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WITH DIAMOND

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Superharte Standard Werkzeuge

PKD und CBN

WORLDIA MANANOVA

Easy Choice Fast Delivery

MANANOVA

Easy Choice Fast Delivery

MANANOVA is the name for Worldia’s stock-keeping standard product portfolio. It provides best-in-class high-quality products within a wide range of most-common applications at very attractive prices.
Each of them has an inventory code which simplifies the order process.
Please refer to Worldia's general PCD and PCBN Turning Inserts catalogue for more grades, geometries, tip sizes, cutting edge designs and coatings.

HOW TO USE THIS CATALOGUE

1. Check in the MANANOVA chapters for the tool you need.
   All items marked with MANANOVA and a product code are on stock.
   The application cases will help you to find the appropriate grade. Price lists are available for all MANANOVA items.
   So you can order the tools directly without a quotation.

   Please note that currently Grooving Tools are not on stock and need to be inquired as under 2.

2. If you don’t find the item under MANANOVA, the best way is to fill in as much as possible information including the description of the current tool into the questionnaire at the last page of this catalogue.
   There is a paperless version available, too.

   Alternatively, you can study our grade recommendations and nomenclature and specify the tool yourself.

   Delivery time for such semi-standard or customized items is around 6 weeks.

3. Please send your request to Worldia.
   You will receive a quote or order confirmation within 48 hrs.

CONTENT

PCD Turning Inserts

MANANOVA PCD Turning Inserts

PCD Customized Turning Inserts

Key Definition - Material designation

Example

M	N	D	10
MANANOVA	1	2	3

1 Application Materials

- P Steel
- M Stainless Steel
- K Cast Iron
- S Power Metal
- H Hardened Steel
- N Non-ferrous Metal

2 Cutting Tool Material

- D PCD
- N CBN

3 Material Code

ISO Turning

WORLDIA MANANOVA

Product range overview of indexable inserts for ISO turning - Inserts description

Key Definition - Identification Code

	1		2	3	4	5	6	7	8		9	10
ANSI	C	-	C	C	G	W		2	1.5	0.5	-	1	N
ISO	C	-	C	C	G	W		06	02	02	-	1	N

1 Insert Style

Without	Standard
C	Chip breaker
L	Full Length
F	Full Face
S	Solid
W	Wiper
H	Heavy cutting

2 Insert Shape

A	85°	M	86°
B	82°	O	135°
C	80°	P	108°
D	55°	R	●
E	75°	S	90°
H	120°	T	60°
K	55°	V	35°
L	90°	W	80°

3 Clearance Angle

A	3°	F	25°
B	5°	G	30°
C	7°	N	0°
D	15°	P	11°
E	20°		

4 Tolerances

	ISO mm	ANSI inch
G		
m	±0.025	±0.001
IC	±0.025	±0.001
S	±0.130	±0.005
R	±0.03	±0.001

5 Pattern Type

A, N, T, W, R

6 Inscribed Circle Diameter

IC (mm) ISO	C	D	T	V	W	IC (inch) ANSI	Code
3.970						5/32	1.2
4.760			08			3/16	1.5
5.560			09			7/32	1.8
6.350	06	07	11	11		1/4	2
7.940						5/16	2.5
9.525	09	11	16	16		3/8	3
12.700	12	15			08	1/2	4
15.875						5/8	5

7 Insert Thickness

ISO	mm	ANSI	inch
01	= 1.59	1	1/16
02	= 2.38	1.5	3/32
T2	= 2.78		
03	= 3.18	2	1/8
T3	= 3.97	2.5	5/32
04	= 4.76	3	3/16
05	= 5.56	3.5	7/32
06	= 6.35	4	1/4
07	= 7.94	5	5/16
09	= 9.525	6	3/8

8 Nose Radius

ISO	mm	ANSI	inch
00	= 0.0	0	.000
01	= 2.1	0.2	.004
02	= 0.2	0.5	.008
04	= 0.4	1	1/64
08	= 0.8	2	1/32
12	= 1.2	3	3/64
16	= 1.6	4	1/16
20	= 2.0	5	5/64
24	= 2.4	6	3/32
28	= 2.8	7	7/64

9 Cutting Edges

1	single
2	double
3	triple

10 Cutting Direction

N, R, L

Chip Control

Chip Breaker Tech

PCD Inserts with lasered chip-breaker

Excellent chip breaking in finish machining

Material: A6061

Cutting conditions: Vc=400m/min f=0.1mm/revap=0.2mm

Insert type: CCGW09T308

PCD Insert

CCGW

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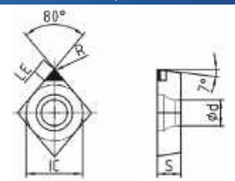
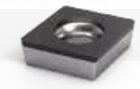
CC 80°Positive 7°Relief

Edge mark:
C- chipbreaker
L - full length
F - full face

Application:
ISO N - Non-ferrous Metal
ISO O - Others

CCGW



	ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	MND 01	MND 10	MND 32	CVD
	CCGW 060202	CCGW 21.50.5	1N	6.35	2.38	0.2	2.8	2.5		MN 00005		
	CCGW 060204	CCGW 21.51	1N	6.35	2.38	0.4	2.8	2.5		MN 00007		
	CCGW 060204	CCGW 21.51.5	1N	6.35	2.38	0.5	2.8	2.5		MN 00660		
	CCGW 060208	CCGW21.52	1N	6.35	2.38	0.8	2.8	2.5		MN 00496		
	CCGW 09T302	CCGW 32.50.5	1N	9.525	3.97	0.2	4.4	2.5		MN 00009		
	CCGW 09T304	CCGW 32.51	1N	9.525	3.97	0.4	4.4	2.5		MN 00010		
	CCGW 09T304 CBST44	CCGW 32.51 CBST44	1N	9.525	3.97	0.4	4.4	4.4		MN 00839		
	CCGW 09T308	CCGW 32.52	1N	9.525	3.97	0.8	4.4	2.5		MN 00011		
	CCGW 09T308 CBST44	CCGW 32.52 CBST44	1N	9.525	3.97	0.8	4.4	4.4		MN 00840		
	CCGW120404	CCGW431	1N	12.7	4.76	0.4	5.5	2.5		MN 00662		
	CCGW120408	CCGW432	1N	12.7	4.76	0.8	5.5	2.5		MN 00663		
	C - CCGW 060202	C - CCGW 21.50.5	1N	6.35	2.38	0.2	2.8	2.5		MN 00006		
	C - CCGW 09T304	C - CCGW 32.51	1N	9.525	3.97	0.4	4.4	2.5		MN 00075		
	F - CCGW 060204	F - CCGW 21.51	2N	6.35	2.38	0.4	2.8	6.4		MN 00008		

Items with order code MNXXXXXon stock

PCD Insert

CCGT

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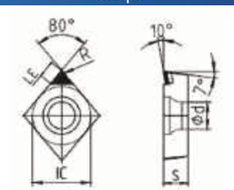
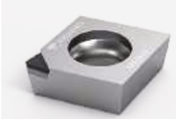
CC 80°Positive 7°Relief

Edge mark:
C- chipbreaker
L - full length
F - full face

Application:
ISO N - Non-ferrous Metal
ISO O - Others

CCGT



	ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	MND 01	MND 10	MND 32	CVD
	CCGT 060202	CCGT 21.50.5	1N	6.35	2.38	0.2	2.8	2.5		MN 00012		
	CCGT 060204	CCGT 21.51	1N	6.35	2.38	0.4	2.8	2.5		MN 00013		
	CCGT 09T302	CCGT 32.50.5	1N	9.525	3.97	0.2	4.4	2.5		MN 00014		
	CCGT 09T304	CCGT 32.51	1N	9.525	3.97	0.4	4.4	2.5		MN 00015		
	CCGT 09T308	CCGT 32.52	1N	9.525	3.97	0.8	4.4	2.5		MN 00016		

Items with order code MNXXXXXon stock

PCD Insert

DCGW-DCGT

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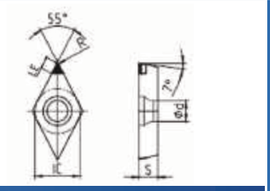
Easy Choice Fast Delivery

DC 55°Positive 7°Relief

Edge mark:
C- chipbreaker
L - full length
F - full face

Application:
ISO N - Non-ferrous Metal
ISO O - Others

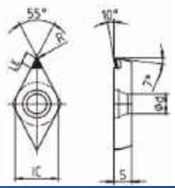
DCGW



ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	MND 01	MND 10	MND 32	CVD
DCGW 070202	DCGW 21.50.5	1N	6.35	2.38	0.2	2.8	2.5		MN 00017		
DCGW 070204	DCGW 21.51	1N	6.35	2.38	0.4	2.8	2.5		MN 00018		
DCGW 11T302	DCGW 32.50.5	1N	9.525	3.97	0.2	4.4	2.5		MN 00019		
DCGW 11T304	DCGW 32.51	1N	9.525	3.97	0.4	4.4	2.5		MN 00020		
DCGW 11T308	DCGW 32.52	1N	9.525	3.97	0.8	4.4	2.5		MN 00021		

Items with order code MNXXXXXon stock

DCGT



ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	MND 01	MND 10	MND 32	CVD
DCGT 070202	DCGT 21.50.5	1N	6.35	2.38	0.2	2.8	2.5		MN 00022		
DCGT 070204	DCGT 21.51	1N	6.35	2.38	0.4	2.8	2.5		MN 00023		
DCGT 11T302	DCGT 32.50.5	1N	9.525	3.97	0.2	4.4	2.5		MN 00024		
DCGT 11T304	DCGT 32.51	1N	9.525	3.97	0.4	4.4	2.5		MN 00025		
DCGT 11T308	DCGT 32.52	1N	9.525	3.97	0.8	4.4	2.5		MN 00026		

Items with order code MNXXXXXon stock

PCD Insert

VCGW-VCGT

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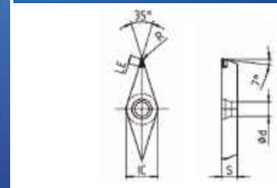
Easy Choice Fast Delivery

VC 35°Positive 7°Relief

Edge mark:
C- chipbreaker
L - full length
F - full face

Application:
ISO N - Non-ferrous Metal
ISO O - Others

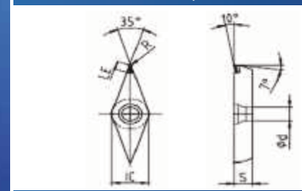
VCGW



ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	MND 01	MND 10	MND 32	CVD
VCGW 110204	VCGW21.51	1N	6.35	2.38	0.4	2.8	2.5		MN 00512		
VCGW 110302	VCGW 220.5	1N	6.35	3.18	0.2	2.8	2.5		MN 00027		
VCGW 110304	VCGW 221	1N	6.35	3.18	0.4	2.8	2.5		MN 00028		
VCGW 110308	VCGW 221	1N	6.35	3.18	0.8	2.8	2.5		MN 00666		
VCGW 160402	VCGW 330.5	1N	9.525	4.76	0.2	4.4	2.5		MN 00029		
VCGW 160402 CBST44	VCGW 330.5 CBST44	1N	9.525	4.76	0.2	4.4	4.4		MN 00836		
VCGW 160404	VCGW 331	1N	9.525	4.76	0.4	4.4	2.5		MN 00030		
VCGW 160404 CBST44	VCGW 331 CBST44	1N	9.525	4.76	0.4	4.4	4.4		MN 00837		
VCGW 160408	VCGW 332	1N	9.525	4.76	0.8	4.4	2.5		MN 00031		
VCGW 160408	VCGW 332	1N	9.525	4.76	0.8	4.4	4.4		MN 00838		

Items with order code MNXXXXXon stock

VCGT



ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	MND 01	MND 10	MND 32	CVD
VCGT 110302	VCGT 220.5	1N	6.35	3.18	0.2	2.8	2.5		MN 00032		
VCGT 110304	VCGT 221	1N	6.35	3.18	0.4	3.3	2.5		MN 00033		
VCGT 160402	VCGT 330.5	1N	9.525	4.76	0.2	4.4	2.5		MN 00034		
VCGT 160404	VCGT 331	1N	9.525	4.76	0.4	4.4	2.5		MN 00035		
VCGT 160408	VCGT 332	1N	9.525	4.76	0.8	4.4	2.5		MN 00036		

Items with order code MNXXXXXon stock

PCD Insert

VBGW-VBGT

WORLDIA MANANOVA

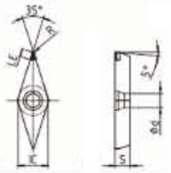
Easy Choice Fast Delivery

VB 35°Positive 5°Relief

Edge mark:
C- chipbreaker
L - full length
F - full face

Application:
ISO N - Non-ferrous Metal
ISO O - Others

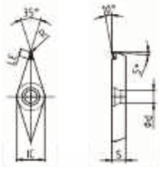
VBGW



Shape		Dimensions						Grade			
ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	MND 01	MND 10	MND 32	CVD
VBGW 160402	VBGW 330.5	1N	9.525	4.76	0.2	4.4	2.5	MN 00037			
VBGW 160404	VBGW 331	1N	9.525	4.76	0.4	4.4	2.5	MN 00038			
VBGW 160408	VBGW 332	1N	9.525	4.76	0.8	4.4	2.5	MN 00039			

Items with order code MNXXXXXon stock

VBGT



Shape		Dimensions						Grade			
ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	MND 01	MND 10	MND 32	CVD
VBGT 110304	VBGT221	1N	6.35	3.18	0.4	2.8	2.5	MN 00805			
VBGT 160402	VBGT 330.5	1N	9.525	4.76	0.2	4.4	2.5	MN 00040			
VBGT 160404	VBGT 331	1N	9.525	4.76	0.4	4.4	2.5	MN 00041			
VBGT 160408	VBGT 332	1N	9.525	4.76	0.8	4.4	2.5	MN 00042			

Items with order code MNXXXXXon stock

PCD Insert

TCGW

WORLDIA MANANOVA

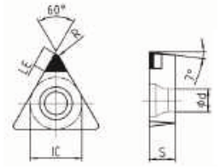
Easy Choice Fast Delivery

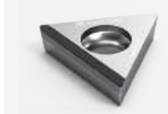
TC 60°Positive 7°Relief

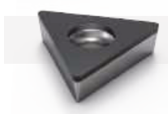
Edge mark:
C- chipbreaker
L - full length
F - full face

Application:
ISO N - Non-ferrous Metal
ISO O - Others

TCGW







Shape		Dimensions						Grade			
ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	MND 01	MND 10	MND 32	CVD
TCGW 090202	TCGW 1.81.50.5	1N	5.56	2.38	0.2	2.4	2.5		MN 00043		
TCGW 090204	TCGW 1.81.51	1N	5.56	2.38	0.4	2.4	2.5		MN 00044		
TCGW 110302	TCGW 220.5	1N	6.35	3.18	0.2	2.8	2.5		MN 00045		
TCGW 110304	TCGW 221	1N	6.35	3.18	0.4	2.8	2.5		MN 00046		
TCGW 110308	TCGW 222	1N	6.35	3.18	0.8	2.8	2.5		MN 00047		
TCGW 16T304	TCGW 32.51	1N	9.525	3.97	0.4	4.4	2.5		MN 00077		
TCGW 16T308	TCGW 32.52	1N	9.525	3.97	0.8	4.4	2.5		MN 00079		
TCGW 160404	TCGW 32.51	1N	9.525	3.97	0.4	4.4	2.5		MN 00051		
TCGW 160408	TCGW 32.52	1N	9.525	3.97	0.8	4.4	2.5		MN 00053		
L-TCGW 16T302	L-TCGW 32.50.5	2N	9.525	3.97	0.2	4.4	16.2		MN 00076		
L-TCGW 16T304	L-TCGW 32.51	2N	9.525	3.97	0.4	4.4	15.9		MN 00078		
L-TCGW 16T308	L-TCGW 32.52	2N	9.525	3.97	0.8	4.4	15.3		MN 00080		
F-TCGW 090204	F-TCGW 1.81.51	3N	5.56	2.38	0.4	2.4	9		MN 00057		

Items with order code MNXXXXXon stock

PCD Insert

TCGT

WORLDIA MANANOVA

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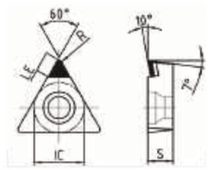
TC 60°Positive 7°Relief

Edge mark:
C- chipbreaker
L - full length
F - full face

Application:
ISO N - Non-ferrous Metal
ISO O - Others

TCGT



Shape		Dimensions						Grade			
ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	MND 01	MND 10	MND 32	CVD
TCGT 090202	TCGT 1.81.50.5	1N	5.56	2.38	0.2	2.4	2.5	MN 00055			
TCGT 090204	TCGT 1.81.51	1N	5.56	2.38	0.4	2.4	2.5	MN 00056			
TCGT 110302	TCGT 220.5	1N	6.35	3.18	0.2	2.8	2.5	MN 00058			
TCGT 110304	TCGT 221	1N	6.35	3.18	0.4	2.8	2.5	MN 00059			
TCGT 110308	TCGT 222	1N	6.35	3.18	0.8	2.8	2.5	MN 00060			
L-TCGT 16T304	L-TCGT 32.51	2N	9.525	3.97	0.4	4.4	15.9	MN 00081			

Items with order code MNXXXXXon stock

PCD Insert

TPGW-TPGT

WORLDIA MANANOVA

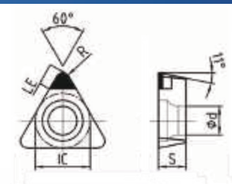
Easy Choice Fast Delivery

TP 60°Positive 11°Relief

Edge mark:
C- chipbreaker
L - full length
F - full face

Application:
ISO N - Non-ferrous Metal
ISO O - Others

TPGW



Shape		Dimensions						Grade			
ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	MND 01	MND 10	MND 32	CVD
TPGW 110302	TPGW 220.5	1N	6.35	3.18	0.2	3.3	2.5	MN 00064			
TPGW 110304	TPGW 221	1N	6.35	3.18	0.4	3.3	2.5	MN 00065			
TPGW 110308	TPGW 222	1N	6.35	3.18	0.8	3.3	2.5	MN 00066			
TPGW 160402	TPGW 330.5	1N	9.525	4.76	0.2	4.4	2.5	MN 00067			
TPGW 160404	TPGW 331	1N	9.525	4.76	0.4	4.4	2.5	MN 00068			
F-TPGW 110308	F-TPGW 222	3N	9.525	3.18	0.8	3.3	15.3	MN 00048			

Items with order code MNXXXXXon stock

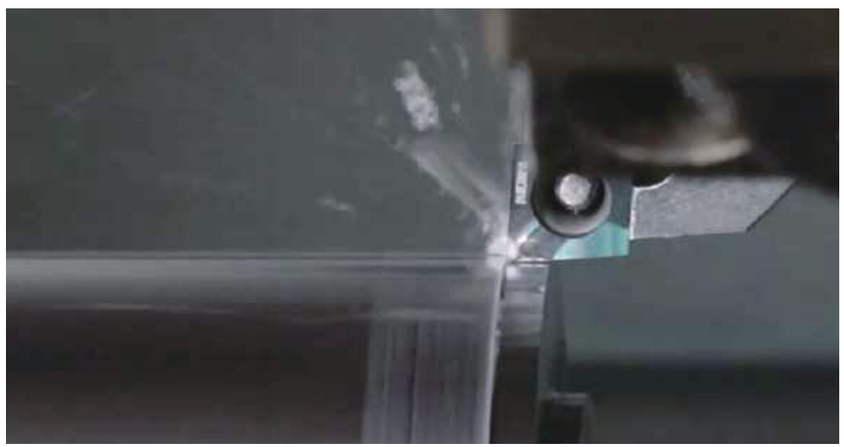
TPGT

Shape		Dimensions						Grade			
ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	MND 01	MND 10	MND 32	CVD
TPGT090204	TPGT1.81.51	1N	5.56	2.38	0.4	2.4	2.5	MN 00804			
TPGT 110302	TPGT 22.50.5	1N	6.35	3.18	0.2	3.3	2.5	MN 00069			
TPGT 110304	TPGT 22.51	1N	6.35	3.18	0.4	3.3	2.5	MN 00070			
TPGT 110308	TPGT 22.52	1N	6.35	3.18	0.8	3.3	2.5	MN 00071			
TPGT 160402	TPGT 330.5	1N	9.525	4.76	0.2	4.4	2.5	MN 00072			
TPGT 160404	TPGT 331	1N	9.525	4.76	0.2	4.4	2.5	MN 00073			

Items with order code MNXXXXXon stock

Worldia PCD Grades Introduction

Standard/Chip breaker/Wiper



Introduction:

Worldia’ portfolio comprise of a variety of different PCD and CVD materials that will be selected base on customer specific application requirements, according to grain size and features of material, Worldia provides you with four types of PCD grades:PD01E、PD10E、PD32E and CVDD. These grades are commonly used for non-ferrous machining applications, other successful applications include machining of wood、MDF、MMC、silicon aluminium alloys、carbide、hard rubber、graphite and so on.

This catalogue shows examples of Worldia’ s capabilities and recommendations for application-specific made-to-order inserts.

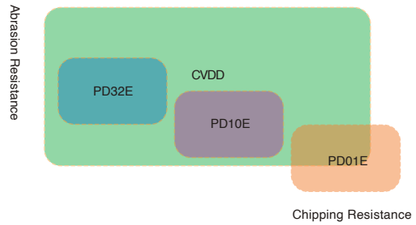
For on-stock standard inserts, please refer to our MANANOVA -Easy Choice -Fast Delivery PCD catalogue.

PCD Material Introduction N

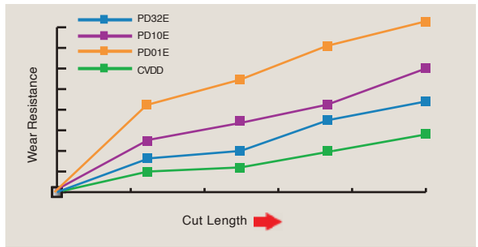
Application Recommendation

Material	Grade size(μm)	Feature	Application
PD01E	1	PD01Efinegrain sizePCDmaterial(1μm)issuitablefor mirror finishing applications.Itshigh impact resistanceand high abrasiveresistanceare comparableto coarsegrain sizegradeof PCD.	PD01Ehasexcellent chip resistance issuitablefor theroughingand interrupt cuttingaluminium alloys.Thisgradeisalso commonlyused for non-ferrousfinishingapplications.Other successful applications includemachiningof wood,MDF.
PD10E	10	PD10Eistheuniversal gradein themarket.It'sthefirst choicefor many applicationswhereagood balanceof toughnessand wear resistanceare required.	Thisgradeiscommonlyused for non-ferrousfinishingapplications.Other successful applicationsincludemachiningof wood,MDF.Themachining of low-medium content silicon aluminium alloys,carbide,hard rubber, graphiteand so on.
PD32E	2~30	PD32Ehasauniquecombination of wear resistance,edgestrength and edgequality.It containsacarefullyselected mixof micron diamond (between 2-30μm).Thecombination of theseparticlesizesand a specifically developed high pressuresinteringprocessproducesa structurewith extremeabrasion resistanceand good thermal stability.	Application areasincludethemachiningof abrasiveworkpiecessuch as MMC,high silicon aluminium alloysaswell asfor themachiningof carbide,hard rubber,graphiteand other applications.
CVDD	—	CVDDisapurecarbon material without binder with extreme abrasion resistanceand good thermal suitability.Dueto itsPerfect cuttingedgesuitablefor applicationswheremirror finishesare required.	Application areasincludethemachiningof abrasiveworkpiecessuch as MMC,high silicon aluminium alloysaswell asfor themachiningof carbide,hard rubber,graphiteand other applications.

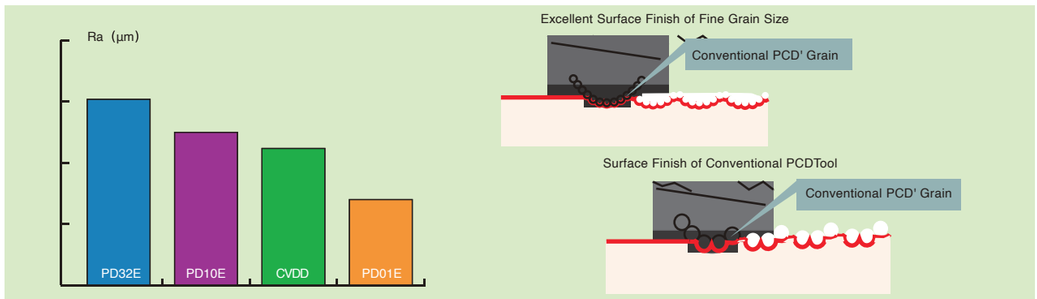
Micro-Structure of PCD Materials



Differences in Abrasive-resistance Among Various Grade of PCD Materials



PCD Grain Size Affects Roughness of Workpiece's Surface



(Effect of grain size on finish machining surface)

Nomenclature

Rule of PCD Insert Code

ISO

Insert Features	Clearance Angle	Thickness	Edges	Rake Description	Clearance Description	Insert Type	Cutting Edge Length
C	C	G	W	09	T3	04	-	1	N	P	00	P	07	CB	ST	30	S	PD10E
1	2	3	4	5	6	7		8	9	10	11	12	13	14	15	16	17	

Shape	Tolerance Class	Insert Size	Tip radius	Cutting Direction	Rake Angle	Clearance Angle	Cutting Edge Design	Surface Treatment

1.Shape

H	Hexagon	120°	C	Diamond	80°
O	Octagonal	135°	D		55°
P	Pentagon	108°	E		75°
R	Round		M		86°
S	Square	90°	V		35°
T	Triangle	60°	W	Hexagon	80°
			L	Rectangular	90°
			A	Diamond	85°
			B		82°
			K		55°

2.Clearance Angle

3°	A	20°	E	11°	P
5°	B	25°	F	X°	O
7°	C	30°	G		
15°	D	0°	N		

3.Tolerance Class

Code	Tolerance			Code	inch		
	m	s	IC		m	ic	s
C	±0.013	±0.025	±0.025	C	±.0005	±.001	±.001
H	±0.013	±0.025	±0.013	H	±.0005	±.0005	±.001
E	±0.025	±0.025	±0.025	E	±.001	±.001	±.001
G	±0.025	±0.13	±0.025	G	±.001	±.001	±.005
K	±0.013	±0.025	±0.05~±0.13	K	±.0005	±.002-.005	±.001
M	±0.08~±0.18	±0.13	±0.05~±0.13	M	±.002-.005	±.002-.005	±.005
U	±0.13~±0.38	±0.13	±0.08~±0.25	U	±.005-.012	±.005-.010	±.005

4.Insert Features

N		G		B	
R		W		H	
F		T		C	
A		Q		J	
M		U	Others		X

5.Insert Size

ISO									ANSI	
Edge length (accoring insert shape)								Inscribed Circle Dia.	Code	IC Size
C	D	R	S	T	V	W		mm		inch
S4	04	03	03	06	-	02		3.97	(1.2)	5/32
04	05	04	04	08	08	S3		4.76	(1.5)	3/16
05	06	05	05	09	09	03		5.56	(1.8)	7/32
-	-	06	-	-	-	-		6	-	-
06	07	06	06	11	11	04		6.35	2	1/4
08	09	07	07	13	13	05		7.94	(2.5)	5/16
-	-	08	-	-	-	-		8	-	-
09	11	09	09	16	16	06		9.525	3	3/8
-	-	10	-	-	-	-		10	-	-
-	-	12	-	-	-	-		12	-	-
12	15	12	12	22	22	08		12.7	4	1/2
16	19	15	15	27	27	10		15.875	5	5/8
-	-	16	-	-	-	-		16	-	-
19	23	19	19	33	33	13		19.05	6	3/4
-	-	20	-	-	-	-		20	-	-
22	27	22	22	38	38	15		22.225	7	7/8
-	-	25	-	-	-	-		25	-	-
25	31	25	25	44	44	17		25.4	8	1
32	38	31	31	54	54	21		31.75	10	1-1/4
-	-	32	-	-	-	-		32	-	-

6.Thickness

ISO		ANSI	
Code	Size	Code	Size
S	mm	S	inch
01	1.59	1	1/16
02	2.38	(1.5)	3/32
T2	2.78	-	-
03	3.18	2	1/8
T3	3.97	(2.5)	5/32
04	4.76	3	3/16
05	5.56	(3.5)	7/32
06	6.35	4	1/4
07	7.94	5	5/16
09	9.525	6	3/8

7.Tip radius

ISO		ANSI	
Code	Size	Code	Size
Rε	mm	Rε	inch
00	sharp	00	.000
003	0.03	(0.1)	.001
01	0.1	(0.2)	.004
02	0.2	(0.5)	.008
04	0.4	1	1/64
08	0.8	2	1/32
12	1.2	3	3/64
16	1.6	4	1/16
20	2.0	5	5/64
24	2.4	6	3/32
28	2.8	7	7/64
32	3.2	8	1/8
M00	Round		circular

Nomenclature

Rule of PCD Insert Code

ANSI

Standard,Chipbreaker	Clearance Angle	Thickness	Edges	Rake Description	Clearance Description	Insert Type	Cutting Edge Length
C	C	M	W	3	(2.5)	1	–	1	N	P	00	P	07	CB	ST	30	S	PD10E
1	2	3	4	5	6	7		8	9	10	11	12	13	14	15	16	17	

Shape	Tolerance-ISO	Inscribed Circle Dia.	Tip radius	Cutting Direction	Rake Angle	Clearance Angle	Cutting Edge Design	Surface Treatment

8.Edges

Code	1	2	3	4	6	8
Edges	1Edge	2Edge	3Edge	4Edge	6Edge	8Edge

9.Cutting Direction

Code	R	L	N

10.Rake Description

P	M
Positive Positive	Negative angle

11.Rake Angle

Code	00	03	05	10
Size	0	3	5	10

12.Clearance Description

P	M
Positive Clearance	Negative Clearance

13.Clearance Angle

Code	00	01	02	03	05	07	11	15	20	25	30	35
Size	0	1	2	3	5	7	11	15	20	25	30	35

14.Insert Type

SF	SL	SS	CB	CS	SWW	SWU
Full Face	Solid Tipped Corner	Solid CBN	Standard Tipped Corners	Standard Full Edge	Solid Tipped Corners Type "W"	Solid Tipped Corners Type "U"

15.Cutting Edge Design

ST	WG	WG00	CBC1	——
Nose Radius	Wiper	0°Wiper	C1 Chip Breaker	——

16. Cutting Edge Length

Code	25	30	35	40	45
Nose Radius	2.8	3.0	3.5	4.0	4.5

17.Surface Treatment

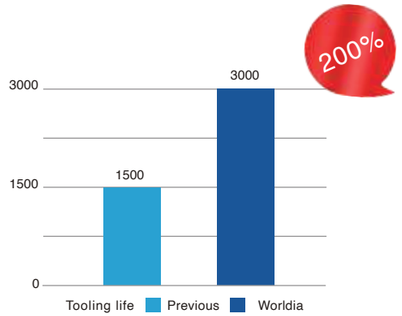
S	Uncoated

Application Cases Of PCD Turning Inserts

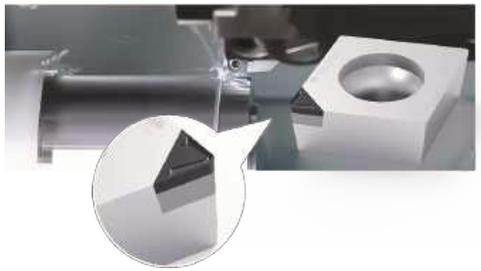
PD306

Workpiece name: Aluminium wheel
Workpiece material: Aluminium alloy
Processing area: outer spoke of AL wheel
Processname: outer spoke finishing
Machining condition:
continuouscutting +strong interrupted cutting
Cooling type: external cooling

	Previous	Worldia
Insert	VCGW160412-1L	VCGW160412-1L
Grade	PCD	PD306
Spindle speed S(r/min)	1400	1400
Feed speed fn(mm/r)	0.25	0.25
Cutting depth ap(mm)	0.05	0.05
Tool life (pcs)	1500	3000

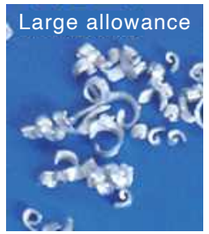


PD306



Material: Aluminum alloy 6061(GB/T)

	Worldia	Worldia
Insert	C-CCGT09T304-1N	C-CCGT09T304-1N
Grade	PCD	PD306
Parameter Vc(m/min)	400	400
Feed speed fn(mm/r)	0.1	0.1/0.15
Cutting depth ap(mm)	0.2	2.0

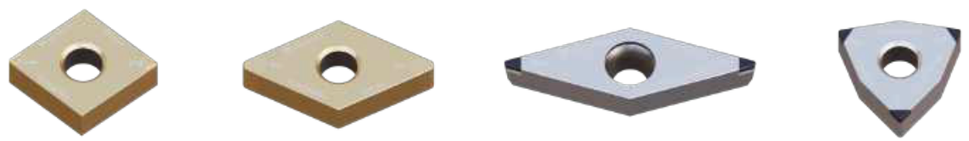


One type of groove works
for small and large margins,
reducing user confusion.

PCBN Turning Inserts

MANANOVA PCBN Turning Inserts

PCBN Customized Turning Inserts



Product range overview of indexable inserts for ISO turning - Inserts description

Definition Key - Material designation

Example

M	H	N	10	C
MANANOVA	1	2	3	4

1	
Application Materials	
P	Steel
M	Stainless Steel
K	Cast Iron
S	Power Metal
H	Hardened Steel
N	Non-ferrous Metal

2	
Cutting Tool Material	
D	PCD
N	PCBN

3
Material Code
10
20
30

4	
Coating	
C	Coated
Without	Uncoated

Material range overview of indexable inserts for ISO turning - PCBN Material Selection

Material Introduction - Easy choice for PCBN Grade

ISO H: Hardened Steel
ISO K: Cast Iron
ISO S: Powder Metal

- Continuous cutting
- Light interrupted cutting
- Medium interrupted cuttting
- Heavy interrupted cutting

PCBN Grade	ISO H			ISO K		ISO S	
	MHN10C	MHN20C	MHN30C	MKN10	MKN20	MSN10	MSN20
	Hardened Steel (●)	Hardened Steel (◔ ●)	Hardened Steel (✸)	Cast Iron	Ductile Iron	Powder Metal	Powder Metal
vc	180(150~250) m/min	100(50~150) m/min	80(30~120) m/min	600(300~800) m/min	300(150~450) m/min	300(200~500) m/min	500(300~800) m/min
fn	0.1(0.03~0.2) mm/r	0.1(0.03~0.2) mm/r	0.1(0.03~0.2) mm/r	0.1(0.03~0.3) mm/r	0.1(0.03~0.3) mm/r	0.1(0.03~0.3) mm/r	0.1(0.03~0.3) mm/r
%	45~55	60~70	85~95	85~95	60~70	60~70	85~95
Grain size	1~2 µm	1~2 µm	2~3 µm	2~3 µm	1~2 µm	1~2 µm	2~3 µm
Bond	TiC	TiN	Co/W	Co/W	TiCN	TiCN	Co/W
First Choice	●	◔ ✸	✸	◔ ● ✸	● ✸	◔ ● ✸	◔ ● ✸

● Continuous ◔ Light ✸ interrupted Medium interrupted Heavy

Product range overview of indexable inserts for ISO turning - Inserts description

Definition Key - Identification Code

	1		2	3	4	5	6	7	8		9	10
ANSI	C	-	C	C	G	W		2	1.5	0.5	-	1	N
ISO	C	-	C	C	G	W		06	02	02	-	1	N

1 Insert Style

Without	Standard
C	Chip breaker
L	Full Length
F	Full Face
S	Solid
W	Wiper
H	Heavy cutting

2 Insert Shape

A	85°	M	86°
B	82°	O	135°
C	80°	P	108°
D	55°	R	●
E	75°	S	90°
H	120°	T	60°
K	55°	V	35°
L	90°	W	80°

3 Clearance Angle

A	3°	F	25°
B	5°	G	30°
C	7°	N	0°
D	15°	P	11°
E	20°		

4 Tolerances

	ISO mm	ANSI inch
G		
m	±0.025	±0.001
IC	±0.025	±0.001
S	±0.130	±0.005
R	±0.03	±0.001

5 Pattern Type

A, N, T, W, R

6 Inscribed Circle Diameter

IC (mm) ISO	C	D	T	V	W	IC (inch) ANSI	Code
3.970						5/32	1.2
4.760			08			3/16	1.5
5.560			09			7/32	1.8
6.350	06	07	11	11		1/4	2
7.940						5/16	2.5
9.525	09	11	16	16		3/8	3
12.700	12	15			08	1/2	4
15.875						5/8	5

7 Insert Thickness

ISO	mm	ANSI	inch
01	= 1.59	1	1/16
02	= 2.38	1.5	3/32
T2	= 2.78		
03	= 3.18	2	1/8
T3	= 3.97	2.5	5/32
04	= 4.76	3	3/16
05	= 5.56	3.5	7/32
06	= 6.35	4	1/4
07	= 7.94	5	5/16
09	= 9.525	6	3/8

8 Nose Radius

ISO	mm	ANSI	inch
00	= 0.0	0	.000
01	= 2.1	0.2	.004
02	= 0.2	0.5	.008
04	= 0.4	1	1/64
08	= 0.8	2	1/32
12	= 1.2	3	3/64
16	= 1.6	4	1/16
20	= 2.0	5	5/64
24	= 2.4	6	3/32
28	= 2.8	7	7/64

9 Cutting Edges

1	single
2	double
3	triple

10 Cutting Direction

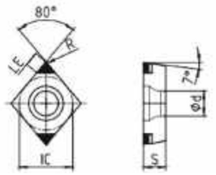
N, R, L

CC 80°Positive 7°Relief

Application materila:
H - Hardened Steel
K - Cast Iron
K - Ductile Iron(NCI)
S - Powder Metal

Symbol mark:
● Continuous
◔ Light interrupted
✱ Medium interrupted
✹ Heavy interrupted

CCGW



	ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	H Coated	H Coated	H Coated	K	K	S	S
MHN Series	CCGW 060202	CCGW21.50.5	2N	6.35	2.38	0.2	2.8	2.2	MHN 10C	MHN 20C	MHN 30C	MKN 10	MKN 20	MSN	MSN 20
	CCGW 060204	CCGW21.51	2N	6.35	2.38	0.4	2.8	2.2	MN 00536	MN 00555	MN 00556	MN 00086	MN 00087	MN 00088	MN 00729
	CCGW 060208	CCGW21.52	2N	6.35	2.38	0.8	2.8	2.2	MN 00529	MN 00557	MN 00558	MN 00092	MN 00093	MN 00094	MN 00730
									MN 00559	MN 00560	MN 00561	MN 00098	MN 00099	MN 00100	MN 00730
MKN Series	CCGW 09T302	CCGW32.50.5	2N	9.525	3.97	0.2	4.4	2.2	MN 00562	MN 00547	MN 00563	MN 00104	MN 00105	MN 00106	MN 00732
	CCGW 09T304	CCGW32.51	2N	9.525	3.97	0.4	4.4	2.2	MN 00511	MN 00540	MN 00532	MN 00110	MN 00111	MN 00112	MN 00733
	CCGW 09T308	CCGW32.52	2N	9.525	3.97	0.8	4.4	2.2	MN 00494	MN 00545	MN 00533	MN 00116	MN 00117	MN 00118	MN 00734
	CCGW 09T312	CCGW32.53	2N	9.525	3.97	1.2	4.4	2.2	MN 00564	MN 00565	MN 00566	MN 00122	MN 00123	MN 00124	MN 00735
MSN Series	CCGW 120408	CCGW432	2N	12.7	4.76	0.8	5.5	2.2	MN 00812		MN 00725				

Items with order code MNXXXXXon stock

PCBN Insert

CPGW-CNGA

WORLDIA MANANOVA

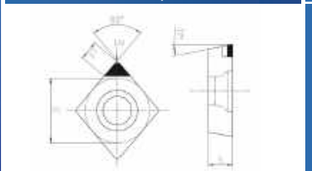
Easy Choice Fast Delivery

CP — 80°Positive, 11°Relief

Application materila:
H - Hardened Steel
K - Cast Iron
K - Ductile Iron(NCI)
S - Powder Metal

Symbol mark:
Continuous
Light interrupted
Medium interrupted
Heavy interrupted

CPGW



ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	H Coated MHN 10C	H Coated MHN 20C	H Coated MHN 30C	K MKN 10	K MKN 20	S	S MSN 20
CPGW060204	CPGW21.51	2N	6.35	2.38	0.4	2.8	2.2			MN 00821				
CPGW060204	CPGW21.51	2N	6.35	2.38	0.4	2.8	2.2						MN 00822	

MHN Series

MSN Series

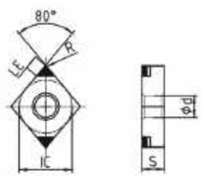
Items with order code MNXXXXXon stock

CN — 80° Negative

Application materila:
H - Hardened Steel
K - Cast Iron
K - Ductile Iron(NCI)
S - Powder Metal

Symbol mark:
Continuous
Light interrupted
Medium interrupted
Heavy interrupted

CNGA



ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	H Coated MHN 10C	H Coated MHN 20C	H Coated MHN 30C	K MKN 10	K MKN 20	S	S MSN 20
CNGA 120402	CNGA430.5	2N	12.7	4.76	0.2	5.16	2.2	MN 00780	MN 00781					
CNGA 120404	CNGA431	2N	12.7	4.76	0.4	5.16	2.2	MN 00525	MN 00497	MN 00567	MN 00128	MN 00129	MN 00130	MN 00736
CNGA 120408	CNGA432	2N	12.7	4.76	0.8	5.16	2.2	MN 00509	MN 00498	MN 00510	MN 00134	MN 00135	MN 00136	MN 00737
CNGA 120408	CNGA432	4N	12.7	4.76	0.8	5.16	2.2	MN 00522	MN 00568	MN 00569	MN 00140	MN 00141	MN 00142	
CNGA 120412	CNGA433	2N	12.7	4.76	1.2	5.16	2.2	MN 00669	MN 00807	MN 00654	MN 00777			
CNGA 120416	CNGA434	2N	12.7	4.76	1.6	5.16	2.2		MN 00823	MN 00824				
CNGA 120416	CNGA434	4N	12.7	4.76	1.6	5.16	2.2		MN 00825	MN 00826				

MHN Series

MKN Series

MSN Series

Items with order code MNXXXXXon stock

PCBN Insert

DCGW

WORLDIAMANANOVA

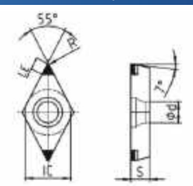
Easy Choice Fast Delivery

DC — 55°Positive, 7°Relief

Application materila:
H - Hardened Steel
K - Cast Iron
K - Ductile Iron(NCI)
S - Powder Metal

Symbol mark:
Continuous
Light interrupted
Medium interrupted
Heavy interrupted

DCGW



ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	H Coated MHN 10C	H Coated MHN 20C	H Coated MHN 30C	K MKN 10	K MKN 20	S	S MSN 20
DCGW070202	DCGW21.50.5	2N	6.35	2.38	0.2	2.8	2.2	MN 00787	MN 00788				MN 00703	
DCGW 070204	DCGW21.51	2N	6.35	2.38	0.4	2.8	2.2	MN 00554	MN 00548	MN 00570	MN 00146	MN 00147	MN 00148	MN 00738
DCGW 070208	DCGW21.52	2N	6.35	2.38	0.8	2.8	2.2	MN 00571	MN 00572	MN 00573	MN 00152	MN 00153	MN 00154	MN 00739
DCGW 11T302	DCGW32.50.5	2N	9.525	3.97	0.2	4.4	2.2	MN 00550	MN 00574	MN 00575	MN 00118	MN 00159	MN 00160	MN 00740
DCGW 11T304	DCGW32.51	2N	9.525	3.97	0.4	4.4	2.2	MN 00520	MN 00549	MN 00515	MN 00164	MN 00165	MN 00166	MN 00741
DCGW 11T308	DCGW32.52	2N	9.525	3.97	0.8	4.4	2.2	MN 00576	MN 00521	MN 00577	MN 00170	MN 00171	MN 00172	MN 00742
DCGW11T312	DCGW32.53	2N	9.525	3.97	1.2	4.4	2.2	MN 00827	MN 00828					

MHN Series

MKN Series

MSN Series

Items with order code MNXXXXXon stock

PCBN Insert

DNGA

WORLDIAMANANOVA

Easy Choice Fast Delivery

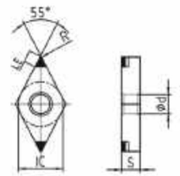
DN — 55° Negative

Application materila:
- H - Hardened Steel
- K - Cast Iron
- K - Ductile Iron(NCI)
- S - Powder Metal

Symbol mark:
- Continuous
- Light interrupted
- Medium interrupted
- Heavy interrupted

DNGA

Shape



ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	H Coated	H Coated	H Coated	K	K	S	S
								MHN MSN	MHN	MHN	MKN	MKN		MSN 20
DNGA 150404	DNGA431	2N	12.7	4.76	0.4	5.16	2.2	MN 00578	MN 00541	MN 00579	MN 00176	MN 00177	MN 00178	MN 00743
DNGA 150408	DNGA432	2N	12.7	4.76	0.8	5.16	2.2	MN 00580	MN 00546	MN 00528	MN 00183	MN 00184	MN 00185	MN 00744
DNGA 150408	DNGA432	4N	12.7	4.76	0.8	5.16	2.2			MN 00829				
DNGA 150412	DNGA433	2N	12.7	4.76	1.2	5.16	2.2	MN 00581	MN 00582	MN 00583	MN 00189	MN 00190	MN 00191	MN 00745

MHN Series

MKN Series

MSN Series

DNGA 150604	DNGA441	2N	12.7	6.35	0.4	5.16	2.2	MN 00584	MN 00585	MN 00586	MN 00195	MN 00196	MN 00197	MN 00746
DNGA 150604	DNGA441	4N	12.7	6.35	0.4	5.16	2.2		MN 00814					
DNGA 150608	DNGA442	2N	12.7	6.35	0.8	5.16	2.2	MN 00524	MN 00514	MN 00513	MN 00201	MN 00202	MN 00203	MN 00747
DNGA 150608	DNGA442	4N	12.7	6.35	0.8	5.16	2.2				MN 00676	MN 00677		
DNGA 150612	DNGA443	2N	12.7	6.35	1.2	5.16	2.2		MN 00830	MN 00668				
DNGA 150612	DNGA443	4N	12.7	6.35	1.2	5.16	2.2	MN 00704						

Items with order code MNXXXXXon stock

PCBN Insert

TCGW

WORLDIAMANANOVA

Easy Choice Fast Delivery

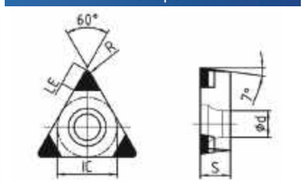
TC — 60°Positive 7°Relief

Application materila:
- H - Hardened Steel
- K - Cast Iron
- K - Ductile Iron(NCI)
- S - Powder Metal

Symbol mark:
- Continuous
- Light interrupted
- Medium interrupted
- Heavy interrupted

TCGW

Shape



ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	H Coated	H Coated	H Coated	K	K	S	S
								MHN MSN	MHN 10C	MHN 20C	MHN 30C	MKN 10	MKN 20	MSN 10	MSN 20
TCGW 090202	TCGW1.81.50.5	3N	5.56	2.38	0.2	2.4	2.2	MN 00815							MN 00748
TCGW 090204	TCGW1.81.51	3N	5.56	2.38	0.4	2.4	2.2	MN 00587	MN 00588	MN 00589	MN 00207	MN 00208	MN 00209		
TCGW 090208	TCGW1.81.52	3N	5.56	2.38	0.8	2.4	2.2	MN 00590	MN 00591	MN 00592	MN 00213	MN 00214	MN 00215	MN 00749	

MHN Series

MKN Series

MSN Series

TCGW 110204	TCGW21.51	3N	6.35	2.38	0.4	2.8	2.2	MN 00552	MN 00593	MN 00594	MN 00219	MN 00220	MN 00221	MN 00750
TCGW 110208	TCGW21.52	3N	6.35	2.38	0.8	2.8	2.2	MN 00526	MN 00595	MN 00596	MN 00225	MN 00226	MN 00227	MN 00751
TCGW 110304	TCGW221	3N	6.35	3.18	0.4	2.8	2.2	MN 00597	MN 00598	MN 00599	MN 00231	MN 00232	MN 00233	MN 00752
TCGW 110308	TCGW222	3N	6.35	3.18	0.8	2.8	2.2	MN 00600	MN 00601	MN 00534	MN 00237	MN 00238	MN 00239	MN 00753
TCGW 16T304	TCGW32.5 1	3N	9.525	3.97	0.4	4.4	2.2		MN 00816					

Items with order code MNXXXXXon stock

PCBN Insert

TNGA

WORLDIAMANANOVA

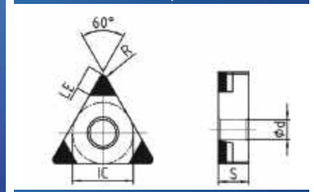
Easy Choice Fast Delivery

TN 60° Negative

Application materila:
H - Hardened Steel
K - Cast Iron
K - Ductile Iron(NCI)
S - Powder Metal

Symbol mark:
Continuous
Light interrupted
Medium interrupted
Heavy interrupted

TNGA



Shape		Dimensions						Applications						
								H	H	H	K	K	S	S
								Coated	Coated	Coated				
ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	MHN 10C	MHN 20C	MHN 30C	MKN 10	MKN 20	MSN	MSN 20
TNGA 160402	TNGA330	3N	9.525	4.76	0.2	3.81	2.2	MN 00842	MN 00843					
TNGA 160404	TNGA331	3N	9.525	4.76	0.4	3.81	2.2	MN 00503	MN 00504			MN 00507		MN 00841
TNGA 160408	TNGA332	3N	9.525	4.76	0.8	3.81	2.2	MN 00602	MN 00495	MN 00519	MN 00243	MN 00244	MN 00245	MN 00754
TNGA 160412	TNGA333	3N	9.525	4.76	1.2	3.81	2.2	MN 00603	MN 00604	MN 00605	MN 00249	MN 00250	MN 00251	MN 00755
TNGA 160416	TNGA334	3N	9.525	4.76	1.6	3.81	2.2		MN 00831	MN 00832				


MHN Series


MKN Series


MSN Series

Items with order code MNXXXXXon stock

PCBN Insert

TPGW

WORLDIAMANANOVA

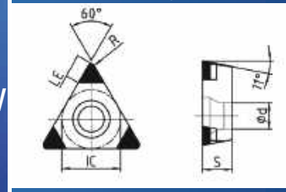
Easy Choice Fast Delivery

TP 60°Positive 11°Relief

Application materila:
H - Hardened Steel
K - Cast Iron
K - Ductile Iron(NCI)
S - Powder Metal

Symbol mark:
Continuous
Light interrupted
Medium interrupted
Heavy interrupted

TPGW



Shape		Dimensions						Applications						
								H	H	H	K	K	S	S
								Coated	Coated	Coated				
ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	MHN MSN	MHN	MHN	MKN	MKN		MSN 20
TPGW 080202	TPGW1.51.50.5	3N	4.76	2.38	0.2	2.4	2.2	MN 00671						
TPGW 080204	TPGW1.51.51	3N	4.76	2.38	0.4	2.4	2.2	MN 00539	MN 00606	MN 00530	MN 00255	MN 00256	MN 00257	MN 00756
TPGW 080208	TPGW1.51.52	3N	4.76	2.38	0.8	2.4	2.2	MN 00607	MN 00608	MN 00609	MN 00261	MN 00262	MN 00263	MN 00757
TPGW 090202	TPGW1.81.50.5	3N	5.56	2.38	0.2	2.8	2.2	MN 00610	MN 00611	MN 00612	MN 00267	MN 00268	MN 00269	MN 00758
TPGW 090204	TPGW1.81.51	3N	5.56	2.38	0.4	2.8	2.2	MN 00613	MN 00614	MN 00531	MN 00279	MN 00280		MN 00759
TPGW 110204	TPGW21.51	3N	6.35	2.38	0.4	2.8	2.2	MN 00615	MN 00616	MN 00535	MN 00273	MN 00274	MN 00275	MN 00760
TPGW 110208	TPGW21.52	3N	6.35	2.38	0.8	2.8	2.2	MN 00618	MN 00619	MN 00620	MN 00285	MN 00286	MN 00287	MN 00761
TPGW 110302	TPGW220.5	3N	6.35	3.18	0.2	3.3	2.2	MN 00621	MN 00622	MN 00623	MN 00291	MN 00292	MN 00293	MN 00762
TPGW 110304	TPGW221	3N	6.35	3.18	0.4	3.3	2.2	MN 00553	MN 00624	MN 00625	MN 00297	MN 00298	MN 00299	MN 00763
TPGW 110308	TPGW222	3N	6.35	3.18	0.8	3.3	2.2	MN 00833	MN 00834					


MHN Series


MKN Series


MSN Series

Items with order code MNXXXXXon stock

PCBN Insert

VCGW

WORLDIAMANANOVA

Easy Choice Fast Delivery

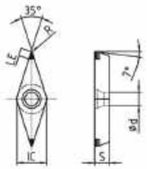
VC 35°Positive 7°Relief

Application materila:
H - Hardened Steel
K - Cast Iron
K - Ductile Iron(NCI)
S - Powder Metal

Symbol mark:
Continuous
Light interrupted
Medium interrupted
Heavy interrupted

VCGW

Shape



ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	Applications: H Coated MHN 10C	H Coated MHN 20C	H Coated MHN 30C	K MKN 10	K MKN 20	S	S MSN 20
 MHN Series														
VCGW 080202	VCGW1.51.50.5	2N	4.76	2.38	0.2	2.3	2.2	MN 00790	MN 00789					
VCGW 080204	VCGW1.51.51	2N	4.76	2.38	0.4	2.3	2.2	MN 00791	MN 00792					
 MKN Series														
VCGW 110302	VCGW220.5	2N	6.35	3.18	0.2	2.8	2.2	MN 00670	MN 00835					
VCGW 110304	VCGW221	2N	6.35	3.18	0.4	2.8	2.2	MN 00626	MN 00627	MN 00628	MN 00303	MN 00304	MN 00305	MN 00764
VCGW 110308	VCGW222	2N	6.35	3.18	0.8	2.8	2.2	MN 00629	MN 00630	MN 00631	MN 00309	MN 00310	MN 00311	MN 00765
 MSN Series														
VCGW 160402	VCGW330.5	2N	9.525	4.76	0.2	4.4	2.2	MN 00778	MN 00779					
VCGW 160404	VCGW331	2N	9.525	4.76	0.4	4.4	2.2	MN 00635	MN 00636	MN 00637	MN 00321	MN 00322	MN 00323	MN 00766
VCGW 160408	VCGW332	2N	9.525	4.76	0.8	4.4	2.2	MN 00638	MN 00639	MN 00640	MN 00327	MN 00328	MN 00329	MN 00767

Items with order code MNXXXXXon stock

PCBN Insert

VBGW

WORLDIAMANANOVA

Easy Choice Fast Delivery

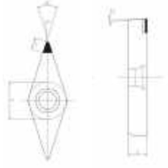
VB 35°Positive 5°Relief

Application materila:
H - Hardened Steel
K - Cast Iron
K - Ductile Iron(NCI)
S - Powder Metal

Symbol mark:
Continuous
Light interrupted
Medium interrupted
Heavy interrupted

VBGW

Shape



ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	Applications: H Coated MHN 10C	H Coated MHN 20C	H Coated MHN 30C	K MKN 10	K MKN 20	S	S MSN 20
 MHN Series														
VBGW110302	VBGW220.5	2N	6.35	3.18	0.2	2.8	2.2	MN 00775	MN 00776					
VBGW110304	VBGW221	2N	6.35	3.18	0.4	2.8	2.2	MN 00782	MN 00783					
 MKN Series														
VBGW160402	VBGW330.5	2N	9.525	4.76	0.2	4.4	2.2	MN 00695	MN 00687	MN 00680	MN 00681	MN 00693	MN 00694	MN 00797
VBGW160404	VBGW331	2N	9.525	4.76	0.4	4.4	2.2	MN 00690	MN 00686	MN 00679	MN 00678	MN 00692	MN 00691	MN 00798
VBGW160408	VBGW332	2N	9.525	4.76	0.8	4.4	2.2	MN 00696	MN 00688	MN 00683	MN 00682	MN 00698	MN 00697	MN 00799
VBGW160412	VBGW333	2N	9.525	4.76	1.2	4.4	2.2	MN 00701	MN 00689	MN 00684	MN 00685	MN 00699	MN 00700	
 MSN Series														

Items with order code MNXXXXXon stock

PCBN Insert

VNGA-MNGA

WORLDIAMANANOVA

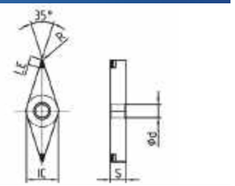
Easy Choice Fast Delivery

VN — 35° Negative

Application materila:
H - Hardened Steel
K - Cast Iron
K - Ductile Iron(NCI)
S - Powder Metal

Symbol mark:
Continuous
Light interrupted
Medium interrupted
Heavy interrupted

VNGA



ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	H Coated MHN MSN	H Coated MHN	H Coated MHN	K MKN	K MKN	S	S MSN 20
VNGA 160402	VNGA330.5	2N	9.525	4.76	0.2	3.81	2.2	MN 00632	MN 00633	MN 00634	MN 00315	MN 00316	MN 00317	MN 00768
VNGA 160404	VNGA331	2N	9.525	4.76	0.4	3.81	2.2	MN 00480	MN 00481	MN 00482	MN 00483	MN 00484	MN 00485	MN 00769
VNGA 160408	VNGA332	2N	9.525	4.76	0.8	3.81	2.2	MN 00486	MN 00487	MN 00488	MN 00489	MN 00490	MN 00491	MN 00770
VNGA 160412	VNGA333	2N	9.525	4.76	1.2	3.81	2.2	MN 00641	MN 00642	MN 00643	MN 00333	MN 00334	MN 00335	MN 00771

Items with order code MNXXXXXon stock


MHN Series


MKN Series

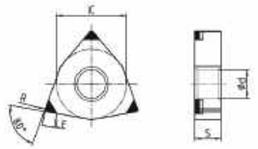

MSN Series

WN — 80° Negative

Application materila:
H - Hardened Steel
K - Cast Iron
K - Ductile Iron(NCI)
S - Powder Metal

Symbol mark:
Continuous
Light interrupted
Medium interrupted
Heavy interrupted

WNGA



ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	H Coated MHN MSN	H Coated MHN	H Coated MHN	K MKN	K MKN	S	S MSN 20
WNGA 080404	WNGA431	3N	12.7	4.76	0.4	5.16	2.2	MN 00644	MN 00499	MN 00645	MN 00339	MN 00340	MN 00341	MN 00772
WNGA 080408	WNGA342	3N	12.7	4.76	0.8	5.16	2.2	MN 00500	MN 00501	MN 00646	MN 00345	MN 00346	MN 00347	MN 00773
WNGA 080412	WNGA433	3N	12.7	4.76	1.2	5.16	2.2	MN 00801	MN 00802		MN 00803			

Items with order code MNXXXXXon stock


MHN Series


MKN Series

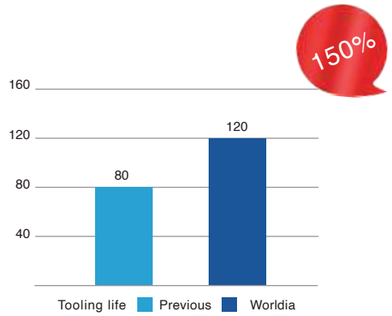

MSN Series

Application Cases Of PCBN Turning Insert

MHN20C

Workpiece：Input shaft
Material：Hardened steel
Hardness：HRC58~62
Surface finish：Ra0.8
Processing：End face
Processing type：Wet-cutting
Cutting condition：Continuous+Interrupted

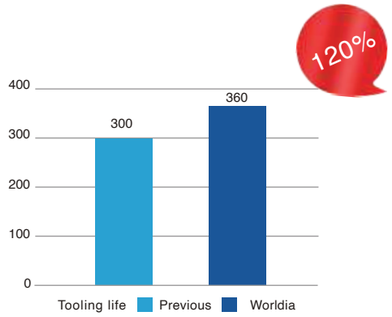
	Previous	Worldia
Specification	CNGA120408-2N	CNGA120408-2N
Grade	PCBN	MHN20C
Cutting speed Vc(m/min)	120	120
Feed f(mm/r)	0.1	0.1
Cutting deep ap(mm)	0.3	0.3
Tool life(pcs/ tip)	80	120



MSN20

Workpiece：Rotor
Material：Power metal
Surface finish：Ra0.8
Processing：Inner hole and end face
Processing type：Wet-cutting
Cutting condition：Continuous+Interrupted

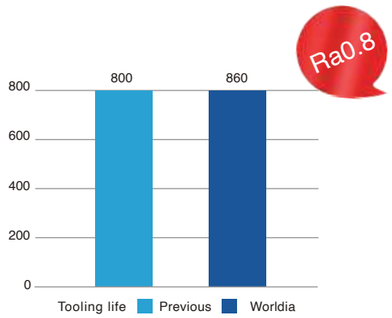
	Previous	Worldia
Specification	DCGW11T302-2N	DCGW11T302-2N
Grade	PCBN	MSN20
Cutting speed Vc(m/min)	250	250
Feed f(mm/r)	0.06	0.06
Cutting deep ap(mm)	0.2	0.2
Tool life(pcs/ tip)	300	360



MHN10C

Workpiece：Gear
Material：Hardened steel
Hardness：HRC55
Surface finish：Ra0.8
Processing：Inner hole and end face

	Previous	Worldia
Specification	TPGW110304-3N	TPGW110304-3N
Grade	PCBN	MHN10C
Cutting speed Vc(m/min)	110	110
Feed f(mm/r)	0.08	0.08
Cutting deep ap(mm)	0.15	0.15
Tool life(pcs/ tip)	800	800

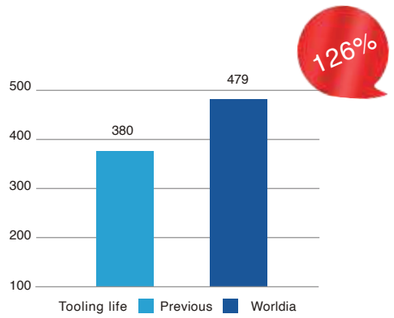


Application Cases Of PCBN Turning Insert

MHN10C

Workpiece：Small ring gear
Material：Carburized hardened steel
Hardness：HRC58~62
Surface finish：Ra1.2
Processing ： Inner hole and end face
Processing dimension：Φ34mm

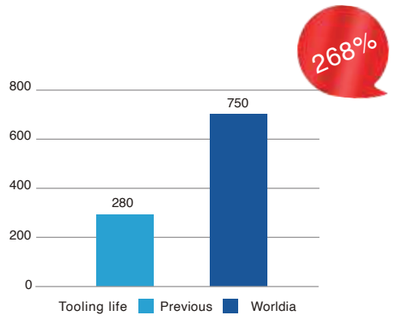
	Previous	Worldia
Specification	WNGA080408-3N	WNGA080408-3N
Grade	PCBN	MHN10C
Cutting speed Vc(m/min)	120	120
Feed f(mm/r)	0.1	0.1
Cutting deep ap(mm)	0.1	0.1
Tool life(pcs/ tip)	380	479



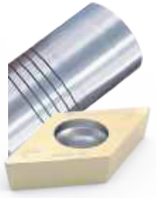
MHN10C

Workpiece：Planetary gear
Material：19GrNi5
Hardness：HRC58~62
Surface finish：Ra0.6
Processing ： Spherical surface

	Previous	Worldia
Specification	DNGA150608-2N	DNGA150608-2N
Grade	PCBN	MHN10C
Cutting speed Vc(m/min)	150	150
Feed f(mm/r)	0.08	0.08
Cutting deep ap(mm)	0.15-0.2	0.15-0.2
Tool life(pcs/ tip)	280	750

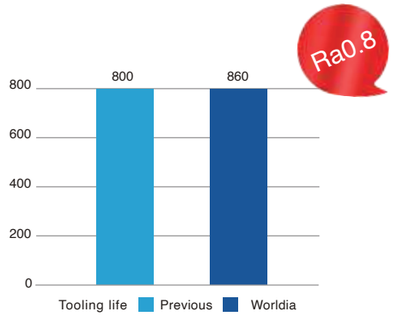


MHN20C



Workpiece：Hydraulic component
Material：Hardened steel
Hardness：HRC56
Surface finish：Ra0.8
Processing ： Cylindrical turning

	Previous	Worldia
Specification	DCGW11T308-2N	DCGW11T308-2N
Grade	PCBN	MHN20C
Cutting speed Vc(m/min)	130	130
Feed f(mm/r)	0.1	0.1
Cutting deep ap(mm)	0.2	0.2
Result	Higher cost performance for the same tool life	

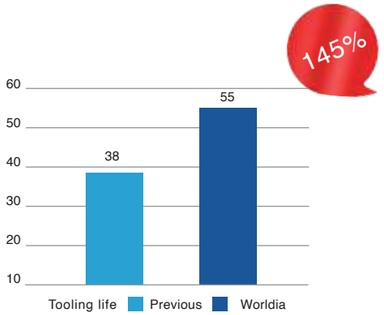


Application Cases Of PCBN Turning Insert

MHN20C

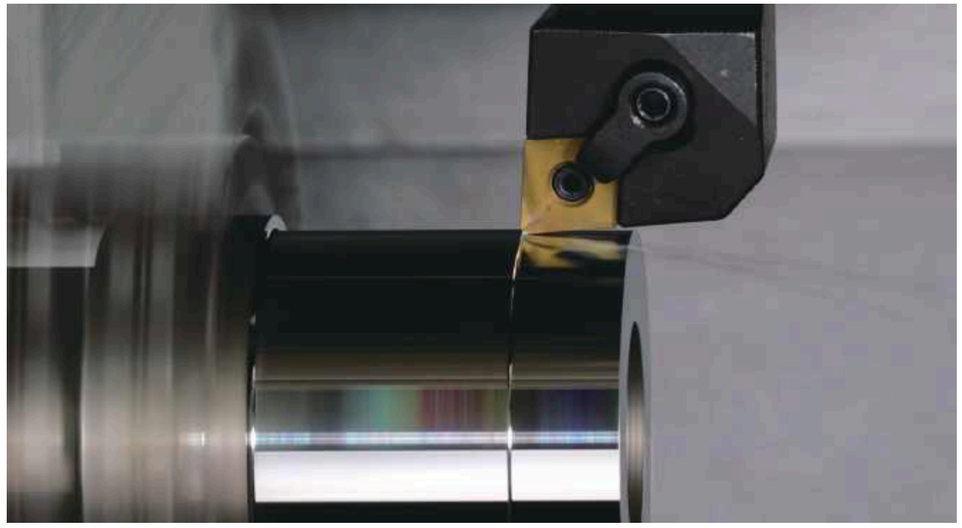
Workpiece：Transmission gear
Material：20CrMnTi
Hardness：HRC58~64
Surface finish：Ra1.6
Processing ： Gear end face

	Previous	Worldia
Specification	WNGA080408-3N	WNGA080408-3N
Grade	PCBN	MHN10C
Cutting speed Vc(m/min)	110	110
Feed f(mm/r)	0.15	0.15
Cutting deep ap(mm)	0.2	0.2
Tool life(pcs/ tip)	38	55



Worldia PCBN Overview

Coating/ Wiper / Chip-breaker



Introduction:

Cubic boron nitride (CBN) is the second hardest material in the world invented successfully in1957; the microhardness of CBN's single crystal is HV8000-9000 while the hardness of PCBN is HV2500-5000, so it is considerably better abrasive resistance than cemented carbide and ceramics. With a higher ability of oxidation resistance within 1000 °C, CBN will not have any chemical reaction with ferrous material at 1200-1300 °C. So it is unique for CBN material dry cutting ferrous materials. The principal application areas for CBN cutting tools are hardened steels, cast irons and sintered irons as well as powder metallurgy components.

Turning hardened steel with PCBN tools has the following advantages over grinding methods：1.Low Cost. Reducing the cost of purchasing new machine tools. It allows for complex surfaces to be finished at once, which shortens the production cycle.2.High Quality. Improving the dimensional and geometrical tolerance with once-champing machining. 3. Environmentally. Using PCBN cutting tools for dry cutting is environmentally friendly and promotes resource recycling.

This catalogue shows examples of Worldia’ s capabilities and recommendations for application-specific made-to-order inserts.

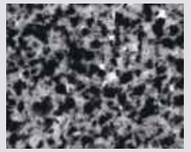
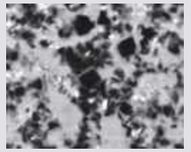
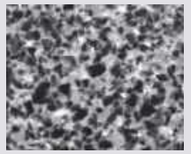
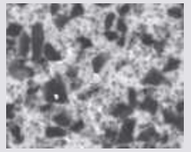
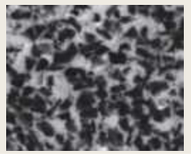
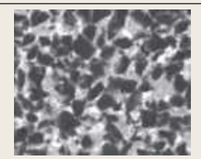
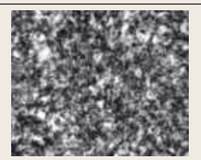
For on-stock standard inserts, please refer to our MANANOVA -Easy Choice -Fast Delivery PCBN catalogue.

H K S

PCBN Material Introduction H

Hardened steel / Cast iron / Powder metallurgy

Hardened Steel Machining

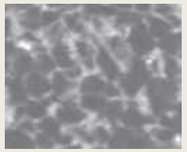
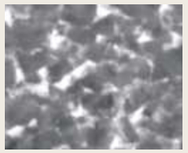
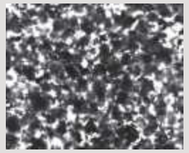
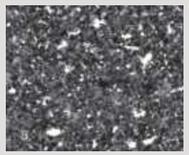
Grade	Content (%)	Grain (μm)	Bond	Structure	Features
★PNH0120	45-50	0.5-2	TiC+TiCN		Widely suitable for continuousfinishing of hardened steel
PNH0122	45-50	0.5-3	TiN		Suitable for high-speed and continuous cutting with a small safety margin featuring excellent wear resistance
PNH0124	45-50	0.5-2	TiN		Suitable for continuousfinishing of hardened steel with better toughness
★PNH1020	50-55	0.5-2	TiCN		A universal cutting material issuitable for both continuousand interrupted cutting of hardened steel
PNH1022	50-55	0.5-3	TiCN		Suitable for both continuousand interrupted cutting of hardened steel with excellent wear resistance and high-temperature resistance
PNH1024	55-60	1-4	TiN		Suitable for continuousto interrupted cutting with high-feed and high-speed featuring excellent toughness
★PNH2016	60-65	0.5-3	TiN		Suitable for interrupted cutting aswell as removing carburized layers with excellent toughnessand high temperature resistance
PNH2018	60-65	0.5-1	TiN		Suitable for light to medium interrupted cutting for high hardness hardened steel with excellent edge anti-breakage performance

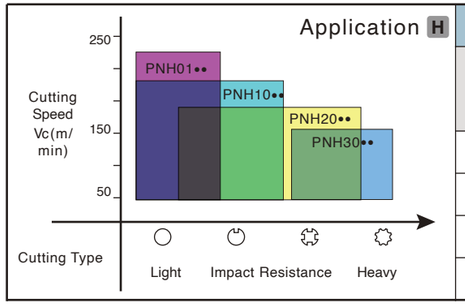
★This mark indicates this material is the preferred material, depending on the actual working condition

PCBN Material Introduction H

Hardened steel / Cast iron / Powder metallurgy

Hardened Steel Machining

Grade	Content (%)	Grain (μm)	Bond	Structure	Features
PNH2024	65-70	2-4	TiN		Suitable for high-feed and heavy interrupted cutting with a large safety margin featuring excellent toughness and high-temperature resistance
PNH2026	70-75	2-4	TiN		The solid PCBN inserts are suitable for heavy roughing of hardened steel with better toughness
PNH2028	65-70	2-4	TiN		The solid PCBN inserts are suitable for continuousto interrupted and heavy cutting of hardened steel with better high-temperature resistance
★PNH3019	85-90	1-2	Metallic compound		Suitable for heavy interrupted of hardened steel with excellent fracture resistance and toughness.
PNH3020	85-90	5-30	Metallic compound		Suitable for continuousto interrupted cutting with a large safety margin and high-feedfeaturing excellent impact resistance and wear resistance.
PNH3023	90-95	0.5-1	Metallic compound		Suitable for heavy interrupted cutting of hardened steel with excellent toughness and fracture resistance.



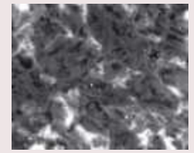
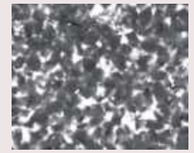
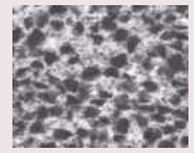
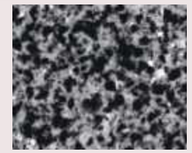
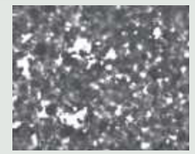
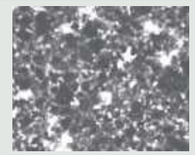
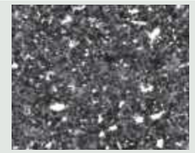
Cutting Data Recommendation			
PCBN Grade	Cutting Data Recommendation		
	Cutting Speed Vc(m/min)	Feed Rate f(mm/rev)	Cutting Depth ap(mm)
PNH01••	180(50-250)	0.03-0.25	0.05-0.3
PNH10••	150(50-200)	0.03-0.25	0.05-0.5
PNH20••	120(50-180)	0.03-0.25	0.05-1.2
PNH30••	100(50-150)	0.03-0.25	0.05-3

★This mark indicates this material is the preferred material, depending on the actual working condition

PCBN Material Introduction K

Hardened steel / Cast iron / Powder metallurgy

Cast Iron Machining

Grade	Content (%)	Grain (μm)	Bond	Structure	Features
★PNK0107	90-95	3-5	Metallic compound		Suitable for continuousand interrupted cutting of gray iron with excellent toughness
PNK0110	85-90	4-10	Metallic compound		Suitable for heavy-duty cutting during rough machining of gray iron featuring exceptional wear resistance
PNK0118	90-95	2-4	Metallic compound		The solid PCBN insert is suitable for finishing of gray iron
★PNK0122	50-55	0.5-2	Special ceramic bond		Suitable for both continuousand interrupted finishing of ductile iron featuring excellent high-temperature resistance
PNK0126	50-55	1-2	Special ceramic bond		Suitable for continuousfinishing of ductile iron at high cutting speedsfeaturing excellent toughness and high-temperature resistance
★PNK3003	85-90	1-2	Metallic compound		Widely suitable for finishing and semi-finishing of gray iron
PNK3007	85-90	1-4	Metallic compound		Suitable for interrupted cutting of gray iron with excellent toughness,
PNK3013	90-95	0.5-1.5	Metallic compound		Ultra-micro grain size PCBN with excellent toughness and sharp edges for stable gray iron finishing

★This mark indicates this material is the preferred material, depending on the actual working condition

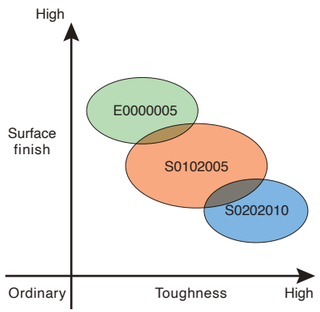
PCBN Material Introduction K

Hardened steel / Cast iron / Powder metallurgy

Cast Iron Machining

Grade	Content (%)	Grain (μm)	Bond	Structure	Features
PNK3020	85-90	4-30	Metallic compound		The solid PCBN insert with excellent wear resistance is suitable for rough machining of cast iron

Application K



Sharp Cutting Edge：E0000005
Standard Cutting
Edge：S0102005 Strong Cutting
Edge：S0202010

Cutting Data Recommendation

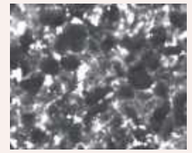
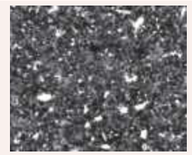
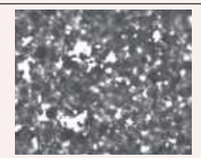
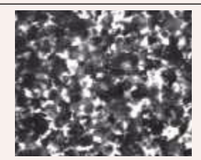
Material to be machined		PCBN Grade	Cutting Recommendation		
Material	Specification		Cutting Speed Vc(m/min)	Feed Rate f(mm/rev)	Cutting Depth ap(mm)
Cast Iron	HT200-300	PNK0110	350-1000	0.1-0.5	0.1-0.5
		PNK0118	350-1200	0.1-05	0.1-1
		PNK0107	350-1200	0.1-0.5	0.1-0.5
		PNK3003	350-1200	0.1-0.5	0.1-0.5
		PNK3007	350-1200	0.1-0.5	0.1-0.5
		PNK3013	350-1200	0.1-0.5	0.1-0.5
		PNK3020	350-1000	0.1-0.5	0.1-3
Ductile Iron	QT500-700	PNK0122	250-350	0.1-0.3	0.1-0.5
		PNK0126	300-600	0.1-0.3	0.1-0.5

★This mark indicates this material is the preferred material, depending on the actual working condition

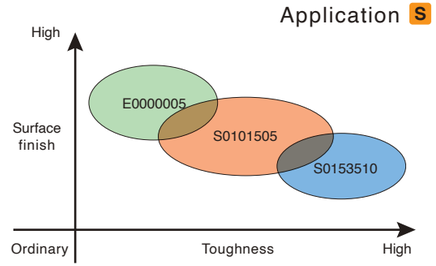
PCBN Material Introduction S

Hardened steel / Cast iron / Powder metallurgy

Powder metallurgy Machining

Grade	Content (%)	Grain (μm)	Bond	Structure	Features
PNS0117	85-90	1-4	Metallic compound		Suitable for continuous processing in powder metallurgy with excellent anti-cracking resistance and outstanding chemical stability
★PNS0126	60-65	0.5-3	TiN		Suitable for hardening of powder metallurgy with excellent high-temperature resistance
PNS2005	90-95	0.5-1.5	Metallic compound		Suitable for finishing and interrupted cutting of powder metallurgy with excellent toughness and sharpness
★PNS2017	85-95	1-2	Metallic compound		A universal grade for machining powder metallurgy
PNS2019	85-90	1-3	Metallic compound		Suitable for interrputed cutting of powder metallurgy featuring excellent toughness and wear resistance

Application S



Sharp Cutting Edge：E0000005
Standard Cutting
Edge：S0101505 Strong Cutting
Edge：S0153510

Cutting Data Recommendation

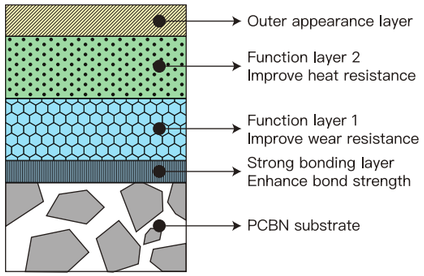
PCBN Grade	Cutting Recommendation		
	Cutting Speed Vc(m/min)	Feed Rate f(mm/rev)	Cutting Depth ap(mm)
PNS0117	450-800	0.1-0.3	0.1-0.7
PNS0126	150-300	0.1-0.3	0.1-0.7
PNS2005	450-800	0.1-0.3	0.1-0.7
PNS2017	450-800	0.1-0.3	0.1-0.7
PNS2019	450-800	0.1-0.3	0.1-0.7

★This mark indicates this material is the preferred material, depending on the actual working condition

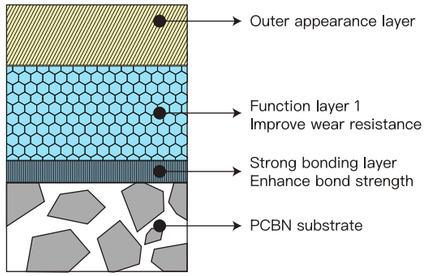
Coating Introduction

CE Coating/ C3 Coating

Applying a PVD coating on the CBN surface can extend the lifespan of tools and enhance precision, particularly in the case of hardened steel machining.

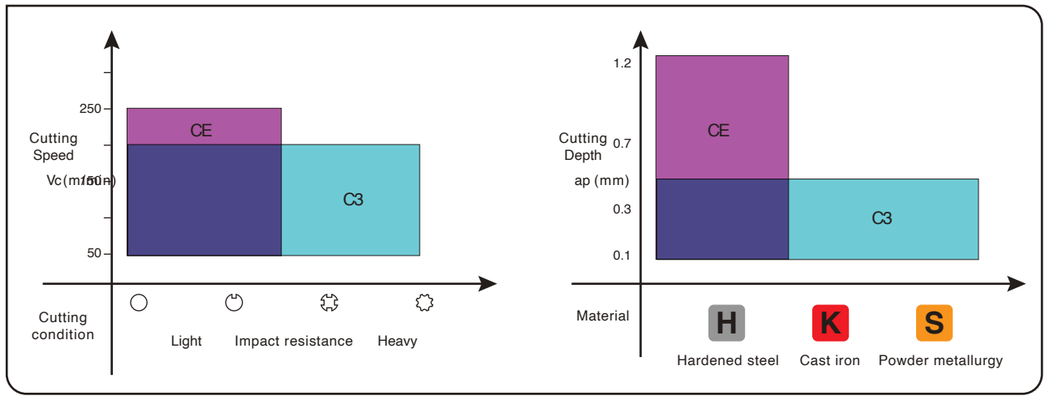


CE Coating



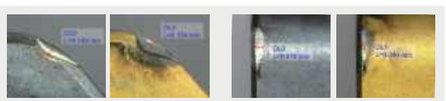
C3 Coating

▪Application of CE/ C3 Coating

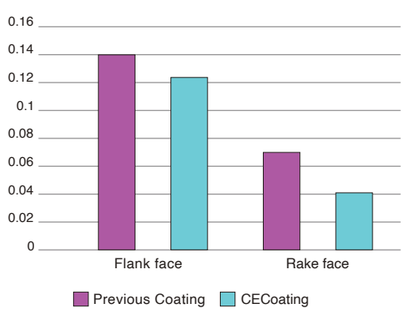


▪Cutting Performance of CE/ C3 Coating

Material: GCr15 Hardness: HRC58-62
Cutting speed: 220m/min Cutting depth: 0.1mm Feed: 0.12mm/rev Dry cutting

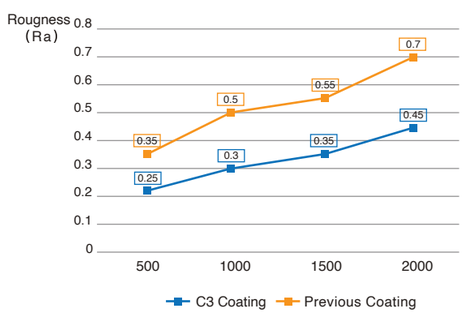


Flank face Rake face



Wear resistance comparison of CE/previous coating

Material:GCr15 Hardness:HRC58-62
Cutting speed:150m/min Cutting depth:0.15mm Feed:0.1mm/rev Dry cutting



Wear resistance comparison of C3/previous coating

Wiper Introduction

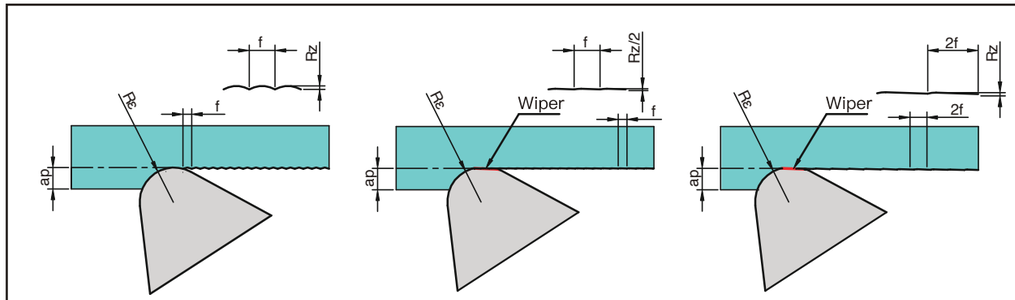
Hardened steel, cast iron， powder metallurgy

Wiper Insert

●Good surface roughness:

Surface roughness can be significantly improved under the same machining conditions, resulting in higher machining quality. High efficiency

●The feed rate can be significantly increased to meet the same surface roughness requirements, resulting in improved machining efficiency.



Standard corner radius

Under the same fn,Wiper inserts improve the surface roughness
High surface roughness

Wiper inserts increase double feed rate(2xfn)
High Efficiency

▪Calculation of theoretical value of machined surface roughness for standard corner inserts

$$R_z = \frac{f^2}{8r_\varepsilon} * 1000$$

R_z(μm)：Theoretical surface roughness
f(mm/rev)：Feed per revolution
re(mm)：Radiusof the tip circle

Tip radius r (mm)	Roughness requirements Ra(μm)				
	0.2	0.4	0.8	1.6	3.2
	Feed f (mm/rev)				
02	0.036	0.05	0.072	0.101	0.143
04	0.05	0.072	0.101	0.143	0.202
08	0.072	0.101	0.143	0.202	0.286
12	0.088	0.124	0.175	0.248	0.351
16	0.101	0.143	0.202	0.286	0.405
0.4/0.8/1.2Wiper	0.16	0.226	0.315	0.426	0.575

Note

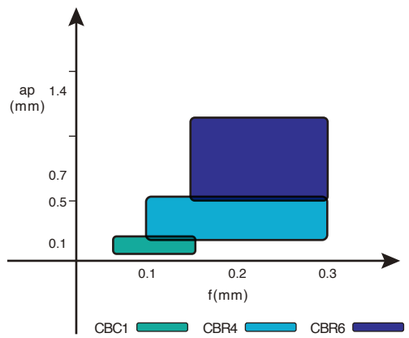
- Wiper inserts are suitable for highly rigid machines and workpieces with high cutting resistance.
- It is important to use the appropriate type of holder with wiper inserts.
- Using the reverse cutting direction with wiper inserts is not recommended.

Chip Breaker Introduction

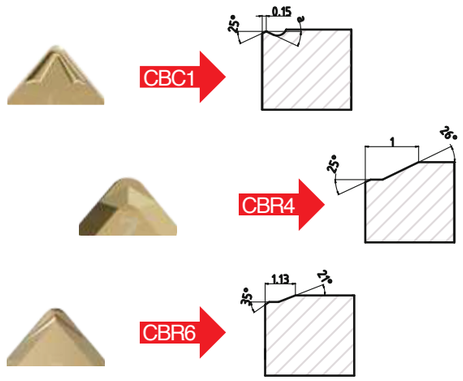
CBC1/CBR4

In the cutting process, long continuous chip will cause many problems such as long chip will be wrapped around the surface of the work piece, the surface is scratched, the tool life is unstable, repeated positioning is not accurate, the manipulator can not work normally, the automatic detection system can not work well etc. Worldia' standard inserts with CBC1,CBC4 and CBC6 chip breaker, are suitable for finishing, semi–finishing, roughing as well as for removing carburized layers during roughing. CBC1 is suitable for finishing chipbreaking, CBR4 is suitable for semi–finishing and roughing, and CBR6 is suitable for roughing and high–efficiency machining with large allowances and high feed rates.
When combined with Worldia's C3 and CE coatings, these chipbreaker inserts can fully leverage their excellent heat and wear resistance, thereby extending the tool life.

▪Application



▪Structure



▪Cutting performance

Workpiece Material：GCr15 HRC58-62
Parameter：CNGM120408-2N SLCBC122C3
Cutting Data：Vc=150m/min f=0.12mm/rev ap=0.15mm

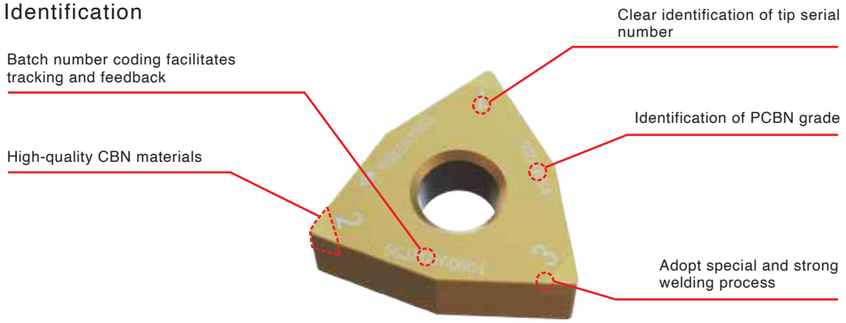
Workpiece Material：20CrMoTi HRC58
Parameter：DNGM150408-2N SLCBR430C3
Cutting Data：Vc=160m/min f=0.15mm/rev ap=0.4mm

Workpiece Material：20CrMoTi HRC58-62
Parameter：CNGA120408-2N SLCBR640CE
Cutting Data：Vc=130m/min f=0.15mm/rev ap=1.3 干切

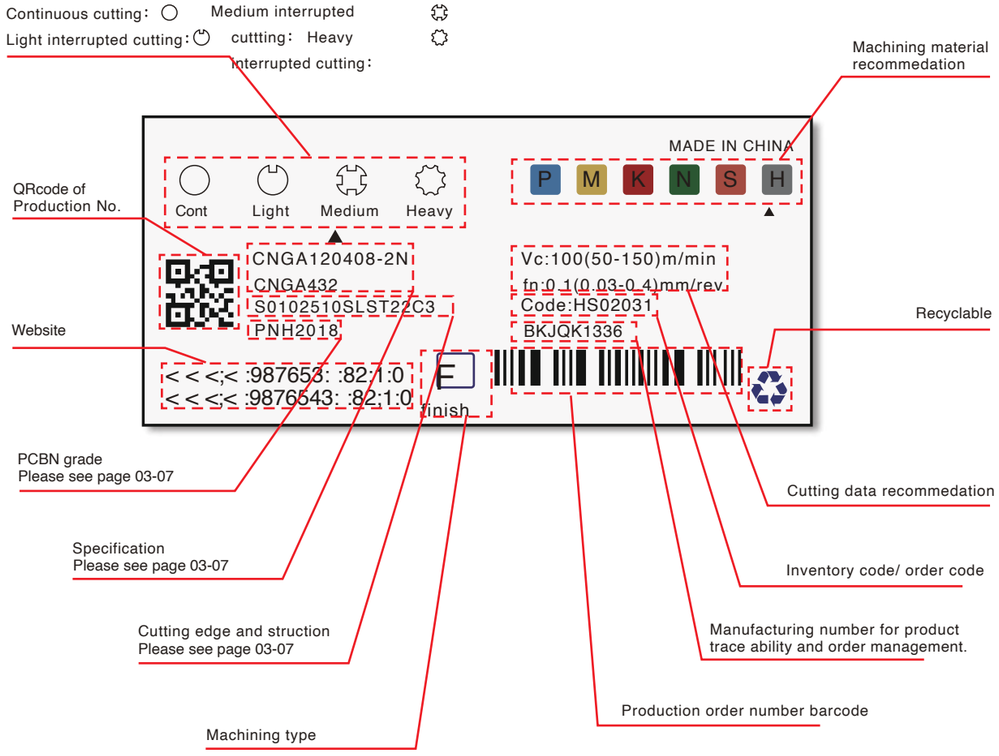
Identification Code and Package Instruction

Hardened steel, cast iron powder metallurgy

▪Insert Identification

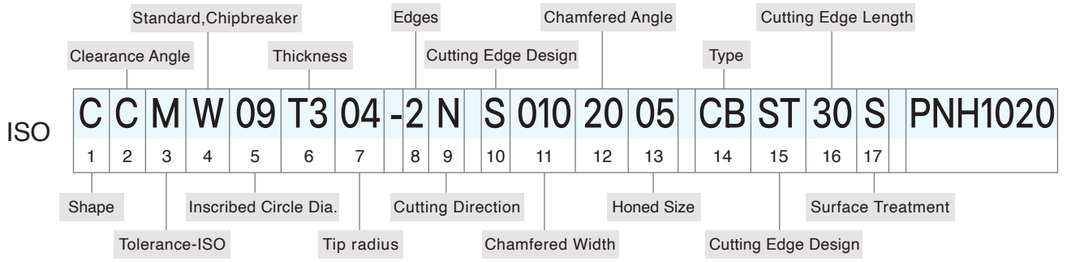


▪Label Identification



Nomenclature

Rule of Worldia PCBN Insert Code



1.Shape

H	Hexagon	120°	C	Diamond	80°
O	Octagonal	135°	D		55°
P	Pentagon	108°	E		75°
R	Round		M		86°
S	Square	90°	V		35°
T	Triangle	60°	W	Hexagon	80°
			L	Rectangular	90°
			A	Diamond	85°
			B		82° 55°
			K		

2.Clearance Angle

3°	A	20°	E	11°	P
5°	B	25°	F	X°	O
7°	C	30°	G		
15°	D	0°	N		

3.Tolerance-ISO

Code	Tolerance			Code	inch		
	m	s	IC		m	ic	s
C	±0.013	±0.025	±0.025	C	±.0005	±.001	±.001
H	±0.013	±0.025	±0.013	H	±.0005	±.0005	±.001
E	±0.025	±0.025	±0.025	E	±.001	±.001	±.001
G	±0.025	±0.13	±0.025	G	±.001	±.001	±.005
K	±0.013	±0.025	±0.05~±0.13	K	±.0005	±.002- 005	±.001
M	±0.08~±0.18	±0.13	±0.05~±0.13	M	±.002-.005	±.002- 005	±.005
U	±0.13~±0.38	±0.13	±0.08~±0.25	U	±.005-.012	±.005- 010	±.005

4.Standard, Chipbreaker

N		G		B	
R		W		H	
F		T		C	
A		Q		J	
M		U	Others		X

5.Inscribed Circle Dia.

ISO								ANSI	
Edgelength (accoringinsert shape)							InscribedCircleDia.	Code	IC Size
C	D	R	S	T	V	W	mm		inch
S4	04	03	03	06	-	02	3.97	(1.2)	5/32
04	05	04	04	08	08	S3	4.76	(1.5)	3/16
05	06	05	05	09	09	03	5.56	(1.8)	7/32
-	-	06	-	-	-	-	6	-	-
06	07	06	06	11	11	04	6.35	2	1/4
08	09	07	07	13	13	05	7.94	(2.5)	5/16
-	-	08	-	-	-	-	8	-	-
09	11	09	09	16	16	06	9.525	3	3/8
-	-	10	-	-	-	-	10	-	-
-	-	12	-	-	-	-	12	-	-
12	15	12	12	22	22	08	12.7	4	1/2
16	19	15	15	27	27	10	15.875	5	5/8
-	-	16	-	-	-	-	16	-	-
19	23	19	19	33	33	13	19.05	6	3/4
-	-	20	-	-	-	-	20	-	-
22	27	22	22	38	38	15	22.225	7	7/8
-	-	25	-	-	-	-	25	-	-
25	31	25	25	44	44	17	25.4	8	1
32	38	31	31	54	54	21	31.75	10	1-1/4
-	-	32	-	-	-	-	32	-	-

6.Thickness

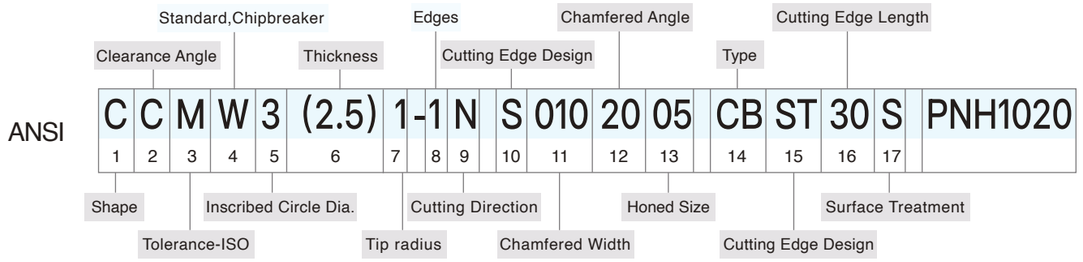
ISO		ANSI	
Code	Size	Code	Size
S	mm	S	inch
01	1.59	1	
1	/	1	6
02	2.38	(1.5)	
3	/	3	2
T2	2.78	-	-
3	3.18	2	1/8
T3	3.97	(2.5)	
5/32			
4	4.76	3	
3	/	1	6
05	5.56	(3.5)	
7	/	3	2
06	6.35	4	1/4
07	7.94	5	
5	/	1	6
09	9.525	6	3/8

7.Tip radius

ISO		ANSI	
Code	Size	Code	Size
Rε	mm	Rε	inch
00	sharp	00	.000
003	0.03	(0.1)	.001
1	0.1	(0.2)	.004
2	0.2	(0.5)	.008
04	0.4		1/64
08	0.8		1/32
12	1.2		3/64
16	1.6		1/16
20	2.0		5/64
24	2.4	6	3/32
28	2.8	7	7/64
32	3.2	8	1/8
M00	Round		circular

Nomenclature

Rule of Worldia PCBN Insert Code



8.Edges

Code	1	2	3	4	6	8
Edges	1 dege	2 deges	3 deges	4 deges	5 deges	6 deges

9.Cutting Direction

Code	R	L	N

10.Cutting Edge Design

E	T	S	F
Honed	Chamfered	Chamfered+Honed	Sharp Edge

11.Chamfered Width

Code	000	005	010	015	020	030
Size	-	0.05	0.1	0.15	0.2	0.3

12.Chamfered Angle

Code	α	00	10	15	20	25	30	35	45
Size	°	-	10	15	20	25	30	35	45

13.Honed Size

Code	00	02	05	10	20	30

14.Type

SF	SL	SS	CB	CS	SWW	SWU
Full Face	Solid Tipped Corner	Solid CBN	StandardTippedCorners	Standard Full Edge	SolidTippedCornersType"W"	SolidTippedCornersType"U"

15.Cutting Edge Design

ST	WG	CB
Nose Radius	Wiper	Chip Breaker

16. Cutting Edge Length

Code	Ap	22	25	28	30	40
Size		2.2	2.5	2.8	3.0	4.0

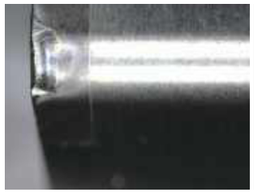
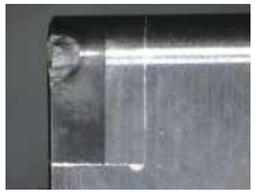
17.Surface Treatment

S	Uncoated
C3	Coated
CE	Coated

Insert Wear Causes and Solutions

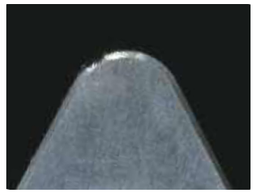
wear on the rake face, breakage of the cutting edge, crescent wear, chipping

▪Wear on the rake face

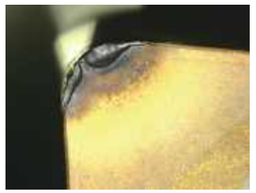
Causes: Excessive cutting speed
Insufficient wear resistance of the material
Low Feed rate
Solutions: Reduce cutting speed
Select a material with higher wear resistance Adjust the feed to match the cutting speed and depth (increase the feed)

▪Breakage of the cutting edge

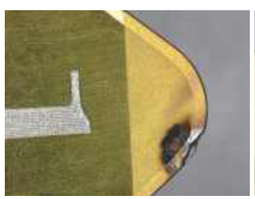
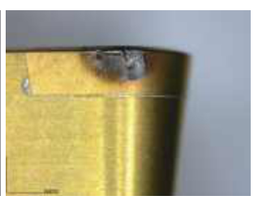
Causes: Hard material Vibration
Excessive feed rate or cutting depth Interrupted cutting
Chip damage
Solutions: Reduce cutting speed
Select a material with higher wear resistance
Adjust the feed to match the cutting speed and depth (increase the feed)

▪Crescent wear

Causes: Excessive cutting speed and/or feed rate
Insufficient wear resistance of the material
Insufficient coolant supply
Solutions: Reduce cutting speed and/or feed.rate
Optimize the coolant supply by increasing the coolant flow and pressure
Use a material with higher wear resistance for crescent

▪Chipping

Causes: Excessive pressure on inserts
Insufficient stability
Small corners
Excessive breakage at the cutting depth of the edge
Solutions: Use tougher materials
Use chamfered inserts
Increase the corners of the inserts

Dry/ Wet Cutting Recommendation

Dry/ Wet Cutting

The coolant plays a lubricating and cooling role when cutting with PCBN tools, minimizing heat damage to the insert. This is especially important during continuous high-speed cutting under heavy loads. However, during interrupted cutting, the use of coolant can create thermal stress on the inserts and lead to cracking. Therefore, it is recommended to use dry cutting for interrupted cutting.

Spindle Speed Recommendation

Cutting speed□ Workpiece/Tool Diameter

Cutting speed Vc(m/min)	Workpiece/Tool Diameter (mm)													
	12	16	20	25	32	50	63	80	100	125	160	175	200	250
80	2123	1592	1274	1019	796	510	404	318	255	204	159	146	127	102
90	2389	1791	1433	1146	896	573	455	358	287	229	179	164	143	115
100	2654	1990	1592	1274	995	637	506	398	318	255	199	182	159	127
110	2919	2189	1752	1401	1095	701	556	438	350	280	219	200	175	140
120	3185	2389	1911	1529	1194	764	607	478	382	306	239	218	191	153
140	3715	2787	2229	1783	1393	892	708	557	446	357	279	255	223	178
160	4246	3185	2548	2038	1592	1019	809	637	510	408	318	291	255	204
180	4777	3583	2866	2293	1791	1146	910	717	573	459	358	328	287	229
200	5308	3981	3185	2548	1990	1274	1011	796	637	510	398	364	318	255
220	5839	4379	3503	2803	2189	1401	1112	876	701	561	438	400	350	280
240	6369	4777	3822	3057	2389	1529	1213	955	764	611	478	437	382	306
260	6900	5175	4140	3312	2588	1656	1314	1035	828	662	518	473	414	331
280	7431	5573	4459	3567	2787	1783	1415	1115	892	713	557	510	446	357
300		5971	4777	3822	2986	1911	1517	1194	955	764	597	546	478	382
400						2548	2022	1592	1274	1019	796	728	637	510
600						3822	3033	2389	1911	1529	1194	1092	955	764
800						5096	4044	3185	2548	2038	1592	1456	1274	1019
1000						6369	5055	3981	3185	2548	1990	1820	1592	1274

Comparison Table of Metal Material

Steel grade comparison table

Steel grade comparison table						
Description	China	Japan	America	England	Germany	France
	GB	JIS	AISI/SAE	BS	DIN	NF
Carbon Steel	08 10	S10C	1010	040A10 045A10 045M10	C10E C10R	XC10
		S12C	1012	040A12		XC12
	15	S15C	1015	055M15	C15E C15R	
		S17C	1017			XC18
	20	S20C	1020	070M20 C22 C22E C22R	C22 C22E C22R	C22 C22E C22 R
		S22C	1023			
	25	S25C	1025	C25 C25E C22R	C25 C25E C22R	C25 C25E C22
		S28C	1029			R
	30	S30C	1030	080A30 080M30 C30 C30E C30R	C30 C30E C30R	C30 C30E C30 R
		S33C				
	35	S35C	1035	C35 C35E C35R	C35 C35E C35R	C35 C35E C35
		S38C	1038			R
	40	S40C	1039 1040	080M40 C40 C40E C40R	C40 C40E C40R	C40 C40E C40 R
		S43C	1042 1043	080A42		
	45	S45C	1045 1046	C45 C45E C45R	C45 C45E C45R	C45 C45E C45
		S48C		080A47		R
	50	S50C	1049	080M50 C50 C50E C50R	C50 C50E C50R	C50 C50E C50 R
		S53C	1050 1053			
	55	S55C	1055	070M55 C55 C55E	C55 C55E C55R	C55 C55E C55 R
	60	S58C	1059 1060	C55R C60 C60E	C60 C60E	C60 C60E
		S09CK		C60R 045A10	C60R C10E	C60R XC10
				045M10		
	15F	S15CK			C15E	XC12
		S20CK				XC18

Comparison Table of Metal Material

Steel grade comparison table

Steel grade comparison table						
Description	China	Japan	America	England	Germany	France
	GB	JIS	AISI/SAE	BS	DIN	NF
Ni-Cr Steel		SNC236			36NiCr6	
	12CrNi2	SNC415			14NiCr10	
	30CrNi3	SNC631			36NiCr10	
	12Cr2Ni4	SNC815		655M13	15NiCr13	
	37CrNi3	SNC836			31NiCr14	
Ni-Cr-Mo Steel	20CrNiMo	SNCM220	8615 8617 8620 8622	805A20 805M20 805A22 805M22	20NiCrMo2 20NiCrMoS2	20NCD 2
		SNCM240	8637 8640		40NiCrMo2-2	
		SNCM415				
	18CrNiMnMoA	SNCM420	4320		17NiCrMo6-4	
		SNCM431			30CrNiMo8	
	40CrNiMoA	SNCM439	4340		40NiCrMo6	
		SNCM447			34CrNiMo6	
		SNCM616				
		SNCM625				
		SNCM630				
		SNCM815				
Chromium Steel	15Cr 15GrA	SCr415			17Cr3 17CrS3	
	20Cr	SCr420	5120			
	30Cr	SCr430	5130 5132	34Cr4 34CrS4	34Cr4 34CrS4	34Cr4 34CrS4
	35Cr	SCr435	5132	37Cr4 37CrS4	37Cr4 37CrS4	37Cr4 37CrS4
	40Cr	SCr440	5140	530M40 41Cr4 41CrS4	41Cr4 41CrS4	41Cr4 41CrS4
	45Cr 50Cr	SCr445				
Cr-Mo Steel	15CrMo	SCM415			15CrMo4	
	20CrMo	SCM418			18CrMo4 18CrMoS4	
		SCM420		708M20	20CrMo5	
		SCM421				
	30CrMo 30CrMoA	SCM430	4130			
		SCM432				
	35CrMo	SCM435	4137	34CrMo4 34CrMoS4	34CrMo4 34CrMoS4	34CrMo4 34CrMoS4
	42CrMo	SCM440	4140 4142	708M40 709M40 42CrMo4 42CrMoS4	42CrMo4 42CrMoS4	42CrMo4 42CrMoS4
		SCM445	4145 4147			
		SCM822				

Comparison Table of Metal Material

Steel grade comparison table

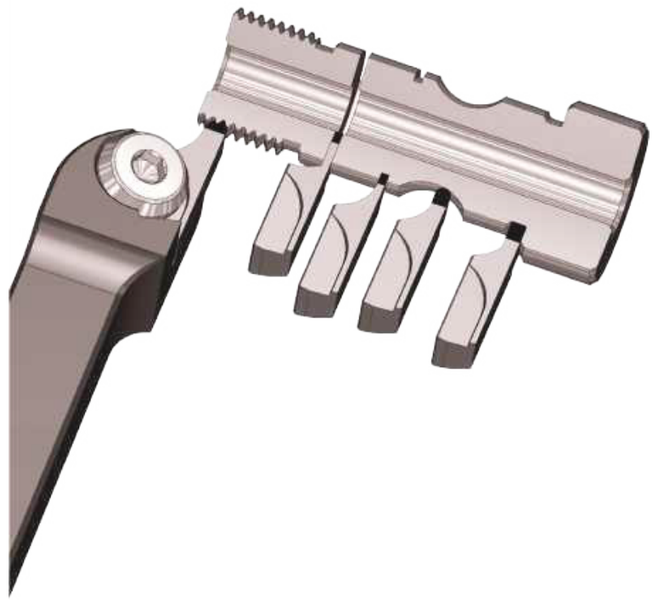
Steel grade comparison table						
Description	China	Japan	America	England	Germany	France
	GB	JIS	AISI/SAE	BS	DIN	NF
Mn-Cr Steel	20Mn2	SMn420	1522	150M19	20Mn5	
	30Mn2 35Mn2	SMn433	1536	150M36	34Mn5	
	40Mn2	SMn438	1541	150M36	36Mn5	
	45Mn2	SMn443	1541			
	15CrMn	SMnC420	5115		16MnCr5	
	40GrMn	SMnC443	5140			
Hardened Steel		SMn420H	1522H			
		SMn433H				
		SMn438H	1541H			
		SMn443H	1541H			
		SMnC420H				
		SMnC443H				
	15Cr1H	SCr415H			17Cr3 17CrS3	
	20Cr1H	SCr420H	5120H		17Cr3	
		SCr430H	5130H 5132H	34Cr4 34CrS4	34Cr4 34CrS4	34Cr4 34CrS4
		SCr435H	5135H	37Cr4 37CrS4	37Cr4 37CrS4	37Cr4 37CrS4
	40CrH	SCr440H	5140H	41Cr4 41CrS4	41Cr4 41CrS4	41Cr4 41CrS4
	15CrMoH	SCM415H	4118H		15CrMo5	
		SCM418H			18CrMo4 18CrMoS4	
	20CrMoH	SCM420H	4118H	708H20	18CrMo4	
		SCM435H	4135H 4137H	34CrMo4 34CrMoS4	34CrMo4 34CrMoS4	34CrMo4 34CrMoS4
	42CrMoH	SCM440H	4140H 4142H	42CrMo4 42CrMoS4	42CrMo4 42CrMoS4	42CrMo4 42CrMoS4
		SCM445H	4145H 4147H			
		SCM822H				
		SNC415H				
		SNC631H				
	12Cr2Ni4H	SNC815H		655H13	15NiCr13	
	20CrNiMoH	SNCM220H	8617H 8620H 8622H	805H17 805H20 805H22	21NiCrMo2	20N CD 2
	20CrNi2MoH	SNCM420H	4320H		20NiCrMoS6-4	
SGP	GCr4	SUJ1	51100			
	GCr15	SUJ2	52100		100Cr6	100Cr6
	GCr15SiMn	SUJ3	ASTM A 485 Grade 1			
	GCr15SiMo	SUJ4				
	GCr18Mo	SUJ5				

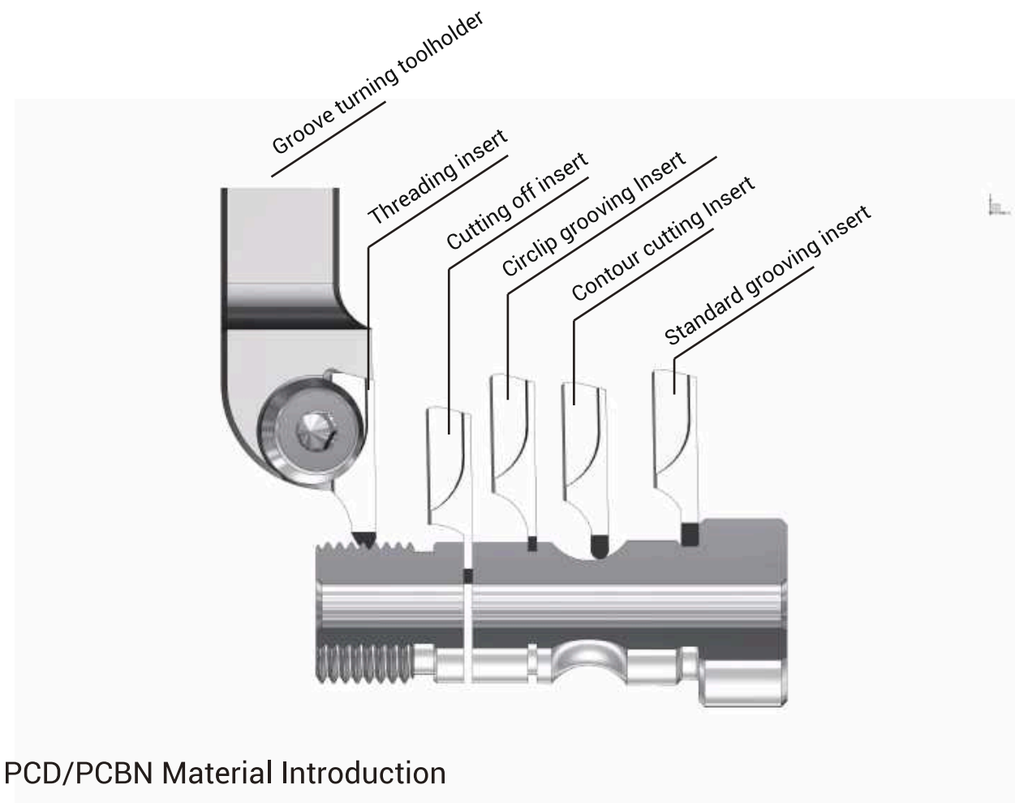
Comparison Table of Metal Material

Cast iron grade comparison table

Cast iron grade comparison table						
Description	China	Japan	America	England	Germany	France
	GB	JIS	AISI/SAE	BS	DIN	NF
Grey Iron	HT100	FC100	NO.20	100	GG10	
	HT150	FC150	NO.30	150	GG15	FGL150
	HT200	FC200	NO.35	200	GG20	FGL200
	HT250	FC250	NO.45	250	GG25	FGL250
	HT300	FC300	NO.50	300	GG30	FGL300
	HT350	FC350	NO.60	350	GG35	FGL350
					GG40	FGL400
Ductile Iron	QT400-18	FCD400	60-40-18	400/17	GGG40	FGS370-17
	QT450-10	FCD450	65-45-12	420/12		FGS400-12
	QT500-7	FCD500	70-50-05	500/7	GGG50	FGS500-7
	QT600-3	FCD600	80-60-03	600/7	GGG60	FGS600-2
	QT700-2	FCD700	100-70-03	700/2	GGG70	FGS700-2
	QT800-2	FCD800	120-90-02	800/2	GGG80	FGS800-2
	QT900-2			900/2		

PCD and PCBN Grooving Tools





PCD/PCBN Material Introduction

Material	PCD	PCBN			
Type	PD10F	PNH1020	PNH2018	PNH3017	PNK3003
Grian size [μm]	10	1~2	< 1	2	3
Content [Vol.%]	92	60~65	65~70	80~85	90
Binder	——	TiCN	TiN	W、Co	W、Co
Material features	The grade for common applications with excellent impact toughness and wear resistance. Suitable for general finishing of non-ferrous metals; precision machining of cemented carbide, ceramic semi-sintered products, extruded molding; machining of FRP, hard rubber, graphite.	Suitable for continuous and light interrupted machining of hardened steel with the combination of wear and impact resistance.	Suitable for medium interrupted machining of hardened steel with excellent wear and impact toughness	Suitable for heavy interrupted and heavy-duty machining of hardened steel with excellent wear resistance and impact toughness	The high CBN content, excellent wear resistance, and impact toughness make it ideal for machining cast iron.

WORLDIA
SHAPING YOUR WORLD
WITH DIAMOND

Grooving Tools Code Description

Standard Grooving Inserts

①	②	③		④	⑤	⑥	⑦
GTI	S	R/L	-	W300	T400	R040	P00
Groove turning inserts	Standard inserts	Right-hand /Left -hand toolholders		Main cutting edge width 3.0	Max cutting depth 4.0	Blade nose radius 0.4	Rake angle 0°

Cut-off Inserts

①	②	③		④	⑤	⑥	⑦
GTI	O	R/L	-	W200	T650	R020	P00
Groove turning inserts	Cut-off inserts	Right-hand /Left -hand toolholders		Main cutting edge width 2.0	Max cutting depth 6.5	Blade nose radius 0.2	Rake angle 0°

Circlip Grooving Inserts

①	②	③		④	⑤	⑥
GTI	R	R/L	-	W195	T400	R020
Groove turning inserts	Specialized groove	Right-hand /Left -hand toolholders		Main cutting edge width 1.95	Max Cutting depth 4.0	Blade nose radius 0.2

Face Grooving Inserts

①	②	③		④	⑤	⑥	⑦	⑧
GTI	E	R/L	-	W300	T850	R020	B060	S040
Groove turning inserts	End face ring groove	Right-hand /Left -hand toolholders		Main cutting edge width 3.0	Max cutting depth 8.5	Blade nose radius 0.2	Max OD Φ60	Min OD Φ40

Contour Cutting Inserts

①	②	③		④	⑤	⑥
GTI	C	R/L	-	R200	T400	P00
Groove turning inserts	Contour cutting inserts	Right-hand /Left -hand toolholders		Radius 2.0, Cutting width 2x R = 4.0	Max cutting depth 4.0	Rake angle 0°

Metric Thread Cutting Inserts

①	②	③		④	⑤
GTI	T	R/L	-	M60	P100
Groove turning inserts	Threading Inserts	Right-hand /Left -hand Toolholders		Metric 60°	Thread pitch 1.0mm

Inch thread cutting Inserts

①	②	③		④	⑤
GTI	T	R/L	-	I55	N11
Groove turning inserts	Threading Inserts	Right-hand /Left -hand toolholders		Inch 55°	11 teeth per inch

Groove Turning Toolholders

①	②		③	④
GTH	R/L	-	C91	S2020
Groove turning toolholders	Cutting Direction:Right-hand direction Left-hand direction		Shank tool cutting edge angle 91°	Tool holder size b=20，h=20

Grooving Tools Nomenclature

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Cutting edge design					Grade
S	010	20	05	-	PNH1020
Edge chamfering + honing	Chamfer width 0.1	Chamfer angle 20°	Rounding R0.005		Tool nose material
T	010	20		-	PNH1020
Edge chamfering	Chamfer width 0.1	Chamfer angle 20°			Tool nose material
E	05			-	PNH1020
Edge honing	Rounding R0.005				Tool nose material
F				-	PNH1020
Edge sharpness					Tool nose material

Standard Grooving Inserts

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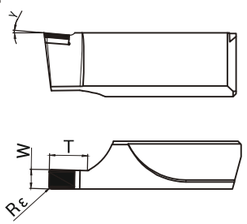
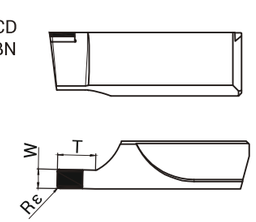
①	②	③		④	⑤	⑥	⑦
GTI	S	R/L	-	W300	T400	R040	P00
Groove turning inserts	Standard inserts	Right-hand /Left -hand toolholders		Main cutting edge width 3.0	Max cutting depth 4.0	Blade nose radiu 0.4	Rake angle 0°

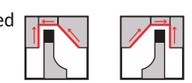
■ Fig: Right hand
■ Material: PCD



■ Material: PCD
PCBN



■ Allowable feed direction Traversing cutting



Right hand Left hand

Material group	N	H	K
Application	○ ◔ ✣	○ ◔ ✣	○ ◔ ✣
Cutting edge design	F	S0102005	S0102005

Right hand inserts						WORLDIA PCD	WORLDIA PCBN			
No.	Type	W	T	Rε	γ°	PD10F	PNH1020	PNH2018	PNH3017	PNK3003
1	GTISR-W300T500R020P00	3	5	0.2	0		▲	▲	▲	▲
2	GTISR-W300T500R020P05	3	5	0.2	5	▲				
3	GTISR-W350T500R020P00	3.5	5	0.2	0		▲	▲	▲	▲
4	GTISR-W350T500R020P05	3.5	5	0.2	5	▲				
5	GTISR-W400T500R040P00	4	5	0.4	0		▲	▲	▲	▲
6	GTISR-W400T500R040P05	4	5	0.4	5	▲				
7	GTISR-W450T500R040P00	4.5	5	0.4	0		▲	▲	▲	▲
8	GTISR-W450T500R040P05	4.5	5	0.4	5	▲				
Left hand inserts						WORLDIA PCD	WORLDIA PCBN			
No.	Type	W	T	Rε	γ°	PD10F	PNH1020	PNH2018	PNH3017	PNK3003
1	GTISL-W300T500R020P00	3	5	0.2	0		▲	▲	▲	▲
2	GTISL-W300T500R020P05	3	5	0.2	5	▲				
3	GTISL-W350T500R020P00	3.5	5	0.2	0		▲	▲	▲	▲
4	GTISL-W350T500R020P05	3.5	5	0.2	5	▲				
5	GTISL-W400T500R040P00	4	5	0.4	0		▲	▲	▲	▲
6	GTISL-W400T500R040P05	4	5	0.4	5	▲				
7	GTISL-W450T500R040P00	4.5	5	0.4	0		▲	▲	▲	▲
8	GTISL-W450T500R040P05	4.5	5	0.4	5	▲				

Circlip Grooving Inserts

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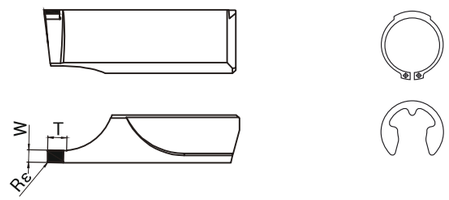
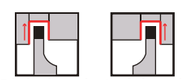
①	②	③		④	⑤	⑥
GTI	R	R/L	-	W195	T400	R020
Groove turning inserts	Specialized groove	Right-hand /Left -hand toolholders		Main cutting edge width 1.95	Max cutting depth 4.0	Blade nose radius angle 0.2

■ Fig: Right hand
■ Material: PCD/PCBN



■ Allowable feed direction



Right hand Left hand

Material group	N	H	K
Application	○ ◔ ✣	○ ◔ ✣	○ ◔ ✣
Cutting edge design	F	S0102005	S0102005

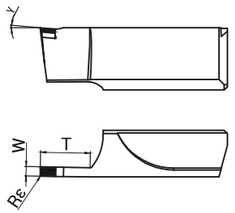
Right hand inserts					WORLDIA PCD	WORLDIA PCBN			
No.	Type	W	T	Rε	PD10F	PNH1020	PNH2018	PNH3017	PNK3003
1	GTIRR-W140T400R020	1.4	2	0.2	▲	▲	▲	▲	▲
2	GTIRR-W170T400R020	1.7	3	0.2	▲	▲	▲	▲	▲
3	GTIRR-W195T400R020	1.95	3	0.2	▲	▲	▲	▲	▲
4	GTIRR-W225T500R020	2.25	3	0.2	▲	▲	▲	▲	▲
Left hand inserts					WORLDIA PCD	WORLDIA PCBN			
No.	Type	W	T	Rε	PD10F	PNH1020	PNH2018	PNH3017	PNK3003
1	GTIRL-W140T400R020	1.4	2	0.2	▲	▲	▲	▲	▲
2	GTIRL-W170T400R020	1.7	3	0.2	▲	▲	▲	▲	▲
3	GTIRL-W195T400R020	1.95	3	0.2	▲	▲	▲	▲	▲
4	GTIRL-W225T500R020	2.25	3	0.2	▲	▲	▲	▲	▲

Cutting off Inserts

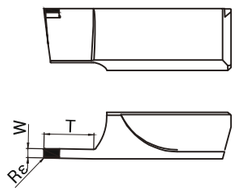
①	②	③		④	⑤	⑥	⑦
GTI	O	R/L	-	W200	T650	R020	P00
Groove turning inserts	Cut-off inserts	Right-hand /Left -hand toolholders		Main cutting edge width 2.0	Max cutting depth 6.5	Blade nose radius angle 0.2	Rake angle 0°

■ Fig: Right hand

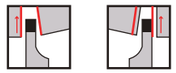
■ Material: PCD



■ Material: PCD
PCBN



■ Allowable feed direction



Right hand Left hand

Material group	N	H	K
Application	○ ◔ ✣	○ ◔ ✣	○ ◔ ✣
Cutting edge design	F	S0102005	S0102005

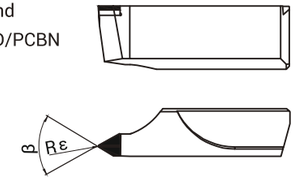
Right hand inserts						WORLDIA PCD	WORLDIA PCBN			
No.	Type	W	T	Rε	γ°	PD10F	PNH1020	PNH2018	PNH3017	PNK3003
1	GTIOR-W150T700R020P00	1.5	7	0.2	0		▲	▲	▲	▲
2	GTIOR-W150T700R020P05	1.5	7	0.2	5	▲				
3	GTIOR-W200T700R020P00	2	7	0.2	0		▲	▲	▲	▲
4	GTIOR-W200T700R020P05	2	7	0.2	5	▲				
5	GTIOR-W250T850R020P00	2.5	8.5	0.2	0		▲	▲	▲	▲
6	GTIOR-W250T850R020P05	2.5	8.5	0.2	5	▲				
7	GTIOR-W300T850R020P00	3	8.5	0.2	0		▲	▲	▲	▲
8	GTIOR-W300T850R020P05	3	8.5	0.2	5	▲				
Left hand inserts						WORLDIA PCD	WORLDIA PCBN			
No.	Type	W	T	Rε	γ°	PD10F	PNH1020	PNH2018	PNH3017	PNK3003
1	GTIOL-W150T700R020P00	1.5	7	0.2	0		▲	▲	▲	▲
2	GTIOL-W150T700R020P05	1.5	7	0.2	5	▲				
3	GTIOL-W200T700R020P00	2	7	0.2	0		▲	▲	▲	▲
4	GTIOL-W200T700R020P05	2	7	0.2	5	▲				
5	GTIOL-W250T850R020P00	2.5	8.5	0.2	0		▲	▲	▲	▲
6	GTIOL-W250T850R020P05	2.5	8.5	0.2	5	▲				
7	GTIOL-W300T850R020P00	3	8.5	0.2	0		▲	▲	▲	▲
8	GTIOL-W300T850R020P05	3	8.5	0.2	5	▲				

Groove Turning Toolholders

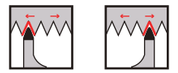
①	②	③		④	⑤
GTI	T	R/L	-	M60	P100
Groove turning inserts	Threading inserts	Right-hand /Left -hand Toolholders		Metric 60°	Thread pitch 1.0mm

■ Fig: Right hand

■ Material: PCD/PCBN



■ Allowable feed direction



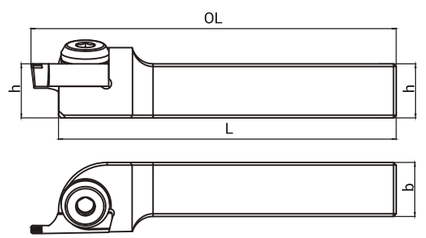
Right hand Left hand

Material group	N	H	K
Application	○ ◔ ✣	○ ◔ ✣	○ ◔ ✣
Cutting edge design	F	S0102005	S0102005

Right hand inserts					WORLDIA PCD	WORLDIA PCBN			
No.	Type	P	A	Rε	PD10F	PNH1020	PNH2018	PNH3017	PNK3003
1	GTITR-M60P100	1.00	60	0.12	▲	▲	▲	▲	▲
2	GTITR-M60P150	1.50	60	0.18	▲	▲	▲	▲	▲
3	GTITR-M60P200	2.00	60	0.25	▲	▲	▲	▲	▲
Left hand inserts					WORLDIA PCD	WORLDIA PCBN			
No.	Type	P	A	Rε	PD10F	PNH1020	PNH2018	PNH3017	PNK3003
1	GTITL-M60P100	1.00	60	0.12	▲	▲	▲	▲	▲
2	GTITL-M60P150	1.50	60	0.18	▲	▲	▲	▲	▲
3	GTITL-M60P200	2.00	60	0.25	▲	▲	▲	▲	▲

Groove Turning Toolholders

①	②	③		④
GTH	R/L	-	C91	S2020
Groove turning Toolholders	Cutting Direction: Right-hand direction Left-hand direction		Shank tool cutting edge angle 91°	Tool holder size b=20, h=20



No.	Type	b	h	L	OL
1	GTHR-C91S2020	20	20	125	135
2	GTHL-C91S2020	20	20	125	135
3	GTHR-C91S2525	25	25	150	160
4	GTHL-C91S2525	25	25	150	160

■ Fig: Right hand

Customized Grooving Inserts

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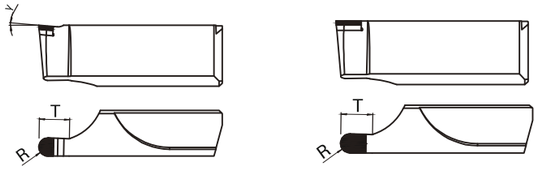
GTIR Contour Cutting Inserts

①	②	③		④	⑤	⑥
GTI	C	R/L	-	R200	T400	P00
Groove turning inserts	Contour cutting Inserts	Right-hand /Left -hand toolholders		Radius 2.0, Cutting width 2x R = 4.0	Max Cutting depth 4.0	Rake angle 0°

- Fig: Right hand
- Material: PCD/PCBN
- Allowable feed direction

Right hand

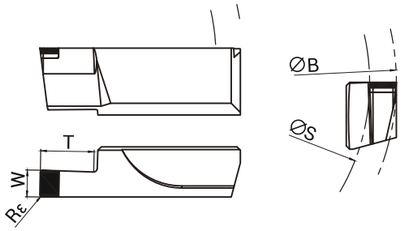


GTIE End Face Ring Grooving Inserts

①	②	③		④	⑤	⑥		⑦	⑧
GTI	E	R/L	-	W300	T850	R020	-	B060	S040
Groove turning inserts	End face ring groove	Right-hand /Left -hand toolholders		Main cutting edge width 3.0	Max Cutting depth 8.5	Blade nose radius angle 0.2		Max OD Φ60	Min OD Φ40

- Fig: Right hand
- Material: PCD/PCBN
- Allowable feed direction

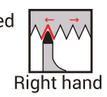
Right hand



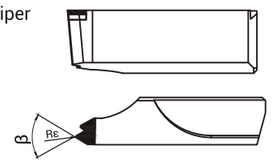
GTIT Metric Threading Inserts

①	②	③		④	⑤
GTI	T	R/L	-	M60	P100
Groove turning inserts	Threading inserts	Right-hand /Left -hand toolholders		Metric 60°	Thread Pitch 1.0mm

- Fig:Right-hand inserts with wiper
- Material: PCD/PCBN
- Allowable feed direction



Right hand

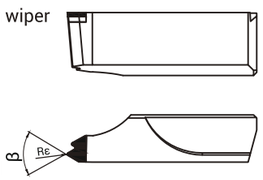


GTIT Inch Threading Inserts

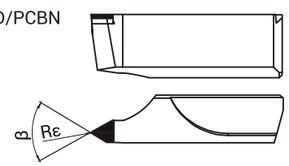
①	②	③		④	⑤
GTI	T	R/L	-	I55	N11
Groove turning inserts	Threading Inserts	Right-hand /Left -hand toolholders		Inch 55°	11 teeth per inch

- Fig:Right-hand inserts with wiper
- Material: PCD/PCBN
- Allowable feed direction

Right hand



- Fig: Right-hand inserts without wiper
- Material: PCD/PCBN



Application Cases

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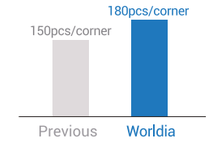
Tool life increased by 1.2 times

PCBN Grooving Cutter Designed for Shaft Grooving

Workpiece: Input shaft
Material: Hardened steel
Hardness: HRC58~62
Surface finish: Ra0.8
Worldia insert: GTIRL-W225T500R020 PNH2018
Parameters: VC: 200m/min f: 0.08mm/rev Ap: 0.3mm

Comparison of tool life

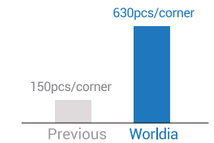


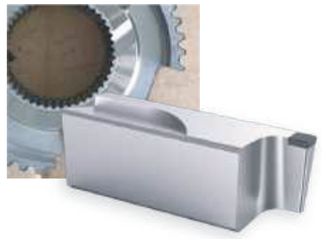
4.2 times longer tool life than pervious tools

Application Case of PCBN Threading Insert

Workpiece: Pulley
Material: 20CrMnTiH
Hardness: HRC58~63
Surface finish: Ra1.6
Machining parts: external thread
Operation type: Continuous
Worldia insert: GTITL-M60P200 PNH2018
Parameters: Vc:100m/min f: 1mm/rev ap: 0.06mm

Comparison of tool life



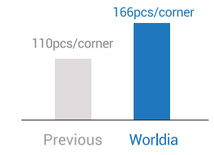


Tool life increased by 1.5 times

Application Case of PCBN Face Grooving Insert

Workpiece: Wheel hub
Material: Powder metal
Hardness:HRC40
Machining size:φ73~φ52
Machining parts: Face grooving
Operation type: Continuous & interrupted cutting
Surface finish:Ra0.8
Worldia Insert: Customized face grooving insert
Parameters:Vc:160~224m/min f: 0.11mm/rev ap: 3mm

Comparison of tool life



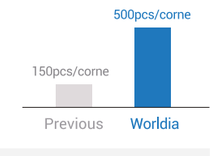
16% increase in machining efficiency

3 times longer tool life than pervious tools

Application Case of PCBN Grooving Insert

Workpiece: Synchronizer
Material:20CrMnTiH
Hardness:HRC58-62
Machining size:D92
Surface finish:RZ3.5
Machining parts: Groove
Operation type: Continuous cutting
Tool: Grooving cutter

Comparison of tool life

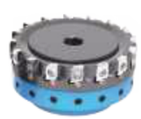
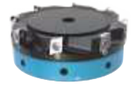


Parameters	Worldia	Previous
Tool	GTISR-W300T500R020P05 PNH2018	—
Cutting depth(mm)	0.15	0.15
Spindle speed(rev/min)	450/500	645
Feed(mm/rev)	0.13/0.2	0.1
Total (s)	42"	50"

PCD and PCBN

Indexable Milling Tools

Worldia offers a comprehensive series of FMP indexable milling solutions for a wide variety of part materials and milling processes from roughing to finishing, including face milling, shoulder milling, side milling and slot milling.

	Shell Milling Cutters Fine Pitch	Shell Milling Cutters Light Weight/ Coarse Pitch	Disc Milling Cutters	Shell Milling Cutters	Shell Milling Cutters
Specification	FMP-BE	FMP-BE	FMP-BE	FMP-SD	FMP-LN
Picture					
Processes	Face + Shoulder Milling	Face + Shoulder Milling	Side Milling LH,RH,Slotting	Face Milling	Face + Shoulder Milling
Work piece Material	N K H	N K H	N K H	K H	K H
Cutting Material	PCD/PCBN	PCD/PCBN	PCD/PCBN	PCBN	PCBN/Carbide
Inserts Type	BEHW1204	BEHW1204	BEHW1204	SDHN07T3	LNHX1205
Cutting Edges/ Insert	1 or 2	1 or 2	1 or 2	4	4 or 8
Max. DOC/ Ap (mm)	11	11	11/21	0.05	11
Standard Cutter Diameter (mm)	40 - 250	80 - 160	100 - 200	50 - 250	80 - 250
Cutter Material	40 - 63:Steel 80 - 250:Aluminium +Steel	Aluminium + Steel	Steel	Steel	Steel
Lead Angle	90°	90°	90°	88°	90°
Axially Adjustable	Yes, 2 µm within 0,1 mm range	Yes, 2 µm within 0,1 mm range	Yes, 2 µm within 0,1 mm range	Yes, 5 µm within 0,3 mm range	NO
Fix Pocket Runout (mm)	0,02 - 0,04	0,02 - 0,04	0,02 - 0,04	0,02 - 0,04	0,02
HSC Capability	Yes	Yes	Yes	Yes	Yes
Internal Coolant	Yes	Yes	No	Yes	Yes
Standard	ISO, INCH	ISO	ISO	ISO	ISO

Main Applications

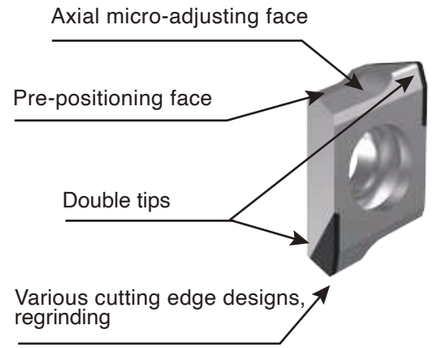
Worldia FMP-BE Milling Cutters were developed for high-speed machining of light metal on even small-size machining centers with precision spindles.
Thanks to innovative Bimetal Aluminium/ Steel body design, requirements for low weight, low inertia and precise balancing to allow high spindle acceleration, high strength and wear resistance are met at the same time.
Cutters from diameter 80 to 160 mm can be mounted to the same adaptor, whereas e.g. the weight of a diameter 160 mm cutter with BT30 adaptor does not exceed 3 kg.

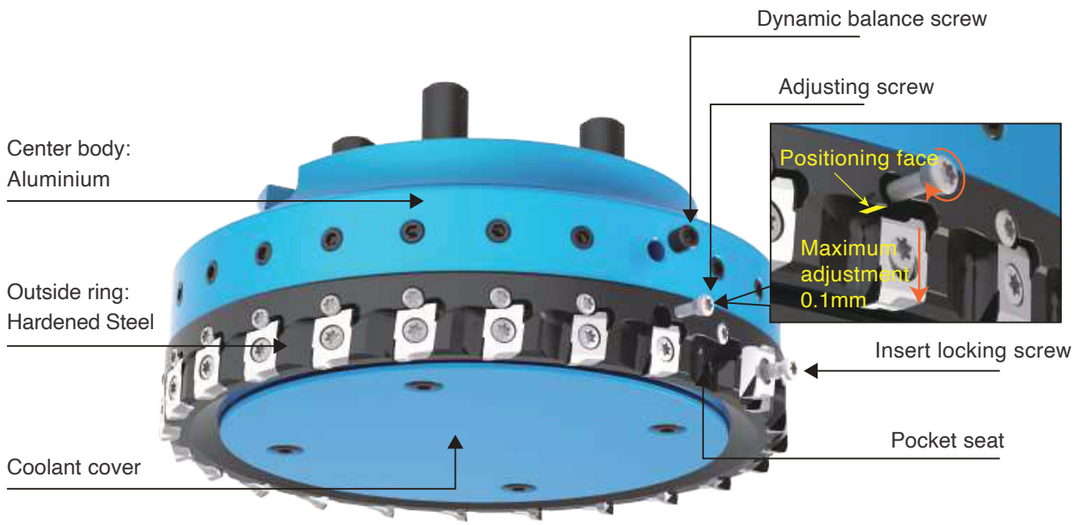
All Worldia FMP-BE cutters have 1 standard insert pocket that allows usage of different combinations of BEHW1204 PCD- and PCBN-tipped inserts, adjustable or non-adjustable, for a comprehensive range of roughing and finishing applications including hatch milling.

Worldia FMP-BE Indexable Milling Cutters
High-speed cutting with highest precision and lowest weight

Design Features

- Aluminium Alloy/ Steel Bimetal design
  - Al center body for weight reduction
  - Hardened Steel ring for high rigidity and wear resistance, therefore longer cutter life versus cutters with Aluminium body
- High precision insert pocket seats keeping 0,02 mm axial runout without insert adjustment
- As a standard, each pocket can also be adjusted to 2 μm axial runout within a 0,1 mm range
- BEHW inserts are available in a variety of cutting materials, lead angles, wiper and corner designs for many different applications in face and shoulder milling, roughing and finishing
- Separation between insert positioning face and cutting edge to protect cutting edge and to simplify the use of relapped or retipped inserts
- Inserts with 2 cutting edges and relap/ retip service to reduce tooling cost per part
- Internal coolant through the cutter body





FMP-BE Shell Milling Cutters – Fine Pitch

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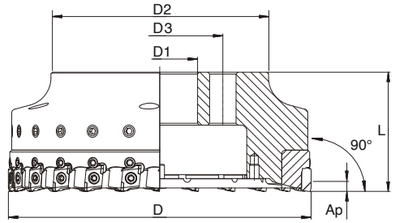
WITH DIAMOND

Facemilling ShoulderMilling



Inventory	
Code	In stock, MANANOVA
○	Made to order

ISO

Inserts see page 21-23

Specification	Inventory	D	D1	D2	D3	L	Ap max	Z	kg	max RPM	Material
FMP040SA16-BE12-06	040401060013	40	16	36	—	40	11	6	0.36	40000	Steel
FMP050SA22-BE12-08	040401060005	50	22	45	—	40	11	8	0.55	35100	Steel
FMP063SA22-BE12-10	040401060006	63	22	45	—	40	11	10	0.75	30200	Steel
FMP080SA27-BE12-12	040401060007	80	27	50	—	50	11	12	0.96	27500	Steel+Aluminium
FMP100SB32-BE12-16	040401060008	100	32	70	—	50	11	16	1.45	23800	Steel+Aluminium
FMP125SB40-BE12-20	040401060009	125	40	90	—	63	11	20	2.40	19100	Steel+Aluminium
FMP160SC40-BE12-24	040401060010	160	40	115	66.7	63	11	24	3.00	14900	Steel+Aluminium
FMP200SC60-BE12-30	040401060011	200	60	150	101.6	63	11	30	4.25	11900	Steel+Aluminium
FMP250SC60-BE12-36	040401060012	250	60	200	101.6	63	11	36	6.50	9550	Steel+Aluminium

Cutters delivered assembled with spare parts,but without inserts,dynamically balanced to G2.5 at 25000 RPM unit: mm

Spare Parts







D	Wrench	Insert screw	Adjusting screw	Dynamic balance screw	Coolant lock screw	Coolant lock screw	Coolant shower plate
40	15IP	S40120J	S30110G	0204010265	FMP040SA16-BE12-06.02	—	—
50	15IP	S40120J	S30110G	0204010265	FMP050SA22-BE12-08.02	—	—
63	15IP	S40120J	S30110G	0204010265	FMP063SA22-BE12-10.02	—	—
80	15IP	S40120J	S30110G	B03400252	FMP080SA27-BE12-12.03	—	—
100	15IP	S40120J	S30110G	B03400252	—	FMP100SB32-BE12-16.03	—
125	15IP	S40120J	S30110G	B03400252	—	FMP125SB40-BE12-20.03	—
160	15IP	S40120J	S30110G	B03400252	—	—	FMP160SC40-BE12-24.03
200	15IP	S40120J	S30110G	B03400252	—	—	FMP200SC60-BE12-30.03
250	15IP	S40120J	S30110G	B03400252	—	—	FMP250SC60-BE12-36.03

FMP-BE Shell Milling Cutters – Fine Pitch

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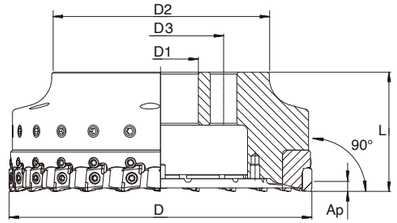
Facemilling ShoulderMilling



Inventory	
Code	In stock, MANANOVA
○	Made to order

INCH

Inserts see page 21-23

Specification	Inventory	D	D1	D2	D3	L	Ap max	Z	kg	max RPM	Material
FMP2.00SA0.75-BE12-08	040401060049	2.00	0.75	1.772	—	1.575	0.45	8	0.48	35100	Steel
FMP2.50SA0.75-BE12-10	040401060050	2.50	0.75	1.772	—	1.575	0.45	10	0.71	30200	Steel
FMP3.00SA1.00-BE12-12	040401060051	3.00	1.00	1.969	—	1.969	0.45	12	0.75	27500	Steel+Aluminium
FMP4.00SB1.25-BE12-16	040401060044	4.00	1.25	2.756	—	1.969	0.45	16	1.32	23800	Steel+Aluminium
FMP5.00SB1.50-BE12-20	040401060048	5.00	1.50	3.543	—	2.480	0.45	20	2.31	19100	Steel+Aluminium

Cutters delivered assembled with spare parts,but without inserts,dynamically balanced to G2.5 at 25000 RPM unit: in

Spare Parts







D	Wrench	Insert screw	Adjusting screw	Dynamic balance screw	Coolant lock screw	Coolant lock screw	Coolant shower plate
2.00	15IP	S40120J	S30110G	0204010265	FMP2.00SA0.75-BE12-08.02	—	—
2.50	15IP	S40120J	S30110G	0204010265	FMP2.50SA0.75-BE12-10.02	—	—
3.00	15IP	S40120J	S30110G	0204010265	FMP3.00SA1.00-BE12-12.03	—	—
4.00	15IP	S40120J	S30110G	B03400252	—	FMP4.00SB1.25-BE12-16.03	—
5.00	15IP	S40120J	S30110G	B03400252	—	FMP5.00SB1.50-BE12-20.03	—

FMP-BE Shell Milling Cutters – Light Weight/ Coarse Pitch

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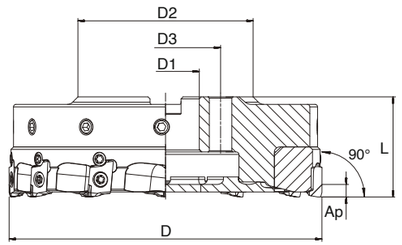

Inventory	
Code	In stock, MANANOVA
○	Made to order

Inserts see page 21-23

Specification	Inventory	D	D1	D2	D3	L	Ap max	Z	kg	max RPM	Material
FMP080SB27-BE12-08	040401060029	80	27	70	—	40	11	8	0.78	27500	Steel+Aluminium
FMP100SB27-BE12-08	040401060028	100	27	70	—	40	11	8	1.12	23800	Steel+Aluminium
FMP125SC27-BE12-12	040401060027	125	27	70	54	40	11	12	1.43	19100	Steel+Aluminium
FMP160SC27-BE12-12	040401060026	160	27	70	54	40	11	12	2.00	14900	Steel+Aluminium

Cutters delivered assembled with spare parts,but without inserts,dynamically balanced to G2.5 at 25000 RPM

unit: mm

Spare Parts







D	Wrench	Insert screw	Adjusting screw	Dynamic balance screw	Coolant lock screw	Coolant lock screw	Coolant shower plate
80	15IP	S40120J	S30110G	0204010265	—	FMP080SB27-BE12-08.03	—
100	15IP	S40120J	S30110G	0204010265	—	FMP100SB27-BE12-08.03	—
125	15IP	S40120J	S30110G	0204010265	—	—	FMP125SC27-BE12-12.03
160	15IP	S40120J	S30110G	B03400252	—	—	FMP160SC27-BE12-12.03

FMP-BE Shank and Screw-On Milling Cutters

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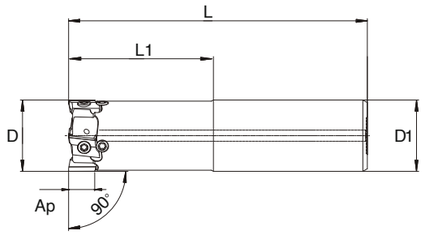
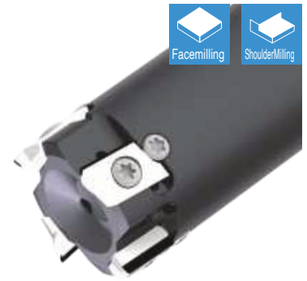




Inventory	
Code	In stock, MANANOVA
○	Made to order

Inserts see page 21-23

Specification	Inventory	D	D1	D2	L	L1	Ap max	Z	kg	max RPM	Material
FMP025CS25-BE12-03	040401070087	25	25	—	130	50	11	3	0.50	25000	Steel
FMP032CS32-BE12-04	040401070005	32	32	—	130	50	11	4	0.80	25000	Steel

unit: mm

Inventory	
Code	In stock, MANANOVA
○	Made to order

Inserts see page 21-23

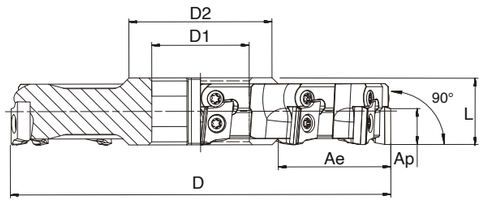
Specification	Inventory	D	D1	D2	L	L1	G	W	Ap max	Z	kg	max RPM	Material
FMP025M12-BE12-03	040401070088	25	12.5	21	40	—	M12	17	11	3	0.13	25000	Steel
FMP032M16-BE12-04	040401070089	32	17	29	40	—	M16	24	11	4	0.23	25000	Steel

unit: mm

Spare Parts

D	Wrench	Insert screw	Adjusting screw
25	15IP	S40090J	S30110G
32	15IP	S40090J	S30110G

SideMilling Slot Milling SideMilling



Inventory	
Code	In stock, MANANOVA
○	Made to order

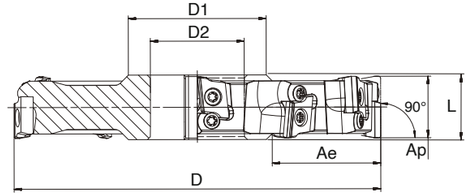
ISO

Inserts see page 21-23

Specification	Inventory	D	D1	D2	L	Ap max	Ae max	Z_{eff}	Z_{axial}	kg	max RPM	Material
RH cutting												
SMP100CA32-BE12-10R	○	100	32	47	22	11	20	10	10	0.85	27000	Steel
SMP125CA32-BE12-12R	○	125	32	47	22	11	30	12	12	1.40	24000	Steel
SMP160CA40-BE12-14R	○	160	40	55	22	11	45	14	14	2.20	21300	Steel
SMP200CA40-BE12-16R	○	200	40	55	22	11	65	16	16	3.50	19100	Steel
LH cutting												
SMP100CA32-BE12-10L	○	100	32	47	22	11	20	10	10	0.85	27000	Steel
SMP125CA32-BE12-12L	○	125	32	47	22	11	30	12	12	1.40	24000	Steel
SMP160CA40-BE12-14L	○	160	40	55	22	11	45	14	14	2.20	21300	Steel
SMP200CA40-BE12-16L	○	200	40	55	22	11	65	16	16	3.50	19100	Steel

unit: mm

SideMilling Slot Milling SideMilling



Inventory	
Code	In stock, MANANOVA
○	Made to order

ISO

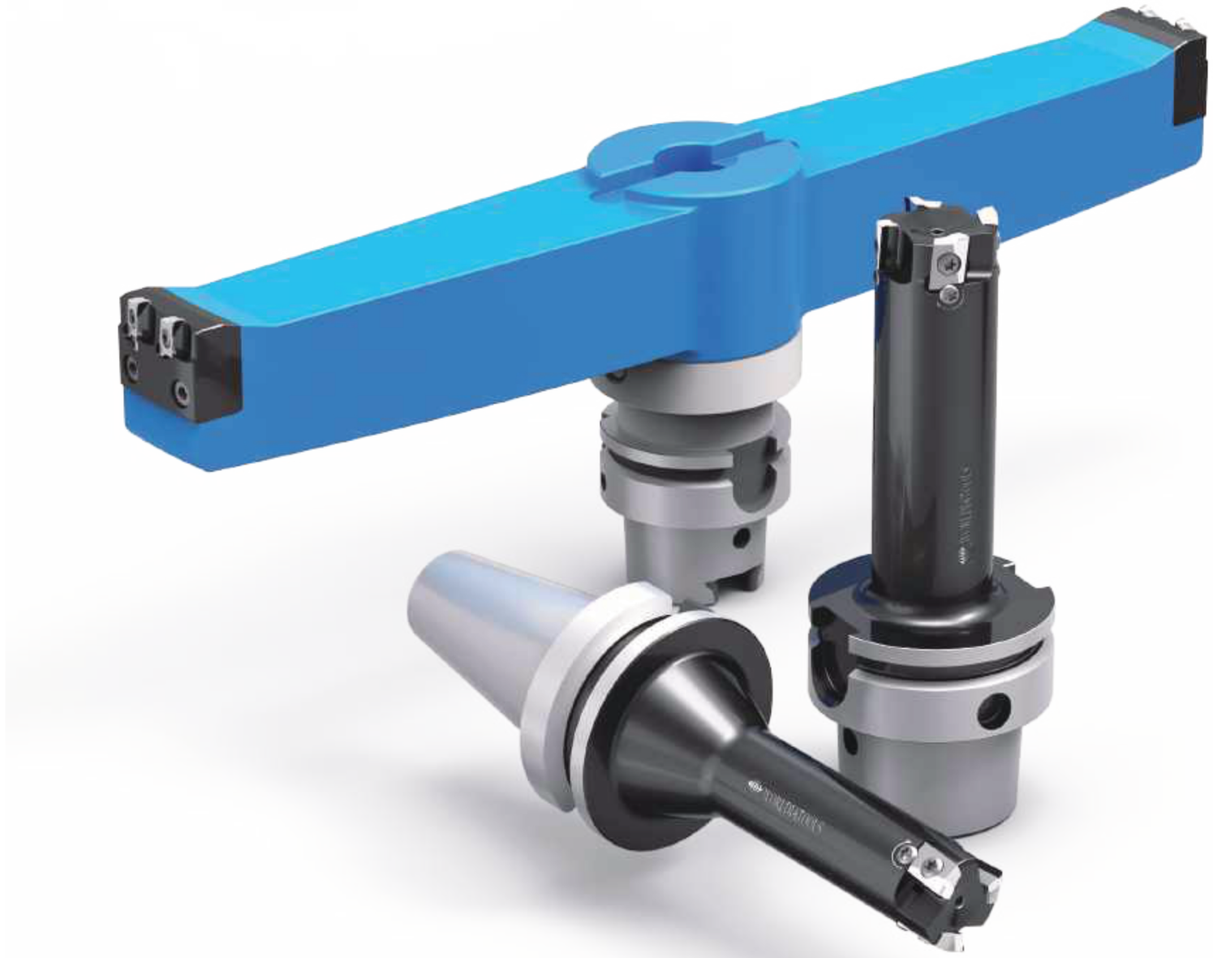
Inserts see page 21-23

Specification	Inventory	D	D1	D2	L	Ap max	Ae max	Z_{eff}	Z_{axial}	kg	max RPM	Material
SMP100CA32-BE12-10N	○	100	32	47	22	21	20	5+5	5+5	0.85	27000	Steel
SMP125CA32-BE12-12N	○	125	32	47	22	21	30	6+6	6+6	1.40	24000	Steel
SMP160CA40-BE12-14N	○	160	40	55	22	21	45	7+7	7+7	2.20	21300	Steel
SMP200CA40-BE12-16N	○	200	40	55	22	21	65	8+8	8+8	3.50	19100	Steel

unit: mm

Designed for

- Complex structures and special tool diameter, length and rigidity requirements
- Flexible machining of cavities, shoulders etc.



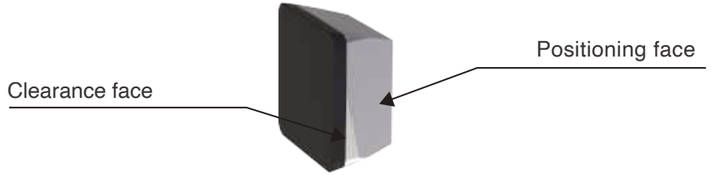
Main Applications

High-speed semi-finish and finish face milling of cast iron and hardened materials with high requirements to surface finish and waviness.

Design Features

- Cutter body is made of hardened Steel-Alloy, machined by 5-axis hard milling High-
- precision insert pocket seats keeping 0,01 mm axial runout without insert adjustment
- As a standard, each pocket can also be adjusted to 2 μm axial runout within a 0,3 mm range
- Positive rake angles for smooth cutting and chip removal from surface
- Separation between insert positioning face and cutting edge to protect cutting egde and to simplify the use of relapped inserts
- Insert wedge clamping system allows easy exchange of inserts and reliable clamping
- SDHN inserts are available in a variety of wiper and corner designs for many different applications in semi-finish and finish face milling
- Full-face PCBN inserts with 4 cutting egdes and regrinding option for low cutting tool cost
- Internal coolant through cutter body

Worldia FMP-SD Indexable Milling Cutters
High-speed cutting with PCBN



FMP-SD Shell Milling Cutters Specifications

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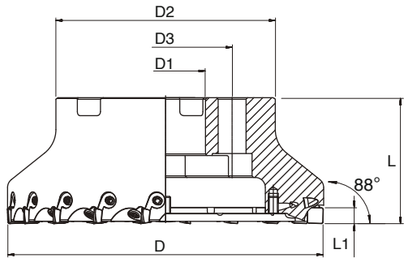
Face milling



Ap max = 0,5 mm

Inventory	
Code	In stock, MANANOVA
○	Made to order

ISO

Inserts see page 24

Specifications	Inventory	D	D1	D2	D3	L	L1	Z	kg	max RPM
FMP050SA22-SD07-05	040401060023	50	22	45	—	40	7.94	5	0.40	9500
FMP063SA22-SD07-08	040401060022	63	22	45	—	40	7.94	8	0.60	7500
FMP080SA27-SD07-10	040401060021	80	27	60	—	50	7.94	10	1.20	6000
FMP100SB32-SD07-12	040401060020	100	32	80	—	50	7.94	12	1.90	4700
FMP125SB40-SD07-16	040401060019	125	40	90	—	63	7.94	16	3.20	3800
FMP160SC40-SD07-20	040401060018	160	40	110	66.7	63	7.94	20	4.50	3000
FMP200SC60-SD07-24	040401060017	200	60	150	101.6	63	7.94	24	6.80	2300
FMP250SC60-SD07-32	040401060016	250	60	200	101.6	63	7.94	32	11.6	1900

unit: mm

Spare Parts

D	Wrench	Dowel screw	Wedge block	Adjustment block	Coolant lock screw(1)	Coolant lock screw(2)	Coolant shower plate
50	15IP	M5*20	FMPSD07.01	FMPSD07.02	FMP050SA22-SD07-05.02	—	—
63	15IP	M5*20	FMPSD07.01	FMPSD07.02	FMP063SA22-SD07-08.02	—	—
80	15IP	M5*20	FMPSD07.01	FMPSD07.02	FMP080SA27-SD07-10.02	—	—
100	15IP	M5*20	FMPSD07.01	FMPSD07.02	—	FMP100SB32-SD07-12.02	—
125	15IP	M5*20	FMPSD07.01	FMPSD07.02	—	FMP125SB40-SD07-16.02	—
160	15IP	M5*20	FMPSD07.01	FMPSD07.02	—	—	FMP160SC40-SD07-20.02
200	15IP	M5*20	FMPSD07.01	FMPSD07.02	—	—	FMP200SC60-SD07-24.02
250	15IP	M5*20	FMPSD07.01	FMPSD07.02	—	—	FMP250SC60-SD07-30.02

Customized FMP-SD Cutters

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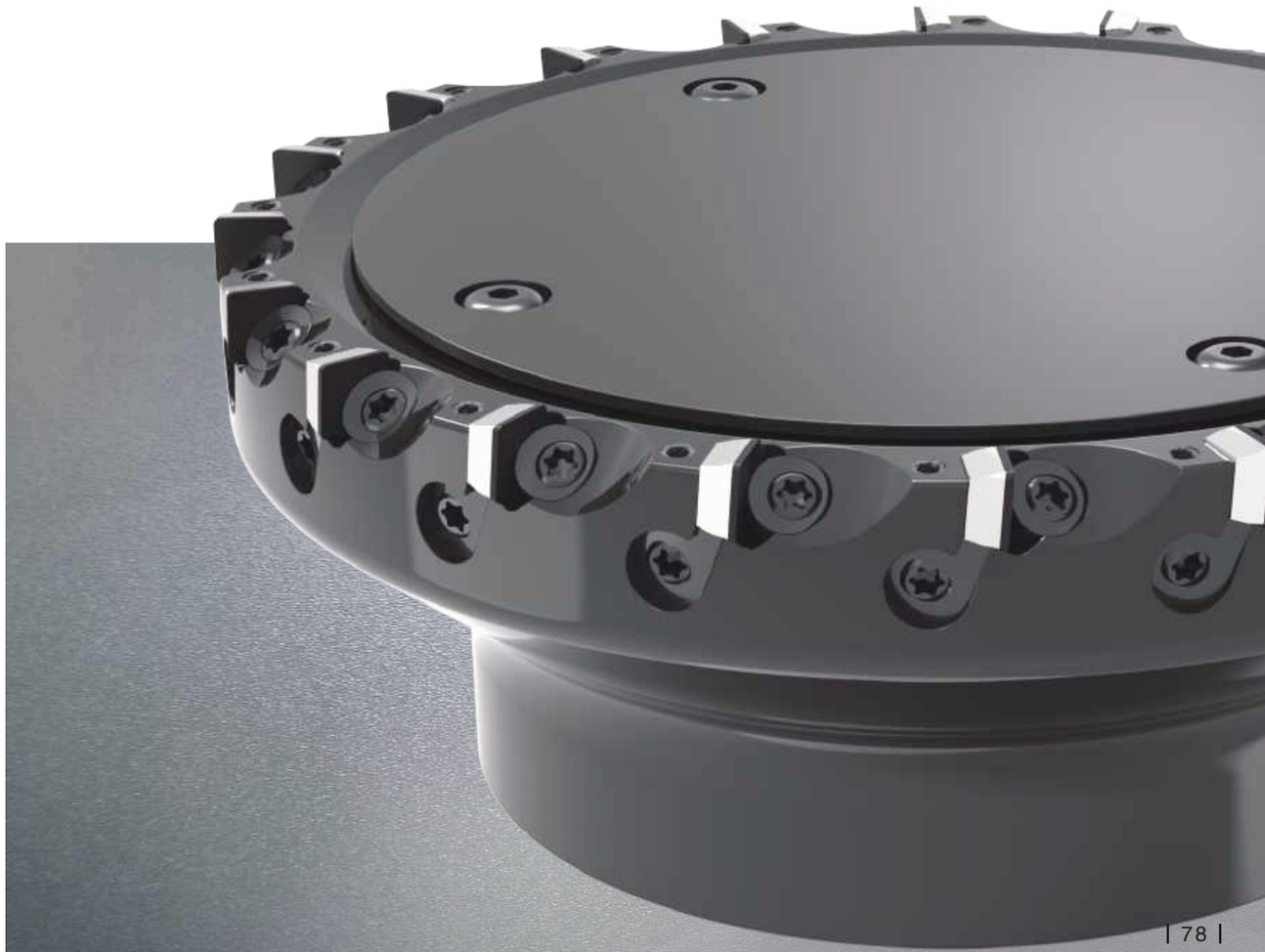
Designed for special applications including disc milling, rear face of machine guideways etc.



Milling Adaptors
BT / HSK

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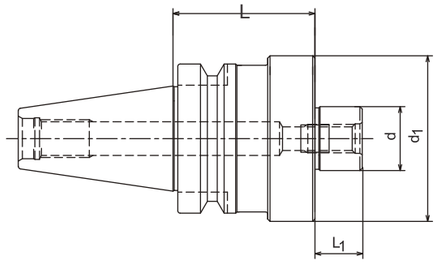
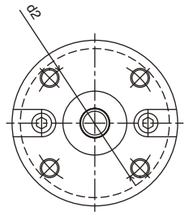
BT

JIS B 6339 | Internal Coolant





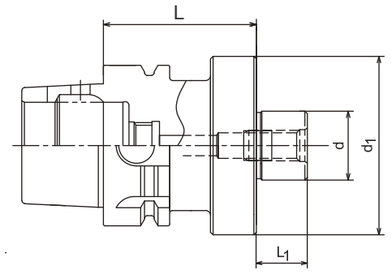
Inventory	
Code	Upon request

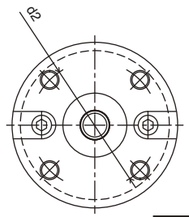
Specifications	Inventory	d	d1	d2	L1	L	kg
BT30-FMB16C-45	SC43129	16	34	—	18	45	0.70
BT30-FMB22C-45	SC40042	22	48	—	18	45	0.74
BT30-FMB27C-45	SC38061	27	60	—	20	45	1.10
BT40-FMB22C-45	SC38884	22	48	—	18	45	1.30
BT40-FMB27C-45	SC88885	27	60	—	20	45	1.50
BT40-FMB32C-50	SC39342	32	78	—	22	50	2.00
BT40-FMB40FC-60	SC43136	40	89	66.7	25	60	2.80
BT50-FMB40FC-75	SC43137	40	89	66.7	25	75	5.80
BT50-FMB60FC-75	SC40576	60	129	101.6	32	75	8.30

unit: mm

HSK

DIN 69893 | Internal Coolant





Inventory	
Code	Upon request

Specifications	Inventory	d	d1	d2	L1	L	kg
HSK63A-FMB16C-100	SC43126	16	35	—	16	100	1.80
HSK63A-FMB22C-50	SC39338	22	48	—	18	50	1.00
HSK63A-FMB27C-60	SC39339	27	60	—	20	60	1.50
HSK63A-FMB32C-60	SC39340	32	78	—	22	60	1.90
HSK63A-FMB40FC-60	SC39180	40	89	66.7	25	60	2.50
HSK100A-FMB40FC-75	SC43127	40	89	66.7	25	75	4.60
HSK100A-FMB60FC-70	SC43128	60	129	101.6	32	70	6.30

unit: mm

Light Weight Milling Adaptors
BT / HSK

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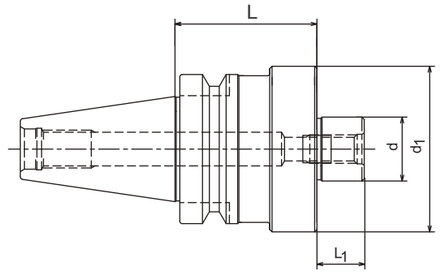
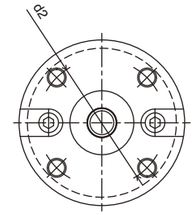
BT

JIS B 6339 | Internal Coolant





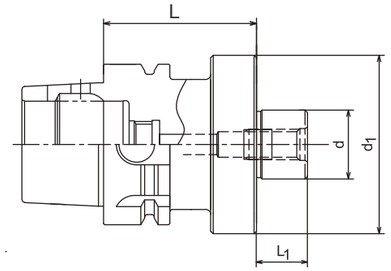
Inventory	
Code	Upon request

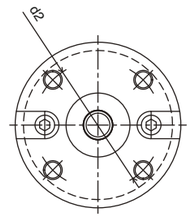
Specifications	Inventory	d	d1	d2	L1	L	Kg
BT30-FMB27FC-45	SC39069	27	70	54	20	45	1.20
BT40-FMB27FC-60	SC39799	27	70	54	20	60	2.50

unit: mm

HSK

DIN 69893 | Internal Coolant





Inventory	
Code	Upon request

Specifications	Inventory	d	d1	d2	L1	L	Kg
HSK63A-FMB27FC-60	SC39798	27	70	54	20	60	1.60

unit: mm

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①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫
B	E	H	W	12	04	EZ 08	T	R	1	-WG	-R04CB05
S	D	H	N	07	T3	DE 08	S	R	4	-WG	

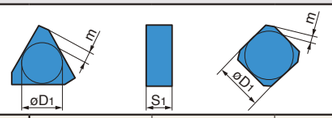
① Shape

Code	Shape
O	Octagonal
S	Square
T	Triangle
C	Diamond 80°
L	Rectangular 90°
B	Diamond 82°
R	Round
X	Special

② Clearance angle

Code	Clearance Angle
C	7°
D	15°
E	20°
F	25°
G	30°
N	0°
P	11°
Z	Other clearance angle

③ Tolerance



Code	Nose Height m (mm)	Inscribed CircleDiameter øD1 (mm)	Tolerance S1 (mm)
A	± 0.005	± 0.025	± 0.025
C	± 0.013	± 0.025	± 0.025
E	± 0.025	± 0.025	± 0.025
H	± 0.013	± 0.013	± 0.025
K*	± 0.013	± 0.05—± 0.15	± 0.025
M*	± 0.08—± 0.18	± 0.05—± 0.15	± 0.13
N*	± 0.08—± 0.18	± 0.05—± 0.15	± 0.025

*standard for no lapping on the side face.

④ Chip breaker and Fixing type

Code	Bore	Shape of Bore	Chip Breaker	Shape
W	With Bore	Cylindrical Bore + Single Side (40°—60°)	Without	
T	With Bore		Single	
B	With Bore	Cylindrical Bore + Single Side (70°—90°)	Without	
N	Without	—	Without	
R	Without	—	Single	
X	—	—	—	Special

⑤ Inscribed circle Dia.

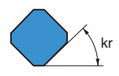
Code B	Code L	Code S		Inscribed Circle (mm)
06	06	06		6.35
08	07	07		7.94
09	09	09		9.525
				10.00
				12.00
12	12	12		12.70
16	15	15		15.875
				20.00

⑥ Thickness

Code	Thickness (mm)
T3	3.97
04	4.76
05	5.56
06	6.35

⑦ Tip radius

Code	Mark (mm)	Code	Mark (mm)
00	0.0	08	0.8
02	0.2	12	1.2
04	0.4	16	1.6

Tool cutting edge angle	Clearance angle of wiper
	

Code	Mark	Code	Mark
A	45°	P	11°
D	60°	D	15°
E	75°	E	20°
P	90°	F	25°
Z	Other	Z	Other

⑧ Cutting edge design

Code	Cutting Edge Design
E	Honed
F	Sharp Edge
T	Chamfered
S	Chamfered + Honed
Z	Chamfered

⑨ Cutting direction

Code	Cutting Direction
L	Left Hand
N	Left& Rright
R	Right Hand

⑩ Edges

Code	Edges
1	1 edge
2	2 edge
4	4 edge

⑪ Cutting edge design

WG	Wiper
UW	Universal
PT	Corner

⑫ Corner Radius / Chamfer

Code	Shqpe	Code	Mark (mm)
R	Radius	0 3	0.3
C	Chamfer	0 4	0.4
		08	0.8

Tip Length CB

Code	Mark (mm)
05 08 12	5
	8
	12

BEHW PCD-tipped Milling Inserts for Light and Medium Applications

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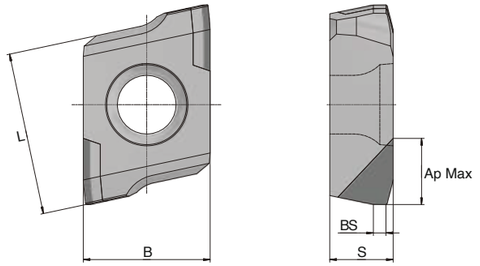
PCD-tipped milling inserts with various angles, wipers and corner radii for face and shoulder milling applications with higher depth of cut and Si-content ≤10%.
Please see page 27-29 for application recommendations.



Dimensions		
L (mm)	B (mm)	S (mm)
12.2	9.525	4.76

Figure	Cutter diameter		Specification	Cutting Edge	Dimensions					N
	25 - 40 mm	≥50 mm			Cutting Tips	BS (mm)	ApMax (mm)	Kr (°)	Re (mm)	PD10E
Standard 75°		√	BEHW1204EZFR1 C03CB05	F	1	1	4	75	–	HS03050
	√		BEHW1204EZFR1B C03CB05	F	1	1	4	75	–	HS03615
		√	BEHW1204EZFR2 C03CB05	F	2	1	4	75	–	HS03665
Wiper 75°		√	BEHW1204EZFR1-WGC03CB05	F	1	4	4	75	–	HC03020
	√		BEHW1204EZFR1B-WGC03CB05	F	1	4	4	75	–	HC07955
		√	BEHW1204EZFR2-WGC03CB05	F	2	4	4	75	–	HS05456
Corner 75°		√	BEHW1204EZFR1-PT R04CB05	F	1	-	4	75	0.4	HS01342
	√		BEHW1204EZFR1B-PT R04CB05	F	1	-	4	75	0.4	HC03861
		√	BEHW1204EZFR2-PT R04CB05	F	2	-	4	75	0.4	HC01106
Universal 90°		√	BEHW1204PZFR1-UWR04CB05	F	1	1.5	4	90	0.4	HC02033
		√	BEHW1204PZFL1-UWR04CB05	F	1	1.5	4	90	0.4	○
	√		BEHW1204PZFR1B-UWR04CB05	F	1	1.5	4	90	0.4	HS03185
		√	BEHW1204PZFR2-UWR04CB05	F	2	1.5	4	90	0.4	HS03630
Full Length 90°		√	BEHW1204PZFR1 R04CB12	F	1	1.5	11	90	0.4	HS01810
		√	BEHW1204PZFL1 R04CB12	F	1	1.5	11	90	0.4	○
	√		BEHW1204PZFR1B R04CB12	F	1	1.5	11	90	0.4	HC03161

Inventory		Delivery Time
Code	In stock, MANANOVA	max.1 week
○	Semi-standard, made to order	approx.5 weeks
C	Customized, made to order	approx.8 weeks

BEHW PCD-tipped Milling Inserts for Heavy Duty Applications

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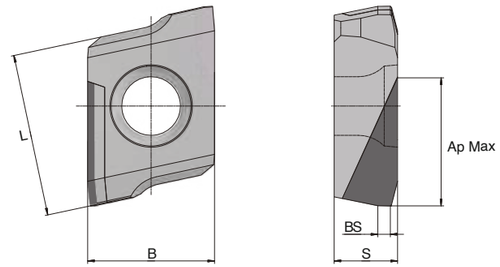
PCD-tipped milling inserts with various angles, wipers and corner radii for face and shoulder milling applications with higher depth of cut and Si-content ≥10%.
Please see page 27-29 for application recommendations.



Dimensions		
L (mm)	B (mm)	S (mm)
12.2	9.525	4.76

Figure	Cutter diameter		Specification	Cutting Edge	Dimensions					N	
	25 - 40 mm	≥50 mm			Cutting Tips	BS (mm)	ApMax (mm)	Kr (°)	Re (mm)	PD10E	PD32E
Standard 75°		√	BEHW1204EZTR1 R04CB08	T1	1	1	7	75	0.4	HC01763	○
	√		BEHW1204EZTR1B R04CB08	T1	1	1	7	75	0.4	HC02636	○
Wiper 75°		√	BEHW1204EZTR1-WGC03CB08	T1	1	4	7	75	–	HC03136	○
	√		BEHW1204EZTR1B-WGC03CB08	T1	1	4	7	75	–	HS05491	○
Corner 75°		√	BEHW1204EZTR1-PT R04CB08	T1	1	-	7	75	0.4	HC02508	○
	√		BEHW1204EZTR1B-PT R04CB08	T1	1	-	7	75	0.4	HC14492	○
Universal 90°		√	BEHW1204PZTR1 R04CB08	T1	1	1	7	90	0.4	HC04256	○
		√	BEHW1204PZTL1 R04CB08	T1	1	1	7	90	0.4	○	○
	√		BEHW1204PZTR1BR04CB08	T1	1	1	7	90	0.4	HC04156	○
Full Length 90°		√	BEHW1204PZTR1 R08CB12	T1	1	1	11	90	0.8	HC02296	○
		√	BEHW1204PZTL1 R08CB12	T1	1	1	11	90	0.8	○	○
	√		BEHW1204PZTR1BR08CB12	T1	1	1	11	90	0.8	HC14044	○

Inventory		Delivery Time
Code	In stock, MANANOVA	max.1 week
○	Semi-standard, made to order	approx.5 weeks
C	Customized, made to order	approx.8 weeks

BEHW PCBN-tipped Milling Inserts for Face and Shoulder Milling Applications

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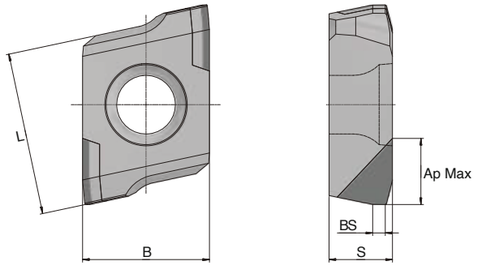
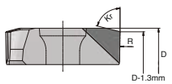
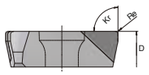
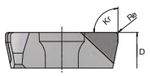
PCBN-tipped milling inserts with various angles, wipers and corner radii for face and shoulder milling applications of cast iron and hardened materials with higher depth of cut.
Please see page 30 for application recommendations.



Dimensions		
L (mm)	B (mm)	S (mm)
12.2	9.525	4.76

Figure	Cutter diameter		Specification	Cutting Edge	Dimensions					K	H
	25 - 40 mm	≥50 mm			Cutting Tips	BS (mm)	ApMax (mm)	Kr (°)	Re (mm)	PNK3003	PNH2019
Wiper 75° 		√	BEHW1204EZSR1-WGC03CB05	S8	1	4	0.5	75	–	○	○
	√		BEHW1204EZSR1B-WGC03CB05	S8	1	4	0.5	75	–	○	○
		√	BEHW1204EZSR2-WGC03CB05	S8	2	4	0.5	75	–	○	○
Standard 90° 		√	BEHW1204PZSR1 R04CB05	S11	1	1.5	0.5	90	0.4	○	○
	√		BEHW1204PZSR1B R04CB05	S11	1	1.5	0.5	90	0.4	○	○
		√	BEHW1204PZSR2 R04CB05	S11	2	1.5	0.5	90	0.4	○	○
Standard 90° 		√	BEHW1204PZSR1 R08CB05	S11	1	1.5	0.5	90	0.8	○	○
	√		BEHW1204PZSR1B R08CB05	S11	1	1.5	0.5	90	0.8	○	○
		√	BEHW1204PZSR2 R08CB05	S11	2	1.5	0.5	90	0.8	○	○

Inventory		Delivery Time
Code	In stock, MANANOVA	max.1 week
○	Semi-standard, made to order	approx.5 weeks
C	Customized, made to order	approx.8 weeks

SDHN Full-Face PCBN Milling Inserts for Finish Face Milling Applications

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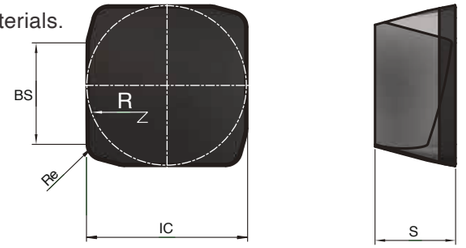
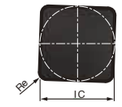
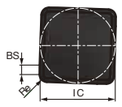
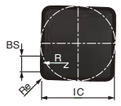
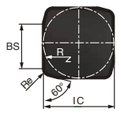
PCBN full-face milling inserts with various angles and wipers for finish face milling of cast iron and hardened materials.
Please see page 30 for application recommendations.



Dimensions	
IC (mm)	S (mm)
7.94	3.97

Figure	Specification	Cutting Edge	Dimensions				K
			Cutting Edges	BS (mm)	Ap Max (mm)	Re (mm)	PNK3003
Corner Radius 	SDHN07T308	S12	4	-	0.5	0.8	HS09895
Standard 	SDHN07T3PPSR4	S12	4	1.5	0.5	0.8	HS09896
Universal 	SDHN07T3PPSR4-UW	S12	4	1.5	0.5	0.8	HS09897
Wiper 	SDHN07T3DPSR4-WG	S8	4	5	0.5	0.8	HS10976

Inventory		Delivery Time
Code	In stock, MANANOVA	max.1 week
○	Semi-standard, made to order	approx.5 weeks
C	Customized, made to order	approx.8 weeks

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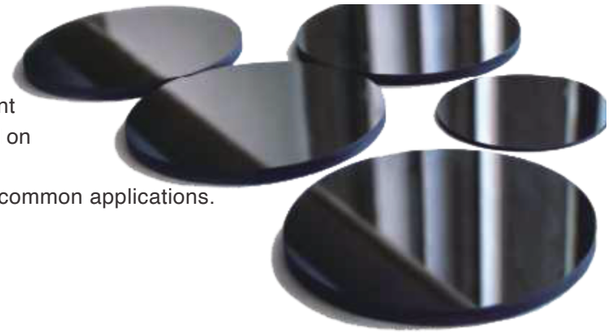
WORLDIA®PCD Grades



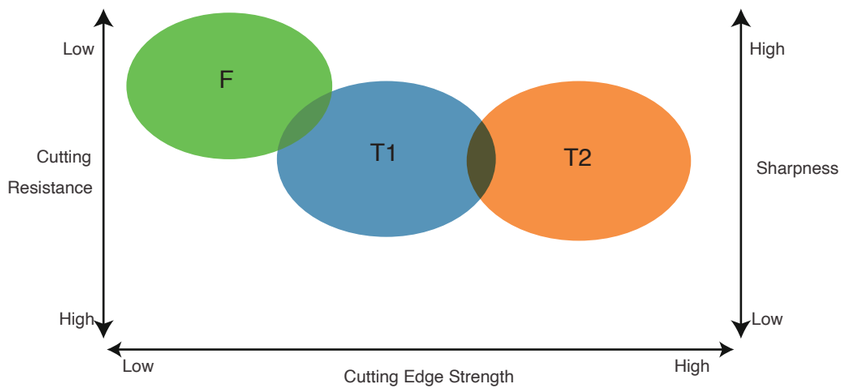
Worldia's portfolio comprises of a variety of different PCD and CVD materials that will be selected based on your specific application requirements.
Below grades are a selection that covers the most common applications.

Application Recommendations

Grades

Workpiece Material	Grade	Grain size (μm)	Characteristics	Application
N	PD10E	10	PD10Eis the universal grade in the market. It's the first choice for many applications where a good balance of toughness and wear resistance are required.	This grade is commonly used for non-ferrous finishing applications. Other successful applica-tions include machining of wood, MDF, low-medium content silicon aluminium alloys, carbide, hard rubber, graphite and so on.
	PD32E	2~30	PD32Ehas a unique combination of wear resistance, edge strength and edge quality. It contains a carefully selected mix of micron diamond (between 2 - 30 μm). The combination of these particle sizes and a specifically developed high pressure sintering process produces a structure with extreme abrasion resistance and good thermal stability.	Application areas include the machining of abrasive workpieces such as MMC, high silicon aluminium alloys as well as machining of carbide, hard rubber, graphite and other materials.

Cutting Edge



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WORLDIA®PCBN Grades

PCBN is considerably better abrasive resistant than tungsten carbide and ceramics. PCBN will not have any chemical reaction with ferrous material at 1200-1300°C .
So PCBN material is unique for dry cutting ferrous material. The principal application areas for PCBN cutting tools are hardened steels, cast irons and sintered irons as well as powder metallurgy components.
Below grades are our recommendations for most milling applications. However, based on analysis of your specific requirements, we will suggest the most appropriate grade for your
application from our comprehensive portfolio.

Application Recommendations

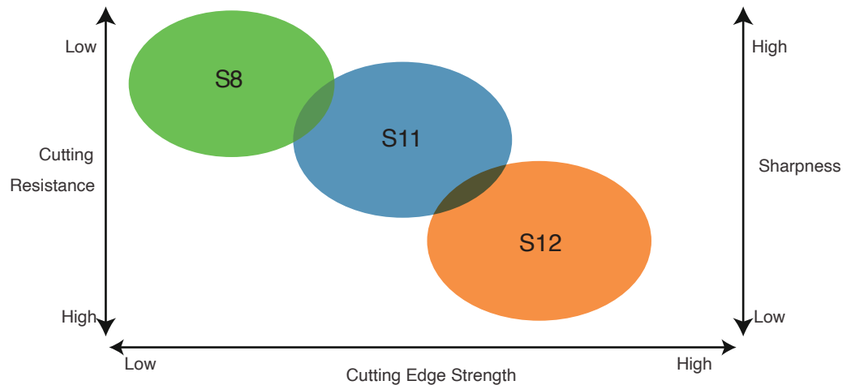
Grades

Workpiece Material	Grade	Content %	Grain Size (μm)	Hardness	Characteristic	Application
K	PNK3003	90~95	1~3	3700~3900	Combination of wear resistance and impact resistance	Cast iron,sintered iron
H	PNH2019	65~70	1	2700~2900	Combination of wear resistance and impact resistance	Hardened steel

Cutting Data Recommendations

PCBN Grade	Cutting Data Recommendations		
	Cutting Speed,vc (m/min)	Feed Rate,fn (mm/r)	Cutting Depth,AP (mm)
PNK3003	300 600 800 1200	0.03 0.08 0.12 0.3	0.05 0.5
PNH2019	100 150 220 250	0.03 0.08 0.1 0.12	0.05 0.3

Cutting Edge



New Energy Vehicle Components

Figure	Processing conditions	Processing parameters

Workpiece: Motor end cover
Material: Aluminum alloy
Spindle: Single spindle
Maximum speed: 16000RPM
Adaptor: BT40
Surface finish: Ra1.25

	Previous	Worldia
Cutter	—	FMP100SB32-BE12-16
Insert Grade	——	BEHW1204PZFR1-UW 12 pcs BEHW1204EZFR1-WG 4 pcs
Cutter diameter (mm)	——	PD10E
Number of teeth Cutting	ϕ100	ϕ100
length (mm) Cutting	6	16
speed (m/min) Feed per	580	580
tooth (mm/z) Depth of	2200	3140
cut (mm) Milling time	0.1	0.063
roughing (s) Milling time	4.2	4.2
finishing (s) Total (s)	7.73	0
Productivity	8.70	3.48
	16.43	3.48
	——	4.7 X

Workpiece: Gearbox housing for commercial vehicles
Material: Aluminum alloy
Spindle: Single spindle
Maximum speed: 16000RPM
Adaptor: BT50
Surface finish: Ra1.25

	Previous	Worldia
Cutter	Integral PCD Milling Cutter	FMP080SA27-BE12-12
Insert Grade	——	BEHW1204PZFR1-UW 10 pcs BEHW1204EZFR1-WG 2 pcs
Cutter diameter (mm)	——	PD10E
Number of teeth Cutting	ϕ80	ϕ80
length (mm) Cutting	8	12
speed (m/min) Feed per	960	960
tooth (mm/z) Depth of	2010	3016
cut (mm) Milling time	0.1	0.07
roughing (s) Milling time	4.5	4.5
finishing (s) Total (s)	7.63	0
Productivity	9.60	5.76
	17.23	5.76
	——	3 X

Workpiece: Integrate valve of heat pump
Material: Aluminum alloy
Spindle: Single spindle
Maximum speed: 16000RPM
Adaptor: BT40
Surface finish: Ra0.8

Cutter		
Insert Grade	Previous	Worldia
Cutter diameter (mm)	—	FMP125SB40-BE12-20
Number of teeth Cutting	——	BEHW1204PZFR1-UW 16 pcs BEHW1204EZFR1-WG 4 pcs
length (mm) Cutting	—	PD10E
speed (m/min) Feed per	ϕ60	ϕ125
tooth (mm/z) Depth of	6	20
cut (mm) Milling time	440	220
roughing (s) Milling time	1320	3927
finishing (s) Total (s)	0.1	0.04
Productivity	Ap1＝2 AP2＝0.2	2.2
	6.60	0
	6.60	1.65
Cutter	13.20	1.65
Insert Grade	——	8 X

Workpiece: Battery compartment
Material: Aluminum alloy
Spindle: Single spindle
Maximum speed: 16000RPM
Adaptor: HSK63A
Surface finish: Ra2.5

Cutter diameter (mm)		
Number of teeth Cutting	Previous	Worldia
length (mm) Cutting	—	FMP080SA27-BE12-12
speed (m/min) Feed per	——	BEHW1204PZFR1-UW 10 pcs BEHW1204EZFR1-WG 2 pcs
tooth (mm/z) Depth of	—	PD10E
cut (mm) Milling time	ϕ80	ϕ80
roughing (s) Milling time	8	12
finishing (s) Total (s)	960	960
Productivity	2011	3016
	0.1	0.07
	4.5	4.5
	7.63	0
	9.60	5.76
	17.23	5.76
	——	3 X

New Energy Vehicle Components

Figure	Processing conditions	Processing parameters

Workpiece: ESC
Material: ADC12
Spindle: Single spindle
Maximum speed:12000RPM
Adaptors: BT40
Surface finish: Ra0.8

	Previous	Worldia
Cutter	—	FMP100SB32-BE12-16
Insert Grade	——	BEHW1204PZFR1-UW 12 pcs BEHW1204EZFR1-WG 4 pcs
Cutter diameter (mm)	PCD	PD10E
Number of teeth Cutting	ϕ100	ϕ100
length (mm) Cutting	6	16
speed (m/min) Feed per	580	580
tooth (mm/z) Depth of	2042（rough）2199（finish）	3142
cut (mm) Milling time	0.12（rough）0.10（finish）	0.063
roughing (s) Milling time	AP1=4 AP2=0.2	4.2
finishing (s) Total (s)	7.73	0
Productivity	8.70	3.48
	16.43	3.48
	——	4.7 X

Combustion Engine Components

Figure	Processing conditions	Processing parameters

Workpiece: Cylinder head
Material: ALSi10MgCu
Spindle: Single spindle
Maximum speed: 12000RPM
Adaptor: HSK63
Processing type: Surface milling
Processing time: 1
Surface finish: Ra3.2

	Previous	Worldia
Cutter	100B08RP90BG15C2WPM	FMP100SB32-BE12-16
Cutter diameter (mm)	ϕ100	ϕ100
Number of teeth	10	16
Inserts	BGHXI 5L1 5PCTRHET	BEHW1204EZFR1
Grade	PCD	PD10E
Cutting speed (m/min)	2513	2513
Feed per tooth (mm/z)	0.088	0.05
Depth of cut (mm)	4	5 4
Tool life		1.6 X

Workpiece: Cylinder block
Material: Aluminum alloy + gray cast iron
Spindle: Single spindle
Maximum speed: 12000RPM
Adaptor: HSK63
Processing type: Surface milling
Processing time: 1
Surface finish: Rt10

	Previous	Worldia
Cutter	EcoFeed 7-06200-01	FMP200SC60-BE12-30
Cutter diameter (mm)	ϕ200	ϕ200
Number of teeth	28	30
Inserts	——	BEHW1204EZFR1
Grade	PCD	PD32E
Cutting speed (m/min)	785	785
Feed per tooth (mm/z)	0.051	0.048
Depth of cut (mm)	0.5	0.5
Tool life		2.35 X

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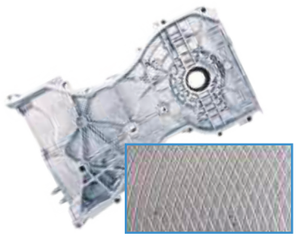
WITH DIAMOND

Other Vehicle Components

Figure	Processing conditions	Processing parameters

Workpiece: Cylinder head cover
Material: AlSi9Cu3
Spindle: Single spindle
Maximum speed: 10000RPM
Adaptor: BT40
Processing type: Surface milling
Surface finish: Ra3.2

	Previous	Worldia
Cutter	FTP063R050A	FMP63SA22-BE12-10
Cutter diameter (mm)	ϕ63	ϕ63
Number of teeth	5	10
Inserts	TMCPA01RRB5	BEHW1204EZTR1
Grade	Alloy (rough) PCD (finish)	PD10E
Cutting tips	2	
Cutting speed (m/min)	1484	1682
Feed per tooth (mm/z)	0.125	0.071
Depth of cut (mm)	Ap1=5 (alloy) AP2=1 (PCD)	6
Tools life		1.2 X



Workpiece:Timing chain housing cover
Material: ADC12
Spindle: Single spindle
Maximum speed: 12000 RPM
Adaptor: BT40
Surface finish: RZ 8~20(gridline)

	Worldia
Cutter	FMP63SA22-BE12-10
Inserts	BEHW1204PZFR1-UW8 pcs BEHW1204EZFR1-PT 2 pcs
Grade	PD10E
Cutter diameter (mm)	63
Number of teeth	10
Cutting speed (m/min)	1188
Feed per tooth (mm/z)	0.1 0.2
Depth of cut(mm)	

Workpiece: Cylinder head
Material: ALSi10MgCu
Spindle: Single spindle
Maximum speed: 16000RPM
Machining process: Deck face rough milling
Surface finish: Ra3.2
Small chips due to lasered chipbreaker, easy chip removal.

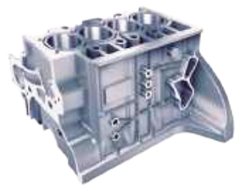
	Worldia
Cutter	FMP125SB40-BE12-24
Inserts	BEHW1204PZTR1-CBR
Grade	PD10E
Cutter diameter (mm)	125
Number of teeth	24
Cutting speed (m/min)	1963 /1571
Feed per tooth (mm/z)	0.058 / 0.072
Depth of cut (mm)	3.5
	

Cast Iron Components

Figure	Processing conditions	Processing parameters

Workpiece: Guideways
Material: HT250
Spindle: Single spindle
Maximum speed: 8000RPM
Surface finish: Ra0.4
Hardness: HB180
Surface finish: Ra0.4
Processing time: 1

	Previous	Worldia
Cutter	CBN Milling cutter	FMP063SA22-SD07-08
Cutter diameter (mm)	ϕ63	ϕ63
Number of teeth	1	4
Inserts	CBN cartridge	SDHN07T3PPSR4-UW
Grade	CBN	PNK3003
Cutting speed (m/min)	158	499
Feed per tooth (mm/z)	0.25	0.08
Depth of cut (mm)	0.2	0.2
Tool life		2.6 X



Workpiece: Cylinder block
Material: HT280
Adaptor: HSK100
Hardness: HB200-275
Processing : Bottom surface
Processing type: Milling
Processing time: 1
Surface finish: Ra3.2

	Previous	Worldia
Cutter	——	FMP160SB32-SD07-20
Cutter diameter(mm)	ϕ160	ϕ160
Number of teeth	17	16
Inserts	Ceramic 14 pcs + PCBN wiper 3 pcs	SDHN07T3PPSR4-UW12 pcs SDHN07T3PPSR4-WG4 pcs
Grade	CBN	PNK3003
Cutting speed (m/min)	452	754
Feed per tooth (mm/z)	0.099	0.063
Depth of cut (mm)	0.5	0.5
Tool life		4.5 X

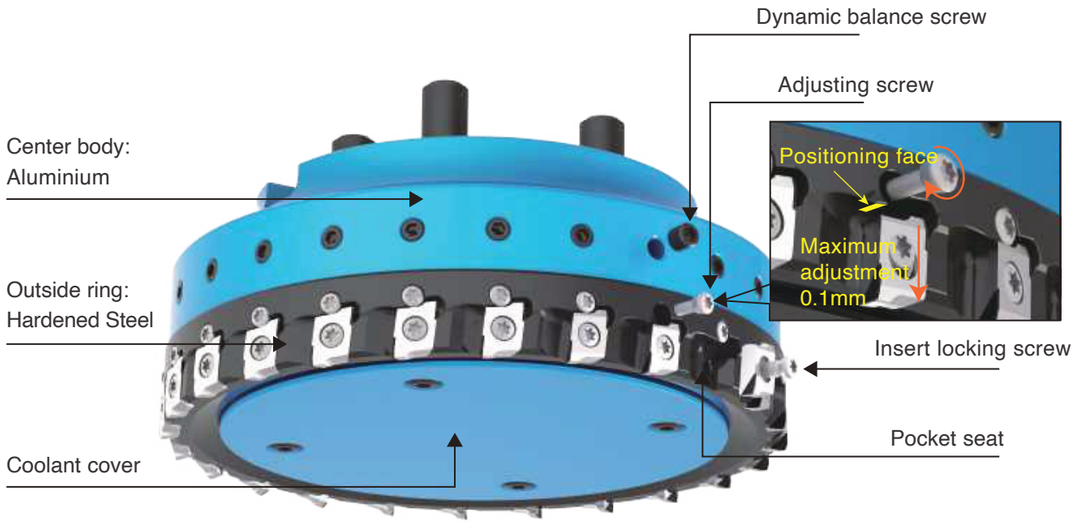
Workpiece: Cylinder block
Material: HT300
Spindle: Single spindle
Maximum speed: 6000RPM
Adaptor: HSK100
Processing part: Front and rear
Processing type: Milling
Processing time: 2
Surface finish: Ra3.2

	Previous	Worldia
Cutter	——	FMP200SC60-SD07-24
Cutter diameter (mm)	ϕ200	ϕ200
Number of teeth	16	16
Inserts	Ceramic 14 pcs + PCBN wiper 2 pcs	SDHN07T3PPSR4-UW12 pcs SDHN07T3PPSR4-WG4 pcs
Grade	CBN	PNK3003
Cutting speed (m/min)	628	754
Feed per tooth (mm/z)	0.15 (rear) 0.144 (front)	0.167 (rear) 0.16 (front)
Depth of cut (mm)	0.35/0.15 (rear) 0.25/0.25 (front)	0.35/0.15 (rear) 0.25/0.25 (front)
Cutting length (m)	1.8 (rear) 1 (front)	1.8 (rear) 1 (front)
Tool life		2.5 X

Workpiece: Pump body
Material: QT500
Spindle: Single spindle
Maximum speed: 8000RPM
Adaptors: BT40
Processing type: Milling
Processing time: 2
Surface finish: Ra1.6

	Previous	Worldia
Cutter	——	FMP125SB40-SD07-16
Cutter diameter (mm)	ϕ125	ϕ125
Number of teeth	1	5
Inserts	APKT160408-1N（CBN）	SDHN07T3PPSR4-UW4 pcs SDHN07T3EPSR4-WG1 pcs
Grade	CBN	PNK3003
Cutting speed (m/min)	236	785
Feed per tooth (mm/z)	0.083	0.038
Depth of cut (mm)	0.5	0.5
Tool life		5 X

Assembly and Setting Instructions
Worldia FMP-BE Indexable Milling Cutters



Assembly and Setting Instructions of PCD Milling Cutter

1. Fully unscrew (left-hand) the insert locking screw, and turn the adjusting screw to the left until the head stands out from the steel ring
2. Clean the insert and steel ring, then install the insert into the steel ring and confirm that the positioning face of the insert fits the pre-positioning face
3.Screw in (right-hand) locking screw and tighten to 2.5 Nm
4.Determine which insert is at the highest axial position, and the axial drop of all inserts is ≤0.04 mm 5. Turn (right-hand) the adjustment screw, adjust other inserts to move smoothly in the axial direction, and the maximum allowable axial runout error is 2 μm
6. Tighten the insert locking screw to 3.5 Nm,check again whether the axial runout of the insert is less than 2 μm,if not, fine adjustment is necessary
7. If there is a combined insert, install the insert according to steps 1-6, adjust the position of the entire set to the required size, and the maximum allowable axial runout error of the insert is 2 μm

Safety attention:

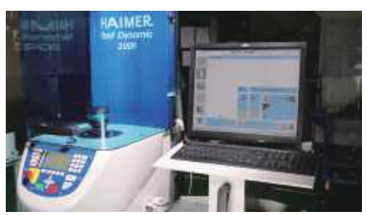
The cutter has been dynamically balanced before leaving the factory, thus the dynamic balance screw does not need to be adjusted. If you need to adjust the dynamic balance precisely after insert assembly, it is necessary to apply thread lock adhesives for protection!

Roughing: The screw should be replaced every fifth insert change

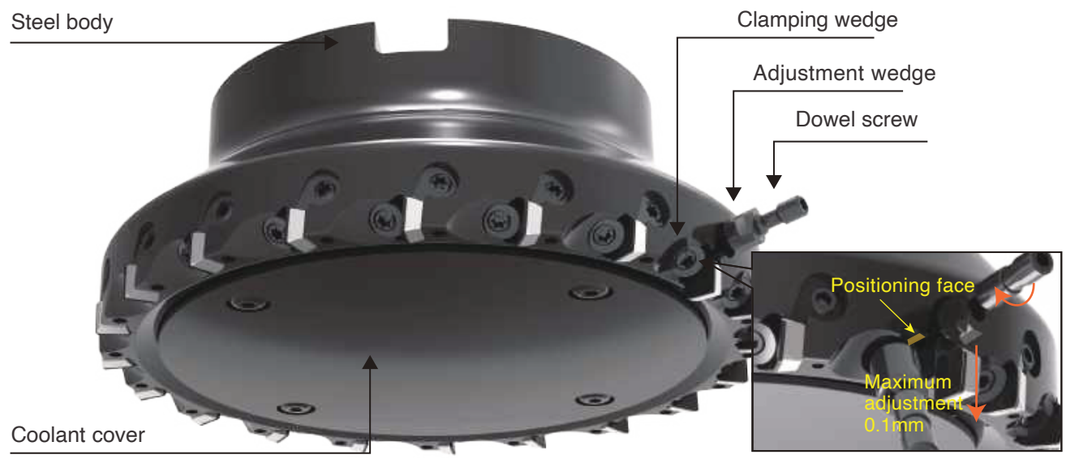
Finishing: The screw should be replaced every tenth insert change







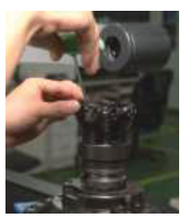
Assembly and Setting Instructions
Worldia FMP-SD Indexable Milling Cutters



Assembly and Setting Instructions of PCBN Milling Cutter

1.Left turn the screw to loosen the clamping wedge,then turn the dowel screw to the left to loosen the adjustment wedge
2.Install the insert into the cutter body, and confirm that the positioning face of the insert fits the pre-positioning face of the cutter body
3. (Pre-adjustment) Turn the screw to the right to drive the clamping wedge and tighten it to 0.5 Nm
4. (Pre-adjustment) Determine which insert is at the highest position in the insert axial direction
5. (Pre-adjustment) Drive the adjustment wedge to adjust the insert to move smoothly (observe the insert during the process, observe the axial , dimension , lead angle , step 3 , 5) , the maximum allowable axial runout error is 5 μm , lead angle error is 15'
6. (Fine adjustment) Turn the screw to the right to drive the clamping wedge and tighten it to 2.5 Nm
7. (Fine adjustment) Determine which blade is at the highest position in axial direction
8. (Fine adjustment) Turn the screw to the right to drive the whole block to adjust the blade to move smoothly in axial direction, and the maximum allowable axial runout error is 5 μm
9.If there is a combined insert, install the insert according to steps 1-8 , adjust the position of the entire set to the required size, and the maximum allowable axial runout error of the insert is 2 μm





Worldia FMP-LN
Shell Milling Cutters

Main Applications

High-speed semi-finish to finish face and shoulder milling of cast iron and hardened materials with high requirements to surface finish and waviness.

Features and Benefits

· 90° lead angle for shoulder and face milling.

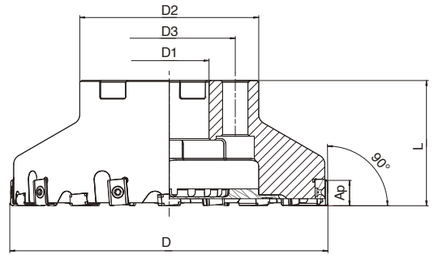
· Easy setup by fix-pocket design.

· High-precision inserts and pockets ensuring max. 0,02 mm axial runout without adjustment.

· Low tooling cost per component by up to 8 indexes per insert.

· A variety of cutting edge design, through inidvidual combination adaptable to different surface finish and waviness requirements.

· Cutter body with internal coolant made of hardened steel-alloy with rust-resistant coating.



ISO

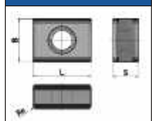
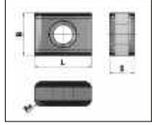
Specification	Inventory	D	D1	D2	D3	L	Ap	Z	Kg	max RPM
FMP80SA27-LN12-10	110210058	80	27	60	—	50	11	10	1.3	6000
FMP100SB32-LN12-12	110210059	100	32	70	—	50	11	12	1.8	4700
FMP125SB40-LN12-16	110210060	125	40	90	—	63	11	16	3.5	3800
FMP160SC40-LN12-20	110009066	160	40	90	66.7	63	11	20	4.5	3000
FMP200SC60-LN12-24	110009067	200	60	150	101.6	63	11	24	7.6	2300
FMP250SC60-LN12-32	110210061	250	60	150	101.6	63	11	32	10.6	1900

Spare Parts

D	Wrench	Insert screw	Coolant lock screw	Coolant shower plate
80	15IP	S40120J	FMP080SA27-LN12-12.02	—
100	15IP	S40120J	FMP100SB32-LN12-16.02	—
125	15IP	S40120J	FMP125SB40-LN12-20.02	—
160	15IP	S40120J	—	FMP160SC40-LN12-24.02
200	15IP	S40120J	—	FMP200SC60-LN12-30.02
250	15IP	S40120J	—	FMP259SC60-LN12-36.02

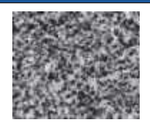
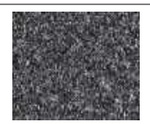
PCBN-tipped milling inserts with various grades, wipers and corner radii for face and shoulder milling applications of cast iron and hardened materials.

Dimensions		
L(mm)	B(mm)	S(mm)
12.7	9.525	5.56

Figure	Specification	Cutting Edge	Dimensions				K		H
			Cutting Tips	Ap Max	Kr	Re	PNK0109	PNK0126	PNK0126
	LNHX120508PNSN	S0281510	4	11	90°	0.8	HC17732	HS15270	HS15270
	LNHX120516PNSN-WG	S0281505	4	0.5		1.6	HC18991	HC18990	HC18990

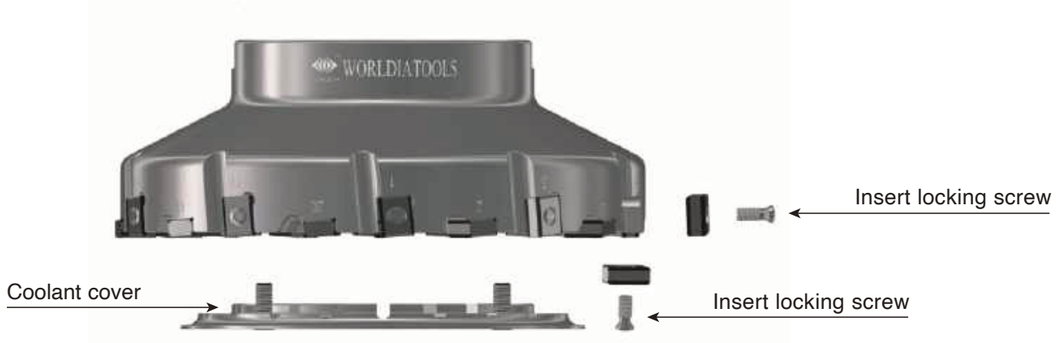
Application Recommendations

PCBN has good high temperature resistance and thermal stability, it will not have any chemical reaction with ferrous material at 1200-1300℃. So PCBN material is unique for dry cutting ferrous material. The principal application areas for PCBN cutting tools are hardened steels, cast irons and sintered irons as well as powder metallurgy components. Below grades are our recommendations for most milling applications. However, based on analysis of your specific requirements, we will suggest the most appropriate grade for your application from our comprehensive portfolio.

PCBN Grade	CBN Content(%)	Grain(μm)	Binder	Structure	Features
PNK0126	50-55	1-2	Special ceramic binder		Excellent toughness and high temperature resistance, suitable for ductile iron, hardened steel processing
PNK0109	90-95	1-4	Metallic compound		Excellent wear resistance for cast iron processing

Cutting Data Recommendations

PCBN Grade	Component Material	Cutting Data Recommendations	
		Vc (m/min)	fz (mm)
PNK0109	Gray Iron	800-1200	0,05-0,25
PNK0126	Ductile Iron	200-400	0,05-0,2
PNK0126	Hardened Steel	150-250	0,05-0,15



Assembly and Setting Instructions of LN Milling Cutter

1.Apply appropriate safety measures (ear plugs, safety glasses, gloves).

2.Clean pockets and inserts.

3.Choose number of wipers according to your process requirements.
Remove screws from pockets without inserts.

4.Install the inserts into the cutter body and ensure that positioning faces have full contact.

5.Screw in (right-hand) insert locking screws and tighten to 3,5 Nm with torque wrench.

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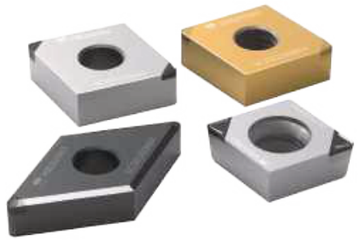
SUPERHARD CUTTING TOOLS



PCD/ MCD/ CVDD/ PCBN INSERTS

PCD/ MCD/ CVDD/ PCBN SPECIAL TOOLS

DIAMOND SCRIBING WHEELS

PCD/ PCBN FACE MILLING CUTTERS

PCD/ MCD/ CVDD/ PCBN MICRO TOOLS

CARBIDE AND CERAMIC TOOLS

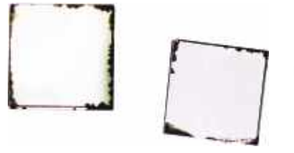
CARBIDE INSERTS AND RODS

SOLID CARBIDE AND CERAMIC ROUND TOOLS

LAB DIAMOND FUNCTIONAL MATERIALS

CVD DIAMOND(JEWELRY)

JEWELRY



MONOCRYSTALLINE DIAMOND (MCD) BLANKS

CVD DIAMOND COMPONENTS

POLYCRYSTALLINE LENSES

PCD BLANKS

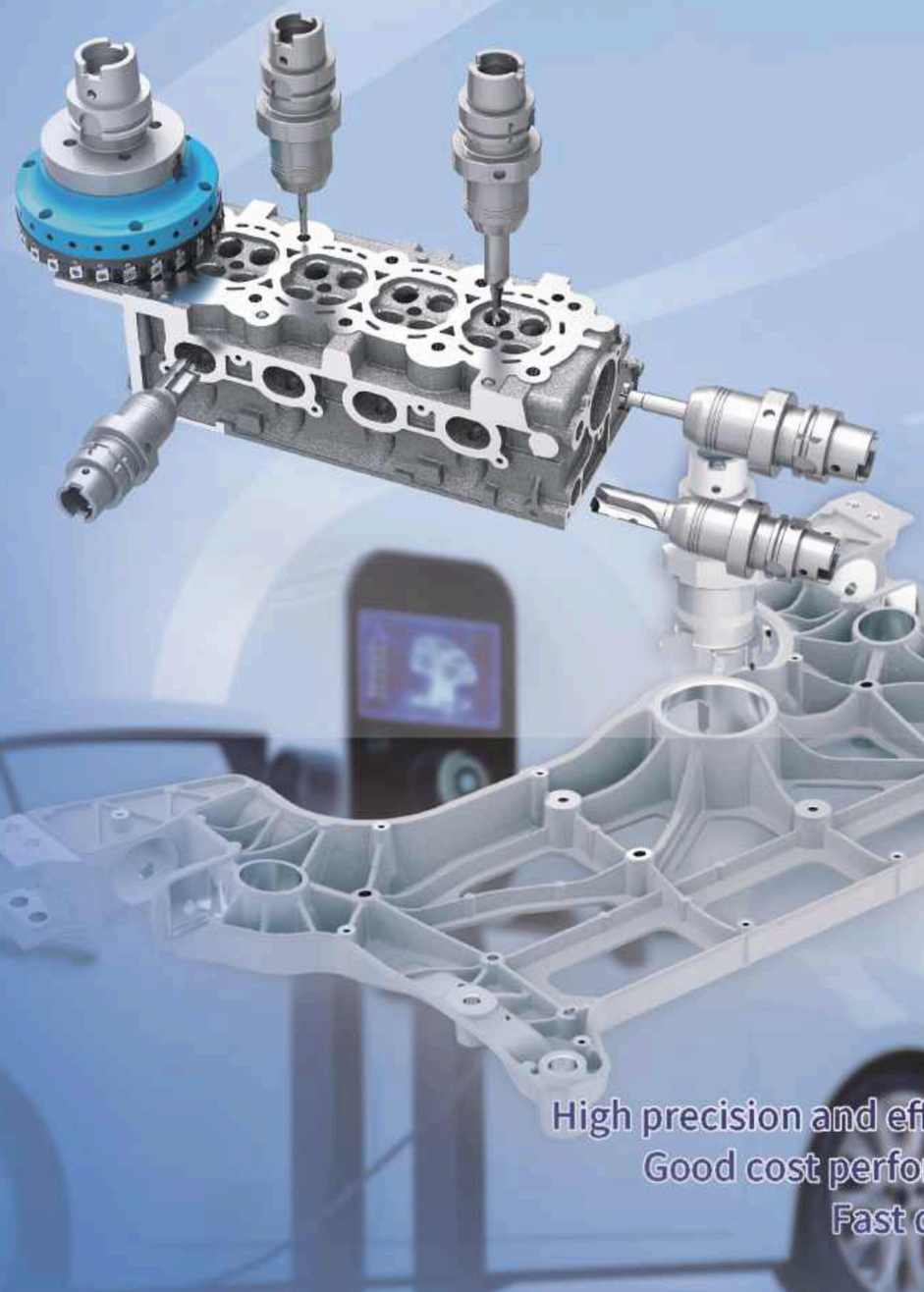
CVD DIAMOND BLANKS

Worldia PCD Tools for Composite Materials Processing

Focusing on Aerospace Field

Worldia Offers Standard and Customized Tool Solutions for Auto Parts Processing

PCD non-standard tool processing application solution



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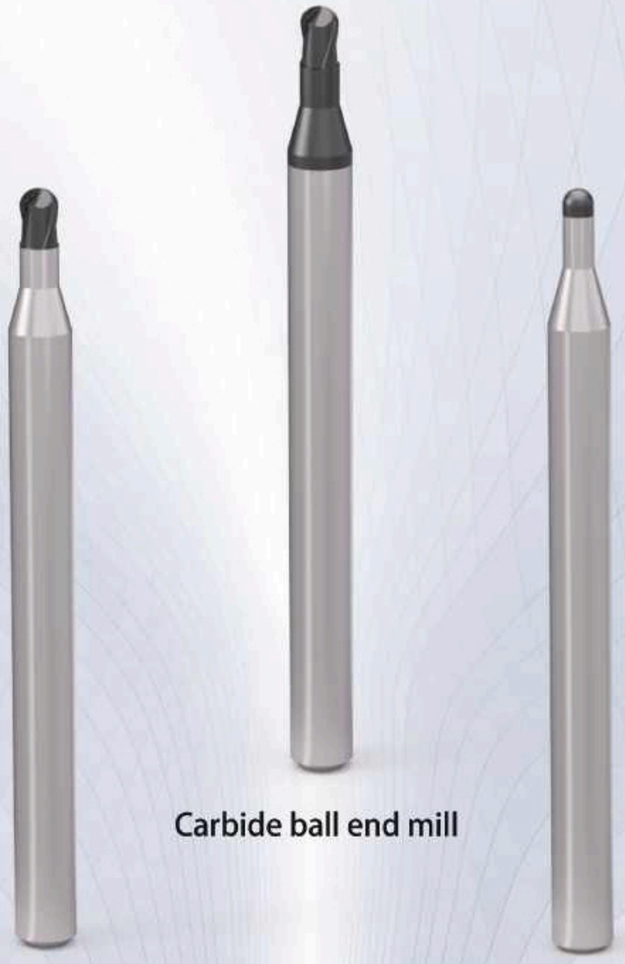
Face Processing Solution



Carbide ball end mill

PCBN ball end mill

PCD ball squeeze tool

Wind Power

Focusing on Bearings & Gears Processing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