

TurnLine

T-DIA SERIES

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Tungaloy Report No. 351-G

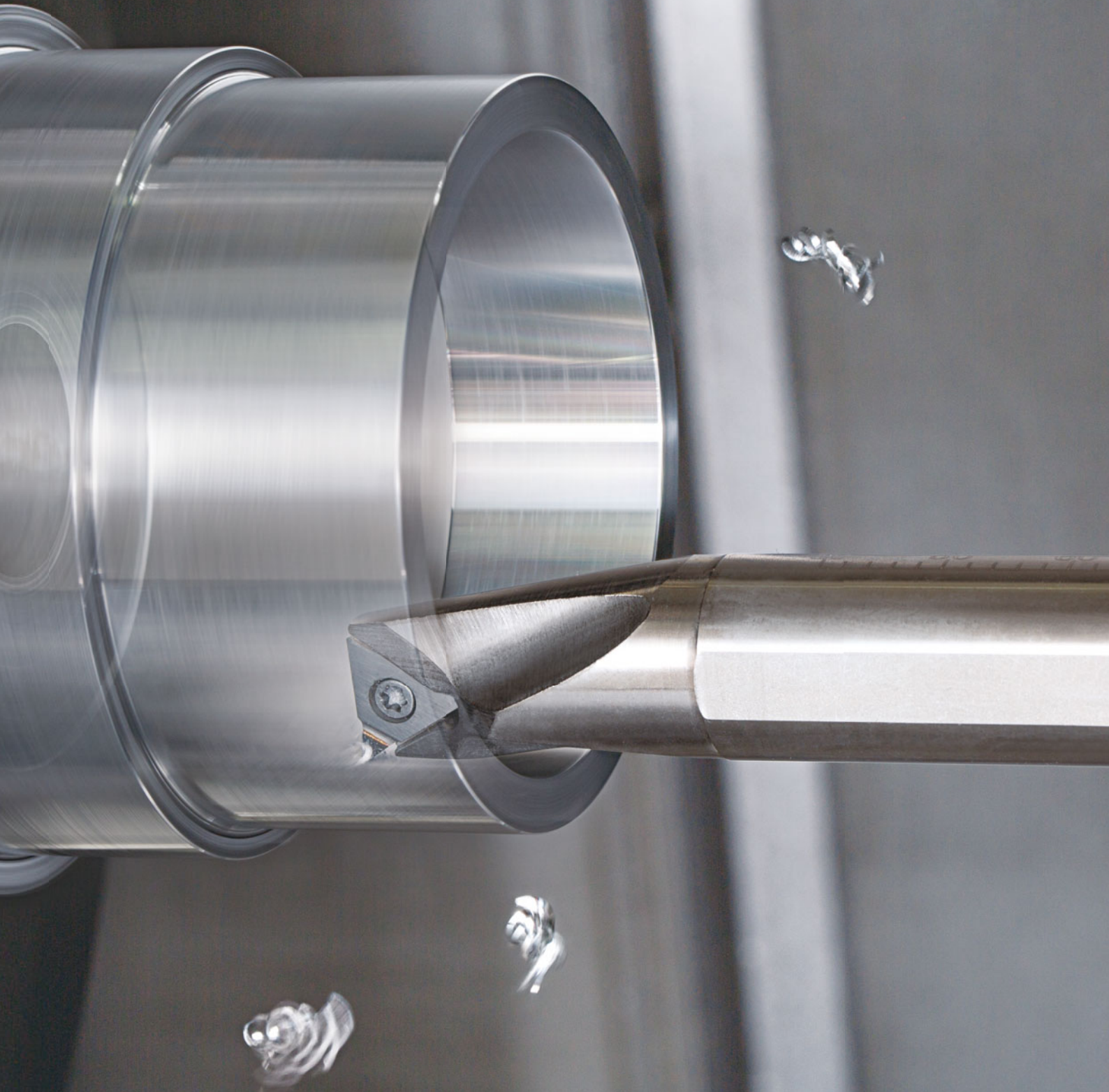
SM[★]TOOLS[®]

Now offers DX110 - Sub-micron grain PCD grade inserts

Member IMC Group
Tungaloy



INDUSTRY 4.0
FEED the SPEED!

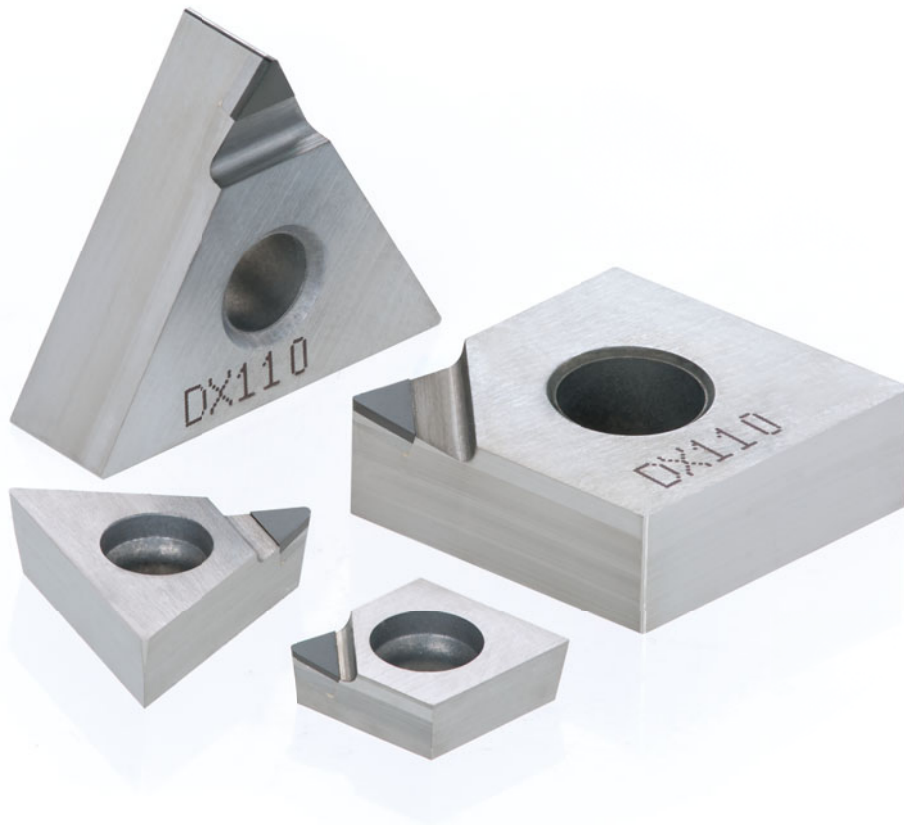


ACCELERATED MACHINING

TurnLine

T-DIA SERIES

TUNGALOY



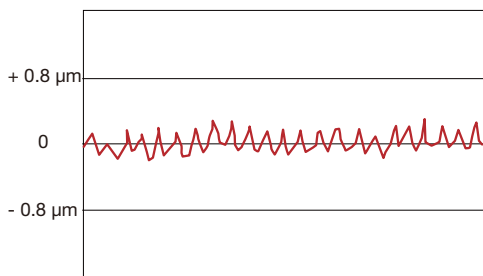
The ultimate solution for high speed machining of aluminum alloys

Now offering **DX110** grade — ultra-fine grain polycrystalline diamond grade

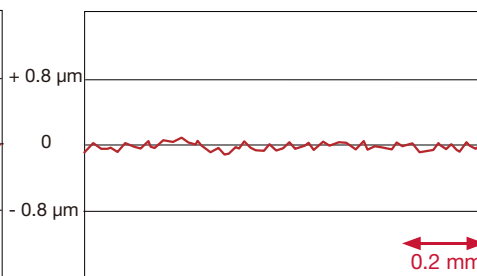
Features of DX110

Submicron grain sized PCD structure allows the insert's cutting edge to retain extreme sharpness. Its strong PCD grain bond significantly reduces the drop-off of the abrasive grains during machining, making the grade exceptionally wear resistant.

Surface finish



Competitor



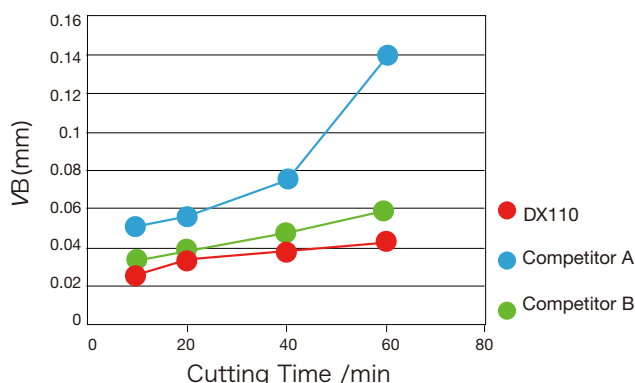
DX110



Insert : CNM**120408
Material : Aluminum alloy (Si:10%)
Cutting speed : $V_c = 500$ m/min
Depth of cut : $a_p = 0.3$ mm
Feed : $f = 0.05$ mm/rev

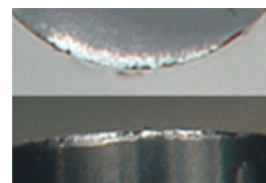
Submicron grain PCD grade DX110 insert with optimized rake angle provides excellent surface finish

Wear resistance



Insert : 1QP-CNMM120408 DX110
Material : Aluminum alloy (Si:17%)
Holder : ACLNL2525M12-A
Cutting speed : $V_c = 500$ m/min
Feed : $f_z = 0.1$ mm/rev
Depth of cut : $a_p = 0.5$ mm
Coolant : Dry

After 60 min



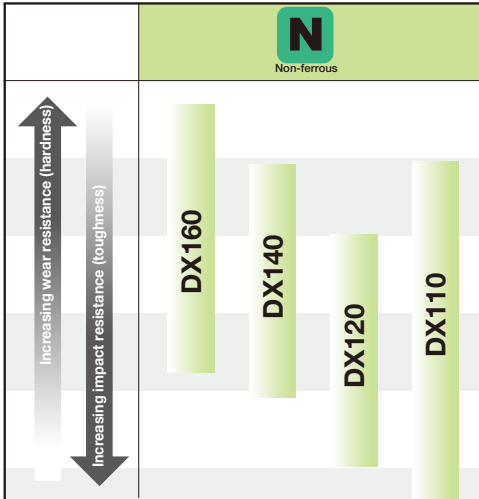
DX110



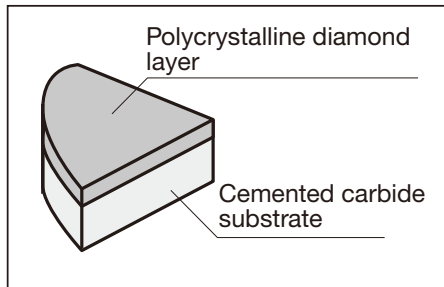
Competitor A

DX110 exhibited excellent wear resistance in machining extremely abrasive Si-Al alloy

Grades



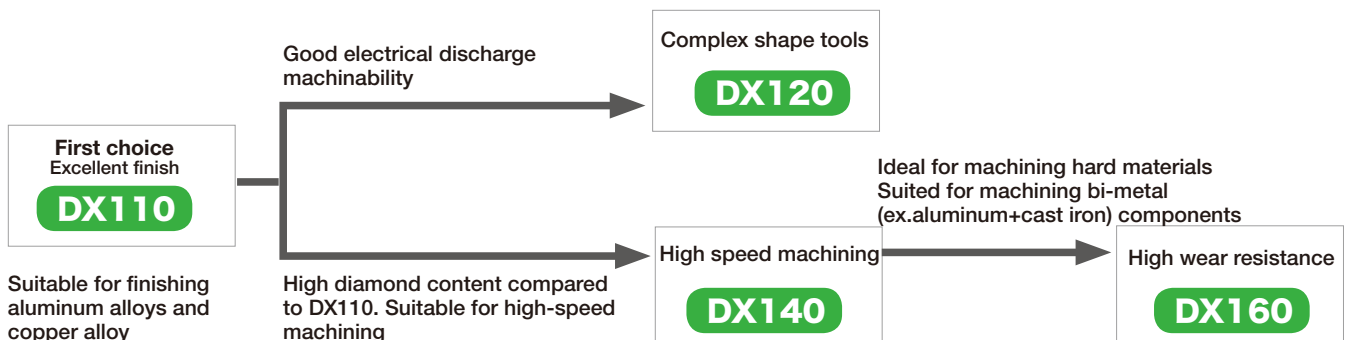
Diamond is the hardest known material on the earth. This is an advanced diamond based tool material where tiny diamond crystals are tightly sintered on the cemented carbide alloy base by means of a super high pressure and temperature process. PCD is therefore the optimum choice for cutting non-ferrous and non-metal materials.



Structure of T-DIA




Application	Grades	Microstructure	Grain size (µm)	Hardness (Hv)	Strength (GPa)	Features
	DX110		< 1	8500	1.8	Super fine grain T-DIA grade for superior surface finish. Excels in cutting edge sharpness and produces consistent high quality surface finish
	DX120		4.5	9000	1.8	High electrical conductivity. Excellent in wire electrical discharge machinability. Suitable for complex cutting edge shape tools
	DX140		12.5	10000	1.7	Medium grain diamond grade. High thermal conductivity, suitable for high-speed processing of Al alloy
	DX160		28	11000	1.6	High diamond content grade. Excellent wear resistance. Suitable for cutting ceramic and cemented carbide

Grade selection guide



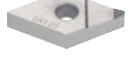


PCD insert

- : Continuous cutting
- ◐ : Light interrupted cutting
- ◑ : Heavy interrupted cutting

NEGATIVE TYPE		P	M	K	N	S	H	PCD length					Corner radius				
 Rhombic, 80° with hole	Steel																
	Stainless																
	Cast iron																
	Non-ferrous				●	●	●										
	Superalloys																
	Hard materials																
Insert shape	Designation	DX110	DX120	DX140				Dimension (mm)					Edge prep			Rake angle	
								Edge/insert	LE	RE	IC	S	D1	Sharp edge			
	CNGA** -DIA CNGA120404-DIA		●					1	3.5	0.4	12.7	4.76	5.16	○			
	CNGA120408-DIA		●					1	2.8	0.8	12.7	4.76	5.16	○			
	CNMM** -DIA CNMM120402-DIA		●					1	3.5	0.2	12.7	4.76	5.16	○			○
	CNMM120404-DIA		●					1	3.5	0.4	12.7	4.76	5.16	○			○
	1QP -CNMM120402			★				1	2.8	0.2	12.7	4.76	5.16	○			○
	1QP -CNMM120404			★				1	2.8	0.4	12.7	4.76	5.16	○			○



● : Line-up
★ : New product

NEGATIVE TYPE		P	M	K	N	S	H	PCD length					Corner radius				
 Rhombic, 55° with hole	Steel																
	Stainless																
	Cast iron																
	Non-ferrous				●	●	●										
	Superalloys																
	Hard materials																
Insert shape	Designation	DX120	DX140	DX160				Dimension (mm)					Edge prep			Rake angle	
								Edge/insert	LE	RE	IC	S	D1	Sharp edge			
	DNGA** -DIA DNGA150404-DIA		●	●				1	3.1	0.4	12.7	4.76	5.16	○			
	DNGA150408-DIA		●					1	2.8	0.8	12.7	4.76	5.16	○			
	DNMM** -DIA DNMM150402-DIA		●					1	3.3	0.2	12.7	4.76	5.16	○			○
	DNMM150404-DIA		●					1	3.1	0.4	12.7	4.76	5.16	○			○



● : Line-up

PCD insert

- : Continuous cutting
- ◐ : Light interrupted cutting
- ✱ : Heavy interrupted cutting

NEGATIVE TYPE		P	M	K	N	S	H	PCD length						Corner radius	
Insert shape	Designation	DX140						LE	RE	IC	S	D1	Sharp edge		
 Square, 90° with hole		●													
	SNGA**-DIA	SNGA120404-DIA	●					1	3.6	0.4	12.7	4.76	5.16	○	
	SNGA120408-DIA	●						1	3.6	0.8	12.7	4.76	5.16	○	
															


● : Line-up



NEGATIVE TYPE		P	M	K	N	S	H	PCD length						Corner radius	
Insert shape	Designation	DX140						LE	RE	IC	S	D1	Sharp edge		
 Square, 90° without hole		●													
	SNGN**-DIA	SNGN120408-DIA	●					1	3.6	0.8	12.7	4.76			
															

● : Line-up


- : Continuous cutting
- ◐ : Light interrupted cutting
- ✱ : Heavy interrupted cutting


PCD insert

POSITIVE TYPE		P	M	K	N	S	H											PCD length		Corner radius					
 Rhombic, 80° with hole Positive 7°	Steel																			LE	RE				
	Stainless																								
	Cast iron																								
	Non-ferrous				●	●	●	●																	
	Superalloys																								
	Hard materials																								

Insert shape	Designation	DX110	DX120	DX140	DX160	Dimension (mm)					Edge prep			Rake angle		
						Edge/insert	LE	RE	IC	S	D1	Sharp edge				
 CCGW**-DIA	CCGW060200-DIA			●		1	2.4	0.05	6.35	2.38	2.8	○				
	CCGW060202-DIA			●		1	2.4	0.2	6.35	2.38	2.8	○				
	CCGW060204-DIA			●		1	2.4	0.4	6.35	2.38	2.8	○				
	CCGW09T302-DIA			●		1	3.5	0.2	9.525	3.97	4.4	○				
	CCGW09T304-DIA			●	●	1	3.5	0.4	9.525	3.97	4.4	○				
	CCGW09T308-DIA				●		1	3.4	0.8	9.525	3.97	4.4	○			
 CCMT**-DIA	CCMT060202-DIA		●			1	2.4	0.2	6.35	2.38	2.8	○			○	
	CCMT060204-DIA		●			1	2.4	0.4	6.35	2.38	2.8	○			○	
	CCMT09T302-DIA		●			1	2.4	0.2	9.525	3.97	4.4	○			○	
	CCMT09T304-DIA		●			1	2.4	0.4	9.525	3.97	4.4	○			○	
	1QP-CCMT060204		★				1	2.4	0.4	6.35	2.38	2.8	○			○
	1QP-CCMT09T304		★				1	2.4	0.4	6.35	3.97	4.4	○			○

● : Line-up
★ : New product



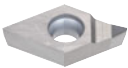
POSITIVE TYPE		P	M	K	N	S	H											PCD length		Corner radius					
 Rhombic, 80° with hole Positive 11°	Steel																					LE	RE		
	Stainless																								
	Cast iron																								
	Non-ferrous				●																				
	Superalloys																								
	Hard materials																								

Insert shape	Designation	DX140	Dimension (mm)					Edge prep			Rake angle					
			Edge/insert	LE	RE	IC	S	D1	Sharp edge							
 CPGA**-DIA	CPGA080202-DIA		●				1	2.4	0.2	9.525	2.38	4.0	○			
	CPGA080204-DIA		●				1	3.5	0.4	9.525	2.38	4.0	○			



● : Line-up

PCD insert

- : Continuous cutting
- ◐ : Light interrupted cutting
- ✱ : Heavy interrupted cutting

POSITIVE TYPE		P	Steel	M	Stainless	K	Cast iron	N	Non-ferrous	S	Superalloys	H	Hard materials	PCD length		Corner radius	
	Rhombic, 55° with hole Positive 7°							●●	●●					LE	RE		
	Insert shape	Designation	DX120	DX140	Edge/insert	LE	RE	IC	S	D1	Sharp edge			Rake angle			
	DCGW**-DIA DCGW070200-DIA	●															
	DCGW070202-DIA	●	●														
	DCGW070204-DIA	●															
	DCGW11T302-DIA	●															
	DCGW11T304-DIA	●															
	DCGW11T308-DIA	●															
	DCMT**-DIA DCMT070202-DIA	●												○			
	DCMT070204-DIA	●												○			
	DCMT11T302-DIA	●												○			
	DCMT11T304-DIA	●												○			

● : Line-up

POSITIVE TYPE		P	Steel	M	Stainless	K	Cast iron	N	Non-ferrous	S	Superalloys	H	Hard materials	PCD length		Corner radius	
	Rhombic, 75° with hole Positive 11°							●	●					LE	RE		
	Insert shape	Designation	DX140		Edge/insert	LE	RE	IC	S	D1	Sharp edge			Rake angle			
	EPGW**-DIA EPGW040102-DIA	●															
	EPGW040104-DIA	●															

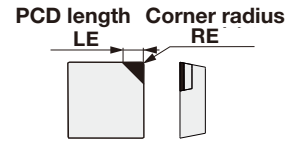
● : Line-up


PCD insert

- : Continuous cutting
- ◐ : Light interrupted cutting
- ✱ : Heavy interrupted cutting

POSITIVE TYPE

 <p>Square, 90° without hole Positive 11°</p>	P Steel																				
	M Stainless																				
	K Cast iron																				
	N Non-ferrous						●	●	●												
	S Superalloys																				
	H Hard materials																				

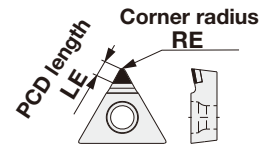



Insert shape	Designation	DX140	DX160	Dimension (mm)						Edge prep											
				Edge/insert	LE	RE	IC	S	D1	Sharp edge											
	SPGN** -DIA																				
	SPGN090308-DIA	●																			
	SPGN120302-DIA	●																			
	SPGN120304-DIA	●																			
	SPGN120308-DIA	●	●																		

● : Line-up

POSITIVE TYPE

 <p>Triangular, 60° with hole Positive 7°</p>	P Steel																				
	M Stainless																				
	K Cast iron																				
	N Non-ferrous						●	●	●												
	S Superalloys																				
	H Hard materials																				


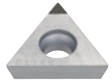


Insert shape	Designation	DX110	DX120	Dimension (mm)						Edge prep			Rake angle									
				Edge/insert	LE	RE	IC	S	D1	Sharp edge												
	TCMT** -DIA																					
	TCMT080202-DIA	●																				
	TCMT080204-DIA	●																				
	TCMT110202-DIA	●																				
	TCMT110204-DIA	●																				
	TCMT110302-DIA	●																				
	TCMT110304-DIA	●																				
1QP-TCMT110304	★																					



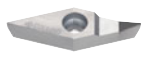
● : Line-up
★ : New product

PCD insert

- : Continuous cutting
- ◐ : Light interrupted cutting
- ✱ : Heavy interrupted cutting

POSITIVE TYPE		P	Steel	M	Stainless	K	Cast iron	N	Non-ferrous	S	Superalloys	H	Hard materials			
 <p>Triangular, 60° with hole Positive 11°</p>								●●●●								
Insert shape	Designation	DX120	DX140	Dimension (mm)					Edge prep							
				Edge/insert	LE	RE	IC	S	D1	Sharp edge						
	TPGW**-DIA TPGW080202-DIA	●														
	TPGW080204-DIA	●														
	TPGW090202-DIA	●	●													
	TPGW090204-DIA	●	●													
	TPGW110202-DIA	●	●													
	TPGW110204-DIA	●	●													
	TPGW130302-DIA	●	●													
	TPGW130304-DIA	●	●													
	TPGW16T302-DIA	●	●													
	TPGW16T304-DIA	●	●													
TPGW16T308-DIA	●	●														

● : Line-up

POSITIVE TYPE		P	Steel	M	Stainless	K	Cast iron	N	Non-ferrous	S	Superalloys	H	Hard materials		
 <p>Rhombic, 35° with hole Positive 7°</p>								●●●●							
Insert shape	Designation	DX120	DX140	Dimension (mm)					Edge prep		Rake angle				
				Edge/insert	LE	RE	IC	S	D1	Sharp edge					
	VCGW**-DIA VCGW160402-DIA	●													
	VCGW160404-DIA	●													
	VCMT**-DIA VCMT160402-DIA	●												○	
	VCMT160404-DIA	●												○	


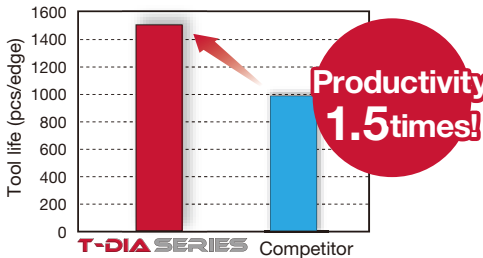
● : Line-up

Standard cutting conditions

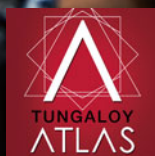
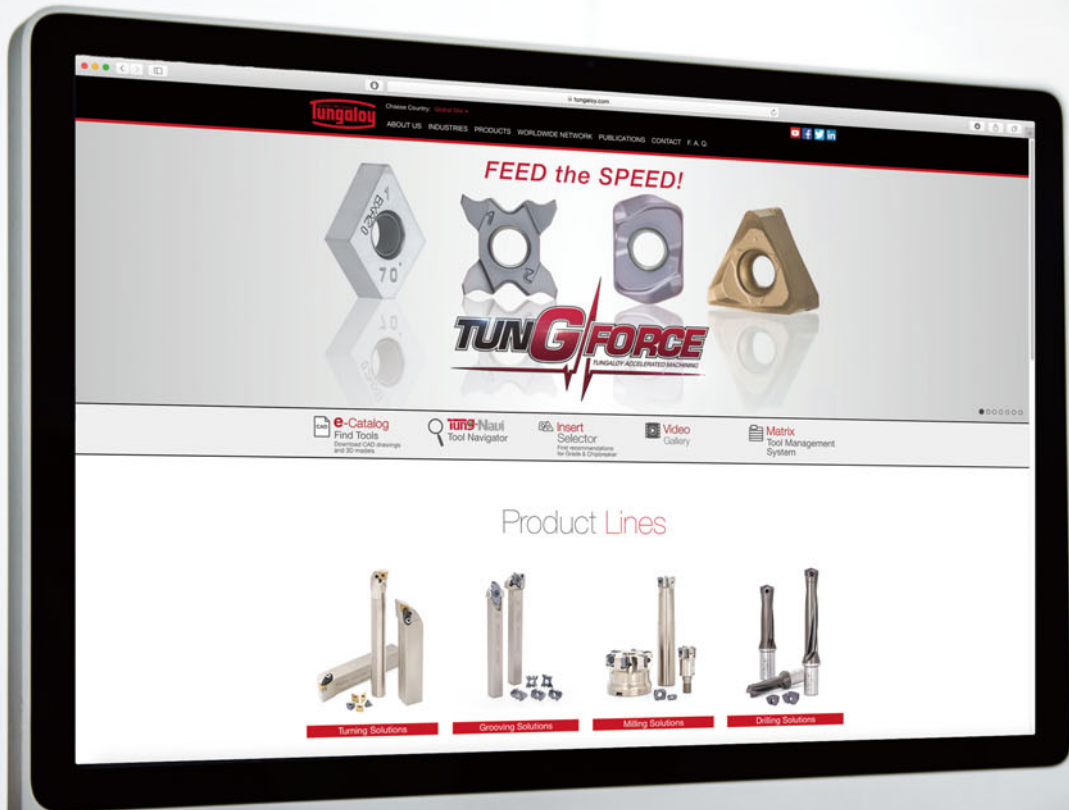
Work material	Cutting speed Vc (m/min)	Depth of cut ap (mm)	Feed f (mm/rev)	Grade selection			
				DX110	DX120	DX140	DX160
Aluminum alloys (Si < 12%)	1500 (1000-2500)	0.5 (0.05-2.0)	0.1 (0.05-0.2)	◎	○	○	
Aluminum alloys (Si ≥ 12%)	600 (400-800)	0.5 (0.05-2.0)	0.1 (0.05-0.2)	◎	○	○	○
Copper and Brass	800 (500-1500)	0.5 (0.05-2.0)	0.1 (0.05-0.2)	◎	○		
Bronze	400 (300-500)	0.5 (0.05-2.0)	0.1 (0.05-0.2)	◎	○	○	
Carbon / Graphite	400 (300-500)	0.5 (0.05-2.0)	0.1 (0.05-0.2)		○	○	◎
FRP	700 (500-1000)	0.2 (0.05-0.5)	0.05 (0.03-0.1)		○	○	◎
Plastic	700 (500-1000)	0.2 (0.05-0.5)	0.03 (0.01-0.05)	◎	○	○	
Cemented carbide (D40 ~ D50)	15 (10-20)	0.1 (0.05-0.2)	0.03 (0.01-0.05)			○	◎
Green ceramics	130 (100-150)	0.5 (0.05-2.0)	0.05 (0.03-0.1)			○	◎

◎ : First choice ○ : Second choice

PRACTICAL EXAMPLES

Workpiece type		Copper-based sintered alloy
Insert		1QP-CCMT09T304, 1QP-CCMT32.51
Grade		DX110
Workpiece		
Cutting conditions	Cutting speed: Vc (m/min)	300
	Feed : f (mm/rev)	0.05
	Depth of cut : ap (mm)	0.1
	Coolant	Water soluble
Results		 <p>Thanks to its optimized rake angle and sharp cutting edge, DX110 eliminated burr formation on the machined surface, while extending tool life by 1.5x over the competitor's.</p>

Check our site and our App to get more info!



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