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Chukyo Overseas Subsidiaries

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Website : <http://www.chukyo.com.cn>

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ckt.sales@chukyo-thailand.com
Website : <https://chukyo-thailand.com>

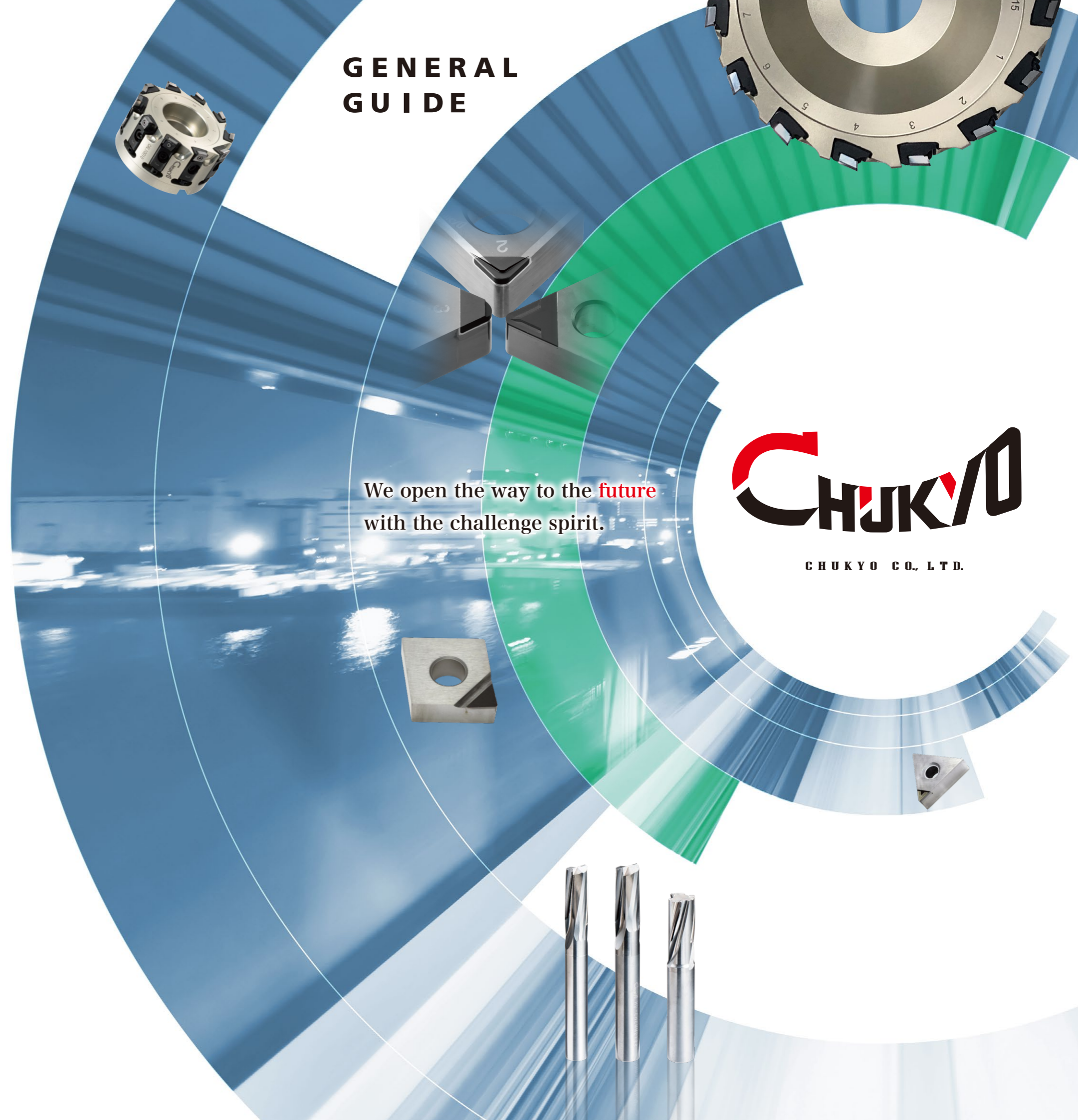
Sales Agent

GENERAL GUIDE

We open the way to the **future**
with the challenge spirit.

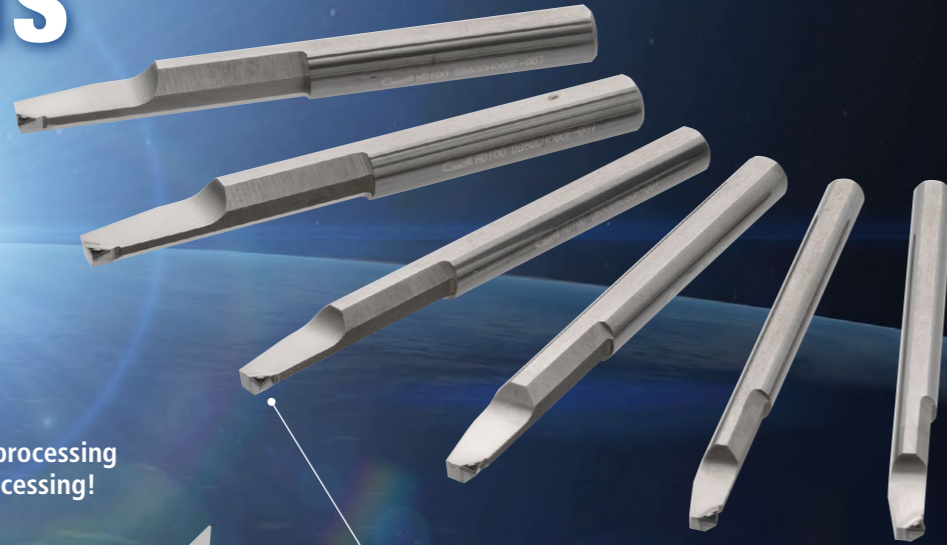
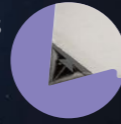


CHUKYO CO., LTD.

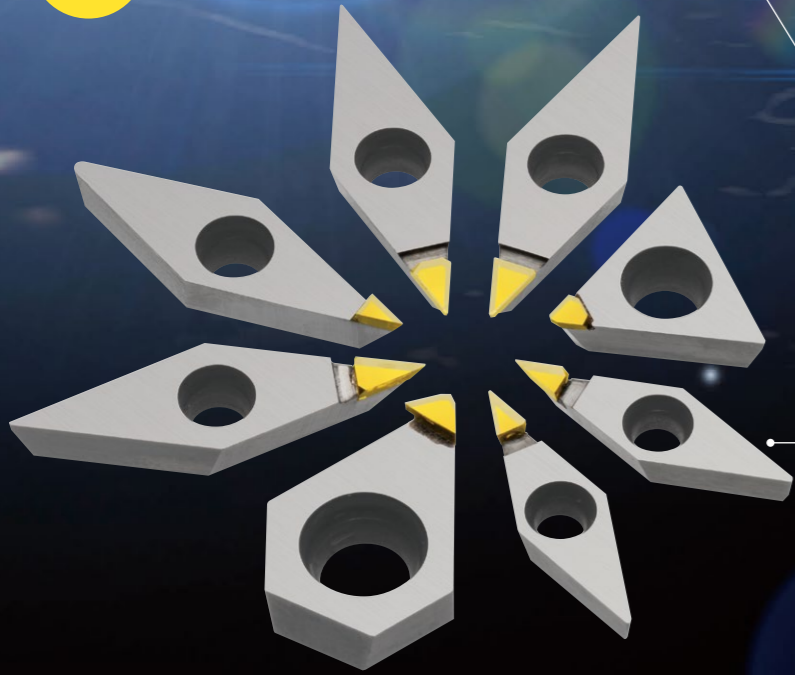


NEW PRODUCTS

We can process a broad range of materials including high-strength ferrous materials, nonferrous metals, and resin!



Specialist in ultrafine processing and high-precision processing!

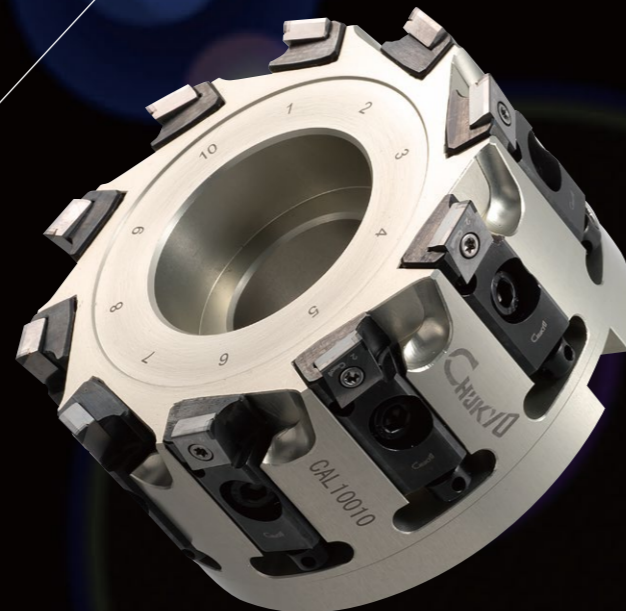
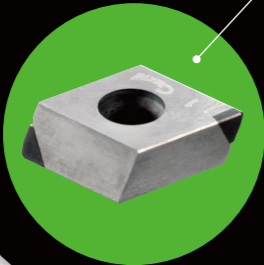


Small Diameter Boring Bar P.25

MCD Insert P.27

CBN-CAL CUTTER P.17

Multi Corner PcBN Insert



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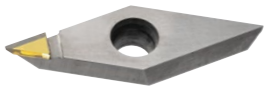
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NEW ■ Small-diameter PCD/PcBN/MCD Boring Bar 25

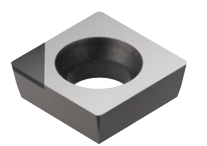


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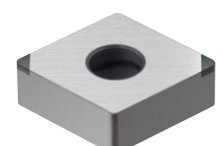
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Company Philosophy

We will live up to the trust of our customers all over the world and contribute to society by producing better products in the field of cutting tools.
In order to look ahead to the next age and create tomorrow, we also continue to produce quality products by pursuing research tirelessly and the roots of our craftsmanship.



Company Profile

As of October 2023

Corporate name : Chukyo Co., Ltd.
 Location : [Head office] 1-65 Matsunoki-cho, Nakagawa-ku, Nagoya-shi, Aichi Prefecture 454-0848, Japan
 [Toyoake Factory] 1-1 Nishifukido, Imaoka-cho, Kariya-shi, Aichi Prefecture 448-0008, Japan
 Tel : +(81)-52-361-5531 (main)
 Fax : +(81)-52-361-5534
 E-mail : metalworking@chukyo-corp.co.jp
 Website : www.chukyo-corp.co.jp
 Representative : Toshihiro Kawase, President and Representative Director
 Date of establishment : August 23, 1961
 Capital stock : 80 million yen
 Business : Manufacturing and sale of industrial cutting tools
 Number of employees : 71 (in Japan), 153 (overseas subsidiaries)
 Financing banks : Financing banks: Takahata Branch of MUFG Bank
 Nagoya Station Branch of Sumitomo Mitsui Banking Corporation
 Nagoya Station Branch of Resona Bank
 ISO9001 : Certified in July 2006



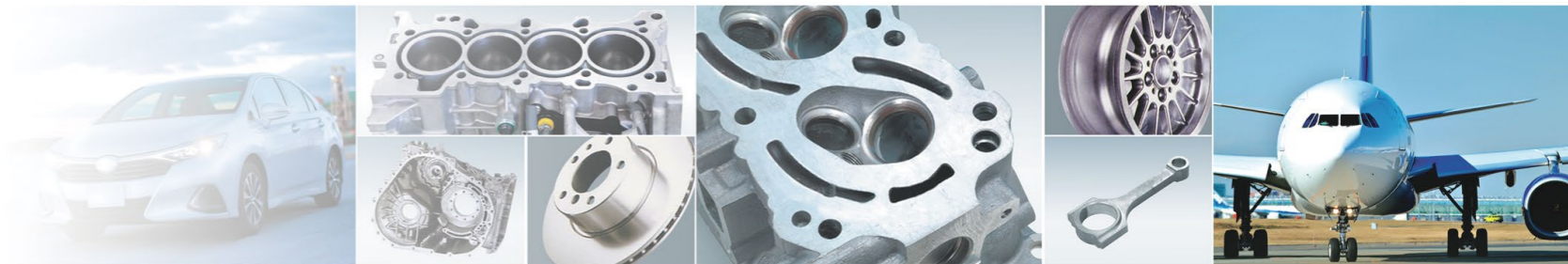
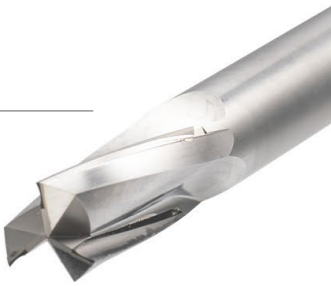
Head Office (Nagoya City, Aichi Prefecture)



Toyoake Factory (Kariya City, Aichi Prefecture)

Company History

- 1961 Atsushi Kawase established "Chukyo Cutting Tools Co., Ltd." in Nakagawa-ku, Nagoya-shi, and started manufacturing and selling of cutting tools for woodworking.
- 1970 Built "Toyoake Factory" as the second domestic manufacturing site in Kariya-shi, Aichi Prefecture.
- 1975 Started manufacturing and selling polycrystalline diamond (PCD) and polycrystalline cubic boron nitride (PcBN) tools, which are cutting tools for metal processing.
- 1990 Changed the corporate name to "Chukyo Co., Ltd."
- 2000 Yukihsa Kawase was appointed as representative director and president. Atsushi Kawase became chairperson of the board of directors.
- 2002 Established "Chukyo Diamond Tools (Dalian) Co., Ltd.," the first overseas subsidiary for manufacturing and selling our products, with our own funds, in Dalian Economic and Technological Development Zone, China.
In addition, Chukyo established "Chukyo Thailand Co., Ltd.," as a sales office in Bangkok, Thailand, and started manufacturing and selling products outside Japan.
- 2003 Commenced the construction of a new building of Chukyo Diamond Tools (Dalian) Co., Ltd. with a total land area of 8,081 m2 in the development zone. Installed polishing equipment in Chukyo Thailand, and started a repolishing service.
- 2004 Completed the new building of Chukyo Diamond Tools (Dalian) Co., Ltd. with a building area of 5,000 m2. Participated in the establishment of "PT. AZ Tecs Indonesia," a multilateral joint venture business, in Cikarang, the Republic of Indonesia. Started selling tools to the market.
- 2006 The factory of the head office in Japan received the certification of ISO9001:2000.
- 2007 Thailand Branch was relocated to a new address in Bangkok.
- 2008 PT. AZ Tecs Indonesia was relocated to a new address.
- 2009 Opened representative offices in Shanghai, China (relocated to Wuxi in 2011) and Guangzhou, China.
- 2010 Invested in the extension of facilities due to the expansion in the manufacturing and sale of rotary tools.
- 2014 Relocated Chukyo Thailand and conducted capital investment in step with the expansion of sale in Southeast Asia.
- 2019 Toshihiro Kawase was appointed as representative director and president. Yukihsa Kawase became director and chairperson.
- 2022 Fully renovated "Toyoake Factory," the manufacturing base in Kariya City, and started operation.



Overseas Network

■Chukyo Diamond Tools (Dalian) Co., Ltd.

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■Wuxi Office

■Guangzhou Office

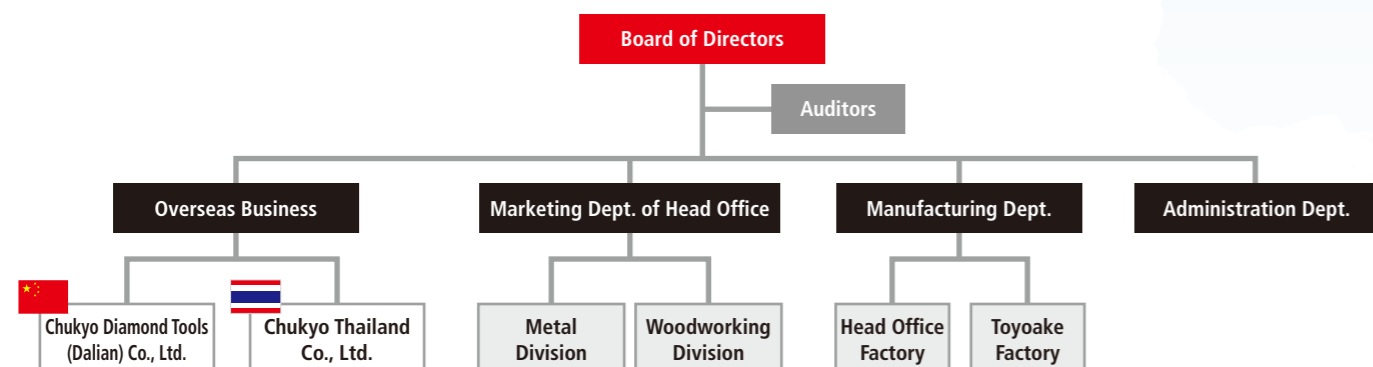
■Chukyo Co., Ltd. Head Office / Toyoake Factory

■Chukyo Thailand Co., Ltd.

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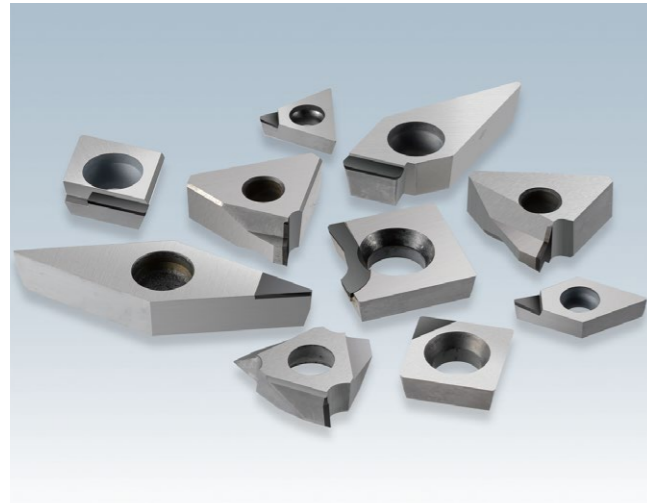


Company Organization

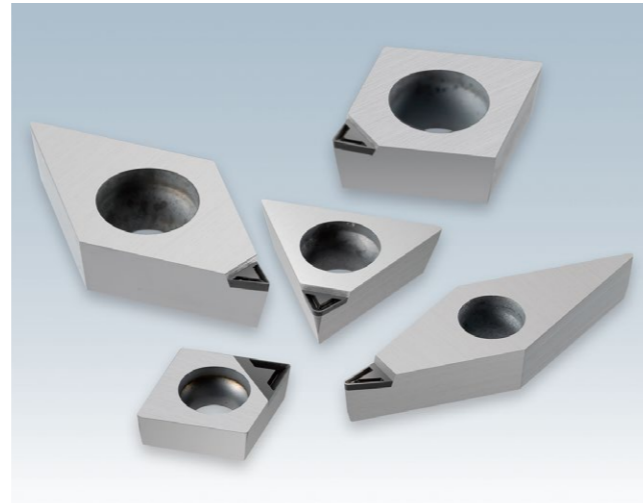


Cutting Tools for Metal Processing

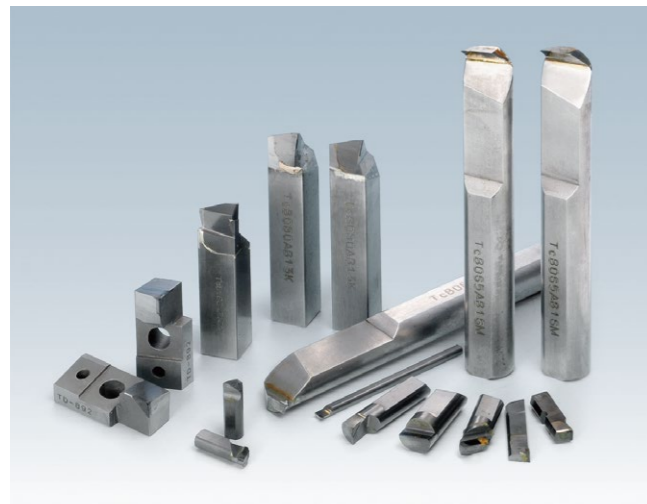
PCD/PcBN inserts



Breaker-attached PCD inserts



PCD/PcBN bars
PCD/PcBN boring bars
PCD/PcBN cartridges



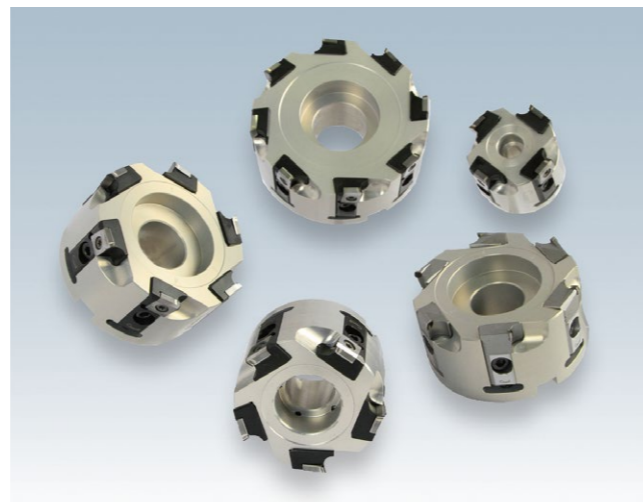
PCD/PcBN rotary tools
Drills, reamers, and end mills



Eco Helix



CAL Cutter



Cutting Tools for Woodworking

PCD circular saw blades



■ PCD circular saw blades
Sizing, cutting, gang saws, etc.

PCD router bits



■ PCD router bits
Those for CNC machines and portable machines

PCD shaping cutters



■ PCD cutters
Parallel line drawing devices, break saws, tongue & groove cutters, chamfering cutters, etc.

Carbide circular saw

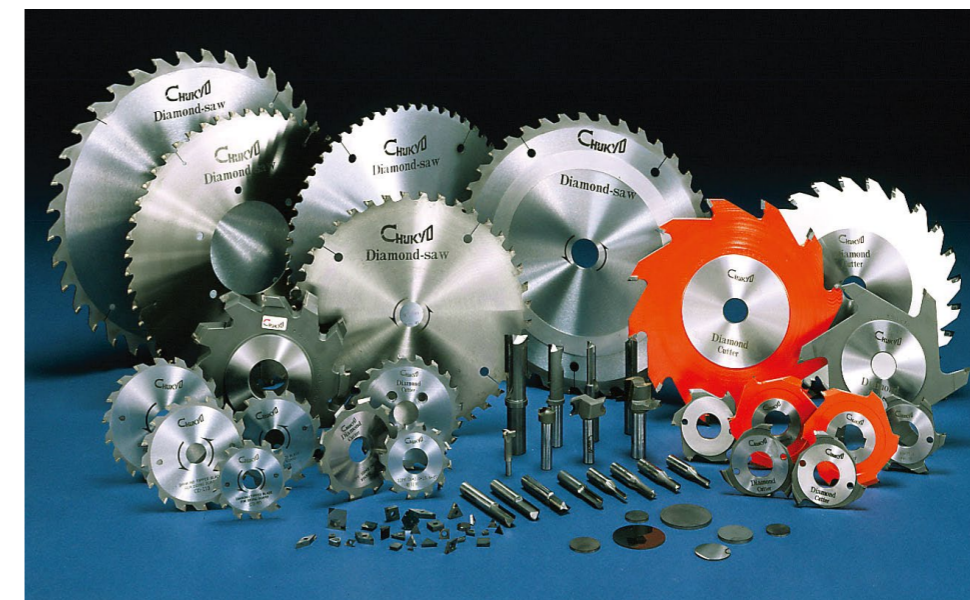


■ Winning Saw®
Robust body, excellent abrasion resistance, noise cutting
We can produce any kind of carbide circular saws, including gang saws and circular saws for electric tools.
Please feel free to contact us.

Blade-replaceable tools



We also handle blade-replaceable router bits and woodworking tools



Chukyo also produces and sells woodworking tools made of polycrystalline diamond (PCD). Please try the quality of Chukyo's woodworking tools.

If you have a meticulous request regarding tools, please contact Chukyo or its dealer in the neighborhood.

Chukyo Indexable Insert Nomenclature (compliance to ISO 1832:1991)

(1) Symbol for Shape			
Symbol	Insert shape	Angle	Diagram
H	Regular hexagon	120°	
O	Regular octagon	135°	
P	Regular pentagon	108°	
S	Square	90°	
T	Regular triangle	60°	
C	Rhombus	80°	
D		55°	
E		75°	
F		50°	
M		86°	
V		35°	
W	Equilateral inequiangular hexagon	80°	
L	Rectangle	90°	
A	Parallelogram	85°	
B		82°	
K		55°	
R	Circle	-	

(3) Symbol for Tolerance			
Symbol	Corner height tolerance (m) [mm]	Incircle tolerance (ϕD_1) [mm]	Thickness tolerance (S1) [mm]
A	±0.005	±0.025	±0.025
F	±0.005	±0.013	±0.025
C	±0.013	±0.025	±0.025
H	±0.013	±0.013	±0.025
E	±0.025	±0.025	±0.025
G	±0.025	±0.025	±0.13
J★	±0.005	±0.05-±0.15	±0.025
K★	±0.013	±0.05-±0.15	±0.025
L★	±0.025	±0.05-±0.15	±0.025
M★	±0.08-±0.2	±0.05-±0.15	±0.13
N★	±0.08-±0.2	±0.05-±0.15	±0.025
U★	±0.13-±0.38	±0.05-±0.25	±0.13

The star symbol (★) represents an insert whose lateral sides are sintered.

[For reference] Details of the tolerance level M (for each shape and each size)

● Corner height tolerance (m) [mm]

Incircle	Regular triangle	Square	80° rhombus	55° rhombus	35° rhombus	Circle
6.35	±0.08	±0.08	±0.08	±0.11	±0.16	-
9.525	±0.08	±0.08	±0.08	±0.11	±0.16	-
12.70	±0.13	±0.13	±0.13	±0.15	-	-
15.875	±0.15	±0.15	±0.15	±0.18	-	-
19.05	±0.15	±0.15	±0.15	±0.18	-	-
25.40	±0.18	±0.18	±0.18	±0.18	-	-
31.75	-	±0.20	-	-	-	-

● Incircle tolerance (ϕD_1) [mm]

Incircle	Regular triangle	Square	80° rhombus	55° rhombus	35° rhombus	Circle
6.35	±0.05	±0.05	±0.05	±0.05	±0.05	-
9.525	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05
12.70	±0.08	±0.08	±0.08	±0.08	-	±0.08
15.875	±0.10	±0.10	±0.10	±0.10	-	±0.10
19.05	±0.10	±0.10	±0.10	±0.10	-	±0.10
25.40	±0.13	±0.13	±0.13	-	-	±0.13
31.75	-	±0.15	-	-	-	±0.15

Incircle (mm)	Insert shape						
	R	S	C	T	W	D	V
3.97		03	03	06	02	04	07
4.76		04	04	08	L3	05	08
5.00	05						
5.56		05	05	09	03	06	09
6.00	06						
6.35	08	06	06	11	04	07	11
7.94		07	08	13	05	09	13
8.00	08						
9.525	09	09	09	16	06	11	16
10.00	10						
12.00	12						
12.70	12	12	12	22	08	15	22
15.875	15	15	16	27	10	19	
16.00	16						
19.05	19	19	19	33	13	23	
20.00	20						
22.225		22	22	38		27	
25.00	25						
25.4	25	25	25	44		31	
31.75	31	31	32	54		38	
32.00	32						

(9) Symbol for Edge preparation		
Symbol	Edge processing	Diagram
F	Sharp	
E	Honed	
T	Chamfered	
S (LS)	Chamfered and honed	
K	Double chamfered	

(12) Symbol for No. of corners (Specify CBN insert only)	
Symbol	Number of corners
None-Nil	1
B	2
C	3
D	4

Material grade: **HB55**

Chukyo's original symbol: **X**

(1) **T**

(2) **N**

(3) **M**

(4) **A**

(5) **16**

(6) **03**

(7) **04**

(8) **(L)**

(9) **(S)**

(10) **(NB)**

(11) **(OH)**

(12) **(C)**

(2) Symbol for Clearance	
Symbol	Clearance angle
A	3°
B	5°
C	7°
D	15°
E	20°
F	25°
G	30°
N	0°
P	11°
O	others

(4) Symbol for Type									
Symbol	Hole	Hole shape	Rake face	Diagram	Symbol	Hole	Hole shape	Rake face	Diagram
W	Formed	Partially cylindrical hole 40°-60°	Not formed		N	Not formed	-	Not formed	
T	Formed	chamfered at one side	Formed		R	Not formed	-	Formed	
Q	Formed	Partially cylindrical hole 40°-60° Chamfered at both sides	Not formed		A	Formed	Cylindrical hole	Not formed	
B	Formed	Partially cylindrical hole 70°-90°	Not formed		M	Formed		Formed	
H	Formed	Partially cylindrical hole 70°-90° chamfered at one side	Formed		X	Formed	Hole (without a rake face) not compliant with ISO or asymmetric inserts		
C	Formed	Partially cylindrical hole 70°-90° Chamfered at both sides	Not formed		V	Formed	Hole (with a rake face) not compliant with ISO		

(6) Symbol for Thickness	
Symbol	Thickness (mm)
01	1.59
02	2.38
T2	2.78
03	3.18
T3	3.97
04	4.76
06	6.35
07	7.94
09	9.52

(7) Symbol for corner size	
Symbol	Nose radius (mm)
00	Sharp corner
01	0.1
02	0.2
04	0.4
08	0.8
12	1.2
16	1.6
20	2.0
24	2.4
28	2.8
32	3.2
0	Circular insert

(8) Symbol for Hand		
Symbol	Hand	Diagram
None-Nil	Neutral	
L	Left	
R	Right	

(10) Symbol for Edge conditions	
Symbol	Edge conditions
NB	Neutral chipbreaker
L	Left hand chipbreaker
R	Right hand chipbreaker
W	Wiper

(11) Symbol for Edge length	
Symbol	Edge length
OH	Mini-tip
1H	Std.-tip
2H	Large-tip

Chukyo Dimension Code Enumeration (compliance to ISO13399)

“ISO 13399” means an international standard regarding the “expression and replacement of cutting tools” that can be clarified by a computer. This is a “global standard” established for the purpose of defining cutting tools around the world with unified parameters and smoothing the communication of information between systems, while producing regulations on methods for developing a database on cutting tools and the production of CAD data.

Insert		Milling		Other	
Symbol	Part/description	Symbol	Part/description	Symbol	Part/description
AN	Cutting edge clearance angle	APMX	Largest notch	ASP	Adjusting screw length
AS	Minor cutting edge clearance angle	AZ	Effective inner cutting edge height	BD	Outer diameter of the body
BCH	Corner chamfering width	BD	Outer diameter of the body	CRKS	Mounting screw size
BS	Minor cutting edge width	BHTA	Taper angle under the neck	CZC	Taper size
CDX	Maximum groove depth	CBDP	Mounting hole depth	DBC	Bolt hole pitch circle
CF	Edge width	CRKS	Attachment screw size	DC	Processing diameter
CW	Grooving blade width	DAH	Bolt hole diameter	DCB	Mounting hole diameter
D1	Mounting hole diameter	DBC	Bolt hole pitch circle	DCON	Mounting part diameter
DC	Processing diameter	DC	Processing diameter	DCON_MS	Machine-side mounting part diameter
DCON	Mounting part diameter	DCB	Mounting hole diameter	DCON_WS	Tool-side mounting part diameter
DMIN	Minimum processing diameter	DCCB	Mounting bolt washer diameter	DF	Outer diameter of the flange
DMM	Shaft diameter	DCON	Mounting part diameter	DMM	Shaft diameter
EDR	R honing amount	DCON_MS	Machine-side mounting part diameter	FLGT	Flange thickness
EPSR	Apex angle	DCON_WS	Tool-side mounting part diameter	HF	Mounting washer size
FHCSA	Taper angle of the mounting hole	DCX	Maximum processing diameter	KWW	Keyway
FHCSD	Upper mounting hole diameter	DHUB	Contact surface diameter	LB	Length of the body
GAN	Rake face of the breaker	DMM	Shaft diameter	LF	Overall length for reference
IC	Incircle	GAMF	Rake angle in the radial direction	LP	Protrusion amount
INSL	Opposite side length	GAMP	Rake angle in the shaft direction	LPR	Distance from the end surface of the flange
KAPR	Cutting angle	KAPR	Corner angle	LS	Shank length
KRISN	Cutting angle of the minor cutting edge	KWW	Keyway width	LSCX	Maximum clamp length
L	Horizontal length of the cutting edge	LCCB	Mounting bolt washer thickness	LU	Processible depth
LBB	Breaker width	LF	Overall length for reference	MHA	Nut angle
LE	Effective cutting edge length of the breaker	LH	Usable blade length	MHD	Nut screw position
LF	Overall cutting edge length	LPCON	Overall head length	MHH	Screw hole height
LU	Usable length	LU	Cutting edge length	OAL	Overall length
M	Location of the cutting edge with respect to the incircle	LUX	Maximum usable blade length	RE	Corner radius
PDPT	Protruding part length	OAL	Overall length	RPMX	Maximum allowable rotational speed
PDX	Thread location in the X direction	PRFRAD	Ball-end milling radius		
PDY	Thread location in the Y direction	PSIR	Lead angle		
PNA	Threat angle	RMPX	Ramping angle		
PSIRL	Left front cutting edge angle	WT	Weight		
PSIRR	Right front cutting edge angle	ZEFP	Number of edges		
RAL	Left side clearance angle				
RAR	Right side clearance angle				
RE	Corner radius				
S	Thickness				
W1	Length in the vertical direction				

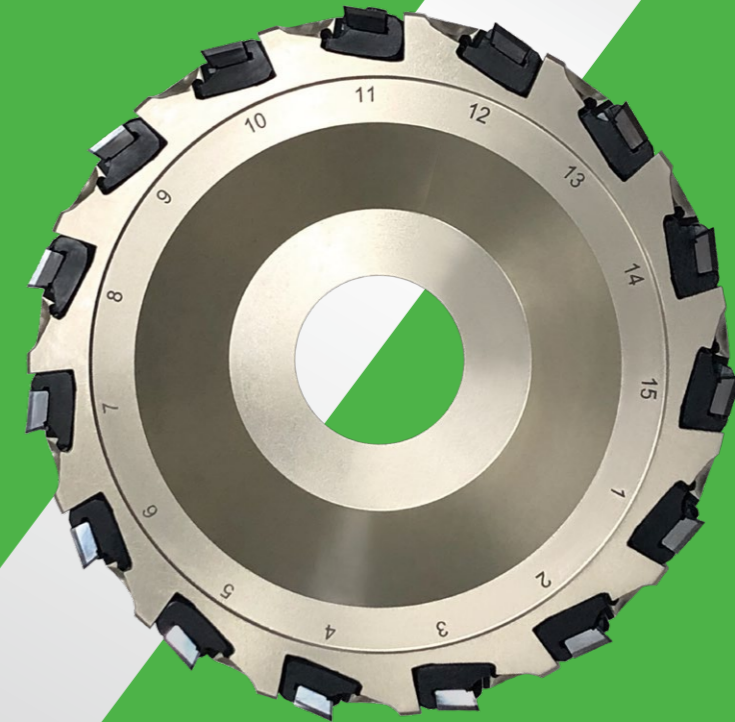
Turning	
Symbol	Part/description
B	Shank width
CDX	Maximum groove depth
CUTDIA	Maximum cutting-off lathe diameter
DAXN	Minimum processing diameter of the end face groove
DAXX	Maximum processing diameter of the end face groove
DCB	Mounting hole diameter
DCON	Mounting part diameter
DMIN	Minimum processing diameter
DMM	Shaft diameter
GAMF	Rake angle in the radial direction
H	Shank height
HBH	Lower step formed due to an error during the cutting process
HBKW	Rear step formed due to an error during the cutting process
HF	Cutting edge height
HTB	Body height
KAPR	Notch angle
LB	Body length
LDRED	Usable blade length
LF	Overall length for reference
LH	Head length
LU	Maximum protrusion length
OAH	Overall height
OAL	Overall length
OAW	Overall width
PSIR	Lead angle
WF	Blade width

Drilling	
Symbol	Part/description
BD	Outer diameter of the body
CDN	Diameter of the lubrication hole at the tip
CNT	Diameter of the lubrication hole at the posterior end
CRKS	Attachment screw size
CZC	Taper size
DC	Processing diameter
DCFSMS	Flange diameter
DCON	Mounting part diameter
DMM	Shaft diameter
LCF	Flute length
LF	Blade length
LH	Usable blade length
LPR	Distance between the flange and the cutting edge tip
LU	Processible depth
OAL	Overall length
PL	Difference in size between the tip and the shank
SDL	Stepped cutting edge length
ZEFP	Number of edges

*The symbols in these tables follow the TS or DTS standards of ISO13399.

*The above tables do not include the unspecified symbols of ISO13399 or our original symbols.

*The above tables include the symbols under discussion, so they may be changed or added. We would appreciate your understanding



CAL CUTTER

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Insert Replaceable Milling Cutter

CAL CUTTER

Lightweight super-hard aluminum body
Low cost and high performance

- Our PCD Milling Cutter is a face milling cutter that is made of lightweight and high-strength aluminum body.
- Our unique design physically prevents cartridges and inserts from popping out.
- It is easy to assemble this cutter because it consists of a small number of components.
- High precision and long service life are ensured as the adjusting screw system helps maintain the axial runout of the face cutting edge easily within 10 μm.
- We have devised a mounting orientation based on the insert shapes developed originally, increasing rigidity.
- Cutting fluid is directly sprayed onto the cutting edge, improving processing performance.

*Attachment cutter arbor with a hole on the end of the dovetail joint (CAL-F/Plus, CAL-MAX/Plus)

Rake angle	Radial direction (GAMF)	+4°
	Axial direction (GAMP)	+10°

Recommended cutting conditions

Workpiece materials	Cutting speed Vc (m/min)	Feeding amount fz (mm/tooth)
Aluminum alloy Si content: 13% or less	1500-2300	0.05-0.2
Aluminum alloy Si content: over 13%	500-800	0.05-0.2

Cutters for processing aluminum and nonferrous metals

Insert materials: PCD and MCD



CAL-MAX/Plus (Super finer pitch + Internal coolant supply model) > P.12

Ultra multi-edged cutter, internal lubrication type, face milling, and shoulder milling

Features

- Ultra multi-edged cutter that is equipped with an internal lubrication system
- The lineup includes products whose sizes are equivalent to BT30

Internal lubrication	Flat	87°	90°	Ultra multi-edged cutter	Small	
Size	φ125	φ100	φ80	φ63	φ50	φ40
Number of edges	15	12	10	8	6	5



CAL-F (Finer pitch model) > P.13

Multi-edged cutter, face milling, and shoulder milling

Features

- Multi-edged cutter that enables highly efficient machining

Flat	87°	90°	Multi-edged	Medium		
Size	φ125	φ100	φ80	φ63	φ50	φ40
Number of edges	12	10	8	5	5	4



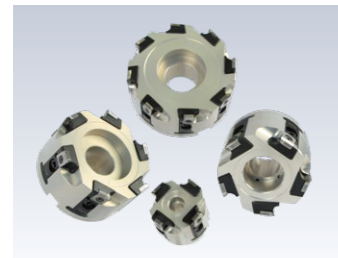
CAL-F/Plus (Finer pitch + Internal coolant supply model) > P.14

Multi-edged cutter, internal lubrication type, face milling, and shoulder milling

Features

- Multi-edged cutter that is equipped with an internal lubrication system
- Cutting fluid is injected directly into the edges
- The lineup includes products whose sizes are equivalent to BT30

Internal lubrication	Flat	87°	90°	Multi-edged	Medium	
Size	φ125	φ100	φ80	φ63	φ50	φ40
Number of edges	12	10	8	5	5	4



CAL-S (Coarser pitch model) > P.15

Standard number of edges, and face milling

Features

- Standard cutter with excellent rigidity
- The shape of the edges prevents this cutter from chipping easily even during the gate processing (sprue, overflow, etc.)

Flat	Large			
Size	φ125	φ100	φ80	φ63
Number of edges	8	6	5	4

CAL-MAX/Plus

Super finer pitch + Internal coolant supply model

Ultra multi-edged cutter, internal lubrication type, face milling, and shoulder milling

- Ultra multi-edged cutter that is equipped with an internal lubrication system
- The lineup includes products whose sizes are equivalent to BT30

Internal lubrication	Flat	87°	90°	Ultra multi-edged cutter	Small
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Size	φ125	φ100	φ80	φ63	φ50	φ40
Number of edges	15	12	10	8	6	5

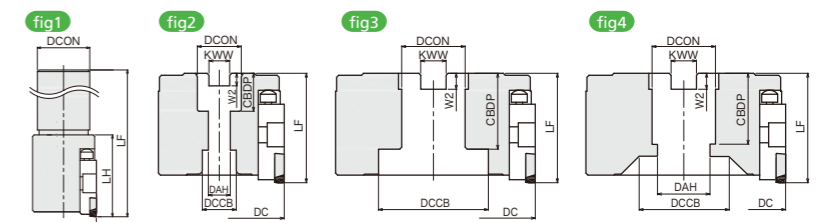
Cutter Body

Designation	Product Number	No. of Cutting Flutes	Dimension (mm)										* Weight (kg)	Max. Speed (rpm)	Fig	Stock
			DC	DCX	DCON	DCCB	DAH	LF	LH	CBDP	KWW	W2				
CAL+04005-20Main unit	4C0NC040	5	40	-	20	-	-	130	50	-	-	-	0.6	18,000	fig1	●
CAL+05006-22Main unit	4C0PC040	6	50	-	22	17	11	50	-	23	10.4	6.3	0.3	20,000	fig2	●
CAL+06308-22Main unit	4C0JC070	8	63	-	22	17	11	50	-	23	10.4	6.3	0.45	15,000	fig2	●
CAL+08010-25.4Main unit	4C0KC070	10	80	-	25.4	35	-	50	-	29	9.5	6	0.7	12,000	fig3	●
CAL+10012-27Main unit	4C0LC090	12	100	-	27	45	25	51	-	27	12	7	1.1	10,000	fig4	●
CAL+10012-31.75Main unit	4C0LC070	12	100	-	31.75	45	26	56	-	36	12.7	8	1.2	10,000	fig4	●
CAL+12515-27Main unit	4C0MC090	15	125	-	27	55	25	51	-	27	12	7	1.6	8,000	fig4	●
CAL+12515-38.1Main unit	4C0MC070	15	125	-	38.1	55	30	63	-	40	15.9	10	1.9	8,000	fig4	●

*Weight including the weight of the inserts

A assembled set

Designation (Assembled)	Product Number	Stock	Accessories
CAL+04005TA-20	4C0NC050	●	Cartridges
CAL+05006TA-22	4C0PC050	●	Torx screws
CAL+06308TA-22	4C0JC080	●	Hexagonal bolts
CAL+08010TA-25.4	4C0KC080	●	Adjustment pieces
CAL+10012TA-27	4C0LC100	●	Three wrenches (spanners) for attachment
CAL+10012TA-31.75	4C0LC080	●	
CAL+12515TA-27	4C0MC100	●	
CAL+12515TA-38.1	4C0MC080	●	

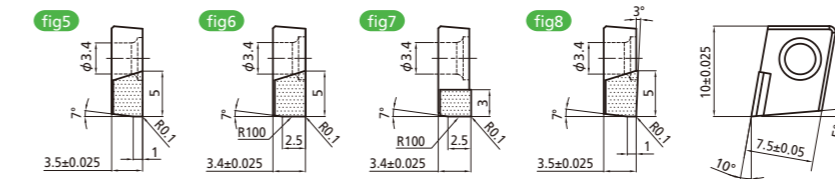


This set does not include an insert.

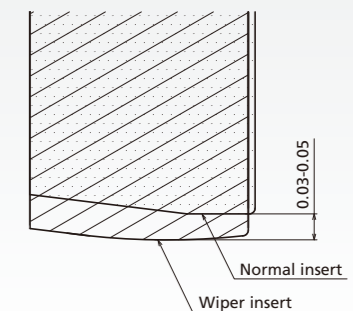
Insert

Product Name	Designation	Product Number	Grade	Stock	Fig
Normal insert	XCBGW0735R	D3009076	HD600	●	fig5
Wiper insert	XCBGW0735R-W	D3009086	HD600	●	fig6
	XCBGW07035R-FW	D300908M	MCD	●	fig7
Shoulder milling insert	XCBGW0735R-RA	D3009096	HD600	●	fig8

If you want to adjust blade deflection, please ask us although we will charge you for this adjustment.



Setting of the wiper insert



When you use a wiper insert (XCBGW0735R-W), too, please adjust the size as shown in the above figure.

Cartridge

Product Name	Designation	Product Number	Stock
Cartridges	XCALBSSS	4CA0E020	●

This set includes a cartridge.

Accessories

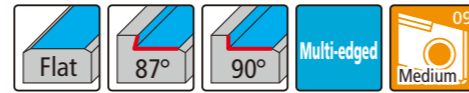
Product Name	Torx screw (Insert fastening screw)	Hexagonal bolt (Cartridge fastening bolt)	Torx wrench (Insert fastening wrench)	Hexagonal wrench (Cartridge fastening wrench)	Adjustment piece	M1.5 hexagonal wrench (Adjustment screw wrench)
Part Number	TS32	M4×8	TKY08F	LM030 (3 mm)	M4×0.7×8	M2.0 (432219)
Product Number	XAZ0A110	XAZ0A120	XAZ0A130	XAZ0A140	XAZ0A150	XAZ0A160
Shape						

CAL-F

Finer pitch model

Multi-edged cutter, face milling, and shoulder milling

- Multi-edged cutter that enables highly efficient machining



Size	φ125	φ100	φ80	φ63	φ50	φ40
Number of edges	12	10	8	5	5	4

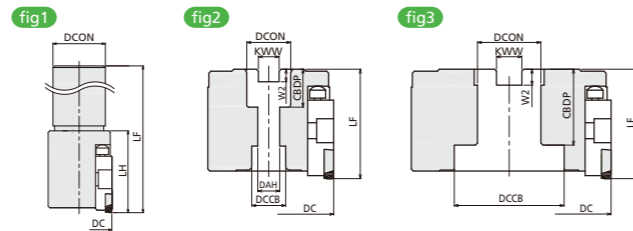
Cutter Body

Designation	Product Number	No. of Cutting Flutes	Dimension (mm)										* Weight (kg)	Max. Speed (rpm)	Fig	Stock
			DC	DCX	DCON	DCCB	DAH	LF	LH	CBDP	KWW	W2				
CAL04004Main unit	4CONC000	4	40	-	32	-	-	130	50	-	-	-	0.9	18,000	fig1	●
CAL05005Main unit	4C0PC000	5	50	-	22	17	11	50	-	21	10.4	6.3	0.3	20,000	fig2	●
CAL06305Main unit	4C0JC030	5	63	-	22	17	11	50	-	21	10.4	6.3	0.4	16,000	fig2	●
CAL08008Main unit	4C0KC030	8	80	-	25.4	35	-	50	-	28	9.5	6	0.7	12,500	fig3	●
CAL10010Main unit	4C0LC030	10	100	-	31.75	45	-	54.8	-	35	12.7	8	1.1	10,000	fig3	●
CAL12512Main unit	4COMC030	12	125	-	38.1	55	-	54.8	-	35	15.9	10	1.6	8,000	fig3	●

*Weight including the weight of the inserts

A assembled set

Designation (Assembled)	Product Number	Stock	Accessories
CAL04004TA	4CONC010	●	Cartridges
CAL05005TA	4C0PC010	●	Torx screws
CAL06305TA	4C0JC040	●	Hexagonal bolts
CAL08008TA	4C0KC040	●	Adjustment pieces
CAL10010TA	4C0LC040	●	Three wrenches (spanners)
CAL12512TA	4COMC040	●	for attachment

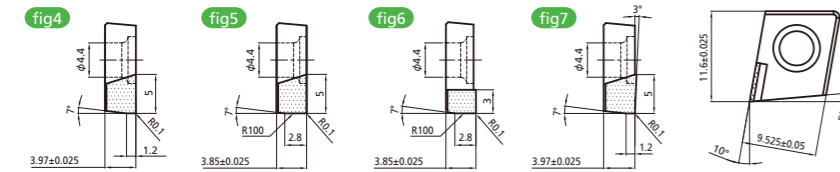


This set does not include an insert.

Insert

Product Name	Designation	Product Number	Grade	Stock	Fig
Normal insert	XCBGW09T3R	D3009036	HD600	●	fig4
Wiper insert	XCBGW09T3R-W	D3009046	HD600	●	fig5
	XCBGW09T3R-FW	D300904M	MCD	●	fig6 NEW
Shoulder milling insert	XCBGW09T3R-RA	D3009106	HD600	●	fig7

If you want to adjust blade deflection, please ask us although we will charge you for this adjustment.



Cartridge

Designation	Product Number	Stock
XCALBSS	4CA0E010	●

This set includes a cartridge.

Accessories

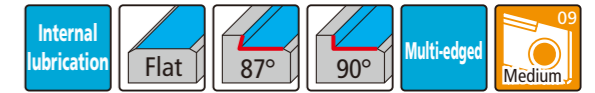
Product Name	Torx screw (Insert fastening screw)	Hexagonal bolt (Cartridge fastening bolt)	Torx wrench (Insert fastening wrench)	Hexagonal wrench (Cartridge fastening wrench)	Adjustment piece	M2 hexagonal wrench (Adjustment screw wrench)
Part Number	TS4	M5×10	TKY15T	LM040 (4 mm)	AS-413.5	LM020
Product Number	XAZ0A070	XAZ0A080	XAZ0A090	XAZ0A100	XAZ0A050	XAZ0A060
Shape						

CAL-F/Plus

Finer pitch + Internal coolant supply model

Multi-edged cutter, internal lubrication type, face milling, and shoulder milling

- Multi-edged cutter that is equipped with an internal lubrication system
- Cutting fluid is injected directly into the edges
- The lineup includes products whose sizes are equivalent to BT30



Size	φ125	φ100	φ80	φ63	φ50	φ40
Number of edges	12	10	8	5	5	4

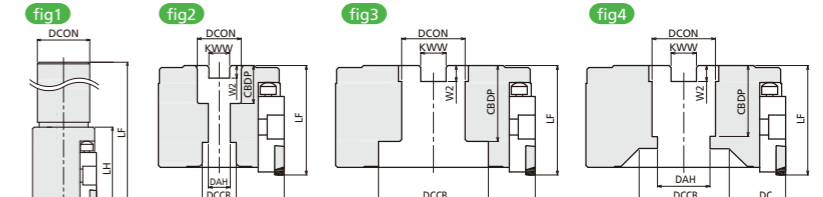
Cutter Body

Designation	Product Number	No. of Cutting Flutes	Dimension (mm)										* Weight (kg)	Max. Speed (rpm)	Fig	Stock
			DC	DCX	DCON	DCCB	DAH	LF	LH	CBDP	KWW	W2				
CAL+04004Main unit	4CONC020	4	40	-	20	-	-	130	50	-	-	-	0.6	18,000	fig1	●
CAL+05005Main unit	4C0PC020	5	50	-	22	17	11	50	-	23	10.4	6.3	0.3	20,000	fig2	●
CAL+06305Main unit	4C0JC050	5	63	-	22	17	11	50	-	23	10.4	6.3	0.4	16,000	fig2	●
CAL+08008Main unit	4C0KC050	8	80	-	25.4	35	-	50	-	29	9.5	6	0.7	12,500	fig3	●
CAL+10010-27Main unit	4COLC110	10	100	-	27	43	25	51	-	27	12	7	1.0	10,000	fig4	●
CAL+10010Main unit	4COLC050	10	100	-	31.75	45	26	56	-	36	12.7	8	1.1	10,000	fig4	●
CAL+12512-27Main unit	4COMC110	12	125	-	27	55	25	51	-	27	12	7	1.6	8,000	fig4	●
CAL+12512Main unit	4COMC050	12	125	-	38.1	55	30	63	-	40	15.9	10	1.9	8,000	fig4	●

*Weight including the weight of the inserts

A assembled set

Designation (Assembled)	Product Number	Stock	Accessories
CAL+04004TA	4CONC030	●	Cartridges
CAL+05005TA	4C0PC030	●	Torx screws
CAL+06305TA	4C0JC060	●	Hexagonal bolts
CAL+08008TA	4C0KC060	●	Adjustment pieces
CAL+10010TA-27	4COLC120	●	Three wrenches (spanners)
CAL+10010TA	4COLC060	●	for attachment
CAL+12512TA-27	4COMC120	●	
CAL+12512TA	4COMC060	●	

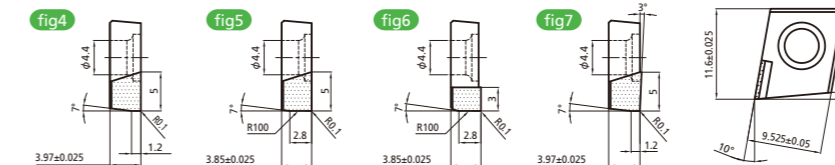


This set does not include an insert.

Insert

Product Name	Designation	Product Number	Grade	Stock	Fig
Normal insert	XCBGW09T3R	D3009036	HD600	●	fig4
Wiper insert	XCBGW09T3R-W	D3009046	HD600	●	fig5
	XCBGW09T3R-FW	D300904M	MCD	●	fig6 NEW
Shoulder milling insert	XCBGW09T3R-RA	D3009106	HD600	●	fig7

If you want to adjust blade deflection, please ask us although we will charge you for this adjustment.



Cartridge

Designation	Product Number	Stock
XCALBSS	4CA0E010	●

This set includes a cartridge.

Accessories

Product Name	Torx screw (Insert fastening screw)	Hexagonal bolt (Cartridge fastening bolt)	Torx wrench (Insert fastening wrench)	Hexagonal wrench (Cartridge fastening wrench)	Adjustment piece	M2 hexagonal wrench (Adjustment screw wrench)
Part Number	TS4	M5×10	TKY15T	LM040 (4 mm)	AS-413.5	LM020
Product Number	XAZ0A070	XAZ0A080	XAZ0A090	XAZ0A100	XAZ0A050	XAZ0A060
Shape						

CAL-S

Coarser pitch model

Standard number of edges, and face milling

- Standard cutter with excellent rigidity
- The shape of the edges prevents this cutter from chipping easily even during the gate processing (sprue, overflow, etc.)



Size	φ125	φ100	φ80	φ63
Number of edges	8	6	5	4

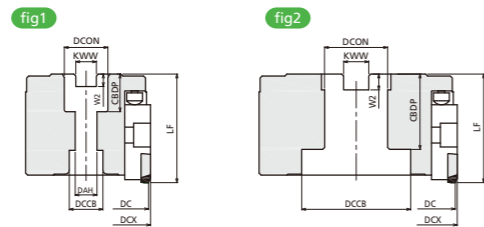
Cutter Body

Designation	Product Number	No. of Cutting Flutes	Dimension (mm)									* Weight (kg)	Max. Speed (rpm)	Fig	Stock
			DC	DCX	DON	DCCB	DAH	LF	CBDP	KWW	W2				
CAL06304Main unit	4C0JC000	4	63	65	22	17	11	54.8	21	10.4	6.3	0.5	16,000	fig1	●
CAL08005Main unit	4C0KC000	5	80	82	25.4	34	-	54.8	34	9.5	6	0.8	12,500	fig2	●
CAL10006Main unit	4COLC000	6	100	102	31.75	55	-	54.8	38	12.7	8	1.1	10,000	fig2	●
CAL12508Main unit	4COMC000	8	125	127	38.1	55	-	54.8	36	15.9	10	1.8	8,000	fig2	●

*Weight including the weight of the inserts

A assembled set

Designation (Assembled)	Product Number	Stock	Accessories
CAL06304TA	4C0JC010	●	Cartridges Torx screws Hexagonal bolts Adjustment pieces
CAL08005TA	4C0KC010	●	
CAL10006TA	4COLC010	●	Three wrenches (spanners) for attachment
CAL12508TA	4COMC010	●	

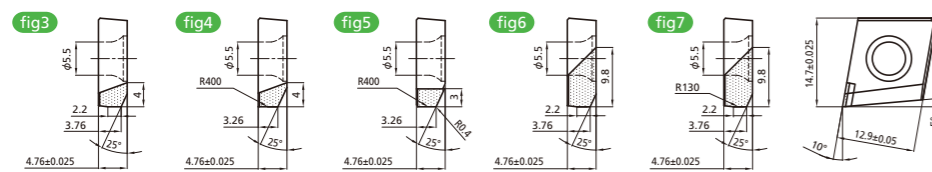


This set does not include an insert.

Insert

Product Name	Designation	Product Number	Grade	Stock	Fig
Normal insert	XCBGW1204R	D3009016	HD600	●	fig3
Wiper insert	XCBGW1204R-W	D3009026	HD600	●	fig4
	XCBGW1204R-FW	D300902M	MCD	●	fig5 NEW
long-side normal insert	XCBGW1204R-L	D3009056	HD600	●	fig6
long-side wiper insert	XCBGW1204R-LW	D3009066	HD600	●	fig7

If you want to adjust blade deflection, please ask us although we will charge you for this adjustment.



Cartridge

Designation	Product Number	Stock
XCALBS	4CA0E000	●

This set includes a cartridge.

Accessories

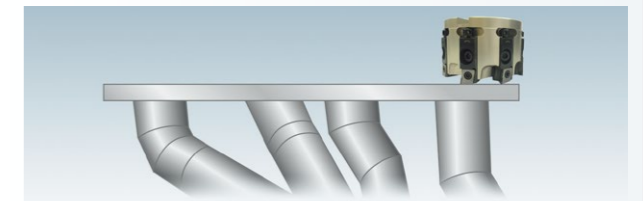
Product Name	Torx screw (Insert fastening screw)	Hexagonal bolt (Cartridge fastening bolt)	Torx wrench (Insert fastening wrench)	Hexagonal wrench (Cartridge fastening wrench)	Adjustment piece	M2 hexagonal wrench (Adjustment screw wrench)
Part Number	CS501160T	M6×15	TKY20T	LM050 (5 mm)	AS-413.5	LM020
Product Number	XAZ0A010	XAZ0A020	XAZ0A030	XAZ0A040	XAZ0A050	XAZ0A060
Shape						

Case Study

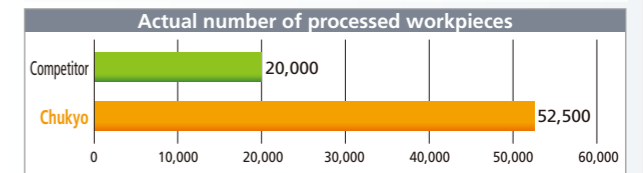
〈Cutters for Processing Aluminum and Nonferrous Metals〉

Manifold joint surface

	Chukyo	Competitor
Tool	CAL08005TA	
Specs	φ80×5 blades	φ80×6 blades
Tool material	HD600	PCD
Cutting method	Intermittent processing	
Cutting speed (Vc)	2,009 m/min	
Rotation speed of the main shaft (n)	8,000 min ⁻¹	
Cutting depth (ap)	0.1 mm	
Feed per revolution (f)	0.5 mm/rev (fz = 0.1 mm)	0.5 mm/rev (fz = 0.083 mm)
Coolant	WET	
Lifespan estimating standard	Roughness on the processed surface: Ra: 3.2 μm Burr from processing	



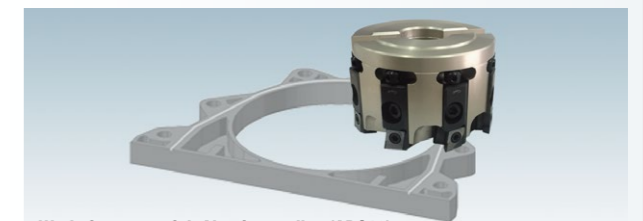
Workpiece material: Aluminum alloy (ADC12)



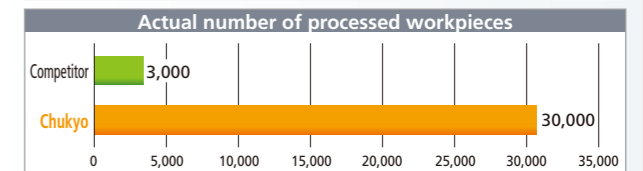
- The service life of the processing tool increased 2.6 times!
- The roughness of the processed surface (Ra) remains 0.35 μm until the completion of processing of 52,500 workpieces, showing very good performance!
- The flatness of the processed surface remains 0.02 mm until the completion of processing of 52,500 workpieces, showing good performance!

Oil pump cover

	Chukyo	Competitor
Tool	CAL05005TA	
Specs	φ50×5 blades	φ50×4 blades
Tool material	HD600	PCD
Cutting method	Intermittent processing	
Cutting speed (Vc)	628 m/min	428 m/min
Rotation speed of the main shaft (n)	4,000 min ⁻¹	3,000 min ⁻¹
Cutting depth (ap)	0.2 mm	
Feed per revolution (f)	0.225 mm/rev (fz = 0.045 mm)	0.167mm/rev (fz = 0.042 mm)
Coolant	WET	
Lifespan estimating standard	Roughness on the processed surface: Ra: 3.2 μm Flatness: 11 mm Burr from processing	



Workpiece material: Aluminum alloy (ADC12)



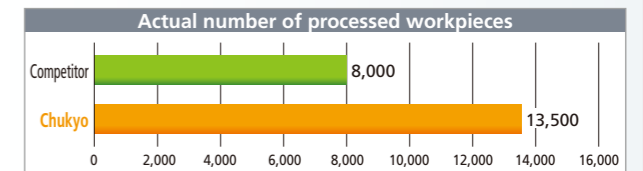
- The service life of the processing tool increased 10 times!
- The roughness of the processed surface (Ra) has improved from 1.63 μm (competitors) to 0.6 μm.
- The service life has improved due to the decrease of burrs!

Hydraulic housing

	Chukyo	Competitor
Tool	CAL08005TA	
Specs	φ80×8 blades	φ80×6 blades
Tool material	HD600	PCD
Cutting method	Intermittent processing	
Cutting speed (Vc)	3,768 m/min	3,768 m/min
Rotation speed of the main shaft (n)	15,000 min ⁻¹	15,000 min ⁻¹
Cutting depth (ap)	(Rough) 0.4 mm / (Finish) 0.1 mm	
Feed per revolution Rough (f)	0.13 mm/rev (fz = 0.016 mm)	0.13 mm/rev (fz = 0.022 mm)
Feed per revolution Finish (f)	0.05 mm/rev (fz = 0.006 mm)	0.05 mm/rev (fz = 0.008 mm)
Coolant	WET	
Lifespan estimating standard	Roughness on the processed surface: Ra: 0.8 μm Burr from processing	



Workpiece material: Aluminum alloy (A2014-T6)



- Our unique blade shape curbs the forming of burrs, extending service life 1.7 times!
- The roughness of the processed surface is good! Ra: 0.1-0.3 μm

NEW

Milling Cutter with CBN inserts

CBN-CAL CUTTER

Multi Corner PcBN Inserts adopted, realizing low costs and high-speed processing

- The body is made of lightweight and high-strength aluminum, and this cutter can process gray cast iron highly efficiently at a high speed.
- Three types of inserts, which are the general-purpose insert, the low-resistant insert, and the wiper insert, are available for satisfying various usage conditions.
- High precision and long service life are ensured as the adjusting screw system helps maintain the axial runout of the face cutting edge easily within 10 μm.
- Inserts are attached in the vertical direction, and their original shape improves rigidity and physically prevents and reduces the protrusion.
- The number of parts is small, so it can be assembled easily.
- This cutter can be used as a cutter for aluminum and nonferrous metals by replacing the inserts and cartridges with the ones for PCD. (Reuse of the body)

Rake angle	Radial direction (GAMF)	-2°
	Axial direction (GAMP)	+10°

Recommended cutting conditions

Workpiece materials	Recommended cutting conditions			
	Cutting speed Vc (m/min)	Feeding amount fz (mm/tooth)	Cutting ap (mm)	Cutting fluid
Gray cast iron (FC)	500-2,000	0.05-0.2	0.05-0.2	DRY
uctile cast iron (FCD)	200-600	0.05-0.15	0.05-0.15	DRY

Notes for Usage

- ◆ Please use this product with a cutting depth not exceeding 0.5 mm.
- ◆ It cannot be used for side milling.
- ◆ Please refrain from using cutting coolants. (Dry processing is recommended.)

Cutters for Cast Iron

Insert materials: PcBN



CBN-CAL-F (Finer pitch model)

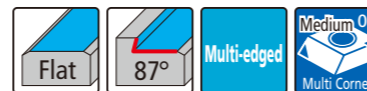
P.18

Multi-edged cutter and face milling

Features

- Face milling cutter for finish processing of FC and FCD
- This cutter can be used interchangeably with our conventional CAL-F body.
- The Multi Corner PcBN has been adopted, realizing low costs and high-speed processing.
- Multi-edged

Size	φ125	φ100	φ80	φ63	φ50	φ40
Number of edges	12	10	8	5	5	4



CBN-CAL-F/Plus (Finer pitch + Internal coolant) supply model

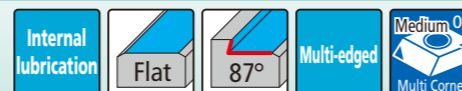
P.19

Multi-edged cutter and face milling

Features

- Face milling cutter for finish processing of FC and FCD
- This cutter can be used interchangeably with our conventional CAL-F body.
- The Multi Corner PcBN has been adopted, realizing low costs and high-speed processing.
- Multi-edged cutter that is equipped with an internal lubrication system
- Cutting fluid is injected directly into the edges

Size	φ125	φ100	φ80	φ63	φ50	φ40
Number of edges	12	10	8	5	5	4

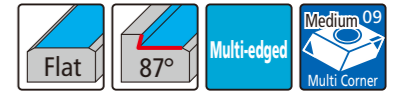


CBN-CAL-F

Finer pitch model

Multi-edged cutter and face milling

- Face milling cutter for finish processing of FC and FCD
- This cutter can be used interchangeably with our conventional CAL-F body.
- The Multi Corner PcBN has been adopted, realizing low costs and high-speed processing.
- Multi-edged



Size	φ125	φ100	φ80	φ63	φ50	φ40
Number of edges	12	10	8	5	5	4

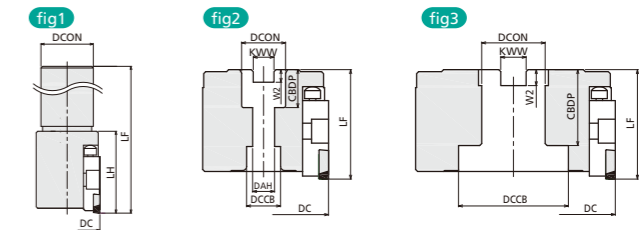
Cutter Body

Designation	Product Number	No. of Cutting Flutes	Dimension (mm)										* Weight (kg)	Max. Speed (rpm)	Fig	Stock
			DC	DCX	DCON	DCCB	DAH	LF	LH	CBDP	KWW	W2				
CAL04004Main unit	4C0NC000	4	40	-	32	-	-	130	50	-	-	-	0.9	18,000	fig1	●
CAL05005Main unit	4C0PC000	5	50	-	22	17	11	50	-	21	10.4	6.3	0.3	20,000	fig2	●
CAL06305Main unit	4C0JC030	5	63	-	22	17	11	50	-	21	10.4	6.3	0.4	16,000	fig2	●
CAL08008Main unit	4C0KC030	8	80	-	25.4	35	-	50	-	28	9.5	6	0.7	12,500	fig3	●
CAL10010Main unit	4C0LC030	10	100	-	31.75	45	-	54.8	-	35	12.7	8	1.1	10,000	fig3	●
CAL12512Main unit	4C0MC030	12	125	-	38.1	55	-	54.8	-	35	15.9	10	1.6	8,000	fig3	●

*Weight including the weight of the inserts

A assembled set

Designation (Assembled)	Product Number	Stock	Accessories
CBN-CAL04004TA	4C0NC060	●	Cartridges Torx screws Hexagonal bolts Adjustment pieces Three wrenches (spanners) for attachment
CBN-CAL05005TA	4C0PC060	●	
CBN-CAL06305TA	4C0JC090	●	
CBN-CAL08008TA	4C0KC090	●	
CBN-CAL10010TA	4C0LC130	●	
CBN-CAL12512TA	4C0MC130	●	

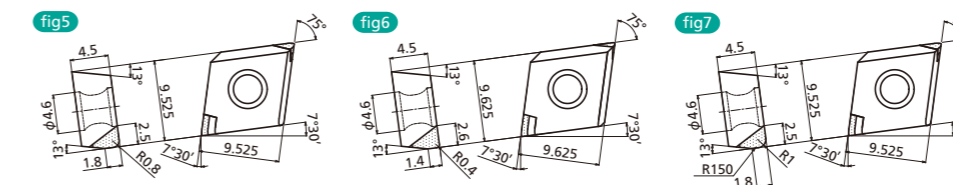


This set does not include an insert.

Insert

Product Name	Designation	Product Number	Grade	Stock	Fig
Standard inserts (versatile)	XCBGW0945R08	B3009027	HB580	●	fig5
Low-resistance inserts (low-resistance)	XCBGW0945R04	B3009007	HB580	●	fig6
Wiper insert	XCBGW0945R-W	B3009017	HB580	●	fig7

If you want to adjust blade deflection, please ask us although we will charge you for this adjustment.



Cartridge

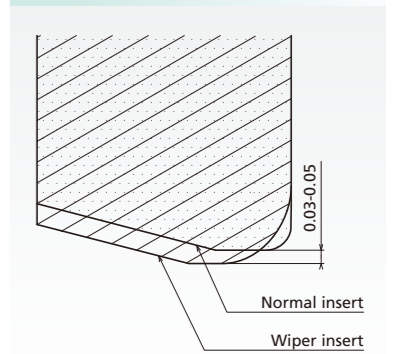
Designation	Product Number	Stock
XCALBSS-CBN	4CA0E030	●

This set includes a cartridge.

Accessories

Product Name	Torx screw (Insert fastening screw)	Hexagonal bolt (Cartridge fastening bolt)	Torx wrench (Insert fastening wrench)	Hexagonal wrench (Cartridge fastening wrench)	Adjustment piece	M2 hexagonal wrench (Adjustment screw wrench)
Part Number	TS32	M5×10	TKY08F	LM040 (4 mm)	AS-413.5	LM020
Product Number	XAZ0A110	XAZ0A080	XAZ0A130	XAZ0A100	XAZ0A050	XAZ0A060
Shape						

Setting of the wiper insert



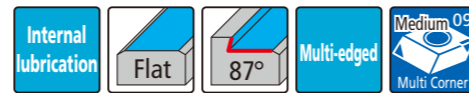
When you use a wiper insert (XCBGW0945R-W), too, please adjust the size as shown in the above figure.

CBN-CAL-F/Plus

Finer pitch + Internal coolant supply model

Multi-edged cutter and face milling

- Face milling cutter for finish processing of FC and FCD
- This cutter can be used interchangeably with our conventional CAL-F body.
- The Multi Corner PcBN has been adopted, realizing low costs and high-speed processing.
- Multi-edged cutter that is equipped with an internal lubrication system
- Cutting fluid is injected directly into the edges



Size	φ125	φ100	φ80	φ63	φ50	φ40
Number of edges	12	10	8	5	5	4

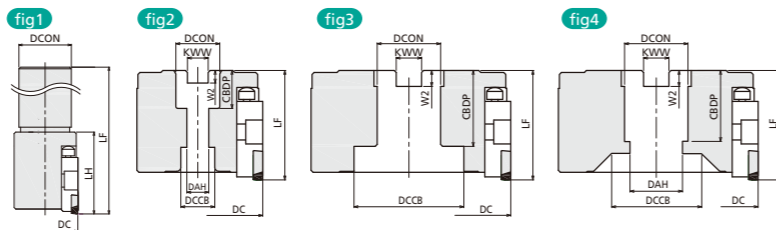
Cutter Body

Designation	Product Number	No. of Cutting Flutes	Dimension (mm)										* Weight (kg)	Max. Speed (rpm)	Fig	Stock
			DC	DCX	DCON	DCCB	DAH	LF	LH	CBDP	KWW	W2				
CAL+04004Main unit	4CONC020	4	40	-	20	-	-	130	50	-	-	-	0.6	18,000	fig1	●
CAL+05005Main unit	4COPC020	5	50	-	22	17	11	50	-	23	10.4	6.3	0.3	20,000	fig2	●
CAL+06305Main unit	4COJC050	5	63	-	22	17	11	50	-	23	10.4	6.3	0.4	16,000	fig2	●
CAL+08008Main unit	4COKC050	8	80	-	25.4	35	-	50	-	29	9.5	6	0.7	12,500	fig3	●
CAL+10010-27Main unit	4COLC110	10	100	-	27	43	25	51	-	27	12	7	1.0	10,000	fig4	●
CAL+10010Main unit	4COLC050	10	100	-	31.75	45	26	56	-	36	12.7	8	1.1	10,000	fig4	●
CAL+12512-27Main unit	4COMC110	12	125	-	27	55	25	51	-	27	12	7	1.6	8,000	fig4	●
CAL+12512Main unit	4COMC050	12	125	-	38.1	55	30	63	-	40	15.9	10	1.9	8,000	fig4	●

*Weight including the weight of the inserts

A assembled set

Designation (Assembled)	Product Number	Stock	Accessories
CBN-CAL+04004TA	4CONC070	●	Cartridges
CBN-CAL+05005TA	4COPC070	●	Torx screws
CBN-CAL+06305TA	4COJC100	●	Hexagonal bolts
CBN-CAL+08008TA	4COKC100	●	Adjustment pieces
CBN-CAL+10010TA-27	4COLC150	●	Three wrenches (spanners)
CBN-CAL+10010TA	4COLC140	●	for attachment
CBN-CAL+12512TA-27	4COMC150	●	
CBN-CAL+12512TA	4COMC140	●	

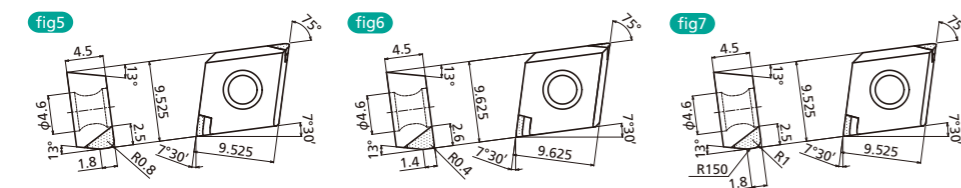


This set does not include an insert.

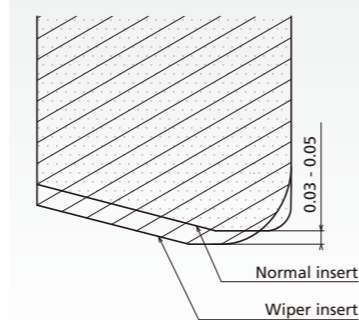
Insert

Product Name	Designation	Product Number	Grade	Stock	Fig
Standard inserts (versatile)	XCBGW0945R08	B3009027	HB580	●	fig5
Low-resistance inserts (low-resistance)	XCBGW0945R04	B3009007	HB580	●	fig6
Wiper insert	XCBGW0945R-W	B3009017	HB580	●	fig7

If you want to adjust blade deflection, please ask us although we will charge you for this adjustment.



Setting of the wiper insert



When you use a wiper insert (XCBGW0945R-W), too, please adjust the size as shown in the above figure.

Cartridge

Designation	Product Number	Stock
XCALBSS-CBN	4CA0E030	●

This set includes a cartridge.

Accessories

Product Name	Torx screw (Insert fastening screw)	Hexagonal bolt (Cartridge fastening bolt)	Torx wrench (Insert fastening wrench)	Hexagonal wrench (Cartridge fastening wrench)	Adjustment piece	M2 hexagonal wrench (Adjustment screw wrench)
Part Number	TS32	M5×10	TKY08F	LM040 (4 mm)	AS-413.5	LM020
Product Number	XAZ0A110	XAZ0A080	XAZ0A130	XAZ0A100	XAZ0A050	XAZ0A060
Shape						

Case Study

⟨Cutters for processing cast iron⟩

Processing of a machine slide table surface

• Workpiece material: gray cast iron (FC300)

	Chukyo	Competitor
Tool (Cutter)	CBN-CAL08008TA	Carbide insert type
Specs	φ80×8 blades	φ80×6 blades
Tool (Insert)	XCBGW0945R04	-
Tool material	HB580	WC
Cutting method	Continuous processing	Continuous processing
Cutting speed (Vc)	1,500 m/min	300 m/min
Rotation speed of the main shaft (n)	6,000 min ⁻¹	1,200 min ⁻¹
Cutting depth (ap)	0.1 mm	0.1 mm
Feed per revolution (f)	0.75 mm/rev (fz = 0.1)	2.4 mm/rev (fz = 0.4)
Coolant	DRY	
Lifespan estimating standard	Roughness on the processed surface: Ra: 3.2 μm Burr from processing	

- The service life of the processing tool has extended 25 times! (cutting length: 100 m ⇒ 2,500 m)
- Processing time per unit has decreased by 40%! (High-speed processing has been realized thanks to cubic boron nitride [CBN].)
- The roughness of the processed surface (Ra) is 1.86 μm, indicating a good performance!

Processing of a hydraulic pump cover

• Workpiece material: Ductile cast iron (FCD400)

	Chukyo (NEW)	Chukyo
Tool (Cutter)	CBN-CAL10010TA	CAL12508TA
Specs	φ100×10 blades	φ125×8 blades
Tool (Standard insert)	XCBGW0945R08 (9 pcs)	-
Tool (Wiper insert)	XCBGW0945R-W (1 pcs)	XCBGW1204RW (8 pcs)
Tool material	HB580	HB569
Cutting method	Intermittent processing	Intermittent processing
Cutting speed (Vc)	628 m/min	628 m/min
Rotation speed of the main shaft (n)	2,000 min ⁻¹	1,600 min ⁻¹
Cutting depth (ap)	0.1 mm	0.1 mm
Feed per revolution (f)	0.4 mm/rev (fz = 0.04)	0.32 mm/rev (fz = 0.04)
Coolant	DRY	
Lifespan estimating standard	Roughness on the processed surface: Ra: 1.6 μm Burr from processing	

- The processing cost has been halved! (Reduction of initial costs with the Multi Corner device)
- Processing time has decreased by 20%! (Improvement in processing efficiency with the multi-edged device)
- The roughness of the processed surface (Ra) is 0.32 μm at the time of completion of processing of 1,000 workpieces, indicating a very good performance! (It became possible to do without polish finishing.)

A large grid of small squares for taking notes, occupying the left half of the page.



Eco-Helix

CONTENTS

- PCD Eco-Helix 23
- PcBN Eco-Helix 24

PCD/PcBN helical end milling

Eco-Helix

Innovation in helical edges

Spiral edges are employed in our Eco-Helix.

By reducing cutting resistance, we improved the performance of cutting difficult-to-cut workpieces dramatically!

- We have reduced cutting resistance, by adopting helical cutting edges in PCD/PcBN end milling.
- The performance of cutting difficult-to-cut workpieces has improved considerably!

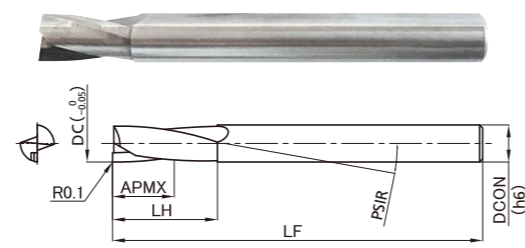


For plastics and non-metals

PCD Eco-Helix Trim Type F

- This helical end mill is ideal for trimming plastics and fiber reinforced plastics.
- The spiral edges employed make processing three times faster than straight edges.
- The sharpness of the edges has been improved, and cutting heat and burrs are reduced.

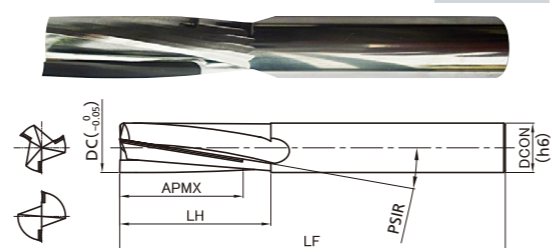
Product Number	Designation	No. of Cutting Flutes	Dimension (mm)						Stock	Grade
			DC	APMX	LH	LF	DCON	PSIR		
1E01C105	HD-EHESF1040	1	4	10	17	60	6	10	●	HD100
1E01C115	HD-EHESF1050	1	5	10	17	60	6	10	●	
1E01C125	HD-EHESF1060	1	6	10	17	60	6	15	●	
1E01C135	HD-EHESF1080	1	8	10	17	60	8	20	●	
1E01C145	HD-EHESF1100	1	10	10	17	60	10	20	●	
1E01C155	HD-EHEMF1060	1	6	15	22	70	6	10	●	HD100
1E01C165	HD-EHEMF1080	1	8	20	27	70	8	10	●	
1E01C175	HD-EHEMF1100	1	10	25	32	80	10	10	●	



PCD Eco-Helix Type H

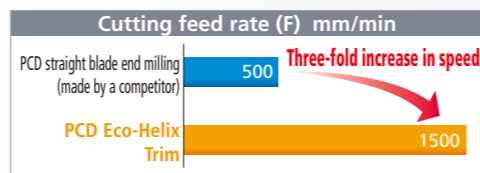
- Suited for processing such materials as CFRP and hard resin!

Product Number	Designation	No. of Cutting Flutes	Dimension (mm)						Stock	Grade
			DC	APMX	LH	LF	DCON	PSIR		
1E01C041	HD-EHEMH2060	2	6	15	25	70	6	10	●	HD30
1E01C051	HD-EHEMH2080	2	8	20	35	80	8	10	●	
1E01C061	HD-EHEMH2100	2	10	25	40	90	10	10	●	
1E02C031	HD-EHEMH2120	2	12	30	45	100	12	10	●	
1E02C041	HD-EHEMH3120	3	12	30	45	100	12	10	●	
1E03C031	HD-EHEMH2160	2	16	40	55	120	16	10	●	
1E03C041	HD-EHEMH3160	3	16	40	55	120	16	10	●	



Case Study

Tool	PCD Eco-Helix Trim	PCD straight blade end milling (made by a competitor)	Workpiece materials	Acrylic resin
Specs	φ6x1 blades		Processing type	Trimming (die-cutting)
Cutting speed (Vc)	1036 m/min			
Rotation speed of the main shaft (n)	55,000 min ⁻¹			
Cutting feed rate (F)	1,500 mm/min	500 mm/min		

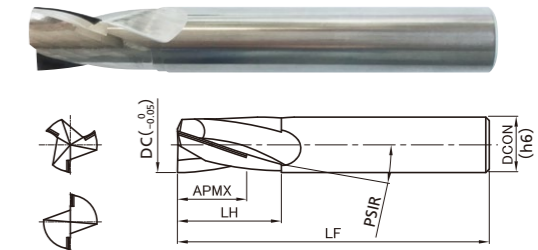


For nonferrous alloy

PCD Eco-Helix Mini Type M

- It is perfectly suited for processing materials such as metal matrix composites (MMC), duralumin, and nonferrous alloy!
- The edge of PCD Eco-Helix mini Type M is the same in design, but made shorter than that of PCD Eco-Helix Type M, which makes Eco-Helix mini Type M available at a more affordable price.
- The high-rake design helps lower cutting resistance further.

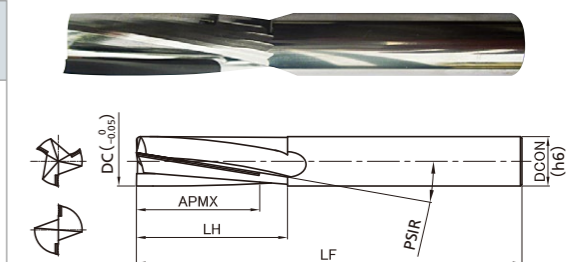
Product Number	Designation	No. of Cutting Flutes	Dimension (mm)						Stock	Grade
			DC	APMX	LH	LF	DCON	PSIR		
1E01C071	HD-EHESM2060	2	6	7	18	60	6	20	●	HD30
1E01C081	HD-EHESM2080	2	8	10	20	70	8	20	●	
1E01C091	HD-EHESM2100	2	10	12	22	70	10	20	●	
1E02C051	HD-EHESM2120	2	12	15	25	80	12	20	●	
1E02C061	HD-EHESM3120	3	12	15	25	80	12	20	●	
1E03C051	HD-EHESM2160	2	16	20	30	90	16	20	●	
1E03C061	HD-EHESM3160	3	16	20	30	90	16	20	●	



PCD Eco-Helix Type M

- It is perfectly suited for processing materials such as metal matrix composites (MMC), duralumin, and nonferrous alloy!

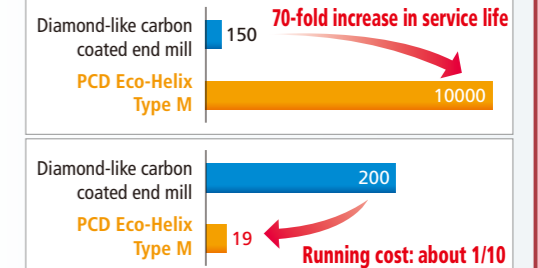
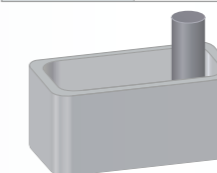
Product Number	Designation	No. of Cutting Flutes	Dimension (mm)						Stock	Grade
			DC	APMX	LH	LF	DCON	PSIR		
1E01C011	HD-EHEMM2060	2	6	15	25	70	6	10	●	HD30
1E01C021	HD-EHEMM2080	2	8	20	35	80	8	10	●	
1E01C031	HD-EHEMM2100	2	10	25	40	90	10	10	●	
1E02C011	HD-EHEMM2120	2	12	30	45	100	12	10	●	
1E02C021	HD-EHEMM3120	3	12	30	45	100	12	10	●	
1E03C011	HD-EHEMM2160	2	16	40	55	120	16	10	●	
1E03C021	HD-EHEMM3160	3	16	40	55	120	16	10	●	



Case Study

Tool	PCD Eco-Helix Type M	Diamond-like carbon coated end mill
Specs	φ14x3 blades	φ14x4 blades 45°twisted
Cutting speed (Vc)	265 m/min	
Rotation speed of the main shaft (n)	6,000 min ⁻¹	
Feed per revolution (f)	0.23 mm/rev	
Cutting depth (ap)	35 mm	
Cutting depth (ae)	0.5 mm	

Workpiece materials Equivalent to ADC12
Cutting method Continuous processing
Coolant Wet type

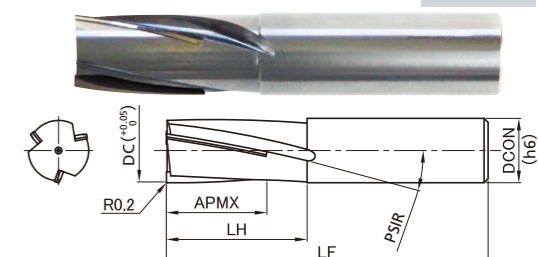


For hardened steel

PcBN Eco-Helix

- High-strength hardened steel: Suited for the processing of SKD11 (60HRC or higher), SCR15 (55HRC for higher), etc.

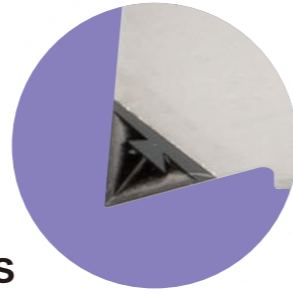
Product Number	Designation	No. of Cutting Flutes	Dimension (mm)						Stock	Grade
			DC	APMX	LH	LF	DCON	PSIR		
2F01C012	HB-EHEM3060	3	6	10	20	60	10	15	●	HB59
2F01C022	HB-EHEM3080	3	8	10	20	60	10	15	●	
2F01C032	HB-EHEM3100	3	10	15	25	70	12	15	●	
2F02C012	HB-EHEM3120	3	12	20	30	75	12	15	●	
2F03C012	HB-EHEM3160	3	16	25	35	80	16	15	●	



Steel

NEW

Small Diameter Boring Bar CB/DB series



Polycrystalline diamond (PCD), polycrystalline cubic boron nitride (PcBN), and monocrystalline diamond

Features

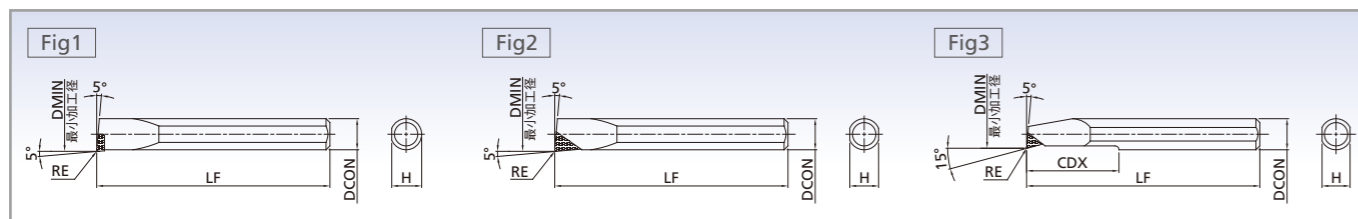
- ◆ Can be used for processing a broad range of materials including high-strength ferrous materials, nonferrous metals, and resin!
- ◆ They can be resharpener and reused, which helps cut costs further.
- ◆ A wide variety of standard inserts that can be used for such general-purpose machines as NC lathes and automatic lathes are available.
- ◆ Some of the boring bars under the DB series come with the 3D Breaker and can deal with metal swarf.

Purposes of use

- **CB Series (PcBN sintered body)**
Processing for finishing hardened steel, gray cast iron, etc.
- **DB Series (PCD sintered body/monocrystalline diamond)**
Processing for finishing aluminum alloys, copper alloys, super engineering plastics, etc.



Polycrystalline diamond (PCD), polycrystalline cubic boron nitride (PcBN), and monocrystalline diamond **CB/DBseries**



Product Number	Designation	Type	Fig	Dimension (mm)					Grade in stock*				
				Minimum processing diameter DMIN	Shank diameter DCON	Processing depth CDX	Height H	Overall length LF	Corner radius RE	Grade Code			
										HB55	HB59	HD100	MCD
2B01B01 *	CB35DH030T-020		1	3.5	3	—	2.7	60	0.2	●	●		
2B01B02 *	CB45DH040T-020		2	4.5	4	—	3.7	60	0.2	●	●		
2B01B03 *	CB55DH050T-020		2	5.5	5	—	4.6	60	0.2	●	●		
2B01B04 *	CB65DH060T-020		2	6.5	6	—	5.6	60	0.2	●	●		
1D01B01 *	DB40DH040F-007		3	4	4	20	3.6	60	0.07			●	
1D01B02 *	DB50DH050F-007		3	5	5	25	4.4	60	0.07			●	
1D01B03 *	DB60DH060F-007		3	6	6	30	5.4	60	0.07			●	
1D01B04 *	DB40DH040F-007-NB	Breaker-attached	3	4	4	20	3.6	60	0.07			●	
1D01B05 *	DB50DH050F-007-NB	Breaker-attached	3	5	5	25	4.4	60	0.07			●	
1D01B06 *	DB60DH060F-007-NB	Breaker-attached	3	6	6	30	5.4	60	0.07			●	
1D01B01 *	DB40DH040F-003		3	4	4	20	3.6	60	0.03				●
1D01B02 *	DB50DH050F-003		3	5	5	25	4.4	60	0.03				●
1D01B03 *	DB60DH060F-003		3	6	6	30	5.4	60	0.03				●

MEMO



NEW

Monocrystalline diamond inserts

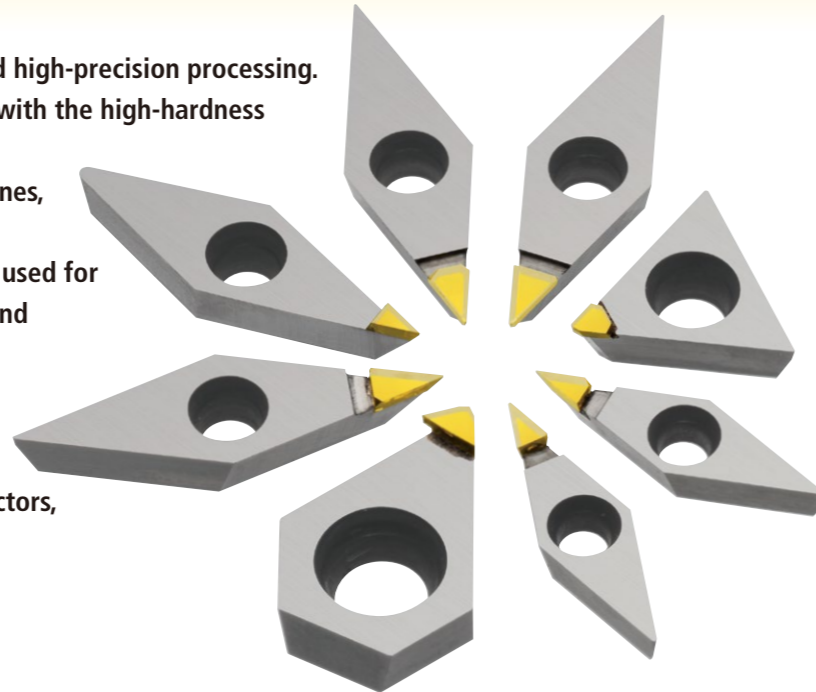
MCD Insert



For ultrafine and high-precision finish processing

Features

- ◆ Specially designed for ultrafine processing and high-precision processing.
- ◆ Stable and high processing quality is ensured with the high-hardness and high-thermal-conductivity properties.
- ◆ This cutter forms superior cutting edge ridgelines, realizing lap-less processing.
- ◆ A wide variety of standard inserts that can be used for such general-purpose machines as NC lathes and automatic lathes are available.



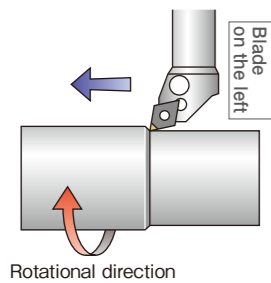
Purposes of use

Processing for finishing automobiles, semiconductors, optical components, etc.

- Nonferrous metals (aluminum alloys and copper alloys)
- Super engineering plastics (PTFE and PEEK)

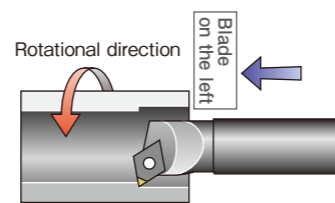
Processing case

Outer diameter processing



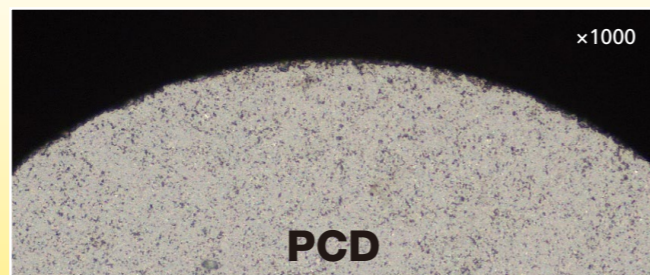
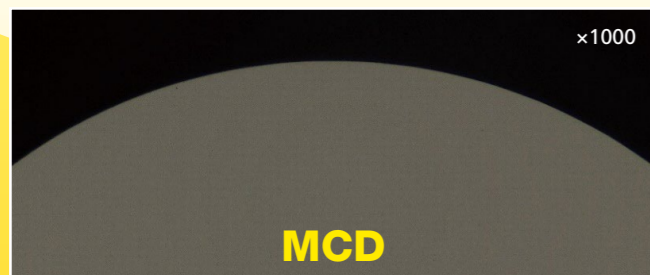
VCMW1103020C
 Workpiece materials : PTFE
 VC = 125 m/min
 n = 1,000 min⁻¹
 f = 0.02 mm/rev
 Processed surface roughness : Ra = 0.2 μm

Inner diameter processing



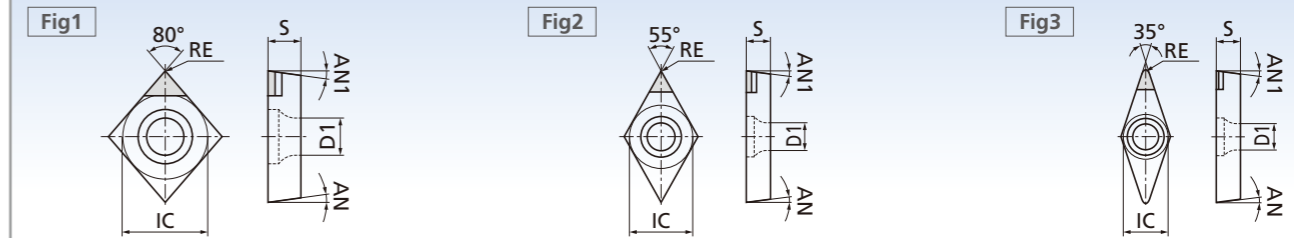
VCMW1103020CP
 Workpiece materials : PTFE
 VC = 75 m/min
 n = 2,000 min⁻¹
 f = 0.02 mm/rev
 Processed surface roughness : Ra = 0.2 μm

Comparison in cutting edge line between MCD and PCD



Monocrystalline diamond inserts

MCD series

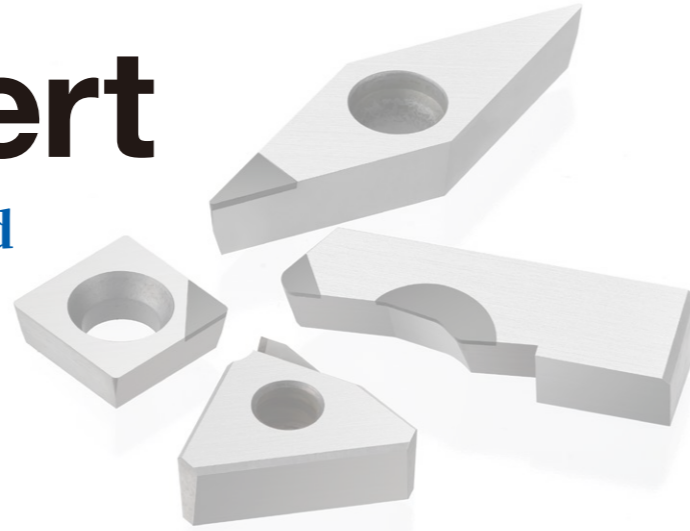


Product Number	Designation		Usage	Fig	Dimension (mm)						Grade
	Size	Code			IC	S	RE	AN (°)	AN1 (°)	D1	
DJ00-101M	CCMW0602005	C	For outer diameter	1	6.35	2.38	R0.05	7	7	2.8	MCD
DJ00-102M	CCMW0602010	C	For outer diameter	1	6.35	2.38	R0.10	7	7	2.8	MCD
DJ00-103M	CCMW0602020	C	For outer diameter	1	6.35	2.38	R0.20	7	7	2.8	MCD
DJ00-104M	CCMW0602005	CP	For inner diameter	1	6.35	2.38	R0.05	7	11	2.8	MCD
DJ00-105M	CCMW0602010	CP	For inner diameter	1	6.35	2.38	R0.10	7	11	2.8	MCD
DJ00-106M	CCMW0602020	CP	For inner diameter	1	6.35	2.38	R0.20	7	11	2.8	MCD
DJ00-107M	CCMW09T3005	C	For outer diameter	1	9.525	3.97	R0.05	7	7	4.4	MCD
DJ00-108M	CCMW09T3010	C	For outer diameter	1	9.525	3.97	R0.10	7	7	4.4	MCD
DJ00-109M	CCMW09T3020	C	For outer diameter	1	9.525	3.97	R0.20	7	7	4.4	MCD
DJ00-110M	CCMW09T3005	CP	For inner diameter	1	9.525	3.97	R0.05	7	11	4.4	MCD
DJ00-111M	CCMW09T3010	CP	For inner diameter	1	9.525	3.97	R0.10	7	11	4.4	MCD
DJ00-112M	CCMW09T3020	CP	For inner diameter	1	9.525	3.97	R0.20	7	11	4.4	MCD
DJ00-201M	DCMW0702005	C	For outer diameter	2	6.35	2.38	R0.05	7	7	2.8	MCD
DJ00-202M	DCMW0702010	C	For outer diameter	2	6.35	2.38	R0.10	7	7	2.8	MCD
DJ00-203M	DCMW0702020	C	For outer diameter	2	6.35	2.38	R0.20	7	7	2.8	MCD
DJ00-204M	DCMW0702005	CP	For inner diameter	2	6.35	2.38	R0.05	7	15	2.8	MCD
DJ00-205M	DCMW0702010	CP	For inner diameter	2	6.35	2.38	R0.10	7	15	2.8	MCD
DJ00-206M	DCMW0702020	CP	For inner diameter	2	6.35	2.38	R0.20	7	15	2.8	MCD
DJ00-207M	DCMW11T3005	C	For outer diameter	2	9.525	3.97	R0.05	7	7	4.4	MCD
DJ00-208M	DCMW11T3010	C	For outer diameter	2	9.525	3.97	R0.10	7	7	4.4	MCD
DJ00-209M	DCMW11T3020	C	For outer diameter	2	9.525	3.97	R0.20	7	7	4.4	MCD
DJ00-210M	DCMW11T3005	CP	For inner diameter	2	9.525	3.97	R0.05	7	15	4.4	MCD
DJ00-211M	DCMW11T3010	CP	For inner diameter	2	9.525	3.97	R0.10	7	15	4.4	MCD
DJ00-212M	DCMW11T3020	CP	For inner diameter	2	9.525	3.97	R0.20	7	15	4.4	MCD
DJ00-501M	VCMW0802005	C	For outer diameter	3	4.76	2.38	R0.05	7	7	2.4	MCD
DJ00-502M	VCMW0802010	C	For outer diameter	3	4.76	2.38	R0.10	7	7	2.4	MCD
DJ00-503M	VCMW0802020	C	For outer diameter	3	4.76	2.38	R0.20	7	7	2.4	MCD
DJ00-504M	VCMW0802005	CP	For inner diameter	3	4.76	2.38	R0.05	5/7	16	2.4	MCD
DJ00-505M	VCMW0802010	CP	For inner diameter	3	4.76	2.38	R0.10	5/7	16	2.4	MCD
DJ00-506M	VCMW0802020	CP	For inner diameter	3	4.76	2.38	R0.20	5/7	16	2.4	MCD
DJ00-507M	VCMW1103005	C	For outer diameter	3	6.35	3.18	R0.05	7	7	2.8	MCD
DJ00-508M	VCMW1103010	C	For outer diameter	3	6.35	3.18	R0.10	7	7	2.8	MCD
DJ00-509M	VCMW1103020	C	For outer diameter	3	6.35	3.18	R0.20	7	7	2.8	MCD
DJ00-510M	VCMW1103005	CP	For inner diameter	3	6.35	3.18	R0.05	5/7	16	2.8	MCD
DJ00-511M	VCMW1103010	CP	For inner diameter	3	6.35	3.18	R0.10	5/7	16	2.8	MCD
DJ00-512M	VCMW1103020	CP	For inner diameter	3	6.35	3.18	R0.20	5/7	16	2.8	MCD
D300902M	XCBGW1204R-FW		For CAL-S	—	—	—	—	—	—	—	MCD
D300904M	XCBGW09T3R-FW		For CAL-F	—	—	—	—	—	—	—	MCD
D300908M	XCBGW07035R-FW		For CAL-MAX	—	—	—	—	—	—	—	MCD

PCD Insert

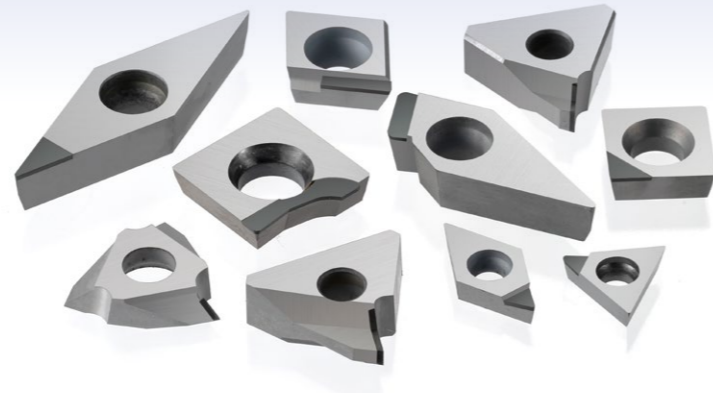
Polycrystalline diamond

Suited for cutting materials such as aluminum alloy and nonferrous metals. They can also be used for ultra high-speed finish cutting.



What is PCD?

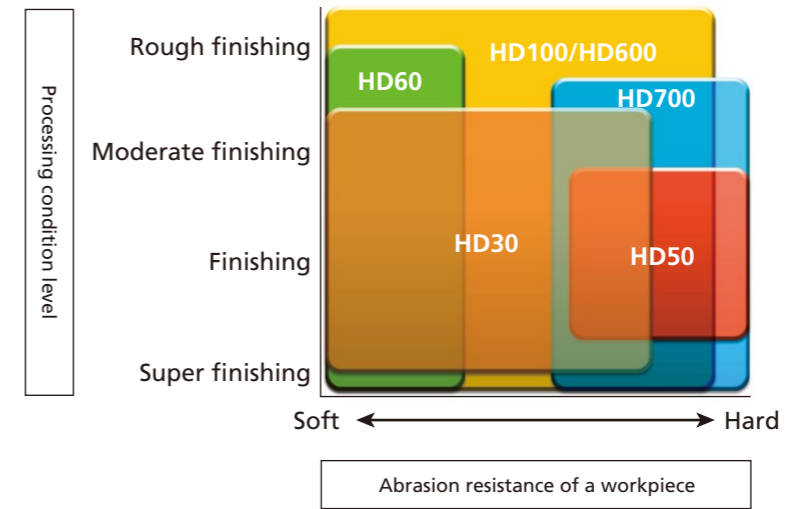
Polycrystalline diamond (PCD) is a tool material produced artificially under an ultrahigh-pressure and ultrahigh-temperature environment. The Vickers hardness of diamond is as high as 9,000 or higher, so diamond is indispensable for cutting abrasion-resistant difficult-to-cut materials. The most popular materials for which PCD tools are used include aluminum and aluminum alloys. Since PCD is sharp and not welded to aluminum, PCD is used for processing the components of automobiles and home appliances, for which many aluminum products are used. Chukyo keep the following PCD types in stock.



Standard PCD grades of Chukyo

Material type	Tissue	Features	Recommended workpieces	Grain size
HD30		Sharp yet abrasion-resistant	Versatile grade. Can be used for a broad range of materials, including nonferrous metals, such as aluminum alloys and copper.	10 μm
HD50		Highly tough and abrasion-resistant	Aluminum alloys with a high silicon content, carbide, ceramics, and metal matrix composites (MMCs)	25 μm
HD60		Highly tough and abrasion-resistant	Plastics, resin, wood, etc.	2 μm
HD700		The highest level of toughness and defect resistance	Processing of bimetal (cutting together with carbide), aluminum alloys with a high silicon content, plastic composites, resin, etc.	Mixed
HD600		Excellent sharpness, defect resistance, and abrasion resistance	Finishing for high surface roughness, as well as the processing of aluminum alloys, plastic composites, resin, etc.	1 μm
HD100		Fracture toughness and deflective strength. Improving defect resistance and abrasion resistance while raising the workability of material themselves.	Processing of aluminum alloys with a high silicon content, finishing for high surface roughness, and processing of titanium, aluminum alloys, ceramics, and plastic composites	≤1 μm

Recommended range of processing with the HD Series



Guidelines for selecting a product of the HD Series

Maker brand	Nonferrous metals					Non-metals			Composites	
	Aluminum alloys		Copper alloys (lead-free)	Titanium alloy (Ti-6Al-4V)	Cemented carbide (6%<Co<17%)	Reinforced plastics	Wooden/inorganic boards	Pre-fired ceramics	Carbon fiber reinforced plastics	Metal matrix composites (MMCs)
	Si<12%	Si>12%								
Chukyo HD Series	HD30 HD60 HD100 HD600	HD50 HD700	HD30 HD60 HD100 HD600	HD30 HD100 HD600	HD50 HD700	HD30 HD60 HD600	HD30 HD60 HD600	HD50 HD700	HD30 HD50 HD100 HD600	HD30 HD50 HD100 HD600
Sumitomo Sumidia®	DA1000 DA150 DA2200	DA1000 DA90 DA150	DA1000 DA2200	DA1000 DA2200	DA90 DA150	DA1000 DA2200	DA1000 DA2200	DA90 DA150	DA1000 DA2200	DA1000 DA2200
Mitsubishi	MD220 MD230	MD205	MD220 MD230	MD220 MD230	MD205	MD220 MD230	MD220 MD230	MD205	MD220 MD230	MD220 MD205 MD230
Tungaloy	DX120 DX140	DX160 DX180	DX110 DX120 DX140	DX140	DX160 DX180	DX120 DX140	DX120 DX140	DX160 DX180	DX140	DX140
Kyocera	KPD010 KPD001	KPD250 KPD230	KPD010 KPD001	KPD010 KPD001	KPD250 KPD230	KPD010 KPD001	KPD010 KPD001	KPD250 KPD230	KPD010 KPD230 KPD001	KPD010 KPD001

*This table was produced with reference to the catalogues and publications of each company without obtaining the approval of each company.

Recommended conditions for processing PCD

	Workpiece materials	Cutting speed Vc (m/min)	Feeding rate f (mm/rev)	Cutting depth ap (mm)
Lathe turning and boring	Aluminum alloys (Si: 12% or less)	300-3000	0.05-0.2	2.0 or less
	Aluminum alloys (Si: over 12%)	100-1000	0.05-0.2	2.0 or less
	Copper, brass, bronze	500-1500	0.05-0.2	2.0 or less
	Burned cemented carbide	10-30	0.01-0.1	0.5 or less
	Cemented carbide (pellets)	80-200	0.05-0.2	0.5 or less
	Carbon	100-800	0.05-0.2	2.0 or less
	Fiberglass synthetic materials and CFRP	100-1000	0.03-0.3	1.0 or less
	Green ceramics (pellets)	100-600	0.05-0.2	2.0 or less
	Reinforced plastics	100-800	0.1-0.3	2.0 or less
	Hard rubber	200-800	0.05-0.2	2.0 or less
Milling	Wooden/inorganic boards	300-4000	0.1-0.5	5.0 or less
	Aluminum alloys	500-3000	0.05-0.3*	3.0 or less
	Chipboards, fiberboards, and plastics	2000-3000	0.1-0.3*	15.0 or less

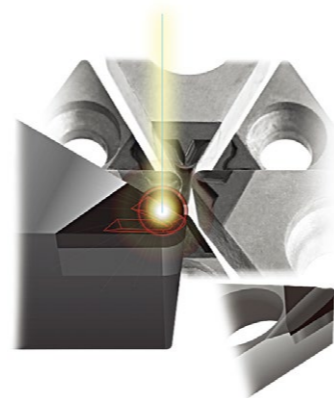
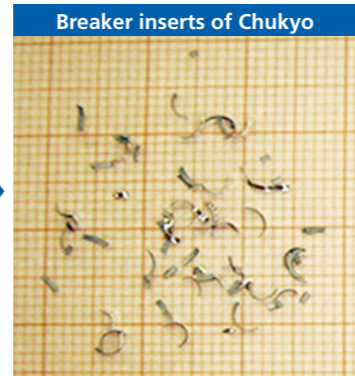
*mm / tooth

Breaker Insert

Are you in trouble?

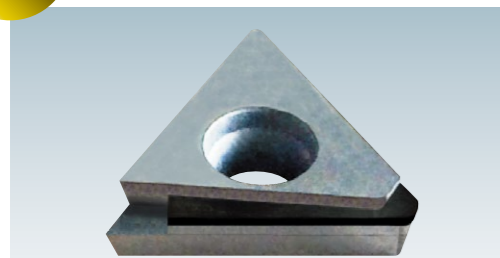
- Short stoppage
- Metal swarf
- Service life

The breaker inserts of Chukyo enable the control of mincing and discharge of metal swarf, reducing quality trouble and downtime.



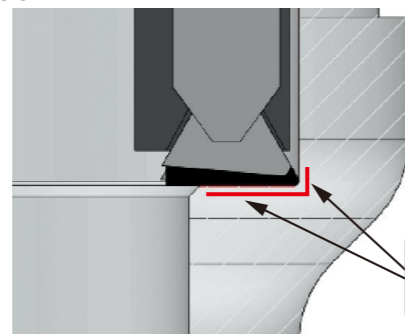
Types of breaker inserts produced with Chukyo's processing technology

Creativity Chip Breaker



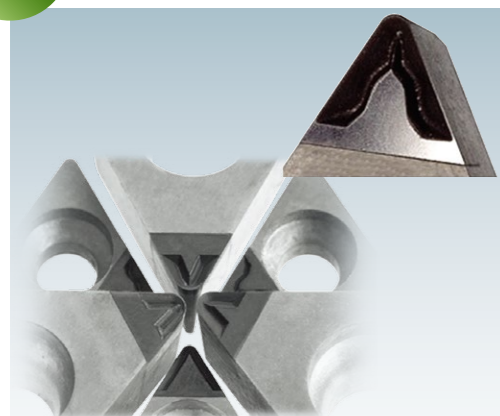
The shape of a breaker to use is determined according to the processing conditions. Chips can be dealt with simultaneously at two surfaces (the side and the bottom surface) with just one insert.

Description



The breaker function can be exerted for the sides and bottom surfaces.

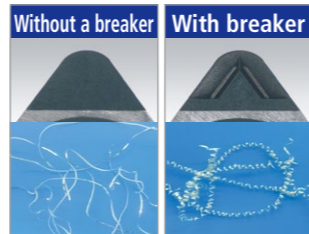
Technology 3D Breaker



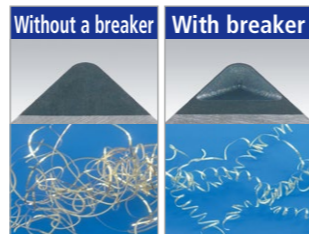
Our 3D Breaker, which is designed three-dimensionally, is a general-purpose breaker suited for various applications.

Case study

Insert	HD30 TPGX090204F
Workpiece materials	Aluminum alloy castings AC4B
Processing conditions	Inner diameter (I.D.) processing
	D = $\phi 30$ mm
	f = 0.15 mm/rev
	ap = 0.15 mm
	n = 2,000 min ⁻¹

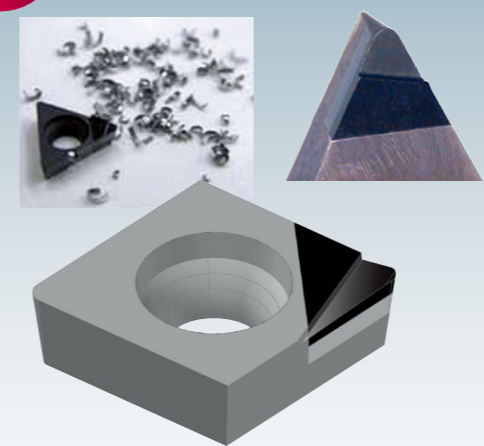


Insert	HD30 TPGX090204F
Workpiece materials	Aluminum alloys A5052
Processing conditions	Inner diameter (I.D.) processing
	D = $\phi 30$ mm
	f = 0.15 mm/rev
	ap = 0.15 mm
	n = 2,000 min ⁻¹



Exquisite technology

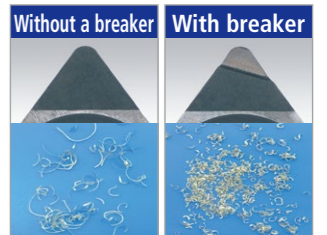
Precision Breaker



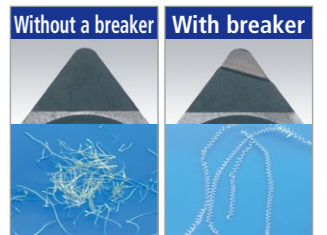
The precise shape of the edge is realized by our skillful processing techniques. With our Precision Breaker, the length and direction of metal swarf can be controlled.

Case study

Insert	HD30 TPGX090208F
Workpiece materials	Aluminum alloys A5052
Processing conditions	Inner diameter (I.D.) processing
	D = $\phi 30$ mm
	f = 0.15 mm/rev
	ap = 0.15 mm
	n = 2,000 min ⁻¹

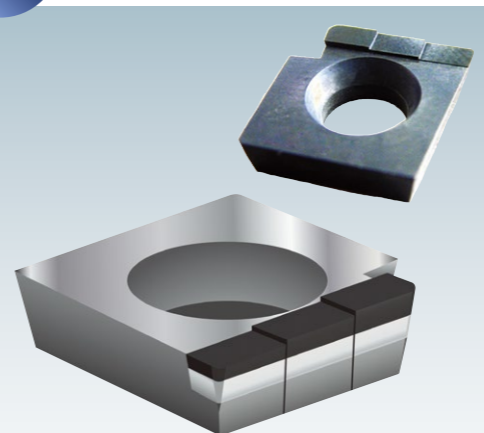


インサート	HD30 CNMA120408F
Workpiece materials	Aluminum alloys A5052
Processing conditions	Outer diameter (I.D.) processing
	D = $\phi 80$ mm
	f = 0.15 mm/rev
	ap = 0.15 mm
	n = 2,000 min ⁻¹



Originality

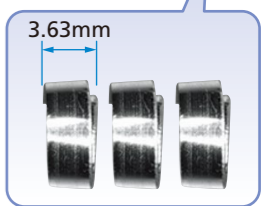
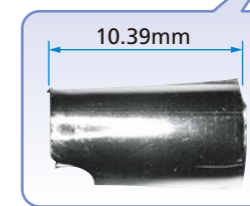
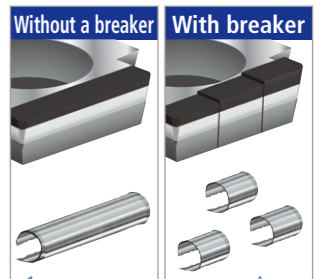
Innovative Breaker



Our Innovative Breaker is a special precision breaker with a three-tier edge for solving issues of chips caused during the surface processing. This breaker cuts chips vertically.

Case study

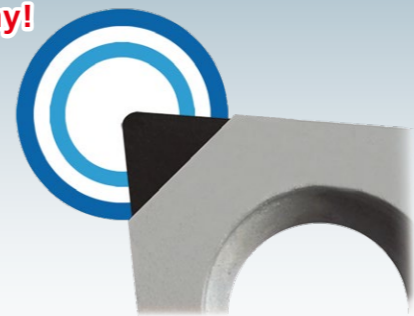
Insert	HD30 SPGX1203TOKU
Workpiece materials	Aluminum alloys ADC12
Processing conditions	End processing
	D = $\phi 95$ mm- $\phi 73.3$ mm
	f = 0.04 mm
	ap = 10.8 mm
	n = 2,000 min ⁻¹



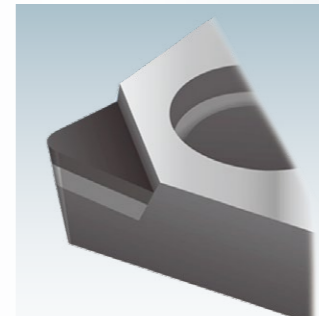
Economical PCD inserts

Emphasis on economical performance. Disposable. Increase in surface roughness with microfine diamond (mini-sized). A 3D breaker-attached type (QE-NB), too, is available.

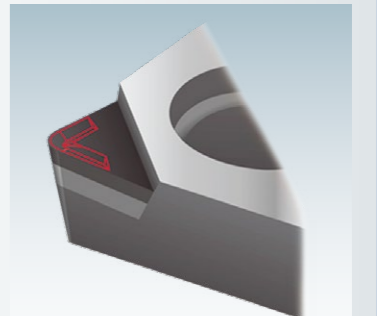
quality!
economy!



QE type



QE-NB type (breaker-attached)



C 80°	Fig1											Fig2										
	Product Number	Designation	Type	Fig	Dimension (mm)						Grade in Stock											
					IC	S	RE	AN	LF	D1	Grade Code											
											HD30	HD600										
Grade Code										1	6											
	D000102 1	CCMT0602 02		1	6.35	2.38	0.2	7	3.0	2.8	●											
	D000103 1	04					0.4				●											
	D000105 1	02 F					0.2				●											
	D000106 1	CCMT09T3 04					0.4				●											
	D000107 1	08					0.8				●											
	D000132 6	QE-CCMT0602 01	Economical type	1	6.35	2.38	0.1	7	2.3	2.8		●										
	D000133 6	02					0.2				●											
	D000134 6	04 F					0.4				●											
	D000148 6	01					0.1				●											
	D000149 6	QE-CCMT09T3 02					0.2				●											
D000150 6	04	0.4	●																			
	D000138 6	QE-CCMT0602 01	Economical type with breaker	1	6.35	2.38	0.1	7	2.3	2.8		●										
	D000139 6	02					0.2				●											
	D000140 6	04 F-NB					0.4				●											
	D000151 6	01					0.1				●											
	D000152 6	QE-CCMT09T3 02					0.2				●											
D000153 6	04	0.4	●																			
	D200134 1	CCMW0602 02		2	6.35	2.38	0.2	7	3.0	2.8	●											
	D200135 1	04					0.4				●											
	D200136 1	02					0.2				●											
	D200137 1	CCMW09T3 04 F					0.4				●											
	D200138 1	08					0.8				●											
	D200139 1	CCMW1204 04					0.4				●											
D000154 1	08	0.8	●																			
	D000144 1	CCMW0602 02	With breaker	2	6.35	2.38	0.2	7	3.0	2.8	●											
	D000145 1	04 F-NB					0.4				●											
	D000146 1	02					0.2				●											
	D000156 1	CCMW09T3 04					0.4				●											
	D000117 1	CPMT0802 04		1	7.938	2.38	0.4	11	2.9	3.4	●											
	D000118 1	08 F					0.8				●											
	D000119 1	02					0.2				●											
	D100120 1	CPMT09T3 04					0.4				●											
	D000135 6	QE-CPMT0802 01	Economical type	1	7.938	2.38	0.1	11	2.3	3.4		●										
	D000136 6	02 F					0.2				●											
	D000137 6	04					0.4				●											
	D000141 6	QE-CPMT0802 01	Economical type with breaker	1	7.938	2.38	0.1	11	2.3	3.4		●										
	D000142 6	02 F-NB					0.2				●											
	D000143 6	04					0.4				●											

Grade Code (Product number)
 [1]...HD30 [2]...HD50 [3]...HD60
 [4]...HD700 [5]...HD100 [6]...HD600
 [7]...HD650

C 80°	Fig1											Fig2											Fig3											Fig4										
	Product Number	Designation	Type	Fig	Dimension (mm)						Grade in Stock																																	
					IC	S	RE	AN	LF	D1	Grade Code																																	
											HD30	HD600																																
Grade Code											1	6																																
	D000123 1	CPMW0502 04		1	5.556	2.38	0.4	11	2.8	2.8	●																																	
	D000125 1	02					0.2				●																																	
	D000126 1	04 F					0.4				●																																	
	D200133 1	CPMW0802 04					0.4				●																																	
	D000129 1	CPMW09T3 04					0.4				●																																	
	D000130 1	08					0.8				●																																	
	D000131 1	CPEW09T3 08 PDFR-2F	With wiper	2	9.525	3.97	0.8	11/16	3.0	4.4	●																																	
	D000109 1	CNMA1204 04 F		3	12.7	4.76	0.4	0	3.5	5.16	●																																	
	D000110 1						08				0.8	●																																
	D000111 1						12				1.2	●																																
	D000155 1	CNMA1204 04 F-NB	With breaker	3	12.7	4.76	0.4	0	3.5	5.16	●																																	
	D000149 1						08				0.8	●																																
	D000113 1	CNMX1204 04 F		4	12.7	4.76	0.4	5/0	4.5	5.16	●																																	
	D000114 1						08				0.8	●																																

Grade Code (Product number)
 [1]...HD30 [2]...HD50 [3]...HD60
 [4]...HD700 [5]...HD100 [6]...HD600
 [7]...HD650

D 55°	Fig1				Fig2				Fig3				Fig4					
	Product Number Grade Code	Designation	Type	Fig	Dimension (mm)						Grade in Stock							
					IC	S	RE	AN	LF	D1	Grade Code							
											HD30	HD600						
1	6																	
	D000202 1	DCMT0702 02	Economical type	1	6.35	2.38	0.2	7	2.9	2.8	●							
	D000203 1	04					0.4				●							
	D000205 1	02 F					0.2				●							
	D000206 1	DCMT11T3 04					0.4				●							
	D000207 1	08					0.8				●							
	D000223 6	QE-DCMT0702 01	Economical type	1	6.35	2.38	0.1	7	2.3	2.8		●						
	D000224 6	02					0.2				●							
	D000225 6	04 F					0.4				●							
	D000233 6	01					0.1				●							
	D000234 6	QE-DCMT11T3 02					0.2				●							
D000235 6	04	0.4	●															
	D000226 6	QE-DCMT0702 01	Economical type with breaker	1	6.35	2.38	0.1	7	2.3	2.8		●						
	D000227 6	02					0.2				●							
	D000228 6	04 F-NB					0.4				●							
	D000236 6	01					0.1				●							
	D000237 6	QE-DCMT11T3 02					0.2				●							
D000238 6	04	0.4	●															
	D000208 1	DCMW0702 02	With breaker	2	6.35	2.38	0.2	7	2.9	2.8	●							
	D000209 1	04					0.4				●							
	D000210 1	02 F					0.2				●							
	D000211 1	DCMW11T3 04					0.4				●							
	D000212 1	08					0.8				●							
	D000229 1	DCMW0702 02	With breaker	2	6.35	2.38	0.2	7	2.9	2.8	●							
	D000230 1	04					0.4				●							
	D000239 1	02 F-NB					0.2				●							
	D000240 1	DCMW11T3 04					0.4				●							
	D000241 1	08					0.8				●							
	D000221 1	DPMW11T3 04 F		2	9.525	3.97	0.4	11	2.9	4.4	●							
	D000222 1	08					0.8				●							
	D000214 1	DNMA1504 04 F		3	12.7	4.76	0.4	0	3.0	5.16	●							
	D000215 1	08					0.8				●							
	D000231 1	DNMA1504 04 F-NB	With breaker	3	12.7	4.76	0.4	0	3.0	5.16	●							
	D000232 1	08					0.8				●							
	D000217 1	DNMX1504 04 F		4	12.7	4.76	0.4	5/0	5.0	5.16	●							
	D000218 1	08					0.8				●							

Grade Code (Product number)
 [1]...HD30 [2]...HD50 [3]...HD60
 [4]...HD700 [5]...HD100 [6]...HD600
 [7]...HD650

S 90°	Fig1				Fig2				Fig3				Fig4					
	Product Number Grade Code	Designation	Type	Fig	Dimension (mm)						Grade in Stock							
					IC	S	RE	AN	LF	D1	Grade Code							
											HD30	HD600						
1	6																	
	D000302 1	SCGW1204 04		1	12.7	4.76	0.4	7	3.5	5.5	●							
	D000303 1	08 F					0.8				●							
	D000333 1	04					0.4				●							
	D000334 1	SPGW09T3 08					0.8				●							
	D000330 1	SPGX0903 04		2	9.525	3.18	0.4	11	3.0	4.5	●							
	D100331 1	08 F					0.8				●							
	D000335 1	04					0.4				●							
	D000336 1	SPGX1203 08					0.8				●							
	D100304 1	SEGN0702 02		3	7.938	2.38	0.2	20	3.0	-	●							
	D000305 1	04 F					0.4				●							
	D200307 1	02					0.2				●							
	D000308 1	SEGN0903 04					0.4				●							
	D200310 1	02					0.2				●							
D000311 1	SEGN1203 04	0.4	●															
	D000317 1	SPGN0702 04		3	7.938	2.38	0.4	11	3.0	-	●							
	D000318 1	08 F					0.8				●							
	D100319 1	02					0.2				●							
	D000320 1	04					0.4				●							
	D100322 1	02					0.2				●							
	D000323 1	04					0.4				●							
	D000324 1	SPGN1203 08					0.8				●							
D100325 1	12	1.2	●															
	D000315 1	SNGA1204 04		4	12.7	4.76	0.4	0	3.5	5.16	●							
	D100316 1	08 F					0.8				●							

Grade Code (Product number)
 [1]...HD30 [2]...HD50 [3]...HD60
 [4]...HD700 [5]...HD100 [6]...HD600
 [7]...HD650

T 60°												Grade in Stock	
	Product Number Grade Code	Designation	Type	Fig	Dimension (mm)						Grade Code		
					IC	S	RE	AN	LF	D1	HD30	HD600	
											1	6	
	D000401 1	TBGN0601	02 F	1	3.97	1.59	0.2	5	2.5	-	-	●	
D000402 1	0.4												
D00048E 1	0.8												
	D000403 1	TBGN0601	02 FH	2	3.97	1.59	0.2	5	-	-	-	●	
D000404 1	0.4												
D000405 1	0.8												
	D000479 6	QE-TBMT0601	02 F	3	3.97	1.59	0.1	5	2.3	2.2	-	●	
D000480 6	0.2												
D000481 6	0.4												
	D000494 6	QE-TBMT0601	02 F-NB	3	3.97	1.59	0.1	5	2.3	2.2	-	●	
D000495 6	0.2												
D000496 6	0.4												
	D00048F 1	TCGW0601	02 F	4	3.97	1.59	0.2	7	2.1	2.2	-	●	
D200482 1	0.4												
D200489 1	9.525												
	D000406 1	TCMT1102	02 F	3	6.35	2.38	0.1	7	2.9	2.8	-	●	
D000407 1	0.2												
D000408 1	0.4												
	D000482 6	QE-TCMT0802	02 F	3	4.76	2.38	0.1	7	2.3	2.3	-	●	
D000483 6	0.2												
D000484 6	0.4												
	D000497 6	QE-TCMT0802	02 F-NB	3	4.76	2.38	0.1	7	2.3	2.3	-	●	
D000498 6	0.2												
D000499 6	0.4												
	D000412 1	TEGN1103	02	1	6.35	3.18	0.2	20	-	-	-	●	
D000413 1	0.4												
D100414 1	0.8												
	D200494 1	TEGN1303	04 F	1	7.938	3.18	0.2	20	-	-	-	●	
D200495 1	0.4												
D200496 1	0.8												
	D000415 1	TEGN1603	02	1	9.525	3.18	0.2	20	-	-	-	●	
D000416 1	0.4												
D000417 1	0.8												
	D20049A 1	TECN1603	PEFR1	5	9.525	3.18	0.4	20	-	-	-	●	
D20049B 1	C0.5												
	D20049C 1	TECN2204	PEFR1	5	12.7	4.76	1.0	20	-	-	-	●	
D20049D 1	C0.5												

Grade Code (Product number)
 [1]...HD30 [2]...HD50 [3]...HD60
 [4]...HD700 [5]...HD100 [6]...HD600
 [7]...HD650

T 60°												Grade in Stock	
	Product Number Grade Code	Designation	Type	Fig	Dimension (mm)						Grade Code		
					IC	S	RE	AN	LF	D1	HD30	HD600	
											1	6	
	D000420 1	TNMA1604	02 F	1	9.525	4.76	0.2	0	3.5	3.81	-	●	
D000421 1	0.4												
D000422 1	0.8												
D100423 1	1.2												
	D0004A0 1	TNMA1604	04 F-NB	1	9.525	4.76	0.4	0	3.5	3.81	-	●	
D0004A1 1	0.8												
	D00049A 1	TNMM1604	02 F	2	9.525	4.76	0.2	0	3.5	3.81	-	●	
D00049B 1	0.4												
D00049C 1	0.8												
D00049D 1	1.2												
	D000424 1	TNMX1604	02 F	3	9.525	4.76	0.2	0/5	3.5	3.81	-	●	
D000425 1	0.4												
D000426 1	0.8												
D000427 1	1.2												
	D000428 1	TPGN0902	02	4	5.556	2.38	0.2	11	2.9	-	-	●	
D000429 1	0.4												
D000430 1	0.8												
	D000432 1	TPGN1103	04 F	4	6.35	3.18	0.2	11	2.9	-	-	●	
D000433 1	0.4												
D000434 1	0.8												
	D100435 1	TPGN1603	02	4	9.525	3.18	0.2	11	3.5	-	-	●	
D000436 1	0.4												
D000437 1	0.8												
	D000450 1	TPGA1102	02 F	5	6.35	2.38	0.2	11	2.9	3.0	-	●	
D000441 1	0.4												
D000442 1	0.8												
	D00042E 1	TPGW0802	02	6	4.76	2.38	0.2	11	2.5	2.4	-	●	
D00042F 1	0.4												
D00043A 1	0.8												
	D00043B 1	TPGW0902	02 F	6	5.556	3.18	0.2	11	2.9	2.8	-	●	
D00043C 1	0.4												
D00043D 1	0.8												
	D00043E 1	TPGW1103	02 F	6	6.35	3.18	0.2	11	2.9	3.4	-	●	
D00043F 1	0.4												
D00044A 1	0.8												
	D203461 1	TPGW1604	02	6	9.525	4.76	0.2	11	3.5	4.4	-	●	
D000462 1	0.4												
D000463 1	0.8												

Grade Code (Product number)
 [1]...HD30 [2]...HD50 [3]...HD60
 [4]...HD700 [5]...HD100 [6]...HD600
 [7]...HD650

T 60°											Grade in Stock	
	Product Number Grade Code	Designation	Type	Fig	Dimension (mm)						Grade Code	
					IC	S	RE	AN	LF	D1	HD30	HD600
											1	6
	D00044B 1 D00044C 1 D00044D 1 D00044E 1 D00044F 1 D00045A 1 D00045B 1 D00045C 1 D00045D 1	TPGW0802 TPGW0902 TPGW1103	F-NB With breaker	1	4.76 5.556 6.35	2.38 3.18	0.2 0.4 0.8 0.2 0.4 0.8 0.2 0.4 0.8	11	2.5 2.3 2.9 2.7 2.9 2.7	2.4 2.8 3.4	● ● ● ● ● ● ● ● ●	
	D00045E 6 D00045F 6 D00046A 6 D00046B 6 D00046C 6 D00046D 6 D00046E 6 D00046F 6 D00047A 6	QE-TPMT0802 QE-TPMT0902 QE-TPMT1103	Economical type	2	4.76 5.556 6.35	2.38 3.18	0.1 0.2 0.4 0.1 0.2 0.4 0.1 0.2 0.4	11	2.3 2.8 3.4	2.4	● ● ● ● ● ● ● ● ●	
	D00047B 6 D00047C 6 D00047D 6 D00047E 6 D00047F 6 D00048A 6 D00048B 6 D00048C 6 D00048D 6	QE-TPMT0802 QE-TPMT0902 QE-TPMT1103	Economical type with breaker	2	4.76 5.556 6.35	2.38 3.18	0.1 0.2 0.4 0.1 0.2 0.4 0.1 0.2 0.4	11	2.3 2.8 3.4	2.4	● ● ● ● ● ● ● ● ●	
	D000443 1 D000444 1 D100445 1 D000446 1 D000447 1 D000448 1 D000454 1 D000455 1 D000456 1 D000458 1 D100459 1	TPGX0802 TPGX0902 TPGX1103 TPGX1603	F With breaker	3	4.76 5.556 6.35	2.38 3.18	0.2 0.4 0.8 0.2 0.4 0.8 0.2 0.4 0.8	11	2.5 2.3 2.9 2.7 2.9 3.5 2.7 3.5 3.0	2.5	● ● ● ● ● ● ● ● ● ● ●	
	D00041D 1 D00041E 1 D00041F 1 D00042A 1 D00042B 1 D00042C 1 D00042D 1	TCGW0601 TPGX0802 TPGX0902 TPGX1103	F-NB With breaker	3	4.76 5.556 6.35	2.38 3.18	0.2 0.4 0.2 0.4 0.2 0.4	11	2.5 3.0 2.9	2.5	● ● ● ● ● ● ●	

Grade Code (Product number)
 [1]...HD30 [2]...HD50 [3]...HD60
 [4]...HD700 [5]...HD100 [6]...HD600
 [7]...HD650

T 60°											Grade in Stock	
	Product Number Grade Code	Designation	Type	Fig	Dimension (mm)						Grade Code	
					IC	S	RE	AN	LF	D1	HD30	HD600
											1	6
	D000485 6 D000486 6 D000487 6 D000488 6 D000489 6 D000490 6 D000491 6 D000492 6 D000493 6	QE-TPMV0802 QE-TPMV0902 QE-TPMV1103	Economical type		4.76 5.556 6.35	2.38 3.18	0.1 0.2 0.4 0.1 0.2 0.4 0.1 0.2 0.4	11	2.3 2.3 3.5	2.5 3.0 3.5	● ● ● ● ● ● ● ● ●	
	D00040A 6 D00040B 6 D00040C 6 D00040D 6 D00040E 6 D00040F 6 D00041A 6 D00041B 6 D00041C 6	QE-TPMV0802 QE-TPMV0902 QE-TPMV1103	Economical type with breaker		4.76 5.556 6.35	2.38 3.18	0.1 0.2 0.4 0.1 0.2 0.4 0.1 0.2 0.4	11	2.3 2.3 3.5	2.5 3.0 3.5	● ● ● ● ● ● ● ● ●	

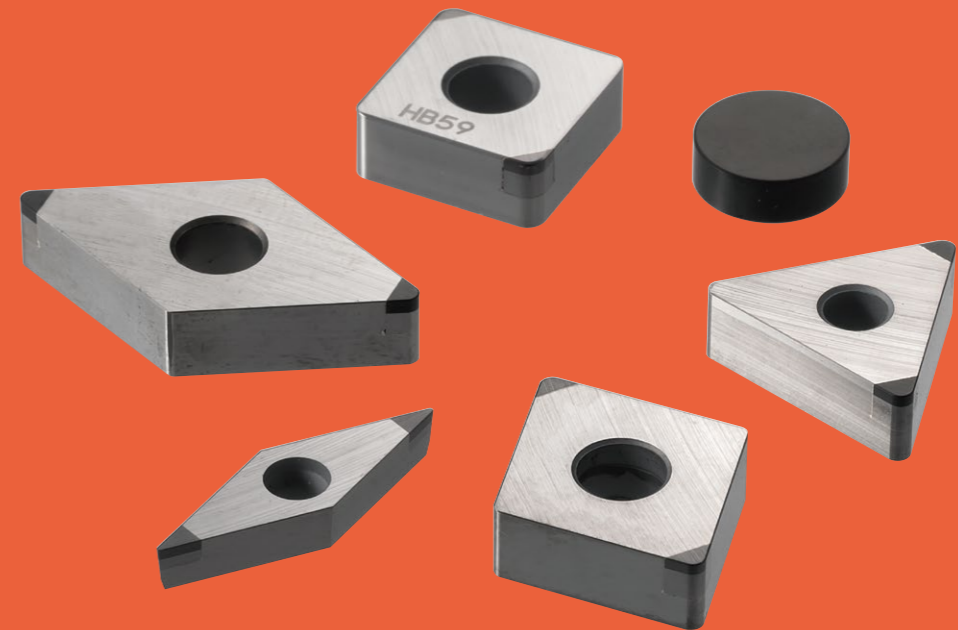
V 35°											Grade in Stock	
	Product Number Grade Code	Designation	Type	Fig	Dimension (mm)						Grade Code	
					IC	S	RE	AN	LF	D1	HD30	HD600
											1	6
	D000503 1 D000504 1	VBMT1103	F	1	6.35	3.18	0.2 0.4	5	3.3 3.0	2.8	● ●	
	D000526 6 D000527 6 D000528 6	QE-VBMT1103	F	1	6.35	3.18	0.1 0.2 0.4	5	2.3	2.8	● ● ●	
	D000532 6 D000533 6 D000534 6	QE-VBMT1103	F-NB	1	6.35	3.18	0.1 0.2 0.4	5	2.3	2.8	● ● ●	
	D000507 1 D000508 1	VBMW1103	F	2	6.35	3.18	0.2 0.4	5	3.3 3.0	2.8	● ●	
	D000509 1 D000510 1 D000511 1	VBMW1604	F	2	9.525	4.76	0.2 0.4 0.8	5	5.5 5.3	4.4	● ● ●	

Grade Code (Product number)
 [1]...HD30 [2]...HD50 [3]...HD60
 [4]...HD700 [5]...HD100 [6]...HD600
 [7]...HD650

V 35°											Grade in Stock	
	Product Number Grade Code	Designation	Type	Fig	Dimension (mm)						Grade Code	
					IC	S	RE	AN	LF	D1	HD30	HD600
											1	6
	D000513 1 D000514 1 D200533 1 D000515 1 D100516 1	VCMT1103 02 04 F VCMT1604 08 12		1	6.35 9.525	3.18 4.76	0.2 0.4 0.8 1.2	7	3.3 3.0 5.0 4.5	2.8	● ● ● ●	
	D000529 6 D000530 6 D000531 6	QE-VCMT0802 02 04 F	Economical type	1	4.76	2.38	0.1 0.2 0.4	7	2.3	2.4	● ● ●	
	D000535 6 D000536 6 D000537 6	QE-VCMT0802 01 02 F-NB 04	Economical type with breaker	1	4.76	2.38	0.1 0.2 0.4	7	2.3	2.4	● ● ●	
	D200529 1 D200530 1 D200534 1 D200537 1	VCMW1103 02 04 F VCMW1604 08		2	6.35 9.525	3.18 4.76	0.2 0.4 0.4 0.8	7	3.3 3.0 4.0 4.4	2.8	● ● ● ●	
	D000519 1 D000520 1 D000521 1	VNMA1604 02 04 F 08		3	9.525	4.76	0.2 0.4 0.8	0	3.5 4.0	3.81	● ● ●	
	D000540 1 D000541 1	VNMA1604 04 08 F-NB	With breaker	3	9.525	4.76	0.4 0.8	0	3.5 4.0	3.81	● ●	
	D000522 1 D000523 1 D000524 1	VNMX1604 02 04 F 08		4	9.525	4.76	0.2 0.4 0.8	0/5	6.9 6.2 5.6	3.81	● ● ●	

W 80°											Grade in Stock	
	Product Number Grade Code	Designation	Type	Fig	Dimension (mm)						Grade Code	
					IC	S	RE	AN	LF	D1	HD30	HD600
											1	6
	D000604 6 D000605 6 D000606 6	QE-WBMT0201 01 02 LF (Former QE-WBMT0601) 04	Economical type		3.97	1.59	0.1 0.2 0.4	5	1.7 1.6 1.5	2.3	● ● ●	
	D000607 6 D000608 6 D000609 6	QE-WBMT0201 01 02 LF-NB (Former QE-WBMT0601) 04	Economical type with breaker		3.97	1.59	0.1 0.2 0.4	5	1.7 1.6 1.5	2.3	● ● ●	

Grade Code (Product number)
 [1]...HD30 [2]...HD50 [3]...HD60
 [4]...HD700 [5]...HD100 [6]...HD600
 [7]...HD650



PcBN INSERT

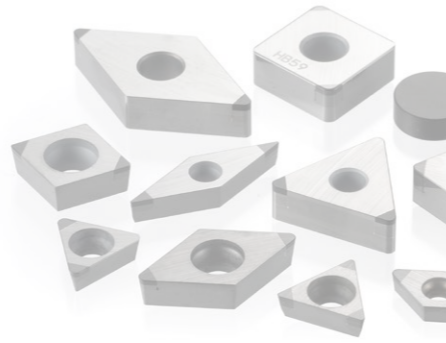
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PcBN inserts for machining hard materials

PcBN Insert

High precision, long service life, and improvement in productivity



Chukyo PcBN grades (standard products in stock)

Chukyo grade	Tissue	CBN content (mass)	Recommended workpieces	Knoop hardness number KHN (kg/mm ²)	Deflective strength (kgf/mm ²)	Average grain size
HB59		45%	For finishing with moderate/strong intermittent cutting of hardened steel	2600	105	<1 μm
HB55		50%	For finishing with continuous cutting of hardened steel Cutting of cobalt/nickel-base super alloys	2750	80	1.5 μm
HB590		65%	For finishing with weak to strong intermittent cutting of hardened steel	2500	115	Mixed (1-4 μm)
HB56		90%	For medium/high-speed finishing of gray cast iron, nickel/cobalt-base super alloys Crude/intermittent processing of gray cast iron, mold/tool steel, surface-hardened steel, and burned metal	3000	91	2 μm
HB560		90%	Moderate finishing of general cast iron or super-hard cast iron Processing of sintered ferrous metal	3000	100	3 μm
HB569		95%	Moderate/high-speed rough finishing of cast iron Processing of chilled cast iron or malleable cast iron	3700	95	3 μm
HB580		85%	Hardened steel, cast iron (HRC: 40 or higher), gray cast iron, ductile cast iron, sintered metal, superalloys, and carbide with a cobalt content of 17% or more	3700	98	1-2 μm
HB57		90%	Processing of Ni-hard cast iron, highly tough cast iron, high-chrome cast iron, gray cast iron, or burned metal alloys	3300	100	15 μm
HB55A		50%	For finishing with continuous cutting of hardened steel Cutting of nickel/cobalt-base superalloys	3200	80	1.5 μm
HB59F		45%	For finishing with moderate/strong intermittent cutting of hardened steel	3300	105	<1 μm

Guidelines for selecting the HB Series

Maker brand name	Processing conditions	Hardened steel				Cast iron		Superalloy	Sintered metal (PM)
		Continuous processing	Intermittent processing			Gray cast iron	Ductile cast iron	Inconel 718	Valve seat surface
Chukyo HB Series	Rough (Cutting depth: over 0.5 mm)	HB57 HB580	HB57 HB59 HB59F	HB57	HB57	HB57 HB580	-	-	HB580 HB569
	Finishing (Cutting depth: 0.5 mm or less)	HB55 HB55A	HB55 HB59 HB55A HB59F	HB59 HB590 HB580 HB59F	HB590 HB580	HB56 HB569 HB580	HB56 HB55 HB59 HB55A HB59F	HB55 HB580 HB55A	HB56 HB55 HB569 HB580
Sumitomo Sumiboron®		BNX10 BN1000 BNC100 BNC160 BNC2010	BNX20 BNX25 BN2000 BNC200 BNC2020	BNX25 BN2000 BNC200 BNC2020	BN350 BNC300	BN5800 BN700 BN500	BN7000 BN500 BNC500	BN350 BN7000	BN700 BN7000 BN7500
Mitsubishi		MB810 MBC010 BC8110	MB825 MB8025 MBC020 BC8020	MB8025 MB835 BC8020	MB835	MBS140 MB4020 MB730 MB710	MB730 MB710	MB730	MB835 MB825 MB4020 MB710
Tungaloy		BX310 BXM10	BX330 BX530 BXM20	BX360 BXM20	BX380 BXC50	BX905 BX850 BX870 BX910 BXC90	BX930	BX950	BX470 BX480
Kyocera		KBN510 KBN05M	KBN525 KBN10M KBN05M	KBN05M KBN25M KBN30M	KBN35M	KBN900 KBN60M	KBN65B	KBN25M	KBN65M KBN70M KBN570

What is PcBN?

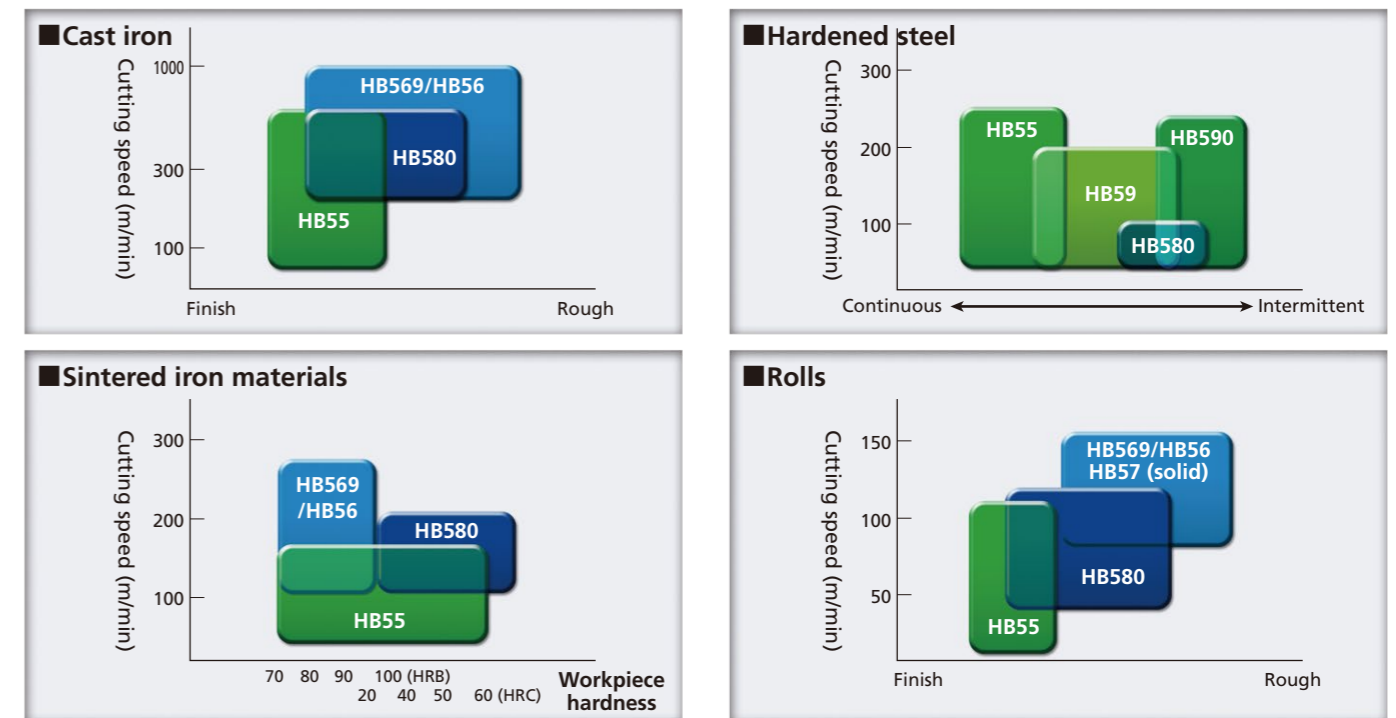
Polycrystalline Cubic Boron Nitride (PcBN for short), which was developed for the first time in 1972, is a substance that does not exist in the natural world because it was developed artificially under an ultra-high-pressure and ultra-high-temperature environment by mixing carefully selected crystal grains of cubic boron nitride and binders, with its hardness being second only to diamond. What are produced from this substance are abrasion-resistant products that have high hardness, abrasion resistance, high impact resistance, and high thermal conductivity at high temperatures.

Except for diamond, there are no other substances that have properties superior to those of PcBN.

While PCD becomes graphitized because of the chemical reaction occurring when ferrous materials are cut with PCD tools, this does not apply to PcBN.

PcBN almost never reacts chemically with such materials as iron, nickel, or cobalt, which is one of its strengths, and it does not get oxidized even at such a high temperature of 1,200°C.

Fields of processing with our HB series



Recommended processing conditions of PcBN

Category	Workpiece type	Lathe turning				Milling			
		Finishing (Cutting depth: over 0.5)		Rough processing (Cutting depth: over 0.5)		Finishing (Cutting depth: less than 0.5)		Rough processing (Cutting depth: less than 0.5)	
		Cutting speed (m/min)	Feeding (mm/rev.)	Cutting speed (m/min)	Feeding (mm/rev.)	Cutting speed (m/min)	Feeding (mm/tooth.)	Cutting speed (m/min)	Feeding (mm/tooth.)
Low-alloy steel, carbon steel	Hot work tool steel (HRC45-50)	100-200	0.05-0.5	100-150	0.1-0.25	150-200	<0.15	150-250	<0.2
	High-tensile steel (HRC45-50)	100-250	<0.25	50-150	0.05-0.3	180-280	<0.1	150-250	0.05-0.25
	Surface-hardened steel (HRC55-62)	70-250	<0.25	-	-	180-300	<0.2	-	-
High-alloy steel	High-speed steel (HSS) (HRC58-66)	100-150	<0.15	50-100	0.05-0.25	-	-	-	-
Super alloys Super heat-resistant alloys	Nickel-base alloy (Inconel 718) (HRC30-45)	300-400	0.1-0.25	-	-	-	-	-	-
	Cobalt-base alloy (Stellite) (HRC>35)	100-250	<0.1	200-250	0.1-0.3	150-200	<0.1	150-250	0.1-0.25
Stainless steel	Martensite-stainless steel (HRC45-60)	50-200	<0.2	50-160	0.05-0.3	100-200	<0.2	150-250	0.05-0.3
Plain cast iron	Pearlite-type gray cast iron (HB270-550)	500-2000	0.1-0.6	500-1500	0.2-0.8	500-2000	0.1-0.45	500-2000	0.2-0.8
Tough cast iron	Ductile cast iron (HB135-430)	150-300	0.05-0.25	150-300	0.05-0.2	-	-	-	-
Cemented carbide (Co content: over 17%)		10-40	0.05-0.15	20-40	0.05-0.25				
Sintered metal (PM)	Valve seat surface	100-300	0.05-0.18	-	-	100-300*	0.05-0.18*	-	-

*: Conditions for plunge milling

V 35°	Fig1			Fig2			Fig3																																
	Product Number Grade Code	Designation	Type	Fig	Edge Prep	Dimension(mm)					No. of Cutting Edges	Grade in Stock																											
						IC	S	RE	AN	LF		D1	Grade Code																										
													Coated				Non-Coated																						
HB55A	HB59F	HB55	HB59	HB590	HB56	HB569	HB580	HB57	HB560	H	I	1	2	D	5	6	7	8	E																				
B100510 *	VNMA1604	02 S-0H-B	Sharp edge	1	*3	9.525	4.76	0.2	0	2.3	3.8	2		●	●	●																							
B100501 E		02 F-0H-B			*1																												●						
B000501 *		02 S-0H-B			*3																		●	●	●	●	●	●											
B200541 1		VNMA1604	04 T-0H-B		Sharpness-oriented	1	*2	9.525	4.76	0.4	0	2.3	3.8	2		●																							
B2005L1 2			04 LS-0H-B				*4																			●													
B100502 E			04 F-0H-B				*1																													●			
B000502 *			VNMA1604		04 S-0H-B		Sharpness-oriented	1	*3	9.525	4.76	0.8	0	2.3	3.8	2		●	●	●	●	●	●																
B200582 1					04 T-0H-B				*2																			●											
B2005L2 2					04 LS-0H-B				*4																				●										
B100503 E	04 F-0H-B			*1																									●										
B000503 *	VNMA1604			04 S-1H			2		*3	9.525	4.76	0.4	0	5.0	3.8	1		●	●			●																	
B000504 *				08 S-1H					*3																		●	●			●								
B100511 *	VBGW1103	02 S-0H-B		Sharp edge	3	*3	6.35		3.18	0.2	5	2.3	2.8	2		●	●	●																					
B100504 E		02 F-0H-B				*1																														●			
B000505 *		04 S-0H-B				*3																				●	●			●									
B100505 E		VBGW1103	04 F-0H-B	Sharp edge		3	*1	6.35	3.18	0.4	5	2.3	2.8	2		●																							
B000506 *			04 S-0H-B				*3																			●	●			●									
B100506 E			08 F-0H-B				*1																														●		
B200515 *			VBGW1604	02 S-0H-B			Sharp edge	3	*3	9.525	4.76	0.2	5	2.3	4.4	2		●	●	●																			
B100507 E				02 F-0H-B					*1																														●
B00050B *				04 S-0H-B					*3																			●	●			●							
B100508 E	VBGW1604			04 F-0H-B	Sharp edge		3		*1	9.525	4.76	0.4	5	2.3	4.4	2		●																					
B00050C *				08 S-0H-B					*3																			●	●			●							
B100509 E				08 F-0H-B					*1																														●

Sign	Type	Chamfer	Honing
*1	Sharp edge	-	-
*2	Sharpness-oriented	0.1 mm×15°	-
*3	Versatile <small>Classified into two types according to material</small>	0.05-0.08 mm×20°	R0.02
		0.1 mm×25°	
*4	Hard-to-chip	0.15 mm×30°	

R ROUND	Fig1																											
	Product Number Grade Code	Designation	Type	Edge Prep	Dimension(mm)		Grade in Stock																					
					IC	S	Grade Code																					
							Coated				Non-Coated																	
HB55A	HB59F	HB55	HB59	HB590	HB56	HB569	HB580	HB57	HB560	H	I	1	2	D	5	6	7	8	E									
B00060D 8	RNMN0903	00 S	Solid	Chamfer 0.15-0.2×20°	9.525	3.18																			●			
B00060E 8	RNMN0904					4.76																						●
B00060F 8	RNMN1203				12.7	3.18																						●
B000610 8	RNMN1204					4.76																						



Technical Information

Formulae for lathe turning

■ **Cutting speed Vc [m/min]:** Cutting speed is calculated from the number of revolutions.

$$V_c = \frac{\pi \times D \times n}{1000} \left(\frac{3.14 \times \text{Workpiece diameter [mm]} \times \text{Number of revolutions [min}^{-1}\text{]}}{1000} \right)$$

■ **Number of revolutions n [min⁻¹]:** The number of revolutions is calculated from cutting speed.

$$n = \frac{1000 \times V_c}{\pi \times D} \left(\frac{1000 \times \text{Cutting speed [m/min]}}{3.14 \times \text{Workpiece diameter [mm]}} \right)$$

■ **Feeding speed f [mm/rev]:**

$$f = \frac{\ell}{n} \left(\frac{\text{Cutting length per minute [mm/min]}}{\text{Number of revolutions [min}^{-1}\text{]}} \right)$$

■ **Cutting time T [min]:**

$$T = \frac{L}{f \times n} \left(\frac{\text{Workpiece length [mm]}}{\text{Feeding speed [mm/rev]} \times \text{Number of revolutions [min}^{-1}\text{]}} \right)$$

■ **Theoretical roughness of the finished surface h [μm]:**

$$h = \frac{f^2}{8 \times R} \times 1000 \left(\frac{\text{Feeding speed}^2 \text{ [mm/rev]} \times 1000}{8 \times \text{Nose radius [mm]}} \right)$$

■ **Chip discharge amount Q [cm³/min]:**

$$Q = \frac{\pi \times a_p \times (D - a_p) \times n \times f}{1000} \left(\frac{3.14 \times \text{Cutting [mm]} \times (\text{Workpiece diameter [mm]} - \text{Cutting [mm]}) \times \text{Number of revolutions [min}^{-1}\text{]} \times \text{Feeding speed [mm/rev]}}{1000} \right)$$

Or

$$Q = V_c \times f \times a_p \text{ (Cutting speed [m/min]} \times \text{Feeding speed [mm/rev]} \times \text{Cutting [mm]})$$

■ **Required power Pc [kw]:**

$$P_c = \frac{V_c \times a_p \times f \times k_c}{60000 \times \eta} \left(\frac{\text{Cutting speed [m/min]} \times \text{Cutting [mm]} \times \text{Feeding speed [mm/rev]} \times \text{Specific cutting force (the table below)}}{60000 \times \text{Mechanical efficiency coefficient (Table below)}} \right)$$

Workpiece	Specific cutting resistance k _c	Mechanical efficiency coefficient η
	f= 0.1-0.4 High rigidity-Low rigidity	
Carbon steel	3000-2500	0.8-0.7
Alloy steel	4500-3000	
Cast iron	2000-1500	

π: pi
D: Workpiece diameter [mm]
n: Number of revolutions [min⁻¹]

ℓ: Feeding speed per minute [mm/min]
L: Workpiece length [mm]

R: Nose radius [mm]
f: Feeding [mm/rev]

a_p: Cutting [mm]
D: Workpiece diameter [mm]
n: Number of revolutions [min⁻¹]
f: Feeding [mm/rev]

Formulae for milling

■ **Cutting speed Vc [m/min]:**

$$V_c = \frac{\pi \times D \times n}{1000} \left(\frac{3.14 \times \text{Cutter diameter [mm]} \times \text{Number of revolutions [min}^{-1}\text{]}}{1000} \right)$$

■ **Number of revolutions n [min⁻¹]:**

$$n = \frac{1000 \times V_c}{\pi \times D} \left(\frac{1000 \times \text{Cutting speed [m/min]}}{3.14 \times \text{Cutter diameter [mm]}} \right)$$

■ **Feeding speed Vf [mm/min]:**

$$V_f = f_z \times Z \times n \text{ (Feeding per tooth [mm/tooth]} \times \text{Number of edges} \times \text{Number of revolutions [min}^{-1}\text{]})$$

◆ **Feeding per tooth fz [mm/tooth]**

$$f_z = \frac{V_f}{Z \times n} \left(\frac{\text{Feeding speed [mm/min]}}{\text{Number of edges} \times \text{Number of revolutions [min}^{-1}\text{]}} \right)$$

■ **Processing time Tc [min]:**

$$T_c = \frac{L}{V_f} \left(\frac{\text{Total feeding length of the table [mm]}}{\text{Feeding speed of the table [mm/min]}} \right)$$

■ **Chip discharge Q [cm³/min]:**

$$Q = \frac{a_p \times a_e \times V_f}{1000} \left(\frac{\text{Cutting depth [mm]} \times \text{Cutting width [mm]} \times \text{Feeding speed [mm/min]}}{1000} \right)$$

■ **Required power Pc [Kw]:**

$$P_c = \frac{a_p \times a_e \times V_f \times K_c}{60,000,000 \times \eta} \left(\frac{\text{Cutting depth} \times \text{Cutting width} \times \text{Feeding speed} \times \text{Specific cutting resistance (Table below)}}{60,000,000 \times \text{Mechanical efficiency coefficient (0.6-0.8)}} \right)$$

◆ **Kc (specific cutting resistance)**

Workpiece materials	Hardness and tensile strength (MPa)	Specific cutting resistance with respect to feeding per tooth (fz) Kc: (Mpa (N/mm ²))
		(Fz=0.1-0.6mm/tooth)
Carbon steel -0.80% C	HB170	3410-2180
Thermal treatment of low-alloy steel	HB350	4610-2950
Thermal treatment of high-alloy steel	HB300	5810-3710
Gray cast iron (pearlite)	HB245	2400-1450
Ductile (ferrite)	HB160	1960-1190
Ductile (pearlite)	HB250	2940-1780
Aluminum (<16% Si)	157MPa	770-490
Aluminum (>16% Si)	196MPa	820-500

π: Pi 3.14
D: Cutter diameter [mm]
n: Number of revolutions [min⁻¹]

V_f: Feeding speed [mm/min]
f_z: Feeding per tooth [mm/tooth]
L: Total feeding length of the table [mm] (Workpiece length + Cutter diameter)
a_p: Cutting depth [mm]
a_e: Cutting width [mm]

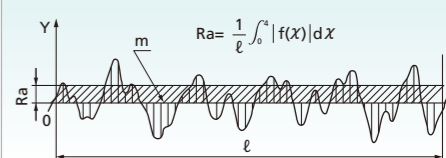
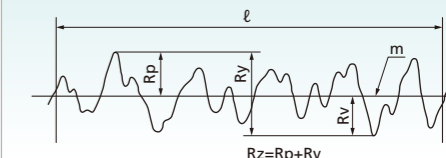
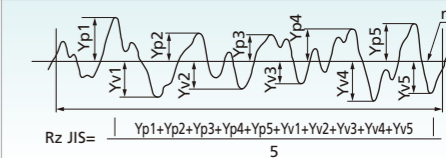
Hardness conversion table (SAE J 417)

[converted approximate values with respect to Vickers hardness of steel]

Vickers hardness	Brinell hardness HB10/3000		Rockwell hardness				Rockwell superficial hardness			Shore hardness	Leeb hardness		Tensile strength (approximate) MPa
	HV	HBS	HBW	HRA	HRB	HRC	HRD	HR15N	HR30N	HR45N	HS	HLD	
	Standard sphere	Tungsten carbide sphere	60 kgf Diamond cone	100 kgf 1/16" sphere	150 kgf Diamond cone	100 kgf Diamond cone	15 kgf Diamond cone	30 kgf Diamond cone	45 kgf Diamond cone		Tungsten carbide sphere	Diamond cone	
940	-	-	85.6	-	68	76.9	93.2	84.4	75.4	98.0	886	851	-
900	-	-	85.0	-	67	76.1	92.9	83.6	74.2	95.6	873	839	-
865	-	-	84.5	-	66	75.4	92.5	82.8	73.3	93.4	862	829	-
832	-	(739)	83.9	-	65	74.5	92.2	81.9	72.0	91.2	852	819	-
800	-	(722)	83.4	-	64	73.8	91.8	81.1	71.0	89.0	843	809	-
772	-	(705)	82.8	-	63	73.0	91.4	80.1	69.9	87.1	834	799	-
746	-	(688)	82.3	-	62	72.2	91.1	79.3	68.8	85.2	824	790	-
720	-	(670)	81.8	-	61	71.5	90.7	78.4	67.7	83.3	814	780	-
697	-	(654)	81.2	-	60	70.7	90.2	77.5	66.6	81.5	805	770	-
674	-	(634)	80.7	-	59	69.9	89.8	76.6	65.5	79.7	795	760	-
653	-	615	80.1	-	58	69.2	89.3	75.7	64.3	78.1	786	750	-
633	-	595	79.6	-	57	68.5	88.9	74.8	63.2	76.4	776	741	-
613	-	577	79.0	-	56	67.7	88.3	73.9	62.0	74.8	767	731	-
595	-	560	78.5	-	55	66.9	87.9	73.0	60.9	73.2	758	722	2075
577	-	543	78.0	-	54	66.1	87.4	72.0	59.8	71.7	749	713	2015
560	-	525	77.4	-	53	65.4	86.9	71.2	58.6	70.2	741	704	1950
544	(500)	512	76.8	-	52	64.6	86.4	70.2	57.4	68.8	732	695	1880
528	(487)	496	76.3	-	51	63.8	85.9	69.4	56.1	67.3	724	687	1820
513	(475)	481	75.9	-	50	63.1	85.5	68.5	55.0	65.9	716	678	1760
498	(464)	469	75.2	-	49	62.1	85.0	67.6	53.8	64.5	708	670	1695
484	451	455	74.7	-	48	61.4	84.5	66.7	52.5	63.1	700	662	1635
471	442	443	74.1	-	47	60.8	83.9	65.8	51.4	61.9	693	655	1580
458	432	432	73.6	-	46	60.0	83.5	64.8	50.3	60.6	685	648	1530
446	421	421	73.1	-	45	59.2	83.0	64.0	49.0	59.4	678	641	1480
434	409	409	72.5	-	44	58.5	82.5	63.1	47.8	58.2	671	634	1435
423	400	400	72.0	-	43	57.7	82.0	62.2	46.7	57.1	664	628	1385
412	390	390	71.5	-	42	56.9	81.5	61.3	45.5	55.9	657	621	1340
402	381	381	70.9	-	41	56.2	80.9	60.4	44.3	54.9	650	616	1295
392	371	371	70.4	-	40	55.4	80.4	59.5	43.1	53.8	644	610	1250
382	362	362	69.9	-	39	54.6	79.9	58.6	41.9	52.7	637	603	1215
372	353	353	69.4	-	38	53.8	79.4	57.7	40.8	51.6	629	597	1180
363	344	344	68.9	-	37	53.1	78.8	56.8	39.6	50.6	623	592	1160
354	336	336	68.4	(109.0)	36	52.3	78.3	55.9	38.4	49.6	616	586	1115
345	327	327	67.9	(108.5)	35	51.5	77.7	55.0	37.2	48.6	609	580	1080
336	319	319	67.4	(108.0)	34	50.8	77.2	54.2	36.1	47.6	602	574	1055
327	311	311	66.8	(107.5)	33	50.0	76.6	53.3	34.9	46.6	595	568	1025
318	301	301	66.3	(107.0)	32	49.2	76.1	52.1	33.7	45.5	587	562	1000
310	294	294	65.8	(106.0)	31	48.4	75.6	51.3	32.5	44.6	581	556	980
302	286	286	65.3	(105.5)	30	47.7	75.0	50.4	31.3	43.6	574	550	950
294	279	279	64.7	(104.5)	29	47.0	74.5	49.5	30.1	42.7	567	544	930
286	271	271	64.3	(104.0)	28	46.1	73.9	48.6	28.9	41.7	559	538	910
279	264	264	63.8	(103.0)	27	45.2	73.3	47.7	27.8	40.9	553	532	880
272	258	258	63.3	(102.5)	26	44.6	72.8	46.8	26.7	40.0	547	526	860
266	253	253	62.8	(101.5)	25	43.8	72.2	45.9	25.5	39.3	541	521	840
260	247	247	62.4	(101.0)	24	43.1	71.6	45.0	24.3	38.5	535	516	825
254	243	243	62.0	100.0	23	42.1	71.0	44.0	23.1	37.7	530	511	805
248	237	237	61.5	99.0	22	41.6	70.5	43.2	22.0	37.0	524	505	785
243	231	231	61.0	98.5	21	40.9	69.9	42.3	20.7	36.4	519	500	770
238	226	226	60.5	97.8	20	40.1	69.4	41.5	19.6	35.7	514	496	760
230	219	219	-	96.7	(18)	-	-	-	-	34.7	506	488	730
222	212	212	-	95.5	(16)	-	-	-	-	33.6	498	479	705
213	203	203	-	93.9	(14)	-	-	-	-	32.4	488	470	675
204	194	194	-	92.3	(12)	-	-	-	-	31.2	478	459	650
196	187	187	-	90.7	(10)	-	-	-	-	30.2	470	450	620
188	179	179	-	89.5	-8	-	-	-	-	-	-	-	600
180	171	171	-	87.1	-6	-	-	-	-	-	-	-	580
173	165	165	-	85.5	-4	-	-	-	-	-	-	-	550
166	158	158	-	83.5	-2	-	-	-	-	-	-	-	530
160	152	152	-	81.7	0	-	-	-	-	-	-	-	515

Surface roughness

Excerpted from JIS B 0601:2001 (ISO4287:1997)

Type	JIS symbol (The parenthesis represents the old symbols.)	How to obtain it	Explanatory diagram and formula
Arithmetical mean deviation of the assessed profile	Ra	The reference length ℓ is extracted in the direction of the average line of the curve of roughness, the curve of roughness of that part is expressed with $y = f(x)$, and the average of the absolute value of $f(x)$ is expressed in units of micrometers ($\mu\text{m} = 0.001 \text{ mm}$). It is common to directly read it from the scale of a centerline average roughness measurement device.	
Maximum height of profile	Rz (Ry, Rmax)	The reference length ℓ is extracted in the direction of the average line of the curve of roughness, and the sum of the maximum peak height R_p and the maximum trough depth R_v of that part is expressed in units of micrometers ($\mu\text{m} = 0.001 \text{ mm}$). Here, extremely high peaks and extremely deep troughs that are considered due to scratches are excluded.	
*Ten point height of roughness profile	*RzJIS	The reference length ℓ is extracted in the direction of the average line of the curve of roughness, and the sum of the average of the first to fifth highest peaks from the average line and the average of the first to fifth deepest troughs is expressed in units of micrometers ($\mu\text{m} = 0.001 \text{ mm}$).	

*Average roughness of ten points (RzJIS): This roughness parameter was excluded from the ISO standards, but it is commonly used, so it was included in this document for reference. Compliant with JIS B 0660:1998/ISO4287:97

Surface roughness in the section and triangle symbols

The maximum height R_z (R_y , R_{max}) in the case of the method of writing in a diagram; the average roughness of ten points R_z JIS; the calculated average roughness R_a in the section, the standard length L and the triangle symbol classification

Calculated average roughness R_a		Maximum height R_z (R_y , R_{max})	Average roughness of ten points R_z JIS	Standard length of R_z (R_y , R_{max}) and R_z JIS ℓ [mm]	Triangle symbol (Finishing symbol)
Standard sequence	Cutoff value λ_c (mm)	Standard sequence			
(0.00125a)	0.08	(0.05S)	(0.05Z)	0.08	
0.025a		0.1S	0.1Z		
0.05a	0.25	0.2S	0.2Z	0.25	▽▽▽▽
0.1a		0.4S	0.4Z		
0.2a	0.8	0.8S	0.8Z	0.8	▽▽▽
0.4a		1.6S	1.6Z		
0.8a		3.2S	3.2Z		
1.6a	2.5	6.3S	6.3Z	2.5	▽▽
3.2a		12.5S	12.5Z		
6.3a		(18S)	(18Z)		
12.5a		25S	25Z		
25a	8	(35S)	(35Z)	8	▽
		50S	50Z		
(50a)	25	(70S)	(70Z)	25	-
		100S	100Z		
		(100S)	(140Z)		
(100a)		200S	200Z		
		(280S)	(280Z)		
		400S	400Z		
		(560S)	(560Z)		

[Remarks] The standard length in the parenthesis is not used unless necessary.