

Insert Grades

A1~A21

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Insert Grades

A6~A21

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A

Summary of Insert Grades

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, Carbide, Ceramic, PCD and CBN.

Turning

Workpiece Material	Steel (Carbon steel / Alloy steel)					Stainless steel / Cast steel					Cast Iron (Gray cast iron / Nodular cast iron)							
	Cutting Range					Cutting Range					Cutting Range							
	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					TN610											
		TN6010					TN6010											
		TN620					TN620											
		TN60					TN60									TN60		
		TN90					TN90											
	TC Series		TC60M					TC60M										
PV Series		PV90					PV90											
MEGACOAT (PV Series)	PV7010					PV7010									PV7005			
	PV7025					PV7025												
MEGACOAT NANO (PV Series)	PV710					PV710												
	PV720					PV720												
Coated Carbide	CA Series	CA510													CA310			
		CA515													CA315			
		CA025P													CA320			
		CA525													CA4120			
		CA530																
		CA5505													CA4505			
		CA5515													CA4515			
		CA5525																
		CA5535																
		PR Series	PR930					PR930										
	PR1005						PR1025											
	PR1025						PR1125											
	PR1115																	
MEGACOAT (PR Series)		PR1225					PR1225											
MEGACOAT NANO (PR Series)		PR1425					PR1425											
		PR1535					PR1535											
Ceramic															KA30			
															KT66			
															A66N			
															PT600M			
															KS6050			
Carbide															CS7050			
															KW10			
															GW15			
CBN															KBN475			
															KBN60M			
															KBN900			

Insert Grades

Turning

Workpiece Material		Non-ferrous Metals (Aluminum / Non-ferrous metals / Non-metals)				Difficult-to-cut Materials (Heat-resistant alloys / Ni-base heat-resistant alloys)				Hard Materials (Hardened steel / Chilled cast iron)				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
Coated Carbide	CA Series						CA6515										
	PR Series							CA6525									
	MEGACOAT (PR Series)						PR1305		PR1125								
	MEGACOAT HARD (PR Series)						PR1310		PR1325								
	MEGACOAT NANO (PR Series)						PR005S		PR1535								
	Cermet													TN6010			TN60
	Ceramic						CF1			KT66							
							KS6030			A66N							
							KS6040			PT600M							
	CBN									KBN510							
										KBN525							
										KBN900							
	MEGACOAT									KBN05M							
										KBN10M				KBN65M			
										KBN25M				KBN70M			
										KBN30M				KBN570			
										KBN35M							

Workpiece Material		Non-ferrous Metals (Aluminum / Non-ferrous metals / Non-metals)				Difficult-to-cut Materials (Titanium / Titanium alloys)				Hard Materials (Hardened steel / Chilled cast iron)				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
Coated Carbide	MEGACOAT NANO (PR Series)								PR1535								
	Carbide						SW05										
							SW10										
							SW25										
		KW10					KW10										
		GW15					GW15										
	DLC Coated Carbide	PDL010															
		PDL025															
	PCD	KPD001					KPD001										
		KPD010					KPD010										
		KPD230															
		KPD250															

PVD Coated Carbide for Small Parts Machining

Workpiece Material		Steel (Carbon steel / Alloy steel)				Stainless steel / Cast steel					Cast Iron (Gray cast iron / Nodular 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					PR930							
			PR1005					PR1025							
			PR1025					PR1125							
			PR1115					PR1115							
	MEGACOAT (PR Series)		PR1225					PR1225							
	MEGACOAT NANO (PR Series)		PR1535					PR1535							
			PR1425					PR1425							

Summary of Insert Grades

Grooving / Cut-off / Threading

Workpiece Material		Steel (Carbon steel / Alloy steel)					Stainless steel / Cast steel					Cast Iron (Gray cast iron / Nodular cast iron)			
		Finishing		Roughing			Finishing		Roughing			Finishing		Roughing	
Classification		P01	P10	P20	P30	P40	M01	M10	M20	M30	M40	K01	K10	K20	K30
Cermet	MEGACOAT (PV Series)	PV7040										PV7040			
	TN Series	TN620					TN620								
		TN6020					TN6020								
TN60					TN60					TN60					
TN90					TN90										
TC Series	TC40N										TC40N				
	TC60M					TC60M									
CR Series	CR9025					CR9025									
Coated Carbide	PR Series	PR630					PR630								
		PR660					PR660								
		PR915					PR915					PR905			
		PR930					PR930								
	PR1025					PR1025									
MEGACOAT (PR Series)	PR1115														
	PR1215					PR1215					PR1215				
MEGACOAT NANO (PR Series)	PR1225					PR1225									
	PR1535					PR1535									
MEGACOAT NANO (PR Series)	PR1625					PR1625									
Ceramic											A65 A66N PT600M				
Carbide											KW10				
											GW15				

Workpiece Material		Non-ferrous Metals (Aluminum / Non-ferrous metals / Non-metals)				Difficult-to-cut Materials (Titanium / Titanium alloys)				Hard Materials (Hardened steel / Chilled cast Iron)				Sintered Steel			
		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	MEGACOAT (PR Series)													PR1215 PR1225			
	Cermet													TN60			
Ceramic	Ceramic									A65 A66N PT600M							
Carbide	Carbide	KW10				KW10											
		GW15				GW15											
DLC Coated Carbide	DLC Coated Carbide	PDL025															
CBN	CBN									KBN510 KBN525				KBN570			
PCD	PCD	KPD001				KPD001											
		KPD010				KPD010											

A
Insert Grades

Drilling

Workpiece Material		Steel (Carbon steel / Alloy steel)					Stainless steel / Cast steel					Cast Iron (Gray cast iron / Nodular 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			
	PR Series			PR660					PR660						
	MEGACOAT (PR Series)			PR830					PR830						
	MEGACOAT NANO (PR Series)			PR1225					PR1225					PR1210	
Carbide				PR1230											
				PR1535					PR1535						
														KW10	
														GW15	

Workpiece Material		Non-ferrous Metals (Aluminum / Non-ferrous metals / Non-metals)				Difficult-to-cut Materials (Titanium / Titanium alloys)				Hard Materials (Hardened steel / Chilled cast iron)			
Cutting Range		Finishing ← → Roughing				Finishing ← → Roughing				Finishing ← → Roughing			
Classification		N01	N10	N20	N30	S01	S10	S20	S30	H01	H10	H20	H30
Coated Carbide	MEGACOAT (PR Series)											PR1230	
Carbide			KW10					KW10					
			GW15					GW15					

Milling

Workpiece Material		Steel (Carbon steel / Alloy steel)					Stainless steel / Cast steel					Cast Iron (Gray cast iron / Nodular 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
Cermet	TN Series			TN620M					TN60						
	TC Series			TN100M					TN100M						
Coated Carbide	CA Series			TC60M					TC60M						
	PR Series			CA6535					CA6535			CA420M			
	MEGACOAT (PR Series)			PR830					PR830						
	MEGACOAT NANO (PR Series)			PR1225					PR1225					PR1210	
Carbide				PR1230											
				PR1525					PR1525					PR1510	
				PR1535					PR1535						
														KW10	
														GW25	

Workpiece Material		Non-ferrous Metals (Aluminum / Non-ferrous metals / Non-metals)				Difficult-to-cut Materials (Heat-resistant alloys / Ni-base heat-resistant alloys)				Difficult-to-cut Materials (Titanium / Titanium alloys)				Hard Materials (Hardened steel / Chilled cast iron)			
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 (PR Series)											PR1210					
	MEGACOAT NANO (PR Series)							PR1535				PR1535					
Carbide												KW10					
												GW25					
DLC Coated Carbide																	
CBN																	
PCD												KPD001					
												KPD010					

Insert Grades

Turning

Indexable Inserts

CBN & PCD Tools

External

Small Parts Machining

Boring

Grooving

Cut-off

Threading

Drilling

Solid Tools

Milling

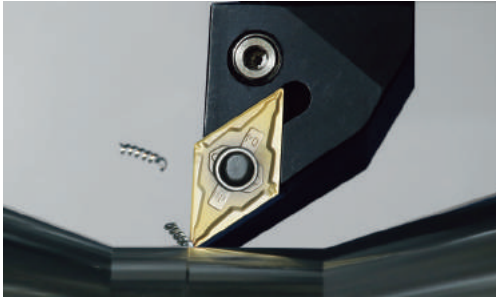
Tools for Turning Mill

Spare Parts

Technical Information

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Cermet



Cermet

KYOCERA is known as one of the leading manufacturers 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.

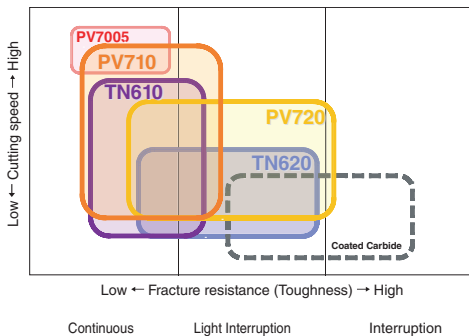
PVD Coated Cermet (MEGACOAT / MEGACOAT NANO Cermet)

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	Symbol	Color	Main Component (Coated Composition)	Advantages and Applications		
<div style="background-color: #0070C0; color: white; padding: 5px; text-align: center; border-radius: 5px;"> P Steel </div>	Cermet	TN610	Gray	TiCN	· 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	Gray	TiCN	· Three types of special reinforcement technology realized the superior fracture resistance and wear resistance · Application : Stable machining of steel	
		TN6010 (Super Micro-Grain)	Gray	TiCN	· Application : Uncoated cermet for steel	
		TN60	Gray	TiCN+NbC	· Application : Machining of steel, continuous to interruption	
		TN6020 (Super Micro-Grain)	Gray	TiCN	· Application : Uncoated cermet for grooving of steel	
		TN620M	Gray	TiCN	· 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	Gray	TiCN+NbC	· Tough cermet with improved oxidation resistance and thermal shock resistance · Application : Milling of steel at high speed	
		TC40N	Gray	TiC+TiN	· Good balance of wear resistance and toughness · Application : Grooving and threading of steel	
	MEGACOAT NANO Cermet	PV710	Gold	TiCN (MEGACOAT NANO)	· 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	Gold	TiCN (MEGACOAT NANO)	· 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	
		MEGACOAT Cermet	PV7010 (Super Micro-Grain)	Blackish red	TiCN (MEGACOAT)	· Application : Long tool life in steel machining
			PV7025 (Super Micro-Grain)	Blackish red	TiCN (MEGACOAT)	· Application : PVD coated cermet for steel machining
			PV7040	Blackish red	TiC+TiN (MEGACOAT)	· MEGACOAT Cermet for Grooving · Application : Excellent surface finish and longer tool life in steel grooving
<div style="background-color: #D9534F; color: white; padding: 5px; text-align: center; border-radius: 5px;"> K Cast Iron </div>	PV7005	Blackish red	TiC+TiN (MEGACOAT)	· Heat-resistant MEGACOAT on cermet with excellent wear resistance · Application : High speed finishing of gray and nodular cast iron		

Application Map



TN Series

(Uncoated Cermet)

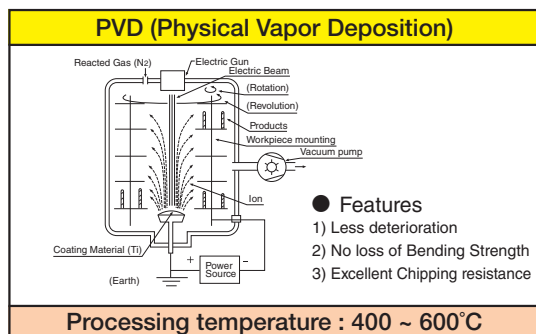
TN610 : Superior wear resistant cermet
TN620 : Superior fracture and wear resistance

PV Series

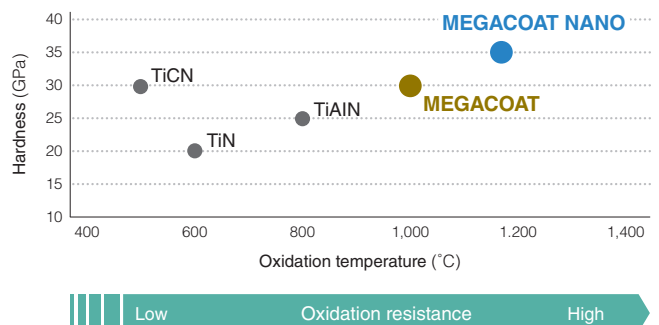
(MEGACOAT NANO Cermet)

PV710 : Long tool life and stable machining of steel at high speed and continuous
PV720 : High efficiency and excellent surface finish (1st choice)

PVD Coating



Properties of PVD Coating



Uncoated Cermet

MEGACOAT NANO Cermet

TN610 / TN620

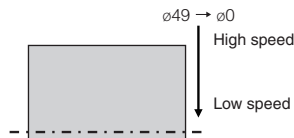
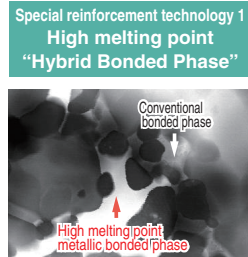
PV710 / PV720

Three types of special reinforcement technology (Hybrid Technology) realized the superior surface finish and stability

1 Excellent surface finish

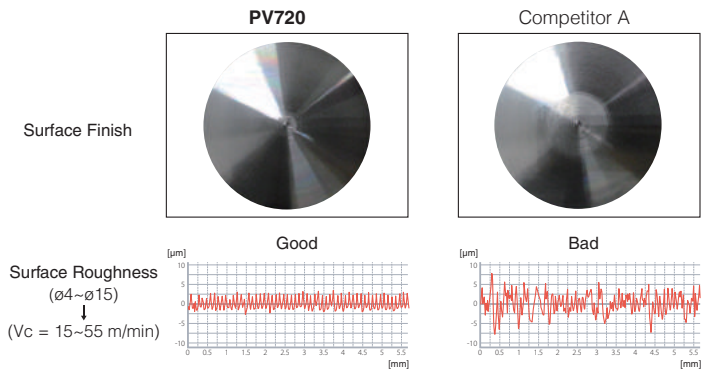
Combining the conventional cermet bonded phase (nickel, cobalt) and the special high melting point metallic bonded phase

Minimizing softening bonded phase at cutting and high deposition resistance and excellent finishing surface quality



Surface finish comparison
(Internal evaluation)

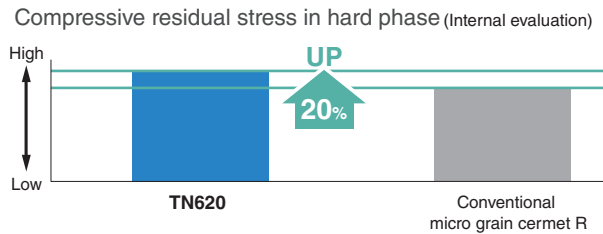
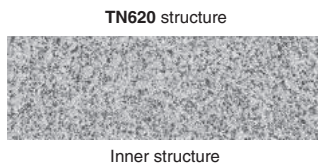
Cutting Conditions : Vc=180~0 m/min (Constant rate), ap = 0.5 mm
f = 0.1 mm/rev, Wet, CNMG120404 type Workpiece Material : S10C



2 Excellent fracture resistance

Improved strength by uniform micro grain hard phase and superior compressive stress by high melting point bonded phase. Fracture resistance improved

Special reinforcement technology 2 Micro grain "Hybrid Hard Phase"



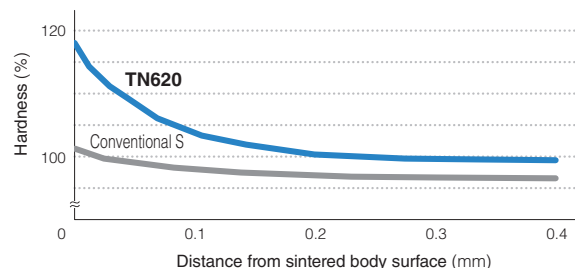
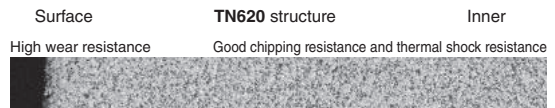
3 Excellent wear resistance

Excellent fracture resistance with the surface-hardened layer using the gradient composition technology

Good balance of stable wear resistance and fracture resistance

TN620's inner structure has high toughness and chipping resistance as well as thermal shock resistance. Surface area has higher hardness and wear resistance compared to the conventional micro grain cermet S. (see the attached chart)
(Internal evaluation)

Special reinforcement technology 3 Special Surface-Hardened "Hybrid Structure"



- Insert Grades **A**
- Turning Indexable Inserts **B**
- CBN & PCD Tools **C**
- External **D**
- Small Parts Machining **E**
- Boring **F**
- Grooving **G**
- Cut-off **H**
- Threading **J**
- Drilling **K**
- Solid Tools **L**
- Milling **M**
- Tools for Turning Mill **N**
- Spare Parts **P**
- Technical Information **R**
- Index **T**

CVD Coated Carbide (Turning)



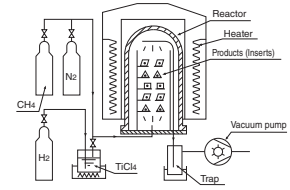
CVD Coated Carbide

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

CVD (Chemical Vapor Deposition)



● Features

- 1) Equally deposited on face
- 2) Easy application for multilayer deposition
- 3) Enabling thick coating

Processing temperature : 900~1100°C

Features of CVD Coated Carbide

Classification	Symbol	Color	Coated Composition	Advantages and Applications
<div style="background-color: #0070C0; color: white; padding: 5px; text-align: center; font-weight: bold;">P</div> Steel	CA510	Gold	TiCN+Al ₂ O ₃ +TiN	· 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	Gold	TiCN+Al ₂ O ₃ +TiN	· Improved wear resistance and stability due to special substrate with heat deformation resistance and hard and tough coating layer with reinforced interface · Application : Light interrupted machining of steel
	CA025P	Gold	TiCN+Al ₂ O ₃ +TiN	· Tough CVD Coating and Substrate with Excellent Wear Resistance, Improved Fracture Resistance, Deposition Resistance and Chipping Resistance · Application : Stable machining of steel for continuous to interrupted machining
	CA525	Gold	TiCN+Al ₂ O ₃ +TiN	· Stable and long tool life machining due to special substrate with heat deformation resistance and tougher coating layer and reinforced interface · Application : Interrupted to general machining of steel
	CA530	Gold	TiCN+Al ₂ O ₃ +TiN	· Special tough substrate and tough coating layer providing high stability and wear resistance · Application : General to heavy interrupted machining (stability oriented)
	CA5505	Gold	TiCN+Al ₂ O ₃ +TiN	· Application : High speed continuous machining of steel, continuous to light interrupted machining of cast iron
	CA5515	Gold	TiCN+Al ₂ O ₃ +TiN	· Application : Machining of steel, continuous to light interruption
	CA5525	Gold	TiCN+Al ₂ O ₃ +TiN	· Application : For general machining of steel, roughing to interruption
	CA5535	Gold	TiCN+Al ₂ O ₃ +TiN	· Application : Roughing to heavy interrupted machining of steel
	CR9025	Gold	TiCN+TiN	· 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; font-weight: bold;">M</div> Stainless steel	CA6515	Gold	TiCN+Al ₂ O ₃ +TiN	· Specialized carbide substrate for machining stainless steel, excellent wear resistance · Application : Continuous machining of stainless steel
	CA6525	Gold	TiCN+Al ₂ O ₃ +TiN	· 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: #FF0000; color: white; padding: 5px; text-align: center; font-weight: bold;">K</div> Cast Iron	CA310	Rose Gold	TiCN+Al ₂ O ₃ +Ti base	· Grade for high-speed continuous machining and improved tool life through the deposition of a thickened Al ₂ O ₃ coating layer · Application : For finishing to roughing of gray cast iron
	CA315	Rose Gold	TiCN+Al ₂ O ₃ +Ti base	· High efficiency and long tool life For continuous to interrupted machining with a good balance of wear resistance and stability · Excellent performance for machining gray and nodular cast iron For machining of nodular cast iron
	CA320	Rose Gold	TiCN+Al ₂ O ₃ +Ti base	· Improved stability with CVD layer structure with high adhesion · Application : Heavily interrupted or High-speed machining for Nodular Cast Iron. 1st Recommendation for the FCD500 or higher application
	CA4120	Gold	TiCN+Al ₂ O ₃ +TiN	· Application : Roughing to heavy interrupted machining of nodular cast iron
	CA4505	Blackish gray	TiCN+Al ₂ O ₃	· 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	Blackish gray	TiCN+Al ₂ O ₃	· 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

CVD Coated Carbide Grade for Steel

CA025P

Next Generation CVD Coating for Longer Tool Life

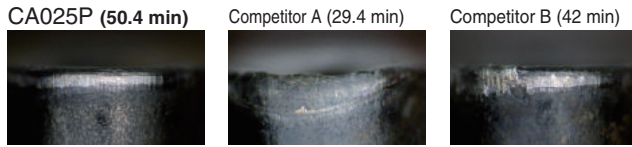
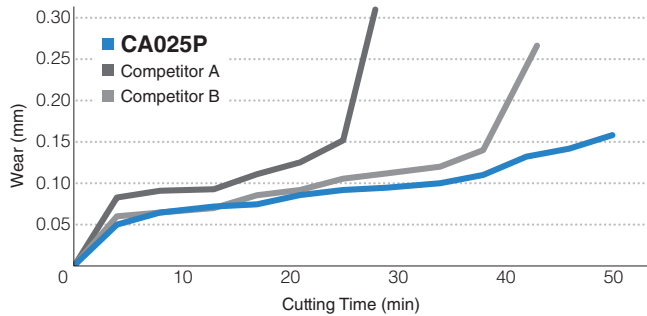


Insert Grades	A
Turning Indexable Inserts	B
CBN & PCD Tools	C
External	D
Small Parts Machining	E
Boring	F
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1 Improved Wear Resistance with New CVD Grade for Steel

Thickened Alumina with Good Thermal Resistance (Twice as thick as conventional coating)
Improved Plastic Deformation Resistance by Increased Temperature Strength

Wear Resistance Comparison (Internal Evaluation)

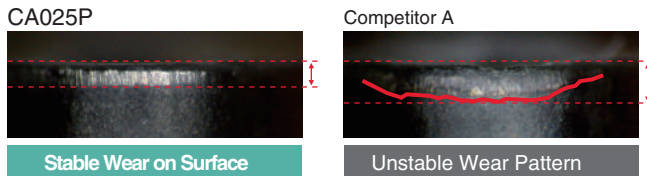


CA025P (50.4 min) Competitor A (29.4 min) Competitor B (42 min)

Good Surface Condition
 Cutting Conditions : $V_c = 300$ m/min, $a_p = 1.5$ mm, $f = 0.3$ mm/rev, Wet Workpiece Material : SCM435

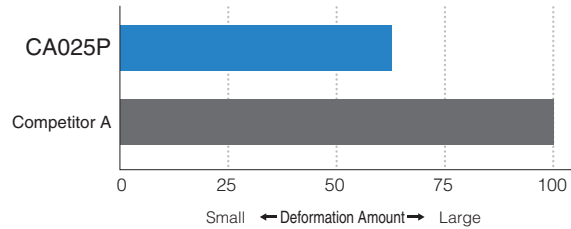
Wear Comparison (Internal evaluation) Cutting Time 25.2 min

CA025P Maintains Smooth and Flat Surface with Stable Tool Life



Cutting Conditions : $V_c = 300$ m/min, $a_p = 1.5$ mm, $f = 0.3$ mm/rev, Wet Workpiece Material : SCM435

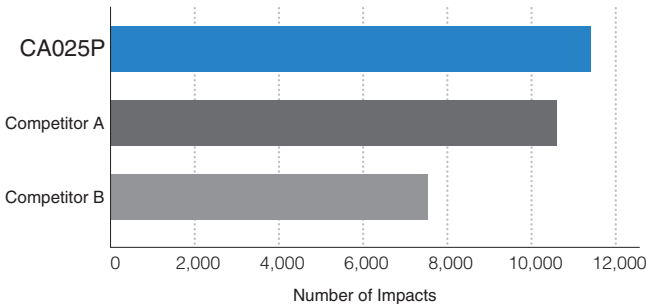
Plastic Deformation Comparison under High Temperature (Internal Evaluation) Comparison with Competitor A



2 Excellent Fracture Resistance

New Substrate with High Stability Provides Excellent Chipping Resistance

Fracture Resistance Comparison (Internal evaluation) Average of 5 times

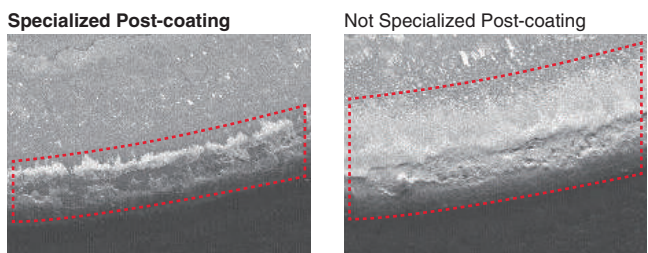


Cutting Conditions : $V_c = 250$ m/min, $a_p = 1.5$ mm, $f = 0.35$ mm/rev, Wet Workpiece Material : SCM440 (with 4 Slots)

3 Excellent Adhesion Resistance and Chipping Resistance

Specialized Post-coating Process Prevents Adhesion

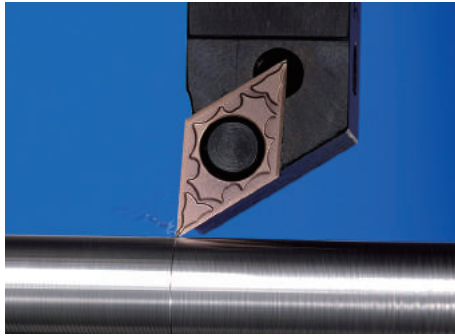
Adhesion on the Edge after Cutting (Internal evaluation)



Less Adhesion
 Wide Area of Adhesion * Adhesion Area Appears White

Cutting Conditions : $V_c = 270$ m/min, $a_p = 1.0$ mm, $f = 0.1$ mm/rev, Wet Workpiece Material : SCM440 (with 4 Slots)

PVD Coated Carbide (Turning)



PVD Coated Carbide

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 more bending strength. PVD coated carbide grades are coated on a very tough carbide substrate and suitable for turning.

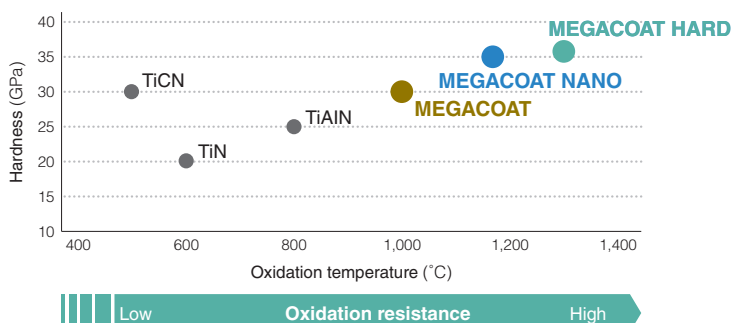
PVD Coated Super Micro-Grain Carbide

- 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	Symbol	Color	Coated Composition	Advantages and Applications
<div style="background-color: #007bff; color: white; padding: 5px; text-align: center; width: 30px; margin: 0 auto;">P</div> <div style="background-color: #007bff; color: white; padding: 2px; text-align: center; width: 30px; margin: 0 auto;">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
	PR1005	Reddish gray	TiCN	· TiCN base PVD coated hard micro-grain carbide · Application : Turning of free-cutting steel, longer tool life achieved through anti-adhesion performance
	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
	PR1425	Blackish red	MEGACOAT NANO	· New coating technology [MEGACOAT NANO] is applied. Nano thin multi-layer coating performs superior wear resistance and high oxidation resistance · Application : Various applications of machining steel, High speed machining of stainless steel, extended tool life
	PR1625	Reddish green	MEGACOAT NANO	· Nano thin multi-layer coating, [MEGACOAT NANO] provides superior wear resistance and high lubrication. · Stable Machining and Long Tool Life for Grooving of Steel and Stainless
<div style="background-color: #ffc107; color: white; padding: 5px; text-align: center; width: 30px; margin: 0 auto;">M</div> <div style="background-color: #ffc107; color: white; padding: 2px; text-align: center; width: 30px; margin: 0 auto;">Stainless steel</div>	PR1125	Purple red	TiAlN	· Hard TiAlN base PVD coated super micro-grain carbide, superior toughness and heat resistance · Application : Finishing and light interrupted machining of stainless steel
	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	Reddish green	MEGACOAT NANO	· Nano thin multi-layer coating [MEGACOAT NANO] on micro-grain carbide substrate improved wear resistance and stability · Application : Threading of stainless steel
	PR1535	Reddish green	MEGACOAT NANO	· 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
<div style="background-color: #dc3545; color: white; padding: 5px; text-align: center; width: 30px; margin: 0 auto;">K</div> <div style="background-color: #dc3545; color: white; padding: 2px; text-align: center; width: 30px; margin: 0 auto;">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
<div style="background-color: #6c757d; color: white; padding: 5px; text-align: center; width: 30px; margin: 0 auto;">S</div> <div style="background-color: #6c757d; color: white; padding: 2px; text-align: center; width: 30px; margin: 0 auto;">Heat-resistant alloys</div>	PR005S	Blackish gray	MEGACOAT HARD	· Superior high temperature properties of special carbide substrate and excellent heat-resistance of MEGACOAT HARD enables high wear resistance · Application : Finishing and high speed application of heat-resistant alloys
	PR015S	Blackish gray	MEGACOAT HARD	· Superior high temperature properties of special carbide substrate and MEGACOAT HARD improved heat-resistance and stability · Application : Recommended for continuous to light interruption machining and finishing of heat-resistant alloys
	PR1305	Blackish red	MEGACOAT	· MEGACOAT on hard and superior heat-resistant carbide, superior wear resistance · Application : Finishing of heat-resistant alloys
	PR1310	Blackish red	MEGACOAT	· MEGACOAT on hard and superior heat-resistant carbide, superior wear and oxidation resistance · Application : First choice for continuous and light interrupted machining and finishing of heat-resistant alloys
	PR1325	Blackish red	MEGACOAT	· MEGACOAT on tough carbide · Application : Light interrupted machining and roughing of heat-resistant alloys

Properties of PVD Coating



Application Map

• Steel

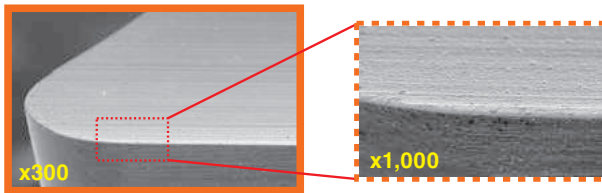
High [Vc=150-200m/min]	PR1425		
Medium [Vc=75-150m/min]	PR1225		
Low [Vc=75m/min以下]	PR930		PR1535
Applications	Continuous 	Light Interruption 	Heavy Interruption

• Stainless steel

High [Vc=125m/min-]	PR1425		
Medium [Vc=50-125m/min]	PR1225		
Low [Vc=50m/min以下]	PR930		PR1535
Applications	Continuous 	Light Interruption 	Heavy Interruption

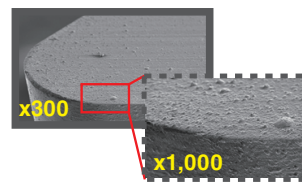
● Cutting edge quality (Sharp edge insert)

PR1225 / PR1425



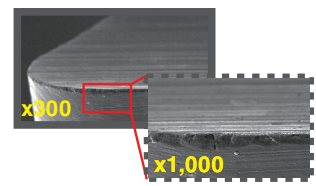
<Superior edge-sharpening performance and Smooth surface>

Competitor A



<Delamination (coating peeling) and rough surface>

Competitor B



MEGACOAT Series (PR1225/PR1425) shows high edge sharpening performance and adhesion resistance. (Internal evaluation)

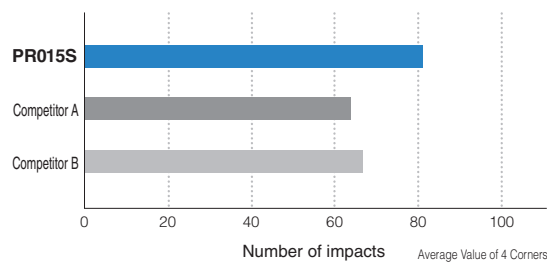
■ Features of PR005S / PR015S

1) Improved thermal properties help to reduce sudden fracture and decrease edge wear
Improved thermal conductivity by optimum distribution of WC coarse grains
Resists heat concentration at the cutting edge to promote stable machining

2) Improved wear resistance with MEGACOAT HARD coating

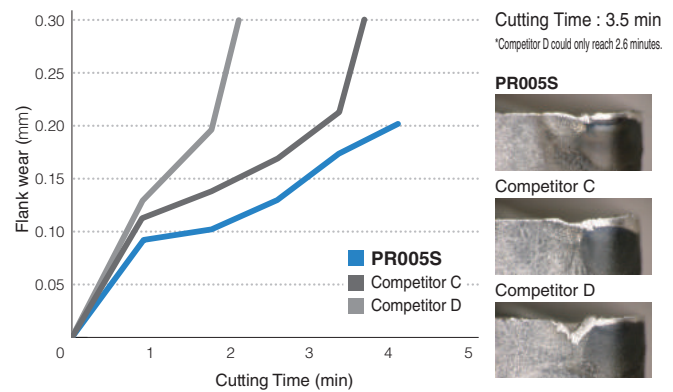
Excellent wear resistance with high-hardness and resists boundary damage with improved thermal properties

Fracture Resistance Comparison (Internal evaluation)



Cutting Conditions : Vc = 25m/min, ap = 1.0 mm, f = 0.10 mm/rev, Wet CNMG120408 type Workpiece Material : Nickel-based Superalloy Cylindrical Workpiece with 1 Flat Face

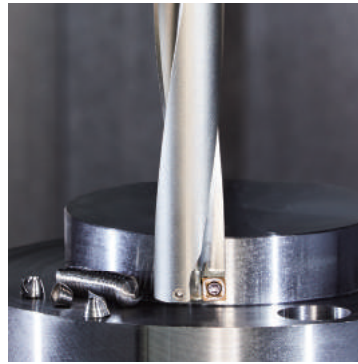
Wear Resistance Comparison (Internal evaluation)



Cutting Conditions : Vc= 60 m/min, ap = 1.0 mm, f = 0.20 mm/rev, Wet, CNMG120408 type Workpiece Material : Nickel-based Superalloy

Insert Grades	A
Turning	B
Indexable Inserts	C
CBN & PCD Tools	D
External	E
Small Parts Machining	F
Boring	G
Grooving	H
Cut-off	J
Threading	K
Drilling	L
Solid Tools	M
Milling	N
Tools for Turning Mill	P
Spare Parts	R
Technical Information	T

PVD / CVD Coated Carbide (Milling / Drilling)



PVD Coated Carbide (MEGACOAT / MEGACOAT NANO)

PVD coated carbide grades for milling and drilling are coated on a very tough carbide substrate. Because of the low processing temperature of PVD compared with CVD, it features less deterioration and more bending strength.

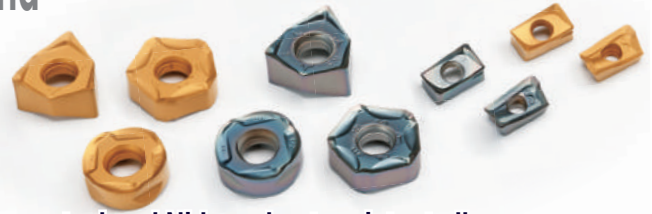
CVD Coated Carbide

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

Classification	Symbol	Color	Coated Composition	Advantages and Applications
<div style="background-color: #007bff; color: white; padding: 5px; text-align: center; width: 30px; margin: 0 auto;">P</div> <div style="font-size: 8px; color: #007bff; text-align: center; margin-top: 2px;">Steel</div>	PR830	Gold	TiAlN+TiN	<ul style="list-style-type: none"> Improved high temperature stability and wear resistance by TiAlN base PVD coating Application : Milling of 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	Reddish green	MEGACOAT NANO	<ul style="list-style-type: none"> New coating technology [MEGACOAT NANO] is applied. 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
	CA520D	Gold	TiCN+Al ₂ O ₃ +TiN (CVD)	<ul style="list-style-type: none"> Combination of High toughness substrate, Coating crystal control technology and advanced layer adhesion coating allow both wear and fracture resistance Application : 1st Recommendation for drilling of steel (at high speed application)
<div style="background-color: #ffc107; color: white; padding: 5px; text-align: center; width: 30px; margin: 0 auto;">M</div> <div style="font-size: 8px; color: #ffc107; text-align: center; margin-top: 2px;">Stainless steel</div>	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
<div style="background-color: #dc3545; color: white; padding: 5px; text-align: center; width: 30px; margin: 0 auto;">K</div> <div style="font-size: 8px; color: #dc3545; text-align: center; margin-top: 2px;">Cast Iron</div>	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	Reddish green	MEGACOAT NANO	<ul style="list-style-type: none"> New coating technology [MEGACOAT NANO] is applied. 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
	CA415D	Gold	TiCN+Al ₂ O ₃ +TiN (CVD)	<ul style="list-style-type: none"> Special carbide substrate for cast iron, coating crystal control technology and advanced layer adhesion coating enable superior wear resistance Application : 1st Recommendation for drilling cast iron (at high speed application)
	CA420M	Gold	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
<div style="background-color: #6c757d; color: white; padding: 5px; text-align: center; width: 30px; margin: 0 auto;">S</div> <div style="font-size: 8px; color: #6c757d; text-align: center; margin-top: 2px;">Heat-resistant alloys, Titanium alloys</div>	PR1535	Reddish green	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
<div style="background-color: #6c757d; color: white; padding: 5px; text-align: center; width: 30px; margin: 0 auto;">S</div> <div style="font-size: 8px; color: #6c757d; text-align: center; margin-top: 2px;">Heat-resistant alloys</div>	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

● New grade for heat-resistant alloys and difficult-to-cut materials



CA6535 (CVD) For martensitic stainless steel and Ni-base heat-resistant alloys

PR1535 (PVD) For Ni-base heat-resistant alloys, titanium alloys and precipitation hardened stainless steel

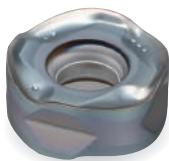
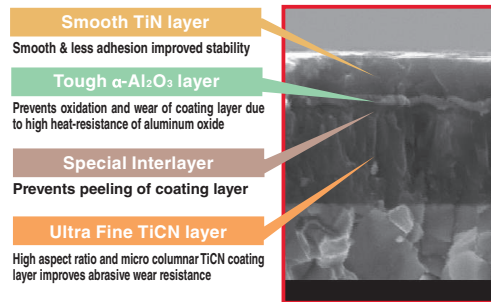
Suitable for variety of workpiece materials

Stable machining by preventing sudden insert fracture
Suitable for high-efficiency machining



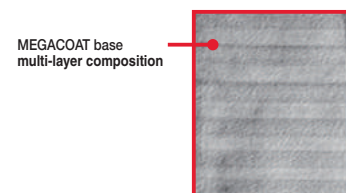
CA6535

For martensitic stainless steel and Ni-base heat-resistant alloys
High heat resistance and wear resistance with CVD coating
Improved stability due to thin layer coating technology



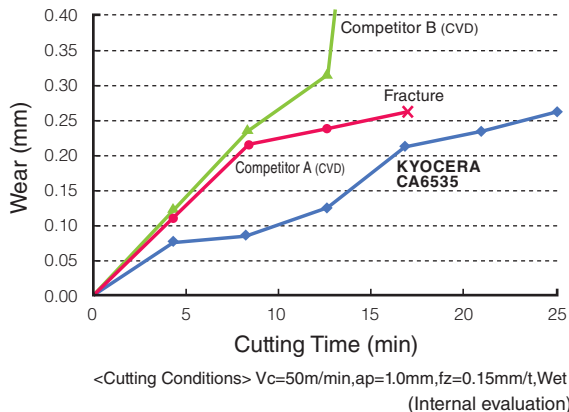
PR1535

For Ni-base heat-resistant alloys, titanium alloys and precipitation hardened stainless steel
Stable machining and longer tool life in milling by special nano thin multi-layer coating [MEGACOAT NANO]

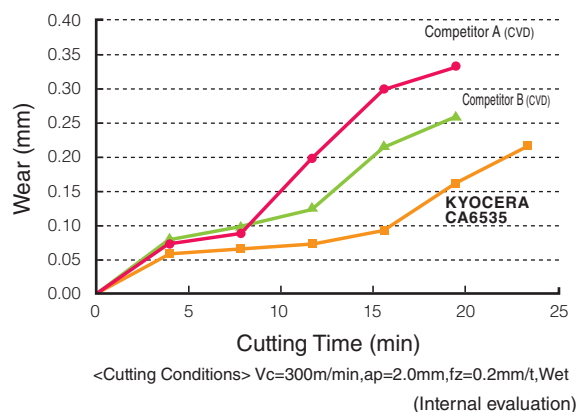


■ Tool Life Comparison

● Ni-base heat-resistant alloys



● Martensitic stainless steel

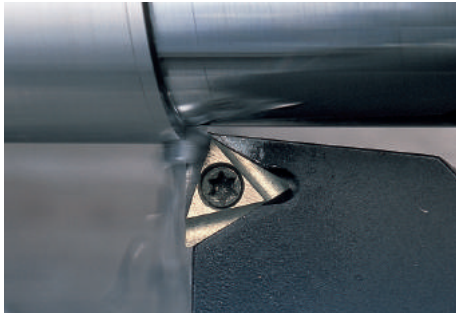


Longer tool life and more stable machining than competitors!

Insert Grades	A
Turning	B
Indexable Inserts	C
CBN & PCD Tools	D
External	E
Small Parts Machining	F
Boring	G
Grooving	H
Cut-off	J
Threading	K
Drilling	L
Solid Tools	M
Milling	N
Tools for Turning Mill	P
Spare Parts	R
Technical Information	T

Insert Grades

Carbide



Carbide

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

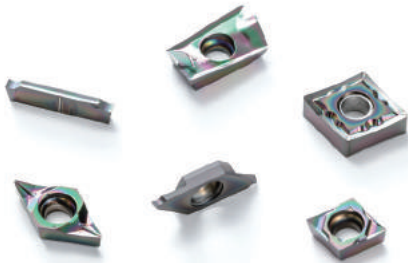
Features

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

Features of Carbide

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

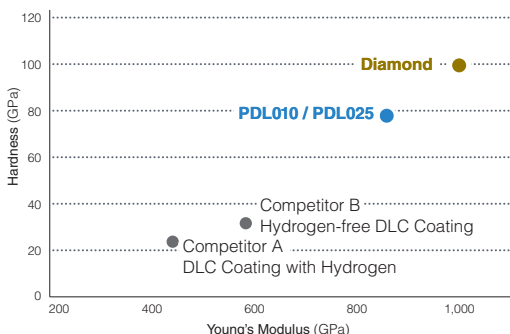
- High Hardness with Kyocera's Proprietary Hydrogen-free DLC Coating
- Excellent surface finish achieved through anti-adhesion performance

Features of DLC Coated Carbide

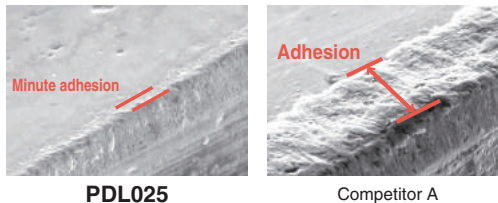
Classification	Symbol	Color	Coated Composition	Advantages and Applications
	PDL010	Rainbow color	C	<ul style="list-style-type: none"> · High Hardness with Kyocera's Proprietary Hydrogen-free DLC Coating · Application: Long tool life machining and stable surface finishing for aluminum alloys
	PDL025	Rainbow color	C	<ul style="list-style-type: none"> · High Hardness with Kyocera's Proprietary Hydrogen-free DLC Coating · Application : Long tool life and stable interrupted machining of aluminum alloys

Properties of DLC Coating

High Hardness with Kyocera's Proprietary Hydrogen-free DLC Coating



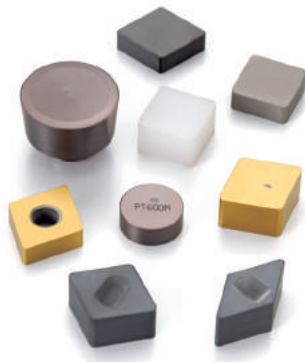
Superior adhesion resistance



Cutting Conditions : $V_c = 800$ m/min, $f_z = 0.1$ mm/t, $a_p \times a_e = 3 \times 5$ mm, Dry
 Cutter Dia. $\phi 25$ mm Workpiece Material : A5052
 Cutting length : 57 m

(Internal evaluation)

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

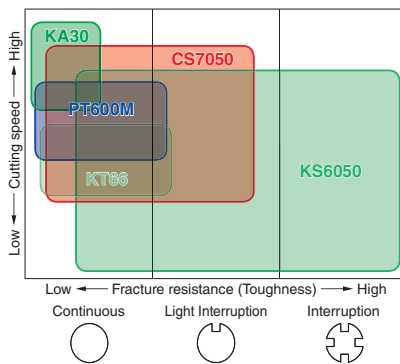
- Excellent wear resistance provides high speeds machining of cast iron
- Ceramic maintains good surface finishes due to the low affinity to workpiece materials
- Silicon nitride ceramic can machine cast iron with coolant due to its superior thermal shock resistance

Features of Ceramic

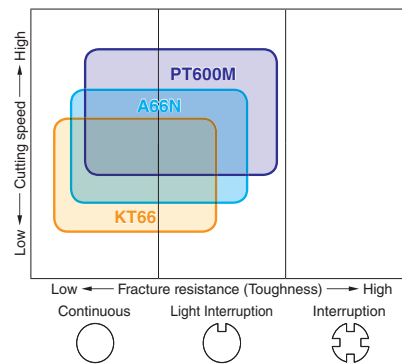
Classification	Symbol	Color	Main Component (Coated Composition)	Coating Layer	Hardness of Substrate (GPa)	Fracture Toughness (MPa·m ^{1/2})	Transverse Strength (MPa)	Advantages and Applications
K Cast Iron	KA30	White	Al ₂ O ₃	-	17.5	4.0	750	• Aluminum Oxide ceramic (Al ₂ O ₃) • Application : Finishing of cast iron at high cutting speeds without coolant
	KS6050	Gray	Si ₃ N ₄	-	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)	Thin coating	15.6	8.0	1,200	• Silicon nitride ceramic (Si ₃ N ₄) + CVD Coated Carbide (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	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, 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 +TiC) • Application : Semi-roughing to finishing of hard materials
H Hard Materials	PT600M	Blackish red	Al ₂ O ₃ +TiC (MEGACOAT)	Thin coating	20.1	4.1	980	• 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	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	SiAlON	-	16.7	7.0	900	• High stability SiAlON ceramic with wear resistance and fracture resistance • Application : Roughing of heat-resistant alloys

Application Map

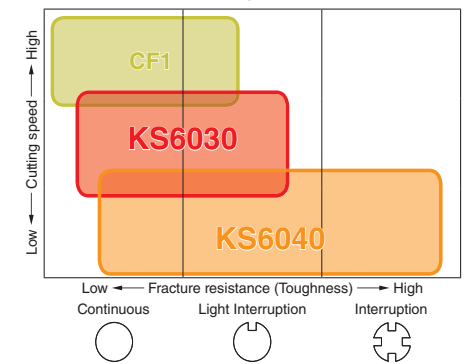
Cast Iron



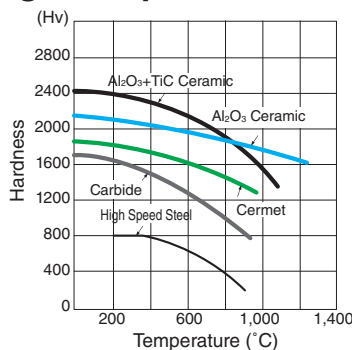
Hard Materials



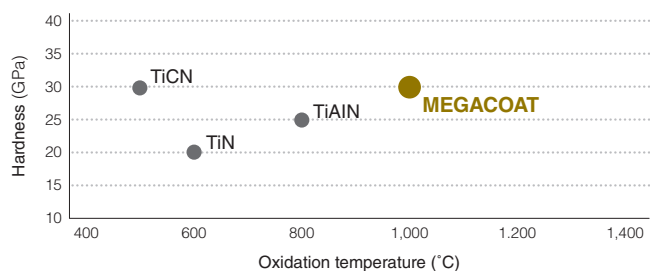
Heat-resistant alloys



High-Temperature Hardness



Properties of PVD Coating



Insert Grades

Turning

CBN & PCD Tools

External

Small Parts Machining

Boring

Grooving

Cut-off

Threading

Drilling

Solid Tools

Milling

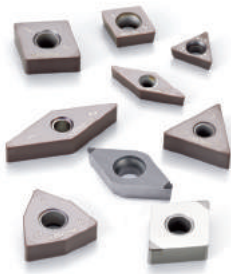
Tools for Turning Mill

Spare Parts

Technical Information

Index

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

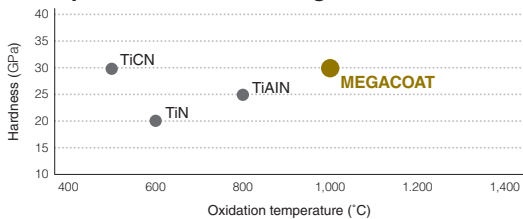
Features of CBN

Classification	Symbol	Color	Ave. grain size (μm)	Hardness of Substrate (GPa)	Transverse Strength (MPa)	Advantages and Applications
	KBN510	Black	2	28	1,000	· Excellent wear resistance and crack resistance, non-coated CBN · Application : Finishing and continuous machining of hardened die steel
	KBN525	Black	1 and under	25	1,250	· Application : General purpose for hardened steel
	KBN05M (MEGACOAT)	Blackish red	0.5-1.5	27	1,000	· Heat-resistant MEGACOAT on highly heat-resistant CBN substrate · Application : High speed finishing of hardened steel
	KBN10M (MEGACOAT)	Blackish red	2	28	1,000	· Application : High speed finishing of hardened die steel
	KBN25M (MEGACOAT)	Blackish red	1 and under	25	1,250	· Heat-resistant MEGACOAT on micro-grain CBN with heat-resistant binder phase · Application : Stable machining of hardened steel at high cutting speeds
Sintered Steel	KBN570	Black	2-4	34	1,350	· High CBN content ratio · Application : Machining of sintered steel (preventing burr formation)
	KBN70M (MEGACOAT)	Blackish red	2-4	34	1,350	· Heat-resistant MEGACOAT on CBN rich substrate · Application : Stable machining of sintered steel (ferrous sintered alloys)
	KBN475	Black	2	39	1,400	· 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	· 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	· 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 CBN

Properties of PVD Coating

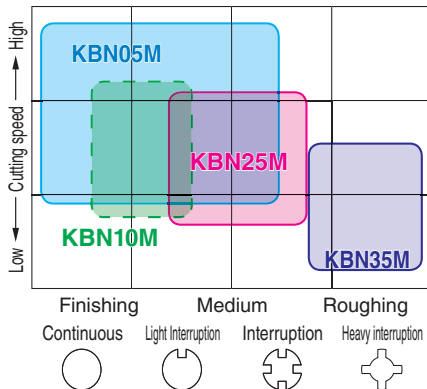


Advantages of MEGACOAT

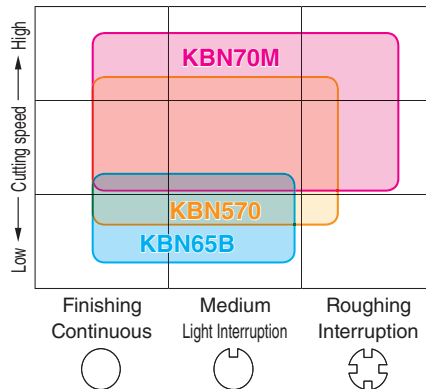
- Longer tool life and high speed machining due to superior heat resistance and hardness
- Stability improvement through prevention of crater wear (oxidation, diffusional wear)
- High thermal stability and surface smoothness provide excellent surface finish

Application Map

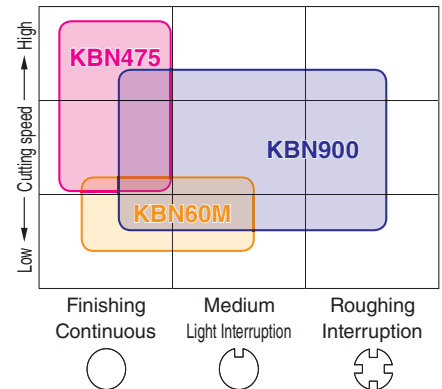
Hard Materials



Sintered Steel



Cast Iron



PCD (Polycrystalline Diamond)



PCD (Polycrystalline Diamond)

PCD (Polycrystalline Diamond) is a synthetic diamond sintered under high temperatures and pressures.

Features

- Applicable for milling of non-ferrous metals and non-metals
- No edge build-up provides high precision machining
- Diversified applications for machining of non-ferrous metals and non-metals
- Finished surface will be rainbow colored
(Because of polycrystalline diamond, a mirror-like finished surface will not be obtained)

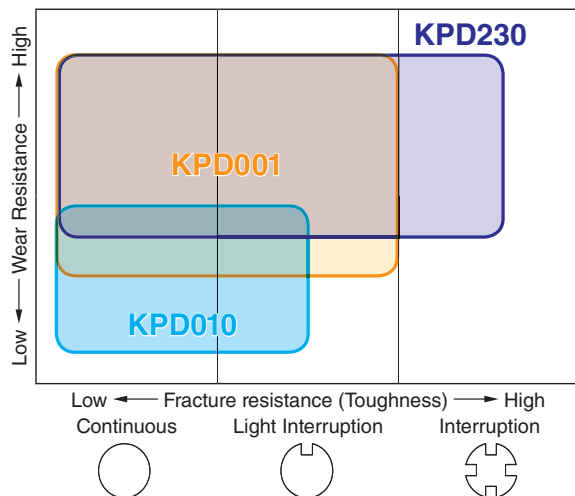
Features of PCD

Classification	Symbol	Ave. grain size (μm)	Advantages and Applications
<div style="border: 1px solid black; padding: 2px; display: inline-block; text-align: center;"> N <small>Non-ferrous Metals</small> </div>	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

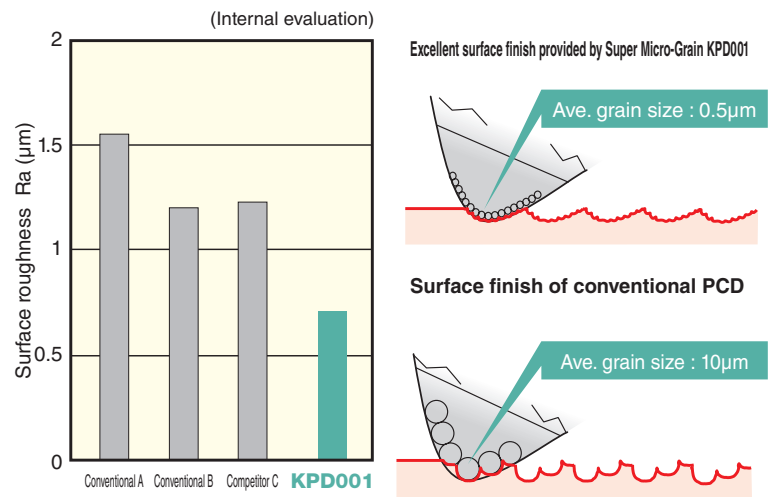
Applications

Workpiece Material	Non-ferrous Metals (Aluminum / Non-ferrous metals / Non-metals)				Difficult-to-cut Materials (Titanium / Titanium alloys)				
	Finishing		Roughing		Finishing		Roughing		
Cutting Range 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)

Insert Grades
Turning
Indexable Inserts
CNC & PCD Tools
External
Small Parts
Machining
Boring
Grooving
Cut-off
Threading
Drilling
Solid Tools
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Insert Grades

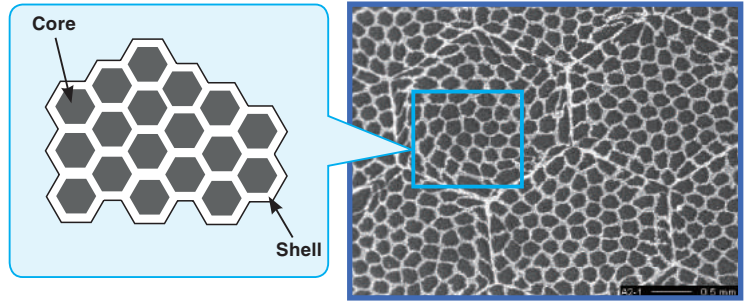
Honeycomb structure CBN / Ceramic

Honeycomb structure CBN / Ceramic

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

Features

- Honeycomb structure CBN / Ceramic 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 materials and ceramic is suitable for heat-resistant alloys

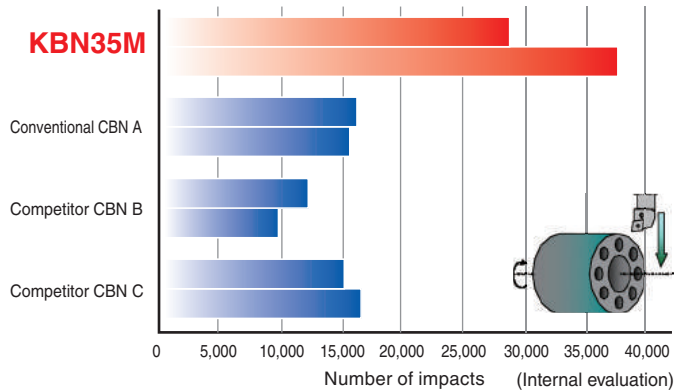
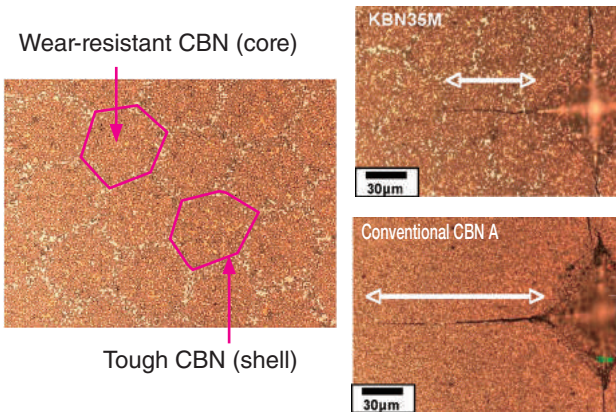


Features of Honeycomb structure CBN / Ceramic

Classification	Symbol	Color	Main Component	Advantages and Applications
H Hard Materials	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) • Heat-resistant MEGACOAT on tough Honeycomb structure CBN • Application : Stable machining of hardened steel at interrupted machining
S Heat-resistant alloys	CF1	Gray	Ceramic	<ul style="list-style-type: none"> • Honeycomb structure ceramic composite material consisting of wear resistant ceramic (core) and tough ceramic (shell) • Application : Machining of heat-resistant alloys like Ni-base heat-resistant alloys

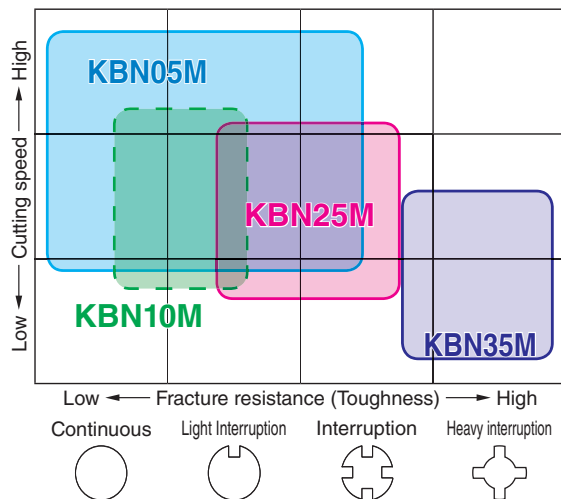
KBN35M (MEGACOAT Honeycomb structure CBN)

- Tough CBN (shell) prevents crack growth

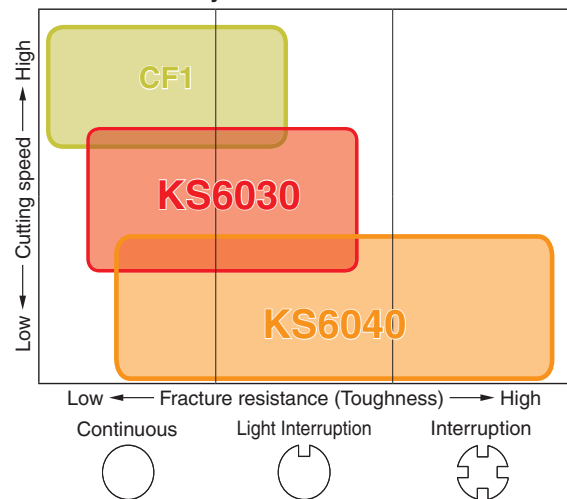


Application Map










- Hard Materials



- Heat-resistant alloys



Insert Material Selection Table

Applications	Cutting Range	P	M	K		N	S		H	Sintered Steel	
		Steel	Stainless steel	Gray Cast Iron	Nodular Cast Iron	Non-ferrous Metals	Heat-resistant alloys	Titanium alloys	Hard Materials		
	Finishing ↑ ↓	TN610		KBN475					KT66	TN610	
		TN6010		KBN60M					A66N	TN60	
		TN620	TN620	KA30	TN60			CF1	PT600M		
		TN60	TN60				KS6040				
		PV710	PV720	PV7005	PV7005	KPD001	KW10				
		PV7010	CA6515	CA5505	CA5505	KPD010	CA6515	KPD001	KBN05M		
		PV720	CA6525	CA310	CA310	PDL010	CA6525	KPD010	KBN10M		
		CA510	PR1125	CA315	CA315	PDL025	PR005S	SW05	KBN25M	KBN570	
		CA515	PR1535	CA315	CA320	KW10	PR015S	SW10	KBN35M	KBN70M	
		CA025P					PR1535	SW25	KBN900		
	Finishing ↑ ↓	CA530									
		TN610								TN610	
		TN6010									TN60
		TN620									
		PV710	TN620								
		PV7010	PV720	CA310	CA310	KPD001	CA6515	KPD001	KBN05M		
		PV720	PR930	CA315	CA315	KPD010	PR1125	KPD010	KBN10M		
		PR930	PR1025	KW10	CA320	PDL010	PR1225	KW10	KBN25M	KBN570	
		PR1005	PR1225		KW10	PDL025	PR1535	PR1535		KBN70M	
		PR1025	PR1535			KW10					
	Large Bore Dia. ↑ ↓	TN610								TN610	
		TN6010								TN60	
		TN620									
		PV710	TN60	KBN475						PT600M	
		PV7010	CA6515	KBN60M							
		PV720	CA6525	PV7005	PV7005	KPD001	CA6515	KPD001	KBN05M		
		CA515	PR1025	CA310	CA310	KPD010	CA6525	KPD010	KBN10M		
		CA525	PR1125	CA315	CA315	PDL010	PR1125	KW10	KBN25M	KBN570	
		CA530	PR1225	KW10	CA320	PDL025	PR1225	SW05		KBN70M	
		PR1025	PR930		KW10	KW10	PR1535	PR1535			
	Large Cutting Dia. ↑ ↓	CR9025	CR9025								
		PR930	PR930								
		PR915	PR915	KW10	KW10	PDL025	KW10	KW10			
		PR1215	PR1215	PR1215	PR1215	KW10	PR1225				
		PR1225	PR1225				PR660				
		PR1535	PR1535								
		PR660	PR660								
	(Depends on the workpiece material)	PR1025	PR1025	KW10	KW10	PDL025	KW10	KW10			
		PR1225	PR1225			KW10	PR1025				
		PR1535	PR1535				PR1225				
	Glossy finish ↑ ↓	TC40N	TC40N								
		TN620	TN620								
		TN90	TN90	PR905	PR905	KPD001	PR915	KPD001	KBN510	TC40N	
		PV7040	PV7040	PR1215	PR1215	PDL025	KW10	KW10	KBN525		
		PR930	PR930	KW10	KW10	KW10	PR1215		PT600M	KBN570	
		PR1115	PR1115	GW15	GW15	GW15	PR1225				
		PR1215	PR1215				PR1535	PR1535			
		PR1225	PR1225								
		PR1625	PR1625								
	Glossy finish ↑ ↓	TC60M	TC60M	KW10	KW10	KW10	KW10	KW10		PR1515	
		PR1115	PR1115	GW15	GW15	GW15	GW15	GW15		PR1115	
		PR930	PR930								
	Wear Resistance ↑ ↓	CA520D		CA415D				PR660			
		PR1225	PR1225	PR1210	PR1210	KW10	PR1225	KW10			
		PR1230	PR830	KW10	KW10	GW15	KW10				
		PR830	PR1535			GW15	GW15				
		PR1535									
	Toughness ↑ ↓	TN100M	CA6535			KPD230	CA6535	KPD230			
		TN620M	PR1225	PR1210	PR1210	KPD001	PR1225	KPD001			
		PR1225	PR1525	PR1510	PR1510	KPD010	PR1535	KW10			
		PR1230	PR830	KW10	KW10	PDL025		PR905			
		PR830	PR1535			KW10		PR1210			
				GW25		PR1535					

* Highlighted materials are recommended choice.

Insert Grades	A
Turning	B
Indexable Inserts	C
CBN & PCD Tools	D
External	E
Small Parts Machining	F
Boring	G
Grooving	H
Cut-off	J
Threading	K
Drilling	L
Solid Tools	M
Milling	N
Tools for Turning Mill	P
Spare Parts	R
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Grade Properties

Cermet

Symbol	Color	Main Component	Coating Layer	Ratio	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	Gray	TiCN	-	6.9	1,550	15.2	9.0	2,500
TN620M	Gray	TiCN	-	6.9	1,550	15.2	9.0	2,500
TN6010	Gray	TiCN	-	6.5	1,700	16.7	7.0	2,000
TN6020	Gray	TiCN	-	6.4	1,500	14.7	10.0	2,500
TN60	Gray	TiCN+NbC	-	6.6	1,600	15.7	9.0	1,760
TN90	Gray	TiCN+NbC	-	6.4	1,450	14.2	10.0	1,960
TN100M	Gray	TiCN+NbC	-	6.7	1,520	14.9	10.5	1,860
TC40N	Gray	TiC+TiN	-	6.0	1,650	16.2	9.0	1,570
TC60M	Gray	NbC	-	8.1	1,500	14.7	10.5	1,670

PVD Coated Cermet

Symbol	Color	Coated Composition	Coating Layer	Ratio	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	Gold	MEGACOAT NANO	Thin coating	6.9	1,550	15.2	9.0	2,500
PV7005	Blackish red	MEGACOAT	Thin coating	6.0	1,650	16.2	8.5	1,470
PV7010	Blackish red	MEGACOAT	Thin coating	6.5	1,700	16.7	7.0	2,000
PV7025	Blackish red	MEGACOAT	Thin coating	6.4	1,500	14.7	10.0	2,500
PV7040	Blackish red	MEGACOAT	Thin coating	6.0	1,650	16.2	9.0	1,570
PV90	Gold	TiN	Thin coating	6.4	1,450	14.2	10.0	1,960

CVD Coated Carbide

Symbol	Color	Coated Composition	Coating Layer	Ratio	Hardness of Substrate		Fracture Toughness (MPa·m ^{1/2})	Transverse Strength (MPa)
					(HV)	(GPa)		
CA310	Rose Gold	TiCN+Al ₂ O ₃ +Ti base	Thick coating	15.0	1,570	15.4	12.0	2,780
CA315	Rose Gold	TiCN+Al ₂ O ₃ +Ti base	Thick coating	15.0	1,570	15.4	12.0	2,780
CA320	Rose Gold	TiCN+Al ₂ O ₃ +Ti base	Thick coating	15.0	1,570	15.4	12.0	2,780
CA415D	Gold	TiCN+Al ₂ O ₃ +TiN	Thick coating	15.0	1,570	15.4	12.0	2,780
CA420M	Gold	TiCN+Al ₂ O ₃ +TiN	Thick coating	14.5	1,600	15.8	13.0	3,400
CA4120	Gold	TiCN+Al ₂ O ₃ +TiN	Thick coating	14.7	1,550	15.2	12.0	2,750
CA4505	Blackish gray	TiCN+Al ₂ O ₃	Thick coating	15.0	1,790	17.5	9.5	2,350
CA4515	Blackish gray	TiCN+Al ₂ O ₃	Thick coating	15.0	1,570	15.4	12.0	2,780
CA510	Gold	TiCN+Al ₂ O ₃ +TiN	Thick coating	14.5	1,470	14.4	11.5	2,500
CA515	Gold	TiCN+Al ₂ O ₃ +TiN	Thick coating	14.4	1,440	14.1	12.5	2,650
CA520D	Gold	TiCN+Al ₂ O ₃ +TiN	Thick coating	14.7	1,370	13.4	16.0	3,100
CA025P	Gold	TiCN+Al ₂ O ₃ +TiN	Thick coating	14.2	1,400	13.7	13.5	2,800
CA525	Gold	TiCN+Al ₂ O ₃ +TiN	Thick coating	14.2	1,360	13.3	13.5	2,750
CA530	Gold	TiCN+Al ₂ O ₃ +TiN	Thick coating	13.9	1,340	13.1	14.5	2,850
CA5505	Gold	TiCN+Al ₂ O ₃ +TiN	Thick coating	14.7	1,730	17.0	10.0	2,540
CA5515	Gold	TiCN+Al ₂ O ₃ +TiN	Thick coating	14.7	1,550	15.2	12.0	2,750
CA5525	Gold	TiCN+Al ₂ O ₃ +TiN	Thick coating	14.5	1,400	13.7	12.0	2,780
CA5535	Gold	TiCN+Al ₂ O ₃ +TiN	Thick coating	14.1	1,340	13.1	16.5	2,970
CA6515	Gold	TiCN+Al ₂ O ₃ +TiN	Thin coating	14.7	1,530	15.0	12.0	2,780
CA6525	Gold	TiCN+Al ₂ O ₃ +TiN	Thin coating	14.7	1,370	13.4	16.0	3,100
CA6535	Gold	TiCN+Al ₂ O ₃ +TiN	Thin coating	14.3	1,320	12.9	16.0	3,700
CR9025	Gold	TiCN+TiN	Thick coating	14.5	1,400	13.7	12.0	2,780

PVD Coated Carbide

Symbol	Color	Coated Composition	Coating Layer	Ratio	Hardness of Substrate		Fracture Toughness (MPa·m ^{1/2})	Transverse Strength (MPa)
					(HV)	(GPa)		
PR005S	Blackish gray	MEGACOAT HARD	Thin coating	15.0	1,750	17.2	8.0	2,000
PR015S	Blackish gray	MEGACOAT HARD	Thin coating	14.9	1,680	16.5	9.0	2,400
PR630	Gold	TiN	Thin coating	12.5	1,500	14.7	11.0	2,160
PR660	Gold	TiN	Thin coating	13.7	1,450	14.2	13.0	2,250
PR830	Gold	TiAlN+TiN	Thin coating	13.7	1,450	14.2	13.0	2,250
PR905	Bluish violet	TiAlN	Thin coating	14.8	1,720	16.8	9.0	2,450
PR915	Bluish violet	TiAlN	Thin coating	14.1	1,700	16.7	11.0	4,140
PR930	Reddish gray	TiCN	Thin coating	14.1	1,700	16.7	11.0	4,140
PR1005	Reddish gray	TiCN	Thin coating	14.9	1,800	17.6	10.0	3,300
PR1025	Reddish gray	TiCN	Thin coating	14.5	1,600	15.8	13.0	3,400
PR1115	Purple red	TiAlN	Thin coating	14.7	1,700	16.7	11.0	3,000
PR1125	Purple red	TiAlN	Thin coating	14.5	1,600	15.8	13.0	3,400
PR1210	Blackish red	MEGACOAT	Thin coating	14.8	1,720	16.8	9.0	2,450
PR1215	Blackish red	MEGACOAT	Thin coating	14.7	1,700	16.7	11.0	3,000
PR1225	Blackish red	MEGACOAT	Thin coating	14.5	1,600	15.8	13.0	3,400
PR1230	Blackish red	MEGACOAT	Thin coating	13.7	1,450	14.2	13.0	2,250
PR1305	Blackish red	MEGACOAT	Thin coating	15.0	1,790	17.5	9.5	2,350
PR1310	Blackish red	MEGACOAT	Thin coating	14.8	1,720	16.8	9.0	2,450
PR1325	Blackish red	MEGACOAT	Thin coating	14.7	1,370	13.4	16.0	3,100
PR1425	Blackish red	MEGACOAT NANO	Thin coating	14.5	1,600	15.8	13.0	3,400
PR1510	Reddish green	MEGACOAT NANO	Thin coating	14.8	1,720	16.8	9.0	2,450
PR1515	Reddish green	MEGACOAT NANO	Thin coating	14.7	1,700	16.7	11.0	3,000
PR1525	Reddish green	MEGACOAT NANO	Thin coating	14.5	1,600	15.8	13.0	3,400
PR1535	Reddish green	MEGACOAT NANO	Thin coating	14.3	1,320	12.9	16.0	3,700
PR1625	Reddish green	MEGACOAT NANO	Thin coating	14.5	1,600	15.8	13.0	3,400

Carbide

Symbol	Color	Main Component	Ratio	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
GW15	Gray	WC+Co	14.7	1,700	16.7	11.0	3,000
GW25	Gray	WC+Co	14.5	1,600	15.8	13.0	3,400
SW05	Gray	WC+Co	15.0	1,790	17.5	9.5	2,350
SW10	Gray	WC+Co	14.8	1,720	16.8	9.0	2,450
SW25	Gray	WC+Co	14.7	1,370	13.4	16.0	3,100

DLC Coated Carbide

Symbol	Color	Coated Composition	Coating Layer	Ratio	Hardness of Substrate		Fracture Toughness (MPa·m ^{1/2})	Transverse Strength (MPa)
					(HV)	(GPa)		
PDL010	Rainbow color	C	Thin coating	15.0	1,650	16.2	10.0	1,470
PDL025	Rainbow color	C	Thin coating	14.5	1,600	15.8	13.0	3,400

Insert Grades

Turning

CBN & PCD Tools

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