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Kyocera promotes research and development to help improve customers' productivity and profitability. Kyocera provides high-quality inserts in various grades including cermet, coated carbide, coated super micro grain carbide, uncoated carbide, ceramic, PCD and CBN.

Turning

Workpiece material	Steel					Stainless steel / Cast steel					Cast iron			
	Finishing		Roughing			Finishing		Roughing			Finishing		Roughing	
Classification	P01	P10	P20	P30	P40	M01	M10	M20	M30	M40	K01	K10	K20	K30
Cermet	TN series					TN610, TN620, TN60, TN90					TN60			
	TC series					TC60								
	CCX (CVD coated)										CCX			
	PV series					PV90								
	MEGACOAT										PV7005			
	MEGACOAT NANO					PV710, PV720, PV730								
Coated carbide	CA series					CA6515, CA6525					CA410K, CA415K, CA310, CA315, CA320, CA4505, CA4515			
	PR series					PR930, PR1025								
	MEGACOAT					PR1225								
	MEGACOAT NANO					PR1535								
	MEGACOAT NANO PLUS					PR1705, PR1725								
	MEGACOAT TOUGH					PR1205								
											KA30, KT66, A66N, PT600M, KS6015, KS6050, CS7050			
											KW10			
	Ceramic													
	Carbide													
CBN										KBN475, KBN60M, KBN900				

*White bars indicate older grades

Turning

Workpiece Material	Non-ferrous Metals				Difficult-to-cut materials Titanium / Titanium Alloys				Hard Materials				Powdered Steel			
Cutting Range	Finishing ↔ Roughing				Finishing ↔ Roughing				Finishing ↔ Roughing				Finishing ↔ Roughing			
Classification	N01	N10	N20	N30	S01	S10	S20	S30	H01	H10	H20	H30	01	10	20	30
Coated Carbide	CA Series						CA6515									
	MEGACOAT HARD						PR005S									
	MEGACOAT TOUGH						PR115S									
	MEGACOAT NANO							PR120S								
Cermet														TN610		
														TN60		
Ceramic							KS001									
							KS6030									
							KS6040									
CBN																

Workpiece material	Non-ferrous metals				Difficult-to-cut materials Heat-resistant alloys / Ni-base heat-resistant alloys				Hard materials				Powdered Steel			
Cutting range	Finishing ↔ Roughing				Finishing ↔ Roughing				Finishing ↔ Roughing				Finishing ↔ Roughing			
Classification	N01	N10	N20	N30	S01	S10	S20	S30	H01	H10	H20	H30	01	10	20	30
MEGACOAT NANO Coated carbide								PR1535								
Carbide																
DLC coated carbide																
PCD																

Small Parts Machining

Workpiece material	Steel				Stainless steel / Cast steel					Cast iron					
Cutting range	Finishing ↔ Roughing				Finishing ↔ Roughing					Finishing ↔ Roughing					
Classification	P01	P10	P20	P30	P40	M01	M10	M20	M30	M40	K01	K10	K20	K30	
Coated carbide	PR series							PR930							
								PR1025							
	MEGACOAT							PR1225							
	MEGACOAT NANO							PR1535							
MEGACOAT NANO PLUS								PR1705							
								PR1725							

Workpiece material	Non-ferrous metals				Difficult-to-cut materials Heat-resistant alloys / Ni-base heat-resistant alloys				Hard materials				Sintered steel			
Cutting range	Finishing ↔ Roughing				Finishing ↔ Roughing				Finishing ↔ Roughing				Finishing ↔ Roughing			
Classification	N01	N10	N20	N30	S01	S10	S20	S30	H01	H10	H20	H30	01	10	20	30
Carbide																
DLC coated carbide																

Grooving / Cut-Off / Threading

A
INSERT
GRADES

Workpiece material		Steel				Stainless steel / Cast steel					Cast iron					
Cutting range		Finishing ← → Roughing				Finishing ← → Roughing					Finishing ← → Roughing					
Classification		P01	P10	P20	P30	P40	M01	M10	M20	M30	M40	K01	K10	K20	K30	
Cermets	MEGACOAT	PV7040										PV7040				
	TN series	TN620					TN620						TN620			
		TN6020					TN6020						TN6020			
TN60					TN60						TN60					
TC series	TN90					TN90						TN90				
	TC40					TC40						TC40				
CR series	TC60					TC60						TC60				
	CR9025					CR9025						CR9025				
Coated carbide	PR series	PR915					PR915						PR905			
		PR930					PR930						PR930			
		PR1025					PR1025						PR1025			
	PR1115					PR1115						PR1115				
	MEGACOAT	PR1215					PR1215						PR1215			
PR1225					PR1225						PR1225					
MEGACOAT NANO	PR1535					PR1535						PR1535				
	PR1625					PR1625						PR1625				
MEGACOAT NANO EX	PR2015					PR2015						PR2015				
	PR2025					PR2025						PR2025				
Ceramic												A65 A66N PT600M				
Carbide												KW10 GW15				

Workpiece material		Non-ferrous metals				Difficult-to-cut materials Titanium / Titanium alloys				Hard materials				Sintered Steel				
Cutting range		Finishing ← → Roughing				Finishing ← → Roughing				Finishing ← → Roughing				Finishing ← → Roughing				
Classification		N01	N10	N20	N30	S01	S10	S20	S30	H01	H10	H20	H30	01	10	20	30	
MEGACOAT Coated carbide															PR1215 PR1225			
Cermets														TN60				
Ceramic										A65 A66N PT600M								
Carbide		KW10 GW05 GW15				KW10 GW15												
DLC coated carbide		PDL015 PDL025																
CBN										KBN510 KBN525				KBN570				
PCD		KPD001 KPD010				KPD001 KPD010												

*White bars indicate older grades

Drilling

Workpiece material		Steel					Stainless steel / Cast steel					Cast iron			
Cutting range		Finishing ← → Roughing					Finishing ← → Roughing					Finishing ← → Roughing			
Classification		P01	P10	P20	P30	P40	M01	M10	M20	M30	M40	K01	K10	K20	K30
Coated carbide	CA series		CA520D					CA6535				CA415D			
	MEGACOAT		PR1225				PR1225				PR1210				
	MEGACOAT NANO		PR1230					PR1535							
Carbide												KW10		GW15	

Workpiece material		Non-ferrous metals				Difficult-to-cut materials <small>Titanium / Titanium alloys</small>				Hard materials			
Cutting range		Finishing ← → Roughing				Finishing ← → Roughing				Finishing ← → Roughing			
Classification		N01	N10	N20	N30	S01	S10	S20	S30	H01	H10	H20	H30
MEGACOAT Coated carbide										PR1230			
Carbide		KW10					KW10						
		GW15					GW15						

Milling

Workpiece material		Steel					Stainless steel / Cast steel					Cast iron			
Cutting range		Finishing ← → Roughing					Finishing ← → Roughing					Finishing ← → Roughing			
Classification		P01	P10	P20	P30	P40	M01	M10	M20	M30	M40	K01	K10	K20	K30
Cermets	TN series		TN620M					TN60							
			TN60				TN100M								
	MEGACOAT NANO		PV60M					PR1225				PR1210			
Coated carbide	CA series							CA6535				CA420M			
	MEGACOAT							PR1225				PR1210			
	MEGACOAT NANO							PR1525				PR1510			
	MEGACOAT NANO EX		PR1825					PR1835				PR1810			
Carbide												KW10		GW25	

Workpiece material		Non-ferrous metals				Difficult-to-cut materials <small>Heat-resistant alloys / Ni-base heat-resistant alloys</small>				Difficult-to-cut materials <small>Titanium / Titanium alloys</small>				Hard materials			
Cutting range		Finishing ← → Roughing				Finishing ← → Roughing				Finishing ← → Roughing				Finishing ← → Roughing			
Classification		N01	N10	N20	N30	S01	S10	S20	S30	S01	S10	S20	S30	H01	H10	H20	H30
Coated carbide	CA series					CA6535				CA6535							
	MEGACOAT									PR1210							
	MEGACOAT HARD													PR015S			
	MEGACOAT NANO					PR1535				PR1535							
Carbide		KW10								KW10							
		GW25								GW25							
DLC coated carbide		PDL025															
PCD		KPD001								KPD001							
		KPD010								KPD010							
		KPD230															
		KPD250															

*White bars indicate older grades

INSERT GRADES	A
TURNING INSERTS	B
CBN/PCD INSERTS	C
TURNING HOLDERS	D
SMALL TOOLS	E
BORING	F
GROOVING	G
CUT-OFF	H
THREADING	J
DRILLING	K
MILLING	M
QUICK CHANGE TOOLING	N
SPARE PARTS	P
TECHNICAL	R
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Cermet

Cermet

KYOCERA is known as one of the leading manufacturer of cermets. Cermets combine toughness with superior wear resistance, and provide longer tool life and excellent surface finishes. Typical materials used in cermets are TiC, TiN, TiCN and NbC.

PVD Coated Cermet (MEGACOAT / MEGACOAT NANO Cermet)

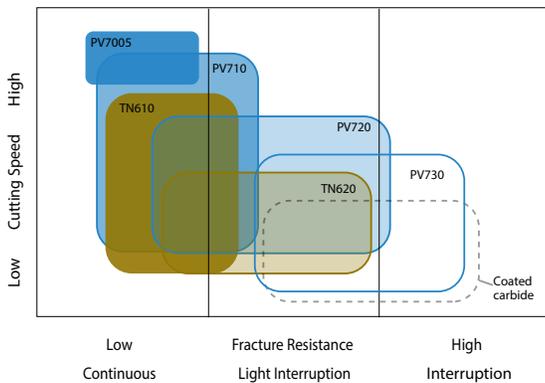
PVD coated cermet is coated on cermet substrate with a thin layer of high wear resistance and high adhesion resistance by PVD (Physical Vapor Deposition) technology. Generally because of the low processing temperature of PVD compared with CVD, PVD coated cermet features less deterioration and more bending strength.



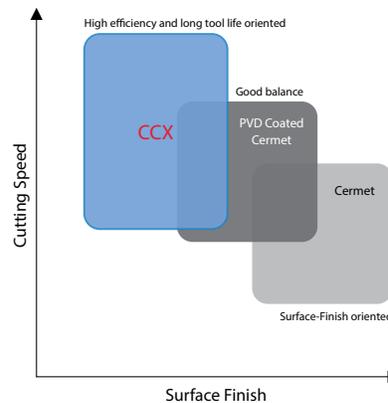
Features of cermet and PVD coated cermet

Classification	Grade	Color	Main Component (Coating Composition)	Advantages and Applications	
<div style="background-color: #ADD8E6; padding: 5px; text-align: center; border: 1px solid black;"> P Steel </div>	Cermet	Gray	TN610	<ul style="list-style-type: none"> High wear resistant cermet due to three types of special reinforcement technology Application: Cermet for steel machining, long tool life in high speed and continuous 	
			TN620	<ul style="list-style-type: none"> Three types of special reinforcement technology realized the superior fracture resistance and wear resistance Application: Stable machining of steel 	
			TN60	<ul style="list-style-type: none"> Application: Machining of steel, continuous to interruption 	
			TN6020	<ul style="list-style-type: none"> Application: Uncoated cermet for grooving of steel 	
			TN620M	<ul style="list-style-type: none"> Tough cermet for milling with excellent balance of wear resistance and toughness Application: Milling of steel with high quality surface finish and long tool life 	
			TN100M	<ul style="list-style-type: none"> Tough cermet with improved oxidation resistance and thermal shock resistance Application: Milling of steel at high speed 	
			TC40	<ul style="list-style-type: none"> Good balance of wear resistance and toughness Application: Grooving and threading of steel 	
	MEGACOAT NANO Cermet	Gold	TiCN (MEGACOAT NANO)	CCX	<ul style="list-style-type: none"> Specialized high-strength micro grain cermet base material with superior wear-resistant thick CVD coating Excellent wear resistance leads long tool life in high speed machining Application: High speed finishing to light interrupted machining of steel
				PV710	<ul style="list-style-type: none"> Superior wear and adhesion resistant MEGACOAT NANO on the high wear resistant cermet Application: Long tool life and stability in high speed continuous machining of steel, excellent surface
				PV720	<ul style="list-style-type: none"> Superior wear and adhesion resistant MEGACOAT NANO on the special reinforcement cermet Application: First choice PVD coated cermet for steel machining, high efficient machining and high quality surface finish
				PV730	<ul style="list-style-type: none"> Fracture resistant grade with MEGACOAT NANO on wear resistant, tough cermet Application: Wear resistant PVD coated cermet for steel machining and high quality surface finish
	MEGACOAT Cermet	Blackish Red	TiCN+NbC (MEGACOAT NANO)	PV60M	<ul style="list-style-type: none"> Improved stable grade for milling by MEGACOAT NANO coating technology Application: Milling of steel with high quality surface finish and stable machining
				PV7040	<ul style="list-style-type: none"> MEGACOAT Cermet for Grooving Application: Excellent surface finish and longer tool life in steel grooving
				PV7005	<ul style="list-style-type: none"> Heat-resistant MEGACOAT on cermet with excellent wear resistance Application: High speed finishing of gray and nodular cast iron
<div style="background-color: #FF0000; color: white; padding: 5px; text-align: center; border: 1px solid black;"> K Cast iron </div>					

Application Map



Coating Properties



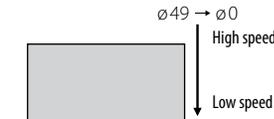
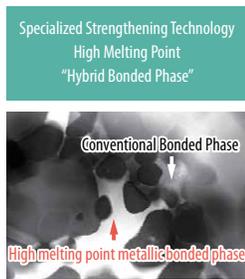
Uncoated CERMET

TN610/TN620

Special reinforcement technology (hybrid technology)
Superior surface finish and machining stability

1 Excellent surface finish

- Combining the conventional cermet bonded phase (nickel, cobalt) and the special high melting point metallic bonded phase.
- Provides high adhesion resistance to eliminate galling of the work piece.

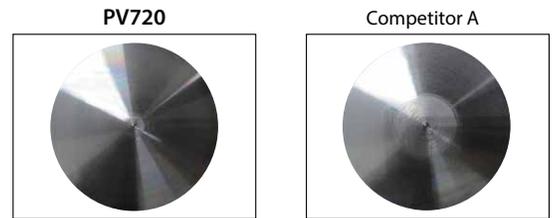


MEGACOAT NANO CERMET

PV710/PV720/PV730

Surface finish comparison
(In-house evaluation)

Cutting Conditions: $V_c = 590 \sim 0$ sfm (Constant Rate), D.O.C. = $0.020''$
 $f = 0.004$ ipr, Wet, CNMG431 type Workpiece: 1010

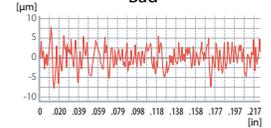
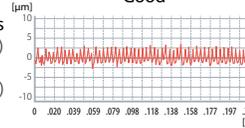


Surface Finish

Good

Bad

Surface roughness
($\phi 0.158'' \sim \phi 0.591''$)
 $(V_c = 50 \sim 180$ sfm)



CVD Coated Cermet for Finishing

CCX

Excellent high speed finishing leads to greater productivity
Applicable to a wide range of cutting conditions from general to high speed machining
Maintains long tool life in soft steel, general steel and cast iron machining

1 Superior wear resistance to PVD coated cermets

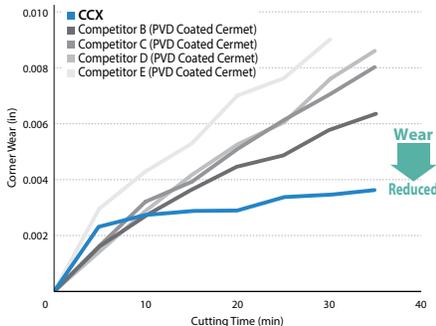
2 Unique cermet base material with thick CVD coating

Alloy Steel

High Speed Comparison: $V_c = 1,310$ sfm

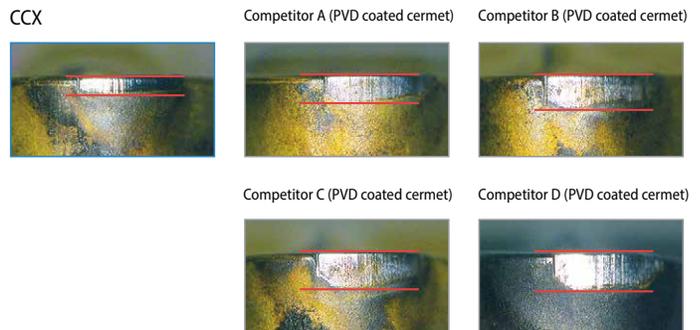
CCX provided better tool life than competitor's CVD cermets by greatly reducing the amount of wear

Wear Resistance Comparison (Internal evaluation)



Cutting Conditions: $V_c = 1,310$ sfm, D.O.C. = $0.012''$, $f = 0.005$ ipr, Wet
CNMG432 Type External Turning

Cutting Edge (After machining 35 min)



* Picture shows 30 min after machining due to a large amount of wear

INSERT GRADES	A
TURNING INSERTS	B
CBN/PCD INSERTS	C
TURNING HOLDERS	D
SMALL TOOLS	E
BORING	F
GROOVING	G
CUT-OFF	H
THREADING	J
DRILLING	K
MILLING	M
QUICK CHANGE TOOLING	N
SPARE PARTS	P
TECHNICAL	R
INDEX	T

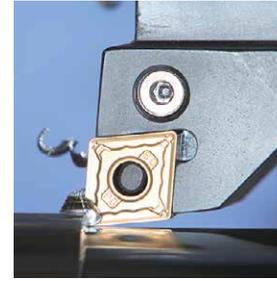
CVD Coated Carbide (Turning)

CVD Coated Carbide

Using chemical vapor deposition coating technology, CVD coated carbide grades provide stable, efficient machining at high speeds or for heavy interrupted applications.

Features

- Applicable from low to high speed machining and from finishing to roughing
- Stable machining is achieved due to the superior toughness and crack resistance
- Cutting times are reduced due to good chip control from effective chipbreakers



Features of CVD coated carbide

Classification	Grade	Color	Coated Composition	Advantages and Applications
<div style="background-color: #0070C0; color: white; padding: 5px; text-align: center; border-radius: 5px;"> P Steel </div>	CA115P	Black + Gold	TiCN+Al ₂ O ₃ +TiN	<ul style="list-style-type: none"> • Combination of a high-hardness + high-temperature, deformation-resistant and special base material and crystallization control technology enables a thick film with both wear resistance and chipping resistance • Application: Highly versatile and wide application range, the first recommendation for steel machining
	CA125P		TiCN+Al ₂ O ₃ +TiN	<ul style="list-style-type: none"> • High toughness + high temperature deformation resistance and special base material combined with crystallization control technology to achieve high toughness with both wear resistance and chipping resistance • Application: High speed and high efficiency steel machining
	CA510	Gold	TiCN+Al ₂ O ₃ +TiN	<ul style="list-style-type: none"> • Special substrate with thermal deformation resistance along with a thick and tough coating layer providing high wear resistance • Application: High speed and high efficiency steel machining
	CA515		TiCN+Al ₂ O ₃ +TiN	<ul style="list-style-type: none"> • Improved wear resistance and stability due to special substrate with heat deformation resistance and hard, tough coating layer • Application: Light interrupted machining of steel
	CA025P		TiCN+Al ₂ O ₃ +TiN	<ul style="list-style-type: none"> • CVD coating with improved wear resistance, adopted base material, excellent chipping resistance and resistance to wear • Application: Continuous to interrupted processing of steel
	CA525		TiCN+Al ₂ O ₃ +TiN	<ul style="list-style-type: none"> • Stable and long tool life machining due to special substrate with heat deformation resistance and tougher coating layer • Application: Interrupted to general machining of steel
	CA530		TiCN+Al ₂ O ₃ +TiN	<ul style="list-style-type: none"> • Special tough substrate and tough coating layer providing high stability and wear resistance • Application: General to heavy interrupted machining (stability oriented)
	CR9025		TiCN+TiN	<ul style="list-style-type: none"> • Improved toughness and stability due to specialized carbide substrate with plastic deformation resistance • Application: Cut-off, grooving and multi-function machining of steel
<div style="background-color: #FFD700; color: black; padding: 5px; text-align: center; border-radius: 5px;"> M Stainless Steel </div>	CA6515		TiCN+Al ₂ O ₃ +TiN	<ul style="list-style-type: none"> • Specialized carbide substrate for machining stainless steel, excellent wear resistance • Application: Continuous machining of stainless steel
	CA6525		TiCN+Al ₂ O ₃ +TiN	<ul style="list-style-type: none"> • Specialized carbide substrate for machining stainless steel, excellent notching resistance and toughness • Application: First choice for general machining of stainless steel, from finishing to roughing, continuous to interruption
<div style="background-color: #C00000; color: white; padding: 5px; text-align: center; border-radius: 5px;"> K Cast Iron </div>	CA410K	Black + Gold	TiCN+Al ₂ O ₃ +TiN	<ul style="list-style-type: none"> • Thick alumina layer with excellent heat and wear resistance close to that of ceramics during high-speed and dry machining • Application: 1st recommendation for continuous, high-speed machining of gray and nodular cast iron
	CA415K		TiCN+Al ₂ O ₃ +TiN	<ul style="list-style-type: none"> • Thick, micro TiCN layer for stable machining with high wear and chipping resistance • Application: 1st recommendation for interrupted to heavily interrupted machining of gray and nodular cast iron
	CA310	Rose Gold	TiCN+Al ₂ O ₃ +Ti base	<ul style="list-style-type: none"> • Grade for high-speed continuous machining and improved tool life through the deposition of a thickened Al₂O₃ coating layer • Application: For finishing to roughing of gray cast iron
	CA315		TiCN+Al ₂ O ₃ +Ti base	<ul style="list-style-type: none"> • Both high abrasion resistance and stability are compatible, high efficiency and long life performance are demonstrated. • Application: Compatible with a wide processing area for cast iron and gray cast iron
	CA320		TiCN+Al ₂ O ₃ +Ti base	<ul style="list-style-type: none"> • Improved stability with CVD layer structure with high adhesion • Application: Heavily interrupted or High-speed machining for Nodular Cast Iron. 1st Recommendation for 70-50-05 cast iron or higher
	CA4505	Blackish Gray	TiCN+Al ₂ O ₃	<ul style="list-style-type: none"> • Stable, longer tool life due to improved bonding strength of coating layers and special treatment of the surface of the top coating layer • Application: For gray cast iron and nodular cast iron at high speed in continuous to light interrupted machining
	CA4515		TiCN+Al ₂ O ₃	<ul style="list-style-type: none"> • Stable, longer tool life due to improved bonding strength of coating layers and special treatment of the surface of the top coating layer • Application: First choice for gray cast iron and nodular cast iron in light to heavy interrupted machining

Next Generation CVD Coated Carbide Grade for Steel

CA115P / CA125P

The new standard for steel machining

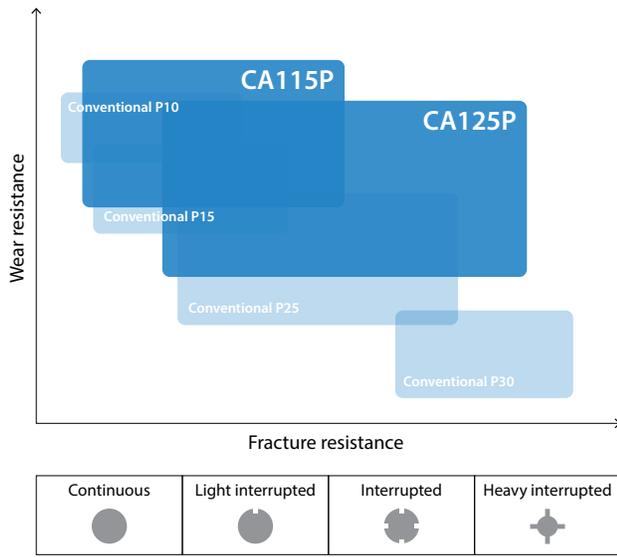
Longer tool life in a wide range of machining environments

Expanded lineup of chipbreakers for steel machining in various applications

INSERT GRADES	A
TURNING INSERTS	B
CBN/PCD INSERTS	C
TURNING HOLDERS	D
SMALL TOOLS	E
BORING	F
GROOVING	G
CUT-OFF	H
THREADING	J
DRILLING	K
MILLING	M
QUICK CHANGE TOOLING	N
SPARE PARTS	P
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1 Extended tool life in a wide variety of applications

Application Map



CA115P

Continuous-light interrupted machining of steel

For high-efficiency machining with wear and chipping resistance

CA125P

Continuous-heavy interrupted steel machining

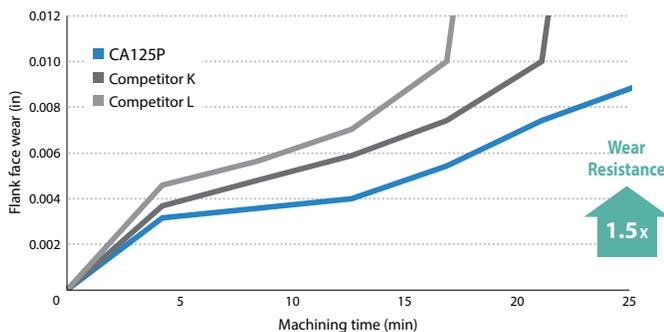
First recommendation for steel machining
High versatility

2 Newly developed proprietary coating and carbide substrate with superior wear and fracture resistance

Optimized coating properties on rake and flank faces provide wear resistance and fracture resistance

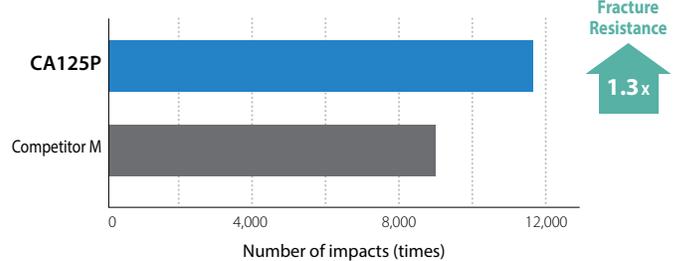
Ultra-uniform alumina film reduces crater wear

Wear resistance comparison (Internal evaluation)



Cutting Conditions : Vc = 980 sfm, D.O.C. = 0.059", f = 0.012 ipr, Wet Workpiece : 4137

Fracture resistance comparison (Internal evaluation)
Interrupted machining n = 3 mean



Cutting Conditions : Vc = 980 sfm, D.O.C. = 0.059", f = 0.014 ipr, Wet Workpiece : 1045 (4 grooves)

3 A large variety of chipbreakers cover a wide range of machining applications and conditions

PVD Coated Carbide (Turning)

PVD Coated Carbide (MEGACOAT / MEGACOAT NANO)

Using a physical vapor deposition coating technology, generally because of the low processing temperature of PVD compared with CVD, PVD coated carbide features less deterioration and improved bending strength. PVD coated carbide grades are coated on a very tough carbide substrate and suitable for turning.



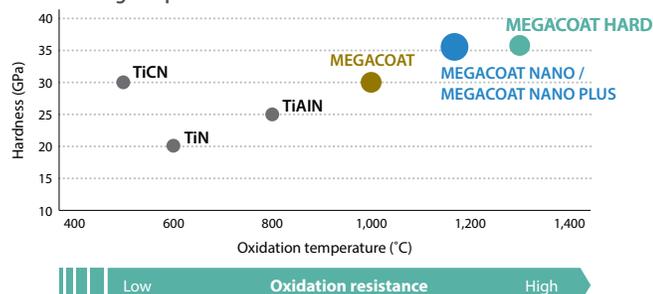
PVD Coated Super Micro-Grain Carbide

- Smooth fine surface of PVD coated carbide provides good surface finish and high precision machining
- Stable machining with excellent toughness

Features of PVD coated carbide

Classification	Grade	Color	Coated Composition	Advantages and Applications
<div style="background-color: #0070C0; color: white; padding: 5px; text-align: center; border-radius: 5px;">P</div> <div style="background-color: #0070C0; color: white; padding: 2px; text-align: center; border-radius: 5px; font-size: 8px;">Steel</div>	PR915 Super Micro-Grain	Bluish Violet	TiAlN	• Application: Stable and reliable high precision machining of steel
	PR930 Super Micro-Grain	Reddish Gray	TiCN	• Application: Low machining speed, precise machining with sharp edge
	PR1025	Reddish Gray	TiCN	• Application: General machining of steel and stainless steel, stable and longer tool life
	PR1115	Purple Red	TiAlN	• Superior oxidation resistance with well balanced wear resistance and toughness • Application: Machining of steel and stainless steel, for grooving, cut-off and threading
	PR1215	Blackish Red	MEGACOAT	• Superior wear and oxidation-resistant MEGACOAT on micro-grain carbide substrate • Application: Superior adhesion resistance and longer tool life for steel and stainless steel machining
	PR1625	Blackish Red	MEGACOAT NANO	• Adopted special nano multi-layer coating "MEGACOAT NANO" excellent in wear resistance and lubricity • Stable processing with steel and stainless steel grooving - Long tool life
	PR1705	Silver	MEGACOAT NANO PLUS	• High-hardness ultrafine particle carbide substrates with special multilayer nano coating MEGACOAT NANO PLUS offer excellent wear resistance and high precision machining • Application: For free-cutting steel turning. Long tool life with excellent wear resistance and high-precision machining
	PR1725	Silver	MEGACOAT NANO PLUS	• New coating technology (MEGACOAT NANO PLUS) with superior wear resistance and adhesion resistance • Application: General grade for steel and stainless steel machining provides stability and longer tool life
	PR2025	Blackish Red	MEGACOAT NANO EX	• Long tool life and high stability with the combination of high content aluminum nano coating layer for excellent wear and fracture resistance • Application: Grooving and cut-off operations in carbon steels and alloy steels
<div style="background-color: #FFD700; color: black; padding: 5px; text-align: center; border-radius: 5px;">M</div> <div style="background-color: #FFD700; color: black; padding: 2px; text-align: center; border-radius: 5px; font-size: 8px;">Stainless Steel</div>	PR1225	Blackish Red	MEGACOAT	• Superior wear and oxidation-resistant MEGACOAT on micro-grain carbide substrate • Application: Light interrupted to interrupted machining of stainless steel
	PR1515	Blackish Red	MEGACOAT NANO	• Improved wear resistance and stability by using fine granite carbide base metal and special nano multi-layer coating "MEGACOAT NANO" • Application: For thread cutting of stainless steel
	PR1535			• Nano thin multi-layer coating (MEGACOAT NANO) improved wear resistance and stability • Application: Medium to roughing of stainless steel and heat-resistant alloys, cut-off of stainless steel
	PR2035	Blackish Red	MEGACOAT NANO EX	• Long tool life and high stability with the combination of high content aluminum nano coating layer with high fracture resistance • Application: Grooving and cut-off operations in stainless steel (
<div style="background-color: #FF0000; color: white; padding: 5px; text-align: center; border-radius: 5px;">K</div> <div style="background-color: #FF0000; color: white; padding: 2px; text-align: center; border-radius: 5px; font-size: 8px;">Cast Iron</div>	PR905	Bluish Violet	TiAlN	• Smooth fine surface PVD coated hard carbide with plastic deformation resistance • Application: Suitable for machining gray and nodular cast iron
	PR2015	Blackish Red	MEGACOAT NANO EX	• Long tool life and high stability with the combination of high content aluminum nano coating layer for high wear resistance • Application: Grooving and cut-off operations in gray and nodular cast iron
<div style="background-color: #8B4513; color: white; padding: 5px; text-align: center; border-radius: 5px;">S</div> <div style="background-color: #8B4513; color: white; padding: 2px; text-align: center; border-radius: 5px; font-size: 8px;">Heat-Resistant Alloys</div>	PR005S	Dark Gray	MEGACOAT HARD	• Superior high temperature properties of special carbide substrate and excellent heat-resistance of MEGACOAT HARD enables high wear resistance • Application: Finish processing of heat-resistant alloys, also for high speed machining
	PR115S	Dark Gray	MEGACOAT TOUGH	• Special carbide substrate with excellent heat resistance and "MEGACOAT TOUGH" coating technology with excellent adhesion enables high wear resistance • Application: Continuous, finishing of heat-resistant alloys
	PR120S			• Special carbide substrate with excellent heat resistance and stability "MEGACOAT TOUGH" coating with excellent adhesion for improved wear resistance • Application: Continuous finishing of stainless steel, continuous to light interrupted machining of heat-resistant alloys

PVD Coating Properties



PVD Coating for Heat-Resistant Alloy

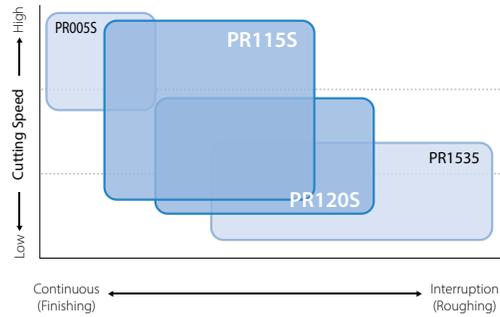
PR115S/PR120S

Unique carbide substrate with excellent heat-resistant properties and new coating technology "MEGACOAT TOUGH" provides longer tool life for heat-resistant alloy machining

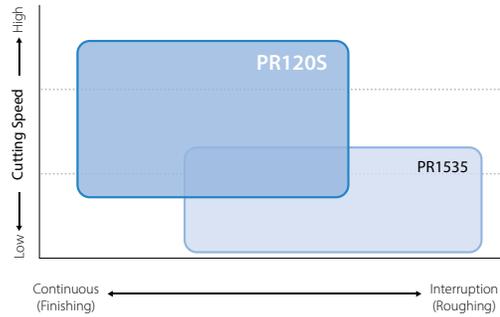
Low cutting force and stable machining with specialized chipbreakers (SQ/SG/SX)

INSERT GRADES	A
TURNING INSERTS	B
CBN/PCD INSERTS	C
TURNING HOLDERS	D
SMALL TOOLS	E
BORING	F
GROOVING	G
CUT-OFF	H
THREADING	J
DRILLING	K
MILLING	M
QUICK CHANGE TOOLING	N
SPARE PARTS	P
TECHNICAL	R
INDEX	T

S Heat-Resistant Alloys Application map

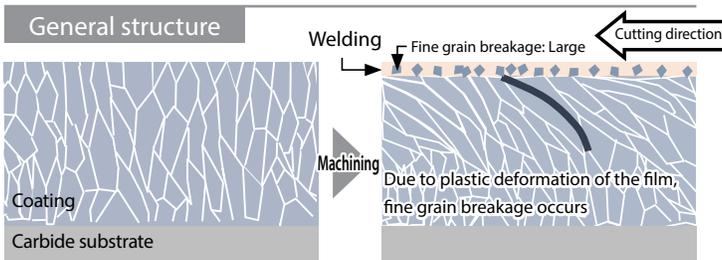


M Stainless Steel Application map



1. Wear Resistant Layer

Thick-film PVD suppresses abrasive wear
Reduces notch damage with ultra-fine grain structure
Damage to the coating during machining of heat-resistant alloys (Image)



PR115S/PR120S

Due to ultrafine structure of the membrane, controls fine grain breakage

Due to grain breakage and dropping of welding, controls wear and tear

2. Middle Layer

TiAlN layer provides superior oxidation resistance
Controls crater wear

Crater wear comparison (Internal evaluation) After machining for 50 min

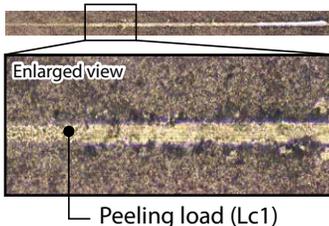


Cutting conditions : Vc = 490 sfm, D.O.C. = 0.039", f = 0.003 ipt, Wet 316L DCGT3251 Type

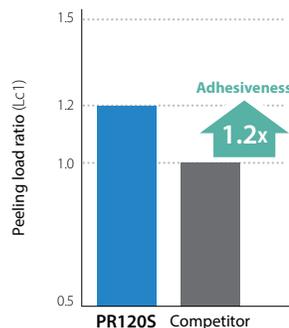
3. Special Adhesive Layer

Adhesion layer at carbide substrate/main layer interface, high affinity and improved adhesion

Scratch test results

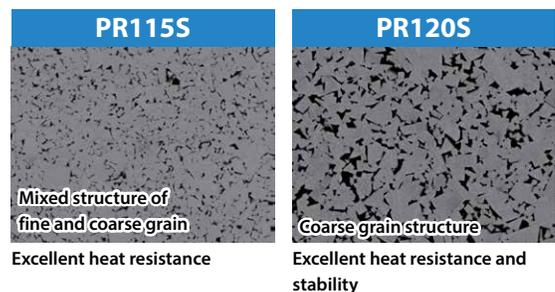


Peeling load (Lc1) (Internal evaluation)



4. Unique Carbide Substrate

Carbide substrate for heat-resistant alloy machining
Excellent thermal properties with high thermal conductivity



PVD / CVD Coated Carbide (Milling / Drilling)

PVD Coated Carbide (MEGACOAT / MEGACOAT NANO)

KYOCERA's PVD coated carbides for milling and drilling utilize very tough carbide substrates. The low processing temperature, compared with CVD, leads to improved bending strength, less deterioration of the coating and superior tool life with stable machining.



CVD Coated Carbide

CVD coated carbide grades provide stable, efficient machining at high speeds or for heavy interrupted applications. Ti-base (TiN, TiCN) coating with superior hardness and wear resistance or ceramic-base (Al₂O₃) coating with high-thermal stability is applied on a tough carbide substrate. Superior fracture resistance and wear resistance.

Features of PVD / CVD Coated Carbide for Milling and Drilling

Classification	Grade	Color	Coated Composition	Advantages and Applications
 Steel	PR1230	Blackish Red	MEGACOAT	<ul style="list-style-type: none"> Superior wear and oxidation-resistant MEGACOAT on a special tough carbide substrate Application: Stable and high feed milling and drilling of steel
	PR1525	Blackish Red	MEGACOAT NANO	<ul style="list-style-type: none"> MEGACOAT NANO Nano thin multi-layer coating performs superior wear resistance and high oxidation resistance Application: Stable and longer tool life for milling of steel and stainless steel
	PR1825	Blackish Gray	MEGACOAT NANO EX	<ul style="list-style-type: none"> Special nano layer + multi-layer lamination technology for excellent abrasion resistant, oxidation resistant, and fracture resistance Application: Next-generation wear resistant grade for steel milling
	CA520D	Gold	TiCN+Al ₂ O ₃ +TiN (CVD)	<ul style="list-style-type: none"> Improved abrasion resistance and fracture resistance by improving high toughness Combination of high toughness substrate, toughened coating and enhanced interface allow both wear and fracture resistance Application: Drilling of steel - first recommended grade (for high speed machining)
 Stainless Steel	PR1225	Blackish Red	MEGACOAT	<ul style="list-style-type: none"> Superior wear and oxidation-resistant MEGACOAT on micro-grain carbide substrate Application: General machining and high feed milling and drilling of steel and stainless steel
	PR1835	Blackish Gray	MEGACOAT NANO EX	<ul style="list-style-type: none"> Special nano layer + multi-layer lamination technology for excellent abrasion resistant, oxidation resistant, and fracture resistance Application: Next-generation grade for stainless steel and stable steel milling
 Cast Iron	PR1210	Blackish Red	MEGACOAT	<ul style="list-style-type: none"> Superior wear and oxidation-resistant MEGACOAT coated on special carbide substrate Application: Highly efficient stable milling and drilling of gray and nodular cast iron
	PR1510	Blackish Red	MEGACOAT NANO	<ul style="list-style-type: none"> MEGACOAT NANO Nano thin multi-layer coating performs superior wear resistance and high oxidation resistance Application: Highly fracture resistance and wear resistance for gray and nodular cast iron
	PR1810	Blackish Gray	MEGACOAT NANO EX	<ul style="list-style-type: none"> Special nano layer + multi-layer lamination technology for excellent abrasion resistant, oxidation resistant, and fracture resistance Application: Next-generation grade for cast iron milling
	CA415D	Gold	TiCN+Al ₂ O ₃ +TiN	<ul style="list-style-type: none"> Special carbide substrate for cast iron, toughened coating and enhanced interface allow both wear and fracture resistance Application: Drilling of cast iron - 1st recommended material for high speed processing
	CA420M		TiCN+Al ₂ O ₃ +TiN (CVD)	<ul style="list-style-type: none"> Kyocera's unique crystal control technology and advanced layer adhesion CVD coating with superior wear resistance and toughness Application: Milling of gray and nodular cast iron
 Heat-Resistant Alloys Titanium Alloys	PR1535	Blackish Red	MEGACOAT NANO	<ul style="list-style-type: none"> Nano thin multi-layer coating (MEGACOAT NANO) improved wear resistance and stability Application: For milling of Ni-base heat-resistant alloys, titanium alloys and precipitation hardened stainless steel
	CA6535	Gold	TiCN+Al ₂ O ₃ +TiN (CVD)	<ul style="list-style-type: none"> High heat-resistance and wear resistance with CVD coating Application: For milling of Ni-base heat-resistant alloys and martensitic stainless steel
 Hard Material	PR0155	Blackish Gray	MEGACOAT HARD	<ul style="list-style-type: none"> Substrate with improved thermal properties reduces sudden fracture and decrease edge wear with MEGACOAT HARD coating technology to deliver high hardness and superior wear resistance Excellent wear and chipping resistance maintains stable machining for high hard materials Application: Difficult-to-cut materials and high hardness (less than 60HRC) machining

Next-Generation PVD Coating for Milling

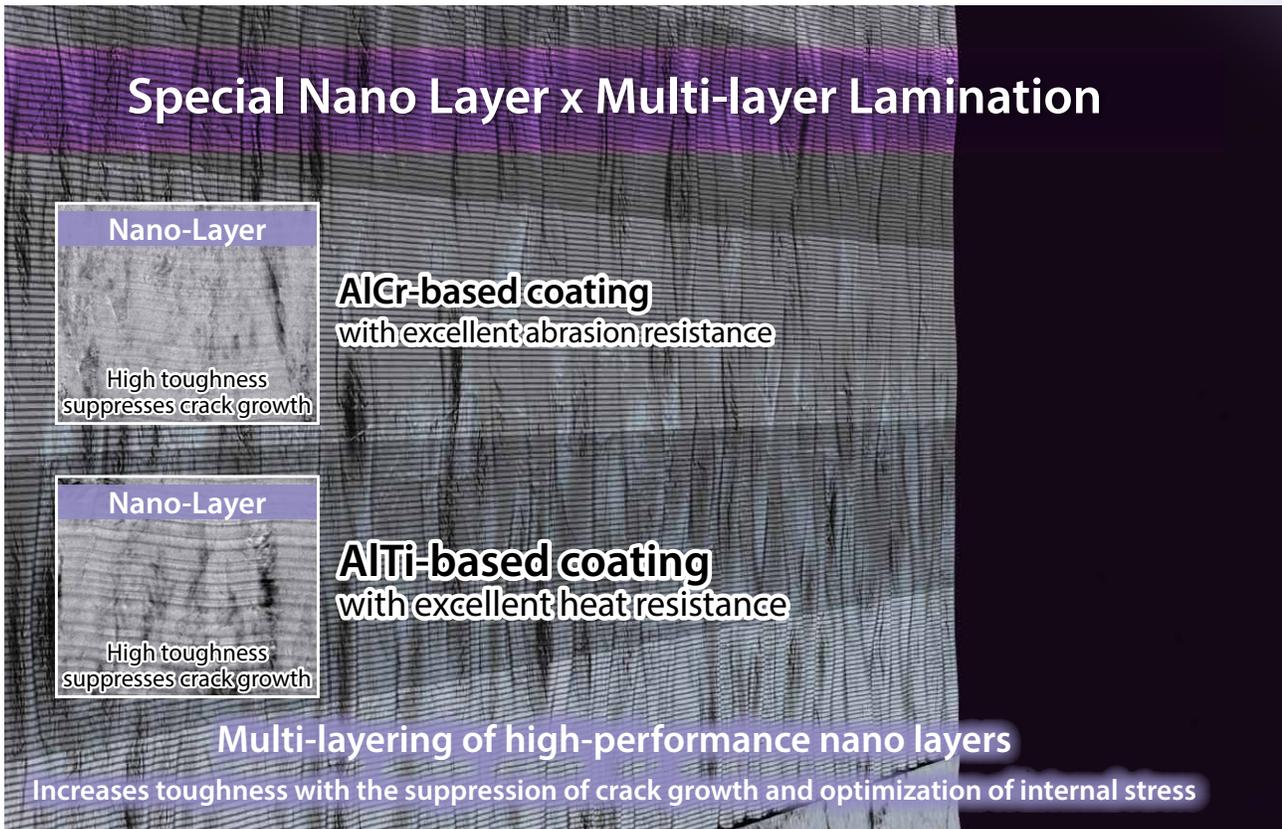
PR18 Series

Double lamination technology with special nano layer MEGACOAT NANO EX provides longer tool life
 Features 3 grades: PR1825/PR1835/PR1810 Available for various machining environments

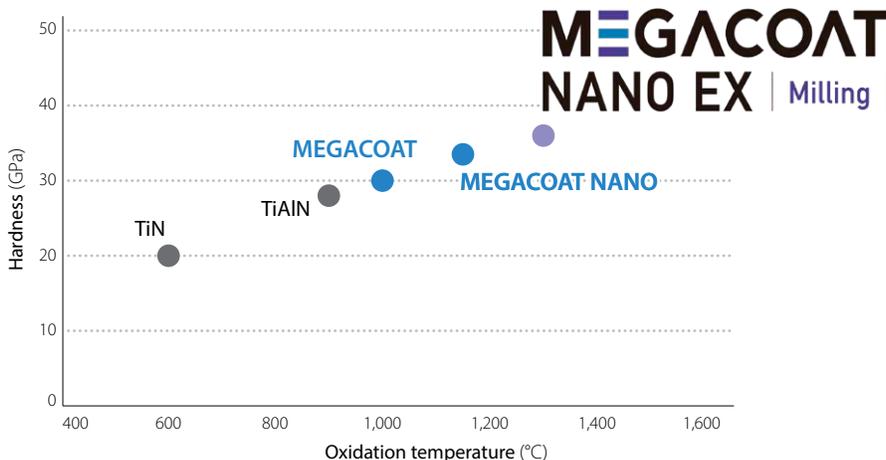


Double Lamination Technology Maintains Longer Tool Life

Multi-layer structure with two unique nano layers
 Superior abrasion resistance and fracture resistance



Coating Characteristics (Internal Evaluation)



INSERT GRADES	A
TURNING INSERTS	B
CBN/PCD INSERTS	C
TURNING HOLDERS	D
SMALL TOOLS	E
BORING	F
GROOVING	G
CUT-OFF	H
THREADING	J
DRILLING	K
MILLING	M
QUICK CHANGE TOOLING	N
SPARE PARTS	P
TECHNICAL	R
INDEX	T

Carbide

Carbide

Uncoated tungsten carbide grade is used in a variety of applications due to its superior mechanical properties.

Features

- KW10: Suitable for machining cast iron with high hardness and toughness
- GW05, GW15, GW25: Suitable for machining cast iron, non-ferrous metals and non-metals
- SW series: Suitable for machining of titanium and titanium alloy



Features of carbide

Classification	Grade	Color	Main Component	Advantages and Applications
	KW10	Gray	WC+Co	<ul style="list-style-type: none"> • ISO identification symbol K carbide (K10 class) • Application: Machining cast iron, non-ferrous materials and non-metals
	GW05			<ul style="list-style-type: none"> • ISO identification symbol K carbide (K05 class) • Application: Excellent wear resistance for machining of cast iron and non-ferrous metal
	GW15			<ul style="list-style-type: none"> • ISO identification symbol K carbide (K10 class), tough micro-grain carbide • Application: Machining cast iron, non-ferrous materials and non-metals
	GW25			<ul style="list-style-type: none"> • ISO identification symbol K carbide (K30 class) • Application: Milling operations of aluminum
	SW05			<ul style="list-style-type: none"> • ISO identification symbol K carbide (K05 class) • Application: Titanium alloys for continuous machining and finishing
	SW10 (Made to Order)			<ul style="list-style-type: none"> • ISO identification symbol K carbide (K10 class) • Application: Titanium alloys for continuous and light interrupted machining
	SW25 (Made to Order)			<ul style="list-style-type: none"> • ISO identification symbol K carbide (K25 class) • Application: Titanium alloys for interrupted and light interrupted machining

DLC Coated Carbide

DLC Coated Carbide

DLC (Diamond-Like Carbon) Coated carbide is coated on carbide substrate with a thin layer of amorphous carbon.

Features

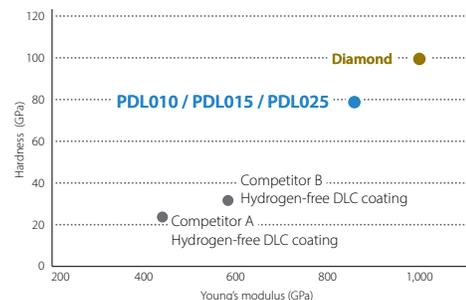
- High Hardness with Kyocera's proprietary hydrogen-free DLC coating
- Excellent surface finish achieved through anti-adhesion performance



Features of DLC coated carbide

Classification	Grade	Color	Main Component	Advantages and Applications
	PDL010	Iridescent	C	<ul style="list-style-type: none"> • DLC coating of original technology has high hardness, excellent adhesion resistance and film peeling resistance • Application: Excellent surface finish and long tool life machining of aluminum alloys
	PDL015			<ul style="list-style-type: none"> • DLC coating of original technology has high hardness, excellent adhesion resistance and film peeling resistance • Application: Grooving of aluminum alloy
	PDL025			<ul style="list-style-type: none"> • DLC coating of original technology has high hardness, excellent adhesion resistance and film peeling resistance • Application: General purpose long tool life and stable machining of aluminum alloys

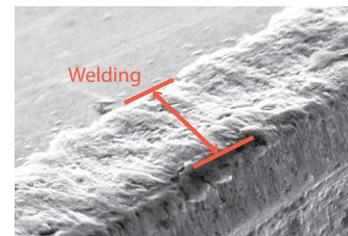
Coating Properties



Welding Resistance Comparison



PDL025



Competitor A

Cutting Conditions: Vc = 2,630 sfm, fz = 0.004 ipt, D.O.C. x ae = 0.118" x 0.197", Dry
Cutter Dia. 01.000" Workpiece: 5052 Cutting Length: 187ft

Ceramic

Ceramic

Ceramics inserts are capable of machining at high speeds. Recommended for hard turning of hardened steel or rough to finish turning of cast iron and heat-resistant alloys.



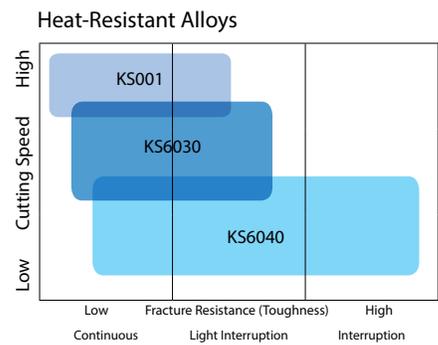
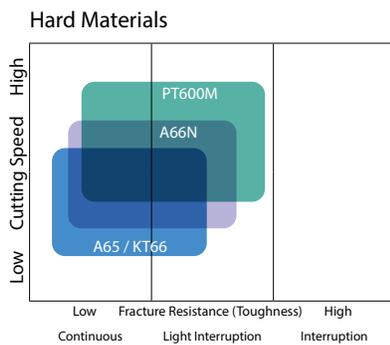
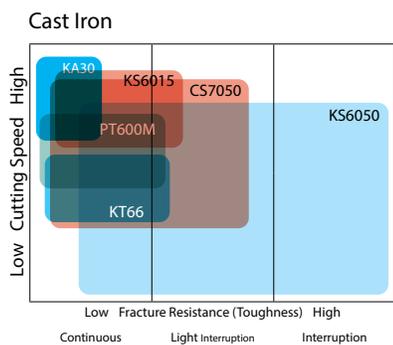
Features

- Excellent wear resistance enables high speeds machining of cast iron
- Ceramic maintains good surface finishes due to the low affinity to workpiece materials
- Silicon nitride ceramic can machine cast iron with coolant due to its superior thermal shock resistance

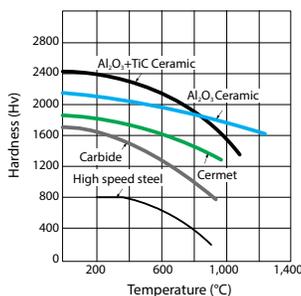
Features of Ceramic

Classification	Grade	Color	Main Component (Coating Composition)	Coating Layer	Substrate Hardness (GPa)	Fracture Toughness (MPa·m ^{1/2})	Transverse Strength (MPa)	Advantages and Applications
K Cast Iron	KA30	White	Al ₂ O ₃	-	17.5	4.0	750	• Aluminum oxide ceramic (Al ₂ O ₃) • Application: Finishing of cast iron at high cutting speeds without coolant
	KS6015	Gray	Si ₃ N ₄		15.2	7.8	1,000	• Silicon nitride ceramic with superior wear resistance reduces heat at the cutting edge • Application: Roughing and high speed machining of cast iron (with or without coolant)
	KS6050	Gray	Si ₃ N ₄	Thin Coating	15.6	8.0	1,200	• Silicon nitride ceramic (Si ₃ N ₄) • Application: Roughing and interrupted machining of cast iron. Focusing on stability (with or without coolant)
	CS7050	Grayish White	Si ₃ N ₄ (Special Al ₂ O ₃ COAT)					• Silicon nitride ceramic (Si ₃ N ₄) + CVD Coating (Special Al ₂ O ₃ COAT) • Application: Finishing and continuous machining, and high speed and high efficient machining (with or without coolant)
K Cast Iron H Hard Material	KT66	Black	Al ₂ O ₃ +TiC	-	20.1	4.1	980	• Aluminum oxide and titanium carbide ceramic (Al ₂ O ₃ +TiC) • Application: Semi-roughing to finishing of cast iron, hard materials and hardened roll materials
	A65	Black	Al ₂ O ₃ +TiC					• Aluminum oxide and titanium carbide ceramic (Al ₂ O ₃ +TiC) • Application: Semi-roughing to finishing of cast iron and hard materials
	A66N	Gold	Al ₂ O ₃ +TiC (TiN COAT)	Thin Coating	20.1	4.1	980	• TiN PVD coated aluminum oxide and titanium carbide ceramic (TiN coated Al ₂ O ₃ +TiN) • Application: Semi-roughing to finishing of hard materials
	PT600M	Blackish Red	Al ₂ O ₃ +TiC (MEGACOAT)					• Heat-resistant MEGACOAT on aluminum oxide and titanium carbide ceramic (MEGACOAT Al ₂ O ₃ +TiC) • Application: Semi-roughing to finishing of cast iron, hard materials and hardened roll materials
S Heat-Resistant Alloys	KS001	Gray	Al ₂ O ₃ +SiC	-	20.6	7.0	-	• Silicon-carbide ceramic inserts with ultra-strong whiskers for excellent wear and fracture resistance • Application: High-speed machining of HRSA, roughing-finishing with continuous to light interruption
	KS6030	Gray	SiAlON		15.2	6.0	600	• SiAlON Ceramic with superior wear resistance and high resistance against boundary wear • Application: Finishing to medium machining of heat-resistant alloys
	KS6040	Brown			16.7	7.0	900	• High stability SiAlON ceramic with wear resistance and fracture resistance • Application: Roughing of heat-resistant alloys

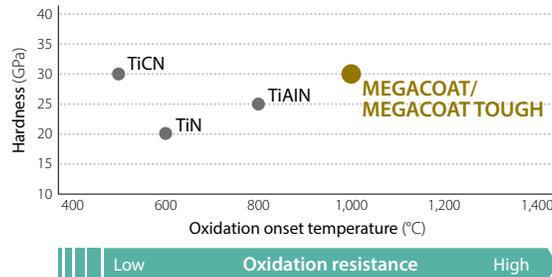
Application Maps



High-Temperature Hardness



PVD Coating Properties



CBN (Cubic Boron Nitride)

CBN

CBN (Cubic Boron Nitride) is second only to diamond in hardness, and is a synthetically produced material with high thermal conductivity.

Features

- Superior wear resistance when machining hard materials
- Suitable for high speed machining of hard materials, sintered steel and cast iron
- High thermal conductivity provides stable machining



Features of CBN

Classification	Grade	Color	Ave. Grain Size (µm)	Substrate Hardness (GPa)	Transverse Strength (MPa)	Advantages and Applications
<div style="border: 1px solid black; padding: 5px; text-align: center;"> H Hard Material </div>	KBN510	Black	2	28	1,000	<ul style="list-style-type: none"> • Excellent wear resistance and crack resistance, uncoated CBN • Application: Finishing and continuous machining of hardened die steel
	KBN525		1 and under	25	1,250	<ul style="list-style-type: none"> • Application: General purpose for hardened steel
	KBN05M (MEGACOAT)	Blackish Red	0.5-1.5	27	1,000	<ul style="list-style-type: none"> • Heat-resistant MEGACOAT on highly heat-resistant CBN substrate • Application: High speed finishing of hardened steel
	KBN10M (MEGACOAT)		2	28		<ul style="list-style-type: none"> • Application: High speed finishing of hardened die steel
	KBN25M (MEGACOAT)		1 and under	25		<ul style="list-style-type: none"> • Heat-resistant MEGACOAT on micro-grain CBN with heat-resistant binder phase • Application: Stable machining of hardened steel at high cutting speeds
	KBN010 (MEGACOAT TOUGH)	Gray	0.5-1.5	27	1,000	<ul style="list-style-type: none"> • Mixed structure of micro grain CBN and coarse grain CBN for excellent heat resistance and surface quality • Application: Continuous finishing of hardened steel
	KBN015 (MEGACOAT TOUGH)	Grayish Red	3	27-29	1,150	<ul style="list-style-type: none"> • High toughness CBN maintains heat resistance and fracture resistance • Application: Continuous to interrupted machining of hardened steel
KBN020 (MEGACOAT TOUGH)	Gray	3	31-32	1,300	<ul style="list-style-type: none"> • High content CBN with high purity TiN binder and high fracture resistance • Application: Continuous to heavy interrupted machining of hardened steel 	
Sintered Steel	KBN570	Black	2-4	34	1,350	<ul style="list-style-type: none"> • High content CBN • Application: Processing of Sintered steel (burr suppression)
	KBN70M (MEGACOAT)	Blackish Red				<ul style="list-style-type: none"> • Heat-resistant MEGACOAT on CBN rich substrate • Application: Stable machining of sintered steel (ferrous Sintered alloys)
<div style="border: 1px solid black; padding: 5px; text-align: center;"> K Cast Iron </div>	KBN475	Black	2	39	1,400	<ul style="list-style-type: none"> • Excellent wear resistance due to high CBN content and special binder • Application: High speed machining of gray cast iron
	KBN60M (MEGACOAT)	Blackish Red	0.5-6	33	1,250	<ul style="list-style-type: none"> • Heat-resistant MEGACOAT on CBN rich substrate with hard binder phase • Application: High speed finishing of gray cast iron
	KBN900 (TiN COAT)	Gold	9	31	630	<ul style="list-style-type: none"> • TiN coated solid CBN • Application: Heavy duty, interrupted machining and finishing of hardened steel, hardened roll steel and cast iron

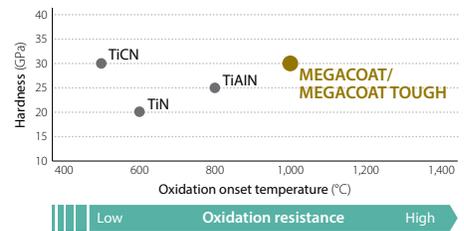
For KBN35M, see page A18.

MEGACOAT TOUGH CBN

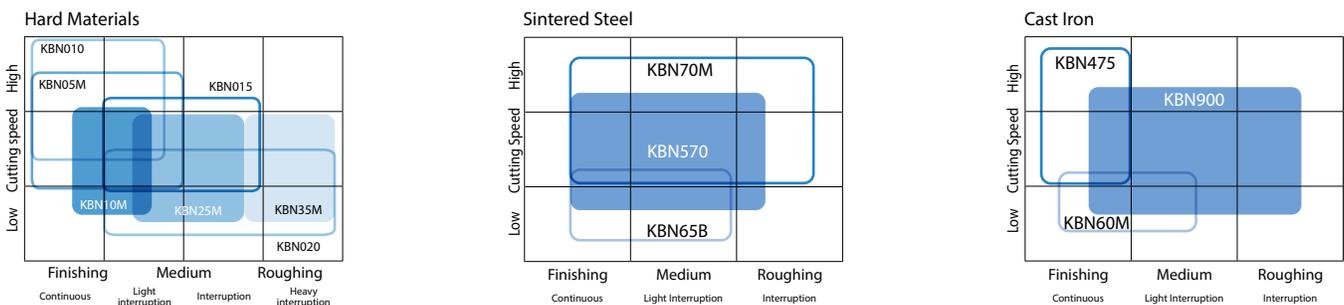
An adhesion layer is laminated between the high wear resistance layer and the CBN. This reduces layer peeling to achieve long tool life and stable machining.



PVD Coating Properties



Application Map



PCD (Polycrystalline Diamond)

PCD

PCD is a synthetic diamond sintered under high temperatures and pressures.

Features

- Applicable for milling of non-ferrous metals and non-metals
- Reduced edge build-up allows for high precision machining
- Diversified applications for machining of non-ferrous metals and non-metals
- Finished surface will be rainbow colored (A mirror-like finished surface will not be obtained)



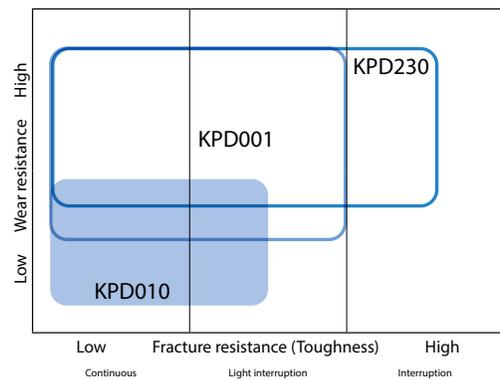
Features of PCD

Classification	Grade	Ave. Grain Size (µm)	Advantages and Applications
	KPD001	0.5	<ul style="list-style-type: none"> • Super Micro-Grain PCD features cutting edge strength, wear resistance, fracture resistance, good edge-sharpening performance and longer, stable tool life • Application: High speed machining of aluminum alloys, brass, non-ferrous metals and non-metals including plastics, and carbide.
	KPD010	10	<ul style="list-style-type: none"> • Good wear resistance and toughness, good grindability • Application: High speed machining of aluminum alloys, brass, non-ferrous metals and non-metals including plastics, and carbide.
	KPD230	2-30	<ul style="list-style-type: none"> • Superior abrasive wear resistance and toughness due to high density PCD with mixed rough and fine grains • Application: High speed machining of aluminum alloys, brass, non-ferrous metals and non-metals including plastics.
	KPD250 (Made to Order)	25	<ul style="list-style-type: none"> • Superior wear resistance due to rough grain PCD (25µm) • Application: High speed machining of high silicon aluminum alloy and machining of carbide

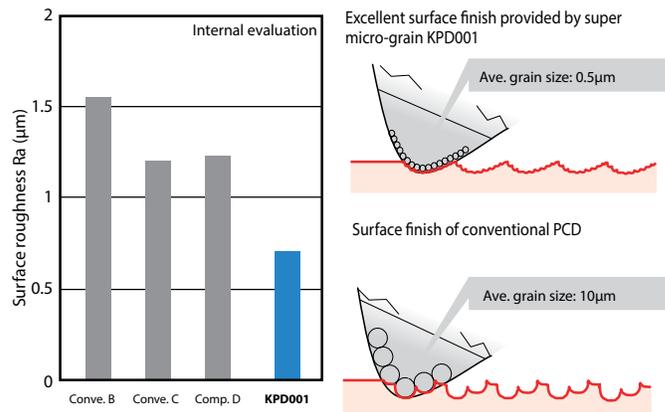
Applications

Workpiece Material		Non-Ferrous Metals				Difficult-to-Cut Materials			
Cutting Range		Finishing ← → Roughing				Finishing ← → Roughing			
Classification		N01	N10	N20	N30	S01	S10	S20	S30
Turning Milling	PCD	KPD001				KPD001			
		KPD010				KPD010			
		KPD230							
		KPD250							

Application Map



Surface finish roughness comparison of aluminum machining



(Grain size affects surface finish quality)

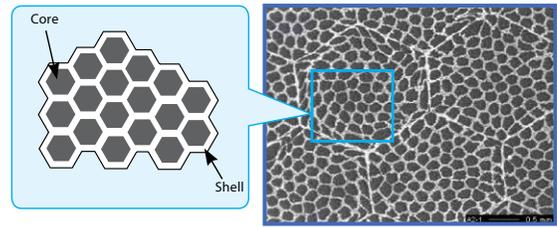
Honeycomb Structure CBN

Honeycomb Structure CBN

Honeycomb structure is the high structural controlled composite material consisting of a hard and superior wear-resistant core (gray portion) and a tough shell (white portion).

Features

- Honeycomb structure CBN combine a hard, wear-resistant core and a tough shell into one insert.
- The tough shell stops cracks that form in the core.
- CBN is suitable for interrupted machining of exceptionally hard material

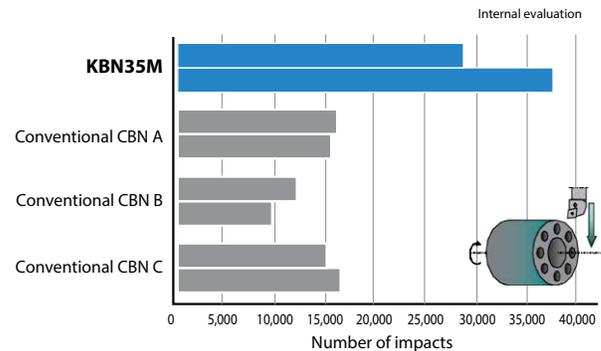
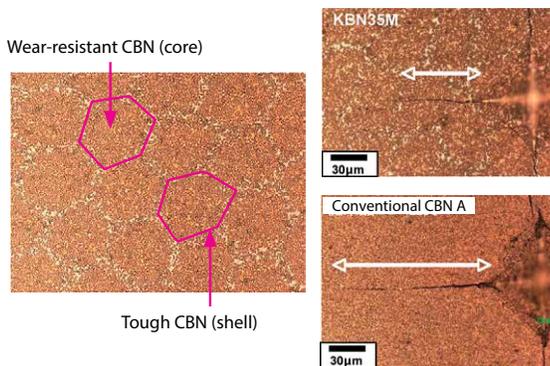


Features of Honeycomb Structure CBN

Classification	Grade	Color	Main Component	Advantages and Applications
	KBN35M (MEGACOAT)	Blackish Red	CBN	<ul style="list-style-type: none"> • Honeycomb structure CBN composite material consisting of wear resistant CBN (core) and tough CBN (shell) with heat-resistant MEGACOAT • Application: Stable machining of hardened steel with interrupted machining

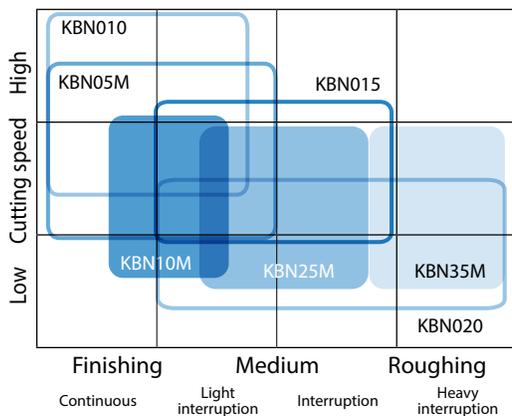
KBN35M (MEGACOAT honeycomb structure CBN)

Tough CBN (shell) prevents crack growth



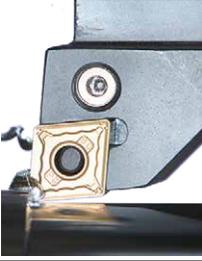
Application Map

Hard Materials



Insert Material Selection Table

Highlighted items are recommended choices.

Applications	Cutting Range	Steel	Stainless Steel	Gray Cast Iron	Nodular Cast Iron	Non-ferrous Metals	Heat-Resistant Alloys	Titanium Alloys	Hard Materials	Sintered Steel	
Turning 	Finishing ↑ ↓ Roughing	TN610		KBN475					KT66		
		CCX	TN610	KBN60M					A66N	TN610	
		TN620	TN620	KA30		TN60		KS6040		PT600M	TN60
		TN60	TN60							KBN010	
		PV710	PV720	PV700S	PV700S	KPD001	KW10			KBN05M	
		PV720	CA6515	CA550S	CA550S	KPD010	CA6515	KPD001		KBN015	KBN570
		PV730	CA6525	CA410K	CA410K	PDL010	CA6525	KPD010		KBN020	KBN70M
		CA510	PR1535	CA415K	CA415K		PR005S	SW05		KBN25M	
		CA115P					PR115S	SW10		KBN35M	
		CA125P					PR120S	SW25		KBN900	
		CA530				PR1535					
Small Tools 	Finishing ↑ ↓ Roughing	TN610	TN610								
		TN620	TN620								
		PV710	PV720							KBN010	TN610
		PV720	PR1725	CA410K	CA410K	KPD001	CA6515	KPD001		KBN05M	TN60
		PR1705	PR930	CA415K	CA415K	KPD010	PR1125	KPD010		KBN015	
		PR1725	PR1025	KW10	KW10	PDL010	PR1225	KW10		KBN020	KBN570
		PR930	PR1225			PDL025	PR1535	PR1535		KBN25M	KBN70M
		PR1025	PR1535			GW05					
		PR1025				KW10					
		PR1535									
Boring 	Large ↑ ↓ Small	TN610									
		TN620									
		PV710	TN60								
		PV720	CA6515	KBN475						PT600M	
		PV730	CA6525	KBN60M						KBN010	TN610
		CA115P	PR1725	PV700S	PV700S	KPD001	CA6515	KPD001		KBN05M	TN60
		CA125P	PR1025	CA410K	CA410K	KPD010	CA6525	KPD010		KBN015	
		CA530	PR1225	CA415K	CA415K	PDL010	PR1125	KW10		KBN020	KBN570
		PR1705	PR930	KW10	KW10	PDL025	PR1225	SW05		KBN25M	KBN70M
		PR1725	PR1535			GW05	PR1535	PR1535			
				KW10							
Cut-Off 	Large ↑ ↓ Small	CR9025	CR9025								
		PR930	PR930								
		PR915	PR915								
		PR1215	PR1215	KW10	KW10	PDL025	KW10	KW10			
		PR1225	PR1225	PR1215	PR1215	KW10	PR1225				
		PR1535	PR1535				PR660				
Cut-Off  (Small Diameter)	Depends on the workpiece material	PR1025	PR1025	KW10	KW10	PDL025	KW10	KW10			
		PR2025	PR1535	PR2015	PR2015	KW10	PR1025				
		PR1535	PR2035				PR1225				
Grooving 	Glossy Finish ↑ ↓ Stable	TC40	TC40								
		TN620	TN620								
		TN90	TN90	KW10	KW10	KPD001	PR915	KPD001	KBN510	TC40	
		PV7040	PV7040	GW15	GW15	PDL025	KW10	KW10	KBN525		
		PR930	PR930	PR905	PR905	KW10	PR1215		PT600M	KBN570	
		PR1115	PR1115	PR2015	PR2015	GW15	PR1225				
		PR1215	PR1215	PR1215	PR1215		PR1535	PR1535			
		PR1225	PR1225								
PR2025	PR2025										
Threading 	Glossy Finish ↑ ↓ Stable	TC60	TC60	KW10	KW10	KW10	KW10	KW10		PR1515	
		PR1215	PR1515	GW15	GW15	GW15	GW15	GW15		PR1115	
		PR1115	PR1115								
		PR930	PR930								
Drilling 	Wear Resistance ↑ ↓ Toughness	CA520D		CA415D							
		PR1225	PR1225	PR1210	PR1210	KW10	PR1225	KW10			
		PR1230	PR1535	KW10	KW10	GW15	KW10	GW15			
		PR1535									
Milling 	Finishing ↑ ↓ Roughing	TN100M	CA6535				KPD230	CA6535	KPD230		
		TN620M	PR1525	PR1810	PR1810	KPD001	PR1225	KPD001		PR015S	
		PV60M	PR1835	PR1510	PR1510	KPD010	PR1535	KW10			
		PR1825	PR1535	KW10	KW10	PDL025		PR905			
		PR1835				KW10			PR1210		
						GW25			PR1535		

INSERT GRADES	A
TURNING INSERTS	B
CBN/PCD INSERTS	C
TURNING HOLDERS	D
SMALL TOOLS	E
BORING	F
GROOVING	G
CUT-OFF	H
THREADING	J
DRILLING	K
MILLING	M
QUICK CHANGE TOOLING	N
SPARE PARTS	P
TECHNICAL	R
INDEX	T

Grade Properties

Cermet

Grade	Color	Main Component	Coating Layer	Relative Density (RD)	Hardness of Substrate		Fracture Toughness (MPa·m ^{1/2})	Transverse Strength (MPa)
					(HV)	(GPa)		
TN610	Gray	TiCN	-	6.6	1,750	17.2	6.0	2,100
TN620				6.9	1,550	15.2	9.0	2,500
TN620M				6.9	1,550	15.2	9.0	2,500
TN6020				6.4	1,500	14.7	10.0	2,500
TN60		TiCN+NbC		6.6	1,600	15.7	9.0	1,760
TN90		6.4		1,450	14.2	10.0	1,960	
TN100M		6.7		1,520	14.9	10.5	1,860	
TC40		TiC+TiN		6.0	1,650	16.2	9.0	1,570
TC60		NbC		8.1	1,500	14.7	10.5	1,670

CVD Coated Cermet

Grade	Color	Main Component	Coating Layer	Relative Density (RD)	Hardness of Substrate		Fracture Toughness (MPa·m ^{1/2})	Transverse Strength (MPa)
					(HV)	(GPa)		
CXX	Gold	TiCN+Al ₂ O ₃ +TiN	Thin Coating	7.0	1,500	14.7	10.0	2,600

PVD Coated Cermet

Grade	Color	Main Component	Coating Layer	Relative Density (RD)	Hardness of Substrate		Fracture Toughness (MPa·m ^{1/2})	Transverse Strength (MPa)
					(HV)	(GPa)		
PV710	Gold	MEGACOAT NANO	Thin Coating	6.6	1,750	17.2	6.0	2,100
PV720				6.9	1,550	15.2	9.0	2,500
PV730				7.0	1,550	14.2	10.0	2,500
PV7005	Blackish Red	MEGACOAT		6.0	1,650	16.2	8.5	1,470
PV7040				6.0	1,650	16.2	9.0	1,570
PV60M	Gold	MEGACOAT NANO		6.6	1,600	15.7	9.0	1,760

CVD Coated Carbide

Grade	Color	Main Component	Coating Layer	Relative Density (RD)	Hardness of Substrate		Fracture Toughness (MPa·m ^{1/2})	Transverse Strength (MPa)	
					(HV)	(GPa)			
CA025P	Gold	TiCN+Al ₂ O ₃ +TiN	Thick Coating	14.2	1,400	13.7	13.5	2,800	
CA115P	Gold + Black	TiCN+Al ₂ O ₃ +TiN		13.9	1,440	14.1	13.0	2,250	
CA125P				13.8	1,400	13.7	14.5	2,300	
CA310				Rose Gold	TiCN+Al ₂ O ₃ +Ti Base	15	1,570	15.4	12.0
CA315	15	1,570				15.4	12.0	2,780	
CA320	15	1,570				15.4	12.0	2,780	
CA410K	Gold + Black	TiCN+Al ₂ O ₃ +TiN		15	1,570	15.4	12.0	2,780	
CA415K				15	1,570	15.4	12.0	2,780	
CA415D	Gold	TiCN+Al ₂ O ₃ +TiN		15	1,570	15.4	12.0	2,780	
CA420M				14.5	1,600	15.8	13.0	3,400	
CA4505	Blackish Gray	TiCN+Al ₂ O ₃		15.0	1,790	17.5	9.5	2,350	
CA4515				15.0	1,570	15.4	12.0	2,780	
CA510				Gold	TiCN+Al ₂ O ₃ +TiN	14.5	1,470	14.4	11.5
CA515	14.4	1,440				14.1	12.5	2,650	
CA520D	14.7	1,370				13.4	16.0	3,100	
CA525	14.2	1,360	13.3			13.5	2,750		
CA530	13.9	1,340	13.1			14.5	2,850		
CA6515	Thin Coating	TiCN+Al ₂ O ₃ +TiN	14.7			1,530	15.0	12.0	2,780
CA6525			14.7			1,370	13.4	16.0	3,100
CA6535			14.3			1,320	12.9	16.0	3,700
CR9025			Thick Coating			TiCN+TiN	14.5	1,400	13.7

Grade Properties

PVD Coated Carbide

Grade	Color	Main Component	Coating Layer	Relative Density (RD)	Hardness of Substrate		Fracture Toughness (MPa·m ^{1/2})	Transverse Strength (MPa)
					(HV)	(GPa)		
PR005S	Gray Black	MEGACOAT HARD	Thin Coating	15.0	1,750	17.2	8.0	2,000
PR015S				14.9	1,680	16.5	9.0	2,400
PR115S		MEGACOAT TOUGH		14.9	1,680	16.5	9.0	2,400
PR120S				14.6	1,500	14.7	14.0	2,700
PR905	Bluish violet	TiAlN		14.8	1,720	16.8	9.0	2,450
PR915				14.1	1,700	16.7	11.0	4,140
PR930	Reddish Gray	TiCN		14.1	1,700	16.7	11.0	4,140
PR102S				14.5	1,600	15.8	13.0	3,400
PR111S	Purple Red	TiAlN		14.7	1,700	16.7	11.0	3,000
PR1210	Blackish Red	MEGACOAT		14.8	1,720	16.8	9.0	2,450
PR1215				14.7	1,700	16.7	11.0	3,000
PR122S				14.5	1,600	15.8	13.0	3,400
PR1230				13.7	1,450	14.2	13.0	2,250
PR1510	Redish Gray	MEGACOAT NANO		14.8	1,720	16.8	9.0	2,450
PR1515				14.7	1,700	16.7	11.0	3,000
PR152S				14.5	1,600	15.8	13.0	3,400
PR153S				14.3	1,320	12.9	16.0	3,700
PR162S	Silver	MEGACOAT NANO PLUS		14.5	1,600	15.8	13.0	3,400
PR170S				14.9	1,800	17.6	10.0	3,300
PR172S				14.5	1,600	15.8	13.0	3,400
PR1810			Redish Gray	MEGACOAT NANO EX	14.9	1,680	16.5	9.0
PR182S	14.5	1,600			15.8	13.0	3,400	
PR183S	14.3	1,320			12.9	16.0	3,700	
PR201S	Blackish Red	14.7			1,700	16.7	11.0	3,000
PR202S		14.5	1,600	15.8	13.0	3,400		
PR203S		14.3	1,320	12.9	16.0	3,700		

Carbide

Grade	Color	Main Component	Coating Layer	Relative Density (RD)	Hardness of Substrate		Fracture Toughness (MPa·m ^{1/2})	Transverse Strength (MPa)
					(HV)	(GPa)		
KW10	Gray	WC+Co	-	15.0	1,650	16.2	10.0	1,470
GW05				14.9	1,800	17.6	10.0	3,300
GW15				14.7	1,700	16.7	11.0	3,000
GW2S				14.5	1,600	15.8	13.0	3,400
SW05				15.0	1,790	17.5	9.5	2,350
SW10				14.8	1,720	16.8	9.0	2,450
SW2S				14.7	1,370	13.4	16.0	3,100

DLC Coated Carbide

Grade	Color	Main Component	Coating Layer	Relative Density (RD)	Hardness of Substrate		Fracture Toughness (MPa·m ^{1/2})	Transverse Strength (MPa)
					(HV)	(GPa)		
PDL010	Iridescent	C	Thin Coating	15.0	1,650	16.2	10.0	1,470
PDL01S				14.7	1,700	16.7	11.0	3,000
PDL02S				14.5	1,600	15.8	13.0	3,400

