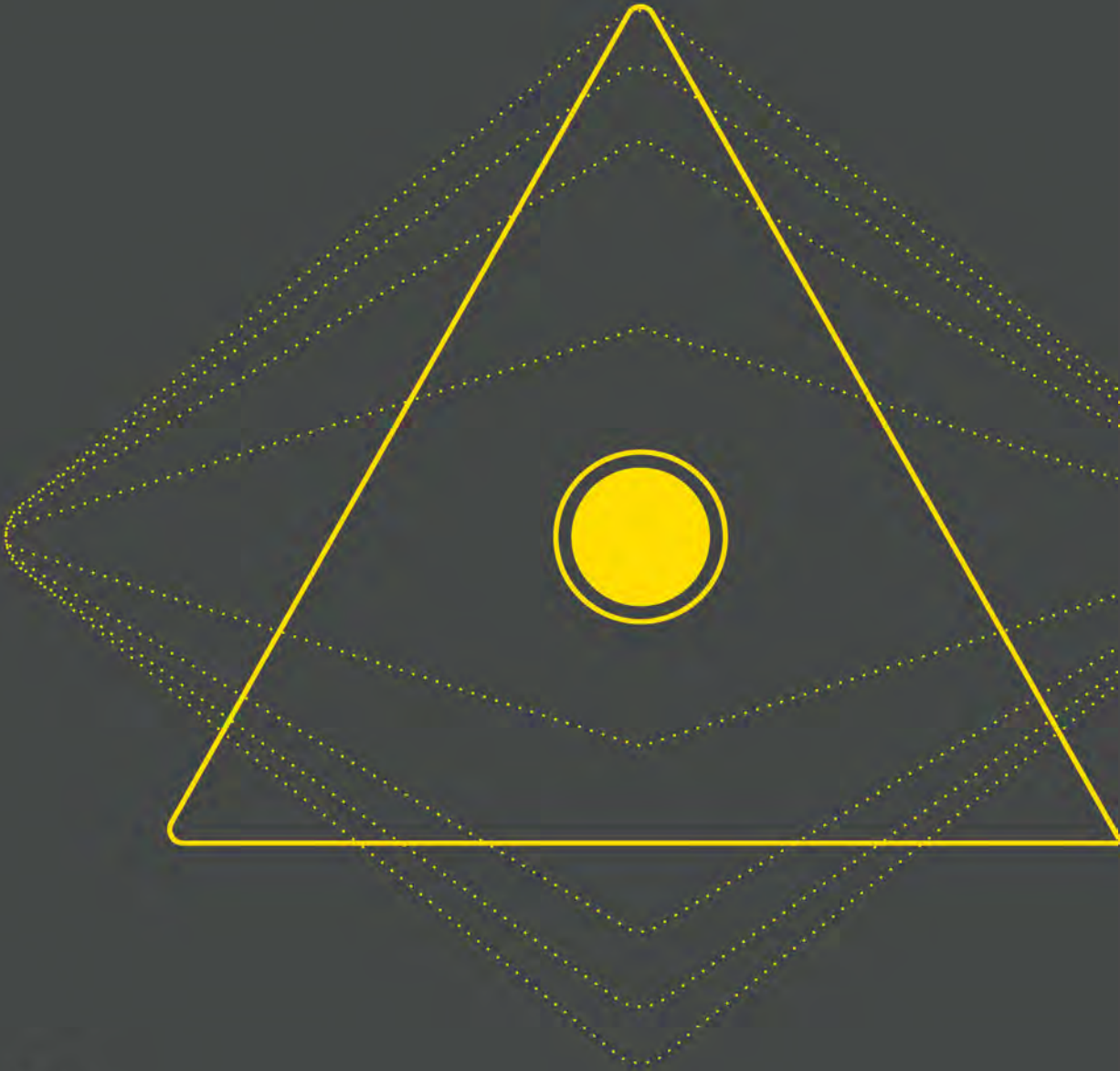


2023

cBN | PCD

DINOX NC TOTAL TOOLING SYSTEM



We will be the leading global company
with the **best technical skills**

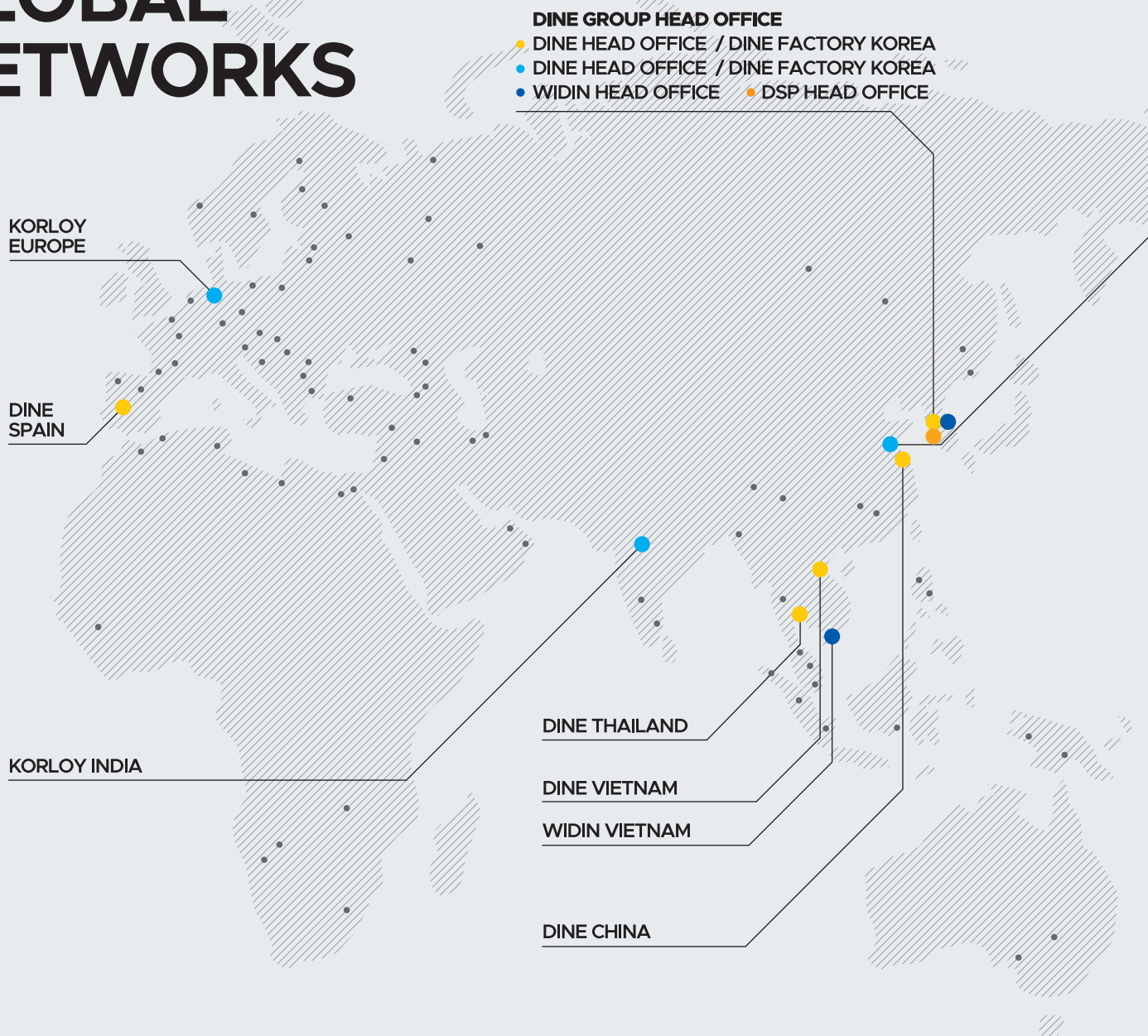




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DINE GROUP GLOBAL NETWORKS



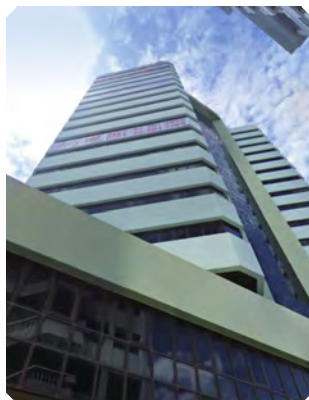
DINE(DC) China since 2006



DINE(DVC) Vietnam since 2017



DINE(DTC) Thailand since 2020



DINE(DMS) Spain since 2022



● DINE FACTORY QINGDAO
● KORLOY FACTORY QINGDAO

WIDIN AMERICA

KORLOY AMERICA

KORLOY BRASIL



DINE(Head office) Korea since 1975



KORLOY Korea since 1966



WIDIN Korea since 1988



DSP Tooling inc. Korea since 2000



How to indicate the model no. of insert (ISO)



1 Insert shape

C **N** **G** **M** 12 04 08 - VM

C
D
E
K
L

R
S
T
V
W

2 Major clearance angle

C **N** **G** **M** 12 04 08 - VM

B
C
D
E

F
N
P
O

3 Tolerance

C **N** **G** **M** 12 04 08 - VM

d : Diameter of inscribed circle
t : Insert thickness
m : Refer to the figure

Class	d	m	t
A	±0.025	±0.005	±0.025
C	±0.025	±0.013	±0.025
H	±0.013	±0.013	±0.025
E	±0.025	±0.025	±0.025
G	±0.025	±0.025	±0.13
J*	±0.05 ~ ±0.15	±0.005	±0.025
K*	±0.05 ~ ±0.15	±0.013	±0.025
L*	±0.05 ~ ±0.15	±0.025	±0.025
M*	±0.05 ~ ±0.15	±0.08 ~ ±0.20	±0.13
N*	±0.05 ~ ±0.15	±0.08 ~ ±0.18	±0.025
U*	±0.08 ~ ±0.25	±0.13 ~ ±0.38	±0.13

(mm)

Tolerance definition of C, H, R, T, and W types of inscribed circle (Exceptions)

d	Tolerance of d		Tolerance of m	
	J, K, L, M, N	U	M, N	U
6.35	±0.05	±0.08	±0.08	±0.13
9.525	±0.05	±0.08	±0.08	±0.13
12.7	±0.08	±0.13	±0.13	±0.20
15.875	±0.10	±0.18	±0.15	±0.27
19.05	±0.10	±0.18	±0.15	±0.27
25.4	±0.13	±0.25	±0.18	±0.38

Tolerance definition of D-type inscribed circle (Exceptions)

d	Tolerance of d	Tolerance of m
6.35	±0.05	±0.11
9.525	±0.05	±0.11
12.7	±0.08	±0.15
15.875	±0.10	±0.18
19.05	±0.10	±0.18

4 Cross-sectional shape

C **N** **G** **M** 12 04 08 - VM

A
B
C

F
G
H

J
M
N

Q
R
T

U
W
X

How to indicate the model no. of insert (ISO)

12

04

08

GA

5

Cutting edge length,
Inscribed circle diameter

6

Cutting edge height

7

Nose "r" size

8

Chip breaker

5

Cutting edge length, Inscribed circle diameter

C N G M 12 04 08 - GA

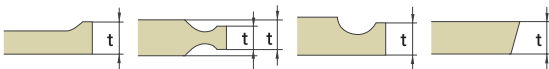
() small symbols

Symbols							Inch	IC d(mm)
C	d	s	T	R	V	W		
03	04	03	06	03	-	02	1.2(5)	3.97
04	05	04	08	04	08	S3	1.5(6)	4.76
05	06	05	09	05	09	03	1.8(7)	5.56
-	-	-	-	06	-	-	-	6.00
06	07	06	11	06	11	04	2	6.35
08	09	07	13	07	13	05	2.5	7.94
-	-	-	-	08	-	-	-	8.00
09	11	09	16	09	16	06	3	9.525
-	-	-	-	10	-	-	-	10.00
11	13	11	19	11	19	07	3.5	11.11
-	-	-	-	12	-	-	-	12.00
12	15	12	22	12	22	08	4	12.70
14	17	14	24	14	24	09	4.5	14.29
16	19	15	27	15	27	10	5	15.875
-	-	-	-	16	-	-	-	16.00
17	21	17	30	17	30	11	5.5	17.46
19	23	19	33	19	33	13	6	19.05
-	-	-	-	20	-	-	-	20.00
22	27	22	38	22	38	15	7	22.225
-	-	-	-	25	-	-	-	25.00
25	31	25	44	25	44	17	8	25.40
32	38	31	54	31	54	21	10	31.75
-	-	-	-	32	-	-	-	32.00

6

Cutting edge height

C N G M 12 04 08 - GA



Symbol	Nose "r"		
	Metric	Inch	Inch
01	1(2)	1.59	1/16
T0	1.125	1.79	9/128
T1	1.2	1.98	5/64
02	1.5(3)	2.38	3/32
T2	1.75	2.78	7/64
03	2	3.18	1/8
T3	2.5	3.97	5/32
04	3	4.76	3/16
05	3.5	5.56	7/32
06	4	6.35	1/4
07	5	7.94	5/16
09	6	9.52	3/8
11	7	11.11	7/16
12	8	12.70	1/2

() small symbols

7

Nose "r" size

C N G M 12 04 08 - GA

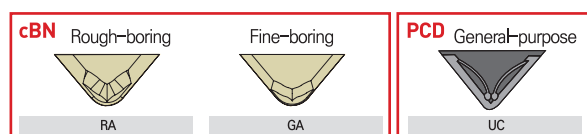


Symbol		Nose "r"	
Metric	Inch	M, N	Inch
01	0	0.1	0.004
02	0.5	0.2	0.008
04	1	0.4	1/64
08	2	0.8	1/32
12	3	1.2	3/64
16	4	1.6	1/16
20	5	2.0	5/64
24	6	2.4	3/32
28	7	2.8	7/64
32	8	3.2	1/8
00	-	Circular insert (Inch type)	
M0	-	Circular insert (Metric type)	

8

Chip breaker

C N G M 12 04 08 - GA

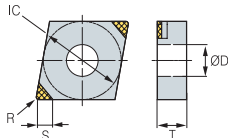
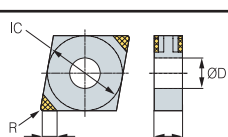
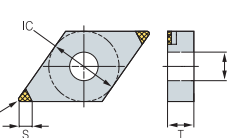
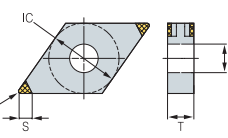
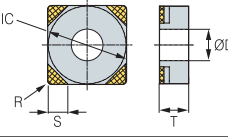
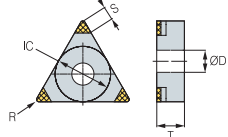


cBN Spec

cBN Multi-corner type (Negative/positive)

※ T-2NU-□□□□△△△△△△△△ model no. package unit is 10 EA.

● : Stock

Drawing	Designation	Grade										W (Weight)	mm					
		DNC100	DNC250	DNC300	DNC350	DNC400	DB1000	DB2000	DBN250	DBN350	DBN700A		DBN20	S (cutting edge length)	IC (inscribed circle)	T (Thickness)	R (Nose R)	∅D (hole diameter)
	2NU-CNGA120404	●	●	●	●	-	●	-	-	-	●	-	9.9	2.7	12.7	4.76	0.4	5.16
	2NU-CNGA120404F	-	●	-	●	-	-	-	-	-	-	-	9.9	2.7	12.7	4.76	0.4	5.16
	2NU-CNGA120404T	-	●	-	●	-	●	-	-	-	-	-	9.9	2.7	12.7	4.76	0.4	5.16
	2NU-CNGA120404W	-	●	-	-	-	-	-	-	-	-	-	9.9	2.7	12.7	4.76	0.4	5.16
	2NU-CNGA120404WF	-	●	-	-	-	-	-	-	-	-	-	9.9	2.7	12.7	4.76	0.4	5.16
	2NU-CNGA120408	●	●	●	●	-	●	●	-	-	●	-	9.9	2.6	12.7	4.76	0.8	5.16
	2NU-CNGA120408F	-	●	-	●	-	-	-	-	-	-	-	9.9	2.6	12.7	4.76	0.8	5.16
	2NU-CNGA120408T	-	●	-	●	-	●	-	-	-	-	-	9.9	2.6	12.7	4.76	0.8	5.16
	2NU-CNGA120408W	-	●	-	●	-	●	-	-	-	●	-	9.9	2.6	12.7	4.76	0.8	5.16
	2NU-CNGA120408WF	-	-	-	-	-	-	●	-	-	-	-	9.9	2.6	12.7	4.76	0.8	5.16
	2NU-CNGA120412	●	●	●	●	-	-	-	-	-	-	-	9.9	2.6	12.7	4.76	1.2	5.16
	2NU-CNGA120412F	-	●	-	●	-	-	-	-	-	-	-	9.9	2.6	12.7	4.76	1.2	5.16
	2NU-CNGA120412T	-	●	-	●	-	-	-	-	-	-	-	9.9	2.6	12.7	4.76	1.2	5.16
	2NU-CNGA120412W	-	●	-	-	-	-	-	-	-	●	-	9.9	2.6	12.7	4.76	1.2	5.16
	2NU-CNGA120412WT	-	-	-	-	-	●	-	-	-	-	-	9.9	2.6	12.7	4.76	1.2	5.16
	T-2NU-CNGA120404	-	●	-	-	-	-	-	-	-	-	-	9.9	2.7	12.7	4.76	0.4	5.16
T-2NU-CNGA120408	-	●	-	●	-	-	-	-	-	-	-	9.9	2.6	12.7	4.76	0.8	5.16	
	4NU-CNGA120404	-	●	-	-	-	-	-	-	-	-	9.9	2.7	12.7	4.76	0.4	5.16	
	4NU-CNGA120408	-	●	-	●	-	-	-	-	-	-	9.9	2.6	12.7	4.76	0.8	5.16	
	4NU-CNGA120412	-	●	-	-	-	-	-	-	-	-	9.9	2.6	12.7	4.76	1.2	5.16	
	2NU-DNGA150404	-	●	●	●	-	-	●	●	-	-	12.3	2.6	12.7	4.76	0.4	5.16	
	2NU-DNGA150404F	-	●	-	●	-	-	-	-	-	-	12.3	2.6	12.7	4.76	0.4	5.16	
	2NU-DNGA150404T	-	●	-	●	-	-	-	-	-	-	12.3	2.6	12.7	4.76	0.4	5.16	
	2NU-DNGA150408	-	●	●	●	-	●	●	-	-	-	12.3	2.2	12.7	4.76	0.8	5.16	
	2NU-DNGA150408F	-	●	-	●	-	-	-	-	-	-	12.3	2.2	12.7	4.76	0.8	5.16	
	2NU-DNGA150408T	-	●	-	●	-	-	-	-	-	-	12.3	2.2	12.7	4.76	0.8	5.16	
	2NU-DNGA150412	-	●	-	●	-	●	●	-	-	-	12.3	2.5	12.7	4.76	1.2	5.16	
	2NU-DNGA150412F	-	●	-	●	-	-	-	-	-	-	12.3	2.5	12.7	4.76	1.2	5.16	
	2NU-DNGA150412T	-	●	-	●	-	-	-	-	-	-	12.3	2.5	12.7	4.76	1.2	5.16	
	2NU-DNGA150604	●	●	-	●	-	-	-	-	-	-	15.4	2.5	12.7	6.35	0.4	5.16	
2NU-DNGA150608	●	●	-	●	-	-	-	-	-	-	15.4	2.5	12.7	6.35	0.8	5.16		
	4NU-DNGA150404	-	●	-	●	-	-	-	-	-	-	12.3	1.8	12.7	4.76	0.4	5.16	
	4NU-DNGA150408	-	●	-	●	-	-	-	-	-	-	12.3	2.9	12.7	4.76	0.8	5.16	
	4NU-DNGA150412	-	●	-	●	-	-	-	-	-	-	12.3	3	12.7	4.76	1.2	5.16	
	4NU-DNGA150608	-	●	-	-	-	-	-	-	-	-	15.4	2.9	12.7	6.35	0.8	5.16	
	4NU-SNGA120404	-	●	-	-	-	-	-	-	●	-	9.9	3.1	12.7	4.76	0.4	5.16	
	4NU-SNGA120408	-	●	-	-	-	-	-	-	●	-	9.9	3.1	12.7	4.76	0.8	5.16	
	3NU-TNGA160404	-	●	-	●	-	●	●	-	●	-	7.2	2.5	9.53	4.76	0.4	3.81	
	3NU-TNGA160404T	-	●	-	-	-	-	-	-	-	-	7.2	2.5	9.53	4.76	0.4	3.81	
	3NU-TNGA160408	-	●	-	●	-	-	-	-	●	-	7.2	2.3	9.53	4.76	0.8	3.81	
	3NU-TNGA160408F	-	●	-	-	-	-	-	-	-	-	7.2	2.3	9.53	4.76	0.8	3.81	
	3NU-TNGA160408T	-	●	-	-	-	-	-	-	-	-	7.2	2.3	9.53	4.76	0.8	3.81	
	3NU-TNGA160412	-	-	-	●	-	-	-	-	-	-	7.2	2.0	9.53	4.76	1.2	3.81	

cBN Spec

cBN Multi-corner type (Negative/positive)

※ T-2NU-□□□□△△△△△△ model no. package unit is 10 EA.

● : Stock

Drawing	Designation	Grade										W (Weight)	mm					
		DNC100	DNC250	DNC300	DNC350	DNC400	DB1000	DB2000	DBN250	DBN350	DBN700A		DBNX20	S (cutting edge length)	IC (inscribed circle)	T (Thickness)	R (Nose R)	∅D (hole diameter)
	2NU-VNGA160404	●	●	●	●	-	-	-	●	-	●	-	10.2	3.5	9.53	4.76	0.4	3.81
	2NU-VNGA160404F	-	●	-	●	-	-	-	-	-	-	-	10.2	3.5	9.53	4.76	0.4	3.81
	2NU-VNGA160404T	-	●	-	●	-	-	-	-	-	-	-	10.2	3.5	9.53	4.76	0.4	3.81
	2NU-VNGA160408	●	●	●	●	-	●	●	●	-	●	-	10.2	2.6	9.53	4.76	0.8	3.81
	2NU-VNGA160408F	-	●	-	●	-	-	-	-	-	-	-	10.2	2.6	9.53	4.76	0.8	3.81
	2NU-VNGA160408T	-	●	-	●	-	-	●	-	-	-	-	10.2	2.6	9.53	4.76	0.8	3.81
	T-2NU-VNGA160408	-	●	-	-	-	-	●	-	-	-	-	10.2	2.6	9.53	4.76	0.8	3.81
	2NU-CCGW060202	-	●	-	-	-	-	-	-	-	-	0.9	2.8	6.35	2.38	0.2	2.8	
	2NU-CCGW060202T	-	●	-	-	-	-	-	-	-	-	0.9	2.8	6.35	2.38	0.2	2.8	
	2NU-CCGW060204	-	●	-	-	-	-	●	-	-	-	0.9	2.7	6.35	2.38	0.4	2.8	
	2NU-CCGW060204F	-	●	-	-	-	-	-	-	-	-	0.9	2.7	6.35	2.38	0.4	2.8	
	2NU-CCGW060204T	-	●	-	-	-	-	-	-	-	-	0.9	2.7	6.35	2.38	0.4	2.8	
	2NU-CCGW060208	-	-	-	-	-	●	-	-	-	-	0.9	2.6	6.35	2.38	0.8	2.8	
	2NU-CCGW09T302	-	●	-	-	-	-	-	-	-	-	-	4.6	2.7	9.53	3.97	0.2	4.4
	2NU-CCGW09T304	●	●	-	●	-	●	-	●	-	●	-	4.6	2.7	9.53	3.97	0.4	4.4
	2NU-CCGW09T304T	-	●	-	-	-	-	-	-	-	-	-	4.6	2.7	9.53	3.97	0.4	4.4
	2NU-CCGW09T308	●	●	-	●	-	-	●	-	●	-	4.6	2.6	9.53	3.97	0.8	4.4	
	2NU-CCGW09T308T	-	●	-	-	-	-	-	-	-	-	4.6	2.6	9.53	3.97	0.8	4.4	
2NU-CCGW09T308W	-	●	-	-	-	-	-	-	-	-	4.6	2.6	9.53	3.97	0.8	4.4		
	2NU-DCGW070204	-	●	-	-	-	●	-	-	-	-	1.3	2.6	6.35	2.38	0.4	2.8	
	2NU-DCGW070208	-	●	-	-	-	-	-	-	-	-	1.3	2.2	6.35	2.38	0.8	2.8	
	2NU-DCGW070208T	-	-	-	-	-	●	-	-	-	-	1.3	2.2	6.35	2.38	0.8	2.8	
	2NU-DCGW11T302	-	●	-	-	-	-	-	-	-	-	4.8	2.6	9.53	3.97	0.2	4.4	
	2NU-DCGW11T304	●	●	-	●	-	●	-	●	-	-	4.8	2.6	9.53	3.97	0.4	4.4	
	2NU-DCGW11T304F	-	●	-	-	-	-	-	-	-	-	4.8	2.6	9.53	3.97	0.8	4.4	
	2NU-DCGW11T304T	-	●	-	-	-	-	-	-	-	-	4.8	2.6	9.53	3.97	0.4	4.4	
	2NU-DCGW11T308	●	●	-	●	-	-	●	-	●	-	4.8	2.2	9.53	3.97	0.8	4.4	
	2NU-DCGW11T308T	-	●	-	-	-	-	-	-	-	-	4.8	2.2	9.53	3.97	0.8	4.4	
	T-2NU-DCGW11T304	-	●	-	-	-	-	-	-	-	-	4.8	2.6	9.53	3.97	0.4	4.4	
	T-2NU-DCGW11T308	-	●	-	●	-	-	-	-	-	-	-	-	-	-	-	-	
	3NU-TCGW090204	-	●	-	-	-	-	-	-	-	-	0.9	2.5	5.56	2.38	0.4	2.5	
	3NU-TCGW090204F	-	●	-	-	-	-	-	-	-	-	0.9	2.5	5.56	2.38	0.4	2.5	
	3NU-TCGW090204T	-	●	-	-	-	-	-	-	-	-	0.9	2.5	5.56	2.38	0.4	2.5	
	3NU-TPGW110304	-	●	-	●	-	●	●	-	●	-	2.3	2.5	6.35	3.18	0.4	3.4	
	3NU-TPGW110304F	-	●	-	-	-	-	-	-	-	-	2.3	2.5	6.35	3.18	0.4	3.4	
	3NU-TPGW110304T	-	●	-	-	-	-	-	-	-	-	2.3	2.5	6.35	3.18	0.4	3.4	
	3NU-TPGW110308	-	●	-	●	-	●	●	-	●	-	2.3	2.3	6.35	3.18	0.8	3.4	
	3NU-TPGW110308F	-	●	-	-	-	-	-	-	-	-	2.3	2.3	6.35	3.18	0.8	3.4	
	3NU-TPGW110308T	-	●	-	-	-	-	-	-	-	-	2.3	2.3	6.35	3.18	0.8	3.4	
	3NU-TPGN110308	-	-	-	-	-	●	●	-	-	-	2.3	2.3	6.35	3.18	0.8	-	
	3NU-TPGN160304	-	●	-	-	-	-	-	-	-	-	4.8	2.5	9.53	3.18	0.4	-	
	3NU-TPGN160308	-	●	-	-	-	-	-	-	-	-	4.8	2.3	9.53	3.18	0.8	-	

cBN Spec

cBN Multi-corner type (Negative/positive)

※ T-2NU-□□□□△△△△△△△△△△ model no. package unit is 10 EA.

● : Stock ○ : Will be discontinued

Drawing	Designation	Grade										W (Weight)	mm							
		DNC100	DNC250	DNC300	DNC350	DNC400	DB1000	DB2000	DBN250	DBN350	DBN700A		DBNX20	S (cutting edge length)	IC (inscribed circle)	T (Thickness)	R (Nose R)	∅D (hole diameter)		
	3NU-TPGB110304	-	○	-	-	-	-	-	-	-	○	-	-	2.0	2.5	6.35	3.18	0.4	3.4	
	3NU-TPGB110304T	-	○	-	-	-	-	-	-	-	-	-	-	-	2.0	2.5	6.35	3.18	0.4	3.4
	3NU-TPGB110308	-	○	-	-	-	-	-	-	-	-	-	-	-	2.0	2.3	6.35	3.18	0.8	3.4
	3NU-TPGB110308F	-	○	-	-	-	-	-	-	-	-	-	-	-	2.0	2.3	6.35	3.18	0.8	3.4
	3NU-TPGB110308T	-	○	-	-	-	-	-	-	-	-	-	-	-	2.0	2.3	6.35	3.18	0.8	3.4
	2NU-VBGW160402	-	●	-	-	-	-	-	-	-	-	-	-	8.6	3.5	9.53	4.76	0.2	4.4	
	2NU-VBGW160404	●	●	-	●	-	●	-	●	-	●	-	●	-	8.6	3.5	9.53	4.76	0.4	4.4
	2NU-VBGW160404F	-	●	-	-	-	-	-	-	-	-	-	-	-	8.6	3.5	9.53	4.76	0.4	4.4
	2NU-VBGW160404T	-	●	-	-	-	-	-	-	-	-	-	-	-	8.6	3.5	9.53	4.76	0.4	4.4
	2NU-VBGW160408	●	●	-	●	-	-	●	●	-	-	-	-	-	8.6	2.6	9.53	4.76	0.8	4.4
	2NU-VBGW160408F	-	●	-	-	-	-	-	-	-	-	-	-	-	8.6	2.6	9.53	4.76	0.8	4.4
	2NU-VBGW160408T	-	●	-	-	-	-	-	-	-	-	-	-	-	8.6	2.6	9.53	4.76	0.8	4.4
	T-2NU-VBGW160408	-	-	-	●	-	-	-	-	-	-	-	-	-	8.6	2.6	9.53	4.76	0.8	4.4
	2NU-VCGW160404	-	●	-	●	-	-	-	-	-	-	-	-	8.6	3.5	9.53	4.76	0.4	4.4	
	2NU-VCGW160404F	-	●	-	-	-	-	-	-	-	-	-	-	-	8.6	3.5	9.53	4.76	0.4	4.4
	2NU-VCGW160404T	-	●	-	-	-	-	-	-	-	-	-	-	-	8.6	3.5	9.53	4.76	0.4	4.4
	2NU-VCGW160408	-	●	-	-	-	-	-	-	-	-	-	-	-	8.6	2.6	9.53	4.76	0.8	4.4
	2NU-VCGW160408F	-	●	-	-	-	-	-	-	-	-	-	-	-	8.6	2.6	9.53	4.76	0.8	4.4
	2NU-VCGW160408T	-	●	-	-	-	●	●	-	-	-	-	-	-	8.6	2.6	9.53	4.76	0.8	4.4
	T-2NU-VCGW160404	-	●	-	-	-	-	-	-	-	-	-	-	-	8.6	3.5	9.53	4.76	0.4	4.4
	T-2NU-VCGW160408	-	●	-	-	-	-	-	-	-	-	-	-	-	8.6	2.6	9.53	4.76	0.8	4.4
	CNMA120404	-	-	-	-	-	-	-	●	-	-	-	-	9.89	4.5	12.7	4.76	0.4	5.16	
	CNMA120408	-	-	-	-	-	-	-	●	-	-	●	-	-	9.89	4.5	12.7	4.76	0.8	5.16
	T-CNMA120408	-	-	-	-	-	-	-	●	-	-	-	-	-	9.89	4.5	12.7	4.76	0.8	5.16
	DNMA150404	-	-	-	-	-	-	-	●	-	-	-	-	12.2	3.7	12.7	4.76	0.4	5.16	
	DNMA150408	-	-	-	-	-	-	-	●	●	-	-	-	-	12.2	3.4	12.7	4.76	0.8	5.16
	TNMA160404	-	-	-	-	-	-	-	●	-	-	-	-	7.2	3.7	9.53	4.76	0.4	3.81	
	TNMA160408	-	-	-	-	-	-	-	●	-	-	-	-	-	7.2	3.5	9.53	4.76	0.8	3.81
	T-VNMA160404	-	-	-	-	-	-	-	●	-	-	-	-	10.2	4.9	9.53	4.76	0.4	3.81	
	VNMA160404	-	-	-	-	-	-	-	●	-	-	-	-	-	10.2	5.8	9.53	4.76	0.4	3.81
	VNMA160408	-	-	-	-	-	-	-	●	-	-	-	-	-	10.2	5.8	9.53	4.76	0.8	3.81
	CCMW09T304	-	-	-	-	-	-	-	●	-	-	-	-	4.5	4.3	9.53	3.97	0.4	4.4	

cBN Spec

cBN Multi-corner type (Negative/positive)

※ T-2NU-□□□□△△△△△△ model no. package unit is 10 EA.

● : Stock ○ : Will be discontinued

Drawing	Designation	Grade										W (Weight)	mm					
		DNC100	DNC250	DNC300	DNC350	DNC400	DB1000	DB2000	DBN250	DBN350	DBN700A		DBNX20	S (cutting edge length)	IC (inscribed circle)	T (Thickness)	R (Nose R)	∅D (hole diameter)
	DCGW11T308	-	-	-	-	-	-	-	●	-	-	-	4.8	3.2	9.53	3.97	0.8	4.4
	T-DCGW11T308	-	-	-	-	-	-	-	●	-	-	-	4.8	3.2	9.53	3.97	0.8	4.4
	VBMW160404	-	-	-	-	-	-	-	●	-	-	-	8.6	3.5	9.53	4.76	0.4	4.4
	VBMW160408	-	-	-	-	-	-	-	●	-	-	-	8.6	3.5	9.53	4.76	0.8	4.4
	4NS-CNGA120408	-	-	-	-	○	-	-	-	-	-	-	9.7	3	12.7	4.76	0.8	5.16
	4NS-CNGA120412	-	-	-	-	○	-	-	-	-	-	-	9.7	2.9	12.7	4.76	1.2	5.16
	4NS-DNGA150408				-	○	-	-	-	-	-	-	15.1	2.83	12.7	6.35	0.8	5.16
	4NS-DNGA150412				-	○	-	-	-	-	-	-	15.1	2.46	12.7	6.35	1.2	5.16
	T-TPGW110304				-	-	-	-	●	-	-	-	2.0	3.7	6.35	3.18	0.4	3.4
	TPGW110304				-	-	-	-	●	●	-	-	2.0	3.7	6.35	3.18	0.4	3.4
	TPGW110308				-	-	-	-	●	-	-	-	2.0	3.5	6.35	3.18	0.8	3.4

PCD Spec

PCD Insert (Negative/positive)

※ T-2NU-□□□□△△△△△△△△ model no. package unit is 10 EA.

● : Stock

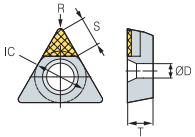
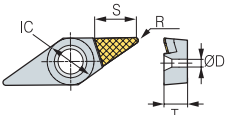
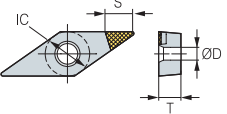
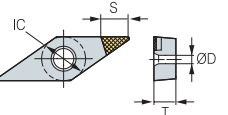
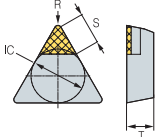
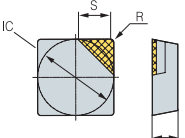
Drawing	Designation	Grade		W (Weight)	mm					
		DP150			S (cutting edge length)	IC (inscribed circle)	T (Thickness)	R (Nose R)	∅D (hole diameter)	
	CNMM120404	●		9.9	4.3	12.7	4.76	0.4	5.16	
	CNMM120408	●		9.9	4.2	12.7	4.76	0.8	5.16	
	CCMW120404	●		9.8	4.3	12.7	4.76	0.4	5.16	
	DNMM150404	●		12.2	3.5	12.7	4.76	0.4	5.16	
	DNMM150408	●		12.2	3.2	12.7	4.76	0.8	5.16	
	CCMT060202	●		0.9	2.8	6.35	2.38	0.2	2.8	
	CCMT060204	●		0.9	2.7	6.35	2.38	0.4	2.8	
	CCMT09T304	●		3.4	4.3	9.53	3.97	0.4	4.4	
	CCMT09T308	●		3.4	4.2	9.53	3.97	0.8	4.4	
	DCMT070202	●		1.2	3.7	6.35	2.38	0.2	2.8	
	DCMT070204	●		1.2	3.5	6.35	2.38	0.4	2.8	
	DCMT11T302	●		4.5	3.5	9.53	3.97	0.2	4.4	
	DCMT11T304	●		4.5	3.5	9.53	3.97	0.4	4.4	
	DCMT11T308	●		4.5	3.2	9.53	3.97	0.8	4.4	
	DCGT11T304	●		4.5	3.5	9.53	3.97	0.4	4.4	

PCD Spec

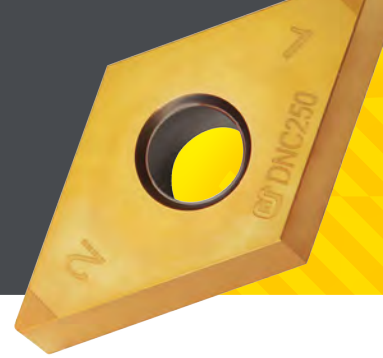
PCD Insert (Negative/positive)

※ T-2NU-□□□□△△△△△△△△△△ model no. package unit is 10 EA.

● : Stock ○ : Will be discontinued

Drawing	Designation	Grade		mm				
		DP150	W (Weight)	S (cutting edge length)	IC (inscribed circle)	T (Thickness)	R (Nose R)	ØD (hole diameter)
	TPGW080204	●	0.6	-	6.35	2.38	0.4	2.4
	TPGW090204	●	0.8	3.2	5.56	2.38	0.4	2.5
	TPGW090208	○	0.8	3	5.56	2.38	0.8	2.5
	TPGW110304	●	1.4	3.7	6.35	3.18	0.4	3.4
	TPGW110308	●	1.4	3.5	6.35	3.18	0.8	3.4
	VBMT110304	●	2.5	5.8	6.35	3.18	0.4	3.4
	VBMT110308	●	2.5	4.9	6.35	3.18	0.8	3.4
	VBMT160404	●	8.6	5.8	9.53	4.76	0.4	4.4
	VBMT160408	●	8.6	4.9	9.53	4.76	0.8	4.4
	VCMT110304	●	2.4	5.8	6.35	3.18	0.4	3.4
	VCMT110308	●	2.4	4.9	6.35	3.18	0.8	3.4
	VBGW160404	●	8.6	5.8	12.7	4.76	0.4	4.4
	VCMT160404	●	8.3	5.8	9.53	4.76	0.4	4.4
	VCMT160408	●	8.3	4.9	9.53	4.76	0.8	4.4
	TPGN110304	●	1.9	3.7	6.35	3.18	0.4	-
	TPGN110308	●	1.9	3.5	6.35	3.18	0.8	-
	SPGN090304	●	3.6	4.1	9.53	3.18	0.4	-

cBN Features



Features

DINOX cBN features very excellent hardness and thermal resistance by adding special ceramic bonding material to cBN, its main ingredient, and sintering them at an ultrahigh-pressure high temperature. It also provides optimal conditions for productivity improvement through high-speed processing of cast iron and heat-treated steel due to its excellent strength and wear resistance.

High accuracy

Wear resistance

Productivity improvement

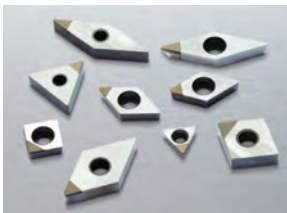


cBN Type

Re-polishing type	One-use type	Multi-corner type	Multi-corner type (coating)	NS Type	NT Type

Re-grinding type

- Stable and long tool life
- Excellent wear resistance, high hardness
- 3-4 time re-polishing is possible, which reduces tool expenses



e.g.) CNGA120408

Multi-corner type (coated/non-coated)

- Simple corner management
- Strong welding surface
- Possible to create an effect of several cBNs with one insert



Coated cBN

Non-coated cBN

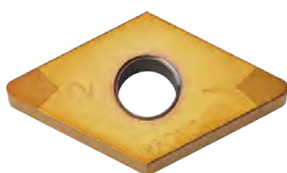


e.g.) 2NU-CNGA120408

NS, NT Type

NS Type

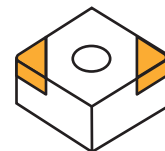
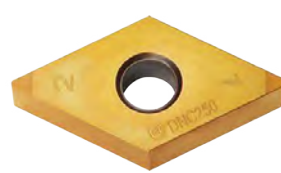
- Specialized high cutting depth
- Excellent machining performance in spite of variable cutting depth



e.g.) 4NS-CNGA120408

NT Type

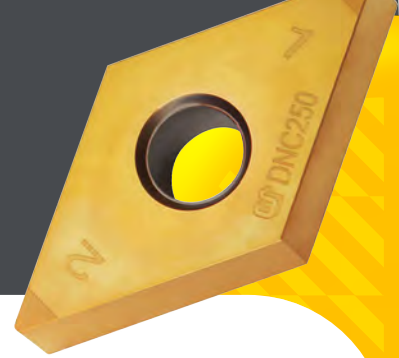
- High cutting depth versus general brazing type
- Economical cBN



e.g.) 2NT-CNGA120408

- ※ High cutting depth and high feed available; excellent machining performance in spite of variable cutting depth
- ※ Universal machining available; stable and efficient machining versus general brazing inserts

cBN Features



Applications by grade and textural characteristics

Textural characteristics	Texture	cBN content	Grade name	Workpiece, Applications	Features
Mostly cBN particles combine by themselves		High ↑	DB7000 DB7500	Cemented carbide alloy, chilled cast iron, Ni-hard cast iron, Iron metal sintered alloy, heat-resistant alloy, cast iron	<ul style="list-style-type: none"> High cBN content and texture where cBN particles strongly combine by themselves Suitable for cutting machining of high-hardness materials such as cast iron, heat-resistant alloy, Cemented carbide alloy, etc.
Mostly cBN particles combine by means of bonding material		↓ Low	DB1000, DB2000, DBN250, DBN350, DBN500, DBNX20, DBNX25, DNC100, DNC250, DNC300, DNC350, DNC400	Alloy steel, titanium steel, carbon tool steel, bearing steel, dice steel, ductile cast iron	<ul style="list-style-type: none"> cBN particles strongly combine by special ceramic bonding material Features excellent wear resistance and tenacity in cutting heat-treated steel due to its high cBN retention capacity


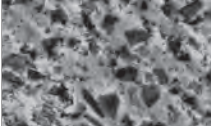
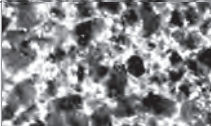
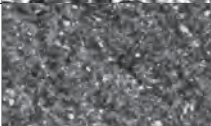
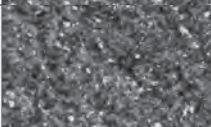
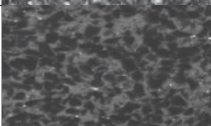
Grade map

Workpiece	Type	High-speed continuous	Continuous	Low/medium interrupted	High interrupted	
 Heat-treat steel	Usage classification	H01	H10	H20	H30	
	Coated cBN	DNC100		DNC250	DNC300 NEW	DNC350
	Non-coated cBN	DB1000		DB2000	DBNX20	DBNX25
 Sinter Alloy	Usage classification	1	10	20	30	
	Non-coated cBN	DB7500		DB7000		
 Cast iron	Usage classification	K01	K10	K20	K30	
	Non-coated cBN	DBN500		DB7000	DBNS800	
	Non-coated cBN	DB7000		DBNS800		
 Difficult-to-cut materials	Usage classification	S01	S10	S20	S30	
	Non-coated cBN	DB7000		DBNS800		

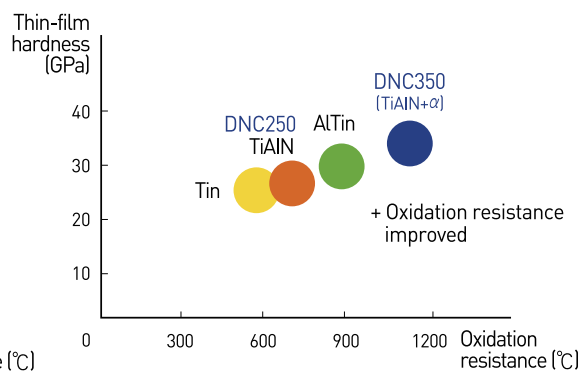
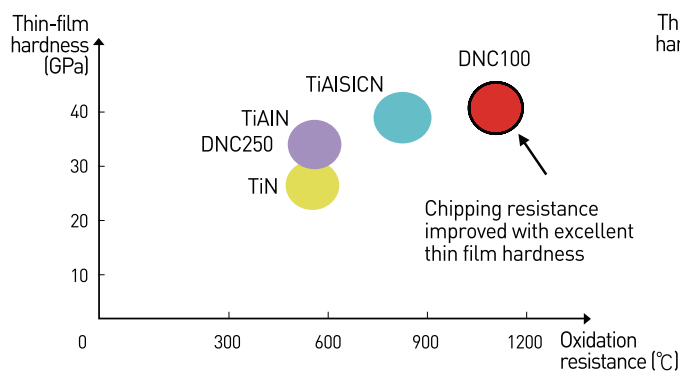
cBN Features

Coating information

Characteristics

Classification	Grade	Texture	Binder	cBN content (%)	Grain size (μm)	Hardness HV (Gpa)
	DNC100		TiN	50 - 55	2	31 - 34
	DNC250		TiC	65 - 70	6	32 - 34
	^{NEW} DNC300		TiN	65 - 70	4	29 - 31
	DNC350		TiN	60 - 65	1	33 - 35
	DNC400		TiN	65	3	-



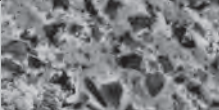


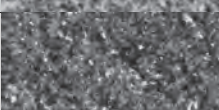


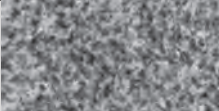


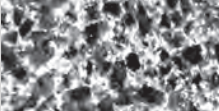
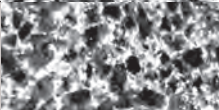




Coated thin-film characteristics



cBN Features








Non-coating information

Characteristics

Classification	Grade	Texture	Binder	cBN content (%)	Grain size (μm)	Hardness HV (Gpa)
	DB1000		TiCN	40 - 45	1	27 - 31
	DB2000		TiN	50 - 55	2	31 - 34
	DBNX20		TiN	55 - 60	3	31 - 33
	DBNX25		TiN	65 - 70	4	29 - 31
	DBN250		TiN	50 - 55	2	31 - 34
	DBN350		TiN	60 - 65	1	33 - 35
	DB7000		CO compound	90 - 95	2	41 - 44
	DB7500		CO compound	90 - 95	1	41 - 44
	DBN500		TiC	65 - 70	6	32 - 34
	DBNS800		Al compound	85 - 90	8	39 - 42
	DB7000		CO compound	90 - 95	2	41 - 44
	DBNS800		Al compound	85 - 90	8	39 - 42
	DB7000		CO compound	90 - 95	2	41 - 44

cBN Heat-treat steel H Heat-treat steel

Features and cutting conditions of cBN grade

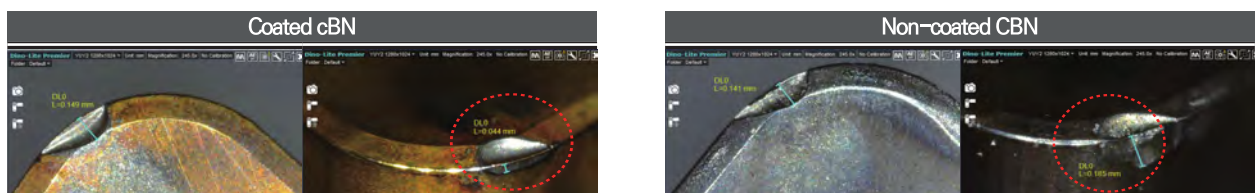
Classification	Grade		Insert color	Applications	Cutting conditions								
	Coated or noncoated	Name			Cutting speed Vc(m/min)		Feed f(mm/rev)	Cutting depth ap(mm)					
					0	50	100	150	200	250	300		
	Coated	DNC100	 Dark brown	For high-speed, continuous cutting	180 300		0.03	0.03					
		DNC250	 Gold	For continuous, low interrupted cutting	120 220		0.05	0.05					
		NEW DNC300	 Dark brown	For low/medium interrupted cutting	90 250		0.05	0.05					
		DNC350	 Dark brown	For medium/high interrupted cutting	90 150		0.05	0.05					
		DNC400	 Gold	For low/medium interrupted cutting	80 200		0.05	0.05					
		DBNX20		For high efficiency cutting	120 150		0.03	0.03					
	DBNX25	For high-speed interrupted cutting		150 200		0.03	0.03						
	DBN250	For low/medium interrupted cutting		80 120		0.03	0.03						
	DBN350	For high interrupted cutting		80 110		0.03	0.03						
	DB1000	For high-speed, continuous cutting		130 250		0.03	0.03						
	DB2000	For low/medium interrupted cutting		80 200		0.03	0.03						

Comparison of coated and non-coated cBNs

Machining information

Vc(m/min)	f(mm/rev)	ap(mm)	No. of machining ops.	Cutting distance	Workpiece	Heat treated	Hardness	Size
200	0,1	0,1	20 times	6km	SCM415 round rod	Carburizing heat treatment	58-62	Ø105*150

Wear loss (coating superior)



Surface roughness (non-coating superior)

Grade	Surface roughness		
	8 times	12 times	20 times
Non-coated cBN	Ra 0.431	Ra 0.477	Ra 0.492
Coated cBN	Ra 0.579	Ra 0.631	Ra 0.792

※ The details may vary according to machining environments.

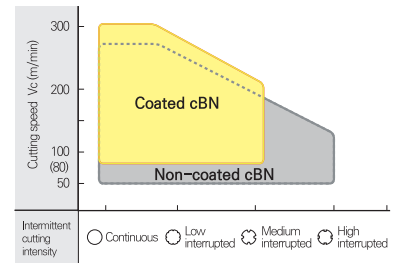
cBN Heat-treat steel **H**

Heat-treat steel

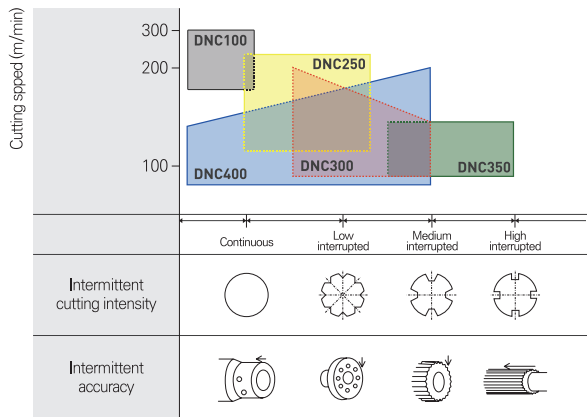
Applicable area

- **Coated cBN** : Suitable for all heat-treated steel machining as it is excellent in high-speed high-efficiency machining
- **Non-coated cBN** : Suitable for machining of high-hardness heat-treated steel or parts to which cutting speed is limited

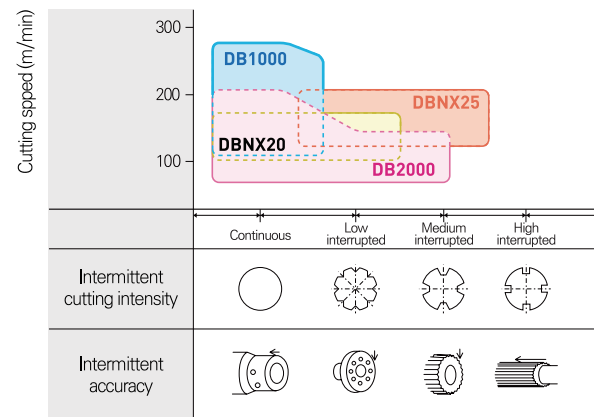
Series	Usable area
Coated cBN	<ul style="list-style-type: none"> • Ideal for heat-treated steel machining • Machining requiring high speed and high precision • Machining requiring high efficiency such as carburized layer removal
Uncoated cBN	<ul style="list-style-type: none"> • Small parts not requiring high cutting speed • Machining materials including much hard particles such as mold parts • Applicable even in case of an unstable machine setup



Coated cBN

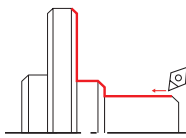


Non-coated cBN

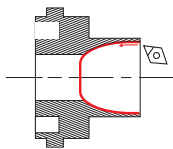


Recommended Machining Works

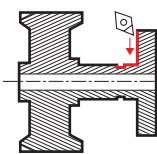
Outer diameter boring



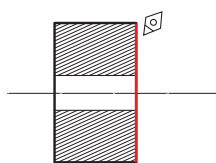
Inner diameter (curved surface) boring



Width decision groove machining

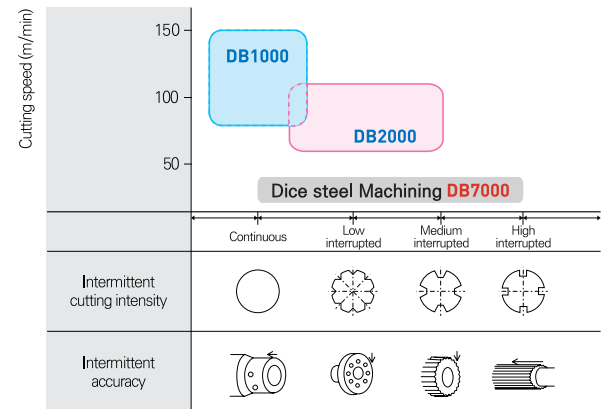


Cross-sectional machining



Dice steel

Non-coated cBN



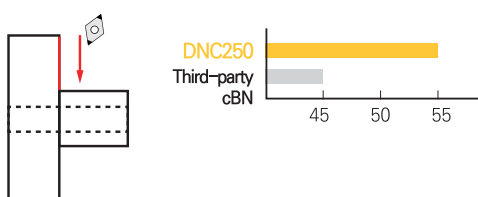
cBN Heat-treat steel ^H

Example of coated grades machining

Machining example

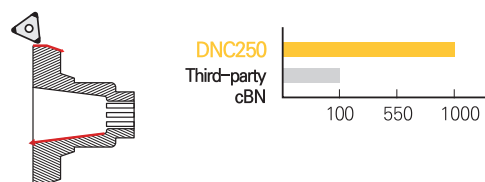
DNC250 TEST RESULT

Grade	DNC250	Third-party cBN
INSERTS	2NU-DNGA150408	
Parts name (workpiece)	H6 Swash plate (FCD55 Plate)	
Vc(m/min)		
f(mm/rev)	0.06	
ap(mm)	0.05 - 0.10	
Dry/wet cutting	Wet cutting	



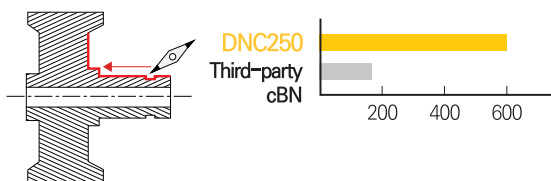
DNC250 TEST RESULT

Grade	DNC250	Third-party cBN
INSERTS	3NU-TNGA160408	
Parts name (workpiece)	Shaft UD Brake(SCR420HB)	
Vc(m/min)	160	
f(mm/rev)	0.08	
ap(mm)	0.425	
Dry/wet cutting	Wet cutting	



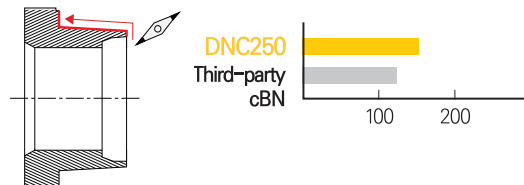
DNC250 TEST RESULT

Grade	DNC250	Third-party cBN
INSERTS	2NU-VCGW160408	
Parts name (workpiece)	Trans driver gear (SCM422)	
Vc(m/min)	90	
f(mm/rev)	0.15	
ap(mm)	0.15	
Dry/wet cutting	Wet cutting	



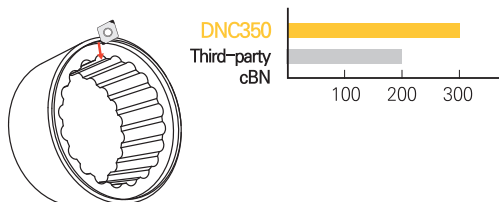
DNC250 TEST RESULT

Grade	DNC250	Third-party cBN
INSERTS	2NU-VNGA160408	
Parts name (workpiece)	CLUTCH BODY(SCR420 8903)	
Vc(m/min)	140	
f(mm/rev)	0.12	
ap(mm)	0.025/0.075	
Dry/wet cutting	Wet cutting	



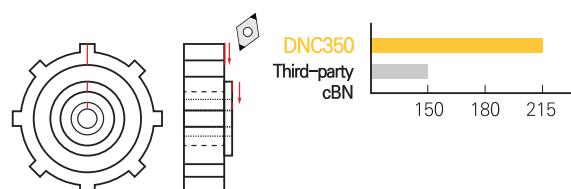
DNC350 TEST RESULT

Grade	DNC350	Third-party cBN
INSERTS	2NU-CNGA120408	
Parts name (workpiece)	Anulus Gear(SCR420)	
Vc(m/min)	200	
f(mm/rev)	0.05 - 0.08	
ap(mm)	0.4	
Dry/wet cutting	Wet cutting	



DNC350 TEST RESULT

Grade	DNC350	Third-party cBN
INSERTS	2NU-CNGA120404	
Parts name (workpiece)	Retainer(SAPH440-P)	
Vc(m/min)	150	
f(mm/rev)	0.2	
ap(mm)	0.10-0.20	
Dry/wet cutting	Wet cutting	



※ The details may vary according to machining environments.

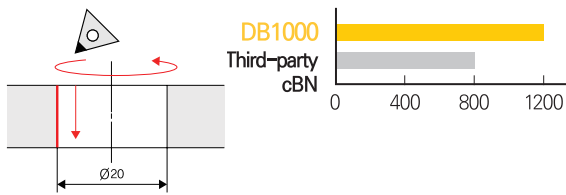
cBN Heat-treat steel **H**

Example of uncoated grades machining

Machining example

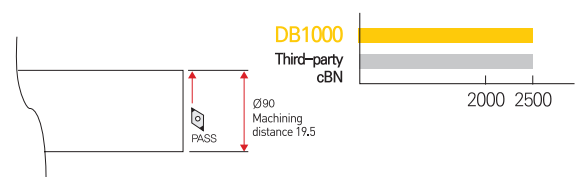
DB1000 TEST RESULT

Grade	DB1000	Third-party cBN
INSERTS	NU-TPGW110304	
Parts name (workpiece)	Inner diameter boring machining (SUJ2)	
Vc(m/min)	120	
f(mm/rev)	0.06	
ap(mm)	0.2	
Dry/wet cutting	Wet cutting	



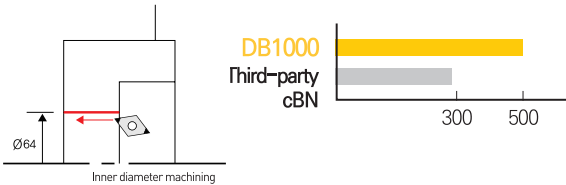
DB1000 TEST RESULT

Grade	DB1000	Third-party cBN
INSERTS	2NU-CNGA120408	
Parts name (workpiece)		
Vc(m/min)	282	
f(mm/rev)	0.1	
ap(mm)	0.1	
Dry/wet cutting	Wet cutting	



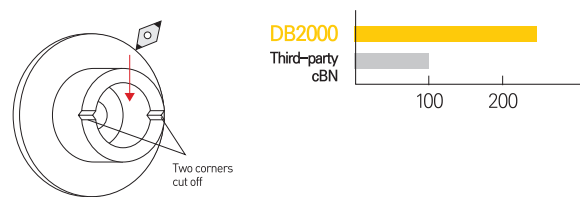
DB1000 TEST RESULT

Grade	DB1000	Third-party cBN
INSERTS	2NU-CNGA120412-W	
Parts name (workpiece)	Reactor	
Vc(m/min)	210	
f(mm/rev)	0.15	
ap(mm)	0.23	
Dry/wet cutting	Wet cutting	



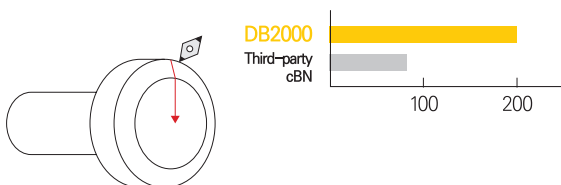
DB2000 TEST RESULT

Grade	DB2000	Third-party cBN
INSERTS	2NU-DNGA150408	
Parts name (workpiece)	Poly slide (SCM415H CVT)	
Vc(m/min)	150	
f(mm/rev)	0.1	
ap(mm)	0.2	
Dry/wet cutting	Wet cutting	



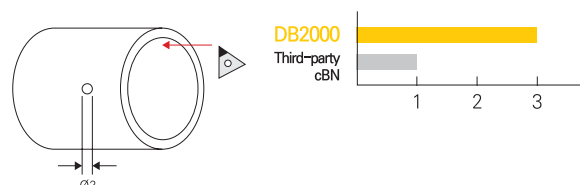
DB2000 TEST RESULT

Grade	DB2000	Third-party cBN
INSERTS	2NU-DNGA150408	
Parts name (workpiece)	Plunger (SKD11)	
Vc(m/min)	100	
f(mm/rev)	0.03 - 0.25	
ap(mm)	0.04	
Dry/wet cutting	Wet cutting	



DB2000 TEST RESULT

Grade	DB2000	Third-party cBN
INSERTS	NU-TPGW110308	
Parts name (workpiece)	Clutch parts (SCM415H)	
Vc(m/min)	135	
f(mm/rev)	0.08	
ap(mm)	0.15	
Dry/wet cutting	Wet cutting	



※ The details may vary according to machining environments.

cBN Heat-treat steel **H**

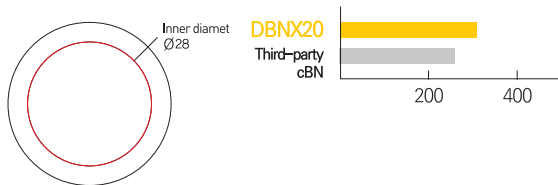
Heat-treat
steel

Example of uncoated grades machining

Machining example

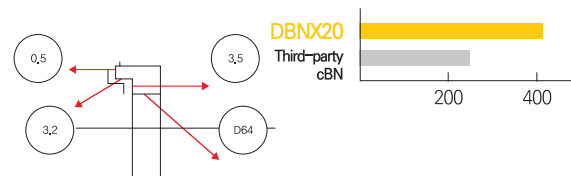
DBNX20 TEST RESULT

Grade	DBNX20	Third-party cBN
INSERTS	VBMW160412	
Parts name (workpiece)	BH-RR Outer wheel	
Vc(m/min)	130	
f(mm/rev)	0.1	
ap(mm)	0.2	
Dry/wet cutting	Wet cutting	



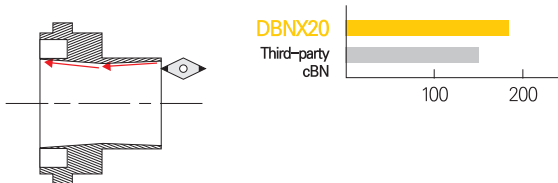
DBNX20 TEST RESULT

Grade	DBNX20	Third-party cBN
INSERTS	2NU-CNGA120408	
Parts name (workpiece)	Reactor	
Vc(m/min)	221~248	
f(mm/rev)	0.1	
ap(mm)	0.2	
Dry/wet cutting	Wet cutting	



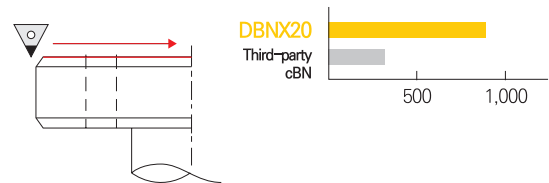
DBNX20 TEST RESULT

Grade	DBNX20	Third-party cBN
INSERTS	2NU-DNGA150612	
Parts name (workpiece)	Transmission(STB2)	
Vc(m/min)	137	
f(mm/rev)	0.18-0.20	
ap(mm)	0.08-0.10	
Dry/wet cutting	Wet cutting	



DBNX20 TEST RESULT

Grade	DBNX20	Third-party cBN
INSERTS	NU-TNMA160408	
Parts name (workpiece)	Flange(HrC62 SCM415)	
Vc(m/min)	150	
f(mm/rev)	0.1	
ap(mm)	0.12	
Dry/wet cutting	Wet cutting	



DBNX20 TEST RESULT

Grade	DBNX20	Third-party cBN
INSERTS	CNMA120408	
Parts name (workpiece)	Chain Sprocket(sintered alloy)	
Vc(m/min)	200	
f(mm/rev)	0.1	
ap(mm)	0.1	
Dry/wet cutting		



DBNX20 TEST RESULT

Grade	DBNX20	Third-party cBN
INSERTS	2NU-DNGA150412	
Parts name (workpiece)	Beering outer wheel(S55 CR)	
Vc(m/min)	190	
f(mm/rev)	0.15	
ap(mm)	0.2	
Dry/wet cutting		



※ The details may vary according to machining environments.

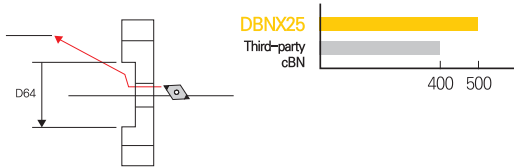
cBN Heat-treat steel ^H

Example of uncoated grades machining

Machining example

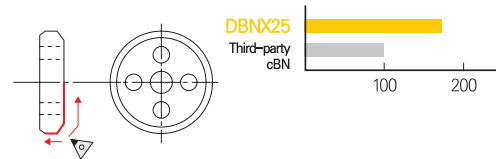
DBNX25 TEST RESULT

Grade	DBNX25	Third-party cBN
INSERTS	2NU-CNGA120412-W	
Parts name (workpiece)	Reactor	
Vc(m/min)	200~220	
f(mm/rev)	0.12~0.16	
ap(mm)	0.12~0.16	
Dry/wet cutting	Wet cutting	



DBNX25 TEST RESULT

Grade	DBNX25	Third-party cBN
INSERTS	NU-TNMA160408	
Parts name (workpiece)	Gear (HrC60 SCM420)	
Vc(m/min)	150	
f(mm/rev)	0.12	
ap(mm)	0.2	
Dry/wet cutting	Wet cutting	



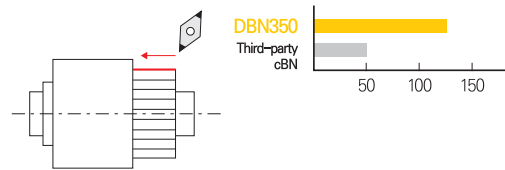
DBN250 TEST RESULT

Grade	DBN250	Third-party cBN
INSERTS	3NU-TPGB110308	
Parts name (workpiece)	Sprocket Crank Shaft(SCM415)	
Vc(m/min)	120~180	
f(mm/rev)	0.18	
ap(mm)	0.12	
Dry/wet cutting	Wet cutting	

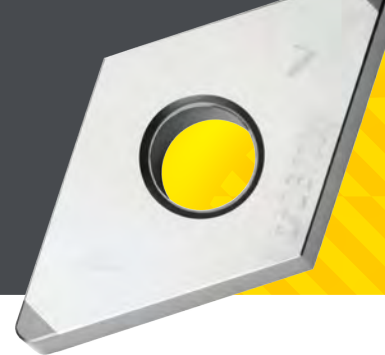


DBN350 TEST RESULT

Grade	DBN350	Third-party cBN
INSERTS	NU-CNMA120412	
Parts name (workpiece)	Gear shaft (SCR420H)	
Vc(m/min)	125	
f(mm/rev)	0.15	
ap(mm)	0.3	
Dry/wet cutting	Wet cutting	



※ The details may vary according to machining environments.

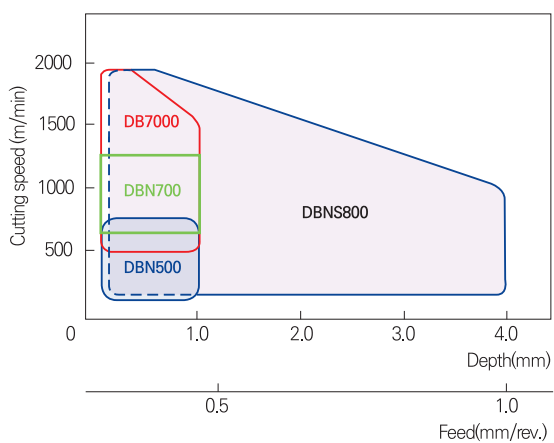


Features and cutting conditions of cBN grade

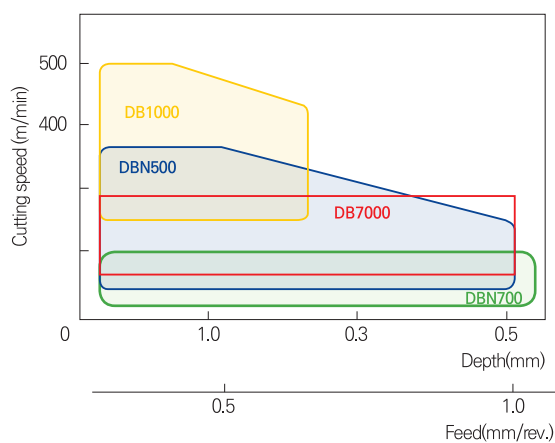
Applications	Workpiece	Grade	Cutting conditions				Feed f(mm/rev)	Cutting depth ap(mm)		
			Cutting speed Vc(m/min)							
			100	500	1000	1500	2000			
Turning	Gray cast iron	DBNS800	200	[Bar from 200 to 2000]			2000	0.1 ~ 1.0	≤4.0	
		DBN500	200	[Bar from 200 to 700]		700		0.1 ~ 0.5	≤1.0	
		DB7000	500	[Bar from 500 to 2000]			2000		0.1 ~ 0.5	≤1.0
	Alloy cast iron	DBNS800	200	[Bar from 200 to 1000]			1000		0.1 ~ 0.8	≤2.0
		Ductile cast iron	DBN500	100	[Bar from 100 to 350]		350		0.1 ~ 0.4	≤0.5
			DB1000	250	[Bar from 250 to 500]		500		0.1 ~ 0.2	≤0.2
		DB7000	80	[Bar from 80 to 200]		200		0.1 ~ 0.4	≤0.5	
Milling	Gray cast iron	DBN700		800	[Bar from 800 to 2000]		2000	0.1 ~ 0.5	≤0.5	
		DBNS800		800	[Bar from 800 to 2000]			2000	0.1 ~ 1.0	≤4.0

Applicable area

Gray cast iron






Ductile cast iron





cBN grade features

Classification	Grade		Insert color	Applications	Features
	Coated or Name uncoated	Name			
	Uncoated	DBN700		High-speed cutting of FC / cutting of milling of FC, cutting of iron metal heat-treated parts cutting of high-hardness roll / cutting of heat-resistant alloy	Grades whose material strength and thermal conductivity are improved by greatly increasing cBN content and optimizing sintered tissues
		DBN500		FC, FCD cutting, high-hardness VSR cutting, high-hardness roll grinding cutting	For cast iron cutting, cBN sintered body formation is optimized and wear resistance and damage resistance are excellent
		DB7000		Foundry machining	For cast-iron difficult-to-cut materials machining, wear resistance and damage resistance are excellent
		DBNS800		Large cutting depth machining, high-precision grinding machining	The solid structure capable to be used cutting knife of entire insert, which responds brazing type machining and high-speed grinding unlike conventional brazing type

Machining example

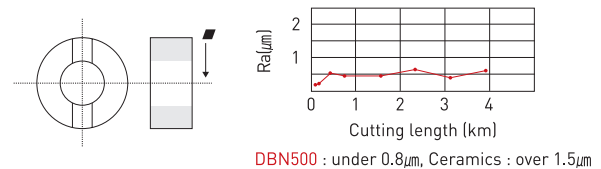
DBN500 TEST RESULT

Grade	DBN500	Third-party cBN
INSERTS	SPGN090308	
Parts name (workpiece)	Crank bore(FC250 = FCD450 Inner boring)	
Vc(m/min)	150	
f(mm/rev)	0.15	
ap(mm)	0.5	
Dry/wet cutting	Wet cutting	



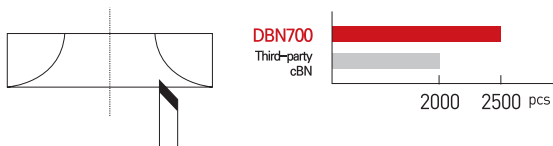
DBN500 TEST RESULT

Grade	DBN500	Third-party cBN
INSERTS	CNMA120412	
Parts name (workpiece)	Compressor Comp(FC250 facing, Interrupted)	
Vc(m/min)	400	
f(mm/rev)	0.07	
ap(mm)	0.15	
Dry/wet cutting	Wet cutting	



DBN700 TEST RESULT

Grade	DBN700	Third-party cBN
INSERTS	Special Bite	
Parts name (workpiece)	VSR intake(Hv250-330 Plunge Cutting)	
Vc(m/min)	95	
f(mm/rev)	0.08	
ap(mm)	0.2	
Dry/wet cutting	Dry cutting	



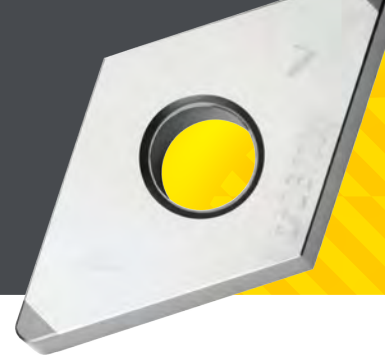
DBN700 TEST RESULT

Grade	DBN700	Third-party cBN
INSERTS	SPGN090308 / TNGA150408	
Parts name (workpiece)	Fly wheel(FC300 facing)	
Vc(m/min)	600	
f(mm/rev)	0.15	
ap(mm)	0.2	
Dry/wet cutting	Wet cutting	





cBN Sinter Alloy

Sinter Alloy



Features and cutting conditions of cBN grade

* First recommended

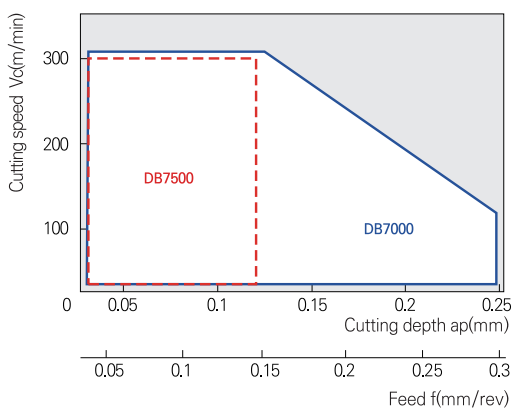
Classification	Grade		Insert color	Applications	Features
	Coated or Name uncoated	Name			
Sinter Alloy	Uncoated	DB7000		High density heat treated parts	Features excellent wear resistance and damage resistance in sintered alloy machining to stably implement a long service life
		DB7500*		High density heat treated parts	Suitable for sintered alloy grinding machining by maintaining the best cutting taste

Workpiece	Grade	Cutting conditions					Feed f(mm/rev)	Cutting depth ap(mm)
		Cutting speed Vc(m/min)						
		100	150	200	250	300		
General sintered alloy	DB7000	80	[Bar chart showing range from 80 to 300]			300	0.1 ~ 0.3	≤0.25
	DB7500*	80	[Bar chart showing range from 80 to 300]			300	0.1 ~ 0.15	≤0.25

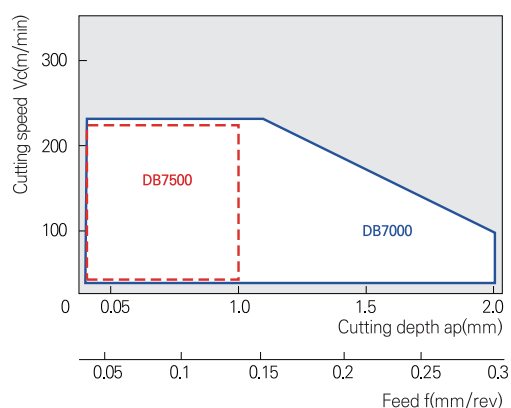
Workpiece	Grade	Cutting conditions					Feed f(mm/rev)	Cutting depth ap(mm)
		Cutting speed Vc(m/min)						
		100	150	200	250	300		
High-density heat-treated sintered alloy	DB7000	80	[Bar chart showing range from 80 to 200]		200	0.1 ~ 0.3	≤0.2	
	DB7500*	80	[Bar chart showing range from 80 to 200]		200	0.1 ~ 0.15	≤0.2	

Applicable area

General sintered alloy



High-density heat-treated sintered alloy



※ The details may vary according to machining environments.

cBN Sinter Alloy

Sinter Alloy

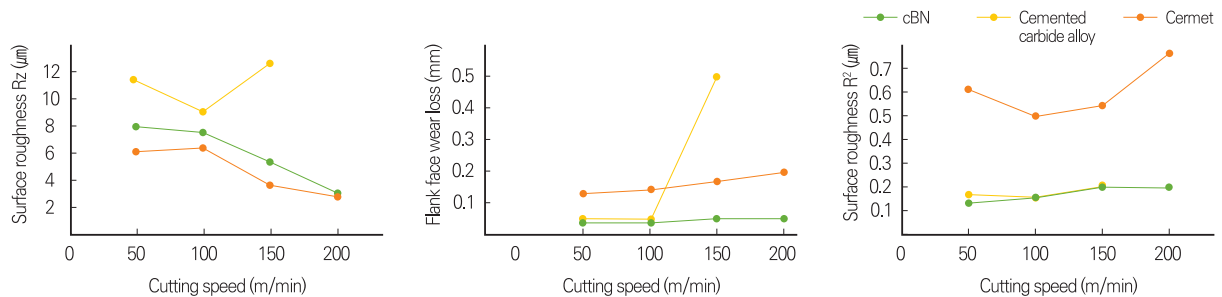


cBN cutting performance

Comparison of cutting performance by tool materials

Workpiece	Equivalent to SMF4040
Details of machining	High interrupted cross-sectional machining with a groove, hole $\varnothing 80\text{-}\varnothing 100$ [after 40 pass machining]
Tool model no.	TNGA160404 / DB7000
Cutting conditions	$f=0.1\text{mm/rev}$, $a_p=0.1\text{mm}$, wet cutting

General sintered alloy up to $V_c=100\text{m/min}$ can be machined even in the case of cemented carbide alloy or cermet. But after about $V_c=120\text{m/min}$ it is rapidly worn so surface roughness is weakened and burr is expanded. On the contrary, cBN ensures reliable machining as it is excellent in surface roughness in high-speed areas, wear resistance, and burr inhibition.



Valve seat ring (VSR)

VSR is divided into VSR for Intake (IN) and VSR for Exhaust (EX). Generally, VSR for EX is of high hardness.

Recommended grade

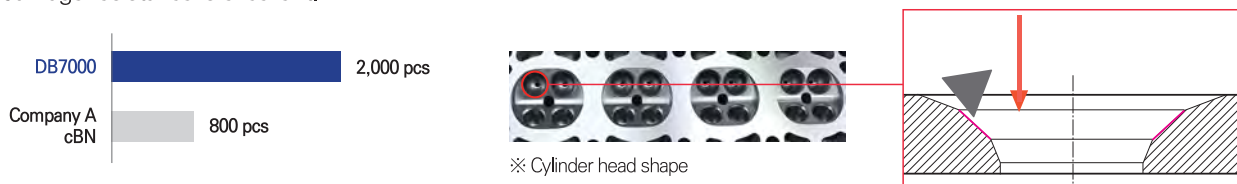
	Gasoline engine VSR material	Diesel engine VSR material
Flange cutting	DB7000 DBN350	DB7000 DBN350
Traverse cutting	DB7000 DBN500	DB7000 DBN500
Workpiece hardness (HV)	Low ◀ HV300 ▶ High	Low ◀ HV300 ▶ High

Recommendation conditions

Cutting speed V_c (m/min)	Feed f (mm/rev)	Cutting depth a_p (mm)
50~100	0.03~0.2	0.05~0.5

Cutting example

The tool service life was increased more than two fold versus conventional one when machining with DB7000 whose damage resistance is excellent.



Recommendation conditions

Workpiece	Sintered alloy (150-250HV)
Details of machining	VSR(IN) 45-face grinding machining
Tool model no.	TBGN060104(DB7000)
Cutting conditions	$V_c=100\text{m/min}$, $f=0.08\text{mm/rev}$, wet cutting

※ The details may vary according to machining environments.

DNC100

Coated cBN



Coating H 0.3mm Continuous
 Heat treated steel Max Depth

Features

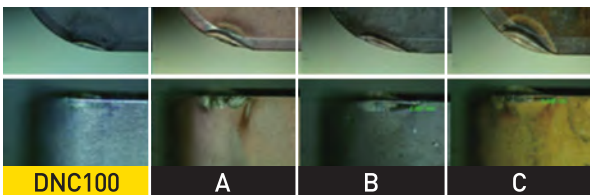
- Grade first recommended of high-speed continuous machining
- High heat resistance with high oxidation temperature
- Thin film applied with high hardness and high resistance to oxidation and chipping

Grade	Texture	Binder	cBN content (%)	Grain size (μm)	Hardness HV [Gpa]
DNC100		TiN	50 - 55	2	31 - 34



Performance comparison test

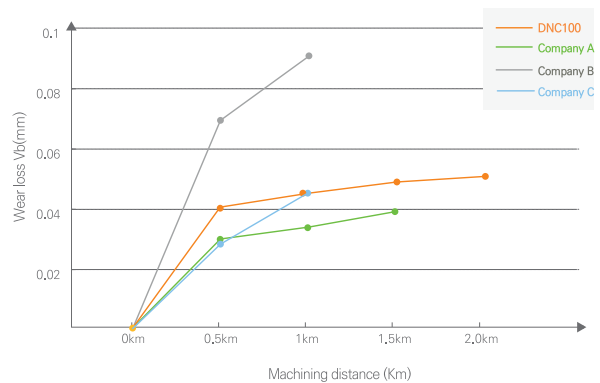
Wear resistance comparison test in high-speed machining



Cutting conditions

Insert model no.	2NU-CNGA120408
Test holder	DCLNL2525-M12
Workpiece	SCM415 (58~62HrC)
Machining speed	300m/min
Feed	0.1mm/rev
Depth of cutting	0.1mm
Dry/wet cutting	Dry cutting

Wear loss



Applicable area

Cutting speed (m/min)	300	DNC100			
	180				
Intermittent cutting intensity	Continuous	Low interrupted	Medium interrupted	Heavy interrupted	
Intermittent accuracy					

Recommended Cutting Conditions

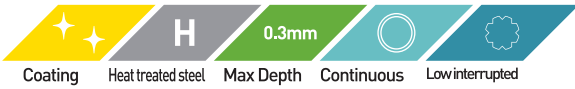
- Improved wear resistance and oxidation resistance with high-hardness thin film adopted
- Significantly improved resistance to chipping, fracture, and wear

Cutting Speed VC (m/min)	180	300
Feed f (mm/rev)	0.03	0.3
Single cutting depth D.O.C ap (mm)	0.03	0.3

※ The details may vary according to machining environments.

DNC250

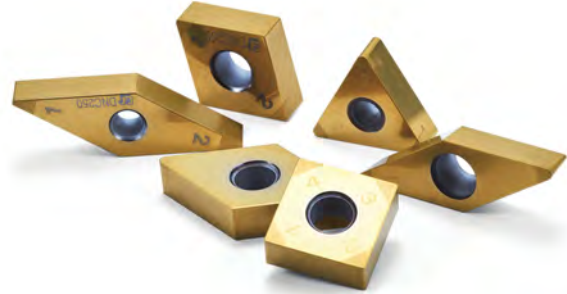
Coated cBN



Features

- Grade first recommended for continuous machining
- General-purpose cBN that enables machining ranging from Continuous cutting to Low interrupted cutting by PVD coating application
- Wear resistance improved

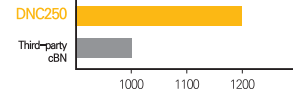
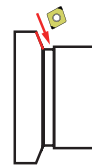
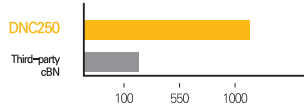
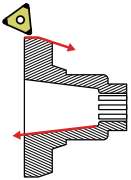
Grade	Texture	Binder	cBN content (%)	Grain size (μm)	Hardness HV (Gpa)
DNC250		TiC	65 - 70	4	32 - 34



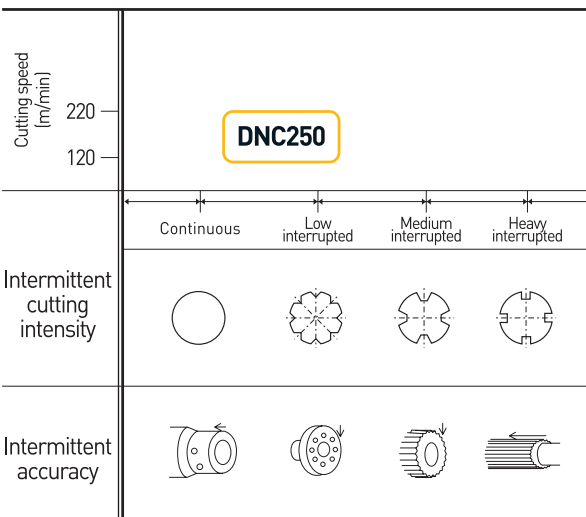
Machining example

Grade	DNC250	Third-party cBN
INSERTS	3NU-TNGA160408	
Parts name (workpiece)	Shaft UD Brake(SCR420HB)	
Vc(m/min)	160	
f(mm/rev)	0,08	
ap(mm)	0,425	
Dry/wet cutting	Wet cutting	

Grade	DNC250	Third-party cBN
INSERTS	2NU-CNGA120408	
Parts name (workpiece)	Hardness : Hrc40-50(SCM92 0HVS I)	
Vc(m/min)	280	
f(mm/rev)	0,08-0,15	
ap(mm)	0,2	
Dry/wet cutting	Wet cutting	

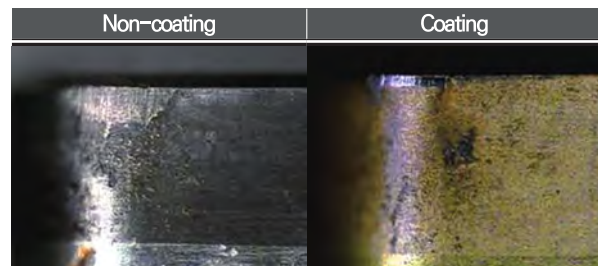


Applicable area



Recommended Cutting Conditions

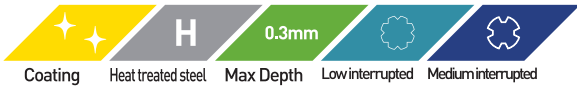
Cutting Speed VC (m/min)	120	220
Feed f(mm/rev)	0.05	0.3
Single cutting depth D.O.C ap (mm)	0.05	0.3



※ The details may vary according to machining environments.

DNC300

Coated cBN



Features

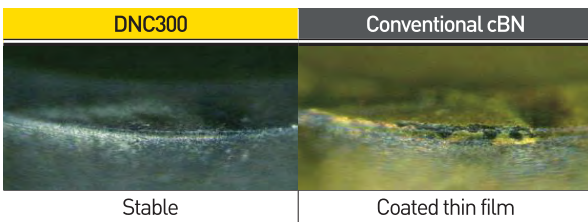
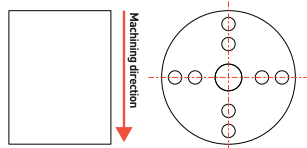
- Grade first recommended for machining ranging from Low interrupted to Medium interrupted
- Improved resistance to chipping and wear versus rival products
- Minimized coating peeling due to its stable coating

Grade	Texture	Binder	cBN content (%)	Grain size (μm)	Hardness HV (Gpa)
DNC300		TiN	65 - 70	4	29 - 31

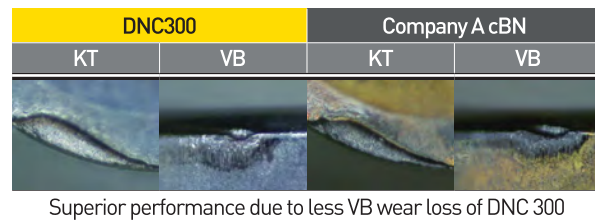
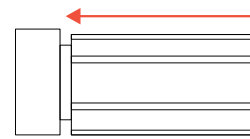


Performance comparison

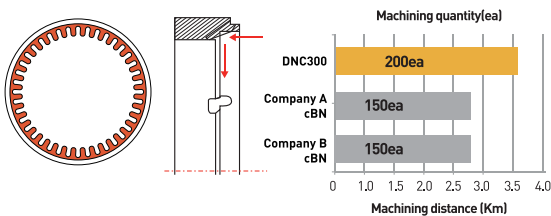
[Interrupted] V90 F0.1 D0.1 / SCR420H(HrC58-62) / DRy (4PATH =0.21KM)



[Outer dia. interrupted] V120 F0.1 D0.1 / 9PATH



Machining example



Grade	DNC300	Company A cBN	Company B cBN
INSERTS	CNGA120408		
Parts name (workpiece)	Heat-treated steel (HrC57.8)		
Vc(m/min)	160		
f(mm/rev)	0.08		
ap(mm)	0.2-0.3		
Dry/wet cutting	Wet cutting		

Applicable area

Cutting speed (m/min)	DNC300			
	Continuous	Low interrupted	Medium interrupted	Heavy interrupted
Intermittent cutting intensity				
Intermittent accuracy				

Recommended Cutting Conditions

- Wear resistance and oxidation resistance are improved with high-hardened thin film adopted
- Significantly improved resistance to chipping, fracture, and wear

Cutting Speed VC (m/min)	90	200
Feed f(mm/rev)	0.05	0.3
Single cutting depth D.O.C ap (mm)	0.05	0.25

※ The details may vary according to machining environments.

DNC350

Coated cBN

Coating	Heat treated steel	H	0.3mm	Low interrupted	Heavy interrupted

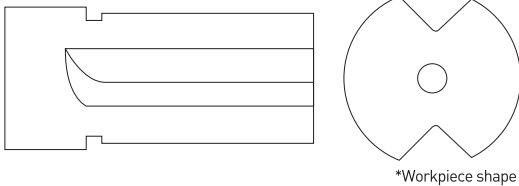
Features

- Grade first recommended for interrupted cutting
- Maintains functionality and precision for a long time due to its advanced coating technology
- Economical due to its longer service life

Grade	Texture	Binder	cBN content (%)	Grain size (μm)	Hardness HV (Gpa)
DNC350		TiN	60 - 65	1	33 - 35

Machining example

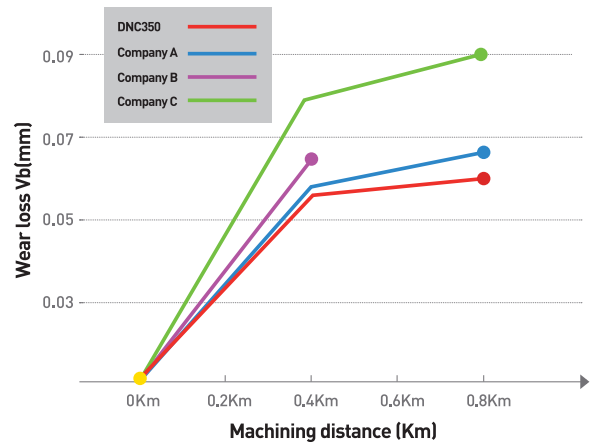
Grade	DNC350	Third-party cBN
INSERTS	2NU-CNGA120408	
Parts name (workpiece)	SCM415(HrC58-60)	
Vc(m/min)	120	
f(mm/rev)	0.1	
ap(mm)	0.1	
Dry/wet cutting	Dry cutting	



Applicable area

Cutting speed (m/min)	DNC350			
	Continuous	Low interrupted	Medium interrupted	Heavy interrupted
Intermittent cutting intensity				
Intermittent accuracy				

Wear loss



Recommended Cutting Conditions

Cutting Speed VC (m/min)	90	150
Feed f(mm/rev)	0.05	0.3
Single cutting depth D.O.C ap (mm)	0.05	0.25

※ The details may vary according to machining environments.

DB1000

Uncoated cBN



Non	H	0.3mm	
Non-Coating	Heat treated steel	Max Depth	Continuous

Features

- Grade for high-speed machining with the best wear resistance among non-coated cBNs
- Features an excellent tool service life in the continuous cutting ~ Low interrupted cutting
- Focuses on wear resistance and improves fracture resistance
- Improves heat resistance and strength by high-purity TiCN ceramic bonding materials

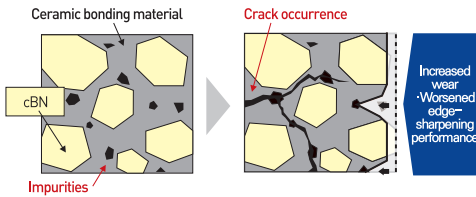
Grade	Texture	Binder	cBN content (%)	Grain size (μm)	Hardness HV (Gpa)
DB1000		TiCN	40 - 45	1	27 - 31



Newly developed high-purity ceramic bonding material

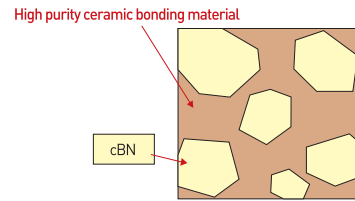
Conventional grade

Impurities included in conventional grade ceramic bonding materials decreased the strength and heat resistance of sintered parts, becoming the cause of crack (fracture) and wear.



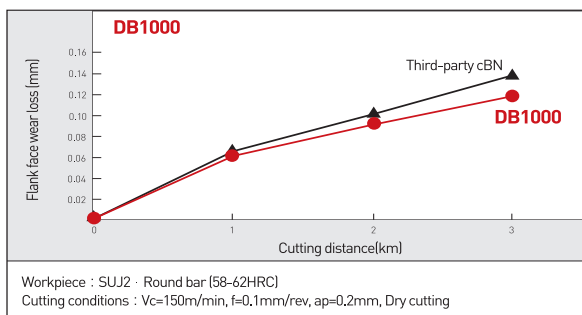
DB1000

DB1000 enhanced heat resistance and strong tenacity by reducing impurities to the very limit using the newly developed "high-purity ceramic bonding material"!



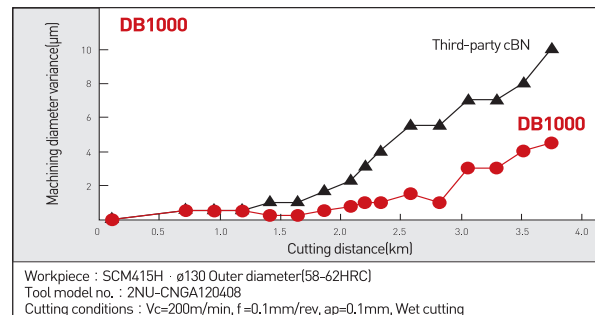
Cutting performance

Dimension accuracy comparison (continuous cutting)

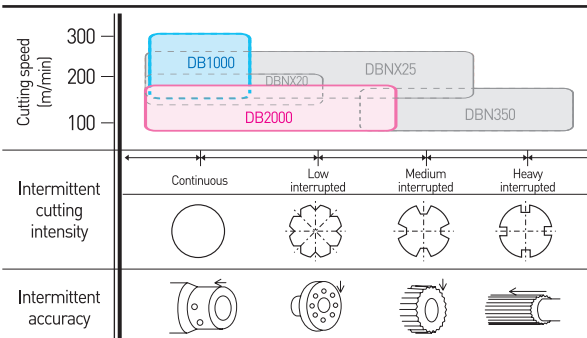


Machining precision

Wear resistance (continuous cutting)



Applicable area



Recommended Cutting Conditions

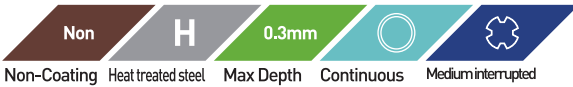
Cutting Speed VC (m/min)	130 - 250
Feed f (mm/rev)	0.03 - 0.15
Single cutting depth D.O.C ap (mm)	0.03 - 0.2

※ Cutting oil : Continuous cutting dry/wet, Interrupted cutting dry

※ The details may vary according to machining environments.

DB2000

Uncoated cBN



Features

- General-purpose grade that responds to overall heat-treated steel – Realizes a stable tool service life ranging from continuous cutting to Low / Medium interrupted cutting
- Highly compatible with fracture resistance and wear resistance – Both properties greatly improved by the use of the high-purity ceramic bonding material
- Achieves a stable surface roughness based on edge-sharpening performance

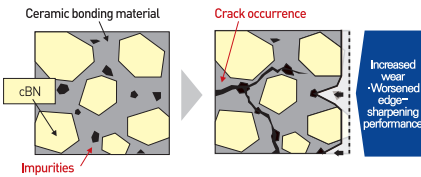
Grade	Texture	Binder	cBN content (%)	Grain size (μm)	Hardness HV (Gpa)
DB2000		TiN	50 - 55	2	31 - 34



Newly developed high-purity ceramic bonding material

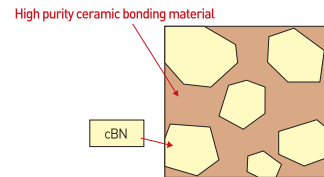
Conventional grade

Impurities included in conventional grade ceramic bonding materials decreased the strength and heat resistance of sintered parts, becoming the cause of cracks (fracture) and wear.



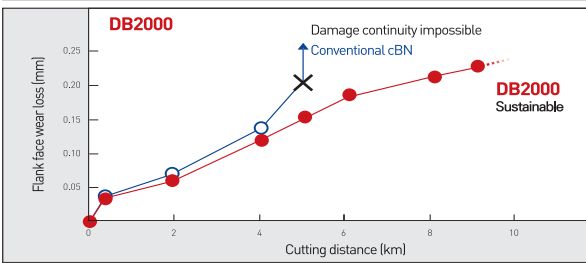
DB2000

DB2000 realizes enhanced heat resistance and strong tenacity by reducing impurities to the very limit using the newly developed 'high-purity ceramic bonding material'!



Cutting performance

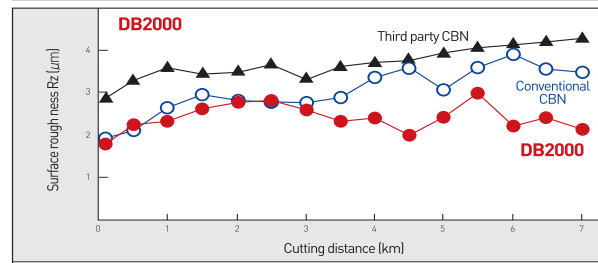
Wear resistance (continuous cutting)



Workpiece : SCM415H Round bar [58-62HRC]
Cutting conditions : Vc=100m/min, f=0.1mm/rev, ap=0.2mm, Dry cutting

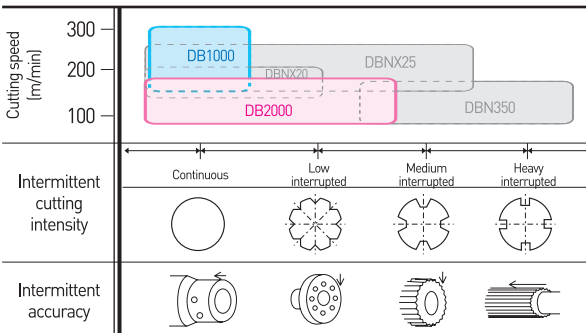
Machining precision

Surface roughness comparison (continuous cutting)



Workpiece : SCM415H Round bar [58-62HRC]
Tool model no. : 2NU-CNGA120408
Cutting conditions : Vc=100m/min, f=0.08mm/rev, ap=0.2mm, Dry cutting

Applicable area



Recommended Cutting Conditions

Cutting Speed VC (m/min)	80	200
Feed f (mm/rev)	0.03	0.2
Single cutting depth D, O.C ap (mm)	0.03	0.3

※ Cutting oil : Continuous cutting dry/wet, Interrupted cutting dry

※ The details may vary according to machining environments.

DB7000

Uncoated cBN



Non	K	0.5mm	Sintered parts		
Non-Coating	Cast iron	Max Depth	Sintered parts	Continuous	Low interrupted

Features

- Ideal for high-speed grinding machining of cast iron
- Suppresses heat crack and realizes excellent damage resistance by highspeed machining of gray cast iron
- Realizes highly efficient sintered alloy machining
- Provides a stably longer service life in case of machining of sintered alloys with diverse shape hardness by meeting the requirements for cutting edge treated products of high standard+2 types
- Responds to various difficult-to-cut materials
- Features high performance for difficult-to-cut materials such as rolls, highspeed tools , and heat resistant alloys, etc.



Grade	Texture	Binder	cBN content (%)	Grain size (μm)	Hardness HV (Gpa)
DB7000		CO Compound	90 - 95	2	41 - 44

Tissue that acidized cBN sintered parts

DB7000

Fewer holes

cBN for third-party cast iron

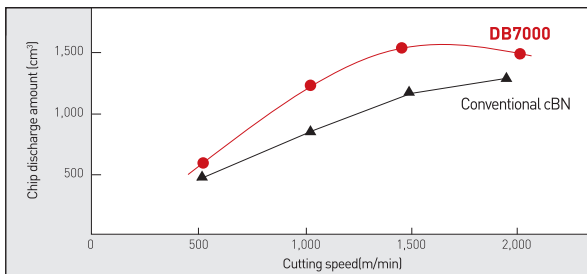
More holes

Holes generated by the elution of bonding materials due to acidizing

Provides an excellent damage resistance and an enhanced inter-cBN particle coherence by sintering intermediate particle cBNs in high density to realize the best content Ensures a long service life and stable machining in highspeed grinding of hard-to-cut materials of cast iron sintered alloys

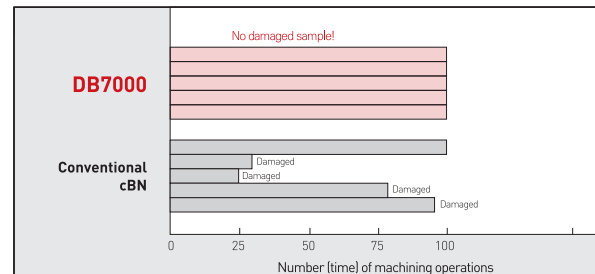
Cutting performance

Cast iron milling machining



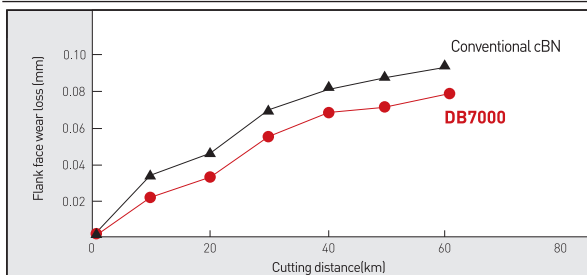
Workpiece : FC250(Pearl lite)
Tool model no. : FMU4100R SNEW1203ADTR
Cutting conditions : Vc=500-2,000m/min, f=0.2mm/rev, ap=0.3mm, Dry cutting

Cast iron turning machining



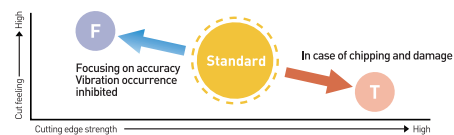
Workpiece : FC300(Pearl lite)
Tool model no. : 2NU-CNGA120408
Cutting conditions : Vc=800m/min, f=0.15mm/rev, ap=0.2mm, Wet cutting

Cast iron turning machining

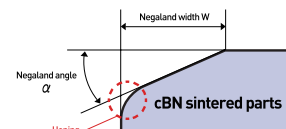


Workpiece : SMF400(70HRB, Interrupted machining)
Tool model no. : 2NU-CNGA120408
Cutting conditions : Vc=250m/min, f=0.1mm/rev, ap=0.3mm, Dry cutting

Recommended cutting edge treatment



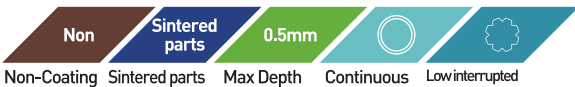
Item	TYPE	Honing	Negaland	Angle
Sharp	F TYPE	—	—	—
Standard	—	—	0.12	15°
Reinforced	T TYPE	—	0.12	25°



※ The details may vary according to machining environments.

DB7500

Uncoated cBN



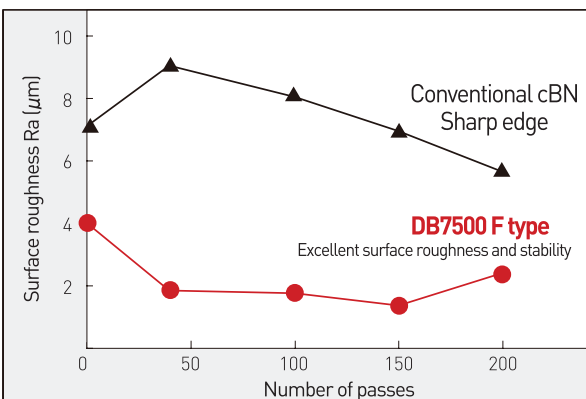
Features

- Ideal for grinding machining of sintered alloys
- Realizes excellent surface roughness and machined surface quality
- Various shapes of sintered parts can cutting by various cutting edge treatment
- Provides burr inhibition and machining precision improvement by F type that focuses on cutting taste designed for sintered alloy machining to meet grade requirements; Features stable resistance to chipping by cutting edge reinforced T type even in case of interrupted grinding machining

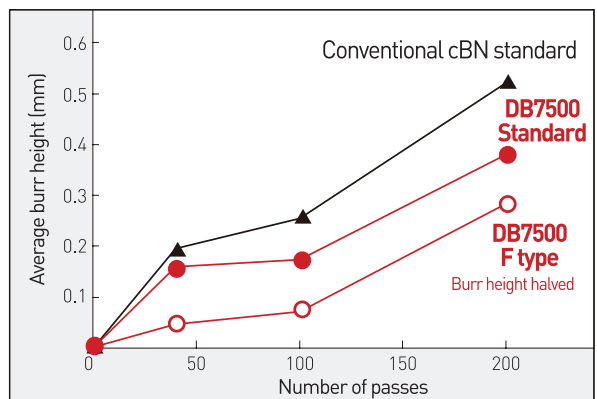
Grade	Texture	Binder	cBN content (%)	Grain size (μm)	Hardness HV (Gpa)
DB7500		CO Compound	90 - 95	1	41 - 44



Cutting performance

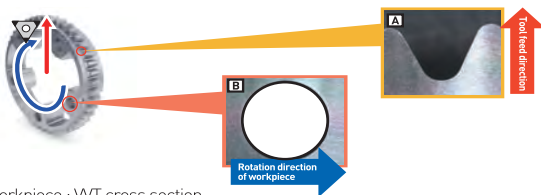


Workpiece : Equivalent to iron metal sintered alloy SMF4040 (70HRB, continuous machining) Old cutting : 2NU-CNGA120408F
 Conditions : Vc=200m/min, f=0.1mm/rev, ap=0.1mm, wet



Workpiece : Equivalent to iron metal sintered alloy SMF4040 (70HRB, continuous machining) Old cutting : 2NU-CNGA120408F
 Conditions : Vc=200m/min, f=0.1mm/rev, ap=0.1mm, wet

Feed-burr relationship

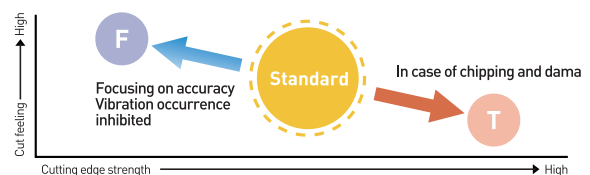


Workpiece : WT cross section
 Tool model no. : 3NU-TNGA160404
 Cutting conditions : Vc=200m/min, f=0.1mm/rev, ap=0.1mm, wet cutting

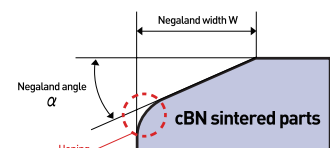
	F type	Standard type	T type
A			
B			

* If Feed is more than 0.1mm/rev, the T type is superior to the standard type in terms of cutting taste and burr can be inhibited.

Recommended cutting edge treatment



Item	TYPE	Honing	Negaland	Angle
Sharp	F TYPE	—	—	—
Standard	—	—	0.12	15°
Reinforced	T TYPE	—	0.12	25°



※ The details may vary according to machining environments.

RA,GA Chip breaker

cBN Chip breaker

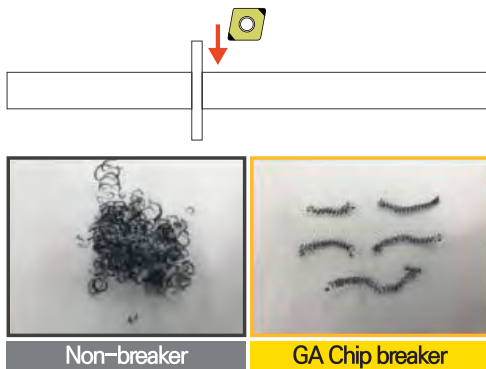


Features

- Prevents drag of chip into the workpiece during machining
- Ideal for unmanned automatic operations of the cutting process
- The RA chip breaker is for rough boring process
- GA chip breaker is for finishing boring process

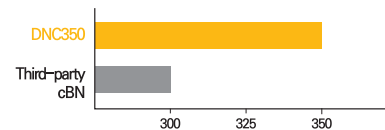


Example of use



Applicable area

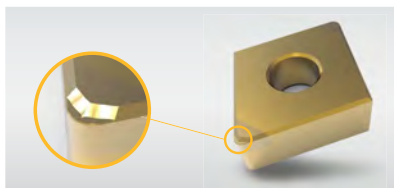
Grade	DNC350(GA)	Third-party cBN
INSERTS	2NU-CNGM120412-GA	
Parts name (workpiece)	Input Shaft(SCM920 HVSII)	
Vc(m/min)	145	
f(mm/rev)	0.1	
ap(mm)	0.4 ~ 0.5	
Dry/wet cutting	Wet cutting (excellent chip breaking versus rival products)	



Chip Breaker

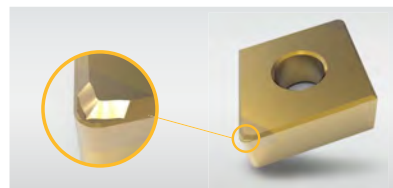
GA type

Chip breaker suitable for fine boring



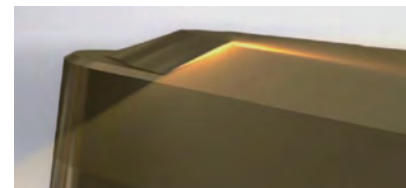
RA type

Chip breaker suitable for rough boring



Chip Breaker Features

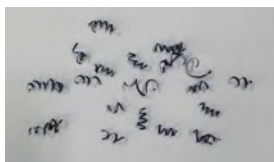
Superior design fit for chip breaking to induce easy curling



Chip breaker comparison

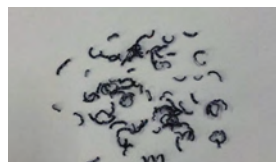
GA Chip Breaker

V=150m/min
f=0.15 mm/rev
ap=0.15mm

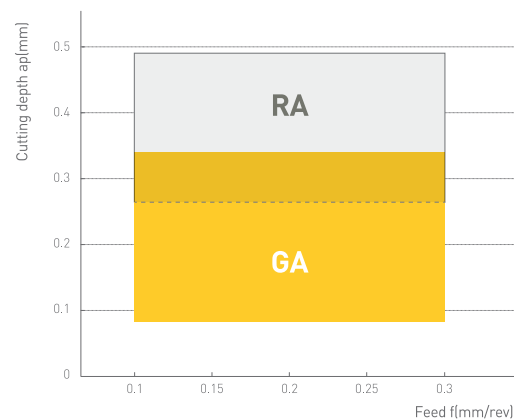


RA Chip Breaker

V=150m/min
f=0.15 mm/rev
ap=0.3mm



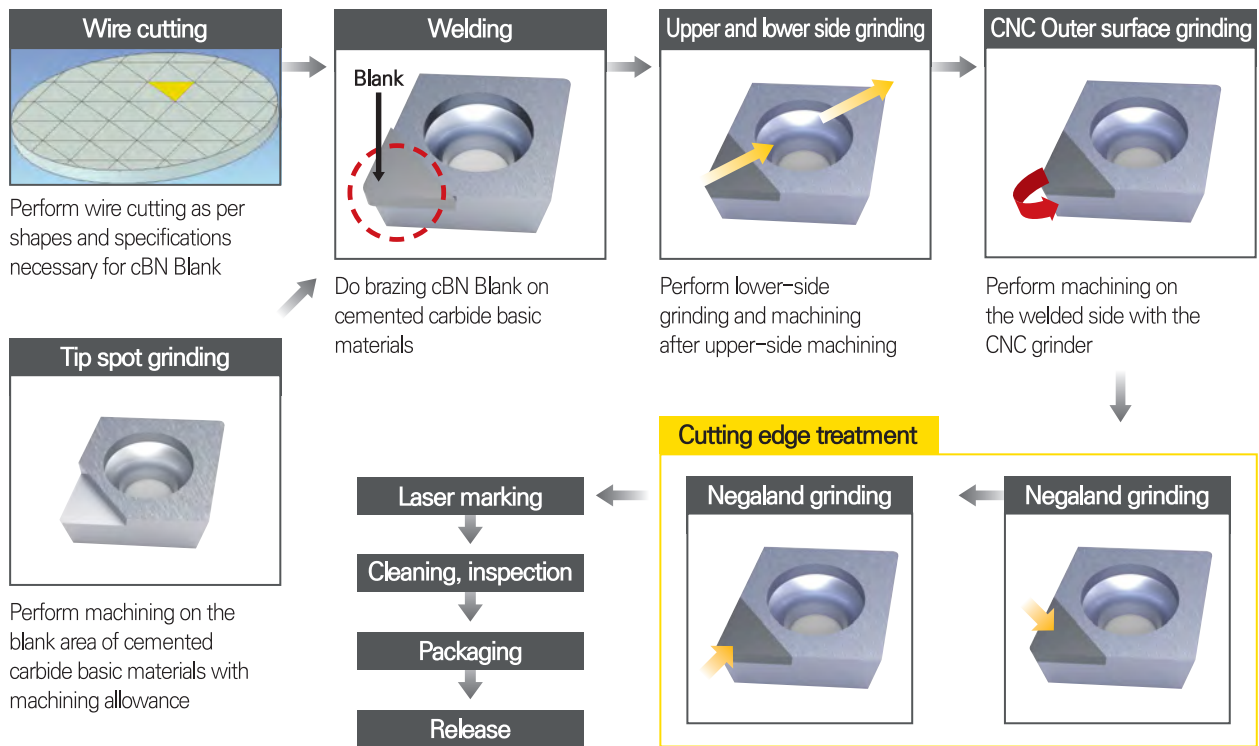
Applicable area



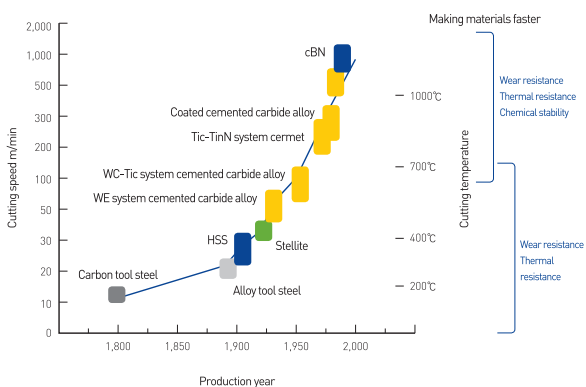
※ The details may vary according to machining environments.

cBN Technical data

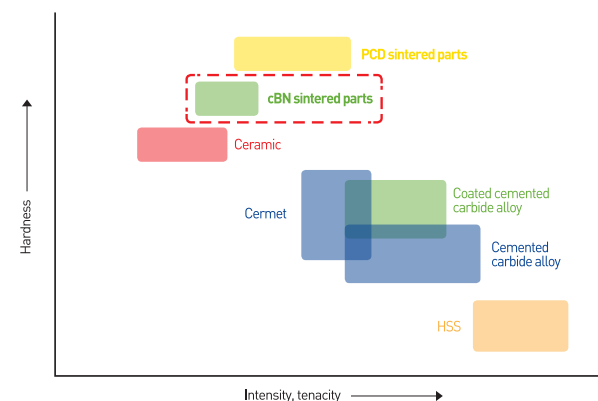
Manufacturing process of cBN



Cutting speed change and tool materials development in history



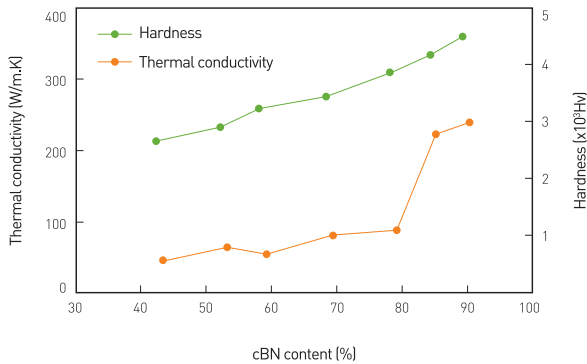
Hardness and intensity of tool materials



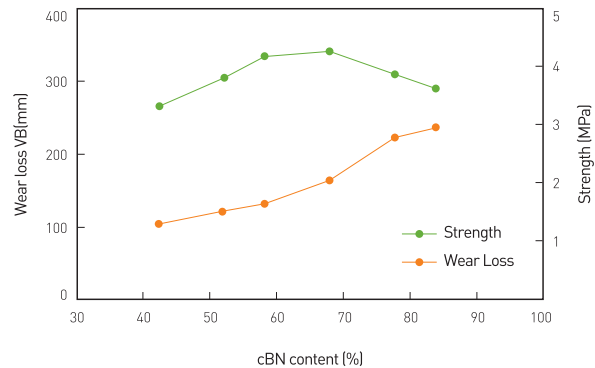
cBN Technical data

Main characteristics of cBN

Main characteristics I of cBN



Main characteristics II of cBN

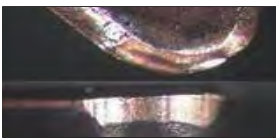


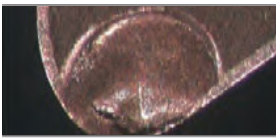

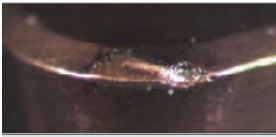

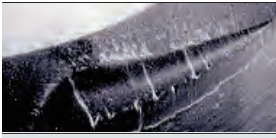

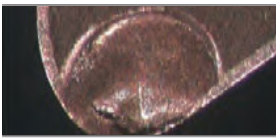

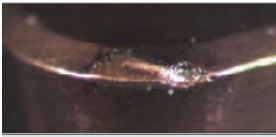

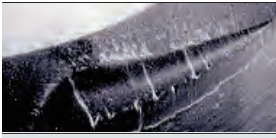



cBN machining workpieces and advantages of cutting machining

Workpiece	Representative parts	Advantages of cutting machining	Corresponding grade
Heat-treated steel	Transmission gear Driving shaft Shafts Valves Hydraulic parts, etc.	<ul style="list-style-type: none"> Improved workpiece phenomenon accuracy Responding to machining of composite parts and micro parts Machining efficiency improved, grinding/polishing minimized Investment equipment cost reduced Environmental measures 	DNC100,DNC250 DNC300,DNC350 DNC400 DB1000, DB2000 DBN250, DBN350 DBNX20, DBNX25
Casting	Engine block Cases Brake disks, etc.	<ul style="list-style-type: none"> Responding to high-speed machining Responding to hard to cut material casting Machining efficiency improved 	DBNS800, DBN500 DB7000
Sintered alloy	WT(VTC) parts Various sprocket rotas oil pump parts valve seats	<ul style="list-style-type: none"> Improved workpiece phenomenon accuracy Responding to heat treatment sintered parts and composite parts Capacity utilization (longer tool service life) High-speed, high-efficiency machining 	DBN500 DB7000, DB7500
Heat resistant alloy	Jet engine parts, etc.	<ul style="list-style-type: none"> Machining efficiency improved Workpiece machining surface roughness improved 	DBNX20

cBN Technical data

Causes of and measures for tool damage

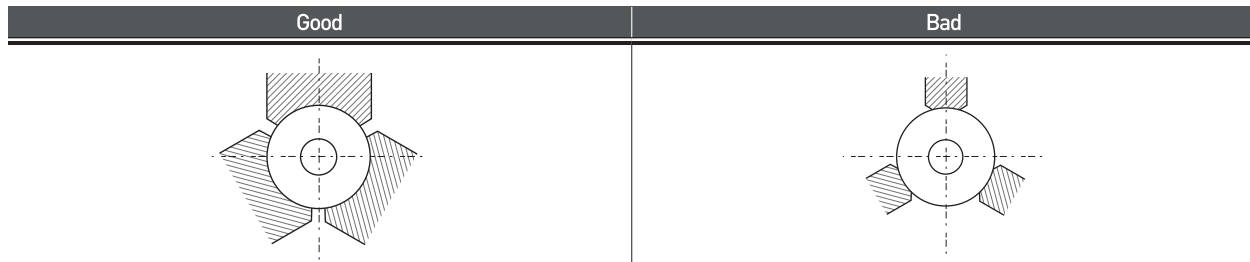
Insert damage type	Causes	Measures																
Flank face wear 	<ul style="list-style-type: none"> • Insufficient of wear resistance of tool grade • Too high cutting speed 	<ul style="list-style-type: none"> • Select high wear resistance grade • Decrease cutting speed • Reduce to less than V_c 200m/min. (Measures to increase feed and decrease machining distance are effective.) • Enlarge clearance angle 																
Crater wear 	<ul style="list-style-type: none"> • Insufficient of crater wear resistance of tool grade • Too high cutting speed 	<ul style="list-style-type: none"> • Change to high-sufficiency machining grade • Decrease cutting speed and increase feed (Low speed, high feed) • Reduce to less than V_c 200m/min. (Measures to increase feed and decrease machining distance are effective.) 																
Crater damage 			Flaking damage 	<ul style="list-style-type: none"> • Insufficient tenacity of tool grade • High radial cutting force 	<ul style="list-style-type: none"> • Use high tenacity grade • Increase cutting edge strength (Enlarge Negaland angle and perform honing) • In case of sufficient tenacity of grade, increase cutting taste 	Just prior to corner wear 	<ul style="list-style-type: none"> • High stress of boundaries 	<ul style="list-style-type: none"> • Change to grade with strong resistance to corner wear • Increase cutting speed (more than 150m/min) • Change feed to a regular number of machining • Enlarge the Negaland angle and perform honing operation 	Previous corner chipping 	<ul style="list-style-type: none"> • Great impact on the front cutting edge and large number of times 	<ul style="list-style-type: none"> • Change to a grade with high resistance to damage • Increase feed (Impact of interruption reduced and chipping inhibited) • Enlarge the Negaland angle and perform honing operation 	Horizontal corner chipping 	<ul style="list-style-type: none"> • Great impact on the horizontal cutting edge and large number of times 	<ul style="list-style-type: none"> • Change to a grade with high resistance to damage • Decrease feed • Enlarge horizontal cutting edge angle • Increase R size • Enlarge the Negaland angle and perform honing operation 	Crack 	<ul style="list-style-type: none"> • Large heat impact 	<ul style="list-style-type: none"> • In case of wet cutting machining → dry cutting recommended • Change to high thermal conductivity grade • Decrease V_c, f, a_p to reduce machining load 	Built up edge 
Flaking damage 	<ul style="list-style-type: none"> • Insufficient tenacity of tool grade • High radial cutting force 	<ul style="list-style-type: none"> • Use high tenacity grade • Increase cutting edge strength (Enlarge Negaland angle and perform honing) • In case of sufficient tenacity of grade, increase cutting taste 																
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Horizontal corner chipping 	<ul style="list-style-type: none"> • Great impact on the horizontal cutting edge and large number of times 	<ul style="list-style-type: none"> • Change to a grade with high resistance to damage • Decrease feed • Enlarge horizontal cutting edge angle • Increase R size • Enlarge the Negaland angle and perform honing operation 																
Crack 	<ul style="list-style-type: none"> • Large heat impact 	<ul style="list-style-type: none"> • In case of wet cutting machining → dry cutting recommended • Change to high thermal conductivity grade • Decrease V_c, f, a_p to reduce machining load 																
Built up edge 	<ul style="list-style-type: none"> • Too low cutting speed • Strong affinity of the workpiece with the tool 	<ul style="list-style-type: none"> • Increase cutting speed • Select a shape whose slope angle is larger than the workpiece • Select a grade whose tenacity is better than the workpiece 																

cBN Technical data

Heat-treated steel high-precision machining points

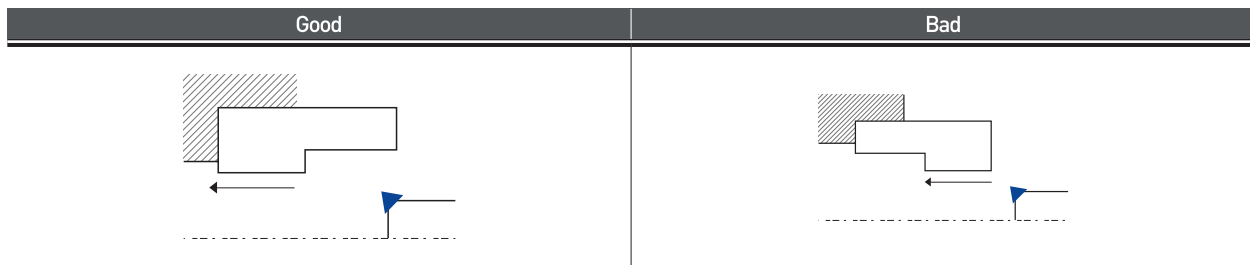
Out of roundness

Perform chucking to apply to the workpiece as equally as possible



Cylindricity

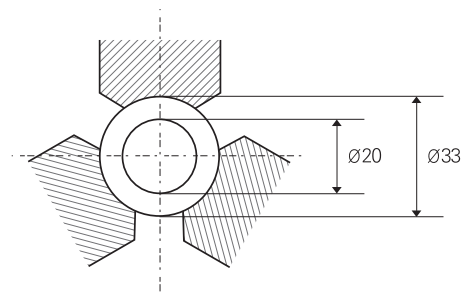
Perform chucking in the vicinity of machining range



Relationship of chucking pressure and out-of-roundness

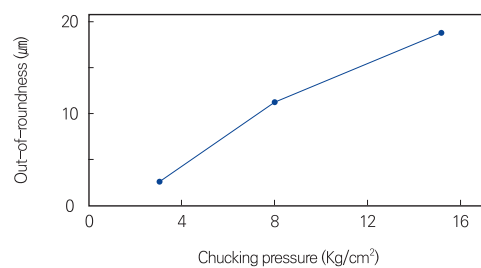
Machining conditions

- Machine : General-purpose N/C lathe
- Workpiece : SUJ2 HRC60
- Chuck : 3Jaw
- Tool : DBN250
TPGW160404



Cutting condition

- V=150m/min
- f=0.04mm/rev.
- d=0.1mm wet cutting

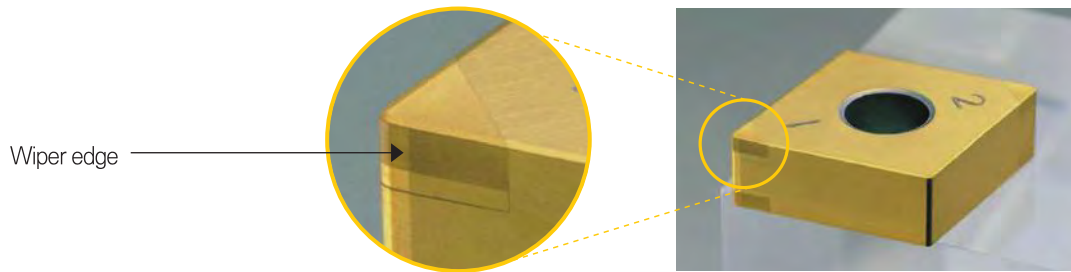


※ An appropriate chuck pressure is necessary for an excellent machining.

cBN Edge treatment

cBN Wiper insert

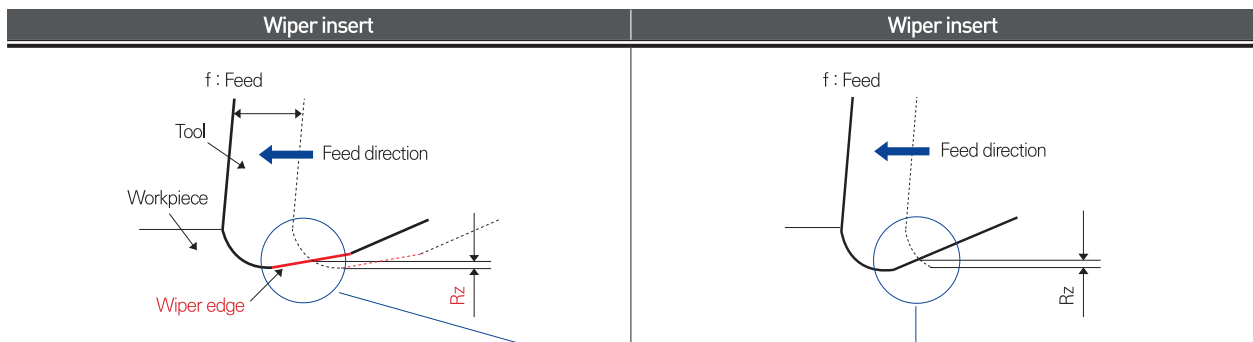
Shape



Purpose

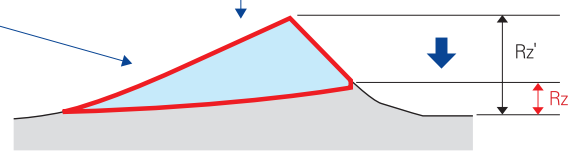
CT reduction — Tool service life increased — High surface roughness required

Features and performance of wiper insert



Features

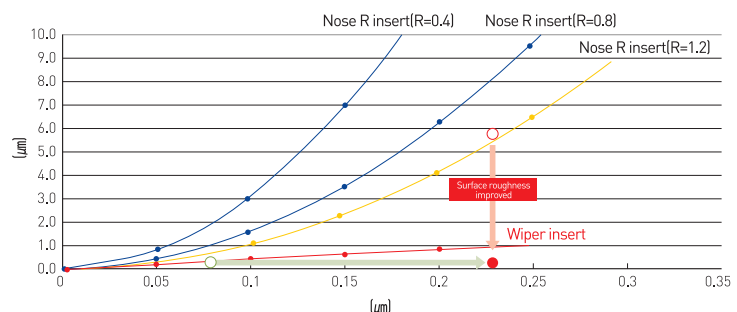
- Surface roughness improved
- High efficiency machining based on high feed (when the surface roughness is the same)



※ According to wiper cutting edge, the surface roughness R_z is getting smaller even in case of cutting with the same feed.

Theoretical surface roughness of wiper insert

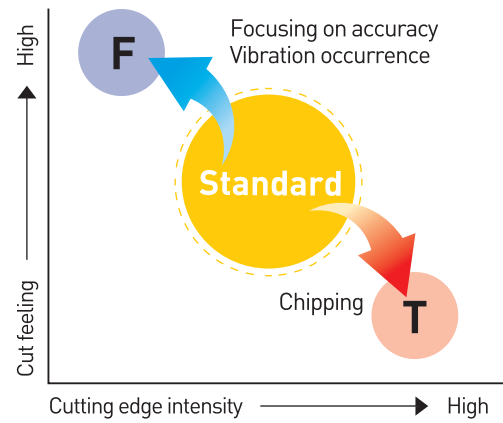
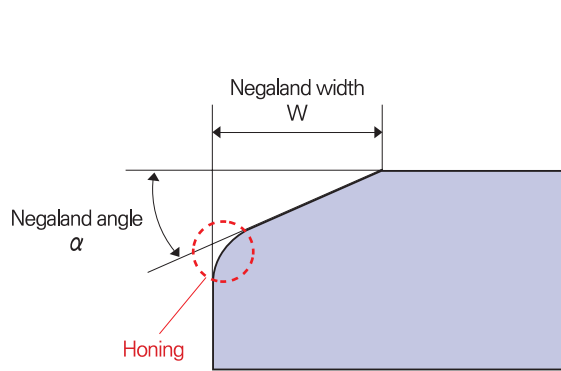
Based on the wiper effect, surface roughness was increased 3~5 times on the same conditions!



※ The details may vary according to machining environments.

cBN Edge treatment

cBN cutting edge treatment



CNGA120408F / CNGA120408 / CNGA120408T

Item	Marking	Heat-treated steel			Cast iron/sintered alloy		
		Honing	Negaland width	Negaland angle	Honing	Negaland width	Negaland angle
Sharp	F	0	0.12	15-degree	-	-	-
Standard*	None	0	0.12	25-degree	N/A	0.12	15-degree
Reinforced	T	0	0.12	35-degree	N/A	0.12	25-degree

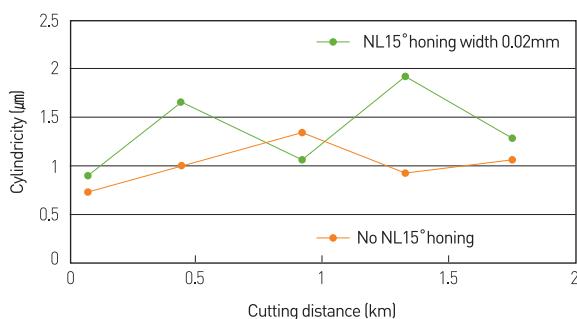
- First recommended cutting edge treatment : standard type*
- Apply sharp / reinforcement types according to machining conditions

Adjust Negaland width and angle and honing amount appropriately for machining

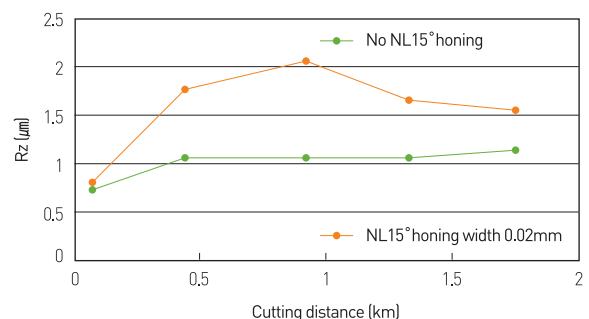
Characteristics of cBN honing

- SCM415 $\varnothing 10$ Inner diameter boring 2NU-CNGA120408 DBNX20
- $V=70\text{m/min}$ $f=0.03\text{mm/rev}$ $d=0.05\text{mm}$ DRY
- Giving honing increases cutting resistance to weaken machining accuracy but tends to improve surface roughness.

Comparison of cylindricity as per cutting edge shape



Comparison of surface roughness as per cutting edge shape



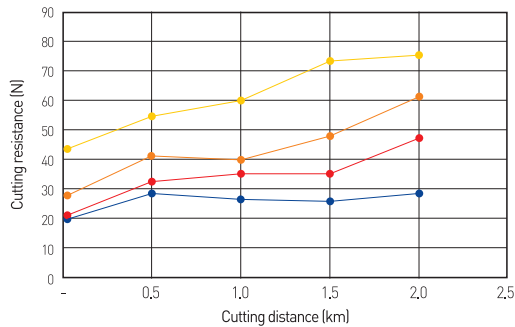
※ The details may vary according to machining environments.

cBN Edge treatment

cBN Test comparison – Negaland

The smaller Negaland angle is, the smaller cutting resistance is.

Comparison of cutting resistance



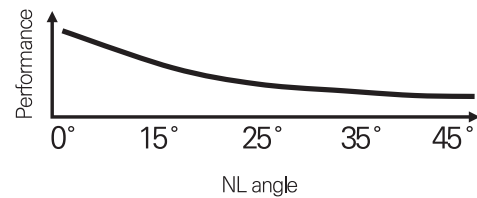
※ TEST information

- Cutting conditions :
 - Vc 90m/min
 - fn 0.06mm/rev
 - ap 0.08mm
- Workpiece : SCM420 (HRC55~57)
- Holder : DCLNR2525
- Insert : CNMA120408 / DBN250
(Standard cutting edge : Negaland angle 25°)

cBN (Effect of Negaland)

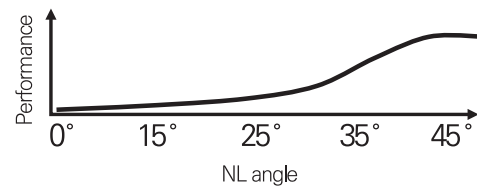
Dimensional accuracy

Dimension accuracy increases as the cutting edge angle is getting smaller.



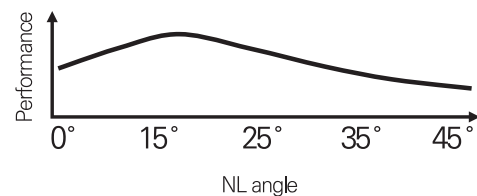
Chipping resistance

Cutting edge strength increases as the cutting edge angle is getting larger.



Surface roughness

Surface roughness decreases as the cutting edge angle is getting larger.

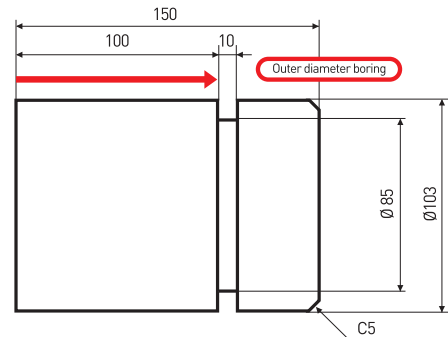


cBN Edge treatment

cBN Test comparison – Cutting edge treatment (standard type/F type/T type)

Workpiece (round bar) information	
Size	∅105X 150
Material	SCM415
Heat treated	Carburization
Hardness	HRC58-62

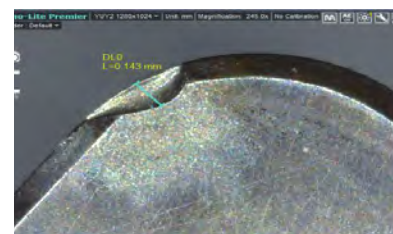
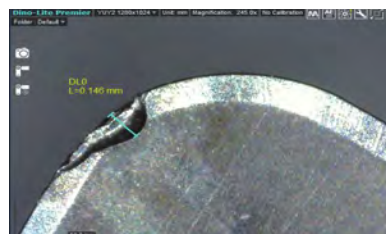
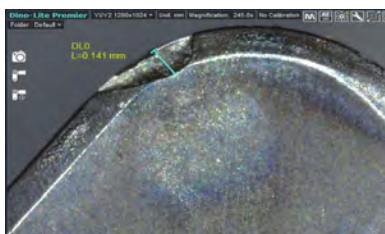
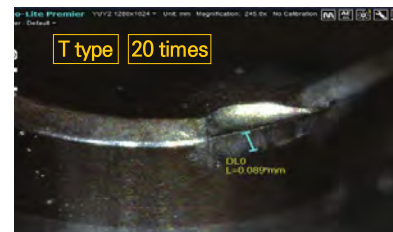
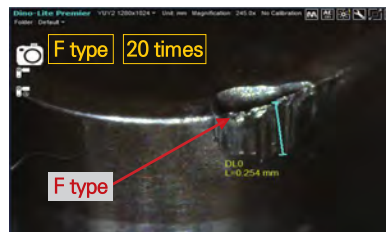
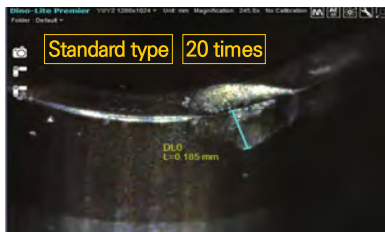
Insert information 2NU-CNGA120408			
Grade	Cutting edge treatment	Negaland	Honing
DB1000	Standard type	0.12 X 25°	0.010
DB1000	F type	0.12 X 15°	0.010
DB1000	T type	0.12 X 35°	0.010



Results analysis

1. Wear loss : T type > Standard type > F type
2. Surface roughness : Standard type > T type > F type
 - With 20 times of machining, surface roughness is machined at 8/12/20 time.
3. Remarks :
 - Theoretically, F type (sharp type) is excellent in surface roughness, but under the machining condition of $V=200/f=0.1/a_p=0.1$, the surface roughness due to initial chipping occurrence of F type is shown inferior.

Comparison of surface roughness			
Grade	8-time machining	12-time machining	20-time machining
DB1000	Ra 0.431	Ra 0.477	Ra 0.492
DB1000F	Ra 0.629	Ra 0.754	Ra 0.821
DB1000T	Ra 0.496	Ra 0.545	Ra 0.584



cBN Re-grinding

How to select re-grinding

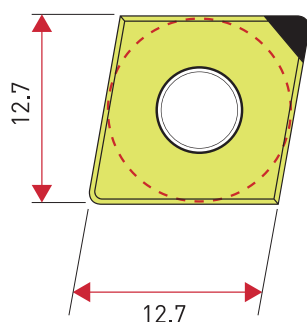
1. Check for abnormality or brokenness through inspection
2. Classify re-grinding according to the size of an inscribed circle

Model No.	New product (before use)	Class B	Class C	Class D
CNMA1204□□	12.7	12.5	12.3	12.1
DNMA1504□□	12.7	12.5	12.3	12.1
VNMA1504□□	9.525	9.4	9.3	9.2
DCGW11T3□□	9.525	9.3	9.1	X
CCGW09T3□□	9.525	9.3	9.1	X

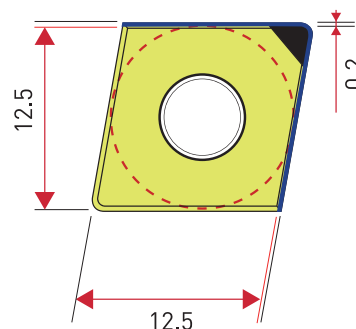
Machining example

CNMA120408 → 0.2mm machined at one time machining

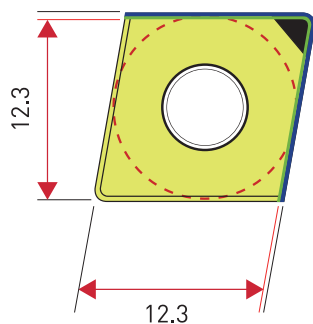
New product (before use) : Regrinding 0 time, inscribed circle 12.7mm



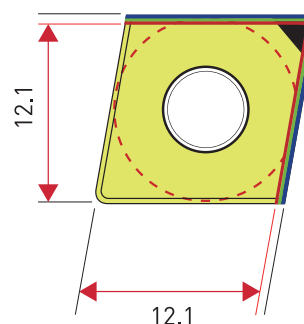
Class B : Regrinding 1 time, inscribed circle 12.5mm



Class C : Regrinding 2 times, inscribed circle 12.3mm



Class D : Regrinding 3 times, inscribed circle 12.1mm



PCD Chip Breaker(UC)

New PCD insert with Chip Breaker



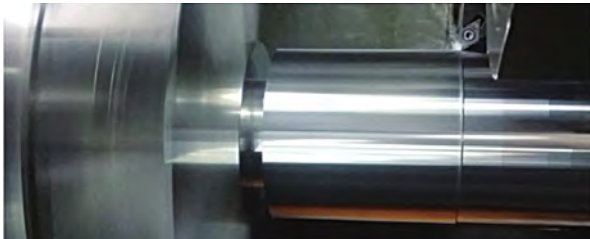
Features

- Productivity improved by resolving chip troubles
- Stable capacity to break chips in the large cutting area
- Excellent in machining aluminium and copper alloys
- Provides very high hardness and excellent wear resistance due to high-density combination of diamond polycrystallines

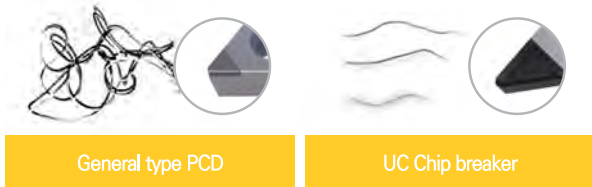
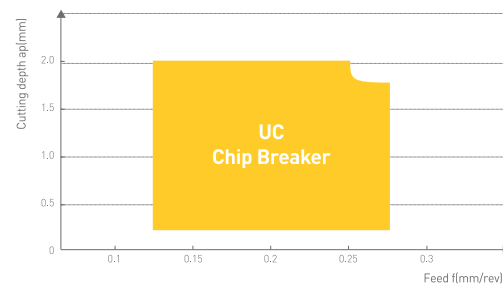


Performance Comparison Test

- Tool model no. : DCMT11T304-UC
- Workpiece : AL6061 (Ø 100*160L outer dia. boring)
- Cutting conditions : $V_c=500\text{m/min}$, $f=0.15\text{mm/rev}$, $a_p=0.2\text{mm}$, dry cutting



Applicable area

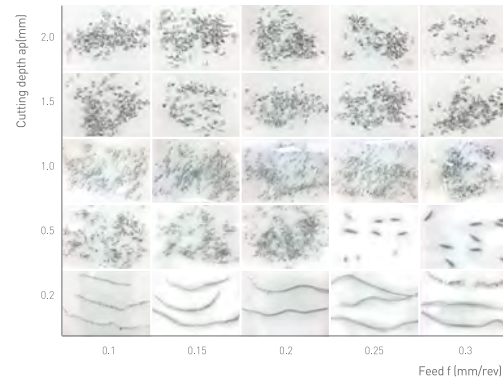


General type PCD

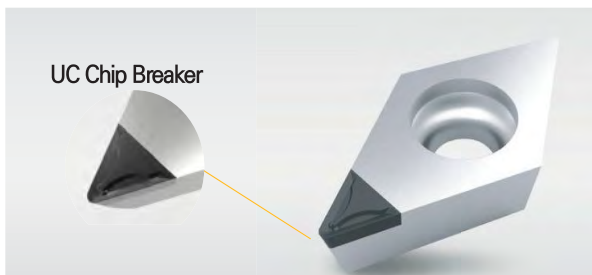
UC Chip breaker

Shape of chip

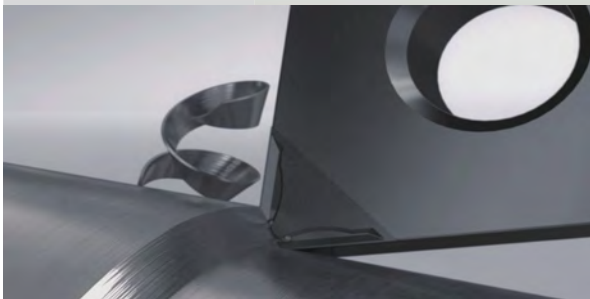
- Tool model no. : DCMT11T304-UC
- Workpiece : AL6061 (Ø 100*160L outer dia. boring)
- Cutting conditions : $V_c=500\text{m/min}$ dry cutting



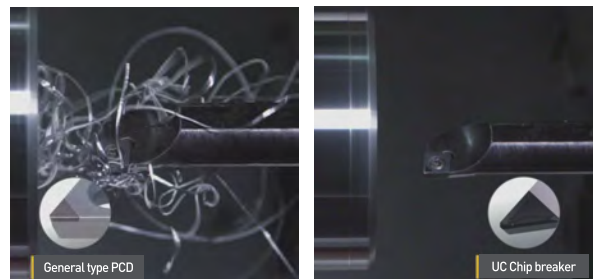
Chip Breaker



※ Excellent chip breaker design to easily make a curl



Comparison of chip rear discharge



PCD Technical data

PCD Features

DINE PCD products provide very high accuracy and excellent wear resistance as they are manufactured by the ultrahigh temperature and ultrahigh pressure manufacturing process to combine diamond polycrystallines in high density.

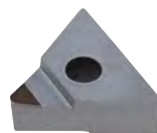
Also as the PCD products are based on the diamond crystal particle size control technology by DINE Inc., various workpieces can be machined widely, DINE PCD products provide excellent workpiece surface roughness, high machining accuracy and long tool service life.

- Excellent in machining aluminium alloys and copper alloys
- Excellent in machining ceramic, high Si-aluminium alloy, stone, etc.
- Excellent in machining rubber, carbon, graphite, wood, etc.

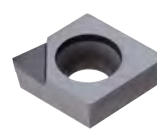
PCD Shape



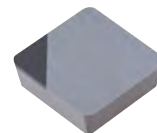
TNMX



CCMT



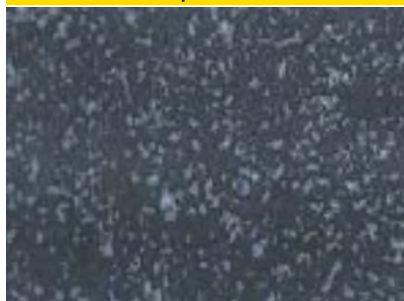
SPGN



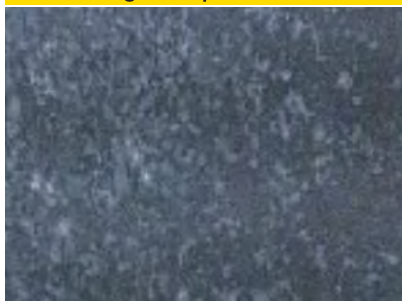
PCD Tool technology guide

1. PCD = polycrystalline diamond = particle sintered diamond
2. Composition : [diamond crystal grain + diamond additives (metal, ceramic)]
sintering by high temperature and pressure (1200°C, 50k atm)
3. Particle size : ultrafine particle (0.5 μ m) < fine-grained particle (10 μ m) < rough particle (more than 25 μ m)

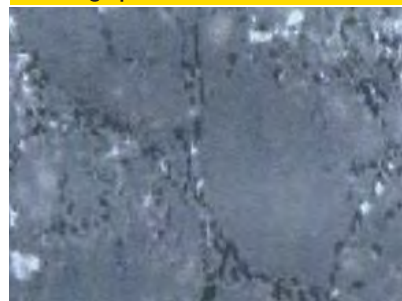
ultrafine particle(0.5 μ m)



fine-grained particle (10 μ m)



rough particle (more than 25 μ m)



4. Application : nonferrous metals, glass fiber, woodwork, high-hardness plastic
5. Specification
 - 1) rough particle => high density and thermal conductivity – excellent wear resistance but weak surface roughness.
 - 2) Cutting edge oxidation occurs in case of machining high-hardness materials at low oxidation temperature



Head Office [15118] 24, MTV 26-ro, Siheung-si, Gyeonggi-do, Republic of Korea (Jeongwang-dong) | T. +82 031-488-6200 | Call Center. +82 031-1544-0920

Branch Office in China T. +86-532-8588-5907 | E. dine@ddinox.com.cn
4th/5th Floor, 88 Building, Beijing Capital Airport International Center, No.6th Changchengnan Road, Chengyang District, Qingdao, Shandong Province, China

Branch Office in Vietnam T. +84-24-7300-6991 | E. sales@dine.com.vn
4th Floor, Tower B, Golden Palace Building, Me Tri ward, Nam Tu Liem district, Hanoi, Vietnam

Branch Office in Thailand T. +66-02-108-8911~3 | E. dine.thai@dine.co.kr
1/38 Bangna Thani Building 19B th Floor, Bangna-Trad 34 Alley, Bangna Tai Sub-district, Bangna District, Bangkok 10260

Branch Office in Spain T. +34-911-09-59-35 | E. dms@dine.co.kr
Avda. de los Montes de Oca, 19, Nave 3, 28703, San Sebastian de los Reyes, Madrid

www.dine.co.kr E-mail : dine@dine.co.kr