

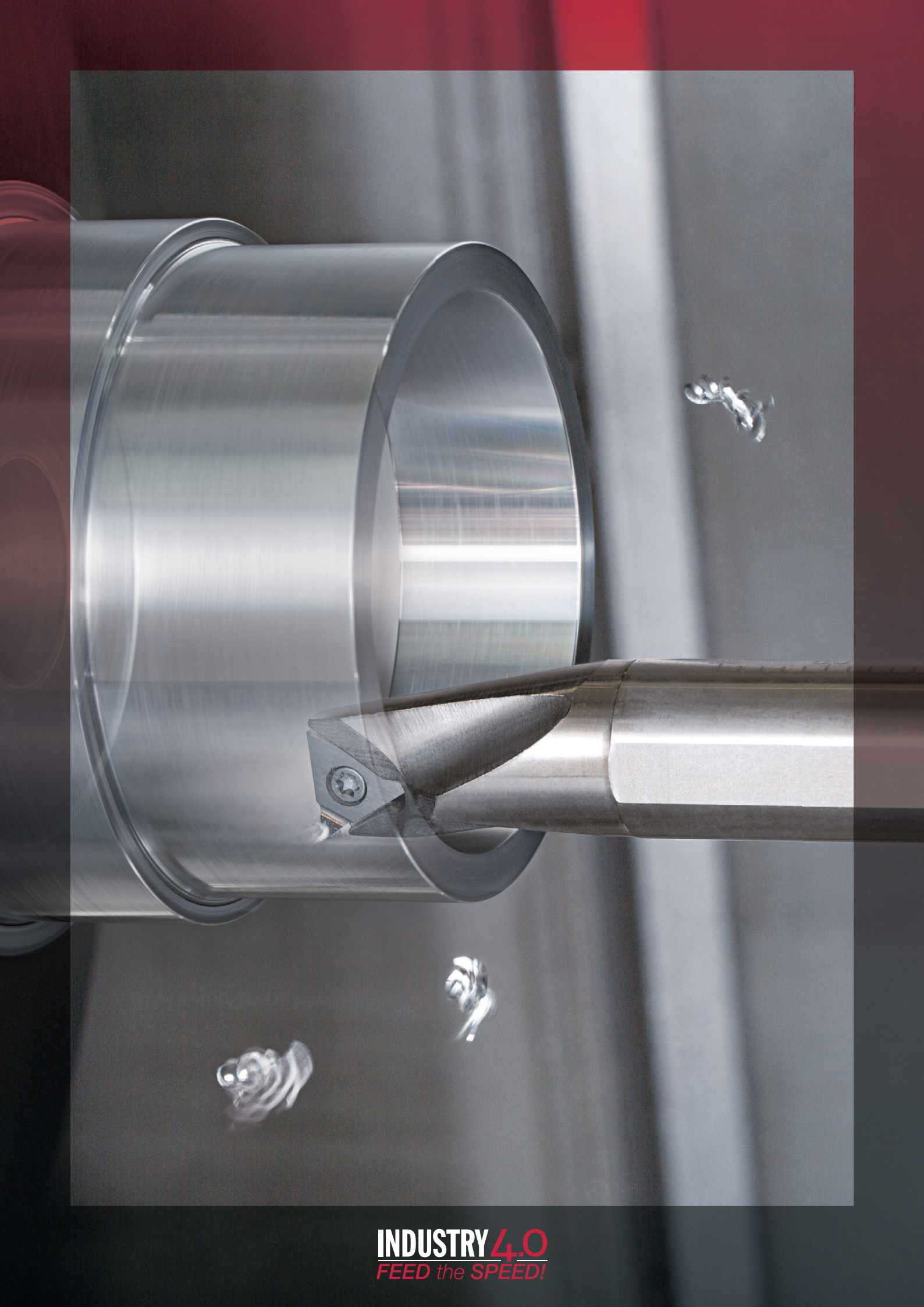
Turning tool

Non-Ferrous Application Series

Tungaloy Report No. 555-US

**Tungaloy's complete turning solutions
for non-ferrous materials with ultimate
stability and productivity**





INDUSTRY 4.0
FEED the SPEED!



Non-Ferrous Application Series



The ultimate tools for high speed machining of
non-ferrous alloys.
Chip nesting is a thing of the past.

Non-Ferrous Application Series

Complete turning solutions for non-ferrous materials

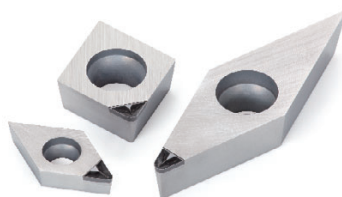
Ultra-fine grain PCD
(polycrystalline diamond)
tipped inserts

**T-DIA SERIES
DX110**



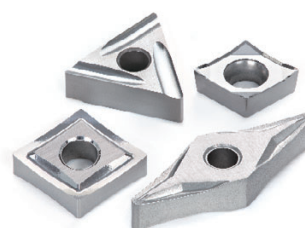
PCD inserts with 3D chipbreaker

**T-DIA SERIES
NS**



Fine-grained cemented carbide
inserts with chipbreaker for
non-ferrous alloy

AL/28/P



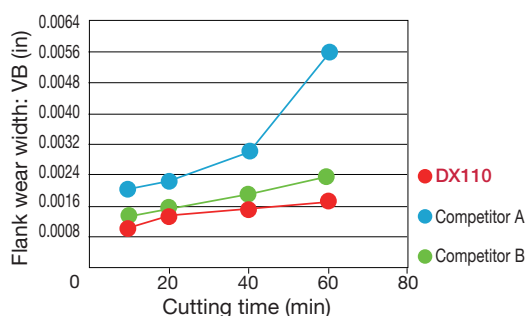
Ultra-fine grained PCD-tipped inserts

T-DIA SERIES DX110

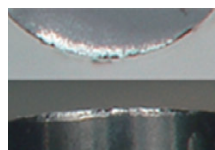
Definitive insert series for high speed machining of aluminum alloys

- Ultra-fine grained PCD grade for edge sharpness
- An extremely wear-resistant grade, featuring strongly-bonded diamond grains that prevents the grains from breaking off during machining
- Thanks to ultra-fine diamond grains, **DX110** provides superior surface finish
- Chipbreaker series with rake angle of 10°

■ Wear resistance



After 60 min



DX110

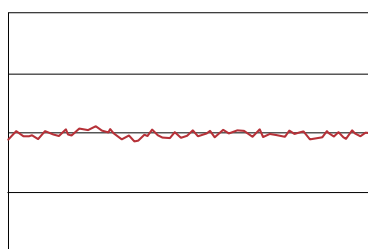


Competitor A

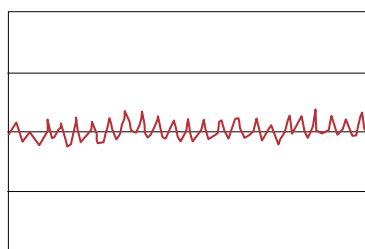
Insert : 1QP-CNMM 431 **DX110**
Workpiece material : Aluminum alloy (Si: 17%)
Holder : ACLNL164-A
Cutting speed : $V_c = 1640$ sfm
Feed : $f = 0.004$ ipr
Depth of cut : $a_p = 0.02$ "
Coolant : Dry

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

■ Surface finish



DX110

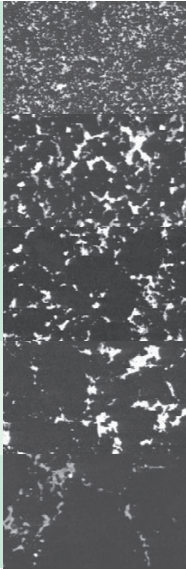


Competitor

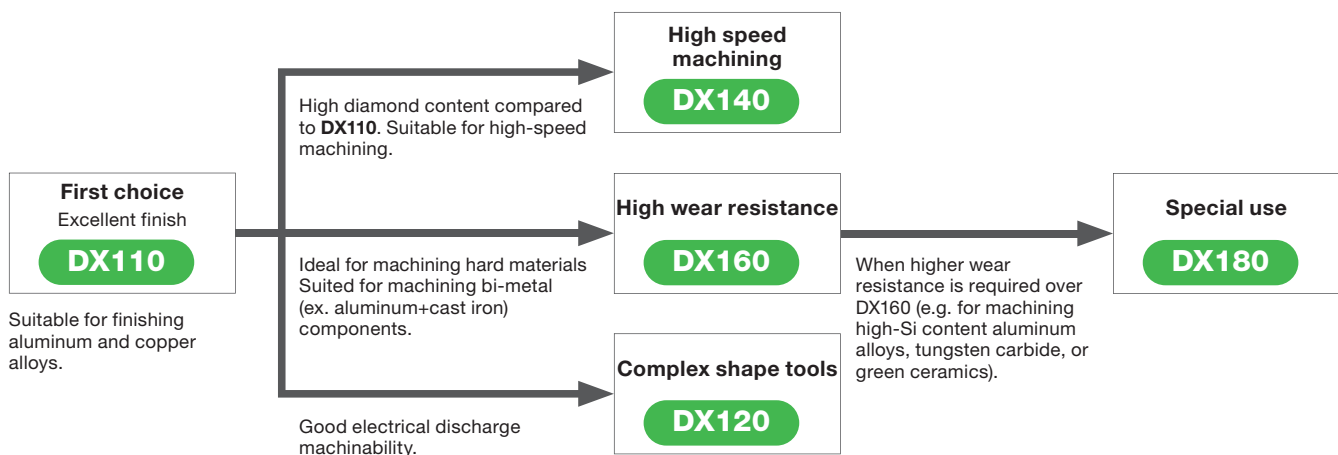
Insert : 1QP-DCGT 32.52 NS **DX110**
Workpiece material : Aluminum alloy (Si:10%)
Cutting speed : $V_c = 1640$ sfm
Feed : $f = 0.002$ ipr
Depth of cut : $a_p = 0.012$ "
Coolant : Wet

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

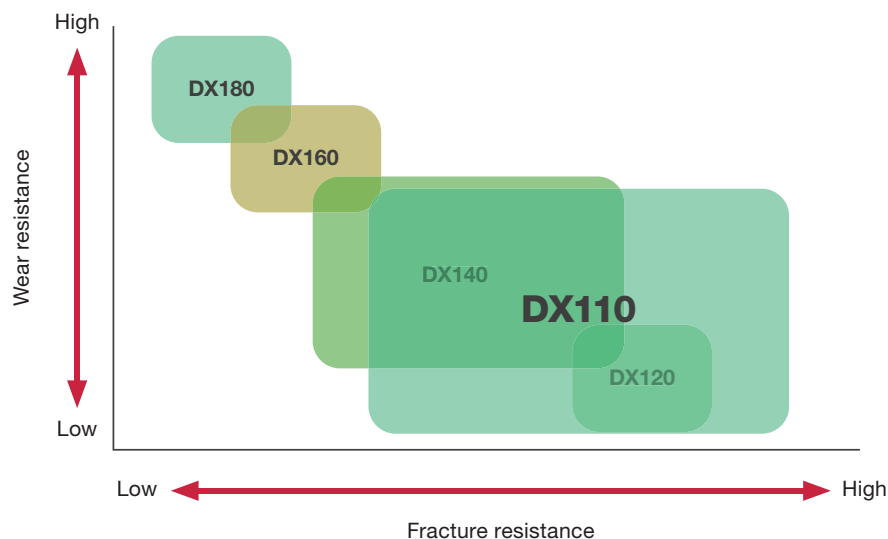
■ Grade properties

Application	Grade	Microstructure	Grain size (μm)	Hardness (Hv)	Strength (GPa)	Features
N	DX110		< 1	8,500	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	9,000	1.8	High electrical conductivity. Excellent in wire electrical discharge machinability. Suitable for complex cutting edge shape tools.
	DX140		12.5	10,000	1.7	Medium grain diamond grade. High thermal conductivity, suitable for high-speed processing of Al alloy.
	DX160		28	11,000	1.6	High diamond content grade. Excellent wear resistance. Suitable for cutting ceramic and cemented carbide.
	DX180		45	12,000	1.5	Extremely wear resistant grade with ultra-fine diamond grains.

■ Grade selection guide



■ PCD grades and applications



Non-Ferrous Application Series

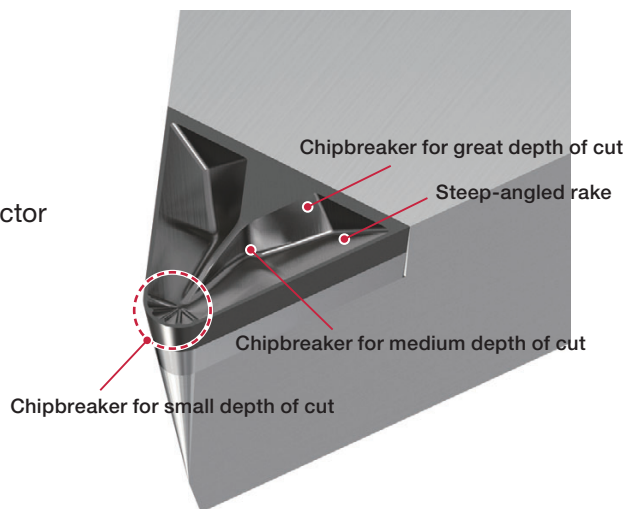
PCD inserts with 3D chipbreaker

T-DIA SERIES NS

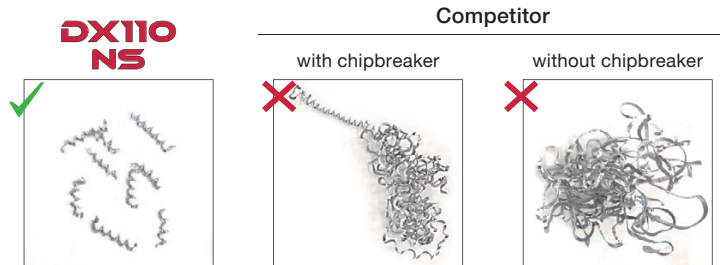
No more chip nesting in aluminum alloy machining

Unique 3D chipbreaker

- Versatile geometry allows excellent chip control
- One insert handles from rough to finish operations
- Optimal rake angle design effectively directs chips to the redirector



■ Chip control



N	Insert	: 1QP-DCGT 32.51 NS
	Holder	: SDJCL163
	Workpiece material	: 5056
	Cutting speed	: $V_c = 3280$ sfm
	Feed	: $f = 0.004$ ipr
	Depth of cut	: $a_p = 0.02$ "
	Application	: External turning, continuous cut
	Coolant	: Wet

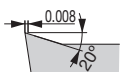
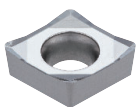
PCD insert with NS chipbreaker provides better chip control than competitors.

Fine-grained cemented carbide inserts with chipbreaker for non-ferrous alloy

AL/28/P

No more chip nesting in aluminum alloy and copper alloy machining

For positive insert

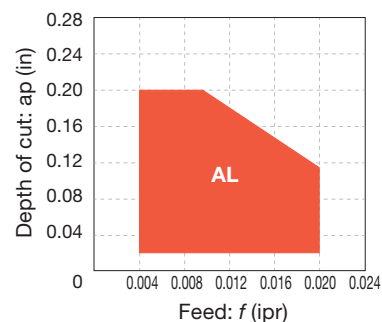


First-choice geometry for non-ferrous applications

AL

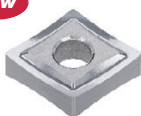
- Provides excellent chip control and resistance to wear and built-up edge
- Low cutting forces generated by a large rake angle and sharp cutting edge
- 3D geometry with lapped rake face
- Superb chip control enabled by large inclination angle of the cutting edge
- Available on 26 total inserts, including CCGT, DCGT, RCGT, TCGT, and VCGT inserts

■ Chip control range



For negative insert

New

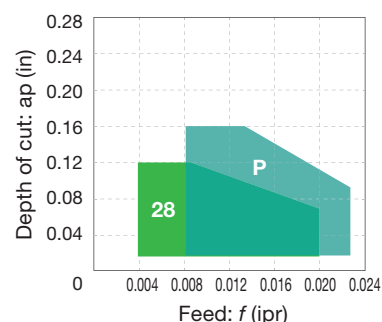


Press-in chipbreaker ideal for medium to finish operations

28

- Versatile geometry with a large inclination angle of the cutting edge. Ideal for medium to finish operations
- Provides superior surface finish and chip control

■ Chip control range



■ Chip control



N

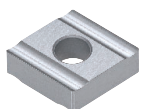
Insert : CNGG 431-28 **KS05F**
 Workpiece material: 6061
 Cutting speed : $V_c = 1640$ sfm
 Feed : $f = 0.008$ ipr
 Depth of cut : $a_p = 0.039$ "
 Application : External turning, continuous cut
 Coolant : Wet



N

Insert : CNGG 431-28 **KS05F**
 Workpiece material: 6061
 Cutting speed : $V_c = 1640$ sfm
 Feed : $f = 0.012$ ipr
 Depth of cut : $a_p = 0.079$ "
 Application : External turning, continuous cut
 Coolant : Wet

28 chipbreaker provides excellent chip control in wide range of applications.



Linear chipbreaker

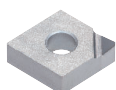
P

Provides process security across a wide range of applications

Non-Ferrous Application Series

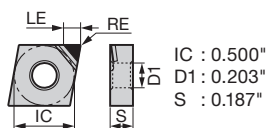
STANDARD CUTTING CONDITIONS

ISO	Workpiece materials	Chipbreaker	Grade	Cutting speed Vc (sfm)	Feed f (ipr)	Depth of cut ap (in)
N	Aluminum alloys (Si ≤ 12%)	NS	DX110	1640 - 8202	0.002 - 0.012	0.004 - 0.079
		Without	DX110	3281 - 8202	0.002 - 0.008	0.002 - 0.079
		Without	DX120	3281 - 8202	0.002 - 0.008	0.002 - 0.079
		Without	DX140	3281 - 8202	0.002 - 0.008	0.002 - 0.079
		AL	KS05F	328 - 3937	0.004 - 0.020	0.020 - 0.197
		28	KS05F	328 - 3937	0.004 - 0.020	0.020 - 0.118
		P	TH10	328 - 3281	0.008 - 0.020	0.020 - 0.157
	Aluminum alloys (Si ≥ 12%)	Without	DX110	1312 - 2625	0.002 - 0.008	0.002 - 0.079
		Without	DX120	1312 - 2625	0.002 - 0.008	0.002 - 0.079
		Without	DX140	1312 - 2625	0.002 - 0.008	0.002 - 0.079
		Without	DX160	1312 - 2625	0.002 - 0.008	0.002 - 0.079
		AL	KS05F	328 - 984	0.004 - 0.020	0.020 - 0.197
		28	KS05F	328 - 984	0.004 - 0.020	0.020 - 0.118
		P	TH10	328 - 984	0.008 - 0.020	0.020 - 0.157
	Copper and copper alloys	NS	DX110	1640 - 4921	0.002 - 0.012	0.004 - 0.079
		Without	DX110	1640 - 4921	0.002 - 0.008	0.002 - 0.079
		Without	DX120	1640 - 4921	0.002 - 0.008	0.002 - 0.079
		AL	KS05F	328 - 984	0.004 - 0.020	0.020 - 0.197
		28	KS05F	328 - 984	0.004 - 0.020	0.020 - 0.118
		P	TH10	328 - 984	0.008 - 0.020	0.020 - 0.157

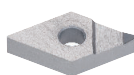


CN 43

**Rhombic, 80°
with hole**

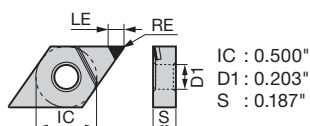
[illegible][illegible]

● : Line up



DN 43

**Rhombic, 55°
with hole**

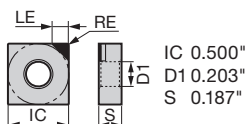
[illegible][illegible]

● : Line up



SNGA 43

**Square, 90°
with hole**

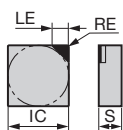
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● : Line up



SNGN 43

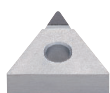
**Square, 90°
without hole**



IC : 0.500"
S : 0.187"

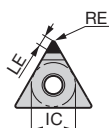
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● : Line up



TN 33

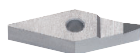
**Triangular, 60°
with hole**



IC : 0.375"
D1 : 0.150"
S : 0.187"

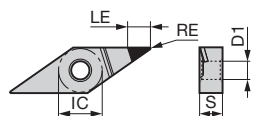
[illegible][illegible]

● : Line up



VNMM 33

**Rhombic, 35°
with hole**



IC : 0.375"
D1 : 0.150"
S : 0.187"

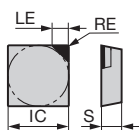
[illegible][illegible]

● : Line up



SPGN 32

Square, 90°
without hole, Positive 11°



IC : 0.375"
S : 0.125"

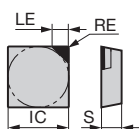
[illegible][illegible]

● : Line up



SPGN 42

Square, 90°
without hole, Positive 11°



IC : 0.500"
S : 0.125"

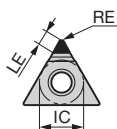
[illegible][illegible]

● : Line up



TCMT 63

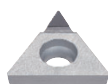
**Triangular, 60°
with hole, Positive 7°**



IC : 0.187"
D1 : 0.106"
S : 0.094"

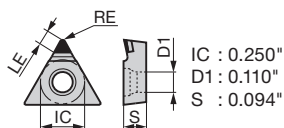
[illegible][illegible]

● : Line up



TCMT 21.5

**Triangular, 60°
with hole, Positive 7°**

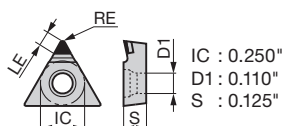
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● : Line up

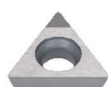


TCMT 22

**Triangular, 60°
with hole, Positive 7°**

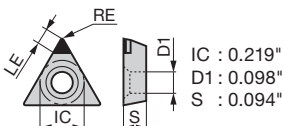
[illegible][illegible]

● : Line up



TPGA 73

**Triangular, 60°
with hole, Positive 11°**

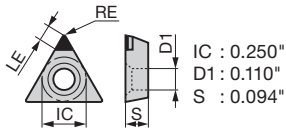
[illegible][illegible]

● : Line up

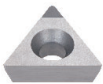


TPGA 21.5

**Triangular, 60°
with hole, Positive 11°**

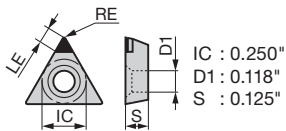
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● : Line up



TPGA 22

**Triangular, 60°
with hole, Positive 11°**

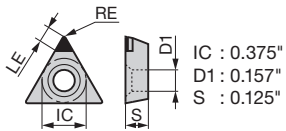
[illegible]

● : Line up



TPGA 32

**Triangular, 60°
with hole, Positive 11°**

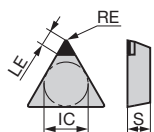
[illegible]

● : Line up



TPGN 73

**Triangular, 60°
without hole, Positive 11°**



IC : 0.219"
S : 0.094"

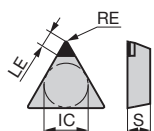
[illegible]

● : Line up



TPGN 22

**Triangular, 60°
without hole, Positive 11°**



IC : 0.250"
S : 0.125"

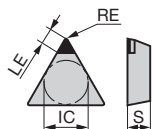
[illegible]

● : Line up



TPGN 32

**Triangular, 60°
without hole, Positive 11°**



IC : 0.375"
S : 0.125"

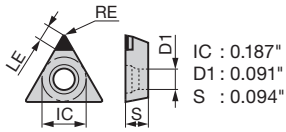
[illegible]

● : Line up



TPGW 63

**Triangular, 60°
with hole, Positive 11°**



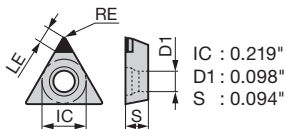
Application	Designation		Dimension (in)		No. of corners	Chipbreaker	DX140												
			RE	LE															
Finishing	Inch	Metric	0.008	0.094	1														●
	TPGW 63Y DIA	TPGW080202-DIA	0.016	0.091	1														●
	TPGW 631 DIA	TPGW080204-DIA																	

● : Line up



TPGW 73

**Triangular, 60°
with hole, Positive 11°**

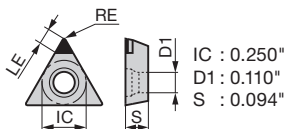
[illegible]

● : Line up

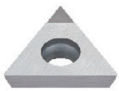


TPGW 21.5

**Triangular, 60°
with hole, Positive 11°**

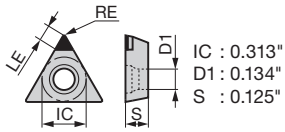
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● : Line up

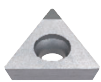


TPGW 2.52

**Triangular, 60°
with hole, Positive 11°**

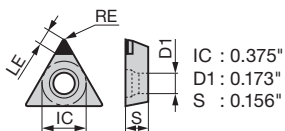
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● : Line up

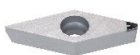


TPGW 32.5

**Triangular, 60°
with hole, Positive 11°**

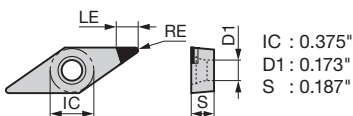
[illegible]

● : Line up



VC 33

**Rhombic, 35°
with hole, Positive 7°**

[illegible]

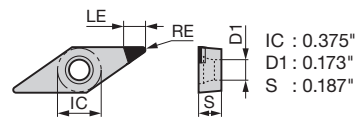
● : New product
● : Line up

PCD Insert POSITIVE TYPE



VBGT 33

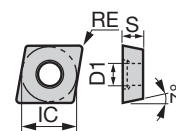
Rhombic, 35°
 with hole, Positive 5°



Application	Designation		Dimension (in)		No. of corners	Chipbreaker												
			RE	LE														
	Inch	Metric																
Finishing	1QP-VBGT 331 NS	1QP-VBGT160404-NS	0.016	0.118	1	○	●											
	1QP-VBGT 332 NS	1QP-VBGT160408-NS	0.031	0.118	1	○	●											

● : New product
 ● : Line up

	P	M	K	N	S	H
Steel						
Stainless						
Cast iron	●					
Non-ferrous	●					
Superalloy	●					
Hard material						



ing to medium cutting

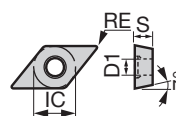
AL



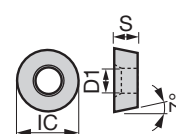
0.008

20°

	P	M	K	N	S	H
Steel						
Stainless						
Cast iron	●					
Non-ferrous	●					
Superalloy	●					
Hard material						



Finishing to medium cutting

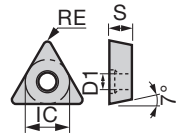
[illegible]

Finishing to medium cutting

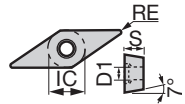
0.008
20°

● : Line up

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

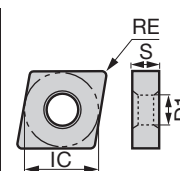
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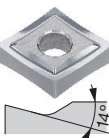
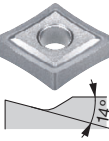
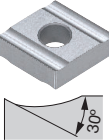
Finishing to medium cutting

[illegible]

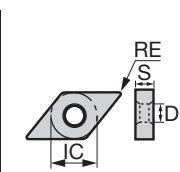
Finishing to medium cutting

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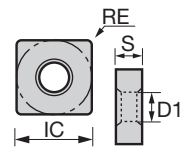
[illegible]

Application	material			Application												Dimension (in)						
	Chipbreaker	Designation		Uncoated														RE	IC	S	D1	
		Inch	Metric	KS05F	TH10																	
Finishing to medium cutting (sharp edge)		28	CNCG 430.5-28	CNCG120402-28	●													0.008	0.500	0.187	0.203	
			CNCG 431-28	CNCG120404-28	●														0.016	0.500	0.187	0.203
			CNCG 432-28	CNCG120408-28	●														0.031	0.500	0.187	0.203
Finishing to medium cutting		28	CNMG 431-28	CNMG120404-28	●													0.016	0.500	0.187	0.203	
			CNMG 432-28	CNMG120408-28	●														0.031	0.500	0.187	0.203
Medium cutting		P	CNCG 431 R-P	CNCG120404R-P	●													0.016	0.500	0.187	0.203	
			CNCG 431 L-P	CNCG120404L-P	●														0.016	0.500	0.187	0.203
			CNCG 432 R-P	CNCG120408R-P	●														0.031	0.500	0.187	0.203
			CNCG 432 L-P	CNCG120408L-P	●														0.031	0.500	0.187	0.203

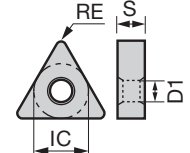
	P	M	K	N	S	H
Steel	●					
Stainless	●					
Cast iron	●	●				
Non-ferrous	●	●				
Superalloy	●					
Hard material						

[illegible]

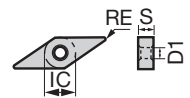
● : New product
● : Line up

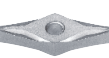
[illegible]

TN

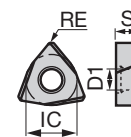
[illegible]

VN

[illegible]

Application				material													Dimension (in)				
	Chipbreaker	Designation		Uncoated																	
Finishing to medium cutting		Inch	Metric	KS05F														RE	IC	S	D1
	28	VNMG 331-28	VNMG160404-28	●														0.016	0.375	0.187	0.150
		VNMG 332-28	VNMG160408-28	●														0.031	0.375	0.187	0.150
																					

● : New product
● : Line up

[illegible][illegible]

● : Line up

Related Items

[illegible][illegible]

● : Line up

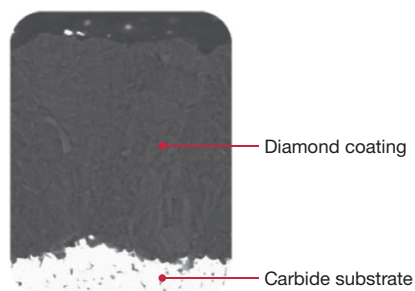
Related Items



Diamond-coated grade for non-ferrous applications

MFSMA

- Tungaloy's unique diamond coating using plasma-enhanced CVD process
- Diamond coating with extremely high hardness and wear resistance.
- Can be coated on all shapes and sizes of carbide tools.
Available upon request



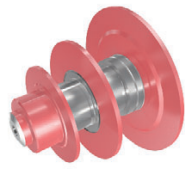
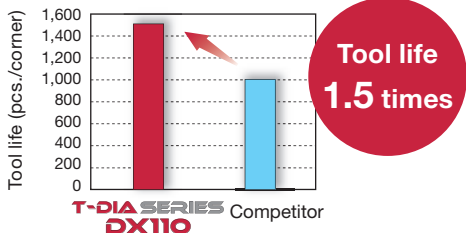
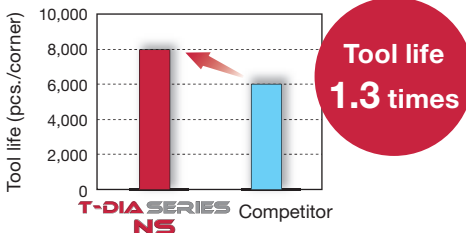
■ Grade properties

Application	Grade	Coating layer		
		Main composition	Thickness (μm)	Hardness (Hv)
N	MFSMA	Diamond	9	< 10,000

Customized inserts are available tailored to your specific application needs.

Non-Ferrous Application Series

PRACTICAL EXAMPLES

Workpiece type		Con-rods	Transmission parts
Insert		1QP-CCMT09T304, 1QP-CCMT 32.51	1QP-VCGT160404-NS, 1QP-VCGT 331 NS
Grade		DX110	DX110
Workpiece material		Copper-based sintered alloy	A2011 / AlCu6BiPb
		 N	 N
Cutting conditions	Cutting speed : Vc (sfm)	984	4,593
	Feed : f (ipr)	0.002	0.003
	Depth of cut : ap (in)	0.004	0.004
	Coolant	Wet	Wet
Results		 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.	 DX110 with NS chipbreaker provided 1.3x tool life over the competitor with superior chip control.
Workpiece type		Pipe	
Insert		1QP-DCGT11T304-NS, 1QP-DCGT 32.51 NS	
Grade		DX110	
Workpiece material		A5052S / AlMg2.5	
		 N	
Cutting conditions	Cutting speed : Vc (sfm)	1,312	
	Feed : f (ipr)	0.004	
	Depth of cut : ap (in)	0.039	
	Coolant	Wet	
Results		 DX110 with NS chipbreaker eliminated chip entanglement, which was the case with the competitor's PCD insert with no chipbreaker.	

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Oct . 2022 (TJ)