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WORLDIA EUROPE GMBH

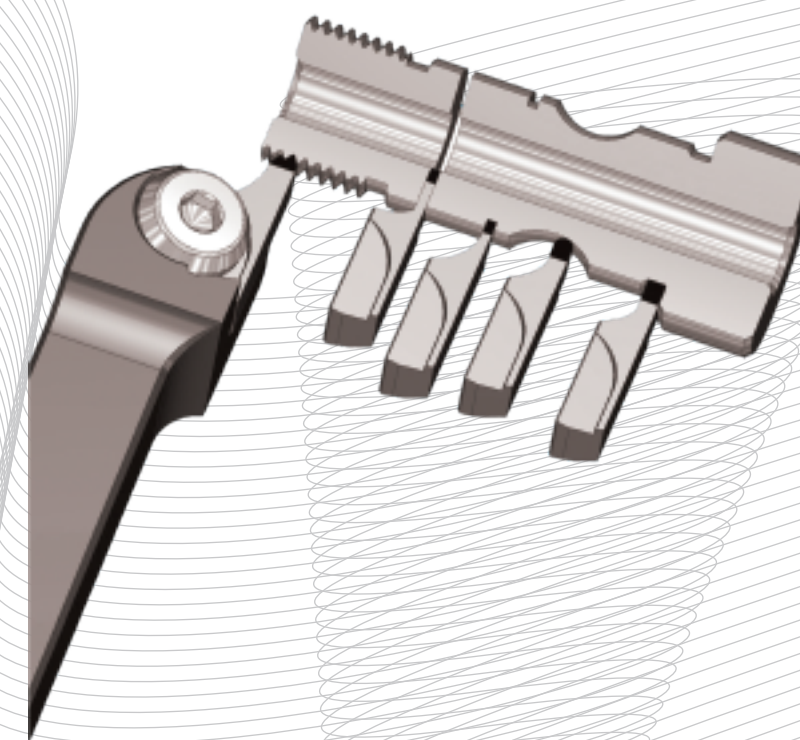
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PCD and PCBN Grooving Cutters
Grooving/ Cutting off/ Threading



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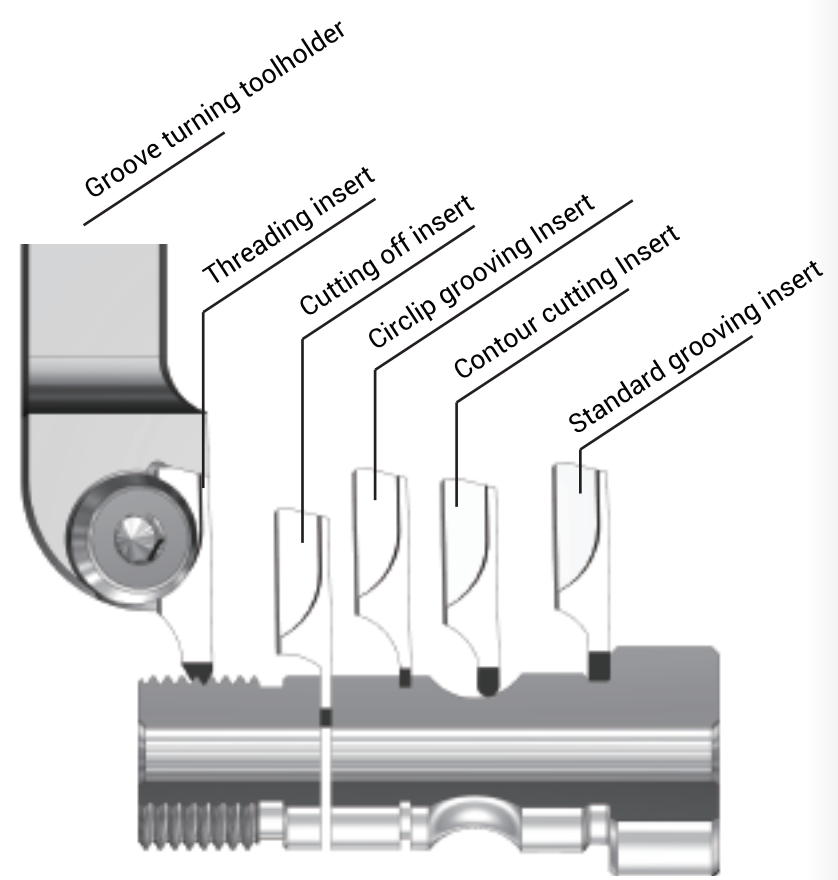
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PCD/PCBN Material Introduction



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.

Grooving Tools Nomenclature



Grooving Tools Code Description

Standard Grooving Inserts

① GTI	② S	③ R/L	-	④ W300	⑤ T400	⑥ R040	⑦ 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 GTI	② O	③ R/L	-	④ W200	⑤ T650	⑥ R020	⑦ 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 GTI	② R	③ R/L	-	④ W195	⑤ T400	⑥ 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 GTI	② E	③ R/L	-	④ W300	⑤ T850	⑥ R020	-	⑦ B060	⑧ 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 GTI	② C	③ R/L	-	④ R200	⑤ T400	⑥ 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 GTI	② T	③ R/L	-	④ M60	⑤ P100
Groove turning inserts	Threading Inserts	Right-hand /Left-hand Toolholders		Metric 60°	Thread pitch 1.0mm

Inch thread cutting Inserts

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

Groove Turning Toolholders

① GTH	② R/L	-	③ C91	④ 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

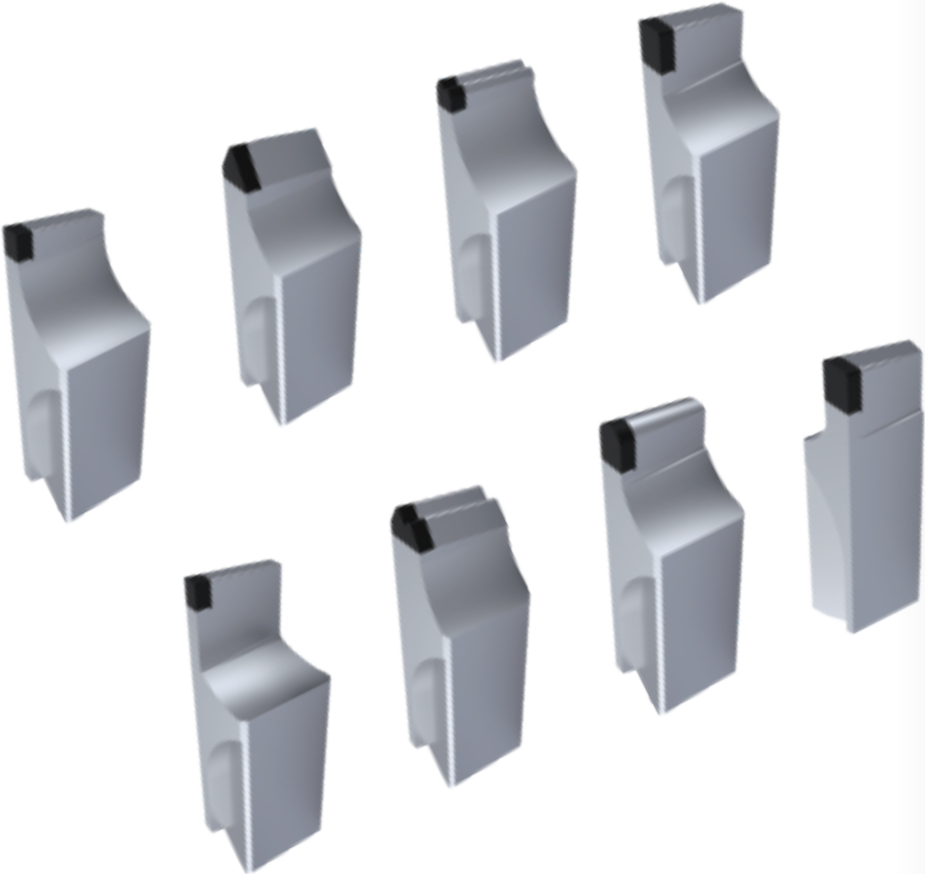


Cutting edge design

S Edge chamfering + honing	010 Chamfer width 0.1	20 Chamfer angle 20°	05 Rounding R0.005
T Edge chamfering	010 Chamfer width 0.1	20 Chamfer angle 20°	
E Edge honing	05 Rounding R0.005		
F Edge sharpness			

Grade

PNH1020 Tool nose material
PNH1020 Tool nose material
PNH1020 Tool nose material
PNH1020 Tool nose material



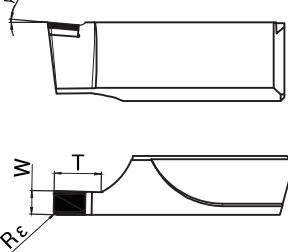
Standard Grooving Inserts



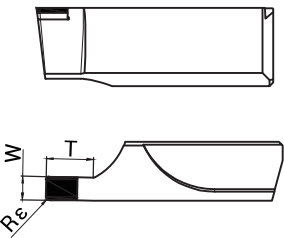
① GTI Groove turning inserts	② S Standard inserts	③ R/L Right-hand /Left-hand toolholders	④ W300 Main cutting edge width 3.0	⑤ T400 Max cutting depth 4.0	⑥ R040 Blade nose radius 0.4	⑦ P00 Rake angle 0°
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■ Fig: Right hand

■ 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		

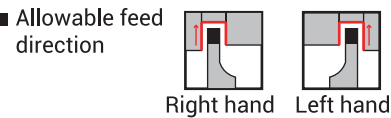
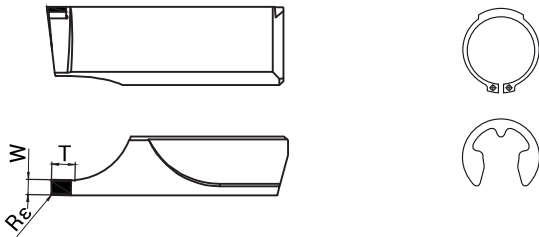
Right hand inserts						WORLDIA PCD		WORLDIA PCBN			
No.	Type	W	T	Rε	Y°	PD10F		PNH1020	PNH2018	PNH3017	PNK3003
1	GTISR-W300T500R020P00	3	5	0.2	0			▲	▲	▲	▲
2	GTISR-W300T500R020P05	3	5	0.2	5	▲					
3	GTISR-W350T500R020P00	3.5	5	0.2	0			▲	▲	▲	▲
4	GTISR-W350T500R020P05	3.5	5	0.2	5	▲					
5	GTISR-W400T500R040P00	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	Y°	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



① GTI	② R	③ R/L	-	④ W195	⑤ T400	⑥ 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



Material group	N			H			K		
Application									
Cutting edge design	F			S0102005			S0102005		

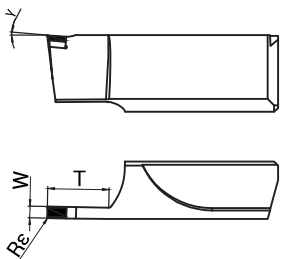
Right hand inserts					WORLDIA PCD	WORLDIA PCBN			
No.	Type	W	T	Re	PD10F	PNH1020	PNH2018	PNH3017	PNK3003
1	GTIRR-W140T400R020	1.4	2	0.2	▲	▲	▲	▲	▲
2	GTIRR-W170T400R020	1.7	3	0.2	▲	▲	▲	▲	▲
3	GTIRR-W195T400R020	1.95	3	0.2	▲	▲	▲	▲	▲
4	GTIRR-W225T500R020	2.25	3	0.2	▲	▲	▲	▲	▲
Left hand inserts					WORLDIA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

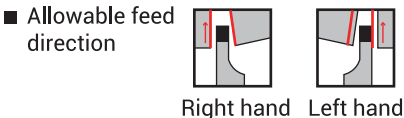
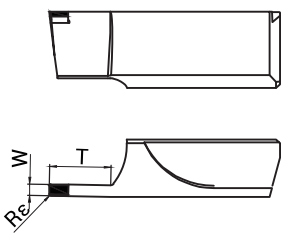


① GTI	② O	③ R/L	-	④ W200	⑤ T650	⑥ R020	⑦ P00
Groove turning inserts	Cut-off inserts	Right-hand /Left-hand toolholders		Main cutting edge width 2.0	Max cutting depth 6.5	Blade nose radius angle 0.2	Rake angle 0°

- Fig: Right hand
- Material: PCD



- Material: PCD
- PCBN



Material group	N			H			K		
Application									
Cutting edge design	F			S0102005			S0102005		

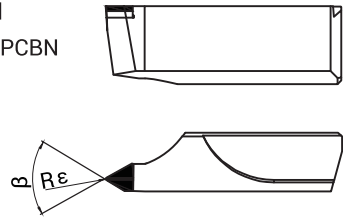
Right hand inserts						WORLDIA PCD		WORLDIA PCBN			
No.	Type	W	T	Re	γ°	PD10F		PNH1020	PNH2018	PNH3017	PNK3003
1	GTIOR-W150T700R020P00	1.5	7	0.2	0			▲	▲	▲	▲
2	GTIOR-W150T700R020P05	1.5	7	0.2	5	▲					
3	GTIOR-W200T700R020P00	2	7	0.2	0			▲	▲	▲	▲
4	GTIOR-W200T700R020P05	2	7	0.2	5	▲					
5	GTIOR-W250T850R020P00	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	Re	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

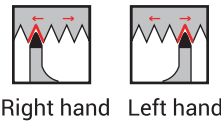


① GTI Groove turning inserts	② T Threading inserts	③ R/L Right-hand /Left -hand Toolholders	-	④ M60 Metric 60°	⑤ P100 Thread pitch 1.0mm
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- Fig: Right hand
- Material: PCD/PCBN



- Allowable feed direction

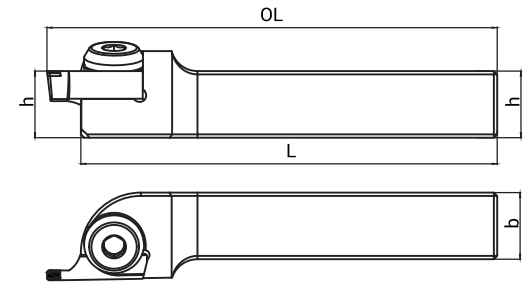


Material group	N	H	K
Application			
Cutting edge design	F	S0102005	S0102005

Right hand inserts					WORLDIA PCD		WORLDIA PCBN		
No.	Type	P	A	Rε	PD10F		PNH1020	PNH2018	PNH3017
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
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 GTH Groove turning Toolholders	② R/L Cutting Direction: Right-hand direction Left-hand direction	-	③ C91 Shank tool cutting edge angle 91°	④ S2020 Tool holder size b=20, h=20
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- Fig: Right hand

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

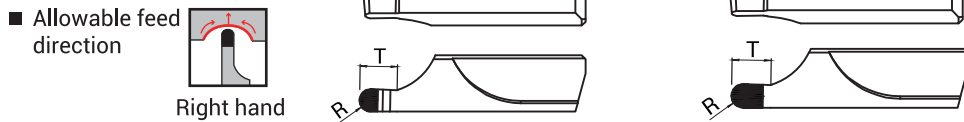
Customized Grooving Inserts



GTIR Contour Cutting Inserts

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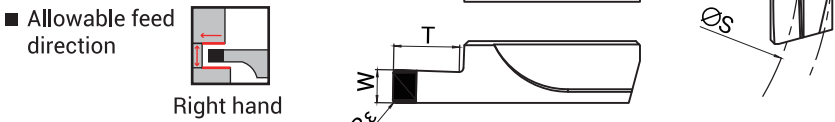
- Fig: Right hand
- Material: PCD/PCBN



GTIE End Face Ring Grooving Inserts

① GTI Groove turning inserts	② E End face ring groove	③ R/L Right-hand /Left -hand toolholders	-	④ W300 Main cutting edge width 3.0	⑤ T850 Max Cutting depth 8.5	⑥ R020 Blade nose radius angle 0.2	-	⑦ B060 Max OD ϕ60	⑧ S040 Min OD ϕ40
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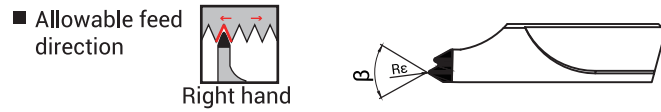
- Fig: Right hand
- Material: PCD/PCBN



GTIT Metric Threading Inserts

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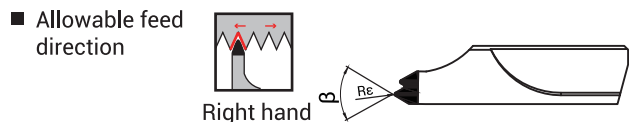
- Fig:Right-hand inserts with wiper
- Material: PCD/PCBN



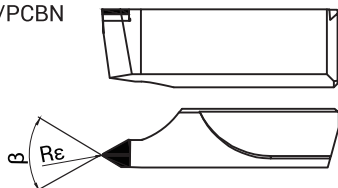
GTIT Inch Threading Inserts

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



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



Questionnaire for Customized Grooving Inserts



In order to enable us to recommend the optimum insert for your application, kindly provide us with application data as **Questionnaire for Customized Grooving Inserts** from below.



Questionnaire for Customized Grooving Inserts

Customer Basic Information		
Company Name *	Contact person's Name *	Contact Tel *
Demand from End User * ___ pcs/order, ___ pcs/month, ___ pcs/year		
Tools Demanding Background		
Workpiece Information		Inserts Information
Drawing: ☐ Yes ☐ No		Drawing: ☐ Yes ☐ No
Workpiece Name *	Mode:	☐ Inserts Style*: Inserts Specification: holder/shank mode:
Workpiece Material *	Material Grade:	☐ brazed type: (L) mm; (W) mm; (H) mm; (Dia mm)
Workpiece Hardness *	surface finish required*:	cutting speed V(m/min)*
Result required:		Feed rate(f)*: mm/rev working allowance(/side)*: (mm)
Processing*:		Cutting dept(AP1)*: mm cutting dept(AP2)*: mm
☐ Outer circle ☐ End face ☐ Inner bore		Cutting Type*: ☐ continuous ☐ light interrupted ☐ medium interrupted ☐ heavy interrupted
☐ Grooving ☐ Circlip grooving ☐ Contour cutting ☐ Threading ☐ Cutting off ☐ Others		Cooling Type*: ☐ drying cutting ☐ gas ☐ wet cutting ☐ water ☐ oil
Expecting Result:		
Machine Tool Information		Lead time required
machining type: ☐ MC ☐ CNC lathe (horizontal) ☐ vertical lathe ☐ turning-milling complex machine		
Items marked* must be required		

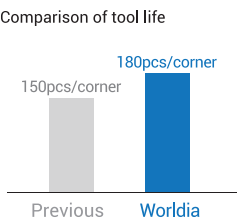
Application Cases



Tool life increased by **1.2 times**

PCBN Grooving Cutter Designed for Shaft Grooving

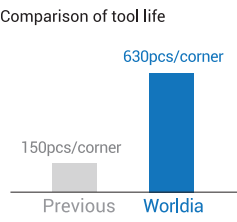
Workpiece: Input shaft
Material: Hardened steel
Hardness: HRC58~62
Surface finish: Ra0.8
Worldia insert: GTIRL-W225T500R020 PNH2018
Parameters: VC: 200m/min f: 0.08mm/rev Ap: 0.3mm



4.2 times longer tool life than pervious tools

Application Case of PCBN Threading Insert

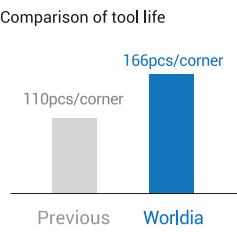
Workpiece: Pulley
Material: 20CrMnTiH
Hardness: HRC58~63
Surface finish: Ra1.6
Machining parts: external thread
Operation type: Continuous
Worldia insert: GTITL-M60P200 PNH2018
Parameters: Vc:100m/min f: 1mm/rev ap: 0.06mm



Tool life increased by **1.5 times**

Application Case of PCBN Face Grooving Insert

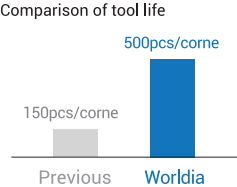
Workpiece: Wheel hub
Material: Powder metal
Hardness:HRC40
Machining size:φ73~φ52
Machining parts: Face grooving
Operation type: Continuous & interrupted cutting
Surface finish:Ra0.8
Worldia Insert: Customized face grooving insert
Parameters:Vc:160~224m/min f: 0.11mm/rev ap: 3mm



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



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"	

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