

#### **Grades system**

#### Cutting tool

Uncoated carbide

Р	Steel	ST10	ST20	ST30A
M	Stainless steel	U20		
K	Cast iron	H01	H05	G10
S	Titanium alloy	H01	H05	
N	Non-ferrous metal	H01	H05	
Н	Hardened steel	H01		

## Coated carbide for turning

Р	Steel	NC3215	NC3225	NC3120	NC3030	NC5330					
M	Stainless steel	PC8105	PC8110	PC8115	NC9115	NC9125	NC5330	NC9135	PC5300	PC9030	PC5400
K	Cast iron	NC6315	NC5330	PC5300	PC5400						
S	HRSA	PC8105	PC8110	PC8115	NC9125	NC9135	PC5300	PC5400			
N	Non-ferrous metal	ND3000	PD1000								
Н	Hardened steel	PC8105	PC8110	PC8115							

# Coated carbide for milling

Р	Steel	NC5330	NC5340	NCM325	PC3500	PC3600	PC5300	PC5400	NC5350	NCM335
M	Stainless steel	NC5330	NC5340	NCM325	PC5300	PC9530	NC5350	NCM335	PC5400	
K	Cast iron	PC8110	PC6510	NC5330	PC5300	NC5340	PC5400			
S	HRSA	PC5300	PC5400							
N	Non-ferrous metal	ND3000	PD2000							
Н	Hardened steel	PC2005	PC2010	PC2015	PC210F	PC2505	PC2510			

Coated
carbide
for drills,
endmills

Р	Steel	PC3500	PC5300	PC5335	PC5400	NC5330
M	Stainless steel	PC5300	PC5335	PC5400		
K	Cast iron	PC6510	PC5300			
S	HRSA	PC5300	PC5400			
N	Non-ferrous metal	H01				

Turning	
cermet	

Р	Steel	CN1500	CN2000	CN2500
K	Cast iron	CN1500	CN2500	

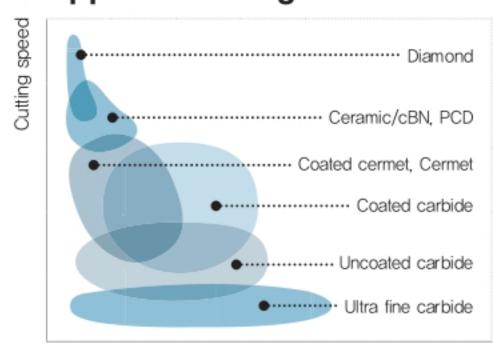
Coated cerme	t
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Р	Steel	CC1500	CC2500

Milling cermet

	Р	Steel	CN2000	CN30
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#### Application range





#### Grades system

#### Cutting tool

	P M K	General	PC203F	PC215F	PC303S	PC310U	PC315E	PC320	PC320S	
Solid	S	HRSA	PC320	PC320S						
endmills	Н	Hardened steel	PC203F	PC303S	PC310U					
	N	Non-ferrous metal	ND3000	ND2100	PD3000	PC210C	H01	H05S		
Solid	P M K	General	PC325U	PC215G	PC315G	PC230F				
drills	N	Non-ferrous metal	FG2	ND2100						
	K	Cast iron	KB350	KB370	KB800					
cBN	S	HRSA	KB370							
	Н	Hardened steel	KB410	KB420	KB425	KB1000	KB2000	KB320	KB335	KB37
Coated cBN	Н	Hardened steel	DNC100	DNC250	DNC350	DNC400				
PCD	N	Non-ferrous metal	DP90	DP150	DP200					

#### Wear resistance tool

Ultra fine grain cemented carbide	Z	Ultra fine grain cemented carbide	FS1	FA1	FCC	
Uncoated	V	Wear parts	D1	D2	D3	G5
carbide	1	Corrosion resistance	IN10	IN20	IN40	

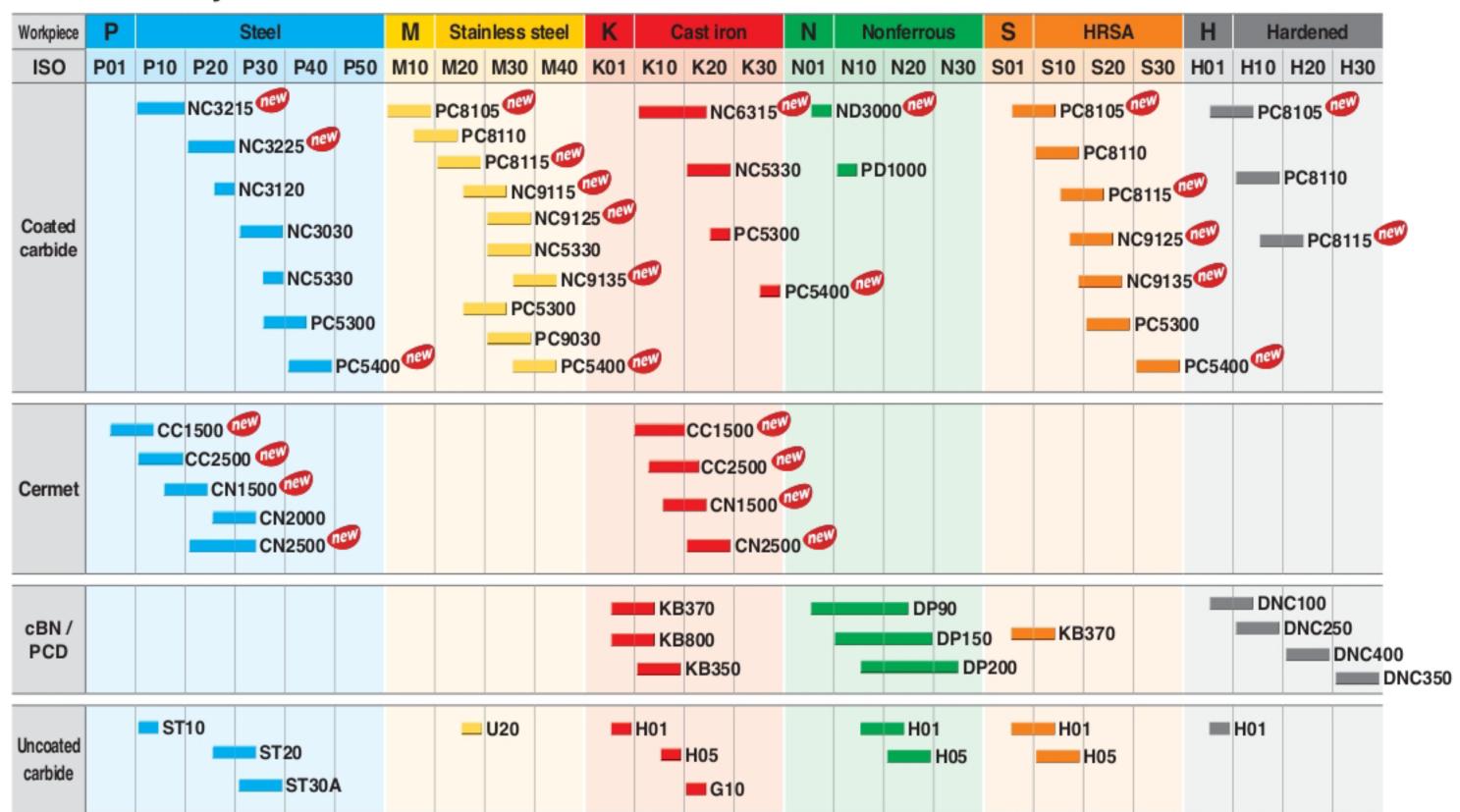
#### Mining tool

Uncoated carbide	Е	General	GR10	GR20	GR30	GR35	GR40
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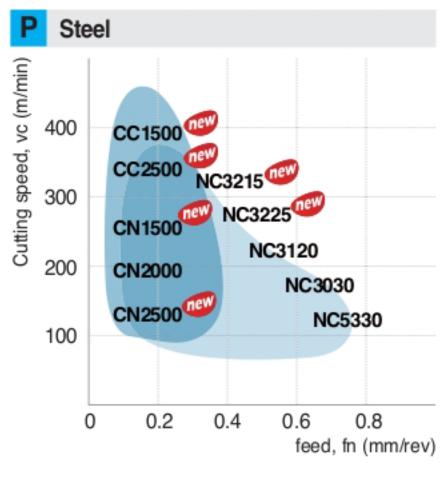


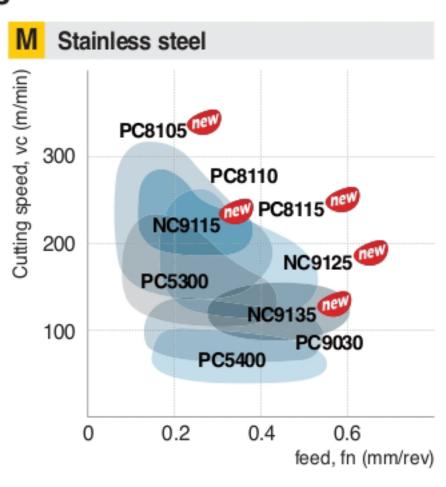
#### **Turning grade selections**

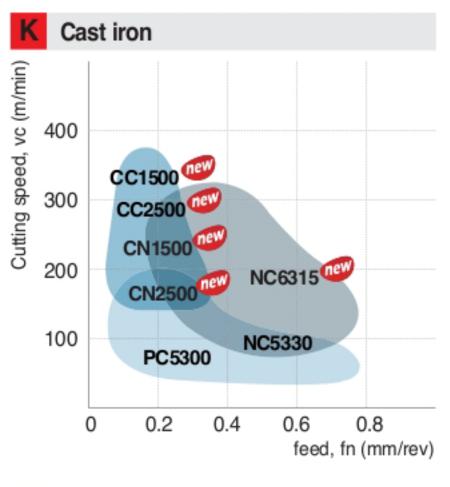
#### Selection system

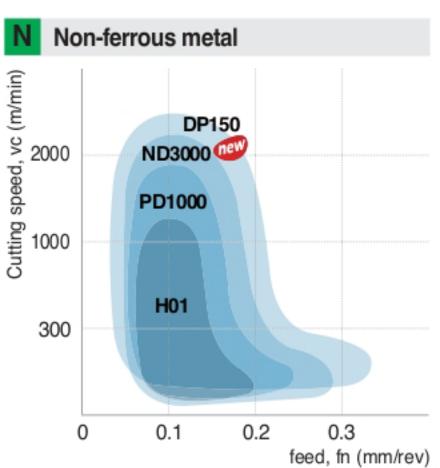


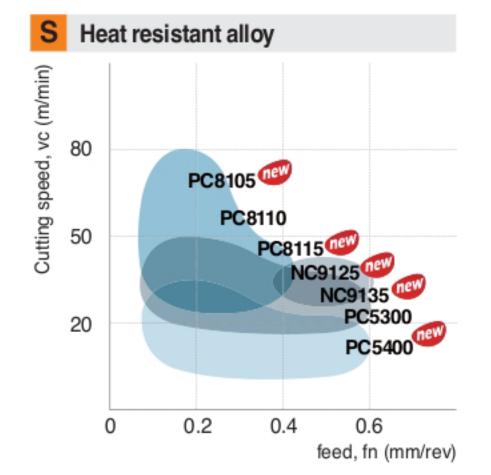
#### Application range of turning grades

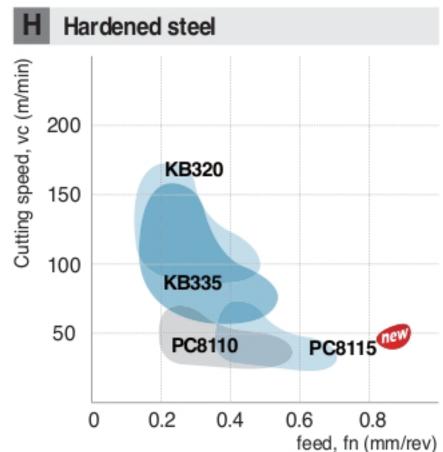














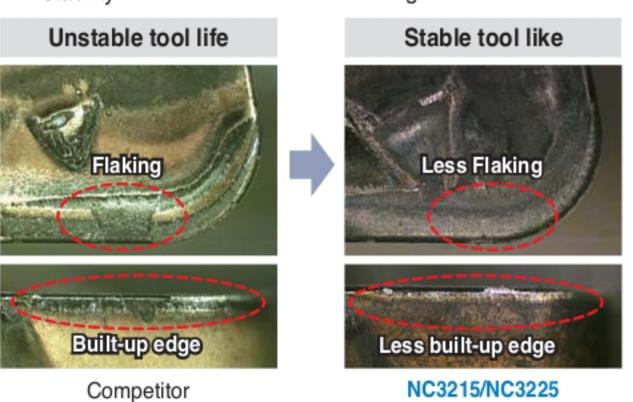
#### **CVD** coated grades

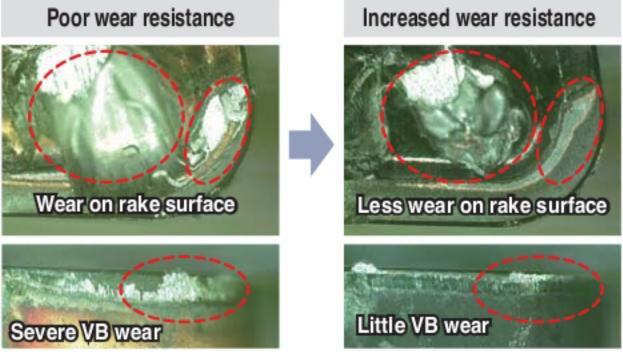
## NC3215 Per / NC3225

- Universal grade especially for machining forged automobile components and bearing steel both in continuous and interrupted cutting
- Available for all kinds of steels carbon steel, alloy steel, rolled steel, tool steel, mild steel, bearing steel and other special kinds of steel
- New coating technology increases welding resistance and chipping resistance, which leads to longer tool life.

#### Features

- · Stable tool life
- → Higher production stability
- · Longer tool life & Higher removal rate
- High cutting conditions and shorter cutting time available
- Ideal combination of a grade and chip breakers
- → Prolongs tool life
- → Wide applications ranging from roughing to finishing

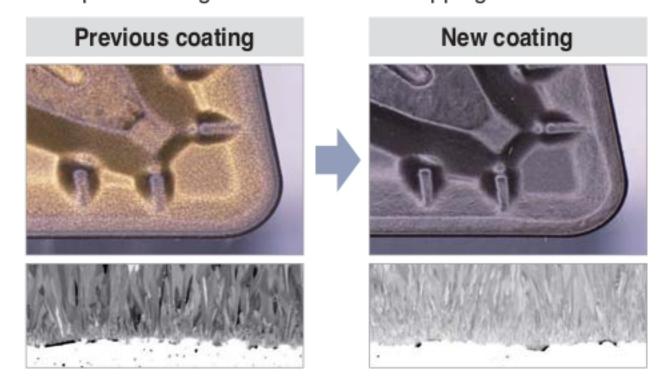




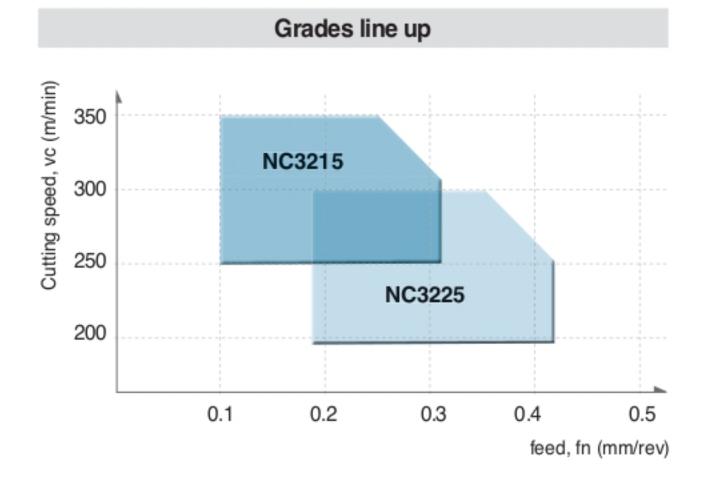
Competitor

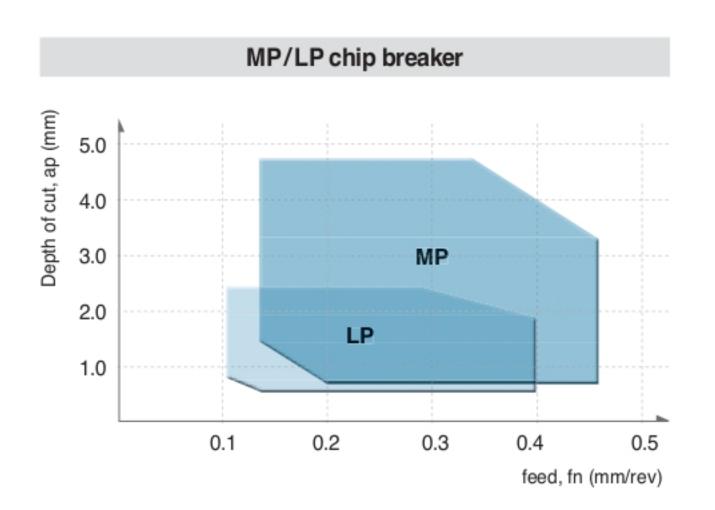
NC3215/NC3225

Disperse cutting force → Reduce chipping → Increase tool life → Improved productivity



#### Application range





## A Turning Grades

#### CVD coated grades

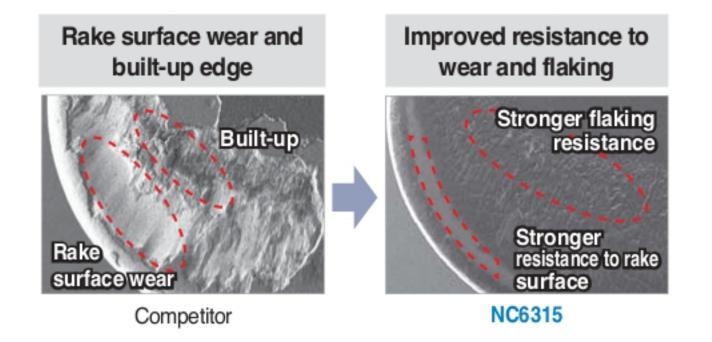
#### Universal grade for cast iron

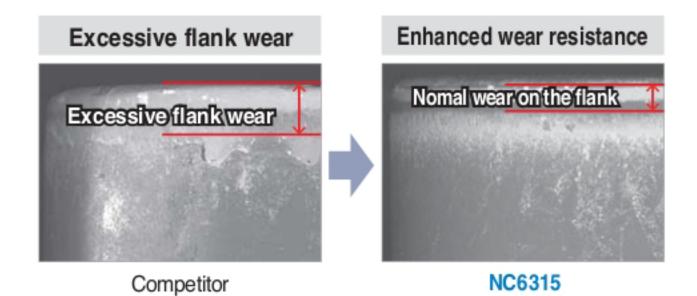
## NC6315

- Higher wear and chipping resistance
  - CVD coated inserts with increased resistance to wear and chipping
- · Solutions for most common Issues in cast Iron machining
  - Preventing excessive wear on rake and flank surfaces of insert, chipping and burr creation

#### Features

- Excellent wear resistance of rake surface in highly interrupted cutting of ductile / gray cast iron at high speeds over vc = 350m/min
- Improved alumina coating → Minimizes built-up edges
- Augmented tool life stability and wear resistance



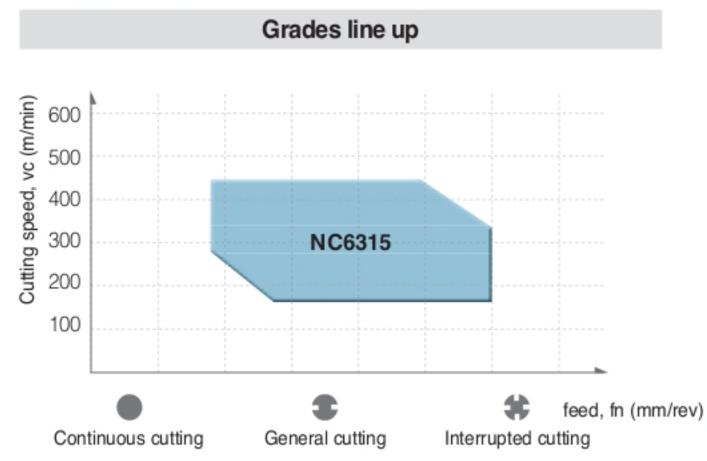


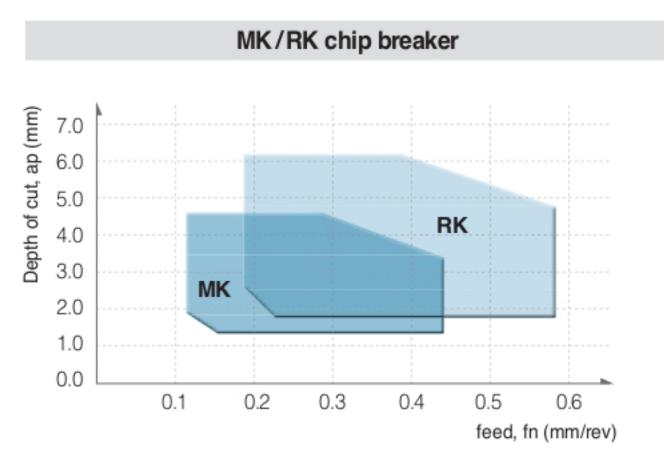
Alumina layer with better surface finish and increased resistance to wear and welding

Titanium layer with stronger anti-fracture

Functional substrate with optimized combination of hardness and toughness

#### Application range







#### CVD coated grades

#### Turning grades for stainless steel

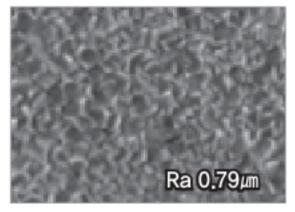
## NC9115 (MC9125 (MC9135 (MC9135

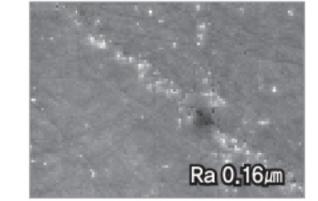
- Optimized for reducing built-up edges, notch wear, plastic deformation and burrs, and for machining stainless steel
- Ideal combination of a grade and MM/RM chip breakers for stable tool life and wide applications ranging from roughing to finishing
- Stable tool life even at high speeds, feeds and depth of cuts (for STS316, vc over 150m/min available), shortening cutting time
- Excellent versatility responding to workpiece change, covering the austenite, the martensite and the ferrite

#### Features

· Improved surface finish thanks to the new lubricative CVD coating

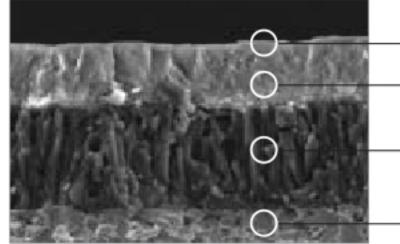
#### Lubricative coating layer to prevent built-up edge





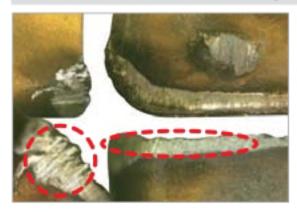
Existing coating

NC9100 Series

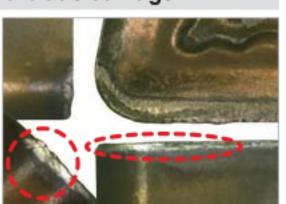


- Top coat with improved welding resistance
- H Alumina coating layer for high speed cutting
- Titanium coating layer with stronger resistance to chipping
- I Tough substrate optimized for continuous cutting and both light & heavy interruption
- Coated layers of stronger chipping resistance and the substrate of high toughness → Inhibits notch wear creation
- Lubricative coating layers → Improves welding resistance

#### Inhibited built-up edge and blade damage

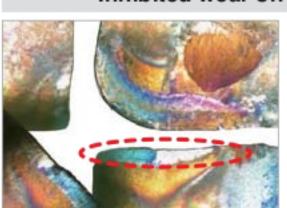


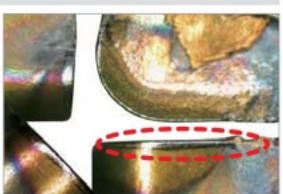
Competitor (M25)



NC9125 (M25)

Inhibited wear on notch and relief surface





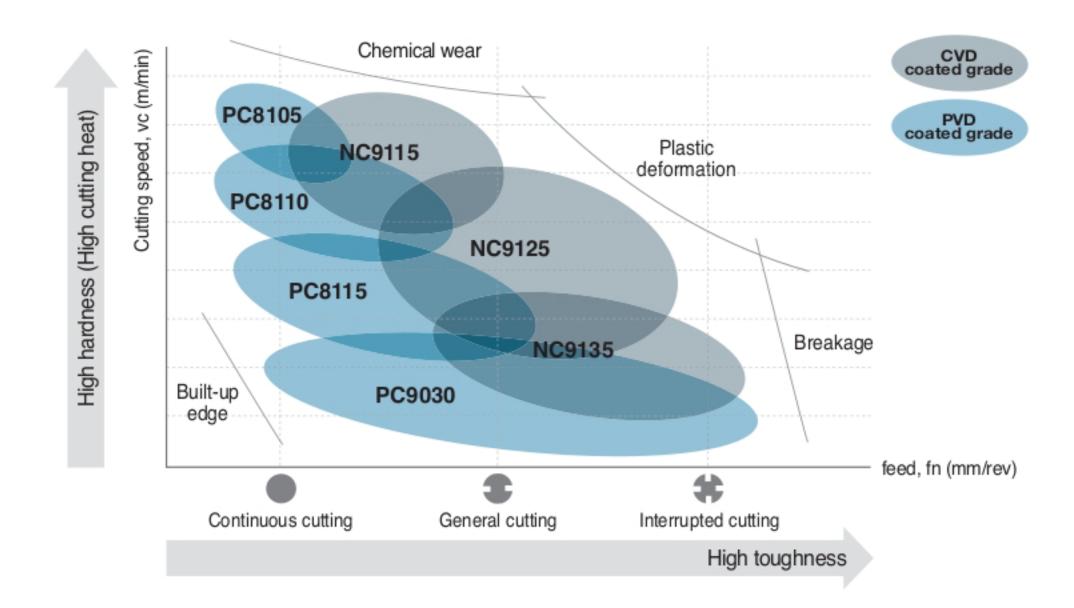
Competitor (M25)

NC9135 (M35)



#### **CVD** coated grades

#### Grades line up



#### Recommended grade and chip breaker per stainless steel type

#### [Austenitic stainless steel]

Cuada	Cutting speed (m/min)								
Grade	50	100	15	0	20	00	250		
NC9115				160		220			
NC9125				150	200	1			
NC9135		100	150						

#### [Duplex stainless steel]

Cuada	Cutting speed (m/min)								
Grade	50	100	150	200	250				
NC9115			120 160						
NC9125		100	140						
NC9135	60	100							

#### [Ferritic/Martensitic stainless steel]

Grade	Cutting speed (m/min)									
	50	100	19	50	200	250				
NC9115				150		250				
NC9125			120		220					
NC9135		100	150							

#### [Precipitation hardened (PH) stainless steel]

0	Cutting speed (m/min)											
Grade	50	100	150	200	250							
NC9115	50	110										
NC9125	40	110										
NC9135	30	100										

#### Selection system of CVD coated grade

1			Recommended cutting speed (m/min)	ISO	Application range	
		Continuous cutting	NC3215	295 (170~420)	P10	NC3215
			NC3225	260 (150~370)	P15	new
			1003223	200 (150~370)	P20	NC3225 NC3120
Р	Steel	Interrupted	NC3120	260 (120~370)	P25	NCS120
		cutting	NC3030	205 (120~290)	P30	NC3030 NC500H
			NC5330	205 (120~290)	P35	1403330
			NC500H	205 (120~290)	P40	
		Continuous	NC9115	240 (220~260)	M10	NC9115
м	Stainless	cutting	NC9125	210 (190~230)	M20	NC9125 NC5330
IVI	steel	Interrupted			M30	NC9135
		cutting	NC9135	180 (160~200)	M40	new
		Continuous cutting	NC6315	250 (130~370)	K10	NC6315
K	Cast iron	Interrupted	1400313	220 (130~310)	K20	NC5330
		cutting	NC5330	190 (110~270)	K30	
s	HDCA	Continuous cutting	NC9125	40 (20, 60)	S10	NC9125 new
3	HRSA	Interrupted cutting	NC9135	40 (20~60)	S20	NC9125

#### The features of CVD coated grades

CVD Coated grades	ISO	Features
NC3215 1000	P10~P15	<ul> <li>Continuous machining of general steel and forged steel at high speed</li> <li>Substrate with excellent thermal crack/plastic deformation resistance, coating with improved chipping resistance for continuous machining</li> <li>MT-TiCN + Al<sub>2</sub>O<sub>3</sub> + TiN</li> </ul>
NC3225 100V	P15~P25	<ul> <li>Universal grade for general steel and forged steel</li> <li>1st recommended grade for general machining with the use of high toughness substrate and coating layer with improved welding/chipping resistance</li> <li>MT-TiCN + Al<sub>2</sub>O<sub>3</sub> + TiN</li> </ul>
NC3120	P20~P25	<ul> <li>Medium to roughing for steel</li> <li>Combining excellent fracture resistance substrate with chipping resistance and heat resistance Al<sub>2</sub>O<sub>3</sub> increased stability</li> <li>MT-TiCN + TiC + Al<sub>2</sub>O<sub>3</sub></li> </ul>
NC3030	P25~P35	<ul> <li>Medium to low speed machining of steel and interrupted roughing</li> <li>Harmony between substrate with excellent wear/fracture resistance and Al2O3 film with excellent thermal/chipping resistance</li> <li>Increased stability in wide ranges of cutting conditions</li> <li>MT-TiCN + TiC + Al2O3 + TiN</li> </ul>
NC5330	P30~P35 M25~M35 K15~K25 S15~S25	<ul> <li>Stainless Steel - General cutting for mild steel &amp; forging steel</li> <li>Excellent cutting performance in hard to cut materials which are vulnerable to built up edge, due to the high tough substrate with improved fracture resistance and the coated layers</li> <li>MT-TiCN + Al<sub>2</sub>O<sub>3</sub> + TiN</li> </ul>
NC9115 1000	M10~M20	High speed cutting for ferritic and martensitic stainless steels  MT-TiCN + Al <sub>2</sub> O <sub>3</sub> + TiN
NC9125 1000	M20~M30	General cutting of stainless steel and heat resistant alloys     MT-TiCN + Al <sub>2</sub> O <sub>3</sub> + TiN
NC9135 1000	M30~M40	Interrupted cutting of stainless steel and heat resistant alloys     MT-TiCN + Al <sub>2</sub> O <sub>3</sub> + TiN
NC500H	P25~P35	<ul> <li>Heavy interrupted cutting for steel</li> <li>Plastic deformation and fracture resistance substrate with chipping resistance and heat resistance Al<sub>2</sub>O<sub>3</sub> increased stability in wide ranges of cutting conditions</li> <li>MT-TiCN + TiC + Al<sub>2</sub>O<sub>3</sub> + TiN</li> </ul>
NC6315	K10~K15	<ul> <li>Universal grade for ductile and gray cast Iron</li> <li>Excellent performance thanks to the alumina (Al<sub>2</sub>O<sub>3</sub>) coating's improved grip on the tough substrate</li> <li>MT-TiCN + Al<sub>2</sub>O<sub>3</sub></li> </ul>

#### Application examples (NC3215/NC3225)

#### Carbon steel (SM20C)

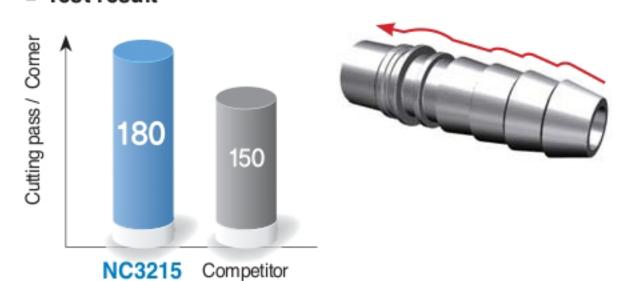
Workpiece Part for fuel system

vc (m/min) = 250~380, fn (mm/rev) = 0.2~0.3Cutting condition ap (mm) =  $1.5 \sim 2.0$ , wet

Designation Insert: CNMG120412-MP (NC3215)

Holder: PCLNL2525-M12

Test result



#### Alloy steel (SNCM, cast)

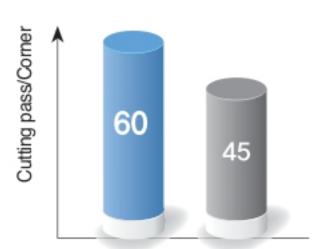
Workpiece Part for engine

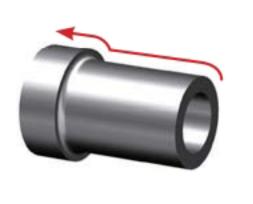
vc (m/min) = 100, fn (mm/rev) = 0.15Cutting condition ap (mm) = 3.0, wet

Insert: CNMG120408-MP (NC3225) Designation

Holder: PCLNR2525-M12

■ Test result





NC3225 Competitor

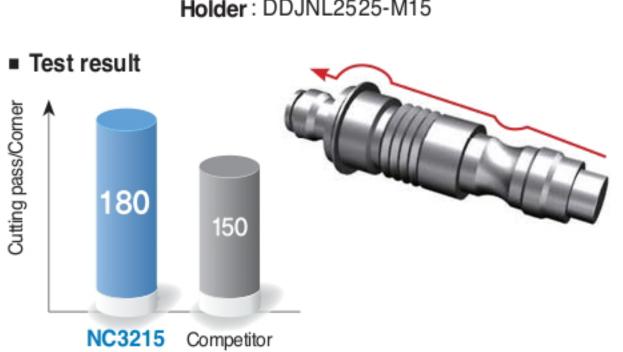
#### Carbon steel (SM40C, cold forging)

Workpiece Part for steering

vc (m/min) = 170, fn (mm/rev) = 0.3Cutting condition ap (mm) =  $2.7 \sim 3.0$ , wet

Insert: DNMG150408-MP (NC3215) Designation

Holder: DDJNL2525-M15



#### Carbon steel (S55CR, hot forging)

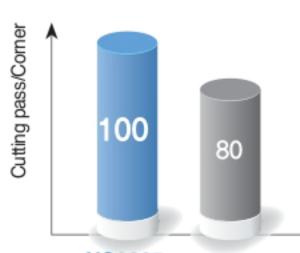
Workpiece Part for steering

vc (m/min) = 230, fn (mm/rev) = 0.3Cutting condition ap (mm) =  $0.5 \sim 1.5$ , wet

Designation Insert: CNMG120408-MP (NC3225)

Holder: PCLNL2525-M12

■ Test result





NC3225 Competitor

#### Carbon steel (SM45C, cold forging)

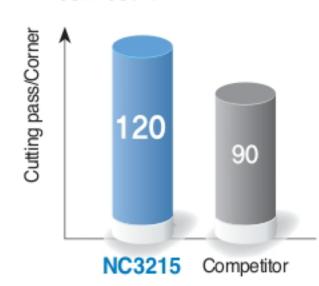
■ Workpiece Part for steering

vc (m/min) = 200~250, fn (mm/rev) = 0.25~0.35 Cutting condition ap (mm) =  $1.0 \sim 2.0$ , wet

Designation Insert: DNMG150612-LP (NC3215)

Holder: DDJNL2525-M15

Test result





Workpiece Part for mission Cutting vc (m/min) = 160, fn (mm/rev) = 0.13condition ap (mm) = 1.0, wet Insert : DNMG150608-LP (NC3225) Designation Holder: DDJNL2525-M15 ■ Test result Cutting pass/Corner 110 80 NC3225 Competitor

Alloy steel (SCR420, cold forging)



#### **Application examples (NC3225)**

#### P Alloy steel (SCR420H, hot forging)

■ Cutting vc (m/min) = 360~430, fn (mm/rev) = 0.2 ap (mm) = 1.2~1.5 (external machining/facing),

wet

■ Designation Insert : CNMG120408-VB (NC3225)

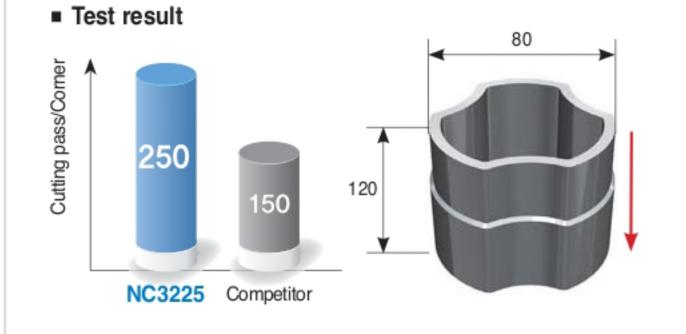
# Holder: PCLNR2225-M12 Test result 379 320 NC3225 Competitor

#### P Carbon steel (S48C, cold forging)

■ Cutting vc (m/min) = 280, fn (mm/rev) = 0.2~0.25 ap (mm) = 1, dry

■ Designation Insert : CNMG120412-VB (NC3225)

Holder: PCLNR2525-M12



#### P Alloy steel (SCM420H, hot forging)

■ Cutting vc (m/min) = 80~500 condition fn (mm/rev) = 0.15~0.3 (External

fn (mm/rev) =  $0.15\sim0.3$  (External machining/facing/grooving/tapping), ap (mm) =  $0.7\sim1.5$ , wet

■ Designation Insert : DNMG150608-VB (NC3225)
Holder: PDJNR2525-M15

 Ø30 175

#### P Carbon steel (S53C, cold forging)

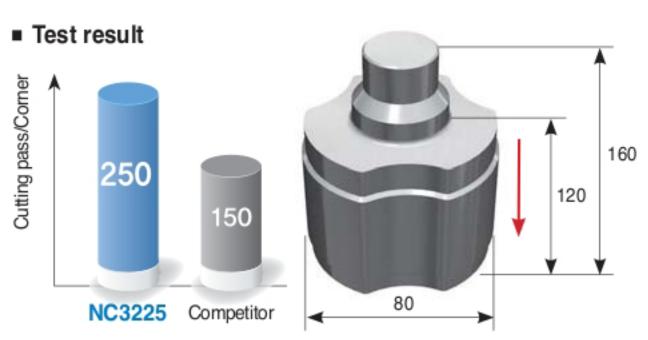
■ **Cutting** vc (m/min) = 280

condition fn (mm/rev) = 0.2~0.25(External machining/

internal machining), ap (mm) = 1, dry

■ Designation Insert : DNMG150608-VB (NC3225)

Holder: PDJNR2525-M15



#### P Alloy steel (SCR series, cold forging)

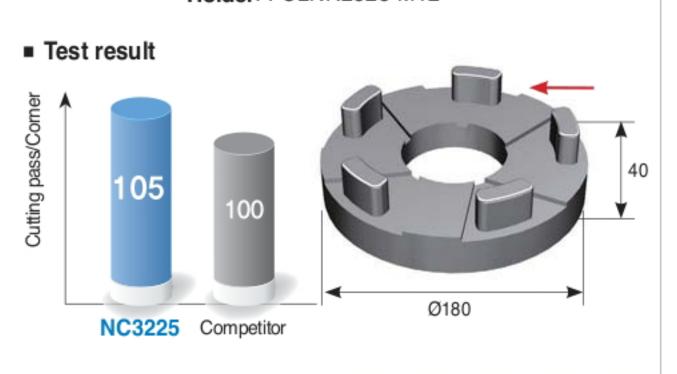
■ Cutting vc (m/min) = 314 condition vc (m/min) = 314

fn (mm/rev) = 0.25 (external machining/facing)

ap (mm) = 1, wet

■ Designation Insert: CNMG120408-VM (NC3225)

Holder: PCLNR2525-M12





#### **Application examples (NC6315)**

#### Gray cast iron (GC250)

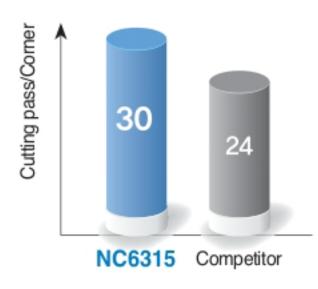
■ Workpiece Break disc

Cutting vc (m/min) = 550, n (rpm) = 547,condition fn (mm/rev) = 0.3, ap (mm) = 3, wet

Designation Insert: CNMG120412-RK (NC6315)

Holder: DCLNR2525

Test result





#### Ductile cast iron (GCD500)

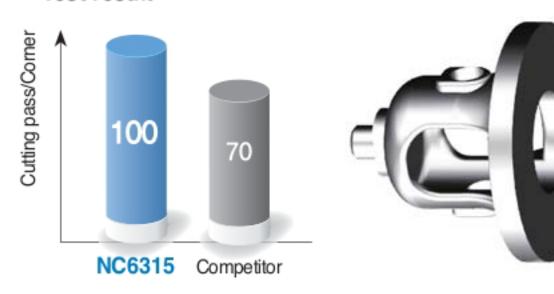
■ Workpiece Diff. case mission

Cutting vc (m/min) = 250, n (rpm) = 800,condition fn (mm/rev) = 0.25, ap (mm) = 1.5, wet

Insert: CNMG120408-MK (NC6315) Designation

Holder: DCLNR2525

■ Test result



#### **Ductile cast iron (GCD500)**

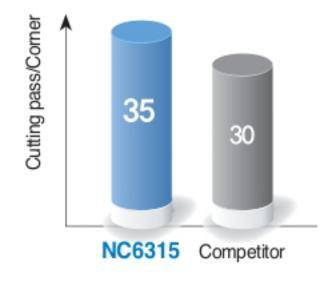
■ Workpiece Fly wheel

Cutting vc (m/min) = 400, n (rpm) = 398,condition fn (mm/rev) = 0.3, ap (mm) = 2, wet

Designation Insert: CNMA120408 (NC6315)

Holder: DCLNR2525

■ Test result





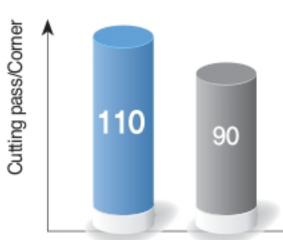
#### Ductile cast iron (GCD500)

Workpiece Knuckle

Cutting vc (m/min) = 200, n (rpm) = 1100,condition fn (mm/rev) = 0.25, ap (mm) = 2, wet

Insert: DNMG150608-MK (NC6315) Designation

Holder: DDJLNR2525







#### Application examples (NC9100 Series)

#### Stainless steel (STS304)

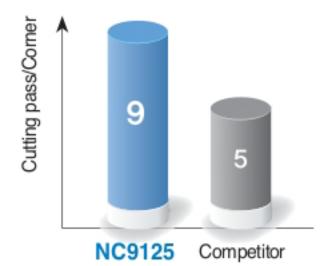
Workpiece Hydraulics part (Mechanical seal)

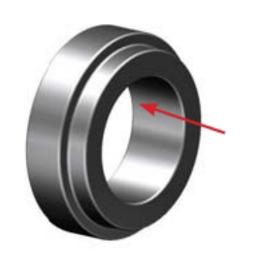
Cutting vc (m/min) = 140, fn (mm/rev) = 0.28condition ap (mm) = 3.0, wet

Designation Insert: CNMG120408-MM (NC9125)

Holder: S32S-PCLCR-12

■ Test result





#### Stainless steel (STS304)

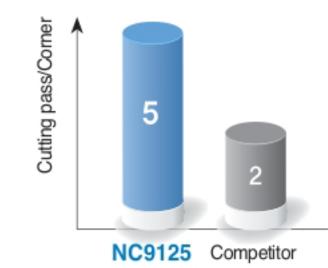
Valve part (Piston valve) Workpiece

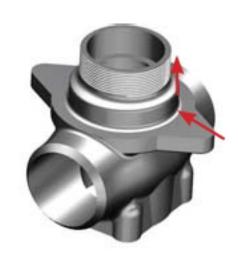
vc (m/min) = 140, fn (mm/rev) = 0.28Cutting condition ap (mm) = 3.0, wet

Designation Insert: CNMG120408-MM (NC9125)

Holder: DCLNL2525-M12

Test result





#### Stainless steel (STS317L)

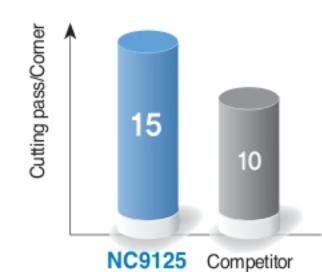
Wind power/offshore plant part (Flange) Workpiece

vc (m/min) = 150, fn (mm/rev) = 0.3~0.5Cutting condition ap (mm) =  $4.0 \sim 6.0$ , wet

Designation Insert: CNMG160616-MM (NC9125)

Holder: PCLNR3232-P16

■ Test result





#### Stainless steel (STS316)

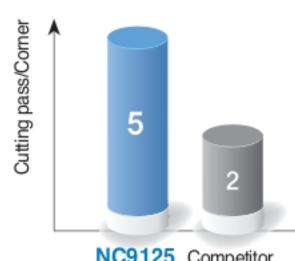
Workpiece Wind power plant part (Flange)

Cutting vc (m/min) = 175, fn (mm/rev) = 0.3~0.8condition ap (mm) = 0.5, wet

Designation Insert: TNMG220416-RM (NC9135)

Holder: PTFNR3232-P22

■ Test result





NC9125 Competitor

#### Stainless steel (Super duplex)

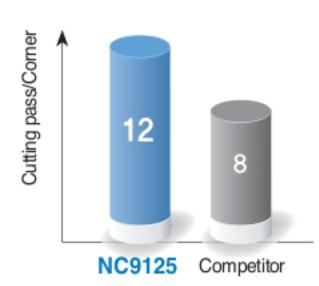
■ Workpiece Plant part (Flange)

vc (m/min) = 100, fn (mm/rev) = 0.5Cutting condition ap (mm) = 3, wet

Designation Insert: CNMG160616-MM (NC9125)

Holder: PCLNR323-P16

■ Test result





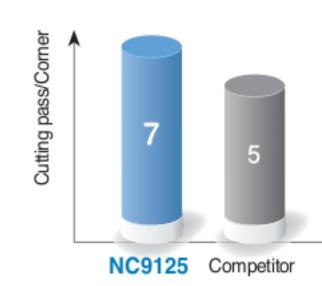
#### Stainless steel (Duplex)

Workpiece Hydraulics part

Cutting vc (m/min) = 120, fn (mm/rev) = 0.4condition ap (mm) = 6, wet

Insert: CNMG160616-RM (NC9125) Designation

Holder: DCLNR3232-P16







#### **PVD** coated grades

Turning grade for heat resistant alloy and stainless steel

## PC8105 (W

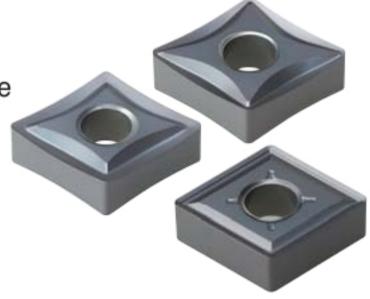
- Micro grain carbide minimizes chipping of cutting edge due to enhanced edge strength
- Latest PVD coating technology with high hardness and high temperature oxidation resistance
- Excellent tool life when finishing heat resistant alloys and stainless steels at high speeds

#### **PC8110**

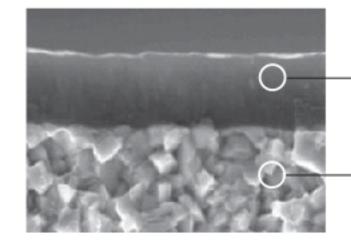
- Substrate with superior wear resistance and plastic deformation resistance at high temperature
- PVD coating technology with high hardness and oxidation resistance at high temperature
- · Long tool life when machining heat resistant alloy and stainless steel at high speed

## PC8115 \*\*\*

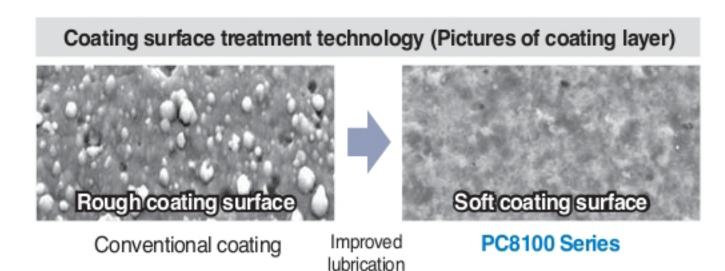
- Ultra fine matrix technology increases wear resistance and chipping resistance.
- PVD coating technology with high hardness and oxidation resistance at high temperature
- · Strong cutting edge and excellent chipping resistance guarantees stable machining
- Long tool life when machining heat resistant alloy and stainless steel at middle to low speed and medium cutting to roughing

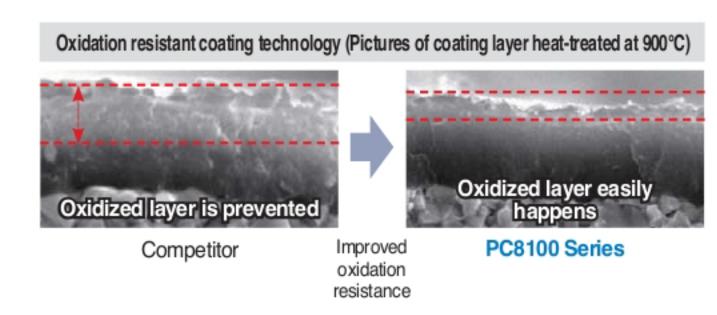


#### ● Features of PC8100 series



- It prevents wear at a high temperature to apply excellent surface roughness and coating with oxidation resistance and high hardness
- It improves wear resistance to equalize submicron matrix, secure stability between corners and improve chipping- and wear resistance





#### Selection system of PVD coated grade

'	Vorkpiece	Machining types	Recommended grade	Recommended cutting speed (m/min)	ISO	Application range
		Continuous cutting	DOESOO	175 (100~250)	P30	DCE 200
Р	Steel	Interrupted	PC5300	145 (80~120)	P40	PC5300 PC5400
		cutting	PC5400		P50	
			PC8105	175 (120~230)	M01	
		Continuous cutting	PC8110	160 (110~210)	M10	PC8105
М	Stainless		PC8115	150 (100~200)	M20	PC8110 PC8115 PC5200
IVI	steel		PC5300	135 (80~190)	M30	PC5300 PC9030 PC5400
		Interrupted cutting	PC9030	130 (80~180)	M40	PC3400
		outing	PC5400 100	110 (80~140)	M50	
			PC8105	55 (40~70)	S01	DC0 105
	Heat	Continuous cutting	PC8110	50 (35~65)	S10	PC8105 PC8110 PC8115
s	resistant	oo aa a g	PC8115	45 (30~60)	S20	PC8115 PC5300 new
	alloy	Interrupted	PC5300	40 (20~60)	S30	PC5400
		cutting	PC5400	35 (20~50)	S40	
			PC8105	110 (80 ~140)	H01	PC8 105
н	Hardened	Interrupted cutting	PC8110	100 (70~130)	H05	PC8110
			PC8115	90 (65~115)	H10	PC8115

#### The features of PVD coated grades

PVD Coated grades	ISO	Features
PC8105 (new)	M05~M15 S01~S10 H01~H05	<ul> <li>For high speed and continuous finishing of hard-to-cut materials and STS</li> <li>Excellent cutting performance with high wear resistance and oxidation resistance</li> <li>Ultra fine substrate and the new TiAIN coating layer</li> </ul>
PC8110	PC8110  • For high speed and continuous medium cutting of hard-to-cut materials and example to the second substrate with excellent thermal resistance.  • For high speed and continuous medium cutting of hard-to-cut materials and example to the second substrate with excellent thermal resistance.	
PC8115 100V	M15~M25 S10~S20 H05~H15	For medium to low speed and medium to rough cutting of hard-to-cut materials and STS     Excellent tool life with high wear resistance and chipping resistance     Ultra fine substrate and the new TiAIN coating layer
PC5300	P30~P40 M20~M30 K20~K25 S15~S25	Universal grade for stainless,HRSA,steel and interrupted cast iron machining     High chipping and welding resistance for longer tool life     New TiAIN coating and ultra fine grain substrate adopted
PC9030	M25~M35	Medium,roughing and heavy interrupted cutting for stainless steel     TiAIN coating and ultra fine grain substrate adopted     High chipping and welding resistance for stable machining
PC5400 🕬	P35~P45 M30~M40 K30~K35 S25~S35	<ul> <li>For medium cutting for hard-to-cut materials, stainless steel, steel, and cast iron at medium or low speed</li> <li>Stable machinability with chipping resistance, fracture resistance and welding resistance</li> <li>Ultra fine substrate with high toughness and new AlCiN layer</li> </ul>

#### Application examples (PC8105/PC8110/PC8115)

#### S Inconel 718

■ Cutting vc (m/min) = 50 condition vc (mm/rev) = 0.15

ap (mm) = 0.5, wet

■ Designation Insert : CNMG120408-VP3 (PC8105)

Holder: PCLNR2525-M12

■ Test result





Competitor A



PC8105

5

Competitor B

#### S Inconel 718

■ Cutting vc (m/min) = 50 fn (mm/rev) = 0.15

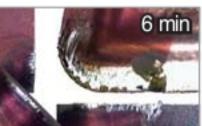
ap (mm) = 1.5, wet

■ Designation Insert : CNMG120408-VP3 (PC8115)

Holder: PCLNR2525-M12

■ Test result







PC8115

Competitor

Conventional grade

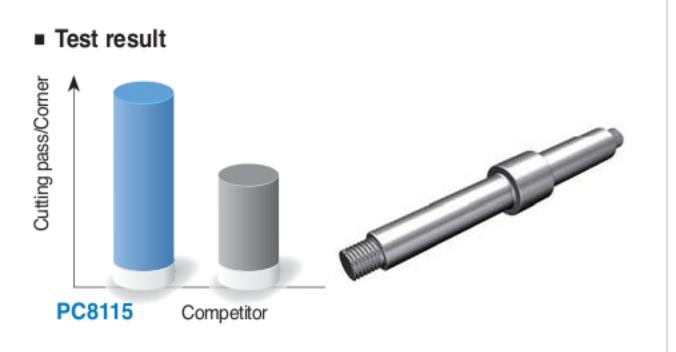
#### M Stainless steel (STS316L)

■ Cutting vc (m/ condition fn (mr

Designation

vc (m/min) = 80fn (mm/rev) = 0.2ap (mm) = 7.0, wet

Insert: CNMG120408-VP3 (PC8115) Holder: PCLNR2525-M12



#### S Inconel 625

Cutting condition

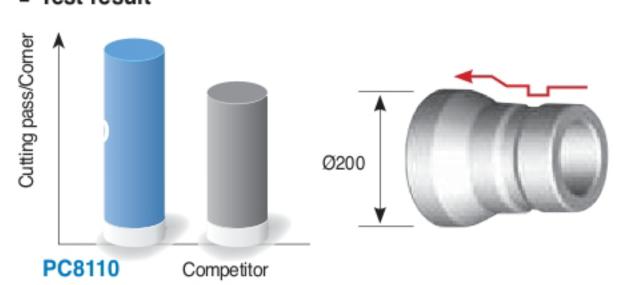
vc (m/min) = 60fn (mm/rev) = 0.2

ap (mm) = 2, wet

Designation

Insert: DNMG150608-HS (PC8110)

Holder: DDLNL2525-M15

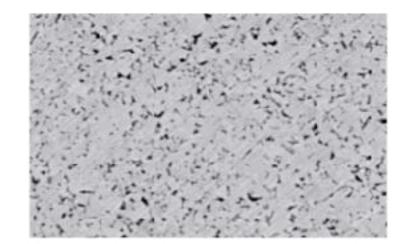


#### Uncoated carbide grades

#### Uncoated carbide grades for turning application of titanium

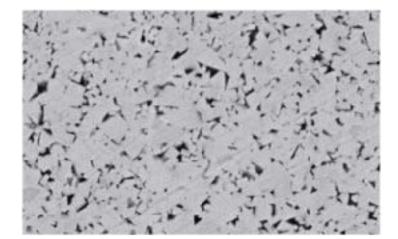
#### **H01**

- Increased wear resistance and chipping resistance with the use of ultra fine substrate
- Improved welding resistance and chipping resistance with the use of special surface treatment and sharp cutting edge of VP chip breaker
- · Excellent tool life when finishing titanium alloy at high speed

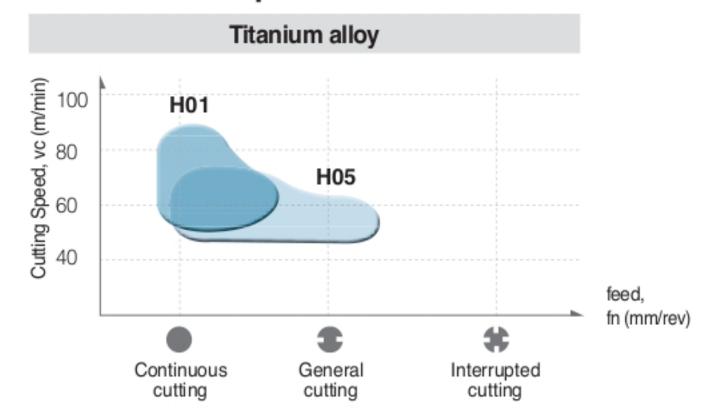


### **H05**

- The 1st recommended grade for machining titanium alloy in a variety of cutting conditions
- Improved welding resistance and chipping resistance with the use of special surface treatment and sharp cutting edge of VP chip breaker
- · Ideal for medium cutting of titanium alloy



#### Grades line up



#### Selection system of uncoated carbide grades

	Workpiece	Recommended grade	Recommended cutting speed (m/min)	ISO	Application range
		ST10	110 (70~140)	P10	<st10< th=""></st10<>
Р	Steel	ST20	80 (50 ~110)	P20	OTOO.
		ST30A	70 (40~90)	P30	ST20 ST30A
M	Stainless steel	U20	70 (40~90)	M25	U20
		H01	105 (60~140)	K01	H01
K	Cast iron	H05	105 (60~140)	K10	H05
		G10	90 (50~120)	K20	G10
N	Aluminum alloy	H01	600 (450~750)	N10	H01
N	Copper alloys	H05	425 (320~530)	N20	H05
s	Titonium elleu	H01	55 (40~70)	S01	H01
3	Titanium alloy	H05	50 (35~65)	S10	H01 H05
Н	High hardness steel	H01	80 (55~105)	H10	H01

#### Main composition and application range

Workpiece Composition		Features	Workpiece		
Р	WC-TiC-TaC-Co	Heat resistance, excellent plastic deformation resistance	Carbon steel, Alloy steel, Stainless steel		
M	WC-TiC-TaC-Co	General tools stable heat resistance with strength	Carbon steel, Alloy steel, Stainless steel, Cast steel		
K	WC-Co	High strength and superior wear resistance	Cast iron, Non-ferrous metal, Plastic, etc		
S	WC-Co	Excellent wear resistance and chipping resistance	Titanium alloy		



#### The physical properties of uncoated carbide grades

Workpiece	Grade	Hardness (HRA)	TRS (kgf/mm²)	Young's modulus (103kgf/mm2)	Thermal expansion coefficient (10-6/°C)	Thermal conductivity (cal/cm · sec·°C
	ST10	92.1	175	48	6.2	25
P	ST20	91.9	200	56	5.2	45
	ST30A	91.3	230	53	5.2	-
М	U20	91.1	210	-	-	88
IVI	ST30A	91.3	230	53	5.2	-
К	H01	92.9	210	66	4.7	109
K	G10	90.9	250	63	-	105
s	H01	92.9	210	66	4.7	109
5	H05	91.8	250	-	-	-

1KPa = 102kgf/m<sup>2</sup>, 1w/mk = 2.39×10<sup>-3</sup>cal/cm·sec·°C

#### **Application examples (H01/H05)**

#### Titanium alloy (Ti-6Al-4V)

Cutting vc (m/min) = 100condition fn (mm/rev) = 0.1

ap (mm) = 0.5, wet

Insert: CNMG120408-VP1 (H01) Designation

Holder: PCLNR2525-M12

■ Test result







H01 (VP1)

H01 (VP3)

Competitor

#### Titanium alloy (Ti-6Al-4V)

Cutting vc (m/min) = 80condition fn (mm/rev) = 0.2

ap (mm) = 2.0, wet

Insert: CNMG120408-VP3 (H05) Designation

Holder: PCLNR2525-M12

■ Test result







H05

Competitor A

Competitor B

#### Titanium alloy (Ti-6Al-4V)

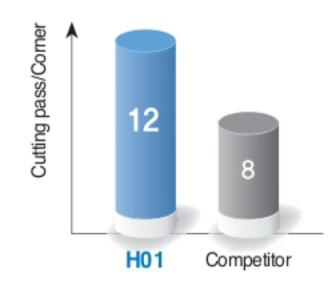
■ Workpiece Part of an industrial machine

Cutting vc (m/min) = 60, fn (mm/rev) = 0.2condition ap (mm) = 0.8, wet

Designation Insert: CNMG120408-VP3 (H01)

Holder: PCLNR2525-M12

■ Test result





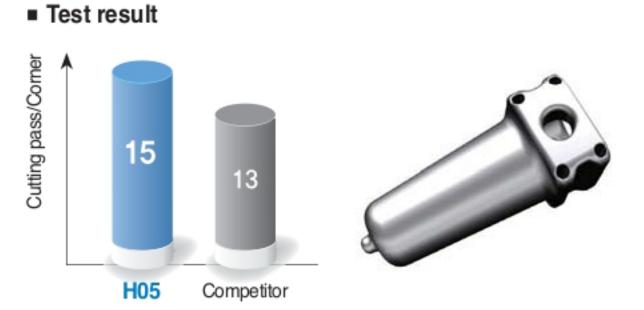
#### Titanium alloy (Ti-6Al-4V)

Workpiece Part of an industrial machine

■ Cutting vc (m/min) = 50, fn (mm/rev) = 0.15condition ap (mm) = 2.0, wet

Designation Insert: CNMG120408-VP3 (H05)

Holder: PCLNL2525-M12





#### **Cermet grades**

#### Solution for turning application of steel

## CN1500 (W

- For continuous machining of cold/hot forged steel and Sintered ferrous alloy at high speed and low depth of cut
- Excellent wear resistance and crater resistance
- Improved surface roughness acquired by optimized cutting edges

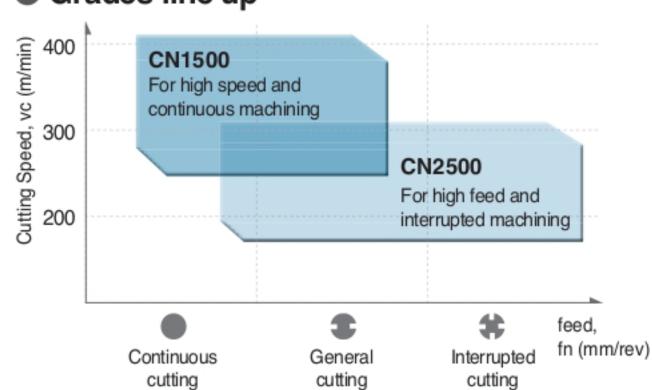
## 

- For high interrupted machining of cold/hot forged steel and Sintered ferrous alloy at high feed and high depth of cut
- Excellent resistance against chipping, fracture and thermal crack
- Improved surface roughness acquired by optimized cutting edges

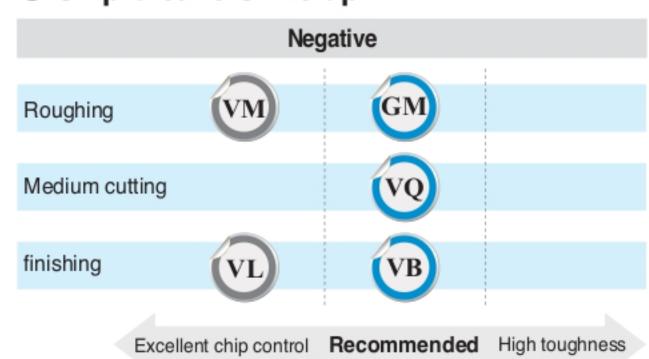
#### Recommended cutting condition

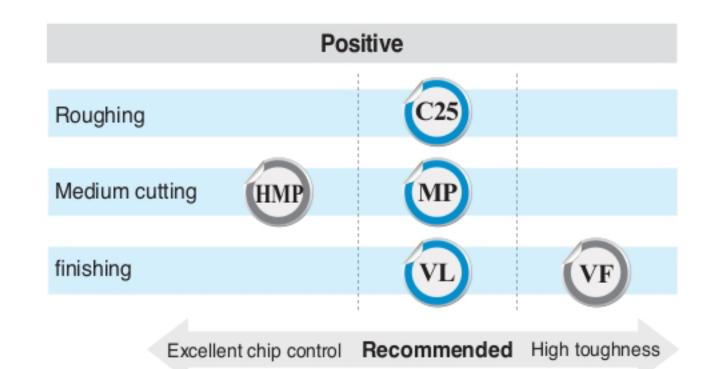
Division	Workpiece	Grade	Recommended cutting speed (m/min)				
DIVISION	workpiece	Grade	Minimum	Recommended	Maximum		
	SM10C,	CN1500	150	270	400		
	SS440	CN2500	130	240	350		
g	SM45C	CN1500	150	250	350		
Turning	SIVI45C	CN2500	130	220	300		
Ē	SCM440, Sintered	CN1500	120	220	300		
	fe ferrous alloy	CN2500	100	200	250		

#### Grades line up



#### Chip breakers line up





#### Selection system of cermet grades

Workpiece		/orkpiece	Machining types	Recommended grade	Recommended cutting speed (m/min)	ISO	Application range
			Continuous cutting	CN1500	250 (150~350)	P10	CN1500
Р	Р	Steel			7	P20	CN2500
			Interrupted cutting	CN2500 @	220 (130~300)	P30	CIV2300

## A Turning Grades

#### Comparison of chip breakers

Insert	Machining	Machining types Application range		Chip breakers					
types	types			CompetitorA	CompetitorB	CompetitorC	CompetitorD		
	Continuous cutting	For machining mild steel with enhanced chip control	VL	FA	GP	TF	FA		
Nega	General cutting	For low interrupted cutting with stronger cutting edges than VG chip breaker	VB	FG	XP CQ	TSF TS	LU SE		
type	General cutting	For medium cutting to finishing at low interruption	VQ	MC	HQ	AS, ZM	SU		
	Interrupted cutting	For medium cutting to roughing at high interruption	GM	MT	HS	TM	GU		
	Continuous cutting	For machining mild steel with enhanced chip control	VL	FA	GP	PF	FP		
Posi	Continuous cutting	Enhanced chip control when machining internal diameter with stronger cutting edges than VL chip breaker	VF	FG-PC	HQ	PS	LU		
type	General cutting	Stronger cutting edges than VF chip breaker	MP	FG	HQ	PS	LU		
	General cutting	For medium cutting to finishing at low interruption	НМР	FG	HQ	PM	SU		
	Interrupted cutting	For medium cutting to roughing at high interruption	C25	MT	GK	24	SC		

#### **Application examples (CN1500)**

#### Carbon steel (SM45C)

Cutting condition vc (m/min) = 200, n (rpm) = 1,800fn (mm/rev) = 0.1, ap (mm) = 0.3

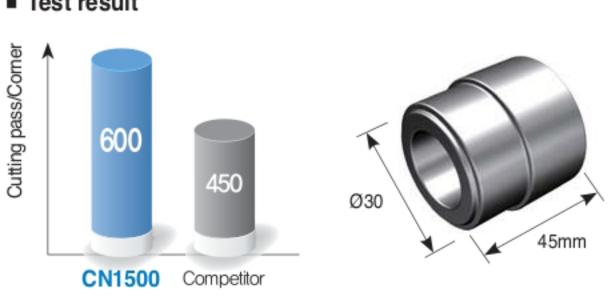
wet

Designation

Insert: CCMT09T304-HMP (CN1500)

Holder: SCLCR2020-K09

■ Test result



#### Alloy steel (SCM430)

Cutting condition vc (m/min) = 230, n (rpm) = 2,000fn (mm/rev) = 0.12, ap (mm) = 0.8

wet

Designation

Insert: TNMG160404-VQ (CN1500)

Holder: DTGNR3232-P16

■ Test result



#### Bearing steel (STB2)

Cutting condition

vc (m/min) = 200, n (rpm) = 2,500fn (mm/rev) = 0.1, ap (mm) = 0.3

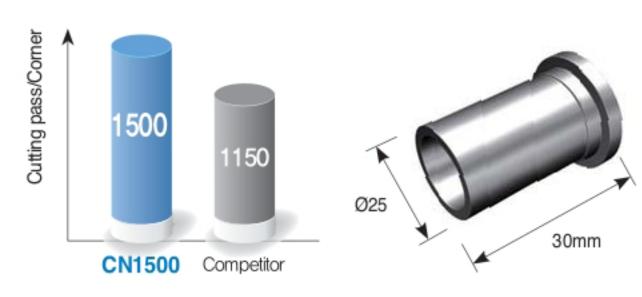
wet

Designation

Insert: DCMT11T302-VF (CN1500)

Holder: SDJCR2525-M11

■ Test result



#### Sintered ferrous alloy

Cutting condition vc (m/min) = 160, n (rpm) = 1,200

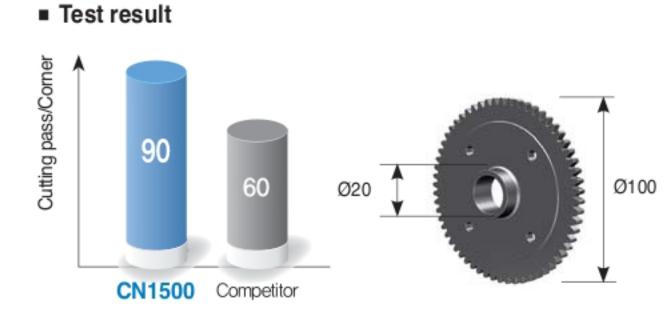
fn (mm/rev) = 0.17, ap (mm) = 0.2

wet

Designation

Insert: SNMG120408-GM (CN1500)

Holder: MSRNR2525-M12



#### **Application examples (CN2500)**

#### P Carbon steel (SM45C)

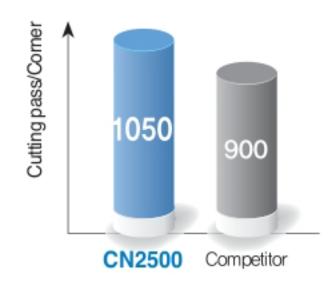
■ Cutting vc (m/min) = 185, n (rpm) = 2,300 fn (mm/rev) = 0.15, ap (mm) = 0.4

wet

■ Designation Insert: CCMT09T304-MP (CN2500)

Holder: SCLCR2020-K09

■ Test result





#### P Alloy steel (SCR420H)

■ Cutting vc (m/min) = 200, n (rpm) = 2,000 condition fn (mm/rev) = 0.15, ap (mm) = 0.2

wet

■ Designation Insert : DCMT11T304-HMP (CN2500)

Holder: SDJCR2525-M11

■ Test result





#### P Sintered ferrous alloy

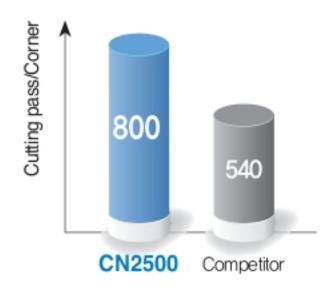
■ Cutting vc (m/min) = 280, n (rpm) = 2,000 fn (mm/rev) = 0.2, ap (mm) = 0.2

wet

■ Designation Insert: VBMT160404-MP (CN2500)

Holder: SVABL-2020-K16

■ Test result





#### P Alloy steel (SCM415)

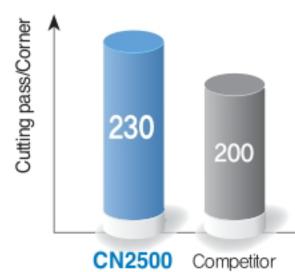
■ Cutting vc (m/min) = 300, n (rpm) = 2,200 fn (mm/rev) = 0.25, ap (mm) = 0.3

wet

■ Designation Insert : CNMG120408-GM (CN2500)

Holder: PCLNR2525-M12

■ Test result





#### P Carbon steel (SM45C)

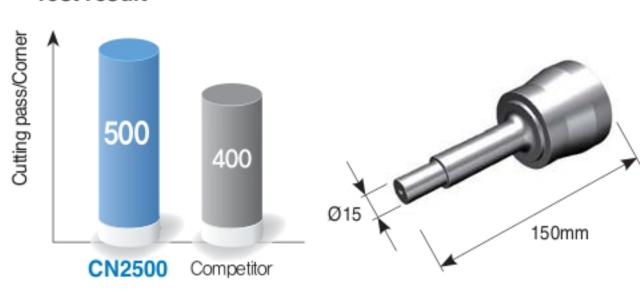
■ Cutting vc (m/min) = 300, n (rpm) = 2,800 fn (mm/rev) = 0.25, ap (mm) = 0.4

wet

■ Designation Insert : CNMG120404-VB (CN2500)

Holder: PCLNR3232P-16

■ Test result



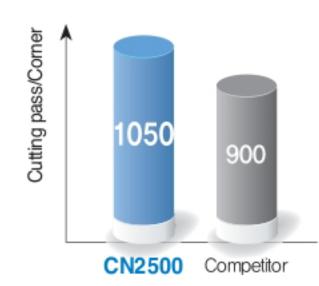
#### P Alloy steel (SCR420)

■ Cutting vc (m/min) = 200, n (rpm) = 2,300 fn (mm/rev) = 0.2, ap (mm) = 0.3

wet

■ Designation Insert : CCMT09T304-HMP (CN2500)

Holder: SCLCR2020-K09





## A Turning Grades

#### Coated cermet grades

#### Coated cermet for machining carbon steel, alloy steel and sintered ferrous components

## CC1500 mew

- Maximized resistance to built-up edge and oxidation in continuous cutting at high speeds and low depth of cuts
- Superior wear resistance vs. existing tools in continuous cutting of carbon steel and alloy steel

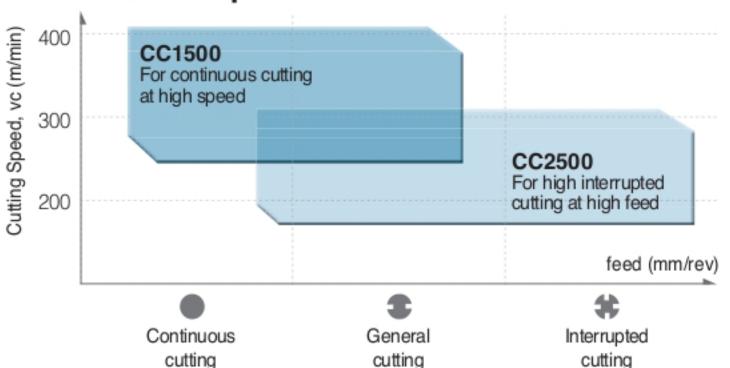
## CC2500 new

- Maximized resistance to built-up edge and oxidation in interrupted cutting at high feeds and high depth of cuts
- Superior impact resistance vs. existing tools in interrupted cutting of carbon steel and alloy steel

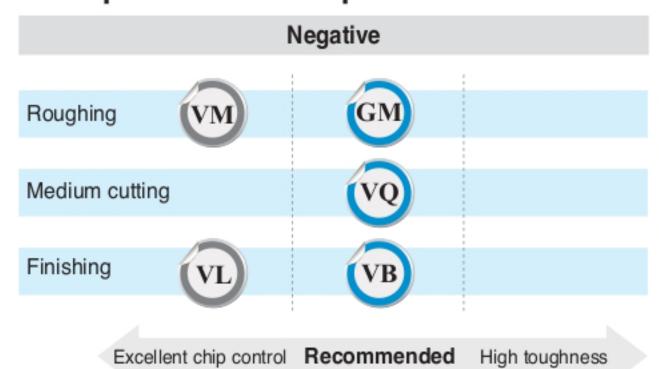
#### Recommended cutting condition

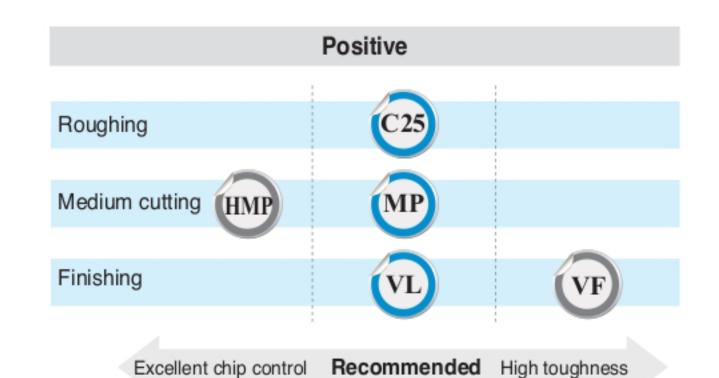
Division	Workpiece	Grade	Recommended cutting speed (m/min)
	SM10C	CC1500	200 < <b>350</b> < 450
	SS400	CC2500	180 < <b>290</b> < 400
g	SM45C	CC1500	200 < <b>300</b> < 400
Turning	SIV145C	CC2500	180 < <b>270</b> < 350
F	SCM440, Sintered	CC1500	180 < <b>270</b> < 350
	fe ferrous alloy	CC2500	150 < <b>250</b> < 300

#### Grades line up



#### Chip breakers line up





#### Selection system of coated cermet grades

W	orkpiece	Machining types	Recommended grade	Recommended cutting speed (m/min)	ISO	Application range
011		Continuous cutting	CC1500	325 (200~450)	P10	CC1500
	Steel	Interrupted COSE00 365 (100 350)	P20 P30	CC2500		

#### The features of coated cermet grade

Coated cermet	ISO	Features			
CC1500 00W	P10~P20	• PVD coated Cermet • Light cutting for steel and cast iron in high speed machining • Optimized for precision boring			
CC2500 10W	P20~P30	• PVD coated Cermet • Light cutting for steel and cast iron in medium or high speed machining • Dry and wet cutting are available			

#### **Application examples (CC1500)**

#### P Carbon steel (SM20C)

Workpiece

Nipple

Cutting condition

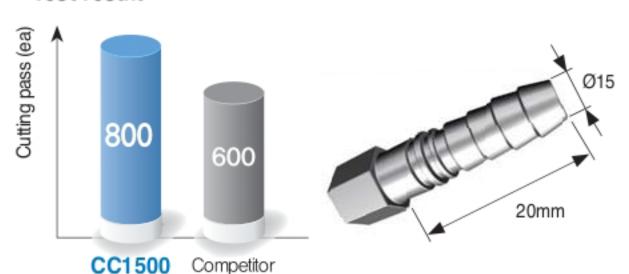
vc (m/min) = 170, n (rpm) = 2,000fn (mm/rev) = 0.12, ap (mm) = 0.12, wet

Designation

Insert: TPMT110304-MP (CC1500)

Holder: S20R-STWPR-11

■ Test result



#### P Alloy steel (SCM440)

■ Workpiece

Plate carrier

Cutting condition

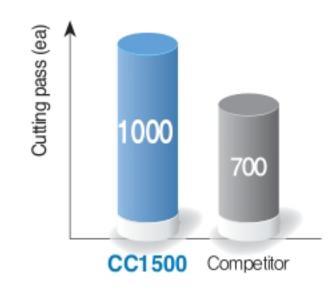
vc (m/min) = 450, n (rpm) = 2,500fn (mm/rev) = 0.2, ap (mm) = 0.2, wet

■ Designation

Insert: DCMT11T304-HMP (CC1500)

Holder: SDJCR2525M11

■ Test result





#### P Carbon steel (SM45C)

■ Workpiece

Cut plate carrier

Cutting condition

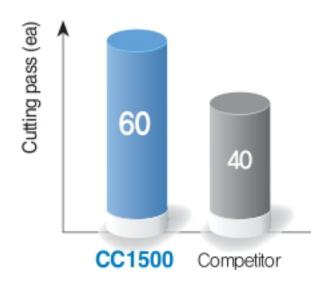
vc (m/min) = 300, n (rpm) = 2,500fn (mm/rev) = 0.3, ap (mm) = 0.4, wet

Designation

Insert: CCMT09T304-C25 (CC1500)

Holder: SCACR1212-F09

■ Test result





#### P Alloy steel (SCM420)

■ Workpiece

Pinion

Cutting condition

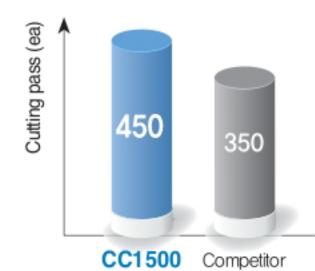
vc (m/min) = 250, n (rpm) = 2,500fn (mm/rev) = 0.2, ap (mm) = 0.5, wet

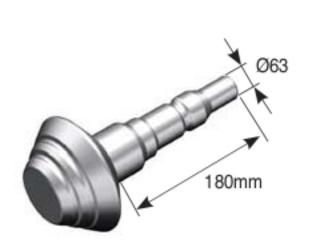
Designation

Insert: DNMG150604-VL (CC1500)

Holder: PDJNR2525-M15

■ Test result





#### P Hot forging (SCM430)

Workpiece

Valve

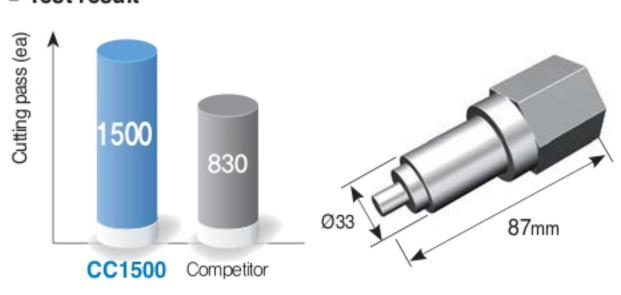
Cutting condition

vc (m/min) = 230, fn (mm/rev) = 0.8 ap (mm) = 0.12, wet

Designation

Insert: TNMG160404-VQ (CC1500)
Holder: PTTNR1616-H16

■ Test result



#### P Sintered ferrous alloy

■ Workpiece

Sprocket

Cutting condition

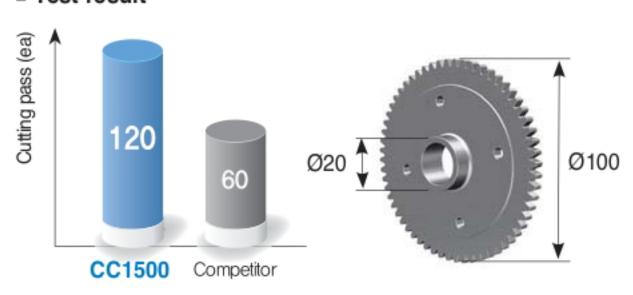
vc (m/min) = 160, fn (mm/rev) = 0.17

ap (mm) = 0.2, wet

Designation

Insert : SNMG120408-VM (CC1500)

Holder: MSKNR3232-P12



#### **Application examples (CC2500)**

#### Carbon steel (SM45C)

Workpiece Swash-Plate

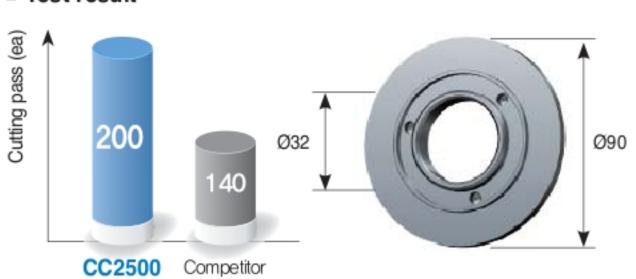
Cutting condition

vc (m/min) = 250, n (rpm) = 890fn (mm/rev) = 0.06, ap (mm) = 0.1, wet

Designation Insert : DNMG110404-VQ (CC2500)

Holder: SDJCR2525-M11

■ Test result



#### Ductile cast iron (FCD400)

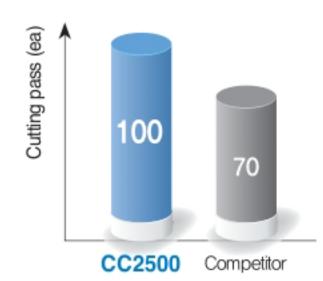
Workpiece Diff. case

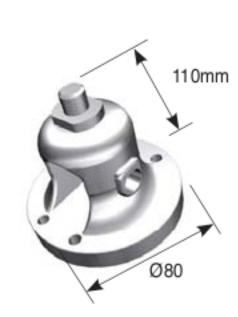
Cutting vc (m/min) = 150, n (rpm) = 600condition fn (mm/rev) = 0.15, ap (mm) = 0.3, wet

Designation Insert: VBMT160404-MP (CC2500)

Holder: SVJBR2525-M16

■ Test result





#### Carbon steel (SM35C)

Workpiece

Piston Rod

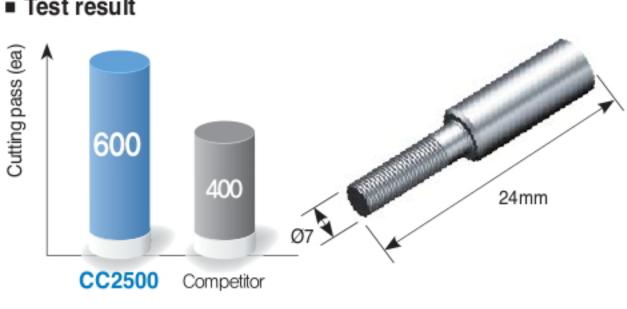
Cutting condition vc (m/min) = 122, n (rpm) = 4,800fn (mm/rev) = 0.15, ap (mm) = 2.0, wet

Designation

Insert : DNMG150604-GM (CC2500)

Holder: MDQNR2525-M15

■ Test result



#### Alloy steel (SCM420)

Workpiece Connecting Rod

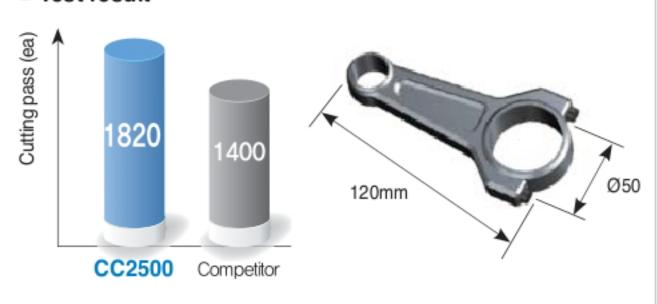
Cutting condition vc (m/min) = 340, n (rpm) = 2,100fn (mm/rev) = 0.15, ap (mm) = 0.07, wet

Designation

Insert : TPMT110304-MP (CC2500)

Holder: S10M-STFPR-11

■ Test result



#### Alloy steel (SCM415)

■ Workpiece

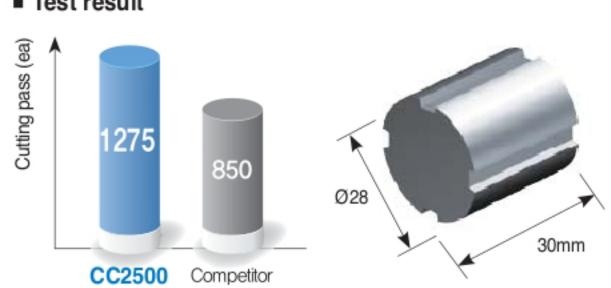
Bush

Cutting condition vc (m/min) = 314, n (rpm) = 3,500fn (mm/rev) = 1, ap (mm) = 0.2, wet

Designation

Insert : CNMG120408-VQ (CC2500) Holder: MCLNR2525-M12

■ Test result



#### Alloy steel (SWCH18A)

Workpiece

Shaft

Cutting condition vc (m/min) = 367, n (rpm) = 5,800fn (mm/rev) = 0.02, ap (mm) = 1.55, wet

Designation

Insert: TBT4405R-D38-R0.25 (CC2500)

Holder: TBH425-45R

