Tool Materials / Selection Guide

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NTK's Recommendation for Swiss Tooling

Front turning

General Purpose

ap ~0.5mm

Splash Series

Y-axis with Coolant Through

- DM4 has excellent heat resistance. It is the best grade to machine for Titanium Alloys, Cobalt Chrome, and HRSA materials.
- YL chipbreaker is designed for both sharpness and chip control. It can hold dimensions very well and evacuate chips smoothly.
- AMX chipbreaker is optimized for very small DOC operations. It can perform very well in thin chip control situations.
- Use with a coolant through tool holder to help with chip evacuation. A Y-axis coolant through toolholder is the best solution for chip control problems.

Cut-off

~ϕ12

DM4-CTP-CX

Splash series

- CTP/CTPA style cut-off tool is a best-seller in the Swiss market. They have excellent rigidity and sharpness. Now NTK added the CX chipbreaker to them. 3D shaped CX chipbreaker can control chips extremely well.
- Use with coolant through toolholder for better chip evacuation.
- **CTP style is designed for up to ϕ12** material and CTPA is for up to ϕ16.

~ϕ16

~ϕ25.4

Splash series

- NTK recently added another coolant through cut-off toolholder for larger diameter materials.
- **CTDP-OH toolholder can cut up to 1"** materials and can control chips very well.

Back turning

General Purpose

DM4-TBP / TBPA-BM

Splash Series

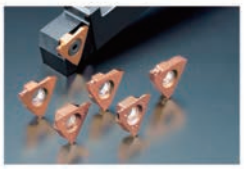
Y-axis with Coolant through

- NTK's TBP/TBPA back turning tools are solid and can provide stable machining even with heavy DOC operations.
- Now, NTK added a 3D chipbreaker named BM to this series. BM chipbreaker can manage chip direction. Just one pass is needed to get excellent face/OD finish.
- Use with coolant through tool holder to help with chip evacuation and the Y-axis coolant through toolholder is the best solution for chip problems.

Grooving

General Purpose

DM4-GX



Splash Series

Y-axis with Coolant through

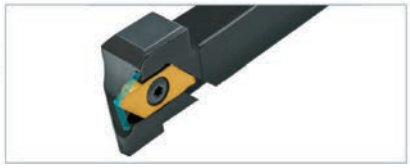
- NTK is expanding its triangle style grooving tools. Now NTK accommodates **wide grooving widths from 0.3㎜ to 3.0㎜.**
- GX chipbreaker can control chips very well, not only for grooving but also side-turning operations.
- Use with a coolant through tool holder to help with chip evacuation and the Y-axis coolant through toolholder is the best solution for chip problems.

Threading

General Purpose

QM3-TTP

TTP



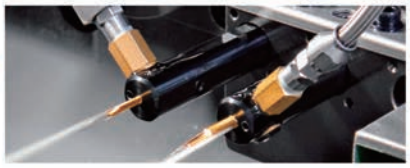
- NTK's side-clamping TTP inserts are rigid and produces high quality good threads. Various lineups are available for each specific threading operations.
- QM3 has good wear resistance and toughness and can cut most materials.

ID turning

General Purpose

STICK DUO Hyper

STICK DUO SPLASH



- Stick Duo Splash are coolant through sleeves for ID operations. NTK has a variety of ID tooling insert bars for ID boring, ID back turning, ID grooving and ID threading to use with Stick Duo Splash.
- The sleeves are equipped with an adjustable overhang mechanism that allow you to index bars easily without length adjustment.

Mogul Bar

- Mogul Bar is a series name for boring tools with indexable inserts. The series starts from 5mm minimum bore diameter and use with F-style chip breaker to make chips evacuate backward.
- They include a coolant through system that ensures better chip evacuation.

End milling

General Purpose

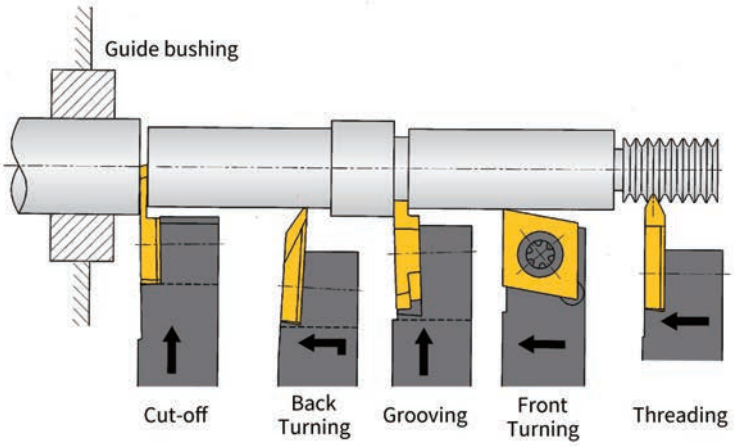
DM4-BL

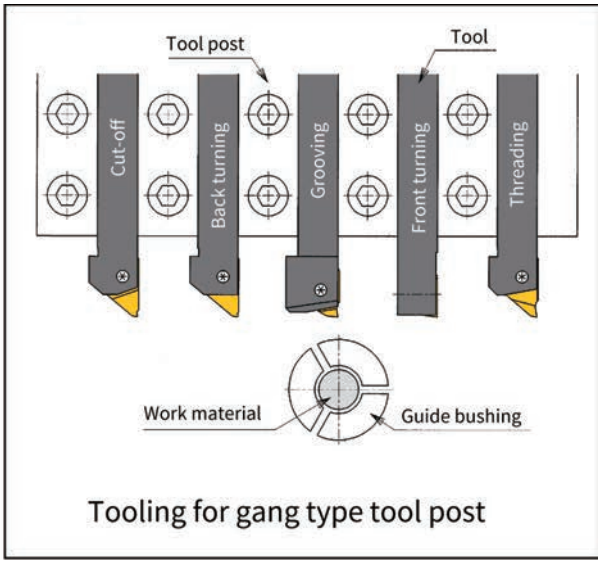
Indexable Endmill

- NTK has a variety of indexable type endmill tools for Swiss machines. The big head endmills can cut in close proximity to the Guide-bushing and provide excellent rigidity. Due to the big diameter, you can also run faster than small diameter endmills.

Tooling example for a small CNC automatic lathe

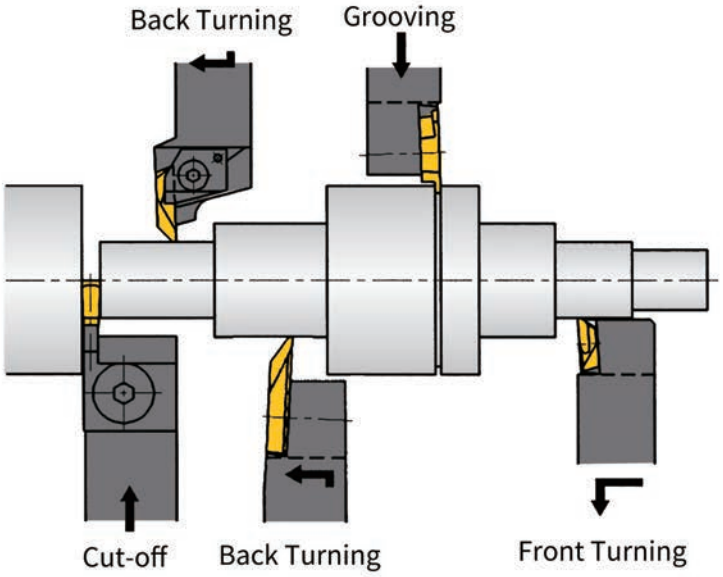
Gang type

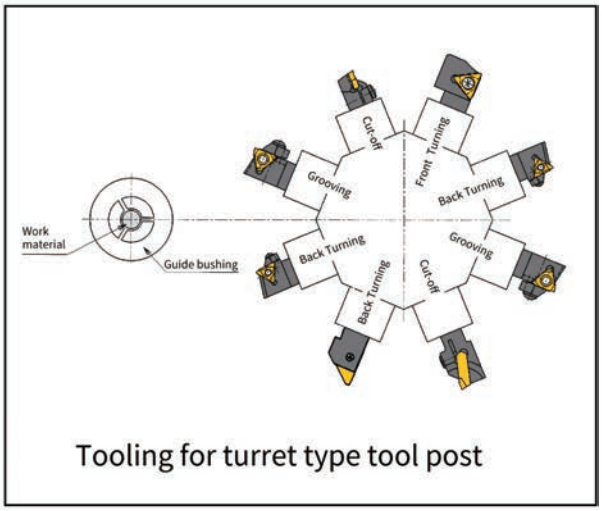




Tooling for gang type tool post

Turret type

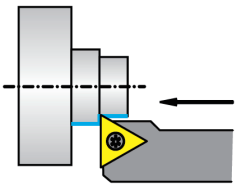




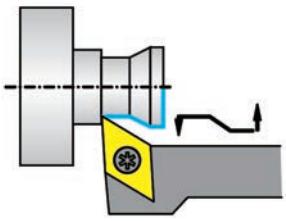
Tooling for turret type tool post

Horizontal gang type

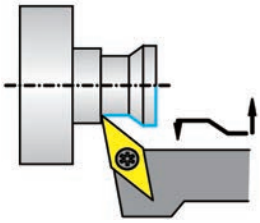
Front Turning



holder : CH-STUCL (screw-on type)
insert : TC..0902

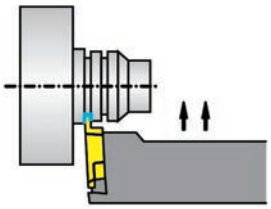


holder : CH-SDUCL (screw-on type)
insert : DC..11T3/TFD11

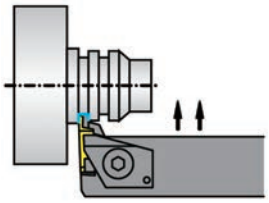


holder : CH-SVUCL(screw-on type)
insert : VC..1103/TFV11
holder : CH-SVUPL(screw-on type)
insert : VP..0802

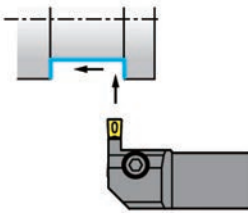
Grooving



holder : CH-GTTL(screw-on type)
insert : GTMH32/GTMX32

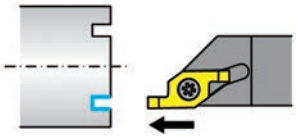


holder : NGTAL..32--..S(clamp-on type)
insert : GTMH32/GTMX32
holder : NGTAL..43-00S5(clamp-on type)
insert : GTMA43/GTMT43



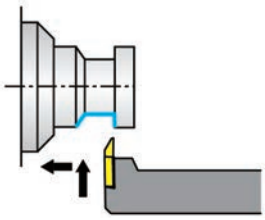
holder : GKWPL (clamp-on type)
insert : GWPG/GWPM

Face grooving

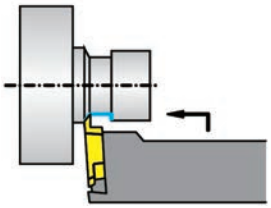


holder : CH-FGVR/L(screw-on type)
insert : FGV/FBV

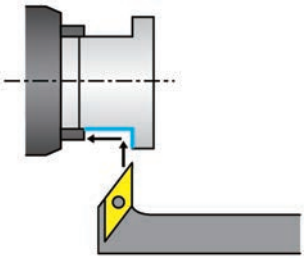
Back turning



holder : CH-TBPAL(screw-on type)
insert : TBPA..FR

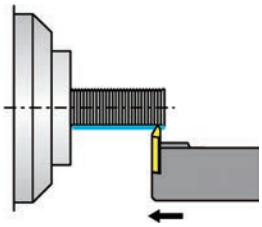


holder : CH-GTTL(screw-on type)
insert : TBMH32



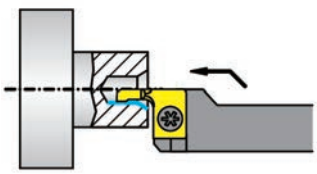
holder : CH-SVXCL(screw-on type)
insert : VC..1103

Threading



holder : CH-TTPL(screw-on type)
insert : TTP..FR

ID Tooling

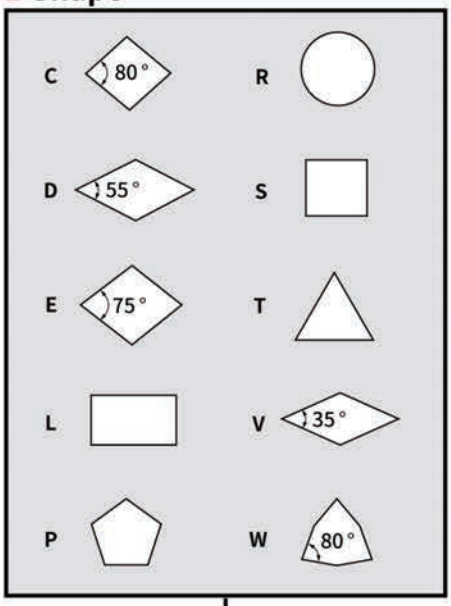


holder : CH-LBML(screw-on type)
insert : LBM

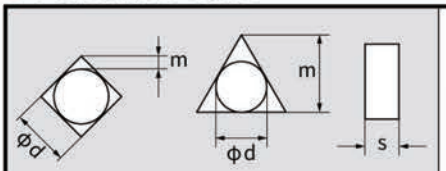
ISO insert code

Carbide

1 Shape



3 Tolerance Class



Symbol	d (mm)	m (mm)	s (mm)
A	±0.025	±0.005	±0.025
F	±0.013	±0.005	±0.025
C	±0.025	±0.013	±0.025
H	±0.013	±0.013	±0.025
E	±0.025	±0.025	±0.025
G	±0.025	±0.025	±0.013
J	±0.05	±0.05	±0.013
K	±0.05 ~±0.13	±0.013	±0.025
L	±0.05 ~±0.13	±0.025	±0.025
M	±0.05 ~±0.13	±0.08 ~±0.08	±0.013
N	±0.05 ~±0.13	±0.08 ~±0.08	±0.025
U	±0.08 ~±0.25	±0.13 ~±.015	±0.013

Accuracy of J,K,L,M,N,U class by form size
For inserts with apex angles greater than 55°

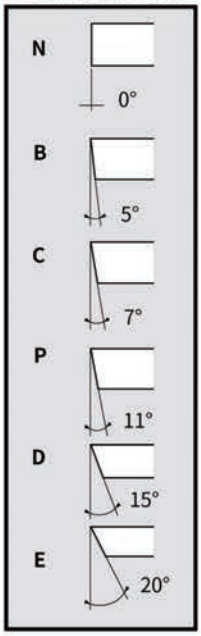
Inscribed Circle	d (mm)	m (mm)
6.35	±0.05	±0.08
9.525	±0.05	±0.08
12.7	±0.08	±0.13
15.875	±0.05	±0.15
19.05	±0.05	±0.15
25.4	±0.13	±0.08

For Class M inserts with apex angles of 55° (D), 35° (V), and 25° (Y)

Inscribed Circle	d (mm)	m (mm)
6.35	±0.05	±0.05
9.525	±0.05	±0.05
12.7	±0.08	±0.15
15.875	±0.05	±0.15
19.05	±0.05	±0.08

	1	2	3	4
Inch	C	C	G	T
Metric	C	C	G	T

2 Clearances



4 Type

Type	Symbol	Type	Symbol
	N (E)	70°–90°	H
	F		
	R	70°–90°	B
	A		
	G	40°–60°	T
	M	40°–60°	W
Special design	X		

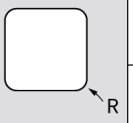
6 Thickness

Thickness S (mm)	Inch	Metric
2.38	1.5	02
3.18	2	03
3.97	2.5	T3
4.76	3	04
5.56	4	06
6.35	5	07
7.94	6	09
12.7	8	12

5 Cutting Edge Length

Inch		Metric						
Inscribed Circle		C	D	R	S	T	V	W
5.56	2	06	07	06		11	11	04
7.94	3	09	11	09		16	16	06
12.7	4	12	15	12		22	22	08
15.875	5	16	19	15		27	27	10
19.05	6	19	23	19		33	33	13
25.4	8	25	31	25		44	44	17

7 Nose Radius



Corner Radius	Inch	Metric
0.03	01	00
0.08	04M	01M
0.1	04	01
0.18	08M	02M
0.2	08	02
0.38	1M	04M
0.4	1	04
0.8	2	08

3	2.5	08M	F	N	AM3
5	6	7	8	9	10
09	T3	02M	F	N	AM3

8 Edge Sharpness

F	Up-sharp edge (without any edge preparation)
(Blank)	Non up-sharp edge

9 Hand of Chipbreaker

N	Neutral*
R	Right-hand
L	Left-hand

* Omitted when edge is not "up-sharp"

10 Type of Chipbreaker

11 Wiper insert

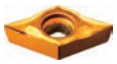
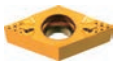
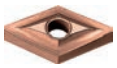
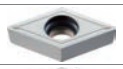
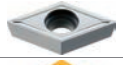
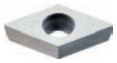
"-WP" after chipbreaker

Micro-grain Carbide and PVD/CVD-coated Carbide

Excellence in precision machining and machining of hard-to-cut materials

These material grades use WC micro-grain carbide, the hard base material which is granulated to a micro size 1μm as the substrate. Furthermore, the substrate is coated using a PVD method with TiN, TiCN, and/ or TiAlN. The resulting materials are suitable for machining difficult-to-cut materials and demanding high precision small part applications. Inserts in these grades are tougher and harder than carbide and come with ultra sharp cutting edges. This selection of micro-grain carbide grades exhibit excellent wear resistance and thermal crack resistance.

Features

Work material	Grade		Coating		Application	Physical properties*					
						Density g/cm³	Hardness HRA	Bending strength Mpa	Young's modulus GPa	Thermal expansion coefficient ×10⁻⁶/K	Thermal conductivity W/m.K
M Stainless steel	ST4		thick PVD	CrAlN	Best grade for 304 SS	14.4	91.0	3000	580	5.8	63
	DT4		thin PVD	TiAlN	Excellent oxidation resistance for Swiss-type lathes	14.4	91.0	3000	580	5.8	63
	TM4		thin PVD	TiN-TiCN	Best combination of wear resistance, toughness and adhesion resistance for Swiss-type lathes	14.4	91.0	3000	580	5.8	63
	ZM3		thick PVD	TiN	Best adhesion resistance enables high accuracy machining	14.4	91.0	3000	580	5.8	63
	DM4		thick PVD	TiAlN	Best oxidation resistance enables high temperature machining	14.4	91.0	3000	580	5.8	63
P Steel	QM3		thick PVD	TiCN	Best wear resistance enables stable machining	14.4	91.0	3000	580	5.8	63
	VM1		thin PVD	TiCN	Best edge sharpness and good wear resistance	14.8	92.0	2500	640	5.7	84
	CP7		thick CVD	Al_2O_3-TiCN	Roughing to semi-finishing of steel	13.8	90.1	2200	580	-	-
K Cast iron	CP1		thick CVD	Al_2O_3-TiCN	For cast iron and ductile cast iron	14.9	92.0	2400	640	-	-
N Non-ferrous material	KM1		uncoated	-	Best for non-ferrous material with a polished mirror finish surface	14.8	92.0	2500	640	5.7	84
M P N	AC3		thin PVD	TiAlN-TiAlCrN	Developed for solid carbide endmills	14.2	91.0	3000	560	6.1	49

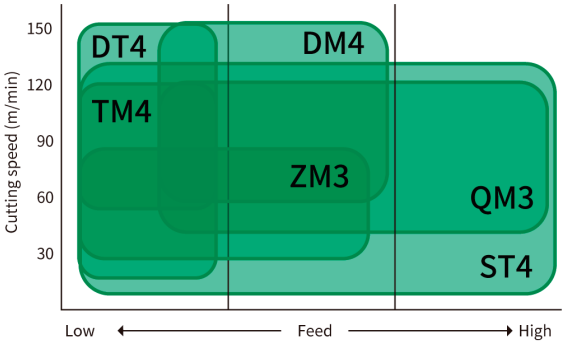
※The values of the base material are indicated.

Coating specifications

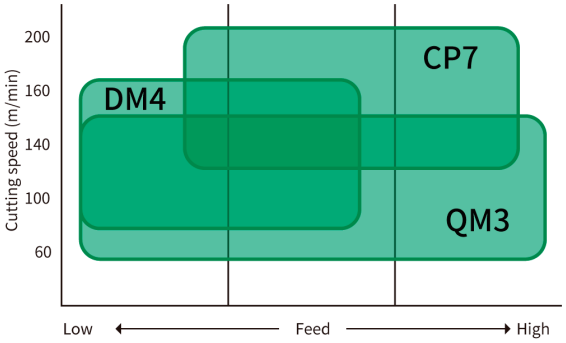
	ST4	QM3	DM4	DT4	TM4	VM1	ZM3
Thickness	Thick	Thick	Thick	Thin	Thin	Thin	Thick
Wear resistance	○	◎	○	○	○	○	
Heat resistance	○		◎	◎			○
Adhesion Resistance	◎				○		◎
Edge Sharpness				○	○	◎	
Composition	CrAlN	TiCN	TiAlN	TiAlN	TiN-TiCN	TiCN	TiN

◎1st choice ○2nd choice

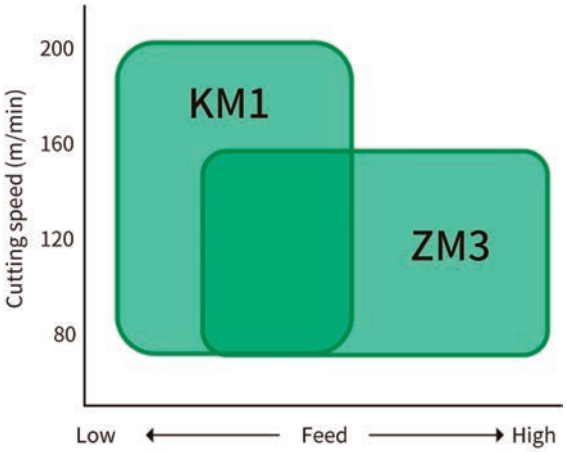
Stainless steel



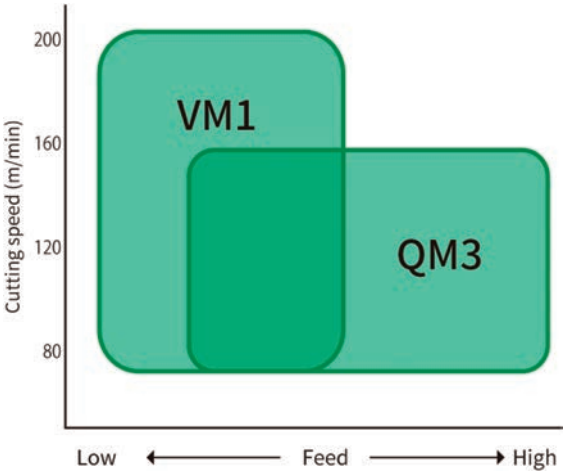
Carbon and alloy steel

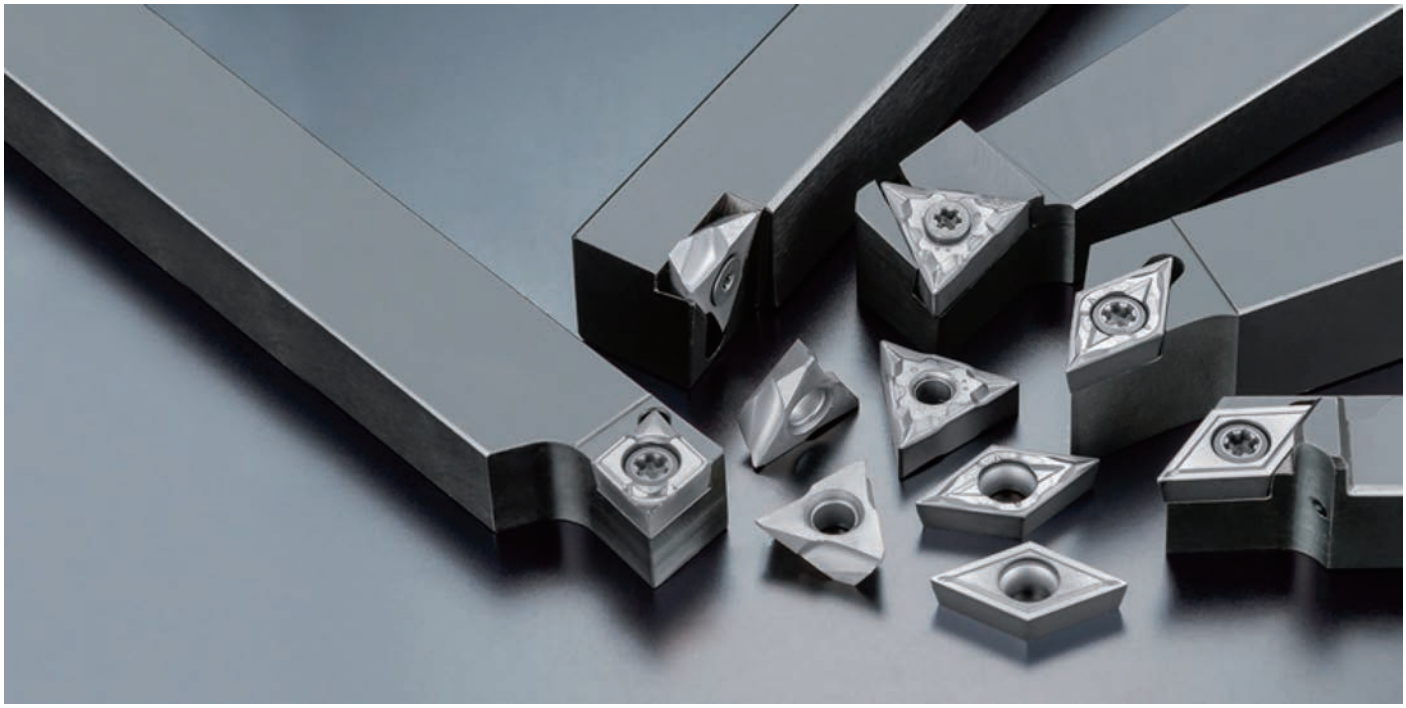


Aluminum and brass



Free-cutting steel





Ideal for stainless steel machining | PVD coated carbide

ST4

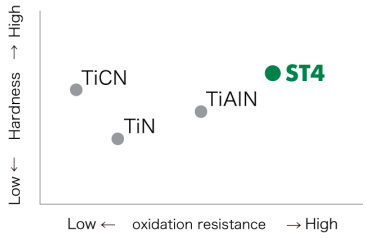
Stable and consistent performance machining tough materials like 304 SS

Solution for stainless steel machining issues like reduced tool life, inconsistency of part dimensions, and poor chip control.

Performance

Unique coating with a high aluminum composition dramatically improves hardness and oxidation resistance.
Extended tool life is achieved by suppressing wear from increased cutting temperatures.

Coating wear and oxidation chart



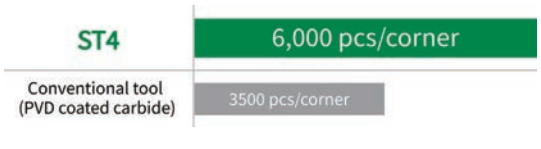
Coating layer adhesion strength

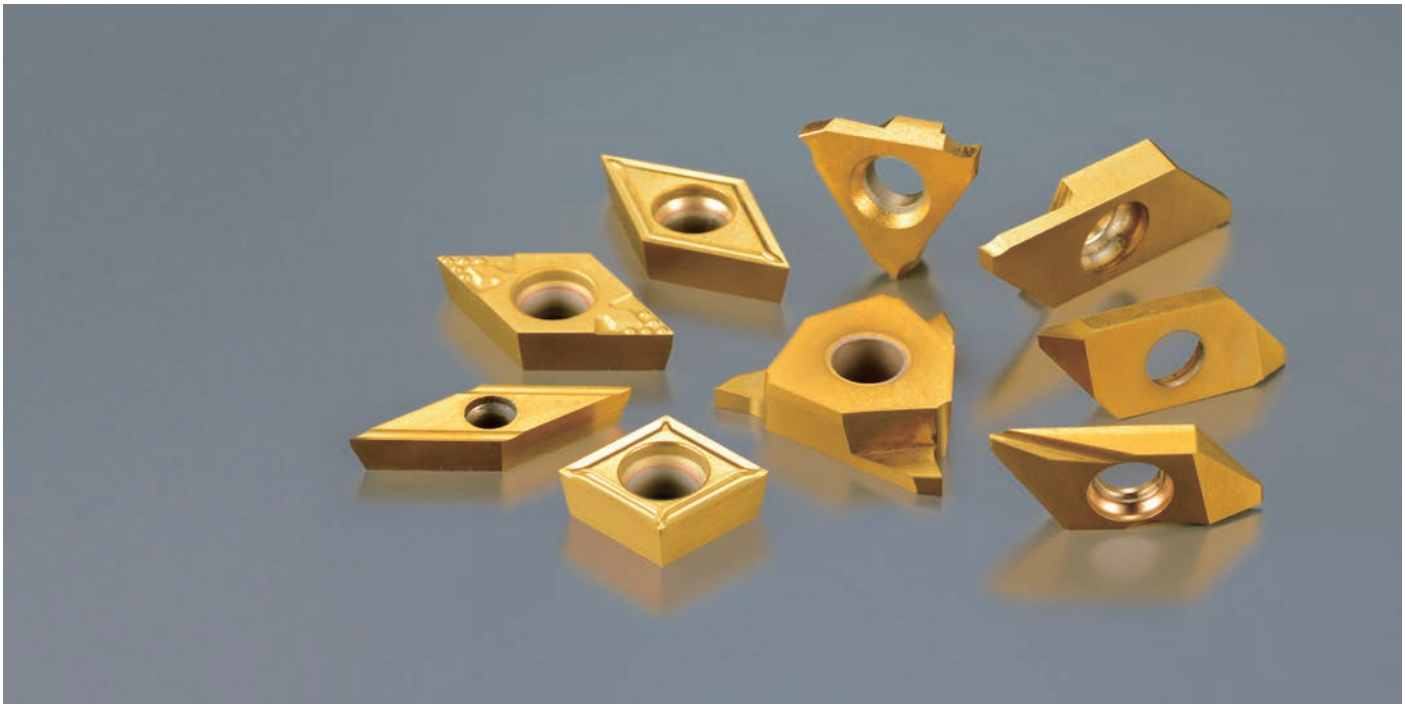
Significantly improved insert surface smoothness and coating adhesion.
Prevents adhesion to the cutting edge, which tends to occur in stainless steel machining, leading to stabilization of dimensional accuracy and machined surfaces.

Case study

ST4 has approximately 1.7 times longer tool life than competitor's tools.

Work material	SUS316L
Cutting speed	60m/min
Feed	End face 0.01mm/rev External 0.03mm/rev
Depth of cut	0.3 - 2.0mm
Coolant	WET





General-purpose machining with excellent adhesion resistance | PVD coated carbide

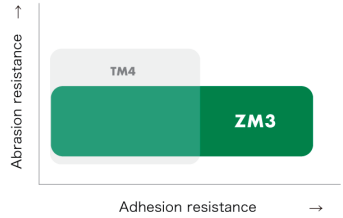
ZM3

Excellent adhesion resistance and dimensional stability, ideal for high-precision machining of small-diameter workpieces

Achieves stable machining with its resistance to built up edge

Performance

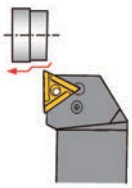
- Stable machining dimensions due to high adhesion of the coating
- Smooth TiN coating provides outstanding adhesion resistance

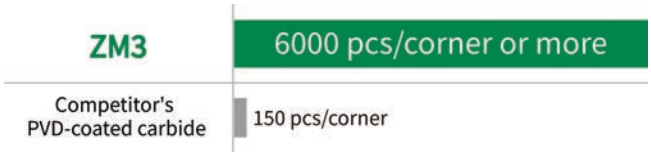


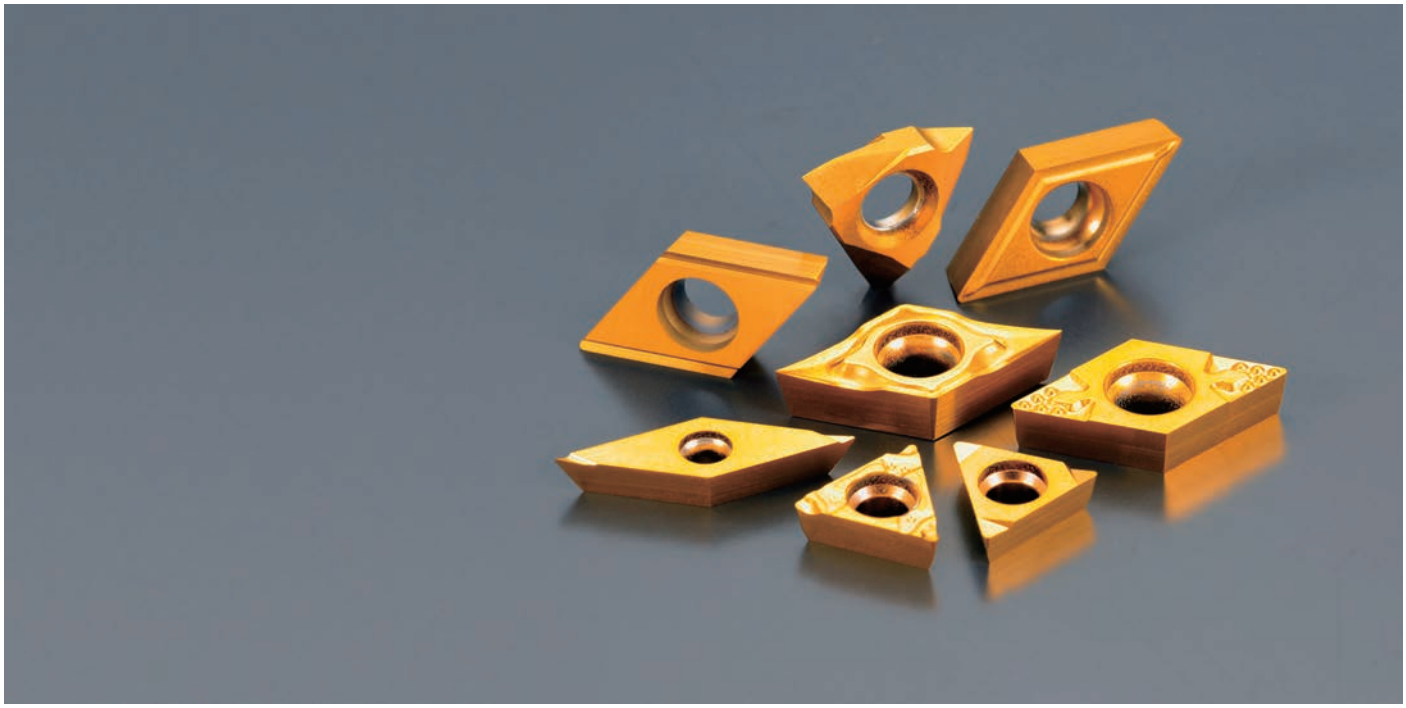
Case study

ZM3 offers outstanding adhesion resistance and dimensional stability with a tool life that is 40 times longer than that of competitor's tools.

Work material	S10C
Cutting speed	100m/min
Feed	0.12mm/rev
Depth of cut	0.3~0.4mm
Coolant	WET







General purpose machining with excellent wear resistance | PVD coated carbide

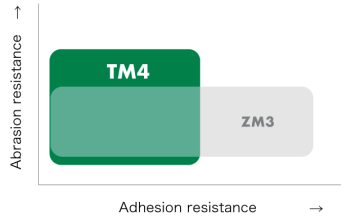
TM4

Versatile grade material for all types of work materials

Easy-to-use grade with excellent sharpness and adhesion resistance

Performance

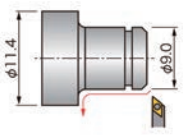
- Excellent workpiece dimensional stability and tool life due to multilayer coating
- A smooth hard coating with excellent adhesion resistance

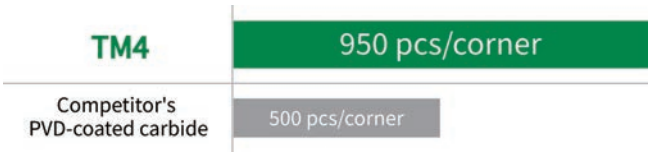


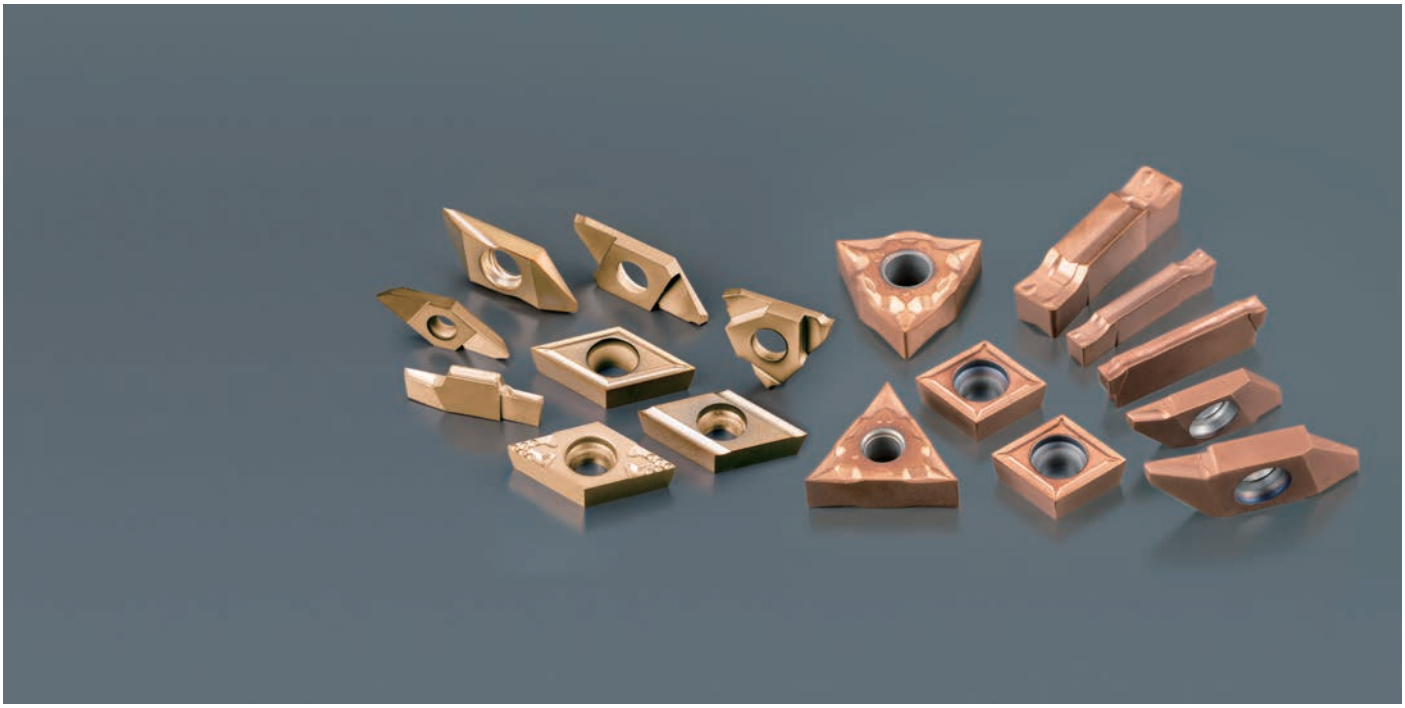
Case study automotive parts

TM4 achieved 1.9 times longer tool life than the competitor's product. Its superior wear resistance ensured long stable machining.

Work material	SUS304
Cutting speed	80m/min
Feed	0.02mm/rev
Depth of cut	-1.2mm
Coolant	WET







Machining difficult-to-cut materials | PVD-coated carbide

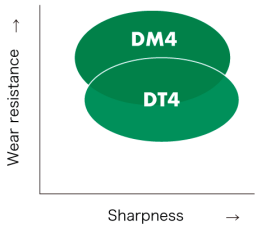
DT4 / DM4

Ideal for machining difficult-to-cut materials such as titanium and heat-resistant alloys

Stable machining even under conditions where cutting heat tends to concentrate on the cutting edge

Performance

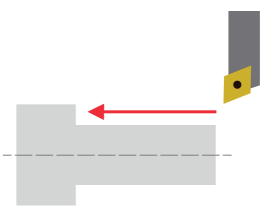
- Thick TiAlN coating reduces cutting tool damage due to machining heat.
- DT4 has a thin coating layer. A sharp cutting edge ideal for machining small diameter parts.
- DM4 has a thick coating layer. A combination of heat resistance and wear resistance makes it ideal for high load machining such as parting and grooving.

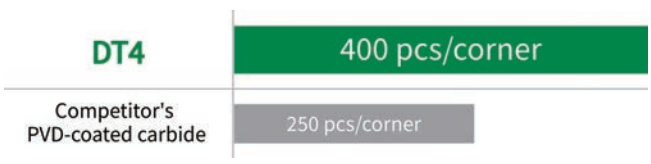


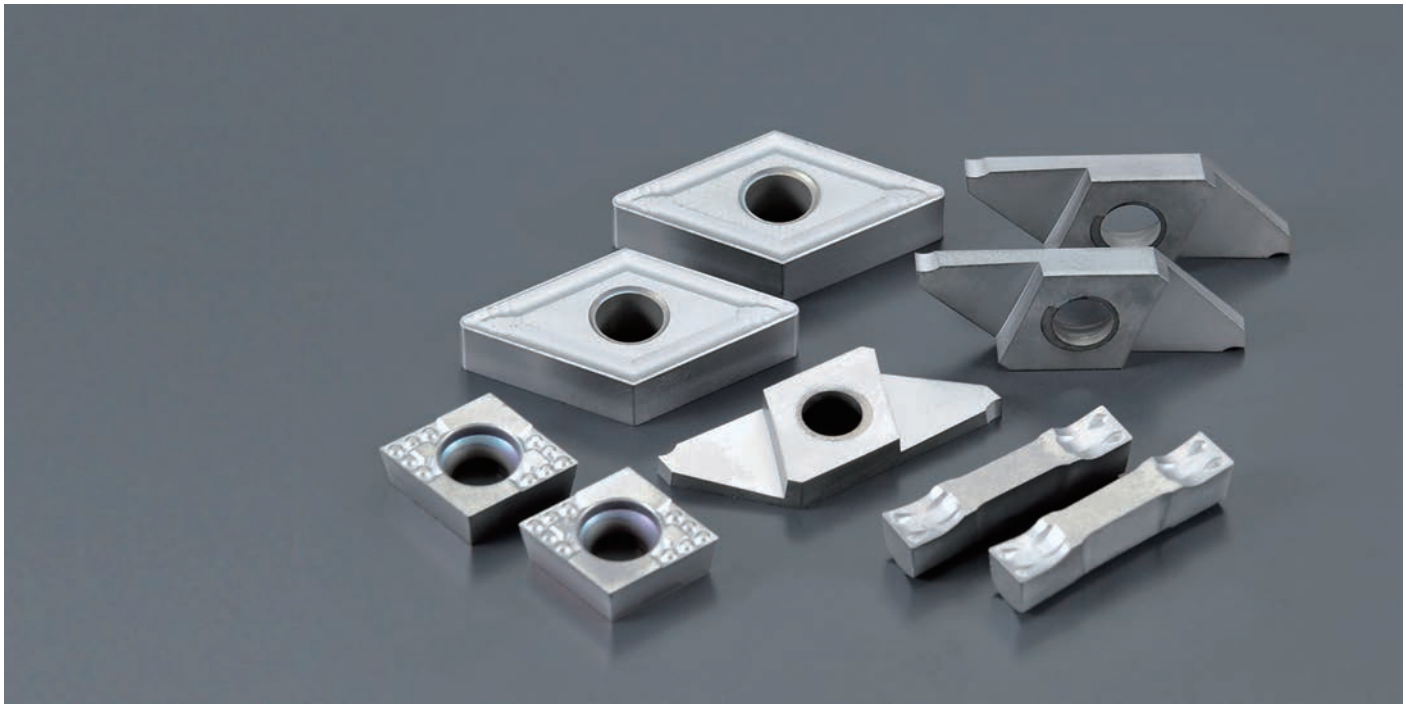
Case study medical screw

DM4 achieved approximately 1.6 times longer tool life than the competitor's product.

Work material	Titanium alloy
Cutting speed	60m/min
Feed	0.02mm/rev
Depth of cut	0.5mm
Coolant	WET







Carbon and alloy steel machining | PVD coated carbide

QM3

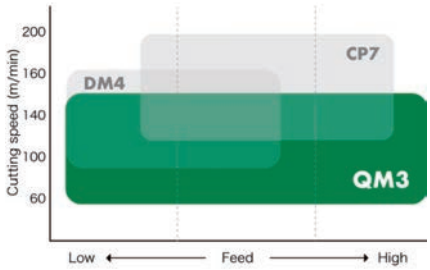
Longer tool life and stable machining of carbon and alloy steels such as S45C and SCM materials

Excellent wear resistance ensures stable machining and extended tool life

Performance

- Combination of tough carbide material and TiCN coating provides excellent chipping resistance.
- Excellent wear resistance, especially in the low speed range.
- Stable machining even in heavy interruptions.

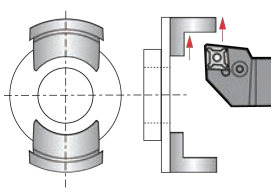
Application area

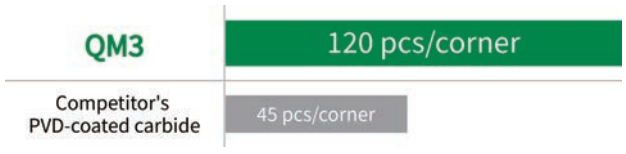


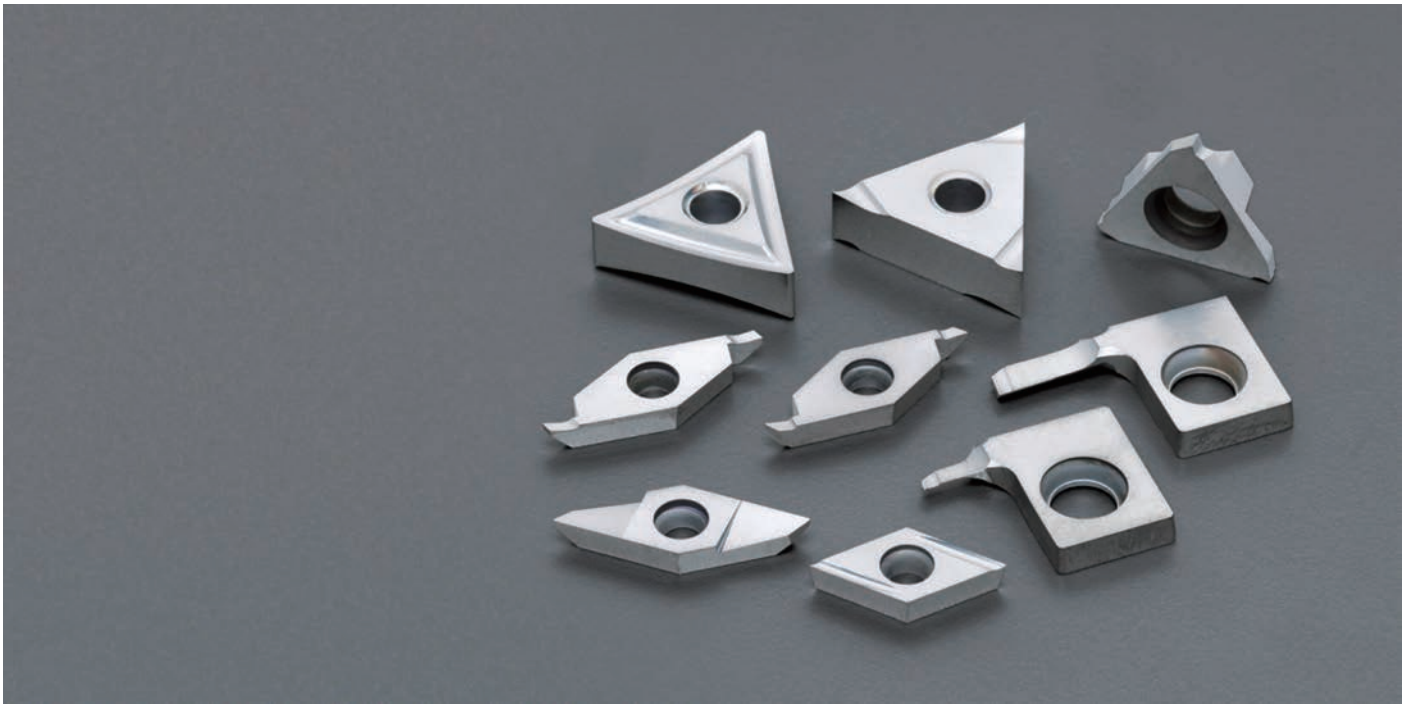
Case study

The combination of QM3 and Z5 chipbreaker extends the tool life by more than 2.5 times, while the competitor's tool experienced unstable tool life.

Work material	S50C
Cutting speed	156m/min
Feed	0.33mm/rev
Depth of cut	1.5mm
Coolant	WET







Free-cutting steel machining | PVD-coated carbide

VM1

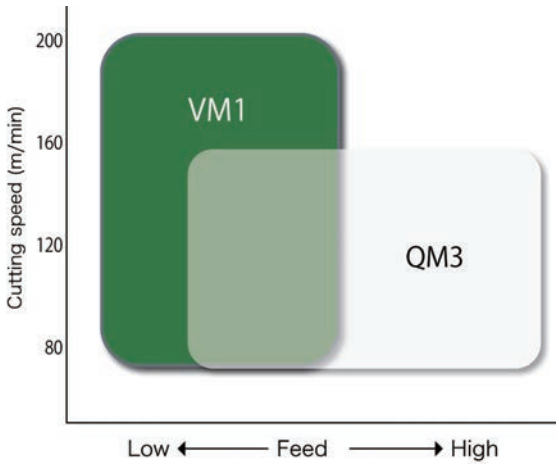
Ideal for machining free-cutting steel (SUM)

Long-tool life machining is achieved by reducing the built up edge on the cutting edge.

Performance

- Thin-layer TiCN coating provides both outstanding sharpness and wear resistance.
- Achieves long tool life and high-precision machining even at high speeds.

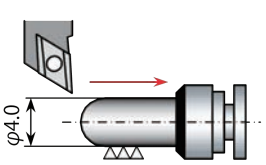
Application area

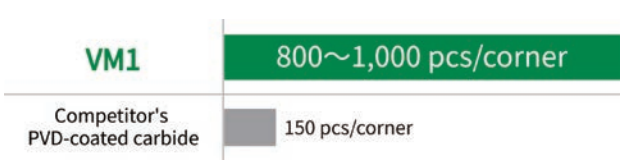


Case study

VM1 is stable in both dimensions and surface finish and has 5 times longer tool life than the competitor's product.

Work material	SUM24L
Cutting speed	140m/min
Feed	0.015mm/rev
Depth of cut	0.1mm
Coolant	WET





High-speed machining of carbon and alloy steel | CVD coated carbide

CP7

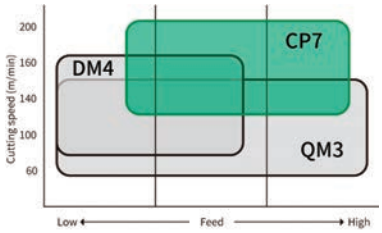
Ideal for high-speed machining of alloy steel and carbon steel

CVD multilayer coating for outstanding performance machining steel

Performance

The CVD multi-layer coating and high strength base material provides excellent wear resistance and toughness that can be used in a wide range of applications.

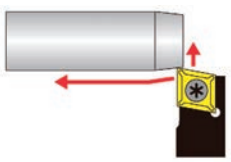
Application area

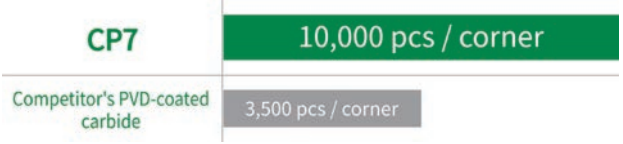


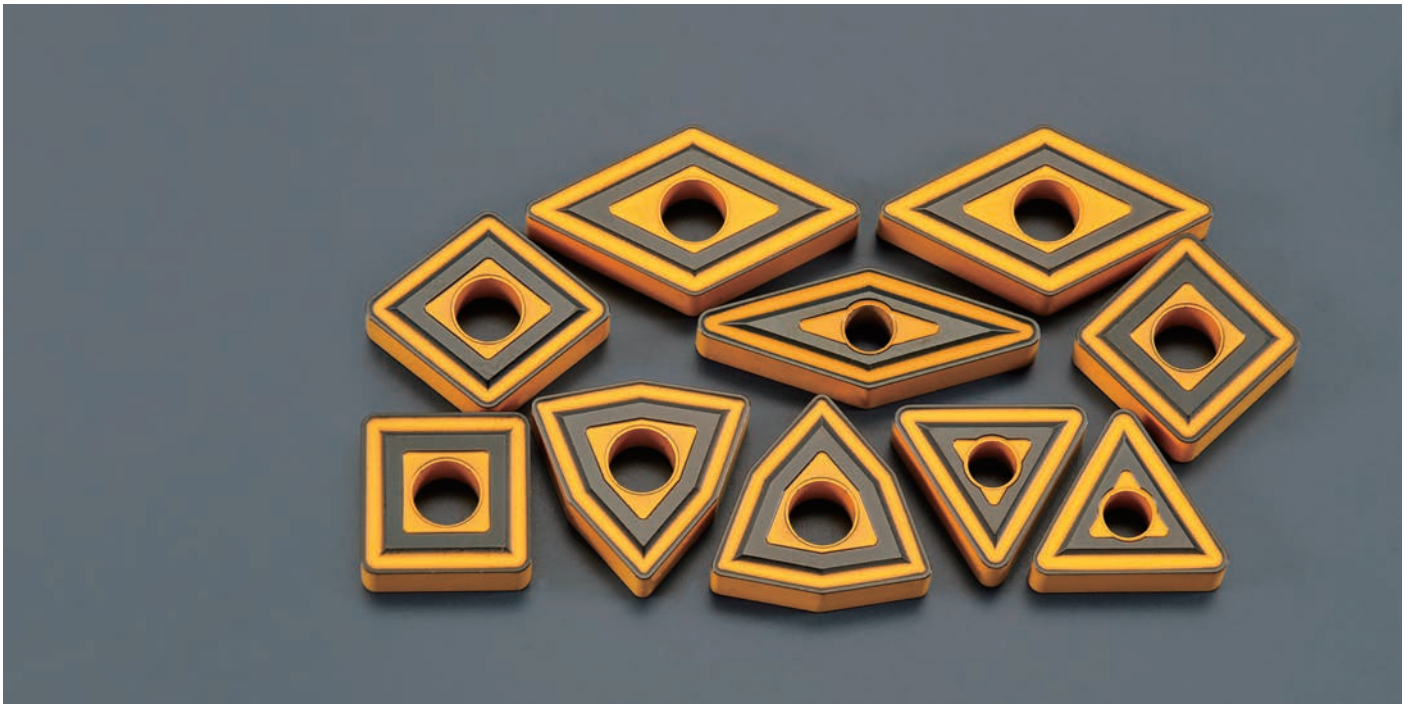
Case study

Achieves approximately 3 times the tool life of the competitor's coated carbide.
Wide range of applications are possible.

Work material	SUJ2
Cutting speed	90m/min
Feed	0.15mm/rev
Depth of cut	0.5mm
Coolant	WET







Grey cast iron and ductile cast iron with scale machining | CVD coated carbide

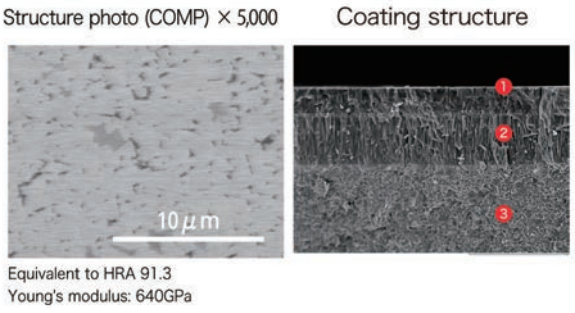
CP1

Achieves high efficiency and stable machining even under conditions where cutting speed cannot be increased

Outstanding wear resistance at Vc=~300m/min

Performance

- Specializing in scale machining of grey and ductile cast iron.
- Excellent wear resistance and stable machining are achieved with a thick TiCN layer and an Al2O3 layer in the coating.
- Unique rake face surface smoothing process provides superior performance in adhesion resistance.



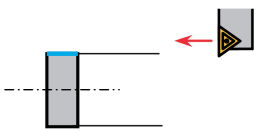
Equivalent to HRA 91.3
Young's modulus: 640GPa

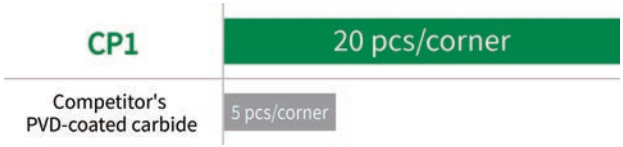
① A very smooth layer of fine grain Al2O3
② Fine column shaped grain TiCN layer
③ Ultra - hard carbide base material

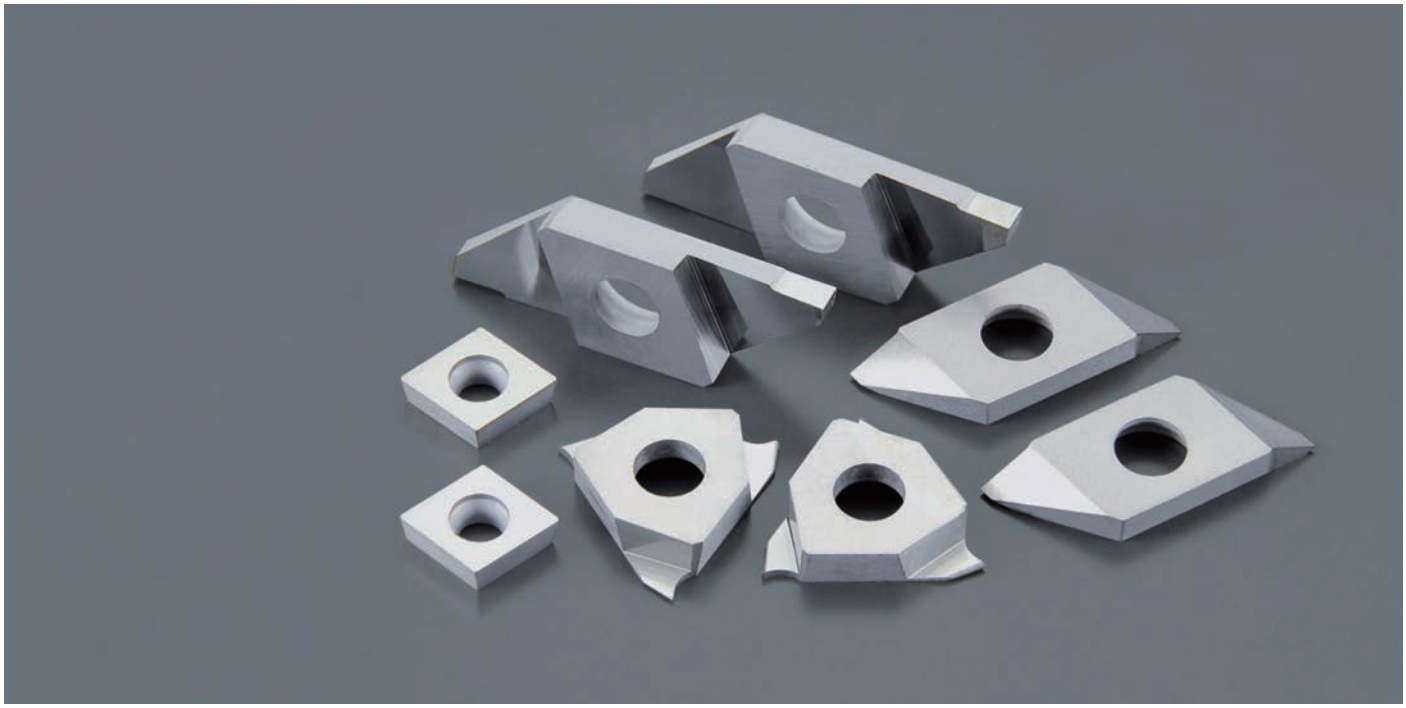
Case study

CP1 achieves higher machining efficiency than competitor's tools.

Work material	FCD450
Cutting speed	200m/min
Feed	0.12mm/rev
Depth of cut	1.0m
Coolant	WET







Nonferrous metal machining, cost effective | Uncoated carbide

KM1

Ideal for machining non-ferrous metals such as aluminum, brass, and resin

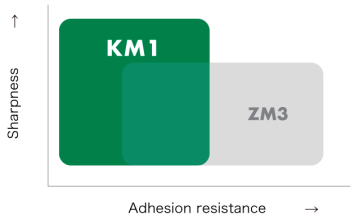
Excellent machined surfaces are achieved by reducing the occurrence of built up edge

Outstanding sharpness solves the problem of a rough machined surface

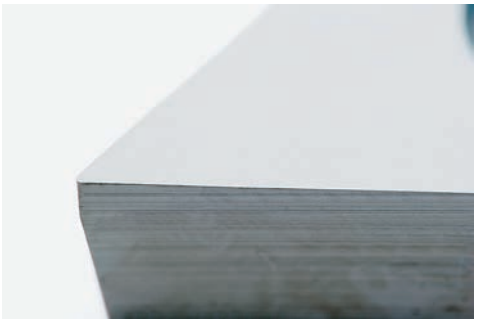
Performance

- Uncoated fine-grained carbide with excellent sharpness.
- Mirror polished surface reduces built up edge.
- Stable machining dimensions and excellent surface finishes.

KM1 comparison chart



Up sharp edges and mirror finish

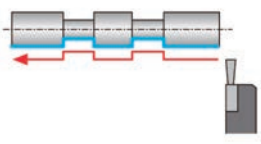


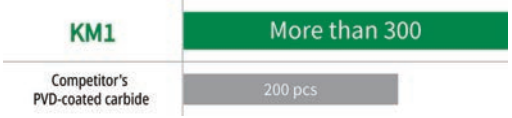
Case study

The competitor's product machined 3 roughing passes and a finishing pass. The chips often scratched the workpiece. The cycle time was more than 3 minutes.

The KM1 machined in a single pass, reducing the cycle time to 1 minute and 50 seconds.

Work material	A5056
Cutting speed	90~170m/min
Feed	0.04mm/rev
Depth of cut	0.5~5.0mm
Coolant	WET





End mill tools | PVD coated carbide

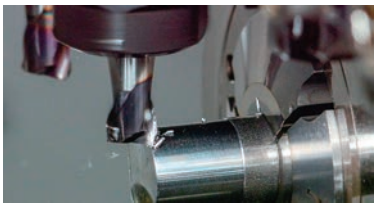
AC3

Developed for solid carbide end milling

Ideal for end milling of small-diameter workpieces that are prone to chattering, or applications that have problems with burrs forming

Performance

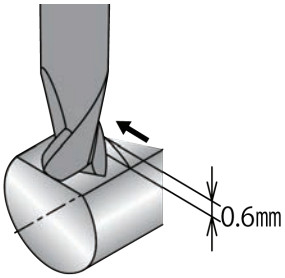
- TiAlN-TiAlCrN coated + fine grain carbide
- Grade with both excellent sharpness and wear resistance required for end milling on CNC type automatic lathes

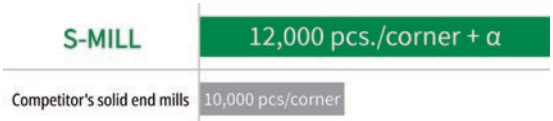


Case study

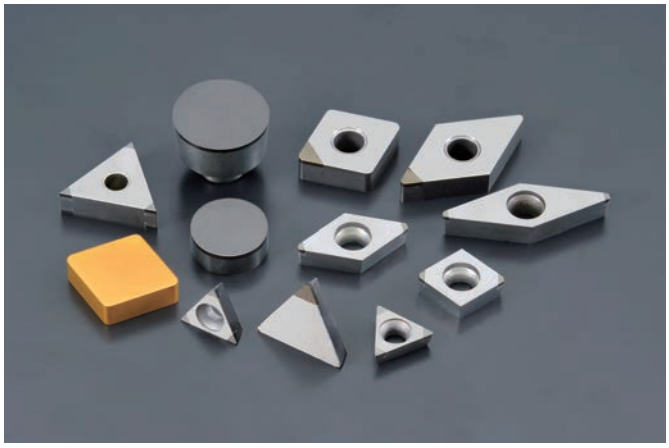
The current tool created a cloudy machined surface when it reached the end of its tool life. The S-Mill achieved good surface finish and an extended tool life.

Work material	SUS416F
Cutting speed	3,200rev/min
Feed	140mm/min
Depth of cut	0.6mm
Coolant	WET





CBN/Ultra-high pressure sintered body

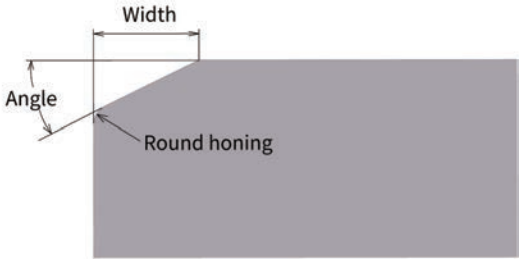


CBN grade inserts are composed mainly of CBN (Cubic Boron Nitride) particles with a special ceramic binder. The material has excellent cutting material properties including high hardness at normal and highly elevated temperatures, as well as little chemical reactions with work materials. CBN inserts can be used for machining hardened materials and high speed machining of cast iron.

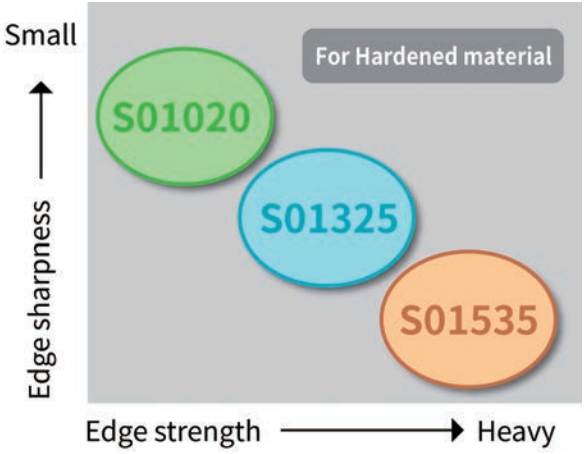
Features

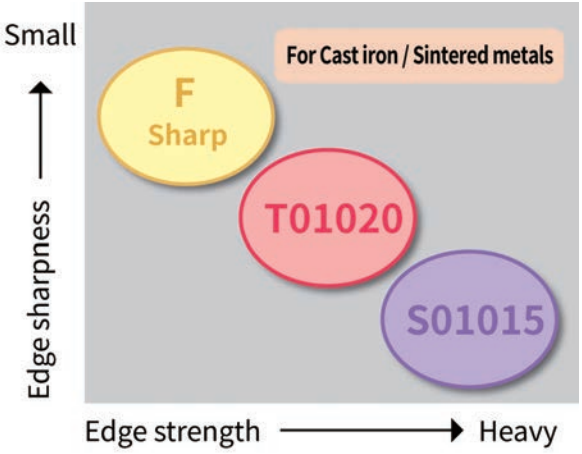
Work material	Grade	Coating	Corner	Application	CBN content	Main binder
H Hardened material	B36	-	multi	Light to heavy interrupted machining of hardened materials	65%	TiCN
	B40	-	multi	Heavy interrupted machining of hardened materials	65%	TiN
	B52	-	multi	Finishing of ductile iron Continuous machining of hardened materials	50%	TiC
	B5K	TiCN	multi	Continuous to light interrupted machining of hardened materials Finishing of ductile iron	50%	TiC
	B6K	TiCN	multi	Middle to heavy interrupted machining of hardened materials	65%	TiCN
K Cast iron	B16	-	solid	Roughing to finishing of gray cast iron Machining of sintered metals	82%	TiN
	B22	-	top-surface	Turning of hardened mill rolls Roughing to finishing of gray cast iron	80%	TiN
	B23	-	multi	Roughing of gray cast iron Machining of sintered metals	90%	Ti
	B30	-	multi	Finishing of gray cast iron Machining of sintered metals	95%	Ti

Edge treatment

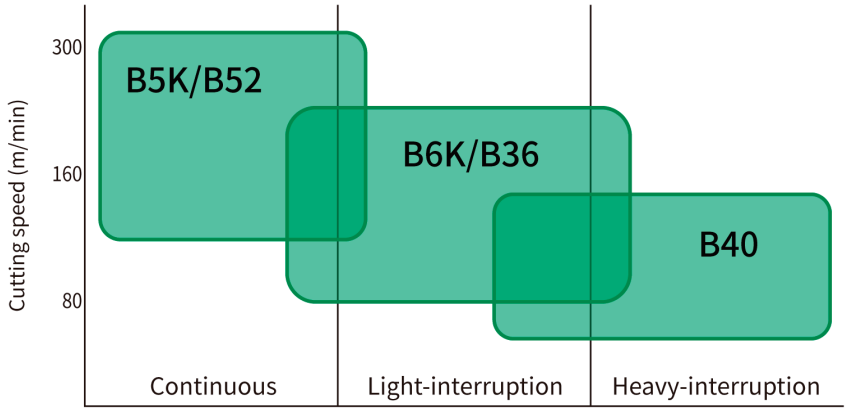


Code	Width	Angle	R-honing
F(sharp-edge)	0.00	0°	none
T01020	0.10	20°	none
S01015	0.10	15°	yes
S01020	0.10	20°	yes
S01325	0.13	25°	yes
S01535	0.15	35°	yes

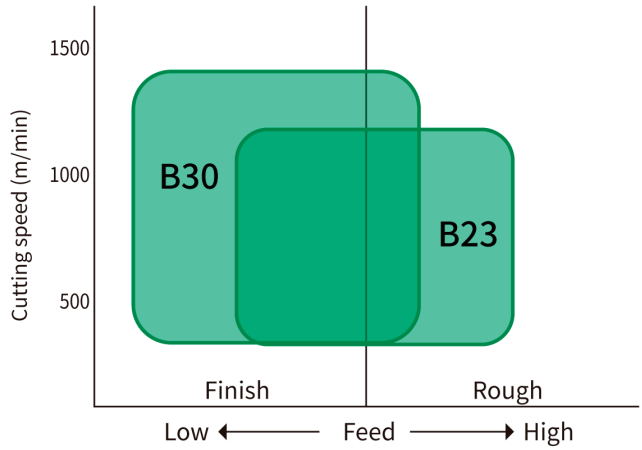




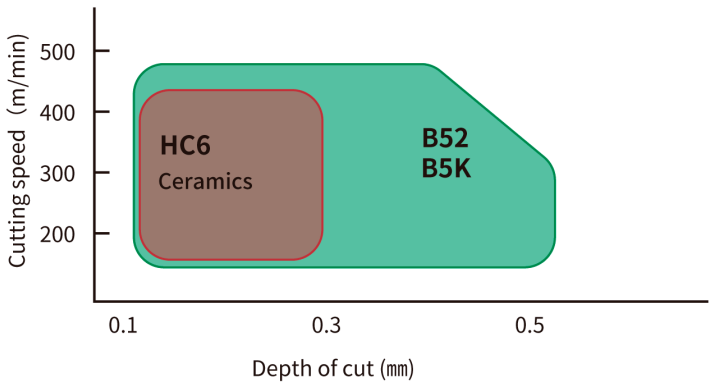
Hardened material



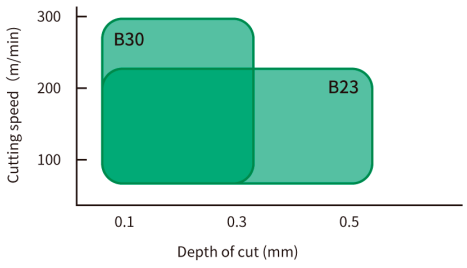
Gray cast iron

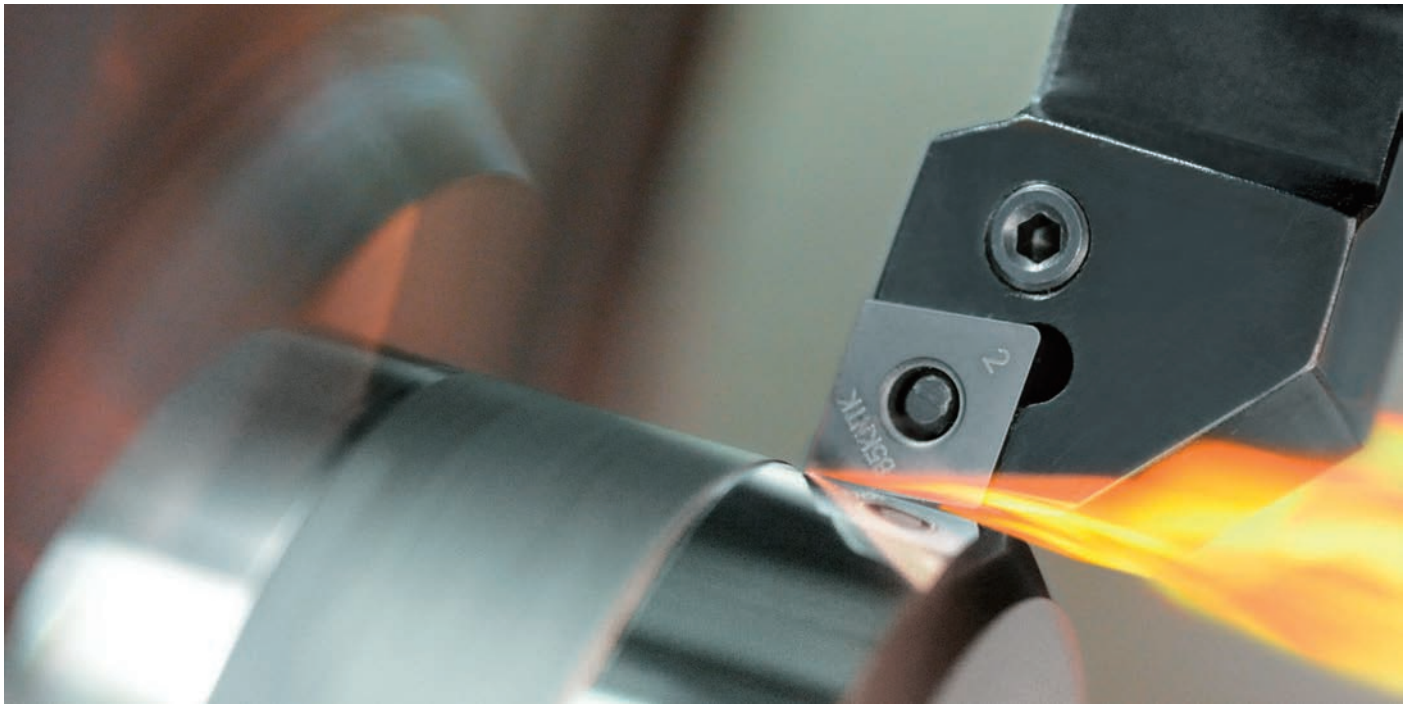


Ductile cast iron



Sintered metals





For continuous machining | CBN for hardened materials

B5K / B52

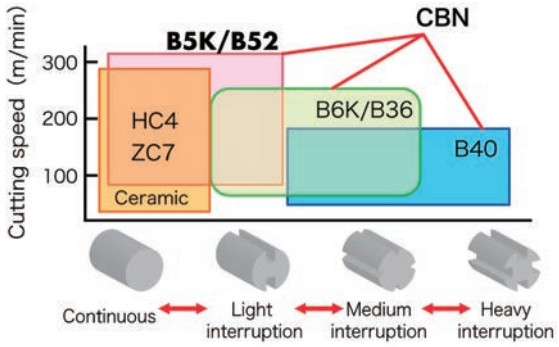
CBN grades ideal for high-precision machining

Roughing to finishing continuous cut operations

Ideal for hardened materials of HRC 60 or higher

Performance

- Excellent wear resistance due to optimum CBN content and special TiC binders
- Continuous machining



Application

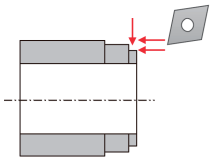
Continuous machining for hardened materials at HRC60 or higher

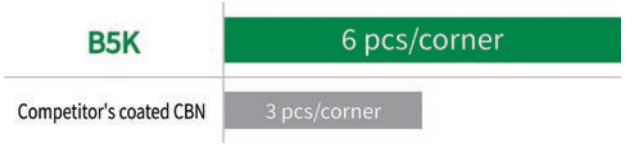
Case study OD Turning of shaft parts

B5K achieved 2 times longer tool life.

Due to dimensional changes and deterioration of the machined surface the competitor's coated CBN needed to be changed.

Work material	SUS440C(HRC58-60)
Cutting speed	150m/min
Feed	0.1mm/rev
Depth of cut	0.2mm
Coolant	DRY





For light to medium interrupted machining | CBN for hardened materials

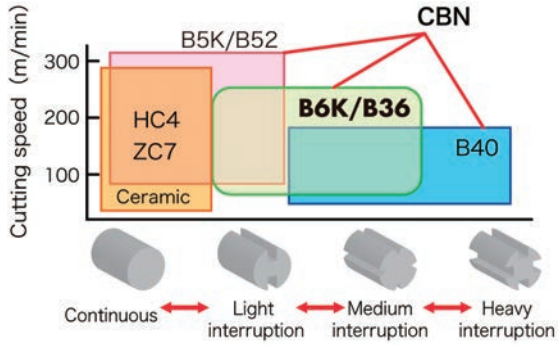
B6K / B36

Recommended for continuous to interrupted cuts

Versatile CBN designed for machining hardened materials at HRC 60 or above with light to medium interruptions

Performance

- CBN with a special TiCN binder achieves a combination of wear resistance and fracture resistance
- Stable performance through light to medium interrupted machining

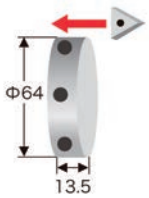


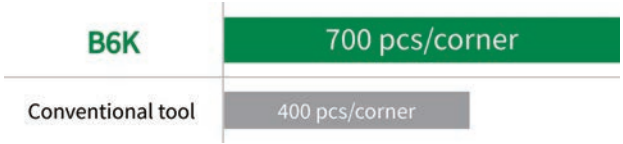
Application

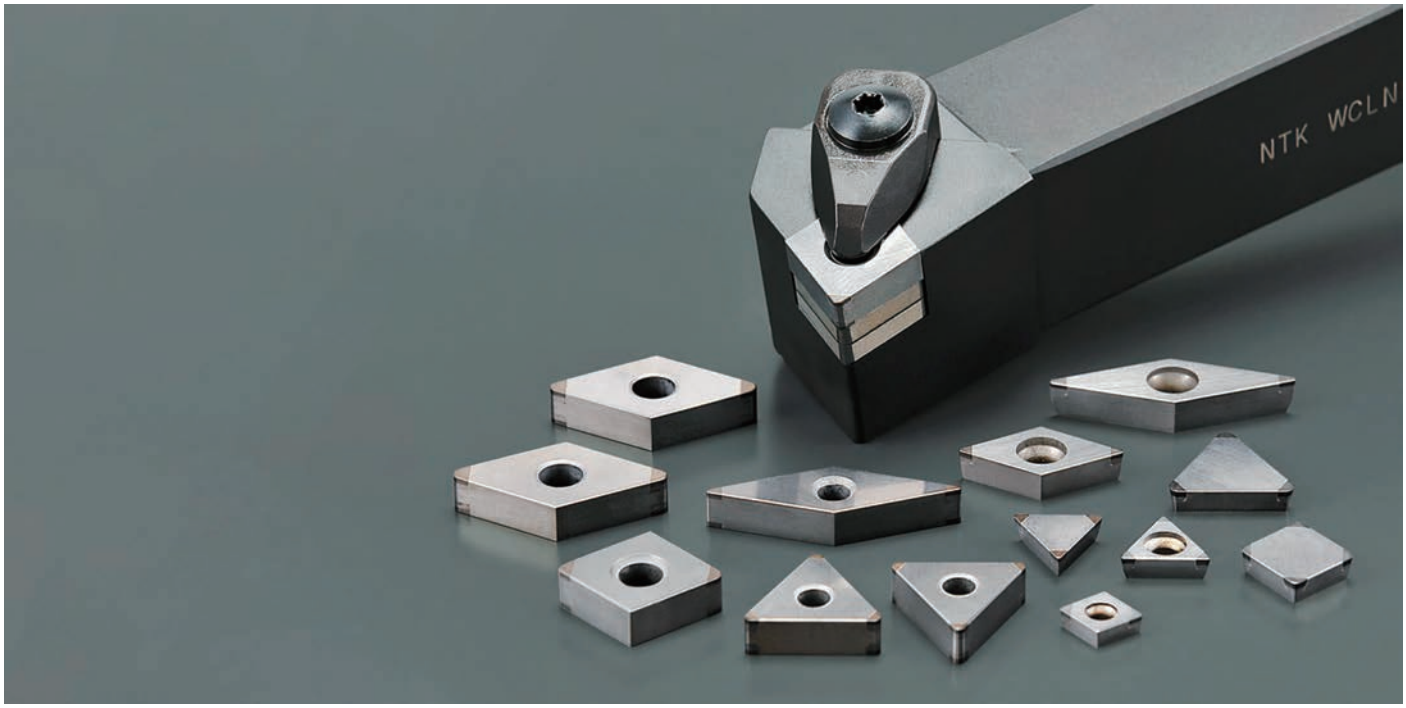
Light to medium interrupted machining of hardened materials of HRC 60 or higher

Case study Interrupted OD turning of machine parts

Work material	STKM(HRC50) interrupted
Cutting speed	210-220m/min
Feed	0.08 mm/rev
Depth of cut	0.2 mm
Coolant	WET







For heavy interrupted machining | CBN for hardened materials

B40

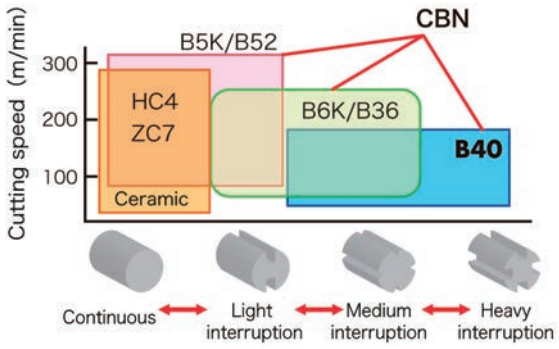
CBN material specialized for heavy intermittent machining

Excellent chipping resistance and stable machining

Best suited for machining of hardened materials over HRC60

Performance

- CBN with a special TiN binder enhances chipping resistance
- CBN material specialized for heavy interrupted machining



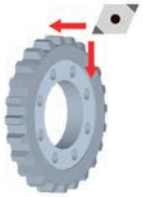
Application

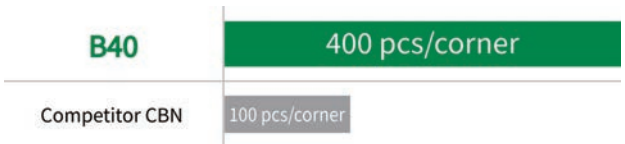
Hardened materials interrupted machining HRC60 or more

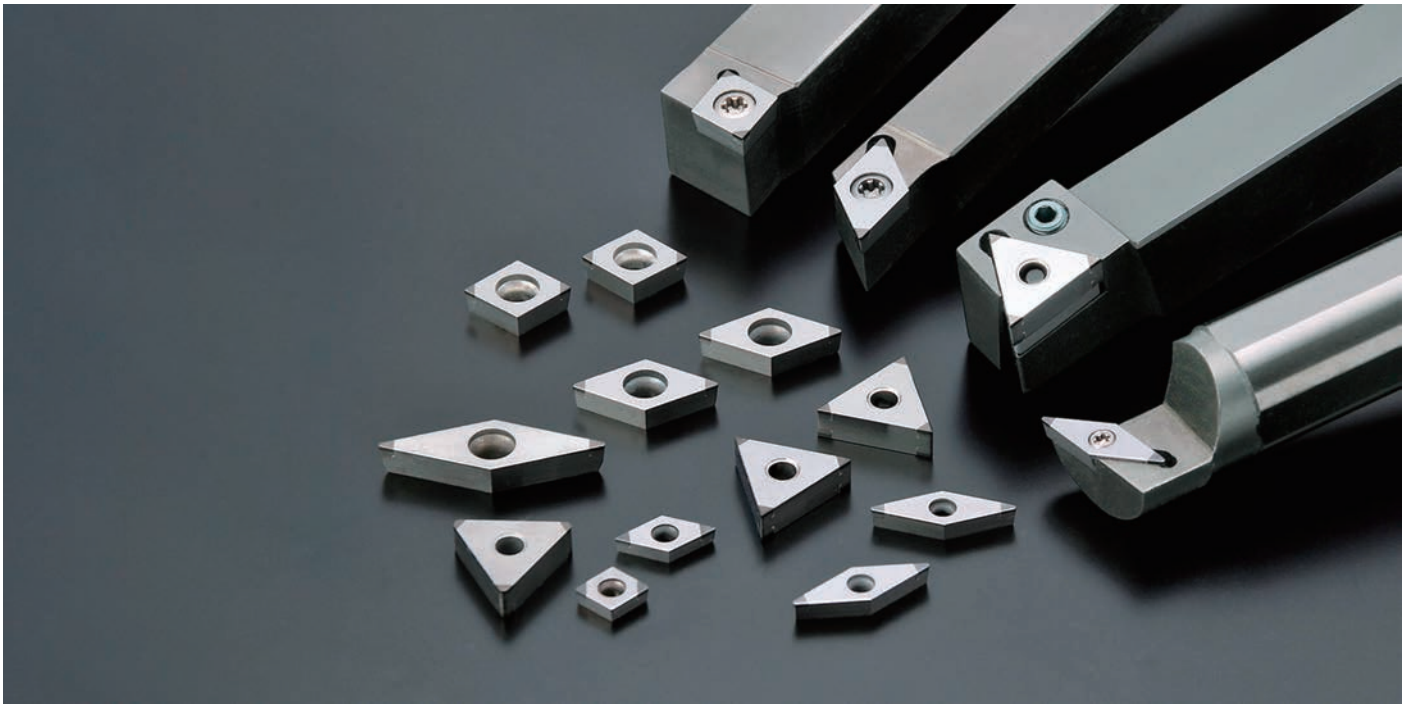
Case study gear parts

Although insert damage due to interrupted machining have been a problem, B40, with its superior resistance to wear, achieved a 4X longer tool life.

Work material	S50C(HRC61)
Cutting speed	28 m/min
Feed	0.12 mm/rev
Depth of cut	0.25 mm
Coolant	WET







High-speed machining of cast iron and sintered alloys | Non-coated CBN

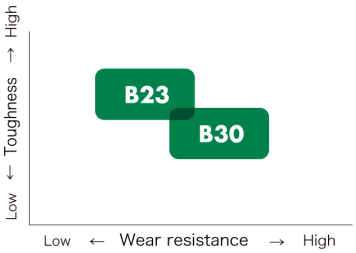
B23 / B30

High-speed machining at Vc=~1,200m/min

Highly efficient machining that significantly outperforms ceramics

Performance

- Specialized in high-speed roughing of gray cast iron
- Ultra high-speed machining at a maximum Vc-1,200m/min

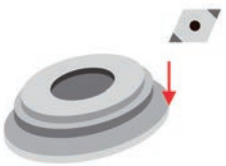


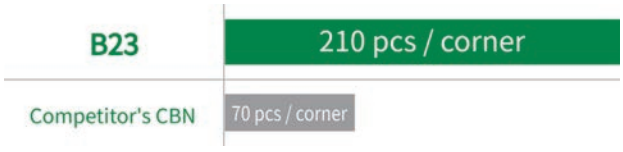
Application

Gray cast iron
Turning scale machining to semi-finishing

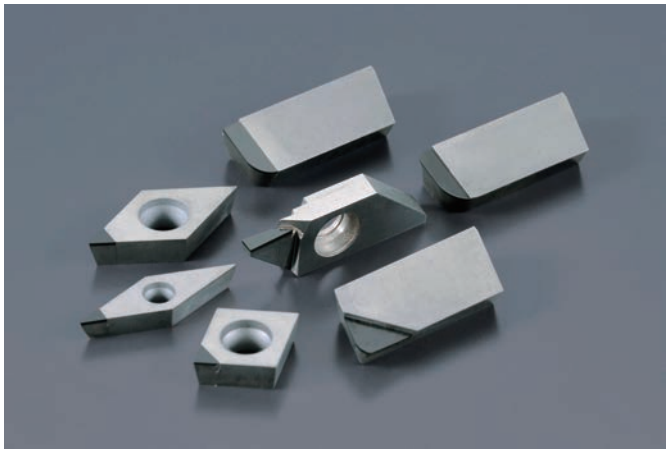
Case study Oil pump housing

Work material	FC250
Cutting speed	250 m/min
Feed	0.2 mm/rev
Depth of cut	2.0 mm
Coolant	WET





PCD / Diamond sintered grade

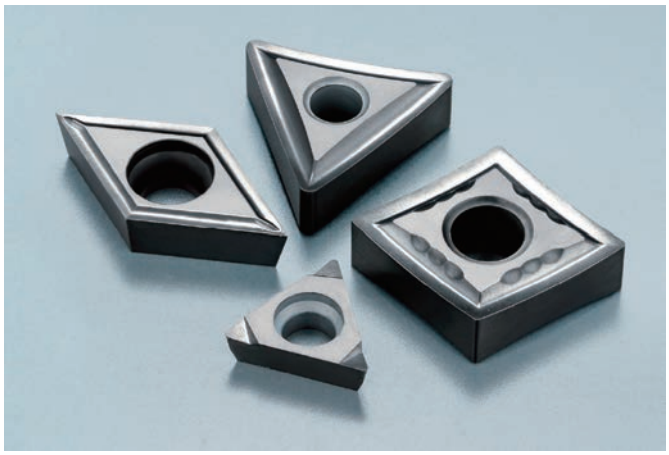


Diamond has low affinity with non-ferrous materials, providing excellent adhesion resistance, a high hardness, and wear resistance, but when used as a cutting tool, it has low strength, which causes a problem with its chipping resistance.

PCD is a material that solves the strength problem without losing the original characteristics of the diamond by sintering the diamond in a fine-grained, polycrystalline state.

Compared to carbide tools used in nonferrous metal machining, PCD enables high-speed machining.

Diamond Coating



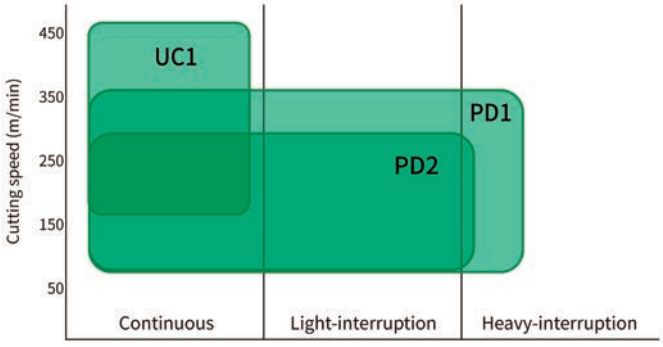
Highly pure diamond layer is precisely coated with high adhesion to our special carbide base material using a state of the art surface treatment technology.

Superior wear resistance compared to conventional PCD tools, especially in difficult-to-machine materials such as carbon and ceramic materials.

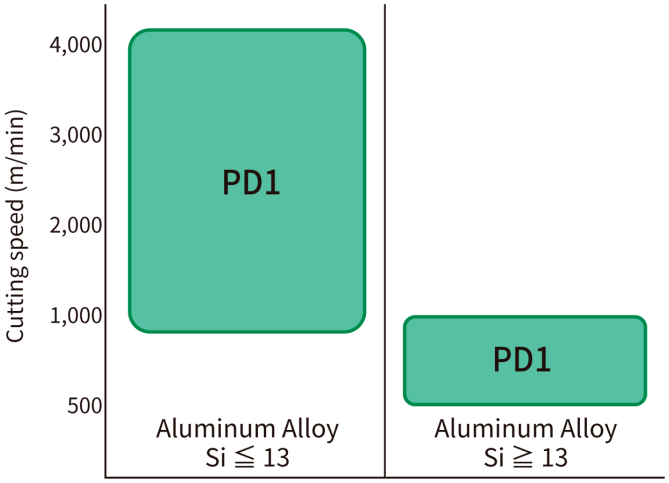
Features

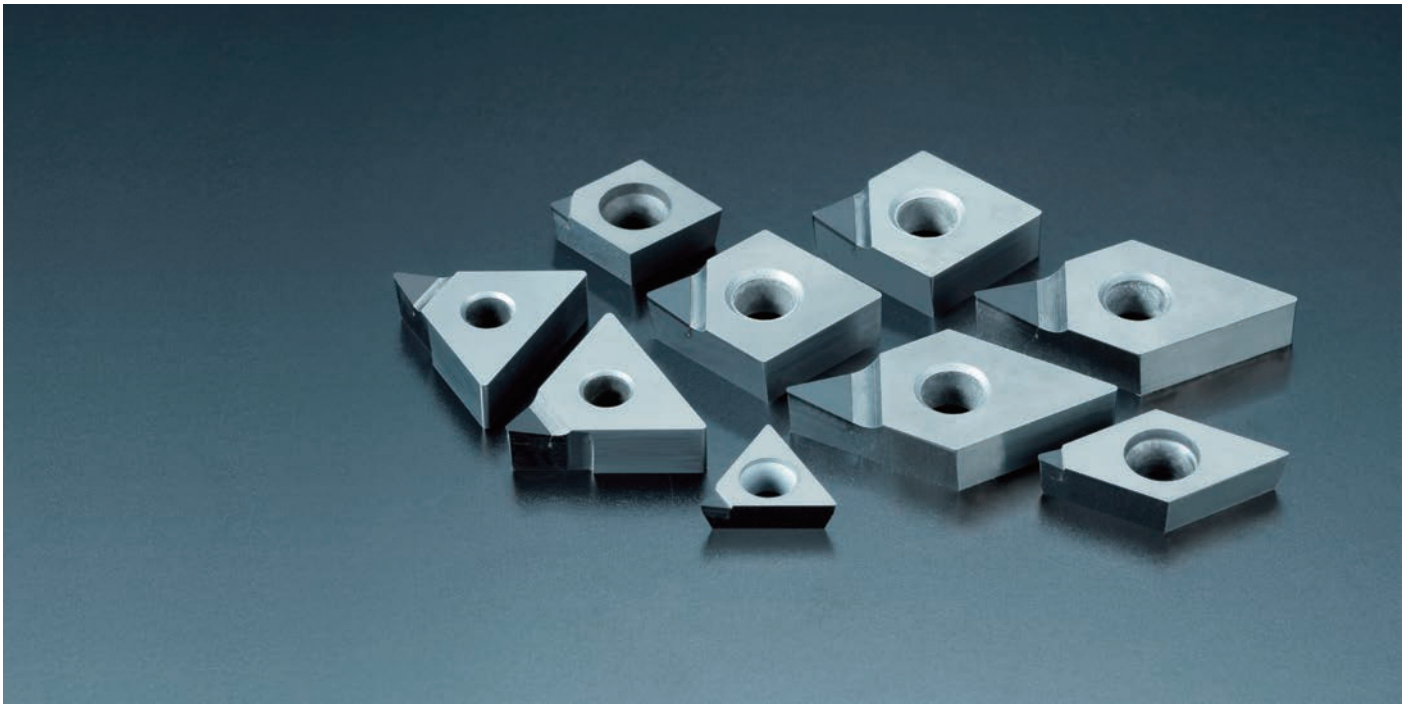
Work material	Grade	Component	Ave. particle size(μm)	Application
N Non-ferrous material	**PD1**	Diamond sintered	10	Machining of non-ferrous metals such as aluminum, brass, resin, copper, carbon, ceramics, etc. Superior adhesion resistance enables high-speed machining compared to carbide
	PD2	Diamond sintered	1	Nonferrous metal machining such as aluminum, brass, resin, copper, carbon, ceramics, etc. Improved sharpness and chipping resistance by ultrafine particle size of carbide base material
	UC1	Diamond Coating	0.1	Nonferrous metal machining such as aluminum, brass, resin, copper, carbon, ceramics, etc. Wear resistance is improved compared to PCD tools by coating a high-purity diamond layer.

Aluminum alloy/brass machining (turning)



Aluminum alloy (Milling)





Non-ferrous material machining | PCD grades

PD1 / PD2

Faster speed capabilities compared to carbide inserts

Optimum machining efficiency for non-ferrous materials PCD demonstrates excellent durability with sharp cutting edge and increased chipping resistance

PCD demonstrates excellent durability with sharp cutting edge and increased chipping resistance

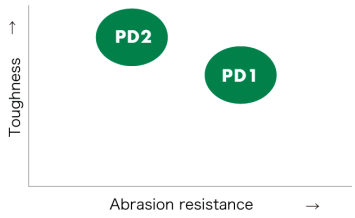
Performance

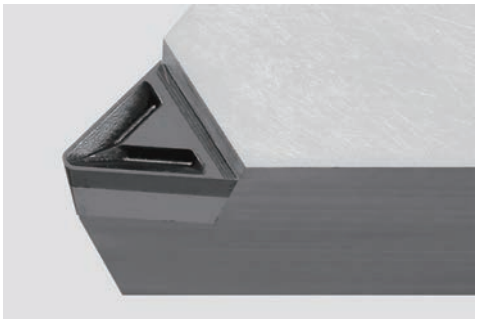
- The hardest fine grain diamond inserts.
- Achieves outstanding edge sharpness and high-speed machining compared to carbide
- The characteristics of diamonds prevent the formation of a built up edge, enabling high-precision and stable machining.

3D molded chipbreaker

Curl & control small chips, and provide high cutting performance.
Suitable for finish machining area (ap=0.5mm)

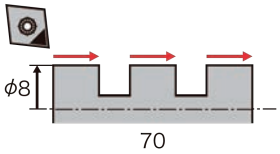
Performance

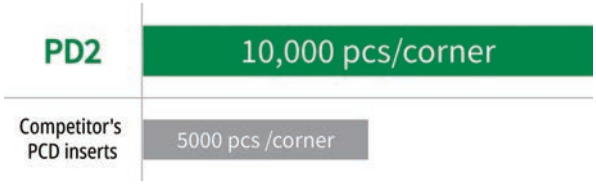


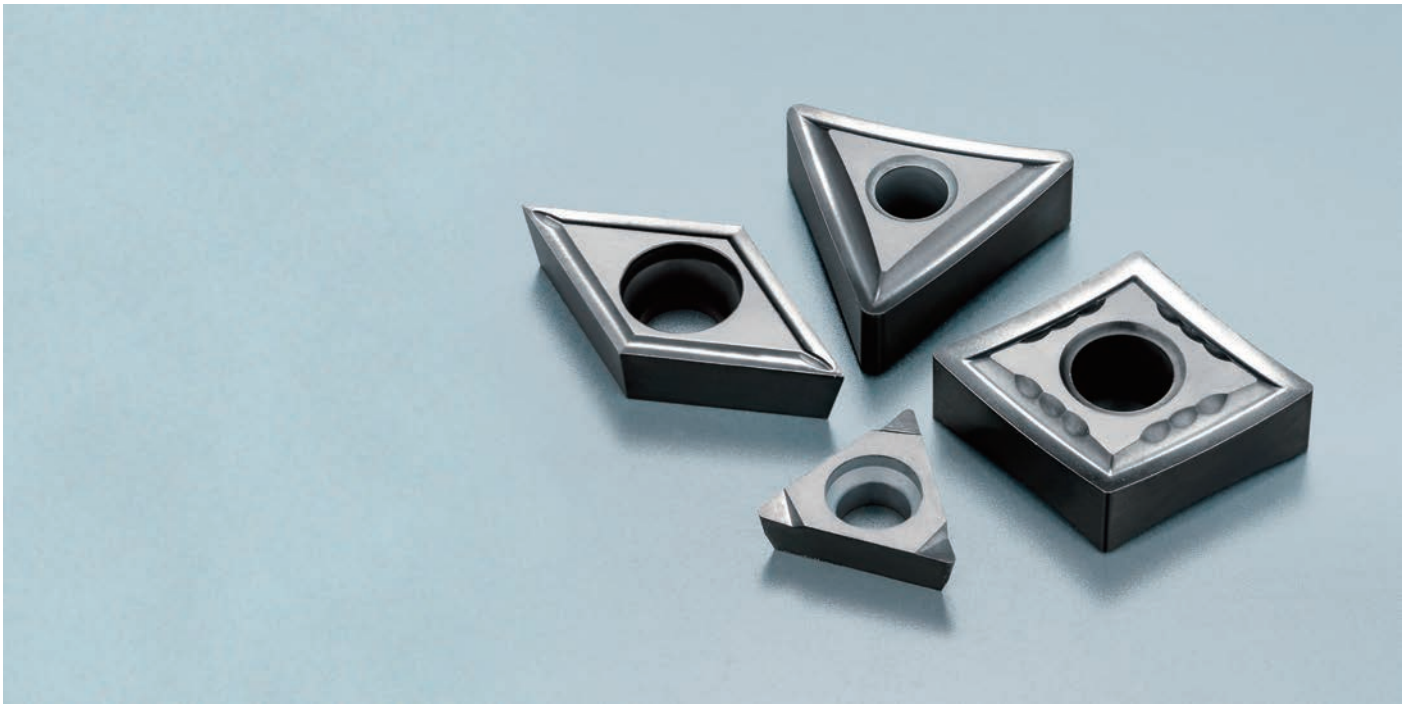


Case study Spool parts

Work material	A6061
Cutting speed	170m/min
Feed	0.06mm/rev
Depth of cut	0.15mm
Coolant	WET







For nonferrous metals and non-metallic machining | Diamond coating

UC1

Ideal for machining difficult-to-machine materials such as carbon and ceramic raw materials

Coated with a high-purity, high-hardness diamond layer with excellent wear resistance

Longer life in difficult-to-machine materials compared to conventional PCD tools and DLC

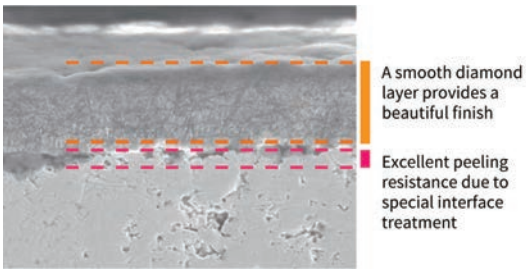
Performance

The dense coating of high-purity, high-hardness diamond layers provides superior wear resistance compared to conventional PCD tools, and can be used for carbon cutting and machining of raw ceramic materials, contributing to cost reduction.

	DLC	PCD	UC1
Binder	none	Co, Ni	none
Diamond grain size	Amorphous	10μm	<0.1μm
Diamond surface roughness	0.25	0.2S	2S
Hardness(GPa)	10	75	90

Good coating adherence

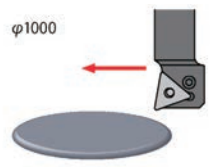
NTK's carbide base material and state of the art surface treatment ensures good coating adherence to reduce flaking which provides stable cutting and long tool life

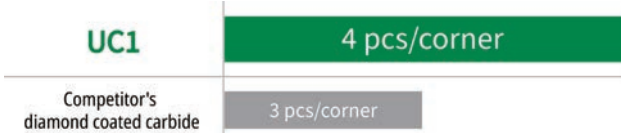


Case study carbon plate

UC1 has a 1.3 times longer tool life than the competitor's diamond coatings.

Work material	Carbon
Cutting speed	300m/min
Feed	0.1~0.4mm/rev
Depth of cut	1.0mm
Coolant	WET





Recommended cutting conditions

Front turning

CSVF / CC.. / DC.. / VC.. / VB.. / TN.. / TF

Work Material		High Temperature Alloys	Titanium Alloys	Cobalt Chrome Alloys	Stainless Steels			Alloy Steels	Carbon Steels
					Hard to cut		Free cutting		
Common Name		Inconel Hastelloy MP35N	Ti-6Al-4V	ASTM F-75	SUS304	SUS316 17-4PH	SUS303 SUS430F	SCr420 SCM435	S10C S45C
Grade	1st choice	DM4 / DT4			ST4 DM4	DM4 DT4	TM4	QM3	
	2nd choice	TM4 / QM3			QM3 / VM1		QM3	TM4 / DM4 / DT4	
Cutting Speed (m/min)		20 40 65	30 55 80		40 70 100		45 110 180	45 90 150	
Feed Rate (mm/rev)	Depth of cut ≦0.1	AMX KHG 0.01 0.02 0.03					AMX KHG 0.01 0.03 0.04		
	Depth of cut 0.1~1.5	YL CL AM3 S 0.02 0.04 0.06					YL CL AM3 AZ7 S U/U1 UL 0.02 0.05 0.09		
	Depth of cut >1.5	YL CL AM3 S 0.02 0.04 0.06					YL CL AM3 ZP 0.03 0.06 0.1		

Back turning

CSVB

Work Material		High Temperature Alloys	Titanium Alloys	Cobalt Chrome Alloys	Stainless Steels		Alloy Steels	Carbon Steels
					Hard to cut	Free cutting		
Common Name		Inconel Hastelloy MP35N	Ti-6Al-4V	ASTM F-75	SUS304 SUS316 17-4PH	SUS303 SUS430F	SCr420 SCM435	S10C S45C
Grade	1st choice	DM4 / DT4					VM1	
	2nd choice	VM1					DM4 / DT4	
Cutting Speed (m/min)		20 40 65	30 55 80			30 60 90		
Feed Rate (mm/rev)	X Direction	0.01 0.02 0.03						
	Z Direction	0.01 0.03 0.04						

TBDP / TBMH / TBP / TBPA / TBVC

Work Material		High Temperature Alloys	Titanium Alloys	Cobalt Chrome Alloys	Stainless Steels			Alloy Steels	Carbon Steels
					Hard to cut		Free cutting		
Common Name		Inconel Hastelloy MP35N	Ti-6Al-4V	ASTM F-75	SUS304	SUS316 17-4PH	SUS303 SUS430F	SCr420 SCM435	S10C S45C
Grade	1st choice	DM4 / DT4			ST4 DM4	DM4 DT4 QM3	TM4	QM3	
	2nd choice	TM4 / QM3			VM1		QM3	TM4 / DM4 / DT4	
Cutting Speed (m/min)		20 40 65	30 55 80				45 90 150		
Feed Rate (mm/rev)	X Direction	0.01 0.02 0.03					0.01 0.02 0.04		
	Z Direction	0.02 0.04 0.06					0.02 0.04 0.08		

TB32 / TB43

Work Material		High Temperature Alloys	Titanium Alloys	Cobalt Chrome Alloys	Stainless Steels		Alloy Steels	Carbon Steels
					Hard to cut	Free cutting		
Common Name		Inconel Hastelloy MP35N	Ti-6Al-4V	ASTM F-75	SUS304 SUS316 17-4PH	SUS303 SUS430F	SCr420 SCM435	S10C S45C
Grade	1st choice	ZM3					ZM3	
	2nd choice							
Cutting Speed (m/min)		15 30 45				45 90 130		
Feed Rate (mm/rev)	X Direction	0.01 0.03 0.05				0.01 0.03 0.05		
	Z Direction	0.04 0.05 0.08				0.04 0.08 0.15		

Cut-off

CSVT

Work Material		High Temperature Alloys	Titanium Alloys	Cobalt Chrome Alloys	Stainless Steels		Alloy Steels	Carbon Steels
					Hard to cut	Free cutting		
Common Name		Inconel Hastelloy MP35N	Ti-6Al-4V	ASTM F-75	SUS304 SUS316 17-4PH	SUS303 SUS430F	SCr420 SCM435	S10C S45C
Grade	1st choice	DM4 / DT4					VM1	
	2nd choice	VM1					DM4 / DT4	
Cutting Speed (m/min)		30 50 70				30 60 90		
Feed Rate (mm/rev)		0.01 0.02 0.03				0.01 0.03 0.05		

CTP / CTPA / CTPS / CTPW

Work Material		High Temperature Alloys	Titanium Alloys	Cobalt Chrome Alloys	Stainless Steels			Alloy Steels	Carbon Steels
					Hard to cut		Free cutting		
Common Name		Inconel Hastelloy MP35N	Ti-6Al-4V	ASTM F-75	SUS304	SUS316 17-4PH	SUS303 SUS430F	SCr420 SCM435	S10C S45C
Grade	1st choice	DM4 / DT4			ST4 DM4	DM4 DT4	TM4	QM3	
	2nd choice	TM4			QM3 / VM1		QM3	TM4 / DM4 / DT4	
Cutting Speed (m/min)		30 50 70					30 60 90		
Feed Rate (mm/rev)		0.02 0.03 0.05					0.02 0.04 0.06		

CTDP / CTWP / CTV

Work Material		High Temperature Alloys	Titanium Alloys	Cobalt Chrome Alloys	Stainless Steels			Alloy Steels	Carbon Steels
					Hard to cut		Free cutting		
Common Name		Inconel Hastelloy MP35N	Ti-6Al-4V	ASTM F-75	SUS304	SUS316 17-4PH	SUS303 SUS430F	SCr420 SCM435	S10C S45C
Grade	1st choice	DT4			ST4 DM4	DM4 DT4	TM4	QM3	
	2nd choice	TM4 / QM3					QM3	TM4 / DM4	
Cutting Speed (m/min)		30 50 70					30 60 90		
Feed Rate (mm/rev)		0.03 0.05 0.08					0.04 0.08 0.12		

Grooving

CSV / GTPS / GTMH / GTMX / GTMT / GTMA / SBG / GTG

Work Material		High Temperature Alloys	Titanium Alloys	Cobalt Chrome Alloys	Stainless Steels			Alloy Steels	Carbon Steels
					Hard to cut		Free cutting		
Common Name		Inconel Hastelloy MP35N	Ti-6Al-4V	ASTM F-75	SUS304	SUS316 17-4PH	SUS303 SUS430F	SCr420 SCM435	S10C S45C
Grade	1st choice	DM4 / DT4			ST4 DM4	DM4 DT4	TM4	QM3	
	2nd choice	TM4 / QM3			QM3 / VM1		QM3	TM4 / DM4 / DT4	
Cutting Speed (m/min)		20 40 65	30 55 80		40 70 100		45 90 180	45 90 150	
Feed Rate (mm/rev) A. Grooving B. Side turning ※	Width 0.25~0.5	A. 0.005 - 0.03							
		B. 0.002 - 0.005							
	0.5~1.0	A. 0.05 - 0.06						A. 0.02 - 0.07	
		B. 0.005 - 0.01						B. 0.005 - 0.01	
	1.0~2.0	A. 0.03 - 0.07						A. 0.03 - 0.08	
		B. 0.02 - 0.05						B. 0.03 - 0.06	
	> 2.0	A. 0.03 - 0.2							
		B. 0.03 - 0.06							

*MAX DOC when side turning (Under 0.4 width side turning impossible)

- MAX0.2mm CSV/GTPS
- MAX2.0mm GTMH/GTMX/GTMT/GTMA
- MAX0.1mm SBG/GTG

GWPG / GWPM / GTV / GEV / TWG

Work Material		High Temperature Alloys	Titanium Alloys	Cobalt Chrome Alloys	Stainless Steels		Alloy Steels	Carbon Steels
					Hard to cut	Free cutting		
Common Name		Inconel Hastelloy MP35N	Ti-6Al-4V	ASTM F-75	SUS304 SUS316 17-4PH	SUS303 SUS430F	SCr420 SCM435	S10C S45C
Grade	1st choice	QM3						
	2nd choice							
Cutting Speed (m/min)		20 40 65	30 55 80		40 70 100	45 90 180	45 90 150	
Feed Rate (mm/rev) A. Grooving B. Side turning *	Width 3.0~4.0	A. 0.05 - 0.15						
	4.0~5.0	A. .0.1 - 0.2					A. 0.1 - 0.25	
							B. 0.15 - 0.3	
	> 5.0	A. 0.15 - 0.35						

*Max DOC when side turning
Groove width x 0.5mm

GTPA

Work Material		Aluminum Alloy
Common Name		A5056 A6061
Grade	1st choice	PD1
	2nd choice	KM1
Cutting Speed (m/min)		PD1 100 200 300 KM1 50 100 200
Feed Rate (mm/rev) A. Grooving B. Side turning *		A. 0.05 - 0.2
		B. 0.1 - 0.2

※Max DOC is 80% of width

Threading

Work Material		High Temperature Alloys	Titanium Alloys	Cobalt Chrome Alloys	Stainless Steels		Alloy Steels	Carbon Steels
					Hard to cut	Free cutting		
Common Name		Inconel Hastelloy MP35N	Ti-6Al-4V	ASTM F-75	SUS304 SUS316 17-4PH	SUS303 SUS430F	SCr420 SCM435	S10C S45C
Grade	1st choice	VM1			VM1 / ZM3		QM3	
	2nd choice	ZM3			QM3		VM1 / ZM3	
Cutting Speed (m/min)		20 40 65	30 55 80		40 70 100	45 90 180	45 90 150	

*Please set the feed rate to 2000mm/min or lower to prevent making incomplete threads
(Unless your machine is equipped with high speed threading program)

ID turning

diameter ≦ φ6 (LBM / STICK DUO)

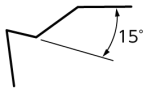
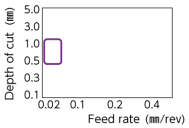
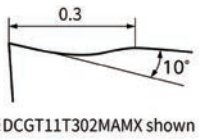
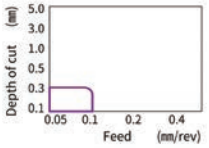
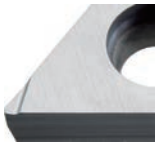
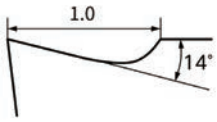
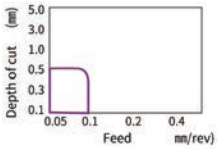
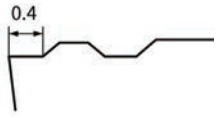
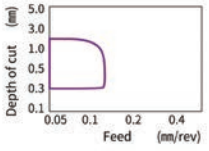
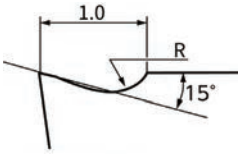
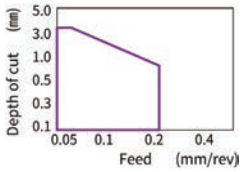
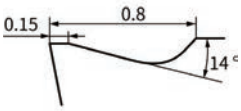
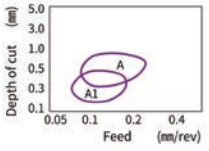
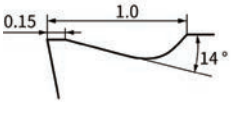
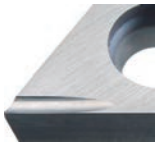
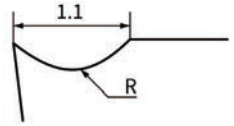
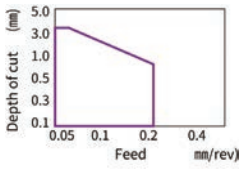
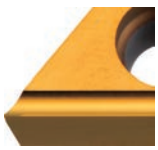
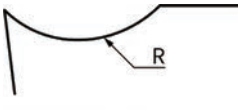
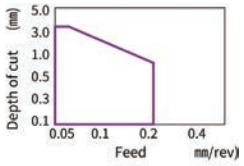
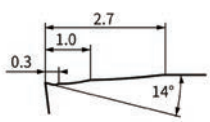
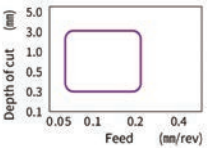
Work Material		High Temperature Alloys	Titanium Alloys	Cobalt Chrome Alloys	Stainless Steels		Alloy Steels	Carbon Steels
					Hard to cut	Free cutting		
Common Name			Ti-6Al-4V	ASTM F-75	SUS304 SUS316 17-4PH	SUS303 SUS430F	SCr420 SCM435	S10C S45C
Grade	1st choice	DM4 / DT4					VM1 / TM4	
	2nd choice	VM1 / ZM3					ZM3	
Cutting Speed (m/min)		20 50 70				30 60 90		
Feed Rate (mm/rev)		0.01 0.03 0.05						
Depth Of Cut (DOC)		0.05 0.08 0.1						

diameter > φ6

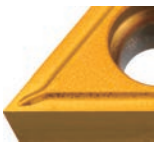
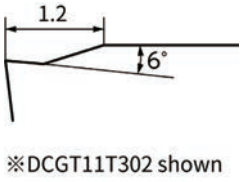
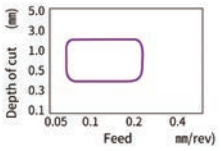
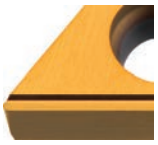
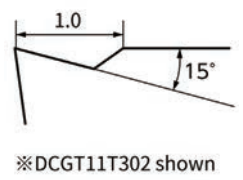
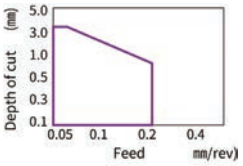
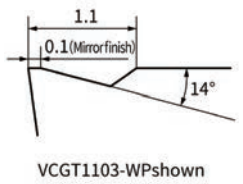
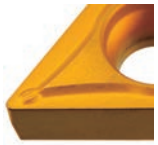
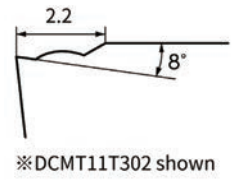
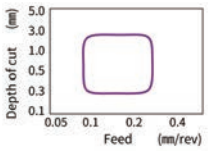
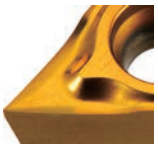
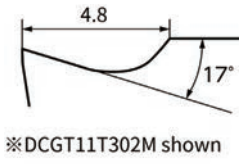
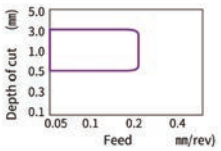
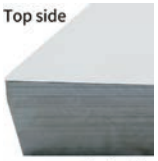
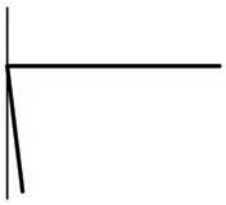
Work Material		High Temperature Alloys	Titanium Alloys	Cobalt Chrome Alloys	Stainless Steels			Alloy Steels	Carbon Steels
					Hard to cut		Free cutting		
Common Name			Ti-6Al-4V	ASTM F-75	SUS304	SUS316 17-4PH	SUS303 SUS430F	SCr420 SCM435	S10C S45C
Grade	1st choice	DM4 / DT4			ST4 DM4	DM4 DT4	TM4	QM3	
	2nd choice	TM4			QM3 / TM4		QM3	TM4 / DT4	
Cutting Speed (m/min)		45 70 100			40 70 100		45 90 180	45 90 150	
Feed Rate (mm/rev)		0.02 0.06 0.12							
Depth Of Cut (DOC)		0.1 0.5 2.0							

Chipbreaker for turning

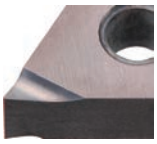
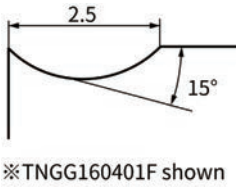
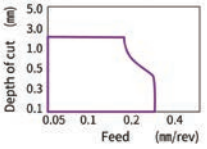
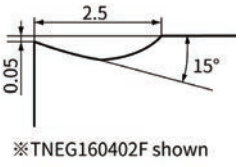
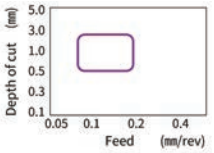
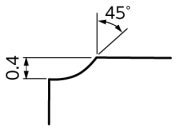
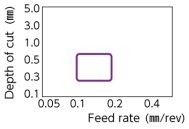
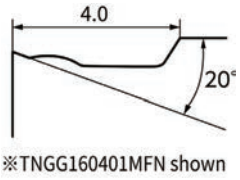
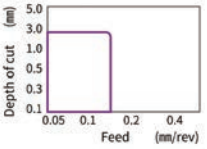
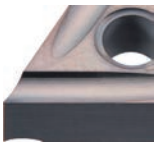
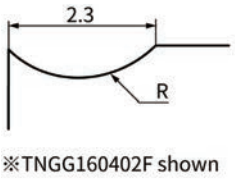
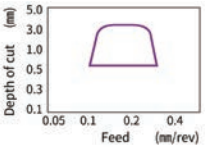
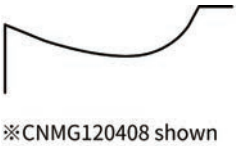
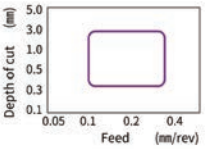
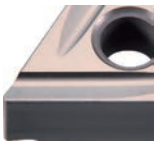
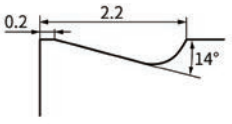
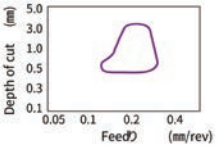
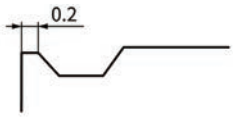
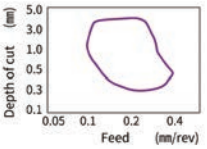
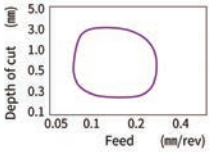
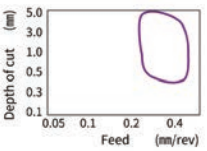
OD turning positive inserts

	Name	Chipbreaker geometry		Features	Chip control range
Finishing	TMV			• Chipbreaker for Vibration Cutting • Reliably long tool life and stable chip evacuation during vibration cutting	
	AMX		 ※DCGT11T302MAMX shown	• Designed for very light depth of cut	
	KHG		 ※DCET11T302 shown	• Excellent chip control on finishing cuts • For super high-precision machining • Precision tolerance in corner radius: ±0.01	
	AZ7		 ※DCGT11T302MFN shown	• Excellent chip control at light feed and light depth of cut	
	AT		 ※DCGT11T302 shown	• Excellent adhesion resistance with dimensional stability • Best for small diameter parts and for machining low carbon steels	
For light cut	A1		 ※CPGH040102 shown	• Tough cutting edge and good chip control • General-purpose ID chipbreaker	
	A		 ※CPGH080202 shown		
	UHG		 ※DCET11T3008R shown	• Excellent chip control on finishing cuts • Precision tolerance in corner radius: ±0.01	
	U U1		 ※DCGT11T302 shown	• Sharp cutting edge prevents materials from work hardening [chipbreaker width] U →1.1mm U1→1.6mm	
	YL		 ※DCGT11T302MYL shown	• Great combination of sharpness and toughness • Excellent chip control	

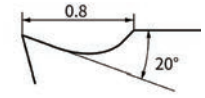
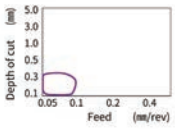
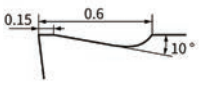
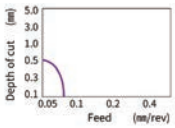
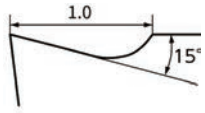
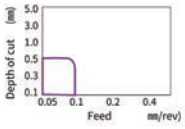
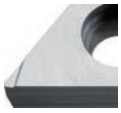
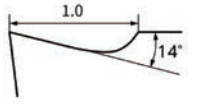
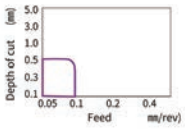
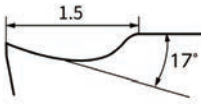
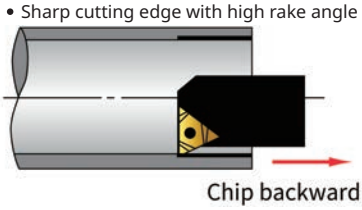
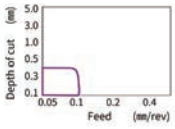
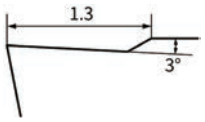
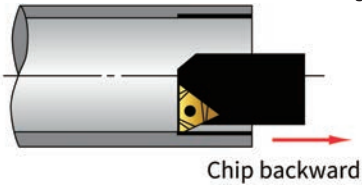
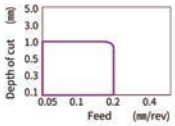
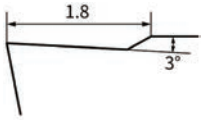
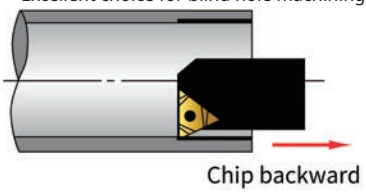
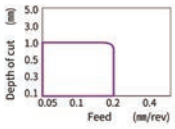
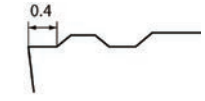
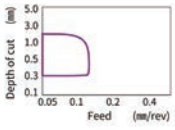
OD turning positive inserts

	Name	Chipbreaker geometry		Features	Chip control range
For Middle Cut	AM3		 ※DCGT11T302 shown	• All purpose chipbreaker • Sharp edge with toughness	
	S		 ※DCGT11T302 shown	• Standard ground chipbreaker with wide cutting condition coverage • Sharp cutting edge with excellent chip control	
	SX		 VCGT1103-WPshown		
	AZ8		 ※DCMT11T302 shown	• Superior cutting quality and versatile breaker with CVD coating	
	CL		 ※DCGT11T302M shown	• Sharpest molded chipbreaker • Excellent chip control • Less tool pressure	
For non-ferrous	V P H			• Very up-sharp edge with mirror finish • V: Mirror finish on Top and Flank side with R0 nose radius • P: Mirror finish on Top and Flank side • H: Mirror finish on Top side	–

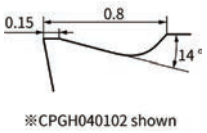
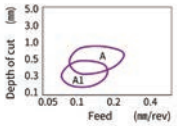
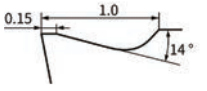
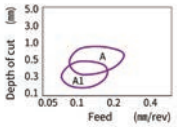
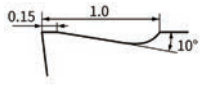
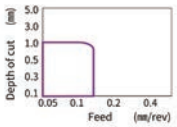
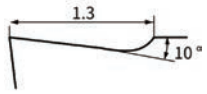
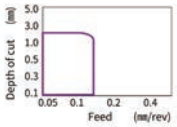
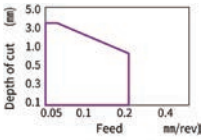
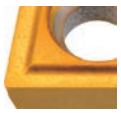
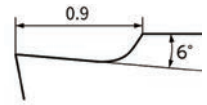
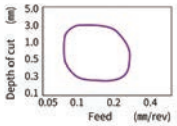
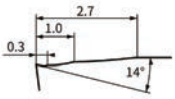
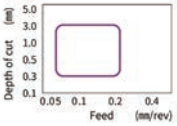
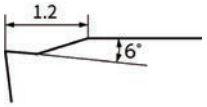
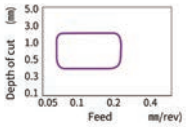
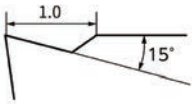
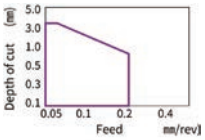
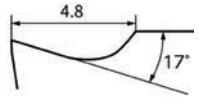
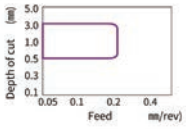
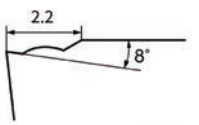
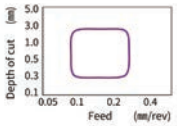
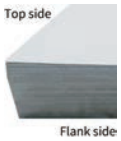
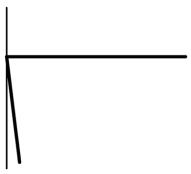
OD turning negative inserts

	Name	Chipbreaker geometry		Features	Chip control range
Finishing	DA		 ※TNGG160401F shown	• Excellent chip control and sharp cutting edge	
	D1		 ※TNEG160402F shown	• Excellent chip control and sharp cutting edge	
	AG			• Resolve chip entanglement, which is likely to occur during machining of low-hardness layer	
For light cut	UL		 ※TNGG160401MFN shown	• Negative insert with a positive insert's chipbreaker • Reduced burr • Improved microfinish • Superb advantage in cost per corner over positive inserts	
For Middle Cut	U2		 ※TNGG160402F shown	• Reduced burr and work hardening due to high rake design	
	ZP		 ※CNMG120408 shown	• Double-positive rake and sharp cutting edge • Low tool pressure even at heavy depth of cut	
	C		 ※TNGG160402F shown	• General-purpose chipbreaker with excellent toughness and chip control	
For Rough Cut	Z5		 ※CNMG120408ENB shown	• Very tough insert • Designed for machining with heavy interruption	
	AM1		 ※VNMG160404 shown	• Tough chipbreaker for roughing with exceptional stability	
	G		 ※CNMG120408 shown	• Tough chipbreaker for roughing with exceptional stability	

ID turning positive inserts

	Name	Chipbreaker geometry		Features	Chip control range
Finishing	A2		 ※ERGHT30102F shown	• Control chips at light feed and light depth of cut • Sharp cutting edge due to large rake angle	
	B1		 ※TCGH060102FV shown	• Stable cutting thanks to sharp and tough cutting edge	
	K		 ※TPGH090202FL shown	• Superb chip control on finishing applications • Sharp cutting edge with the high rake angle	
	KHG		 ※DCET11T302 shown	• For super high-precision machining • Precision tolerance in corner radius: ±0.01	
	FG		 ※TPGH110304 shown	• Evacuates chips BACKWARD at light depth of cut • Sharp cutting edge with high rake angle 	
	F05		 ※TPGH060102F shown	• Evacuates chips BACKWARD • Excellent choice for blind hole machining 	
	F1		 ※TPGH110302F shown	• Evacuates chips BACKWARD • Excellent choice for blind hole machining 	
	AZ7		 ※DCGT11T302MFN shown	• Excellent chip control at light feed and light depth of cut	

ID turning positive inserts

	Name	Chipbreaker geometry		Features	Chip control range
For light cut	A1		 ※CPGH040102 shown	• Tough cutting edge and good chip control • General-purpose ID chipbreaker	
	A		 ※CPGH080202 shown	• Tough cutting edge and good chip control • General-purpose ID chipbreaker	
	B2		 ※TPGH090202FV shown	• Stable cutting thanks to sharp and tough cutting edge	
	B3		 ※TPGH090202F shown	• Stable cutting thanks to sharp and tough cutting edge	
	U U1		 ※DCGT11T302 shown	• Sharp cutting edge prevents materials from work hardening [chipbreaker width] U →1.1mm U1→1.6mm	
	AM5		 ※CPGH060202FN shown	• Provides both good cutting performance and chip control	
	YL		 ※DCGT11T302MYL shown	• Great combination of sharpness and toughness • Covers extremely wide range • Excellent chip control	
For Middle Cut	AM3		 ※DCGT11T302 shown	• All purpose chipbreaker • Sharp edge with toughness	
	S		 ※DCGT11T302 shown	• Standard ground chipbreaker with wide cutting condition coverage	
	CL		 ※DCGT11T302M shown	• Sharpest molded chipbreaker • Less tool pressure	
	AZ8		 ※DCMT11T302 shown	• CVD coated chip breaker with excellent sharpness and high versatility.	
For non-ferrous	V P H			• Very up-sharp edge with mirror finish • V: Mirror finish on Top and Flank side with R0 nose radius • P: Mirror finish on Top and Flank side • H: Mirror finish on Top side	–

Multi-purpose holders

All the inserts can use the same toolholder

CSV series

Able to use in Cam-style machine lathe

Front Turning — CSVF
Back Turning — CSVB
Threading — CSVT

Cut-off — CSVC
Grooving — CSVG

CTPS series

Best for

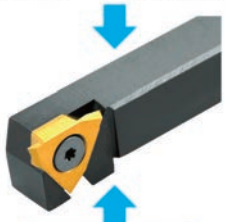
Cut-off — CTPS
Back Turning — TBPS

Grooving — GTPS
Threading — TTPS

GTT type

Grooving

GTM32 GTMH32 GTMH32-GX GTMX32

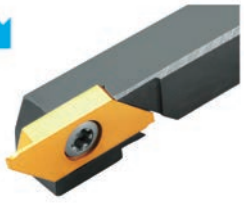


Back Turning

TBMH32

CTPA type

Cut-off — CTPA
Back Turning — TBPA



Grooving

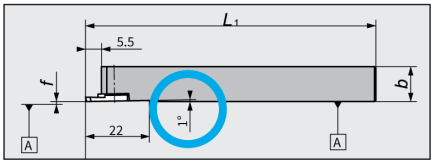
GTPA

Insert can be attached, but it will interfere the machining process due to the difference of set angle.

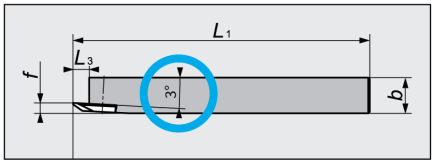
*** CTP (cut-off), TBP (back turning), and TTP (threading) tools are not interchangeable.**

The inserts may fit in the holders, but because the set angle is different there will be an interference during machining.

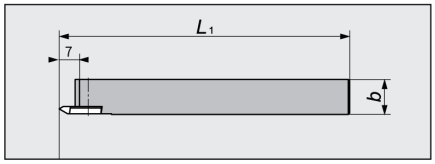
Cut-off CTP ✕ Back Turning TBP ✕ Threading TTP



Set angle : 1˚



Set angle : −3˚



Set angle : 0˚