






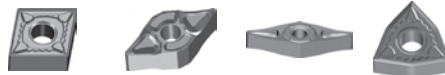












TURNING









General turning inserts

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Negative inserts with hole

Application	Chipbreaker	Precision	Recommended cutting parameters	Feature/Shape of insert
For finishing	SF 	M	$ap=0.05\sim1(\text{mm})$ $fn=0.05\sim0.35(\text{mm/r})$	Recommended chipbreaker for finishing of P-type materials Double-sided chipbreaker with M-level tolerance has outstanding performance in finishing, achieving good surface quality. 
	DF 	M	$ap=0.3\sim2(\text{mm})$ $fn=0.05\sim0.35(\text{mm/r})$	Recommended chipbreaker for finishing of M-type materials Double-sided chipbreaker with M-level tolerance has sharp edges, which can effectively cut off stainless steel and avoid adhering and surface hardening, achieving high surface quality. 
	EF 	M	$ap=0.05\sim1(\text{mm})$ $fn=0.05\sim0.3(\text{mm/r})$	Recommended chipbreaker for finishing of S-type materials Double-sided chipbreaker with M-level tolerance can prevent wear and hardening to achieve high machining precision and good surface quality. 
	NF 	E	$ap=0.1\sim1(\text{mm})$ $fn=0.05\sim0.3(\text{mm/r})$	Recommended chipbreaker for finishing of S-type materials Double-sided chipbreaker with E-level tolerance can prevent wear and hardening to achieve high machining precision and good surface quality. 
	NGF 	E	$ap=0.1\sim1(\text{mm})$ $fn=0.05\sim0.3(\text{mm/r})$	Recommended chipbreaker for finishing of S-materials E-class double side chip breaker with excellent sharp edge. High positioning accuracy, light cutting force. -NGF is recommended chip breaker for S series material general finishing. 
	WGF 	M	$ap=0.5\sim3.0(\text{mm})$ $fn=0.05\sim0.5(\text{mm/r})$	Wiper chipbreaker for finishing Double-sided chipbreaker with M-level tolerance, finishing chipbreaker with wiper designed can achieve high surface quality. With excellent chip breaking ability, it is suitable for machining at high feed and small depth of cut. 
For semi-finishing	DM 	M	$ap=1.5\sim5(\text{mm})$ $fn=0.15\sim0.5(\text{mm/r})$	Recommended chipbreaker for semi-finishing of P-type materials Double-sided chipbreaker with M-level tolerance produces small cutting forces and has large chip breaking range, which ensures good performance for machining highly adhesive alloy steel. 
	PM 	M	$ap=1.5\sim5(\text{mm})$ $fn=0.15\sim0.5(\text{mm/r})$	Recommended chipbreaker for semi-finishing of P-type materials Double-sided chipbreaker with M-level tolerance has higher strength of cutting edge than chipbreaker DM. It is suitable for semi-finishing under unstable working conditions as well as machining cast iron with small cutting forces. 
	NM 	M	$ap=0.1\sim1.5(\text{mm})$ $fn=0.05\sim0.3(\text{mm/r})$	Recommended chipbreaker for semi-finishing of S-type materials Double-sided chipbreaker with M-class tolerance keeps high precision after inserts are turned, with good capability to prevent wear and hardening to achieve higher machining efficiency than chipbreaker NF. 










Negative inserts with hole

Application	Chipbreaker	Precision	Recommended cutting parameters	Feature/Shape of insert
For semi-finishing	WGM	M	$ap=1.0\sim5.0(\text{mm})$ $fn=0.15\sim0.80(\text{mm/r})$	Wiper chipbreaker for semi-finishing Double-sided chipbreaker with M-level tolerance, semi-finishing chipbreaker with wiper designed, perfect combination of good wiper result and sturdy cutting edge structure, which perfectly meet 
	EM			Recommended chipbreaker for semi-finishing of M-type materials Double-sided chipbreaker with M-level tolerance can solve the processing problems such as chip breaking and adhering of stainless steel, achieving higher machining efficiency than chipbreaker EF. 
	All round			From semi-finishing to roughing of P-type, M-type, K-type materials Double-sided chipbreaker with M-level tolerance has good cutting edge strength and wide application. 
Light-load roughing	DR Double-side	M	$ap=3\sim12(\text{mm})$ $fn=0.3\sim0.8(\text{mm/r})$	Recommended chipbreaker for light roughing of P-type and K-type materials Double-sided chipbreaker with M-level tolerance is the first choice for light roughing, can achieve high evacuation rate and efficiency of cutting edge. 
	LR Single-side			Recommended chipbreaker for light-load roughing of P-type materials Single-sided general chipbreaker with M-level tolerance, has wide chip breaking range and sharp cutting edge is designed with inclined angle, which enables it to cut lightly and easily and control the chipping flow direction. Chip-loaded-stages can reduce the contact area with chips, so that heat can easily be dissipated. 
For roughing	DR Single-side	M	$ap=3\sim15(\text{mm})$ $fn=0.3\sim0.8(\text{mm/r})$	Recommended chipbreaker for roughing of P-type materials Single-sided chipbreaker with M-level tolerance has high security of cutting edge, which can achieve high feed rate and low cutting forces at great cutting depth and high feed rate. 
	ER Single/Double side			Recommended chipbreaker for roughing of M-type materials Single / double-sided chipbreaker with M-level tolerance has good capacity of impact-resistance. It is designed to achieve balance between security and sharpness of the cutting edge, and it can achieve high efficiency by preventing the problems of adhering and high cutting heat when roughing stainless steel. 
	SNR		$ap=0.5\sim3(\text{mm})$ $fn=0.05\sim0.3(\text{mm/r})$	Recommended chipbreaker for S-material high efficiency roughing M-level double-sided chipbreaker perfectly combines sharpness and strength of the cutting edge, with small cutting resistance and high edge strength can effectively reduce groove wear. SNR is recommended chipbreaker for high depth roughing of S- materials. 









Negative inserts with hole

Application	Chipbreaker	Precision	Recommended cutting parameters	Feature/Shape of insert
General turning	HPR Single-side	M	$ap=3\sim17(\text{mm})$ $fn=0.5\sim1.2(\text{mm/r})$	Recommended chipbreaker for heavy-load machining of P-type materials Single-sided chipbreaker with M-level tolerance, strong cutting edge. Multi-stages chipbreaker ensures the flowing of chip and heat dissipation of insert. It is suitable for machining under unstable and relatively bad working condition, especially for external roughing of work piece with a rough oxidized surfaces. 
	Without chipbreaker			For cast iron machining Double-sided chipbreaker with M-level tolerance has high cutting edge strength. It can overcome inferior factors such as interruption and vibration, etc. when machining cast iron. 
	Without chipbreaker	G	$ap=0.05\sim0.5(\text{mm})$ $fn=0.05\sim0.3(\text{mm/r})$	For machining of non-ferrous metal and high-hardness metal G-level tolerance is the best choice for machining non-ferrous metals and high-hardness material by welding PCBN and PCD material to cemented carbide substrate. 
	Without chipbreaker			For roughing of K-, H- high-temperature alloy roughing Sialon Ceramics, V-positioning, solution for high-speed machining of cast iron, hardened steel and superalloy. 
Cast iron machining	Without chipbreaker	M	$ap=0.3\sim12(\text{mm})$ $fn=0.05\sim0.6(\text{mm/r})$	
Super hard inserts	Without chipbreaker	G	$ap=0.05\sim0.5(\text{mm})$ $fn=0.05\sim0.3(\text{mm/r})$	
Ceramic inserts	Without chipbreaker	G	$ap=0.1\sim3(\text{mm})$ $fn=0.05\sim0.4(\text{mm/r})$	

Positive inserts with hole

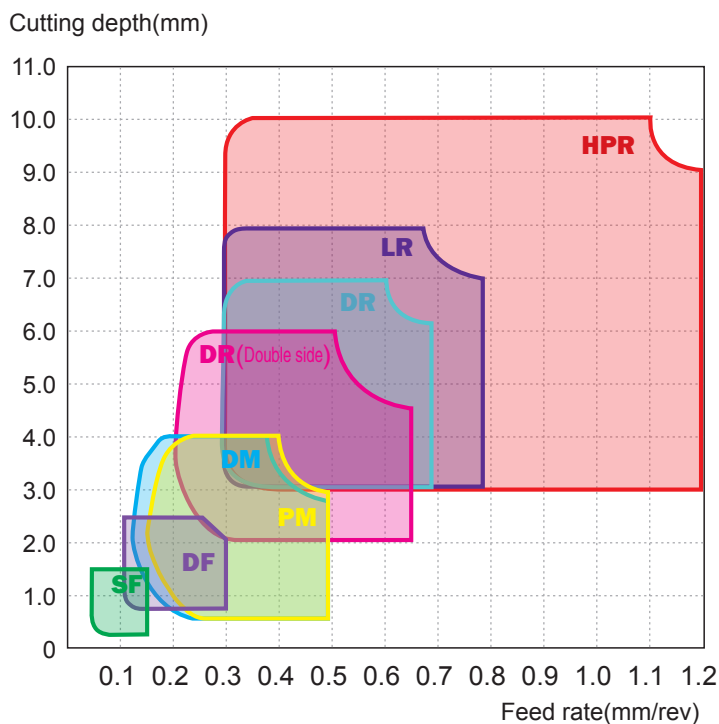
Application	Chipbreaker	Precision	Recommended cutting parameters	Feature/Shape of insert
For extra finishing	USF	G	$ap=0.02\sim1.5(\text{mm})$ $fn=0.01\sim0.08(\text{mm/r})$	Precision turning chipbreaker With G-level tolerance, large rake angle, sharp cutting edge, for soft cutting action, this is the first choice for precision turning of small shaft parts. 
	R/L			Recommended chipbreaker for precise boring inserts With G-level tolerance, sharp cutting edge and small nose radius, it can effectively reduce the vibration in machining and is suitable for boring and external turning. 
	SF			First choice for finishing with high requirements on chipbreaker With G-level tolerance, it is the first choice for precise finishing due to its excellent performance on chip breaking. 
For finishing	HF	M	$ap=0.1\sim2(\text{mm})$ $fn=0.05\sim0.3(\text{mm/r})$	Chipbreaker for finishing with wide application With M-level tolerance, it is suitable for internal and external finishing of various materials such as steel and cast iron. 
	EF			Recommended chipbreaker for finishing of M-type materials With M-level tolerance, it has sharp cutting edges and is suitable for cutting adhesive materials such as stainless steel, soft steel, etc. 
	NF	E G	$ap=0.05\sim1(\text{mm})$ $fn=0.05\sim0.2(\text{mm/r})$	Recommended chipbreaker for finishing S-type materials With E and G-level tolerance and sharp cutting edges, it is suitable for internal and external finishing of high-temperature alloy materials. 
	NGF			Recommended chipbreaker for S-material general finishing E, G grade accuracy, for inner hole finishing of S materials. 
	HM	M	$ap=1\sim4(\text{mm})$ $fn=0.2\sim0.5(\text{mm/r})$	Chipbreaker for semi-finishing with wide application With M-level tolerance, it is suitable for internal and external semi-finishing of materials like steel, cast iron, etc. 
For semi-finishing	EM			Recommended chipbreaker for semi-finishing of M-Type materials With M-level tolerance, it has higher hardness of cutting edge than EF and can achieve higher efficiency. 

Positive inserts with hole

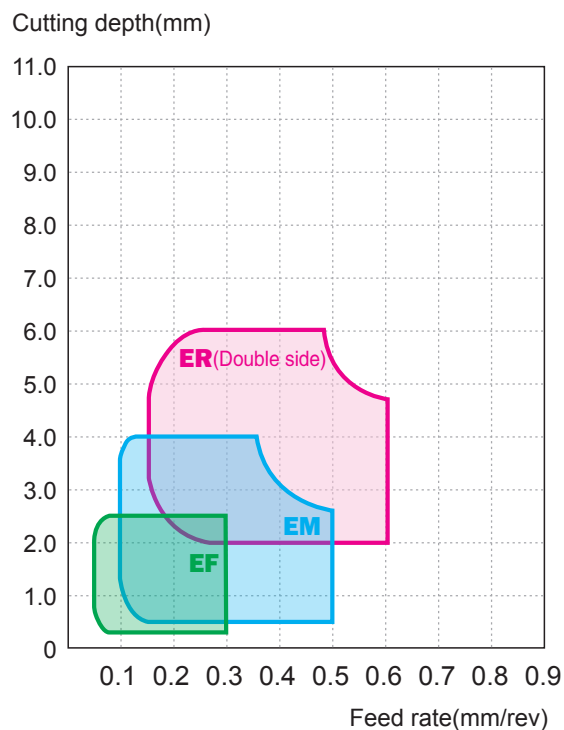
Application	Chipbreaker	Precision	Recommended cutting parameters	Feature/Shape of insert
For semi-finishing	All round	M	$a_p=1\sim8(\text{mm})$ $f_n=0.2\sim0.6(\text{mm/r})$	Recommended chipbreaker for semi-finishing of M-type materials With M-level tolerance, it is suitable for profile machining materials like steel, cast iron, etc. 
	Without chipbreaker			
Cast iron machining	Without chipbreaker	M G	$a_p=0.3\sim12(\text{mm})$ $f_n=0.05\sim0.5(\text{mm/r})$	Chipbreaker for machining of cast iron With M- and G-level tolerance, it has high cutting edge strength and is suitable for internal and external machining of cast iron. 
	Without chipbreaker			
For roughing	HR	M	$a_p=3\sim7(\text{mm})$ $f_n=0.3\sim0.7(\text{mm/r})$	General chipbreaker for roughing With M-level tolerance, it is suitable for both internal and external roughing of materials such as steel, stainless steel, cast iron, etc. 
	Special chipbreaker			
	Special chipbreaker	M	$a_p=3\sim10(\text{mm})$ $f_n=0.3\sim1.2(\text{mm/r})$	Recommended chipbreaker for heavy machining of P-type materials Single-sided with M-level tolerance, it has good cutting edge strength with high security. It is the first choice for profile roughing. 
	SNR			
	SNR	M	$a_p=0.5\sim3(\text{mm})$ $f_n=0.05\sim0.3(\text{mm/r})$	Recommended chipbreaker for S-material high-efficiency roughing M-level accuracy, for inner hole roughing of S materials. 
	SNR			
For Al machining	LC	G	$a_p=0.02\sim4.8(\text{mm})$ $f_n=0.05\sim0.5(\text{mm/r})$	Chipbreaker for machining of Al alloy With G-level tolerance, large rake angle and clearance angle make the cutting edge sharper, ensuring easy and fast cutting while remaining effective chip breaking. 
	LC			
	LH	G	$a_p=0.1\sim8(\text{mm})$ $f_n=0.1\sim0.5(\text{mm/r})$	Special chipbreaker for machining of Al alloy With G-level tolerance, large rake angle and polishing treatment on surface, it can effectively prevent built-up edge and achieve high workpiece surface quality while maintaining long life. 
	LH			
Super hard inserts	Without chipbreaker	G	$a_p=0.05\sim0.5(\text{mm})$ $f_n=0.05\sim0.3(\text{mm/r})$	Special chipbreaker for non-ferrous metals and materials with high hardness With G-level tolerance, it is the best choice for machining of non-ferrous metals and materials with high-hardness by welding PCBN and PCD material to cemented carbide substrate. 
	Without chipbreaker			

Chip breaking range reference for general turning inserts

Negative inserts

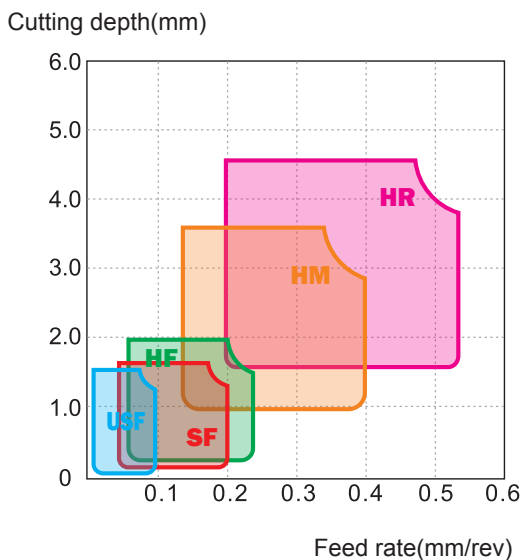


► Workpiece material: 45# steel

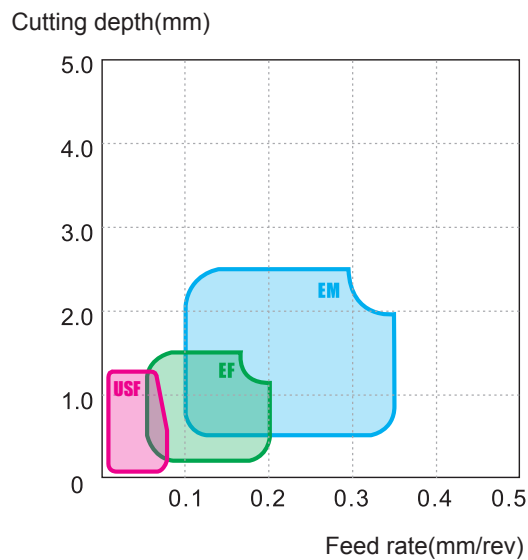


► Workpiece material: stainless steel (1Cr18Ni9Ti)

Positive inserts



► Workpiece material: 45# steel



► Workpiece material: stainless steel (1Cr18Ni9Ti)

Cutting test for chip breaking range of general turning inserts

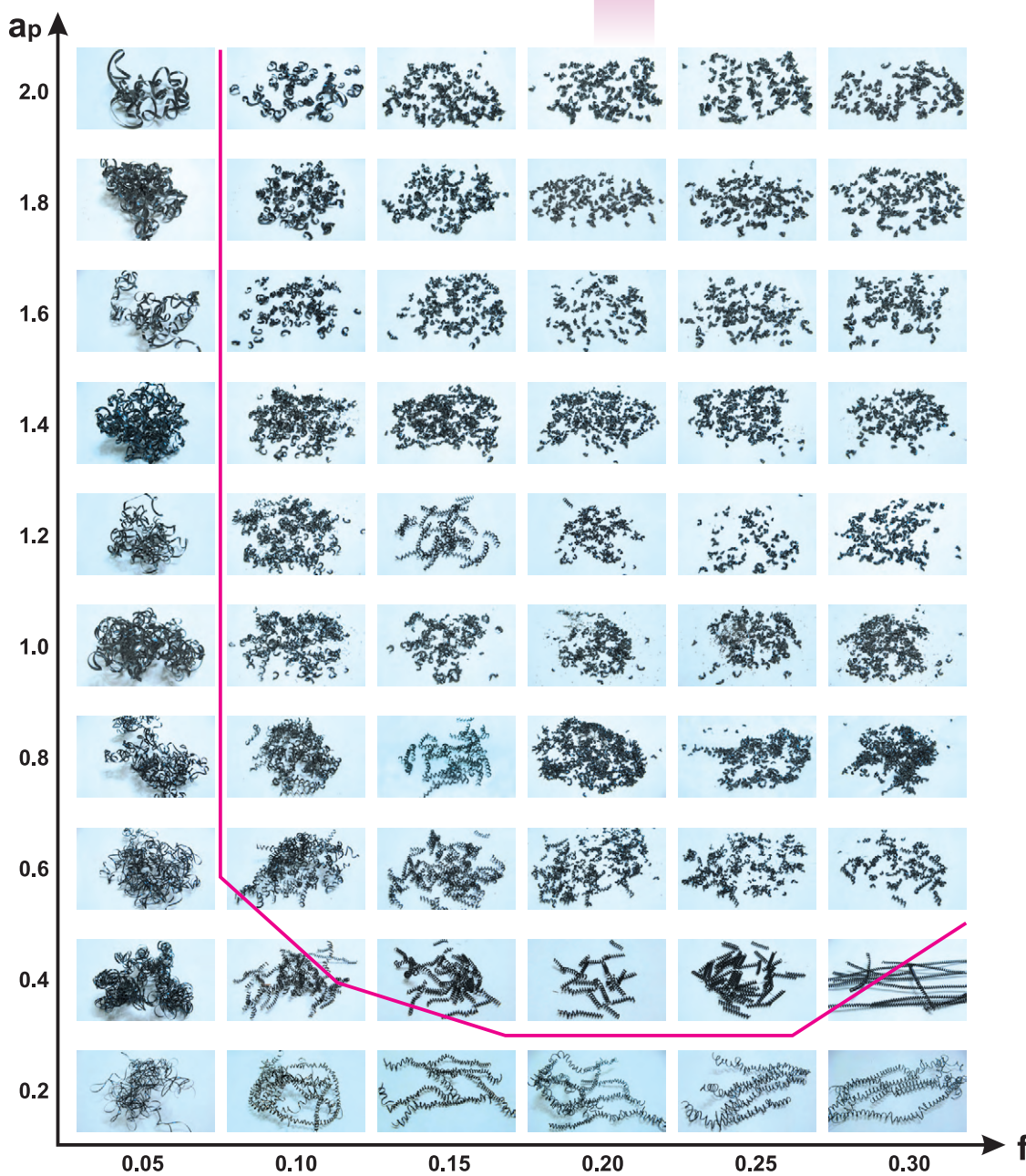
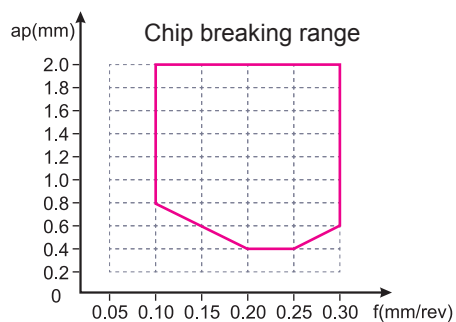
Case

Insert: CNMG120408-DF

Toolholder: PCLNL2525M12

Workpiece material: 45# steel

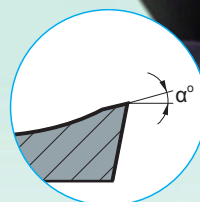
Cutting speed: 200(m/min)



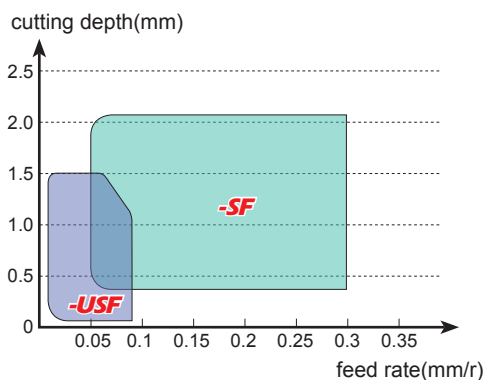
-USF

Precision turning chipbreaker

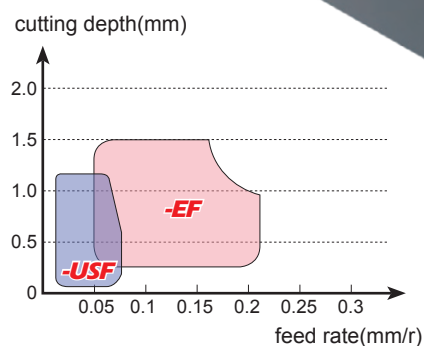
- Effective chip control due to the proper chipbreaker.
- Large rake angle makes cutting easier and faster.
- Nose radius precision controlled within 0.02mm for excellent machining precision.
- Special surface after-treatment for better surface quality.
- High strength screw clamping ensures good repeatability and accuracy.



Application range of USF chipbreaker



Workpiece material: 42CrMo



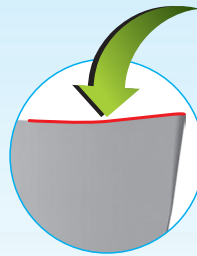
Workpiece material: 1Cr18Ni9Ti

-LC

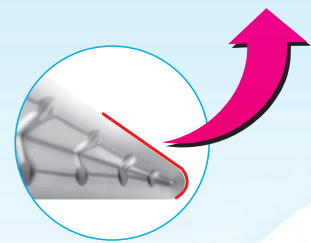
chipbreaker for aluminum

- LC inserts are designed with a special chipbreaker. Large rake angle and clearance angle make the cutting edge sharper, ensuring easier cutting while remaining effective chip breaking.
- Achieved the mirror rake face after special treatment. Reduced the friction resistance, and stick free. Accordingly, make the chip removal fluently and improve the surface quality and tool life.
- The G-class tolerance of insert, higher Repeated Position Accuracy, at the same time, it can effectively avoid the vibration during the machining process.

Optimized inclined angel makes controlling the chipping flow direction valid.

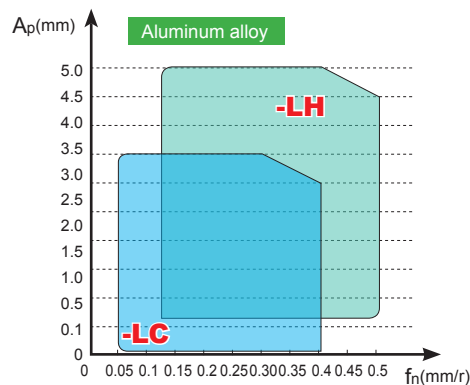
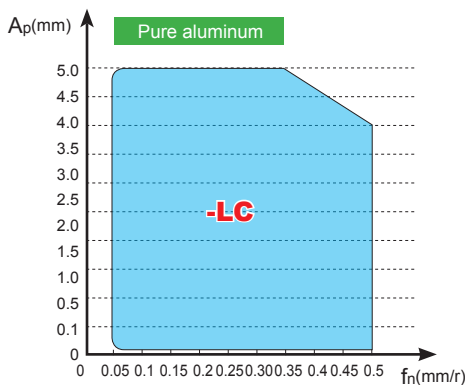


Smooth connection of insert nose and cutting edge makes rake face smoother.



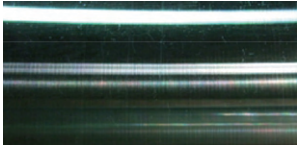
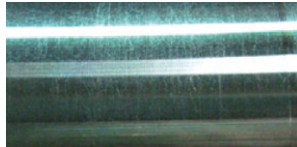


-LC and -LH chipbreaker characteristics and machining range

- LC chipbreaker can be used in machining of pure Al, while -LH chipbreaker can not.
- LC chipbreaker expand the chip breaking range of Al alloy machining.

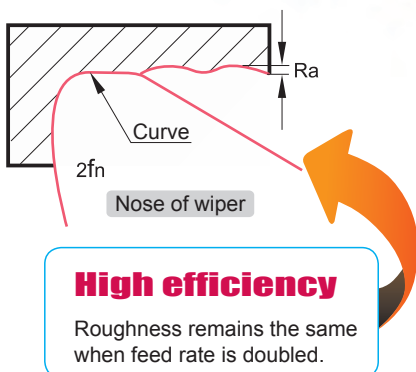


Workpiece material: Pure aluminum

Cutting parameters	V=350m/min Ap=0.2mm F=0.2mm/r	
Chips		
Surface quality		
	-LC chipbreaker	similar products from overseas manufacturers
	<ul style="list-style-type: none"> -LH chipbreaker is more suitable for machining aluminum alloy in condition of large cutting depth and high feed rate. -LC chipbreaker is more suitable for machining aluminum alloy in condition of small cutting depth and low feed rate. -LC chipbreaker can be used in machining pure aluminum. 	

-WGF/WGM

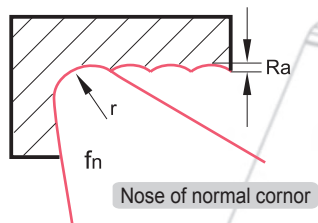
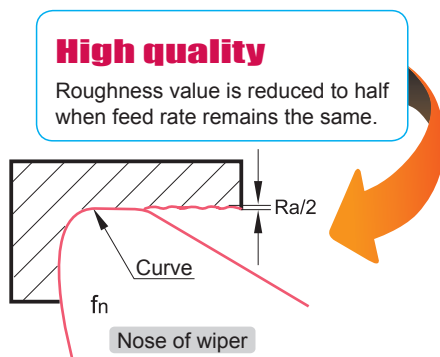
chipbreaker series Turning inserts with wiper



Wiper is assembled by three curves to form a circular arc edge. The nose of wiper provides less profile height on the surface that is formed by the cutting edge, resulting in a smooth turning surface.

Inserts with wiper has high efficiency when used for finish and semi-finish turning. The surface quality remains the same even at double feed rate.

Wiper technique =
high machining efficiency + high surface quality



When used for finishing, it can improve roughness of workpiece surface and achieve turning instead of grinding.

When used for semi-finishing, efficiency could be improved by doubling the feed rate, the roughness of workpiece surface remaining the same.

Guide to use

● Select reasonable approach angle of the tools

Minor angle being close to 0 degree is the reason that inserts with wiper can reduce roughness of the surface, which is determined by the shape of insert and approach angle of the tool holder. Therefore, acceptable roughness of surface is the result of reasonable approach (minor) angle. The finishing function of wiper would be reduced or invalid if unreasonable approach (minor) angle is chosen. For example, the approach angle should be 95° for CNMG / WNMG inserts, while 93° is the best for DNMX.TNMX inserts.

● Be careful with DNMX / TNMX inserts

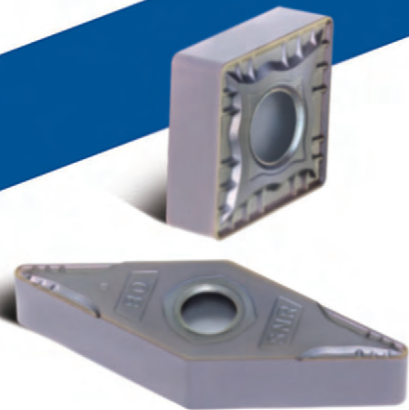
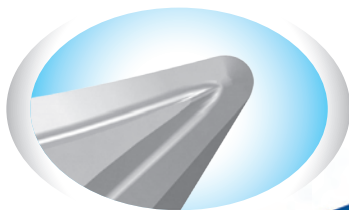
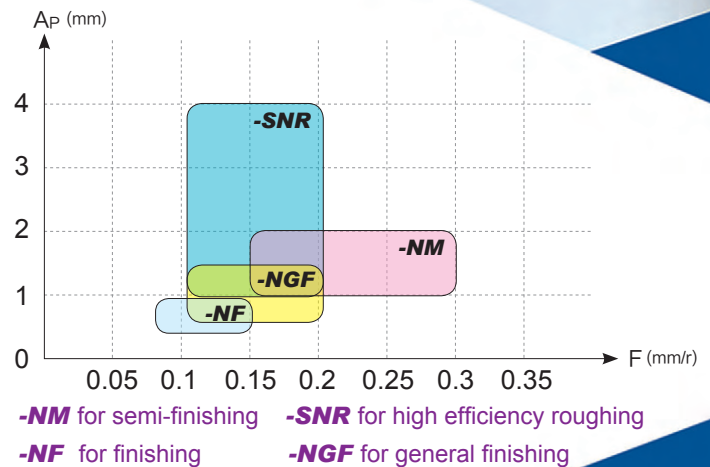
DNMX / TNMX inserts with wiper don't have wide application. It cannot achieve a wiper result when minor angle is not 0 degree, like chamfer and profile surface, and will even cause over-cutting or no-cutting on workpiece, affecting the shape and size precision of workpiece. Please contact technical service regarding these problems.

S- Ni-based Superalloy Machining Difficulties Overcame

Features of Ni-based superalloy machining


- High cutting resistance (containing a large amount of alloying elements, severe hardening, great plastic deformation ;
- High cutting temperature;
- Severe wear of inserts.

Chipbreaker for machining of Ni-based superalloy should have tough and sharp insert nose, smooth rake face and proper inclination angle.



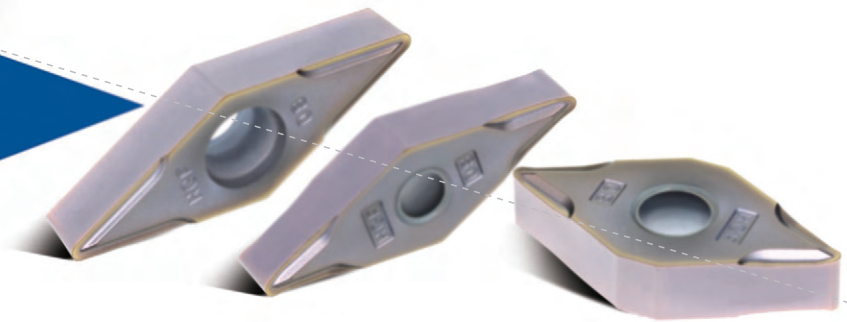
-SNR Chipbreaker for roughing with large depth of cut

- Positive rake angle design, sharp cutting edge, low cutting resistance, effectively reducing groove wear;
- Cutting edge with variable rake angles increase cutting edge strength at large depths of cut. Edge strength increases as the depth of cut increases;
- Large slot width combined with unique edge rib design not only provides excellent chip breaking performance but also can effectively improve edge strength.



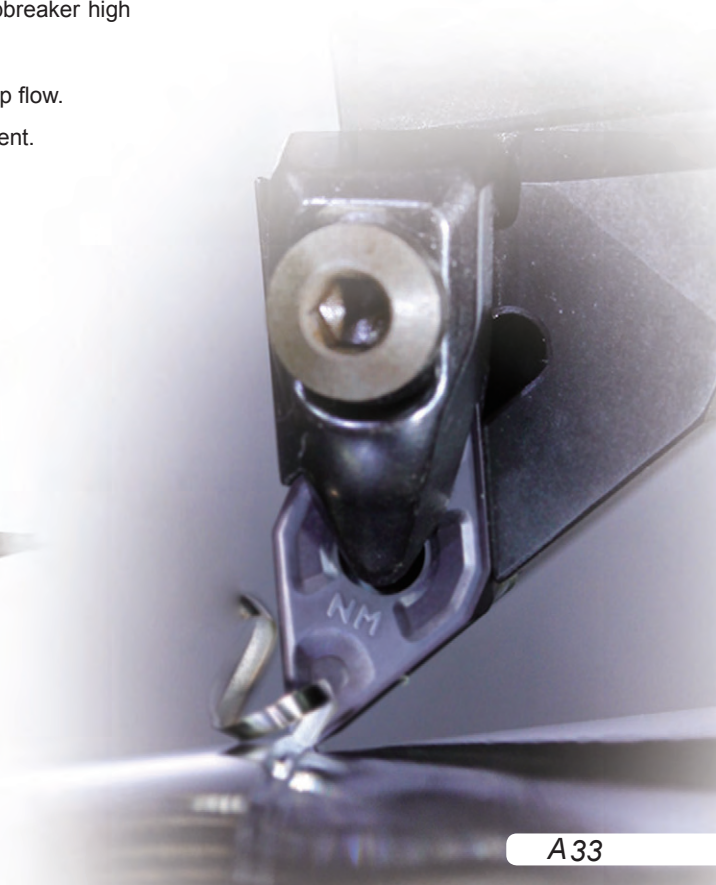
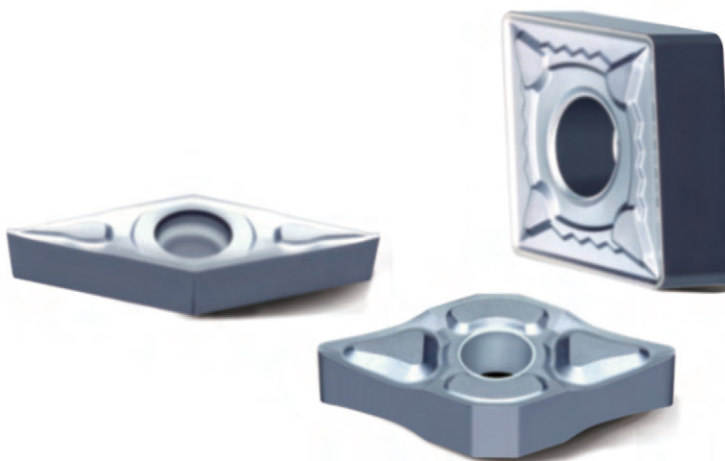
-NGF Chipbreaker for General Finishing

- Proper inclination angle design, sharp cutting edge, small cutting resistance;
- E-level tolerance of insert, high clamping accuracy, proper chipbreaker width, good chip breaking performance, excellent surface quality;
- Special edge treatment, high wear resistance.



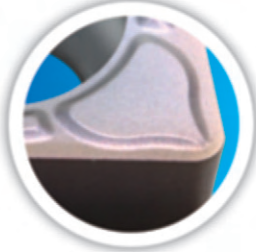
-NFINM Chipbreaker for General Finishing

- -NF chipbreaker has sharp cutting edge, while -NM chipbreaker high cutting edge strength.
- Smooth surface of chipbreaker ensures unobstructed chip flow.
- High wear resistance of cutting edge after special treatment.



-EF -EM -ER

Specially designed for machining intensively adhesive and high-plasticity materials such as stainless steel, etc



-EF

Rake angle and inclined angle are specially designed for intensively adhesive stainless steel and high-plasticity materials which are hard to be machined. Sharp cutting edge enables it to cut lightly and easily and achieve good surface quality by well controlling chip breaking. It is especially suitable for finishing these kinds of materials.



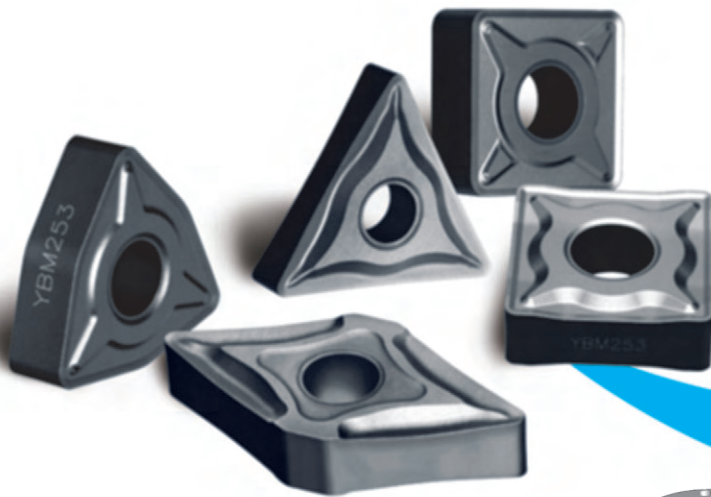
-EM

Inserts meet the requirements of machining intensively adhesive materials. Impact resistance of cutting edge is improved in addition to sharpness, which makes it suitable for semi-finishing and intermittent machining of adhesive materials such as austenitic stainless steel, etc.

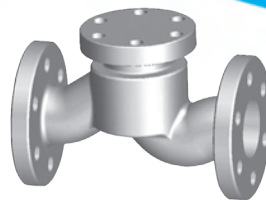
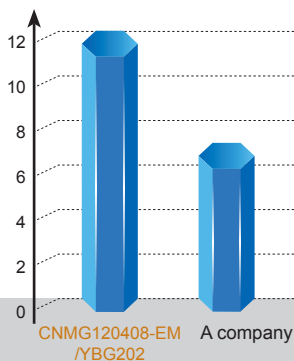


-ER

Specially designed double rake angle with wide land achieves balance between edge security and sharpness, and effectively reduces cutting resistance and wear on groove.



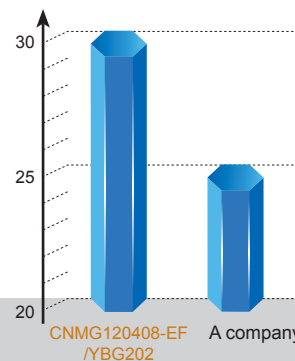
Number of machined parts / Cutting edge



Machining external of valve

Machining end surface of valve (intermittent machining)
Workpiece diameter: 135mm
Rotating speed: 350rpm
Feed rate: 0.25mm/r
Cutting depth: 1.5mm

Number of machined parts / Cutting edge



Machining external of valve
Workpiece diameter: 89mm
Rotating speed: 635rpm
Feed rate: 0.15mm/r
Cutting depth: 1.0mm



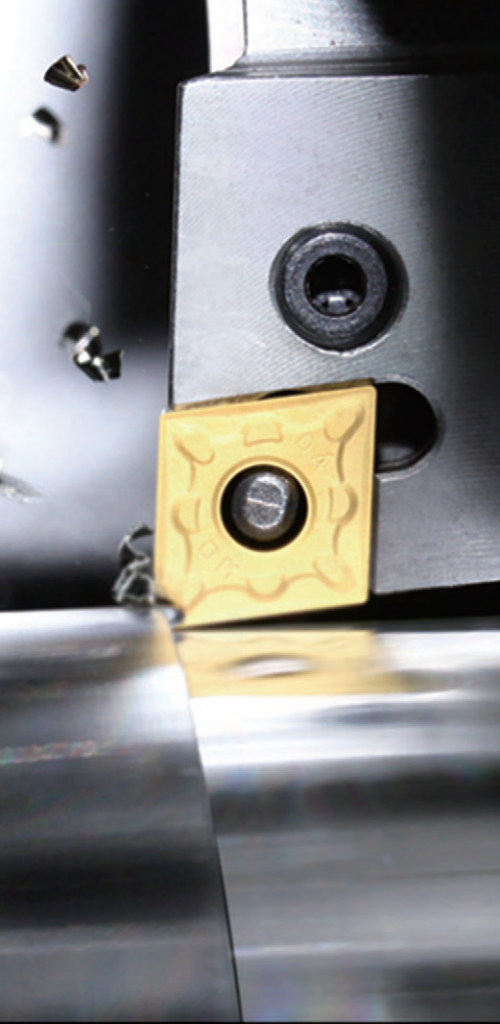
-SF Chipbreaker for finishing

Unique nose design and sharp cutting edge lead to small cutting resistance and effectively reduce vibration of the tool holder.

With high re-positioning precision, the insert is compatible with specially developed cemented carbide tool holders, which can increase the capability of vibration resistance and improve machining quality.

Special treatment on insert's surface can reduce the possibility of chips adhering to the rake face of insert. Good performance of chip breaking and chip flowing ensures improved surface quality of workpiece.

By adopting excellent grade, it is suitable for extra finishing of various materials.



YBC151

The combination of substrate with excellent wear resistance and coating composed of MT-TiCN, thick layer of Al₂O₃ and TiN makes it suitable for finishing steel.

YBC251

The substrate with good toughness and high security of cutting edge, in optimal combination with coating composed of MT-TiCN, thick layer of Al₂O₃ and TiN makes it suitable for steel semi-finishing.

YBC351

The best combination of substrate with high wear resistance and coating composed of MT-Ti (CN), thick Al₂O₃ layer and TiN makes it suitable for finishing and semi-finishing of cast iron materials.

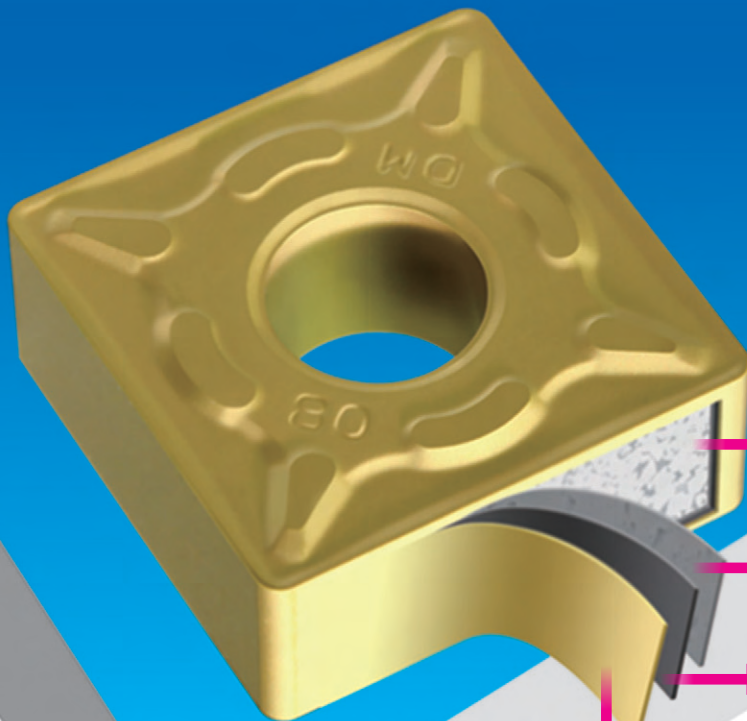
YBM151

Substrate with special structure, in combination with coating composed of TiCN, thin Al₂O₃ layer and TiN, with excellent resistance against diffusive wear and plastic deformation makes it suitable for finishing, semi-finishing and roughing of stainless steel.

YBM251

Combination of substrate with good toughness and strength and coating composed of TiCN, thin Al₂O₃ layer and TiN makes it suitable for semi-finishing and roughing of stainless steel.

Coated Cemented Carbide **CVD**



YBC251 Coating

Thanks to the technology of gradient sintering, impact resistance of cutting edge and wear resistance are improved which lead to improved capability of cutting edge against damage.

Carbide with special crystal structure improves the Red Hardness of substrate and strengthens heat resistance of insert.

TiCN layer acts against abrasion, which leads to the best wear resistance of the flank.

Special structure of Al₂O₃ deposit layer acts as a thermal barrier and strengthens the capability of substrate against plastic deformation under dry and high-speed cutting conditions.

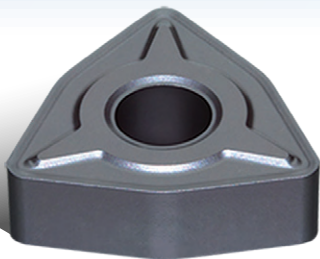
Golden surface of TiN can reduce friction and enable easy distinction of the variety of wear.

BLACK DIAMOND INSERTS

Innovation of machining techniques for stainless steel turning



YBM153



Best choice for roughing of stainless steel with high-speed under good working condition

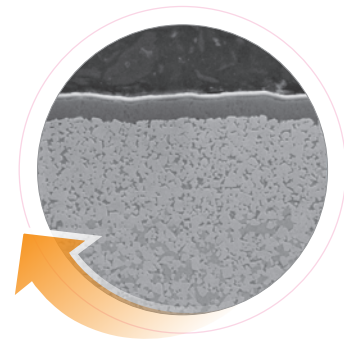


Coating

- ✓ CVD coating with advanced ultra-fine grain coating technology, greatly improves wear resistance of inserts.
- ✓ Thanks to special treatment on transition layer, multi-layer coating are combined firmly.
- ✓ The exceptionally smooth coating surface and good low friction ability can reduce the occurrence of built-up edges.

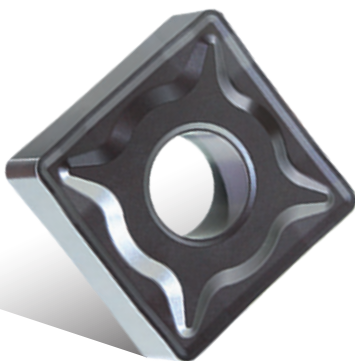
Substrate

- ✓ Added with resist high temperature rare element, inserts shows a good capability against plastic deformation and good capability of Red Hardness.
- ✓ Unique manufacturing technology improves high temperature toughness and wear resistance of substrate.



Application fields YBM153 is suitable for finishing and semi-finishing of stainless steel with high cutting efficiency under stable working condition. Such as medium-size fluid valve components in petrochemical industry, flange and other parts in auto pipeline, valve and valve body in auto engine systems, ship mechanical parts, aviation hydraulic parts, adapting pieces in IT and semiconductor industry, medium and long-axis in food processing machinery, construction machinery and general machinery.

YBM253



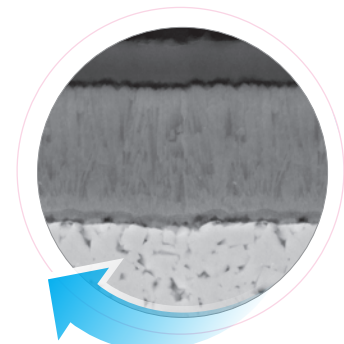
Ideal grade for turning of stainless steel with high cutting depth and high feed rate under bad working condition

Coating

- ✓ Ultra-fine grain coating technology provides better wear resistance and toughness;
- ✓ Improved remain internal stress design ensures good toughness and anti-cracking performance;
- ✓ Polishing treatment on coating surface makes it suitable for cutting adhesive materials.

Substrate

- ✓ With gradient carbide substrate insert has better impact resistance and cutting edge strength.



Application fields YBM253 grade is suitable for roughing of heavy stainless steel parts with high cutting depth and high feed rate under the condition with great impact.



Coated Cemented Carbide CVD

BLACK DIAMOND INSERTS

**Achieving both higher cutting
speed and longer tool life**

Second generation of



YBC152

Thick TiCN and thick Al_2O_3 coatings improve the impact toughness and abrasion resistance, which makes it suitable for finishing and semi-finishing of steel at high speed. Cutting speed can increase by more than 25%, while the tool life can increase by more than 30% at the same cutting speed.

YBC252

Comprising of thick TiCN and thick Al_2O_3 coatings, the grade has high capability against plastic deformation and good hardness of cutting edge. It is preferred grade for machining of steel from finishing to roughing. Under the same cutting conditions, the cutting speed can be increased by more than 25%, while the tool life can be 30% longer under the same cutting speed.

YBC352

Thickness TiCN and Al_2O_3 coating, with strongest toughness and plastic deformation resistance, the ideal grade for high efficient steel rough machining under the bad condition.

Test comparison of inserts abrasion

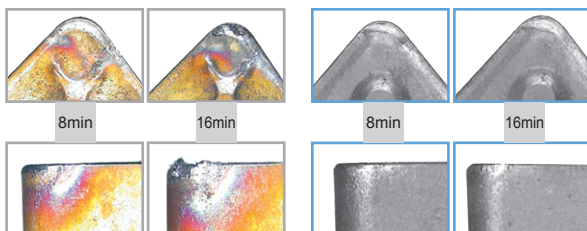
Workpiece material : 45#steel

Inserts: CNMG120408-DM

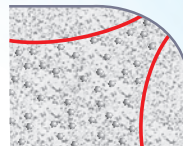
Cutting parameters: $V_c=400m/min$ $a_p=1mm$ $f_n=0.2mm/r$

Grade from other company

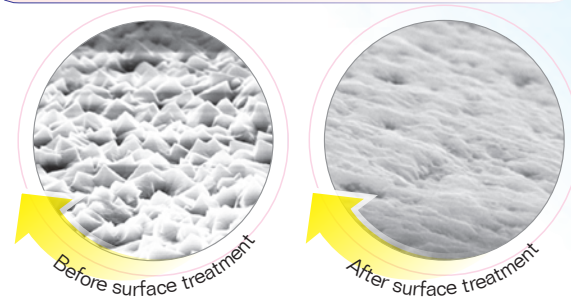
YBC152



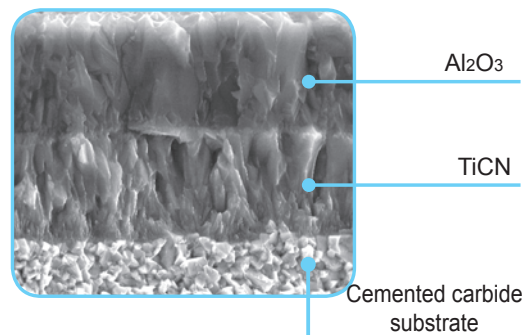
- Perfect unification of toughness and anti-plastic deformation. Specially designed cutting edge with "skeleton" realizes perfect unification of toughness and anti-plastic deformation.



- Roughness of insert surface is improved after special treatment on surface, which effectively reduces cutting forces, prevents workpiece adhering to surface of inserts and improves operation stability of inserts.



- The perfect combination of fibrous TiCN and fine grain Al_2O_3 obviously improves abrasion resistance and anti-breakage of inserts.



Coated Cemented Carbide CVD

YBD052

CVD coated grade, which is characterized by super fine grain and smooth surface, is the combination of hard substrate and coating (extra thick Al_2O_3 + thick TiCN). The grade is optimized for best wear resistance when machining gray cast iron at high speed under dry condition.

YBD152

CVD coated grade, which is the combination of hard substrate and coating (medium thick Al_2O_3 + thick TiCN), has good flaking resistance. It is suitable for turning of cast iron at high speed, and light intermittent cutting can be supported even at moderate speed. It is also suitable for milling of cast iron.

YBD102

CVD coated grade, which is the combination of hard substrate and coating (thick Al_2O_3 + thick TiCN), shows excellent wear resistance and impact resistance when machining nodular cast iron at high speed.

YBD252

CVD coated grade, which is the combination of hard substrate and coating (medium thick Al_2O_3 + thick TiCN), achieves the balance between wear resistance and toughness. It is suitable for wet milling of cast iron, which requires toughness (such as nodular cast iron) at moderate or low speed. It is also suitable for intermittent turning.

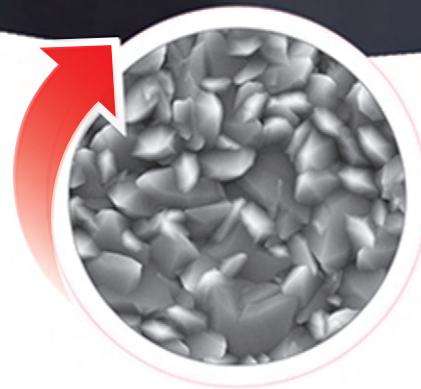
**First choice for high-efficiency
and high-speed machining of cast iron**

BLACK DIAMOND INSERTS YBD

- The combination of thick coating and substrate with good hardness and impact resistance gives the inserts excellent impact resistance and stability under high temperature, and improves wear resistance of inserts. Inserts also satisfy the requirements of high speed and high feed rate when machining cast iron.
- The appearance of shining full black is easily identified.

Significant results

- Working efficiency has been improved. Both the coating and the substrate are suitable for machining cast iron at high speed and high feed rate. Cutting speed can be increased by 30% to 40%.
- Cost is reduced as tool life is increased by 40%-50%.
- High machining stability.



Layer of fine grain with compact surface

Coated Cemented Carbide CVD

Recommended combination of grade and chipbreaker

For machining of P-type materials

Grade	Type
YBC151	DF
YBC152	
YBC251	DM
YBC252	
YBC251	DR
YBC252	
	(Double-side)
YBC351	DR
YBC351	HPR
YBC352	

For machining of M-type materials

Grade	Type
YBM151	EF
	EM
	ER
YBM153	EF
	EM
YBM251	EM
	ER
YBM253	EM
	ER

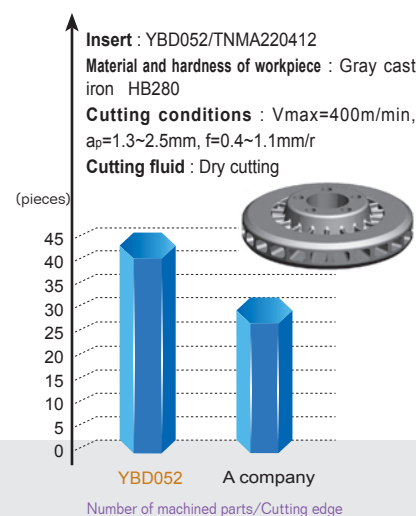
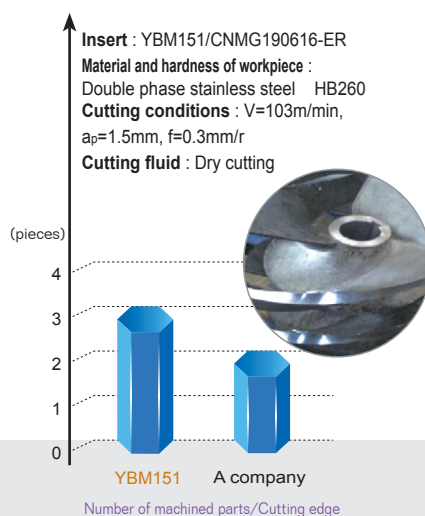
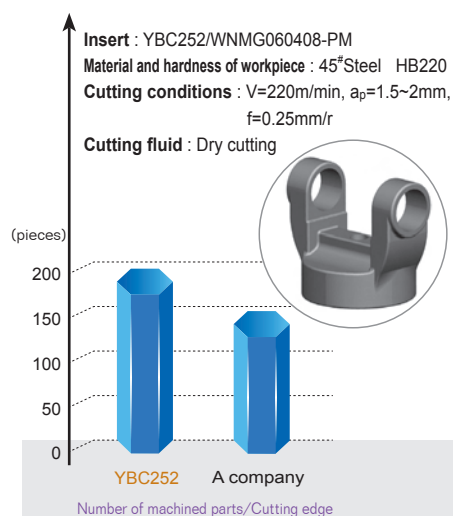
For machining of K-type materials

Grade	Type
YBD052	Without chipbreaker
	PM
YBD102	Without chipbreaker
	PM
YBD152	Without chipbreaker
	PM
YBD252	Without chipbreaker
	PM

Recommended cutting parameters

Workpiece material	Range of machining	Grade	Recommended cutting speed(m/min)
P Steel	For finishing	YBC151	180-460
		YBC152	220-500
	For semi-finishing	YBC251	160-440
		YBC252	180-480
	For roughing	YBC351	130-380
M Stainless steel	For finishing	YBM151	110-280
	For semi-finishing	YBM153	
	For roughing	YBM251	
		YBM253	
K Cast iron	For finishing	YBD052	200-500
		YBD102	200-480
	For semi-finishing	YBD151	180-450
		YBD152	190-450
	For roughing	YBD252	150-380

Case

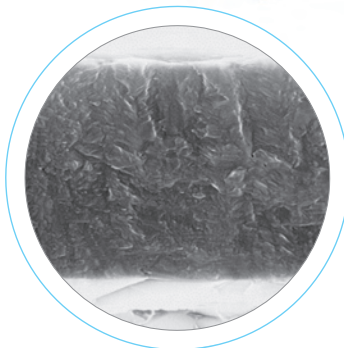
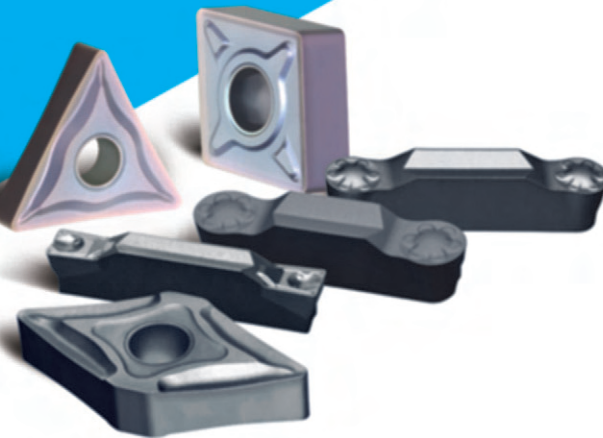


Coated Cemented Carbide **PVD**

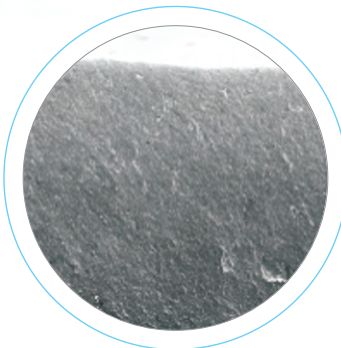
makes it easy to machine materials which are hard to be machined

New nano coating grade

- Special coating techniques make inserts smooth, which leads to low friction and unobstructed chip flow.
- Unique coating with nano structure closely integrates with substrate, ensuring higher hardness and toughness.
- Excellent thermal stability and chemical stability can effectively protect cutting edge.



nc-TiAlN coating(YBG202)



TiAlN base multi-elements coating (YBG105)

High-performance nanostructure coating guarantees good toughness and hardness of inserts. Special coating technology guarantees smooth surface and excellent wear resistance. Outstanding thermal stability and chemical stability effectively protect cutting edge.

▶ **YBG102**

The combination of nc-TiAlN coating and fine grain substrate makes it suitable for turning of various materials and finishing and semi-finishing of high-temperature alloys.

▶ **YBG202**

nc-TiAlN coating and ultra-fine grain substrate makes it suitable for finishing and semi-finishing of various materials and turning of super alloy.

▶ **YBG302**

The combination of nc-TiAlN coating and tough cemented carbide substrate, which integrates security and wear resistance, makes it suitable for parting and grooving of various materials.

▶ **YBG105**

Finishing and semi-finishing for materials difficult to cut PVD coated grade

PVD coated grade, new TiAlN based multilayer coating, has higher wear resistance and Anti-thermal-oxidation ability. It is suitable for finishing and semi-finishing turning of various materials difficult to cut, such as high temperature alloy, heat resistant alloy, etc.

▶ **YBG205**

PVD coating grade for finishing of stainless steel

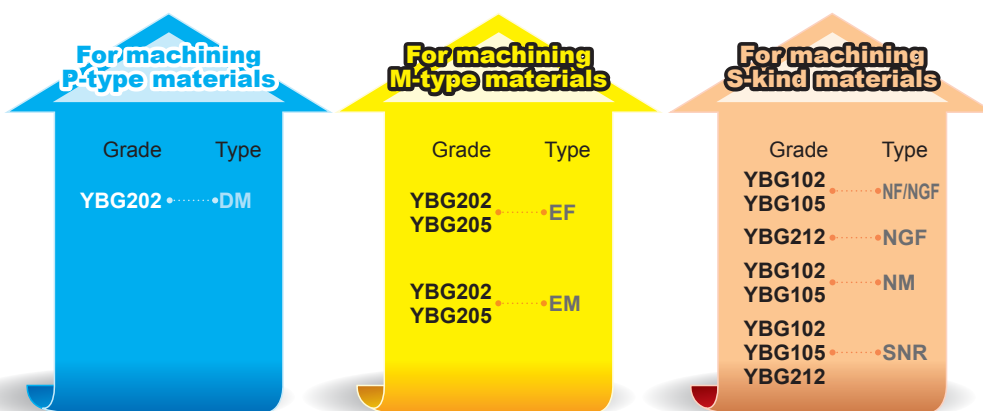
Suitable for relatively small workpieces which require high surface smoothness.

Superfine TiAlN nano coating added with wear-resistant and heat-resistant rare elements has high hardness and excellent heat-resistance, providing effective protection for the cutting edge. Special coating technology ensures stronger combination of coating and substrate. It is suitable for extra finishing of stainless steel.

▶ **YBG212**

Nc-TiAlN coating combined with super tough substrate which made of super fine grain. It's suitable for finishing and roughing materials which are hard to be machined.

Recommended combination of grade and chipbreaker



Recommended cutting parameters

Workpiece material	Range of machining	Grade	Recommended cutting speed(m/min)
P Steel	For finishing	YBG102	180-460
	For semi-finishing	YBG202 YBG205	150-380
M Stainless steel	For finishing ~ for semi-finishing	YBG202 YBG205	170-300
S Heat resistant Alloy Ti alloy	For finishing	YBG102	30-90
		YBG105	40-90
		YBG212	30-90
		YBG202	20-70
	For semi-finishing	YBG105	30-70
		YBG212	20-60
	For roughing	YBG102	20-40
		YBG105	30-40

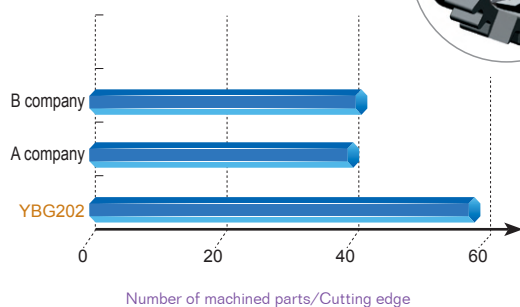
Case

Insert : YBG202/TNMG120404-EF

Hardness and material of workpiece : 0Cr18Ni9 HB240

Cutting conditions : $V=200\text{m/min}$, $a_p=1\text{mm}$,
 $f=0.15\text{mm/r}$

Cutting fluid : Dry cutting

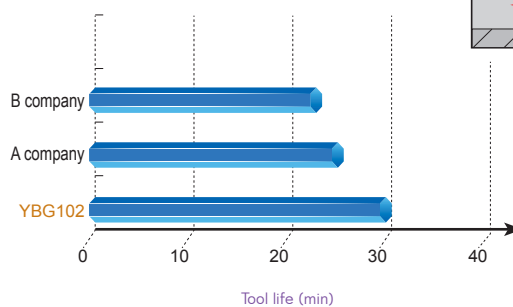
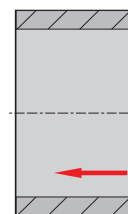


Insert : YBG102/DNEG150404-NF

Hardness and material of workpiece :

High temperature alloy Inconel 718 HRC≥39
Cutting conditions : $V_c=80\text{m/min}$, $a_p=0.3\text{mm}$,
 $f=0.15\text{mm/r}$

Cutting fluid : Dry cutting



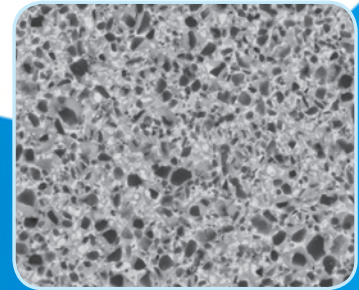
Cermet & Coated Cermet

The chemical stability between Ti(CN) base cermet inserts and workpieces is relatively high, which reduces the friction and temperature of the cutting edge during cutting, preventing mutual diffusion of atoms of the workpiece material and the inserts, and improving resistance to bonding abrasion. Therefore, Ti(CN) base cermet shows good capability of Red Hardness and resistance to crater wear. It is an optimal material for high-speed finishing and semi-finishing of steel. High temperature strength of cermet is higher than that of WC-Co, and toughness better than that of Al_2O_3 and Si_3N_4 ceramic. This fulfils the application blank of WC-base cemented carbide and Al_2O_3 and Si_3N_4 ceramic from finishing to semi-finishing at high speed.

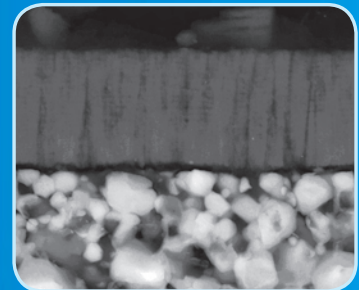
Product features

Scientifically designed structure ensures good material performance and long tool life. Refined production management assures the stability of product quality.

- Symmetrical fine grain organization, together with the control of symmetrical organization and toric phase structure, improves the strength and hardness of cermet.
- Intensified bonding phase and well-designed grain boundary improve the high temperature capacity, heat conductivity and thermal vibration resistance.
- Coating of Physical Vapor Deposition (PVD) is applied to cermet substrate with high toughness, so that the grade has high hardness and toughness with wide-range application.



Substrate of cermet grade of YNG151 (homogenized ultra-fine structure)



PVD coating organization structure of cermet

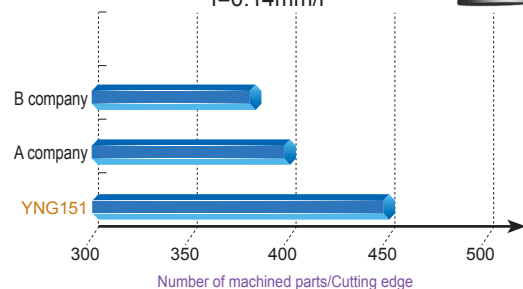
Recommended cutting parameters

Workpiece material	Range of machining	Grade	Recommended cutting speed(m/min)
 Steel	For finishing	YNG151	260-550
		YNG151C	260-580
 Stainless steel		YNG151	170-330
		YNG151C	160-350
 Cast iron		YNG151	250-400
		YNG151C	270-420

Case

Insert: YNG151/CNMG120404-SF
 Hardness and material of workpiece: 20CrMnTi HB180-223
 Cutting parameters: $v=220\text{m/min}$

$a_p=0.5\sim 1.0\text{mm}$
 $f=0.14\text{mm/r}$

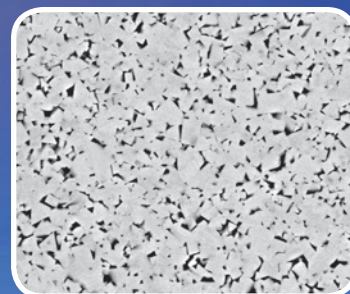


Outstanding chip breaking Good surface quality

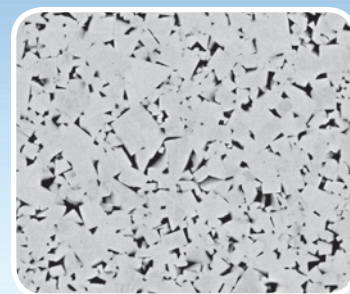


Cemented Carbide Grade

Uncoated cemented carbide grade is widely used for machining of non-ferrous metal, high temperature alloy, etc. It is economical and can be universally applied.



Substrate of YD101: the combination of cemented carbide phase WC of fine grain and bonding phase Co



Substrate of YD201: the combination of cemented carbide phase WC of middle grain and bonding phase Co

Recommended cutting parameters

Workpiece material	Range of machining	Grade	Recommended cutting speed(m/min)
P Steel	For finishing	YC10	130-360
	For roughing	YC40	80-300
K Cast iron	For finishing	YD051	100-170
	For semi-finishing ~ For roughing	YD201	60-130
N Non-ferrous metal	For finishing ~ for semi-finishing	YD101	110-1750
S Heat resistant Alloy Ti alloy	For finishing	YD101	20-50

Case

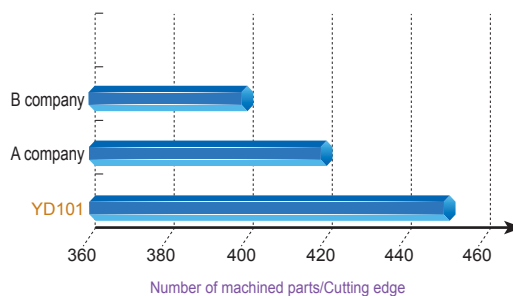
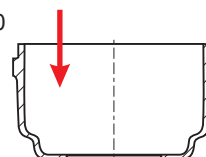
Insert: YD101/CCGX09T304-LH

Workpiece material: ZL105 HB70

Cutting parameters: $v=400\text{m/min}$

$a_p=1\text{mm}$

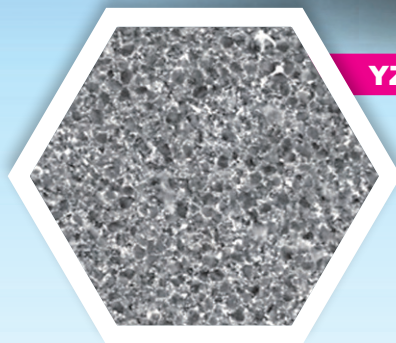
$f=0.3\text{mm/r}$



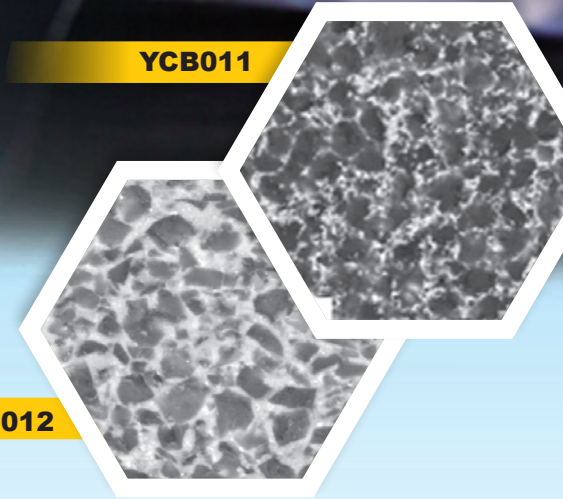
Workpiece has high surface quality and high dimensional precision.

Polycrystalline Cubic Boron Nitride **PCBN**

PCBN is a synthesis of CBN powder and special binder under ultra-high pressure and high temperature conditions. PCBN has high hardness, high thermal stability and high chemical inertness, mainly suited to machining in hardened steel with hardness above HRC45 (eg carbon tool steel, bearing steel and die steel, etc.) , gray cast iron, high hardness cast iron, Ni-based, Co-based, and Fe-based superalloy.



YZB221



YCB011

YCB012

► **YCB012** **H** Super hard material

Low CBN content, high wear resistance and thermal stability, suitable for continuous ~ light interrupted cutting of hardened steel.

► **YCB011** **K** Cast iron

High CBN content, high wear resistance and strength, suitable for cutting cast iron materials, strong interrupted cutting in hardened steel.

► **YZB221** **K** Cast iron

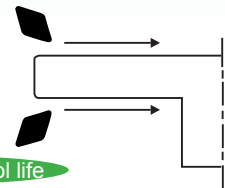
High CBN content, high wear resistance and impact resistance, good versatility, suitable for cutting cast iron materials.

Application and machining Parameter Guidelines:

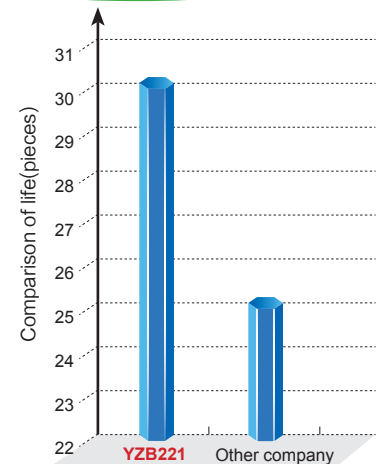
Workpiece material		Grade	Speed(m/min)	Feed(mm/r)	Depth of Cut(mm)
Cast iron	Grey cast iron	YCB011	800 (500-1500)	0.3(0.1-0.5)	≤1
		YZB221	1000 (500-1500)	0.4(0.1-1)	≤4
	High hardness Cast iron	YCB011	500 (300-800)	0.2(0.1-0.4)	≤0.5
		YZB221	600 (300-800)	0.4(0.1-0.8)	≤2
Hardened steel		YCB012	150 (100-250)	0.15(0.03-0.3)	≤0.5

Case

Workpiece: Brake disc
Workpiece Material: Cast Iron (HB180)
Insert grade: YZB221/grade of other company
Insert specification: DNGA150408-2
Operation: Wet machining
Cutting data: $V_c=550\text{m/min}$, $f_n=0.2\text{mm/rev}$
 $a_p=0.1\text{mm}$

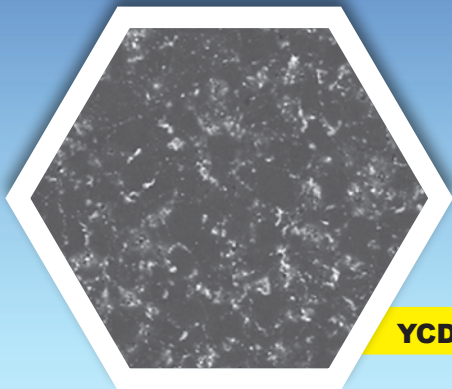


Comparison of tool life

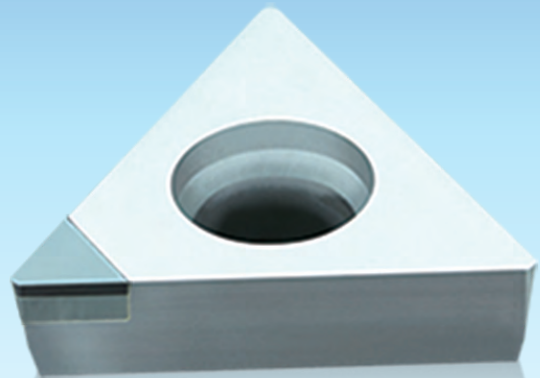


Polycrystalline Diamond **PCD**

PCD has high hardness, excellent abrasion resistance, thermal conductivity, low coefficient of friction, suitable for cutting in non-ferrous metal and their alloys (such as: Cu, Al, Mg, etc.), non-metallic materials, and composite materials (such as: MMC, ceramics, reinforced plastics, etc.).



YCD011



► **YCD011** **N** Non-ferrous materials

- ◆ Medium-grained diamond PCD material with a good balance between wear resistance and toughness;
- ◆ Good versatility;
- ◆ Suitable for high-speed machining of non-ferrous metals such as aluminum alloy, copper, magnesium and their alloys with medium and low silicon content;
- ◆ Suitable for high speed machining of glass fiber and plastics;
- ◆ For use in machining of carbide and ceramics.

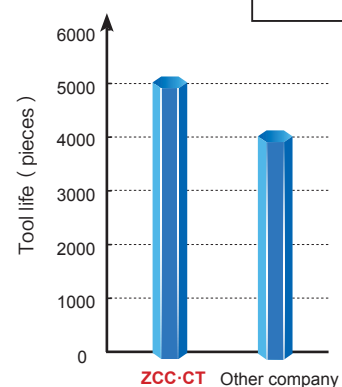
Application and machining Parameter Guidelines:

Workpiece material	Speed(m/min)	Feed(mm/r)	Depth of Cut(mm)
Pure aluminum	1000(200–1500)	0.2 (0.02–0.6)	≤2
Aluminum alloy (Si content ≤12%)	800(200–1500)	0.2 (0.02–0.5)	
Aluminum alloy (Si content >12%)	600(200–1500)	0.2 (0.02–0.4)	
Copper, magnesium and their alloy	700(200–1200)	0.2 (0.02–0.4)	≤1.5
Reinforced plastic	600(100–1000)	0.2 (0.1–0.3)	
Glass fiber material	500(100–800)	0.15 (0.1–0.3)	

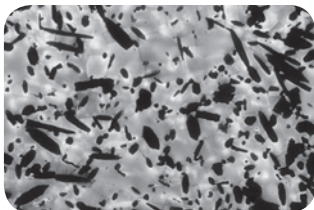
Case

Workpiece: MOTO CYLINDER HEAD
 Workpiece Material: Aluminum alloy (HB250)
 Insert grade: YCD011/grade of other company
 Insert specification: DCGW11T304
 Operation: Wet machining
 Cutting data: $V_c=1000\text{m/min}$, $f_n=0.35\text{mm/rev}$
 $a_p=2\text{mm}$

Comparison of life



Ceramic Grade



CN3100

α -sialon/ β -sialon matrix, the latest developed Siloxane sialon.

Applications: With excellent wear resistance, fracture toughness and thermal shock resistance, for use in general machining to finishing in high temperature alloy parts. Compared with SiC/Al₂O₃ whisker ceramic material, it has better resistance to breakage at the depth of cut.

Physical properties

Grade	Density(g/cm ³)	HardnessHv(GPa)	Flexural strength(MPa)	Fracture toughness (MPa m ^{1/2})
CN3100	3.34	1720	≥900	7.5

Recommended cutting data

Grade	Workpiece material	Operation	Cutting speed (m/min)	Feed rate(mm/r)	Depth of cut (mm)
CN3100	Nickel high temperature alloy	For roughing	150-260	0.1-0.3	<5

Case

Workpiece material: GH4169
 Insert specification: RPGN090700T01020-V
 Cutting data: V=200 m/min, ap=1 mm,
 f=0.1 (mm/r)

Workpiece shape and process: Figure 1, four working procedures, two blades and four cutting edges in the figure finish the milling of turbine disk section, and the wear resistance is excellent.

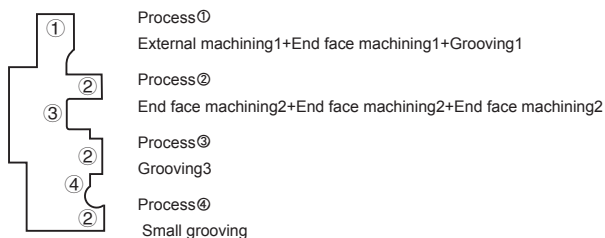


Figure 1

Table of correctional coefficient between material hardness and cutting speed

Workpiece material	Theoretical Hardness	Correctional coefficient between hardness of materials and cutting speed								
		Hardness decrease ← Hardness difference(Measured value – Theoretical value) → Hardness increase								
		-60	-40	-20	0	+20	+40	+60	+80	+100
P	HB180	1.42	1.24	1.11	1.0	0.91	0.84	0.77	0.72	0.67
M	HB180	1.44	1.25	1.11	1.0	0.91	0.84	0.78	0.73	0.68
K	Grey cast iron	HB220	1.21	1.13	1.06	1.0	0.95	0.90	0.86	0.82
	Nodular cast iron	HB250	1.33	1.21	1.09	1.0	0.91	0.84	0.75	0.70
N	HB75			1.05	1.0	0.95				
S	HB350			1.12	1.0	0.89				
Rockwell hardness HRC			-6	-3	0	+3	+6	+9		
H	HRC60		1.10	1.02	1.0	0.96	0.93	0.90		

Actual Cutting Speed = Recommended Cutting Speed × Correctional Coefficient of Cutting Speed

● Please find recommended cutting parameters on insert packing box.

Example: If the material you are going to machine is normal alloy steel, whose theoretical hardness is HB180, and the selected insert is CNMG120404-DF/YBC151, then the recommended cutting speed is $V=150\text{m/min}$. If the hardness measured value of the material is HB220, then the hardness difference value is $220-180=+40$. Correctional coefficient found in the table is 0.84. Therefore, the actual applicable cutting speed is $V_c=250 \times 0.84=210\text{m/min}$.

Correctional coefficient table between tool life and cutting speed

Tool life Insert materials	Correctional coefficient between tool life and cutting speed					
	10 minutes	15 minutes (Standard life)	30 minutes	45 minutes	60 minutes	90 minutes
YBC151	1.12	1.00	0.82	0.73	0.67	0.60
YBC251	1.11	1.00	0.84	0.76	0.71	0.64
YBC351	1.11	1.00	0.84	0.76	0.70	0.63
YBC152	1.25	1.00	0.68	0.54	0.46	0.37
YBC252	1.55	1.00	0.47	0.30	0.22	0.14
YBM151	1.28	1.00	0.66	0.52	0.43	0.34
YBM153	1.32	1.00	0.64	0.48	0.37	0.31
YBM251	1.19	1.00	0.75	0.63	0.56	0.47
YBM253	1.22	1.00	0.73	0.61	0.54	0.45
YBG202	1.10	1.00	0.85	0.77	0.72	0.66
YBG205	1.15	1.00	0.82	0.74	0.69	0.64
YBD052	1.22	1.00	0.80	0.65	0.60	0.55
YBD102	1.20	1.00	0.75	0.62	0.58	0.50
YBD151	1.20	1.00	0.74	0.63	0.55	0.47
YBD152	1.11	1.00	0.70	0.60	0.50	0.40
YBG105	1.28	1.00	0.79	0.72	0.63	0.58
YBG212	1.25	1.00	0.75	0.70	0.60	0.50

Actual cutting speed = Recommended cutting speed × Correctional coefficient of cutting speed

Example: If the material you are going to machine is normal alloy steel, and the selected insert is CNMG120404-DF/YBC151, then the recommended cutting speed is $V=250\text{m/min}$ (standard life is 15 minutes). If you expect the tool life to reach 60 minutes, the correctional coefficient found in the table is 0.67, then the applicable cutting speed is $V_c=250 \times 0.67=167.5\text{m/min}$.