Material Cutting data	Pre-hardened steel, Die steel (~ HRC52)				Die steel (~ HRC62)				High speed tool steel (~ HRC70)			
	n (rpm)	f _t (mm/tooth)	d _{oc} (mm)	W _{oc} (mm)	n (rpm)	f _t (mm/tooth)	d _{oc} (mm)	W _{oc} (mm)	n (rpm)	f _t (mm/tooth)	d _{oc} (mm)	W _{oc} (mm)
R 0,2	20.000~50.000	0,02	0,03	0,03	20.000~50.000	0,02	0,01	0,02	20.000~50.000	0,015	0,01	0,02
R 0,3	20.000~50.000	0,02	0,03	0,03	20.000~50.000	0,02	0,01	0,02	20.000~50.000	0,015	0,01	0,02
R 0,5	20.000~50.000	0,03	0,05	0,05	20.000~50.000	0,03	0,03	0,04	20.000~50.000	0,02	0,02	0,03
R 0,75	20.000~50.000	0,04	0,08	0,1	20.000~50.000	0,04	0,05	0,05	20.000~50.000	0,03	0,02	0,05
R 1,0	20.000~50.000	0,05	0,1	0,1	17.000~50.000	0,05	0,05	0,05	17.000~50.000	0,03	0,03	0,05

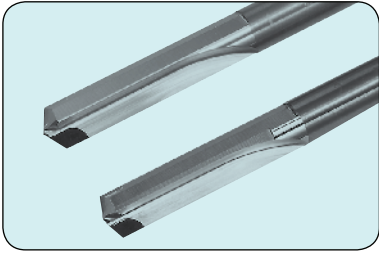
Important Notes

- (1) For stable machining, a more rigid machine is recommended.
- (2) Air blast or oil mist coolant is recommended.
- (3) Shorten overhang as much as possible.



SUMIDIA Drills

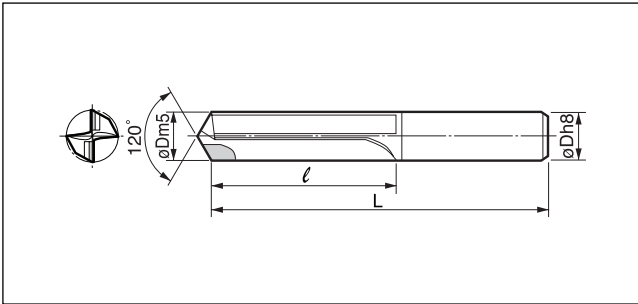
DAL/DDL/DML Type



From general to High Precision Drilling of Aluminum Alloys!

- High precision DAL type is able to produce holes of IT Class of 7~8.
- General DDL type is able to produce holes of IT class of 11~12, mainly for drilling of pre-tap holes.
- DML type is DDL type with a chamfer edge, incorporating 2 processes in one operation.

■ DAL Type



Cat. No.	Stock	ϕD	L	ℓ
	DA2200			
DAL 0500H ~ 0600H		$\phi 5 \leq D \leq \phi 6$	80	30
DAL 0601H ~ 0700H		$\phi 6 < D \leq \phi 7$	90	35
DAL 0701H ~ 0800H		$\phi 7 < D \leq \phi 8$	90	35
DAL 0801H ~ 0900H		$\phi 8 < D \leq \phi 9$	100	40
DAL 0901H ~ 1000H		$\phi 9 < D \leq \phi 10$	100	40
DAL 1001H ~ 1100H		$\phi 10 < D \leq \phi 11$	110	50
DAL 1101H ~ 1200H		$\phi 11 < D \leq \phi 12$	110	50

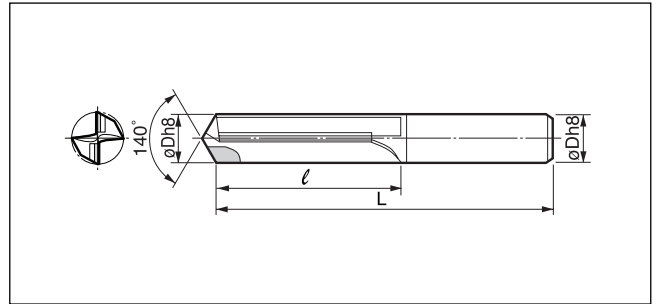
■ Recommended Conditions

	Cutting Speed (m/min)	Feed Rate (mm/rev)	Drilling Length L/D	Oil
$\phi D < 8$	80 ~ 250	0,05 ~ 0,2	Below 3 x D	Water soluble
$8 \leq \phi D$		0,1 ~ 0,3		

■ Application Examples (DAL Type)

Work Shape	Work	Conditions	Results
	A390 High silicon Aluminum	$V_c=100\text{m/min}$ $f=0,1\text{mm/rev}$	<ul style="list-style-type: none"> • Holes by carbide drill was out of specifications after 2.000 holes/reg. • SumiDia drill could drill up to 30.000 holes/reg. • 15 times tool life that of carbide drills.
	A390 High silicon Aluminum (pre-cast hole of $\phi 10$)	$V_c=120\text{m/min}$ $f=0,12\text{mm/rev}$	<ul style="list-style-type: none"> • Average 40,000 holes/reg • Surface roughness $R_y = 1\mu\text{m}$
	ADC10 Aluminum Die Cast	$V_c=90\text{m/min}$ $f=0,08\text{mm/rev}$	<ul style="list-style-type: none"> • More than 50.000 holes and still running

■ DDL Type



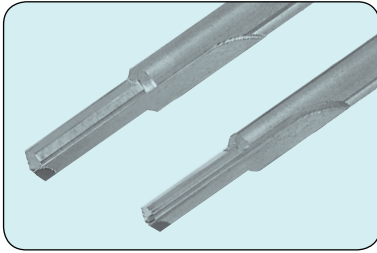
Cat. No.	Stock	ϕD	L	ℓ
	DA2200			
DDL 050V ~ 060V		$\phi 5 \leq D \leq \phi 6$	80	30
DDL 061V ~ 070V		$\phi 6 < D \leq \phi 7$	90	35
DDL 071V ~ 080V		$\phi 7 < D \leq \phi 8$	90	35
DDL 081V ~ 090V		$\phi 8 < D \leq \phi 9$	100	40
DDL 091V ~ 100V		$\phi 9 < D \leq \phi 10$	100	40
DDL 101V ~ 110V		$\phi 10 < D \leq \phi 11$	110	50
DDL 111V ~ 120V		$\phi 11 < D \leq \phi 12$	110	50

■ Important Notes

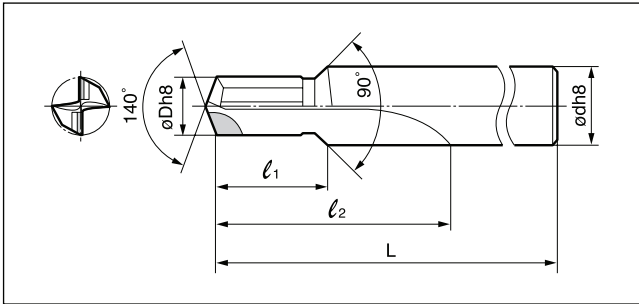
- Select a high rigidity machine and high precision tool holder.
- Enough coolant to drilled hole.

■ Application Examples (DDL Type)

Work Shape	Work	Conditions	Results
	ADC12 Aluminum Die Cast M8 Pre-tap holes	$V_c=214\text{m/min}$ $f=0,14\text{mm/rev}$	<ul style="list-style-type: none"> • Regrind after 100.000 holes
	ADC12 Aluminum Die Cast	$V_c=200\text{m/min}$ $f=0,17\text{mm/rev}$	<ul style="list-style-type: none"> • Regrind after 74.000 holes (2.000m) (Preset tool change)
	AC2A Aluminum Casting	$V_c=234\text{m/min}$ $f=0,28\text{mm/rev}$	<ul style="list-style-type: none"> • Regrind after 80.000 holes (Preset tool change)



■ DML Type

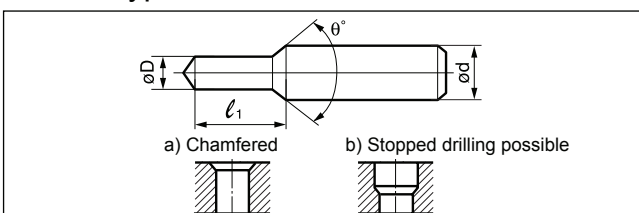


Applicable Tap Size	Cat. No.	Stock	ϕD	ϕd	L	l_1	l_2
		DA2200					
M6	DML 050V		5	8	90	18	36
M8	DML 068V		6,8	10	104	24	48
M10	DML 085V		8,5	12	122	30	60
M12	DML 103V		10,3	14	136	36	72

■ Application Examples (DML Type)

Work Shape	Work	Conditions	Results
	AC4C-T6 Aluminum Casting M6 Pre-tap holes	$V_c=100\text{m/min}$ $f=0,1\text{mm/rev}$ $m/c=6$ spindles	<ul style="list-style-type: none"> • Regrind after 150.000 holes • Tool life for carbide drill is 500 holes. • 30 times tool life that of carbide drills
	AC2C-T2 Aluminum Casting M8 Pre-tap holes	$V_c=210\text{m/min}$ $f=0,15\text{mm/rev}$	<ul style="list-style-type: none"> • 100.000 holes/reg (2.000m) and still running. • Drilling and chamfering in the same process
	AC4C-T6 Aluminum Casting M10 Pre-tap holes	$V_c=250\text{m/min}$ $f=0,2\text{mm/rev}$	<ul style="list-style-type: none"> • 80.000 holes/reg (1,840m) and still running. • Drilling and chamfering in the same process

■ DML Type Possible Profiles



- (1) Tolerance for dimension L is more than 0,2mm.
- (2) θ° is less than 180° .