KORLOY Inc. Code System



Chip breaker



Terminology of tool formula

TERM	CODE	UNIT	TERM	CODE	UNIT
Tool diameter	D	mm	Horse power requirement	Pc	kW
Cutting speed	VC	m/min	Specific cutting resistance	kc	MPa
Revolution per minute	n	min [*]	Torque	Мс	N.m
Feed per minute	vf	mm/min	Thrust	Тс	N
Feed per revolution	fn	mm/rev	Cycle time	tc	min
Feed per tooth	fz	mm/t	Tool life	Т	min
Tooth	Z		Flank wear	Vв	mm
Axial depth of cut	ар	mm	Crater wear	Kt	mm
Radial depth of cut	ae	mm	Nose radius	r	mm
Peak feed	pf	mm			

How to use Tool4U (Web quotation requriement)



3. Main page



4. Screen shot





- 1. Step: Select category, product and check product detail
- 2. Next step: Open new window for changing dimension
- 3. Print: Print current page
- 4. Search: Search product by designation

Screen shot 2: Size input page



Enter essential information needed to quote and click "Quote" button to send e-mail

GRADES & CHIP BREAKERS

KORLOY's new grades are designed with optimal substrates for each application and are PVD coated for high temperature, high hardness and oxidation resistance, or CVD coated for high tempeure and wear resistance. Additionally, the improved post-coating treatment provides superior surface finishes to ensure the highest levels of quality and productivity.





Grades

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Milling Grades

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Solid Endmills & Solid Drills Grades

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Chip Breakers

- A48 Chip breaker for turning
- A51 Chip breaker for milling
- A55 Chip breaker for drilling

Grades system

Cutting tool

	Р	Steel	ST10	ST20	ST30A							
	М	Stainless steel	U20									
Uncoated	К	Cast iron	H01	H05	G10							
carbide	S	Titanium alloy	H01	H05								
	Ν	Non-ferrous metal	H01	H05								
	н	Hardened steel	H01									
	Р	Steel	NC3215	NC3225	NC3120	NC3030	NC5330					
	М	Stainless steel	PC8105	PC8110	PC8115	NC9115	NC9125	NC5330	NC9135	PC5300	PC9030	PC5400
Coated	К	Cast iron	NC6315	NC5330	PC5300	PC5400						
for turning	S	HRSA	PC8105	PC8110	PC8115	NC9125	NC9135	PC5300	PC5400			
	Ν	Non-ferrous metal	ND3000	PD1000								
	н	Hardened steel	PC8105	PC8110	PC8115							

			Steel	NC5330	NC5340	NCM325	PC3500	PC3600	PC5300	PC5400	NC5350	NCM335
		М	Stainless steel	NC5330	NC5340	NCM325	PC5300	PC9530	NC5350	NCM335	PC5400	
Coated carbide for milling		К	Cast iron	PC8110	PC6510	NC5330	PC5300	NC5340	PC5400			
		S	HRSA	PC5300	PC5400							
		Ν	Non-ferrous metal	ND3000	PD2000							
		н	Hardened steel	PC2005	PC2010	PC2015	PC210F	PC2505	PC2510			



Turning	Р	Steel	CN1500	CN2000	CN2500
cermet	к	Cast iron	CN1500	CN2500	
Coated cermet	Р	Steel	CC1500	CC2500	
Milling cermet	Р	Steel	CN2000	CN30	

Application range



Feed rate

Grades system

Ocutting tool

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











Grades & Chip Breakers

feed, fn (mm/rev)



- 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

Unstable tool life



Competitor

 Longer tool life & Higher removal rate
 → High cutting conditions and shorter cutting time available

Stable tool like



NC3215/NC3225

- · Ideal combination of a grade and chip breakers
- → Prolongs tool life
- \rightarrow Wide applications ranging from roughing to finishing





NC3215/NC3225

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



New coating

Application range





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 \rightarrow Minimizes built-up edges
- · Augmented tool life stability and wear resistance





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

I Titanium layer with stronger anti-fracture

+ Functional substrate with optimized combination of hardness and toughness

Application range





Turning grades for stainless steel NC9115 me / NC9125 me / NC9135 me

- 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



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

Inhibited built-up edge and blade damage



Competitor (M25)



NC9125 (M25)

Inhibited wear on notch and relief surface





Competitor (M25)



Grades line up



• Recommended grade and chip breaker per stainless steel type

[Austenitic stainless steel]

Overla		Cutting speed (m/min)										
Grade	50		100		150		200		250			
NC9115						160		220				
NC9125						150	200	1				
NC9135				100	150	1						

[Ferritic/Martensitic stainless steel]

Quarta		Cutting speed (m/min)									
Grade	50 1		10	00	150		200		250		
NC9115						150			250		
NC9125					120			220			
NC9135				100	150	1			_		

[Duplex stainless steel]

Quada	Cutting speed (m/min)									
Grade	50		100		150		20	00	25	50
NC9115					120 1	60				
NC9125				100	140					
NC9135		60	100							

[Precipitation hardened (PH) stainless steel]

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



١	Vorkpiece	Machining types	Recommended grade	Recommended cutting speed (m/min)	ISO	Application range
		Continuous cutting	NC3215	295 (170~420)	P10	NC3215
			NCOODE	060 (150, 070)	P15	(rev)
			NC3225	200 (150~370)	P20	NC3225
Р	Steel	Interrupted	NC3120	260 (120~370)	P25	NC3120
	cutting	cutting	NC3030	205 (120~290)	P30	NC3030 NC500H
			NC5330	205 (120~290)	P35	
			NC500H	205 (120~290)	P40	
		Continuous	NC9115	240 (220~260)	M10	NC0115
м	Stainless	cutting	NC9125	210 (190~230)	M20	NC9125 NC5330
IVI	steel	Interrupted	1100120		M30	NC0135
		cutting	NC9135	180 (160~200)	M40	new lines
		Continuous cutting	NC6315	250 (130~370)	K10	NC6315
К	Cast iron	Interrupted	1000313	220 (130~310)	K20	NC5330
		cutting	NC5330	190 (110~270)	K30	
c	S HRSA	A Continuous cutting Interrupted cutting	NC9125	NC9125		NC0125
3			NC9135	40 (20~60)	S20	NC9135

Selection system of CVD coated grade

• The features of CVD coated grades

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

Application examples (NC3215/NC3225)



Application examples (NC3225)



Designation Insert : CNMG120408-VM (NC3225) Holder: PCLNR2525-M12





Application examples (NC6315)





Application examples (NC9100 Series)



Turning grade for heat resistant alloy and stainless steel

PC8105 🖤

- · 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

Coating surface treatment technology (Pictures of coating layer)



Conventional coating

Improved lubrication

Soft coating surface PC8100 Series Oxidation resistant coating technology (Pictures of coating layer heat-treated at 900°C)

Improved

oxidation resistance



Competitor

PC8100 Series



٧	Vorkpiece	Machining types	Recommended grade	Recommended cutting speed (m/min)	ISO	Application range
		Continuous cutting	BCE200	175 (100~250)	P30	PCF000
Р	Steel	Interrupted	PC5300	145 (80~120)	P40	PC5300 PC5400
		cutting	PC5400	125 (80~160)	P50	
			PC8105	175 (120~230)	M01	
		Continuous	PC8110	160 (110~210)	M10	PC8105 PC0110
	Stainless	cutting	PC8115	150 (100~200)	M20	PC8110 PC8115 PC5200
IVI	steel	Interrupted cutting	PC5300	135 (80~190)	M30	PC9030 PC9030
			PC9030	130 (80~180)	M40	PC3400 -
			PC5400	110 (80~140)	M50	
			PC8105	55 (40~70)	S01	POOLO
	Heat	Continuous	PC8110	50 (35~65)	S10	PC8105 PC8110 (PC8110
S	resistant	outurig	PC8115	45 (30~60)	S20	PC8113 PC5300
	alloy	Interrupted	PC5300	40 (20~60)	S30	PC5400
		cutting	PC5400	35 (20~50)	S40	
			PC8105	110 (80 ~140)	H01	PC8105
н	Hardened	Interrupted cutting	PC8110	100 (70~130)	H05	PC8110
			PC8115	90 (65~115)	H10	PC8115

Selection system of PVD coated grade

The features of PVD coated grades

PVD Coated grades	ISO	Features
PC8105 💷	M05~M15 S01~S10 H01~H05	 For high speed and continuous finishing of hard-to-cut materials and STS Excellent cutting performance with high wear resistance and oxidation resistance Ultra fine substrate and the new TiAIN coating layer
PC8110	M10~M20 S05~S15 H01~H10	 For high speed and continuous medium cutting of hard-to-cut materials and STS Excellent tool life with high wear/plastic deformation resistance at high temperature New TiAIN coating layer and substrate with excellent thermal resistance
PC8115 🕬	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	 For medium cutting for hard-to-cut materials, stainless steel, steel, and cast iron at medium or low speed Stable machinability with chipping resistance, fracture resistance and welding resistance Ultra fine substrate with high toughness and new AlCiN layer



Turning Grades

Application examples (PC8105/PC8110/PC8115)





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

Orades line up



Selection system of uncoated carbide grades

	Workpiece	Recommended grade	Recommended cutting speed (m/min)	ISO	Application range
		ST10	110 (70~140)	P10	<pre>ST10</pre>
Р	Steel	ST20	80 (50 ~110)	P20	CTOO
		ST30A	70 (40~90)	P30	ST30A ST30A
М	Stainless steel	U20	70 (40~90)	M25	<u>U20</u>
		H01	105 (60~140)	K01	HOI
к	Cast iron	H05	105 (60~140)	K10	H01
		G10	90 (50~120)	K20	< <u>G10</u>
N	Aluminum alloy	H01	600 (450~750)	N10	
	Copper alloys	H05	425 (320~530)	N20	H05
c	Titopium allau	H01	55 (40~70)	S01	
3	Thannum alloy	H05	50 (35~65)	S10	H05
Н	High hardness steel	H01	80 (55~105)	H10	<h01< th=""></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				
М	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 (10 ³ kgf/mm ²)	Thermal expansion coefficient (10 ⁻⁶ /°C)	Thermal conductivity (cal/cm · sec·°C		
	ST10	92.1	175	48	6.2	25		
Р	ST20	91.9	200	56	5.2	45		
	ST30A	91.3	230	53	5.2	-		
	U20	91.1	210	-	-	88		
IVI	ST30A	91.3	230	53	5.2	-		
v	H01	92.9	210	66	4.7	109		
ĸ	G10	90.9	250	63	-	105		
S	H01	92.9	210	66	4.7	109		
	H05	91.8	250	-	-	-		

1KPa = 102kgf/m², 1w/mk = 2.39×10^{-3} cal/cm·sec·°C



Cermet grades

Solution for turning application of steel CN1500 meV

- 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

Recommended cutting condition

Improved surface roughness acquired by optimized cutting edges

CN2500

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

Grades line up



Chip breakers line up





Selection system of cermet grades

Workpiece		Machining types	Recommended grade	Recommended cutting speed (m/min)	ISO	Application range
_	Cheel	Continuous cutting	CN1500	250 (150~350)	P10	CN1500
Р	Steel	Interrupted		7	P20	
		cutting	CN2500	220 (130~300)	P30	0122000





• Comparison of chip breakers

Insert	Machining	Application range	Chip breakers								
types	types	Application range	KORLOY	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)



Application examples (CN2500)



Coated cermet grades

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



- 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

- 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 Division Workpiece Grade speed (m/min) 200 < **350** < 450 SM10C CC1500 SS400 180 < 290 < 400 CC2500 CC1500 200 < **300** < 400 Turning SM45C CC2500 180 < 270 < 350 CC1500 180 < **270** < 350 SCM440, Sintered fe ferrous alloy CC2500 150 < 250 < 300

Recommended cutting condition

Orades line up



Chip breakers line up





Selection system of coated cermet grades

Workpiece		Machining types	Recommended grade	Recommended cutting speed (m/min)	ISO	Application range
		Continuous	CC1500 ^{nev}	325 (200~450)	P10	CC1500
Ρ	Steel	Interrunted	nel	V)	P20	002500
		cutting	CC2500	265 (180~350)	P30	00200

The features of coated cermet grade

Coated cermet	ISO	Features
CC1500 new	P10~P20	PVD coated Cermet · Light cutting for steel and cast iron in high speed machining · Optimized for precision boring
CC2500 ^{new}	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)



500

830

CC1500 Competitor

Ø33

87mm



Application examples (CC2500)



Milling grade selections

Selection system

Workpiece	Ρ			Steel			М	Stai	nless	steel	Κ		Cast iron		Ν	Nonfe	errous	S	HR	SA	Н	H	ardene	ed	
ISO	P01	P10	P20	P30	P40	P50	M10	M20	M30	M40	K01	K10	K20	K20	K40	N01	N10	N20	S10	S20	S30	H01	H10	H20	H30
Coated carbide				P	C5330 C3500 C3600 N N	C5340 CM325 C5300 NC53 NC54 NCM	new 5 350 nev 335 400 nev			C5330 C5300 PC95 NC53 NCM	530 340 (18) 325 C5350 CM338 C5400	new new	PC81	10 510 NC53	330 C5300 C5340 PC54	new 100 nev	ND3(000 💷	0		PC53	800 PC54		C2005 C2505 PC20 PC20 PC20 PC20	new hav h10 new h10 new C2015 new C210F
Cermet				C	N2000 CN3	0																			
cBN / PCD																			DP15	50				KB35	0
Uncoated carbide			- ST	F20	ST3(A			<u> </u>	20		H	01 H05 G	10				H	01 H05						

Application range of milling grades

CVD

PVD







fz (mm/t)
S Heat resistant alloy





Universal Line up of CVD-coated grades NC5330

- Excellent quality and a universal grade applicable to P, M, and K materials
- High toughness substrate and coating layer with excellent surface roughness and welding resistance



- Milling grades applicable to P, M, K
- Stable tool life due to its tough substrate and chipping-resistant coatings

• Coating structure



⊣ Lubricative coating with excellent surface finish and welding resistance

H Titanium coating with superb toughness and wear resistance

High-tough substrate specialized for the coating films

Selection system of CVD coated grades

٧	Vorkpiece	Machining types	Recommended grade	Recommended cutting speed (m/min)	ISO	Application range					
		Continuous	NC5220	205 (120, 200)	P20						
		cutting	100000	203 (120~290)	P25	NC5330					
Р	Stool	Continuous	NC5340 🔎	220 (120, 220)	P30						
F	Sieei	cutting	NCM325	230 (130~330)	P35	♦ NC5340					
		Interrupted	NC5350 🔎	205 (120, 200)	P40	NC5350 (NCM335					
		cutting	NCM335	203 (120~290)	P45						
		Continuous cutting	NCE220	140 (80~200)	M10						
			100000		M20						
вл	Stainless	Continuous	NC5340 🔎	155 (00220)	M25	NC5330 new					
IVI	steel	cutting	NCM325	155 (90~220)	M30	NC5340 NCM325					
		Interrupted	NC5350 🔎	140 (80-200)	M35	NC5350 NCM335					
		cutting	NCM335	140 (80~200)	M40						
			NC5220	100 (110, 270)	K10						
к	Cast iron	Continuous cutting	1003330	190 (110~270)	K20	NC5330					
		Galling	NC5340 🔎	150 (80~250)	K30	< NC5340 ***					

The features of CVD milling grades

CVD Coated grades	ISO	Features
NC5330	P20~P30 M20~M30 K15~K25	 For high speed milling of steel and stainless steel Superior wear resistance and chipping resistance grade for steel and stainless steel MT-TiCN + Al2O3 + TiN
NC5340 00 NCM325	P30~P40 M25~M35 K25~K30	 For high speed milling of steel and stainless steel Optimized grade for steel & stainless steel by employing proper substrate and hard coating MT-TiCN + Al₂O₃ + TiN
NC5350 1000 NCM335	P35~P45 M30~M40	For interrupted and rough milling of steel and stainless steel Toughest substrate with hard coating provides stable cutting and tool life for severe interrupted cutting MT-TiCN + Al2O3 + TiN



Application examples (NC5330/NC5340)



PVD coated grades for finishing high hardened steel PC2005 (PC2010 (PC2015 (PC2015 (PC2015)))

- Finishing grade lineup for tool steel and plastic die steel
- PC2005 with extremely hard substrate and coatings
- · PC2010 with high hardened cutting edges, ideally suited for pre-hardened steel and interrupted cutting
- PC2015 for carbon steel and casting machining, demonstrating excellent performance in hard-to-cut materials



Features



Heat shield coating was applied to prevent thermal crack.

 Ultra fine WC was combined with high contents cobalt to be optimized for machining pre hardened steel.

PVD coated grades for roughing high hardened steel PC2505 (PC2510)

• Roughing grade series for high hardened steel

Application guideline per workpiece

- PC2505 with excellent wear resistance, ideal for machining die steel and high hardened steels over HRC50
- PC2510 with stabilized toughness, ideal for interrupted cutting of high hardened steel and wet cutting accompanied by massive thermal shock



Features







Normal coating

After surface treatment

Application examples (PC2005/PC2010/PC2015)



Application examples (PC2505/PC2510)





Universal PVD grade PC5300

- Advanced PVD coating with high hardness and high temp stability
- High tough substrate and coating films produce excellent surface finish
- Universal tooling capability covering P, M, K, S with this single grade, PC5300
- Stable machining resulting from excellent edge hardness and chipping resistance

Features



- Latest PVD coating technology
 developed by KORLOY
- developed by KORLOY
- New concept of coating equipped with high temperature oxidation resistance and high hardness

High temp properties





- New PVD coating layer with high toughness and lubrication
- · High adhesive strength and toughness between the substrate and coating layer
- Excellent cutting edge strength and chipping resistance ensure stable machinability for P, M, K, S.

Features



- Improved lubrication High toughness and strong adhesion
- Ultrafine substrate of high toughness

Crack creation on the coating surface after leaving an indentation by 60kg



Normal coating



High toughness coating



Workpiece Machi type		Machining types	Recommended grade	Recommended cutting speed (m/min)	ISO	Application range		
Р	Steel	Continuous cutting	PC3600	235 (180~290)	P20	D02000		
			PC3500	235 (180~290)	P30	PC3500 PC3500		
		Interrupted cutting삭	PC5300	195 (150~240)	P40	PC5300		
			PC5400	145 (80~210)				
		Continuous	PC5300	130 (100~160)	M20	DC5200		
М	Stainless steel	Interrupted	PC9530	125 (80~150)	M30	PC9530 PC9530		
		cutting	PC5400	110 (80~140)	M40	PC3400		
к		Continuous cutting	PC8110	180 (140~230)	K05			
	Continon		PC6510	180 (140~230)	K10	PC8110 PC6510		
	Cast Iron	Interrupted cutting	PC5300	145 (110~180)	K20	DC5200		
			PC5400	125 (85~160)	K30	PC5400		
	HRSA	Continuous cutting	PC5300	55 (40~70)	S10			
s					S20	PC5300		
		Interrupted cutting	PC5400	40 (30~50)	S30	PC5400		
		Continuous cutting	PC2005	60 (40~80)	H01	DODOOL TRUE DODOOL TRUE		
н	High hardness steel		PC2010	55 (40~70)	H10	PC2003 PC2003 PC2010 PC2510 PC2510 PC2010 PC		
			PC2015	50 (35~65)	H20	PC2015 PC210F -		
			PC210F	50 (35~65)	H30			

Selection system of PVD coated grades

The features of PVD coated grades

PVD Coated grades	ISO	Features				
PC3600	P20~P30	 Milling grade for medium and roughing of steel New coating layer with superior wear resistance and oxidation resistance with high toughness substrate 				
PC3500	P25~P35	Medium and rough milling for steel K-Gold coating				
PC5300	P30~P40 K20~K30 M20~M30 S15~S25	 Superior universal grade for steel, cast iron, hard to cut material, stainless steel New coating and ultra fine grain provide wear resistance and oxidation resistance TiAIN Series new coating 				
PC5400	P35~P45 K25~K35 M30~M40 S25~S35	Universal grade for interrupted machining of steel, cast iron, hard-to-cut materials and stainless steel with stable machinability New coating layer with high toughness and lubrication on ultra fine grain substrate with high toughness AICiN series new coating				
PC8110	K05~K15	 Excellent wear resistance in cast iron milling finish applications Superior wear resistance for finishing cast iron New coating and ultra fine grain provide wear resistance and oxidation resistance TiAIN Series new coating 				
PC6510	K05~K15	High speed milling grade for cast iron and aluminum K-Gold coating				
PC9530	M25~M35	 Medium to rough cutting of hard to cut materials such as stainless steel, Cr-Ni steel, etc. The toughest sub-micron substrate provides excellent cutting performance at high feed TiAIN coating 				
PC2005	H01~H10	 Exclusive for Laser Mill in milling of high hardness workpieces and press mold steel Utmost wear resistance due to high hardness substrate and coating Ultra high hardness K-Brown coating 				
PC2010 000	H05~H15	 Exclusive for Laser Mill in milling of pre hardened steel and plastic mold steel High hardness enhanced cutting edges due to ultra fine WC and high contents binder for expanding application range to high hardness steel and pre hardened steel Ultra high hardness K-Brown coating 				
PC2015	H10~H20	 Exclusive for Laser Mill in milling of carbon steel and cast Highly lubricative K-SILVER coating Lubricative coating layer and high contents substrate for machining mild steel and hard-to-cut cast materials 				
PC210F	H10~H20 P25~P35 K15~K25 M15~M25 S10~S20	 High speed milling grade for hardened steel, cast iron, and stainless steel(Laser Mill) New coating and ultra fine grain provide wear resistance and oxidation resistance TIAIN Series new coating 				
PC2505 11	H01~H10	 Roughing grade for high hardened steel and pressed die steel Excellent wear resistance ideal for machining die steel and high hardened steel over HRC50 				
PC2510 🕬	H05~H15	 Roughing grade for pre-hardened steel and plastic die steel Stabilized toughness ideal for interrupted cutting of high hardened steel and wet cutting accompanied by massive thermal shock 				

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Application examples (PC5300)





Application examples (PC5400)



Uncoated carbide grades

Features

 Due to KORLOY's advanced sintering technology, our uncoated carbide grades have a fine alloy structure which is necessary to get superior quality from a uncoated cutting tool

Advantages

- Consist of P,M,K carbide grades and can be used in all kinds of workpiece
- Excellent quality at machining with coolant, due to the superior thermal crack resistance of the carbide
- Due to the special design of carbides, it has fine micro structure and low affinity with workpiece
- · It has excellent toughness and produces lower cutting loads



Workpiece		Grade	Recommended cutting speed (m/min)	ISO	Application range		
Ρ	Steel	ST30A	80 (60~100)	P30	ST30A		
М	Stainless steel	U20	90 (70~110)	M20	1120		
IVI				M30	020		
к	Cast iron	H01, H05	150 (110~190)	K10	H01 H05		
		G10	120 (90~150)	K20	G10		
N	Aluminum alloy	H01	600 (450~750)	N10	H01		
N	Copper alloys	H05	425 (320~530)	N20	Н05		

Selection system of uncoated carbide grade

• Main composition and application range

Workpiece	Composition	Features	Workpiece	
Р	WC-TiC-TaC-Co	Excellent thermal shock resistance and plastic deformation resistance	Carbon steel, Alloy steel, Stainless steel	
м	WC-TiC-TaC-Co	General grades with thermal shock resistance and hardness	Carbon steel, Alloy steel, Stainless steel, Cast steel	
к	WC-Co	High hardness and superior wear resistance	Cast iron, Non-ferrous metal, Non metal	

• The physical properties of uncoated carbide grades

Workpiece	Grade	Hardness (HRA)	TRS (kgf/mm²)	Young's modulus (10 ³ kgf/mm ²)	Thermal expansion coefficient(10 ⁻⁶ /°C)	Thermal conductivity (cal/cm·sec·°C)
	ST10	92.1	175	48	6.2	25
Р	ST20	91.9	200	56	5.2	45
	ST30A	91.3	230	53	5.2	-
м	U20	91.1	210	-	-	88
V	H01	92.9	210	66	4.7	109
r.	G10E	90.9	250	63	-	105

1KPa = $102kgf/m^2$, $1w/mk = 2.39 \times 10^{-3} cal/cm \cdot sec \cdot °C$


Cermet grades

Features

- High hardness substrate ensures long tool life in high speed milling
- High toughness cutting edge ensures long tool life even in high impact machining
- Chemically stable substrate provides excellent surface finish of the workpiece

Selection system of cermet grades

Workpiece		Machining types	Grade	Recommended cutting speed (m/min)	ISO	Application range
	Ctool	Continuous	CN2000	250 (200~300)	P20	CN/2000
P	Sleer	Interrupted cutting	CN30	150 (100~200)	P30	CN30

The features of cermet grades

Cermet Grade	ISO	Features
CN2000	P20~P30	Universal grade from finishing to roughing of steel Functionally Gradient Material
CN30	P25~P35	For milling of steel Cermet with high toughness

The physical properties of cermet grades

Workpiece	Grade	Hardness(Hv)	TRS(kgf/mm ²)	SG(g•cm ⁻³)
р	CN2000	< 1800	210 <	6.8~7.0
F	CN30	< 1500	240 <	7.0~7.3

Application examples (CN30)





Solid endmills grade selection



- Ultrafine substrate & high hardness coatings for excellent wear resistance
- Special surface treatment provides higher chipping resistance

Features



H Exceptional wear resistance resulting from extremely hard coating layers



• Fine substrate & lubricative coatings for stable machinability

Features



- Lubricative coatings for excellent machinability

Selection system

١	Workpiece	Grade	ISO	Application range
		PC303S	P01	new
		PC310U	P10	PC303S PC203F
Р	Steel	PC315F	P20	PC310U TEW TEW
		PC320 new	P30	PC315E PC320 PC215F
		PC2020	P40	
	Obstations	PC3035	M10	
Μ	Stainless	PC2200 10	M20	PC310U PC310U PC310U PC310U
	31001	PC2155 new	M20	PC3205 PC315F PC320 PC215F
		FC315E	IVISU KO1	
		PC303S	KUT	DC2025 DC2025
v	Costinon	PC310U	K 10	PC3033 PC203P PC310U rew
r	Castillon	PC315F	K20	PC315E PC320 PC215F PC220 FA2
		PC320	K40	
		ND3000	NO1	
		ND2100	N05	ND3000
Ν	Nonferrous	PD3000	N10	ND2100 PD3000 H01 H05S
		H01	N20	PC210C
		PC210	S10	
s	HRSA	PC320S	\$20	PC210 pc2000 new
		PC315E	\$30	PC3205 PC315E PC320 PC215F PC220 FA2
	High	PC303S	H01	
н	hardness	PC203F	H10	PC303S PC203F
	steel	PC310U	H20	PC310UT



Solid endmills grade selection

S Grade information for each product

ltom	Gra	ade	ltem	Grade	
nem	Coated	Uncoated	nem	Coated	Uncoated
H Endmill	PC303S, PC310U	-	Dt Endmill new	HN30T, HC10T, HC20T, HC30T,	ENIQOT
V Endmill	PC215F	-	R' Enumin -	PC10T, PC20T, PC30T, PC40T	FINOUT
Z Endmill 🔎	PC315E	-	Aluminum solid endmill ⊄	PD3000	H01
F Endmill	PC203F	-	A+ Endmill	-	H05S
T Endmill 🔍	PC2510, ND3000	-	C-Max	PC210C	-
I+ Endmill	PC320	-	D Endmill	ND3000	-
Z ⁺ Endmill	PC320U	-	Composite Router Endmill	ND2100	-
S ⁺ Endmill	PC320S	-	Brazed endmill	PC221F	FCC

• The features of PVD coated grades

Workpiece	ISO	Features
PC303S	P05~P15 M05~M15 K05~K15	 Excellent wear/chipping resistance in high speed machining due to the combination of ultra fine substrate and PVD coating For high speed machining of high hardness steel New film applied with excellent oxidation resistance and hardness at high temperature
PC310U 🕬	P10~P20 M10~M20 K10~K20	 Excellent wear/chipping resistance in high speed machining due to the combination of ultra fine substrate and PVD coating For high speed machining of high hardness steel New film applied with excellent oxidation resistance and hardness at high temperature
PC315E 1000 PC320 1000	P20~P35/M20~M30 K20~K35/S20~S30	 Excellent wear/welding resistance in high speed machining due to the combination of ultra fine substrate and PVD coating For low/medium speed machining of general steel New film applied with excellent chipping/wear resistance
PC320S	M15~M25 S15~S25	 Low to medium speed cutting of stainless steel and heat resistant alloys Advanced coating layers with increased resistance to built-up edge and oxidation Excellent resistance to wear and built-up edge at high speeds due to the ultrafine substrate and dedicated coating layers
PC210C	N10~N20	 Medium to high speed cutting of copper and copper electrode Medium to high speed cutting of acrylic materials K-Silver coating with excellent lubrication and wear and chipping resistant substrate
ND3000 000	N01~N05	 For electrode machining of graphite at medium to high speeds Dia. coating layer with high wear resistance and lubrication
ND2100	N05~N10	For composite materials Diamond-coated layers with excellent adhesion
PD3000	N05~N10	 For Non-ferrous metals(Aluminum alloy) machining DLC(Diamond Like Carbon) coating layer with high wear resistance and lubrication

Features of KORLOY endmills

Index	Features
H Endmill (Endmill for high hardness steel)	 Negative cutting edges proper to machine high hardness heat-treated workpiece under H_RC70 Longer tool life with the use of ultra fine substrate and high hardness film
Z Endmill/I ⁺ Endmill (Endmill for general cutting)	 Excellent in machining various workpieces such as carbon steel, alloy steel, cast iron, pre hardened steel, etc. under HRC45 Longer tool life with the use of ultra fine substrate and new coating technology
T Endmill (For dental purpose)	 Endmill for dental prostheses made of zirconia, titanium, Co-Cr, wax, PMMA, and glass ceramic Custom-made tools for each type of milling machines for dental purpose
Z [*] Endmill	 Universal endmill applicable to a variety of workpiece materials under H_RC47 Roughing and finishing availability Improved tool life thanks to the new substrate and the most advanced coating Inhibited chipping and longer cutting time due to the optimized blade design
SSEA/A⁺ Endmill (Endmill for aluminum)	 Suitable for high speed machining in aluminum and other Non-ferrous materials Can accomplish excellent surface finishing, superior chip removal in high feed rate
S ⁺ Endmill (Endmill for hard-to-cut materials)	Sharp cutting edge and high rake angle with streamline chip pocket shows good cutting performance in stainless steel machining where work hardening is a problem
R* Endmill	 High efficient roughing endmill for medium to rough cutting Excellent machining efficiency thanks to the high efficient roughing edge design Reduced cutting force thanks to specifically designed corners, and irregular flute spacing and lead angle
D Endmill	 Diamond-coated endmill for graphite and ceramic Excellent wear resistance thanks to the diamond coating of high hardness and high purity Optimized for high speed and heavy duty cutting thanks to the strong grip of coating Excellent cutting performance and finish thanks to the optimized blade design of high rake
Composite Router Endmill	 Router endmill for machining composite materials (CFRP & GFRP) Minimized machining defects thanks to its design to prevent flaking, peeling off and burrs Excellent resistance to wear and flaking thanks to the nano-crystalline diamond coating of high hardness and high purity
C-Max	 Ideally suited for machining copper, brass, bronze, and Non-ferrous materials thanks to the optimized combination between K-Silver coating with excellent lubrication and resistance to wear and chipping, and the dedicated substrate

Solid drills grades selection

Grades for Mach Solid Drill (MSD)

- Special surface treatment provides improved lubrication and reduced cutting loads
- Stable tool life thanks to increased welding resistance

Features



Increased welding resistance in medium to high speed cutting due to highly lubricative coating layers Increased wear resistance in carbon steel machining

Grades for Mach Long Drill (MLD) PC215G new / PC315G new

- Improved wear resistance due to the ultrafine substrate
- Reduced friction resistance and smooth chip flow due to improved coating lubrication

Features



+ Exceptional wear resistance due to the ultrafine substrate

Selection system

Workpiece		Grade	ISO	Application range
		PC215G	P01	
	Steel	PC315G	P10	
-	Sieei	PC325U	P20	PC215G PC315G Dev
		PC230F	P30	PC325U PC230F
		PC215G	M01	
8.4	Stainless	PC315G	M10	
IVI	steel	PC205F	M20	PC215G PC315G PC305E PC305E
		PC325U	M30	
		PC215G	K01	
v	Costiron	PC315G	K10	
	Cast II OII	PC205F	K20	PC215G PC315G new
		PC325U	K30	PC205F PC325U
		ND2100	N05	ND2100
Ν	Nonferrous	EG2	N10	
		FGZ	N20	ruz

Solid drills grades selection

• Grade information for each product

ltom	Grade			
item	Coated	Uncoated		
MSD Plus	PC325U	FU25		
MSD Plus CFRP	ND2100	FK02		
MSFD 1	PC325U	FU25		
MLD Plus	PC215G, PC315G	FG2		
VZD	PC230F	ST30N		
SSD Plus	-	FA1, FG2		

The features of PVD coated grades

Workpiece	ISO	Features
PC325U	P20~P35 M20~M30 K20~K35	 Universal grade for machining steel, cast iron, stainless steel, etc. Stable cutting performance with excellent wear/chipping resistance Increased welding resistance due to lubricative new coating at medium to high speed
PC215G	P15~P30 M15~M25 K15~K30	 Universal grade for machining steel, cast iron, etc. Stable cutting performance with excellent wear/chipping resistance
PC315G 1999	P15~P30 M15~M25 K15~K30	 Universal grade for machining steel, cast iron, stainless steel, etc. Stable cutting performance with excellent wear/chipping resistance Increased welding resistance due to lubricative new coating at medium to high speed
PC230F	P25~P35	 For machining general steel at medium to high speed Stable cutting performance with excellent wear/chipping resistance
ND2100 (1999)	N05~N10	 For machining composite materials Diamond-coated layers with excellent adhesion
FG2	N05~N25	Increased wear/chipping resistance with the use of ultra fine substrate

Features of KORLOY drills

Index	Features
MSD Plus	 Increased welding resistance in medium to high speed cutting due to highly lubricative coating layers Increased wear resistance in carbon steel machining Reduced friction resistance around corners and flutes
MSD Plus CFRP	 The best tool for hole making of CFRP workpieces Excellent wear resistance due to the diamond-coated grade Reduced burr creation in CFRP machining due to high rake cutting edges
MSFD	 High quality hole making capability with 180° point angle Improved anti-chipping and welding resistance by edge honing and chamfering Minimized creation of burrs compared to general drills
MLD Plus	 Higher rigidity due to straight-edge design Smooth chip flow due to wider chip pockets and improved surface finish on flutes Double margin system for stable machinability
MSD Plus	 Improved chip control due to newly developed design Improved surface finish and design for high quality machining Increased productivity due to stable tool life



Diamond coated grades

Grade for graphite and ceramic ND3000 new

- SP3-crystalline diamond coatings of high purity and high hardness
- Improved adhesion between coated layers and the substrate that is specialized for diamond coatings
- Excellent tool life when machining graphite and ceramic

Grade for composite materials ND2100 new

- Improved surface finish and wear resistance due to the control technology of nano-crystalline diamond particles
- Improved flaking resistance due to the substrate that is specialized for diamond coatings
- High quality and high precision machining availability thanks to sharp edges
- Excellent tool life when machining composite materials

Application range



Selection system



The features of diamond coated grades

Grade	ISO	Features
ND3000 🚥	N01~N05	 For continuous roughing of graphite, ceramic, and AI alloy at high speeds Exceptional cutting performance due to high resistance to wear and flaking High hardness diamond coatings of high purity SP3-crystalline structure
ND2100 🚥	N05~N10	 For continuous finishing of composite materials and AI alloy at high speeds Stable machinability due to durable sharp edges Nano-crystalline diamond coatings under particle control

Surface of ND3000



Cross section of ND3000's coated layers



Surface of ND2100





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Others

DLC coated grades

Features

- Hardness of film is up to Hv 7000, tool life is 3~6times of cemented carbide cutting tool
- Good surface finish can be acquired due to the lubrication effect that led from low friction co-efficient (<0.1)
- Suitable for Non-ferrous material machining



• For aluminum, carbon, plastic, wood/Insert, drill, endmill

Cutting performance (Built- up edge / surface finish, FMACM3100R)



Workpiece: AC2B

• Cutting length: 12m • Cutting condition: vc = 1500m/min, fz = 0.15mm/t, ap = 2mm, Dry

Application range





cBN inserts grades

Features

- Excellent hardness and thermal resistance by sintering KORLOY's main constituents and special ceramic binder at high pressure and high temperature
 - Excellent hardness and wear resistance for higher productivity in machining cast iron and heat-treated alloy at high speed

Insert type

High pr	resicion	Wear r	esistance	Productivity				
	•	•		0				
For regrinding type	One use type	Multi-corner type	Multi-corner type (coated)	Solid type	Grooving type			

CBN inserts

Multi edge coated type	One use type
2NU-CNGA120408	КU-CNGA120408
Easy handling of corners Strong Brazing Excellent tool life compared to non-coated insertse	Economic price • Easy handling of tools • A wide variety of series Smaller than expensive cBN and dramatic cost down Strong weld face and stable cutting performance
Multi edge type	Regrinding type
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
2NU-CNGA120408	CNMA120408

#### CBN application range 300 Cutting speed, vc (m/min) KB1000 200 KB410 **KB425** KB420 100 KB2000 Continuous cutting General cutting Interrupted cutting Degree of \$--<del>|</del>-interruption

#### Ocoated cBN application range



Δ

#### • Cutting condition of cBN grades

	Ins			sert		(	Cutting sp	eed, vc (m/	min)		feed, fn	Depth of cut,
ISO	G	rades	color	Application	50	100	150	200	250	300	(mm/rev)	ap (mm)
		DNC100		Continuous cutting at high speed			1	80		300	0.03~0.3	0.03~0.3
	Control	DNC250	•	Continuous and low interrupted cutting at high speed		120	0.05~0.3	0.05~0.3				
	Coaled	DNC350	0	Medium and high interrupted cutting		90	150	)			0.05~0.3	0.05~0.3
		DNC400	<b>~</b>	Continuous and medium interrupted cutting		90	0.05~0.3	0.05~0.5				
eated steel		KB410		Continuous cutting at high speed			150	200			0.03~0.13	0.03~0.2
		KB1000		Continuous cutting at high speed		13	80		250		0.03~0.15	0.03~0.2
Heat-tre		KB420		Highly efficient cutting		120	150	)			0.03~0.3	0.03~0.5
т	Non-	KB425		Interrupted cutting at high speed			150	200			0.03~0.3	0.03~0.5
	coated	KB320	$\checkmark$	Medium and low interrupted cutting		80		0.03~0.2	0.03~0.3			
		KB2000		Medium and low interrupted cutting		80		200			0.03~0.2	0.03~0.3
		KB335		High interrupted cutting		80 🗾 1	10				0.03~0.2	0.03~0.3
		KB400		High speed and high depth of cut		120			220		0.10~0.3	0.5

# Solid type cBN KB400

#### Features

- For medium and light interrupted cutting of heat-treated steel
- Balanced grade of wear resistance and shock resistance
- Solid type for highly efficient machining

#### Features of solid type

- Increased productivity at high speed and high depth of cut
- Ideal for removing cemented layer and machining the welds
- Stable welding with the use of 3-face blazing
- Excellent performance at varying depth of cuts

#### Application range





#### Recommended cutting condition

Cutting speed vc (m/min)	120 220	
feed fn (mm/rev)	0.1	
Depth of cut per time ap (mm)	0.5	ß
		J.



# Coated cBN



#### Features

• Excellent thermal resistance

• Coating layer with high hardness, oxidation resistance and chipping resistance



#### Application range



#### Recommended cutting condition



Increased oxidation resistance and wear resistance due to high hardness coating layer
 Dramatically improved fracture resistance and chipping resistance

#### Multi-corner coated cBN for high efficient cutting of heat-treated alloy

# DNC250

- Features
- Stable and long tool life
- Cost effective by multi-cornered one-use insert



#### Application range





#### Recommended cutting condition

Cutting speed vc (m/min)	120 220
feed fn (mm/rev)	0.05
Depth of cut per time ap (mm)	0.05

# Coated cBN for high interrupted cutting DNC350

#### Features

- Excellent tool life and productivity in interrupted cutting
- New PVD coating applied with high hardness and oxidation resistance



coating

High tough coating

High hardness and oxidation-resistant

Fine cBN + High tough substrate



#### Application range



#### Recommended cutting condition

 $\bigcirc$ 



# Solid type coated cBN

#### Features

- For machining heat-treated steel in continuous and medium interrupted cutting
- Longer tool life due to coating layer
- Solid type for universal purpose

#### Features of solid type cBN

- Increased productivity at high speed and high depth of cut
- Ideal for removing cemented layer and the welds
- Better welding stability due to 3-face blazing
- Excellent cutting performance at varying depth of cuts



#### Application range



#### Recommended cutting condition





# Non-coated cBN

#### Features

- Non-coated cBN with the highest wear resistance at high speed
  - Excellent tool life in continuous to light interrupted cutting
  - Improved fracture resistance along with high wear resistance
     Higher thermal resistance and hardness due to pure TiCN ceramic binder

# Non-coated cBN

#### Features

- Universal grade for overall machining of heat-treated - Stable tool life in continuous to low/medium interrupted cutting
- Both fracture resistance and wear resistance acquired with the use of pure ceramic binder
- Stable surface roughness





# New technology of high purity ceramic binding materials Conventional grade Ceramic binding Geramic binding Ceramic binding <td

Impurities included in conventional grade's ceramic binder caused inferior thermal resistance and hardness of sintered compounds, which led to crack (fracture) and wear

KB1000/KB2000



High purity ceramic binding materials CBN

KB2000 dramatically minimizes impurities with the use of high purity ceramic binding materials and enhances thermal resistance and toughness.

#### Application range



#### Recommended cutting condition (KB1000)



#### Recommended cutting condition (KB2000)

Cutting speed vc (m/min)	80 200
feed fn (mm/rev)	0.03 0.2
Depth of cut ap (mm)	0.03 0.3



#### PCD inserts grades

Features

KORLOY PCD products are manufactured by using high quality PCD tips under ultra high temperatures and pressure. The PCD tip is welded on the qualified KORLOY carbide insert KORLOY high quality PCD products meet a wide range of application needs in turning, milling, and endmills.

- Excellent tool life for aluminum alloy and copper alloy
- Excellent tool life for Ceramic, high-silicon aluminum and rock or stone
- Excellent tool life for rubber, carbon, graphite and wood

#### PCD grade

Grade	Features	Application	Grain size (μm)	Hardness (Hv)	TRS (kgf/mm ² )
DP90	Coarse diamond grain has been used to get excellent wear resistance enough to machine cemented-carbide, high Si aluminum alloy	Cemented carbide Ceramic roughing High Si aluminum alloy Rock, Stone	50	10,000~12,000	110
DP150	By use of fine diamond grain having good bonding property, it is suitable for machining of Non-ferrous metal, graphite	High Si aluminum alloy Copper, Bronze alloy Rubber, Wood, Carbon	5	10,000~12,000	200
DP200	By use of ultra fine diamond grain, it is possible to make sharp cutting edge. Thus it is appropriate grade to machine Non-ferrous material	Plastic Wood Precise finishing of aluminum	0.5	8,000~10,000	220

#### Recommended cutting condition

Worksiege	Cutting aroad (m/min)	Food (mm/rou)	Donth of out (mm)	Recommended grade			
workpiece	Cutting speed (m/min)	reed (minurev)	Depth of cut (mm)	1 st	2 nd		
Aluminum alloy (4%~8% Si)	1000~3000	0.1~0.6	~ 3	DP150	DP200		
Aluminum alloy (9%~14% Si)	600~2500	0.1~0.5	~ 3	DP150	DP200		
Aluminum alloy (15%~18% Si)	300~700	0.1~0.4	~ 3	DP150	DP200		
Copper, Bronze alloy	~ 1000	0.05~0.2	~ 3	DP150	DP200		
Reinforced plastic	~ 1000	0.1~0.3	~ 2	DP150	DP200		
Wood	~ 4000	0.1~0.4	-	DP150	DP200		
Cemented carbide	10~30	~ 0.2	~ 0.5	DP90	DP150		

#### Ocutting performance



			Application range feed rate fn (mm/rev)															
	Geometry	Cutting edge	0.04	0.063	0.10	0.16	0.25	0.4 depth	4 n of ci	0.63 ut ap	1.0 (mm)	1.6	2.	.5	4.0	6.3		Features
	VQ		0.1	0.16	0.25	0.10	0.63	1.(	0	1.6	2.5	4.0	6.	.3	10.0	11.6	i 13	For Medium to finish cutting
	The second								1	1.0~	3.0							Medium to finishing cutting edges offer improved edge hardness
	VL					0 10	~0.35											For Finishing
	C. S. C. S.					0	.2~1.5											Stable chip control in high toughness material; low carbon steel, pipe steel & steel plates     Improved chip control for facing, copy machining and better surface finish
	VF				0.0	15~0 34	5											For Finishing
							0.	.5~1.	5									Good chip control quality on varied depth of cut     Excellent cutting edge strength has been acquired due to the special chip-breaker
	VB						15~0	45										For Finishing
							.13~0	0.5~	-2.0									Improved chip control for smaller depth of cuts     Excellent chip control in copying, corner R machining
	VC					0	12~0 4	15										For Medium to finish cutting
eries						0.		0	).5~:	3.5								Stable chip control in copying and internal machining with various depths of cut
V se	VM					0.1	0~0.5	0										For Medium cutting
										1	.0~5.0	D						Wide available chip control range from medium-finishing to medium-roughing     Suitable chip breaker for CNC machining
	VH									(	) 70~	1 40						For Heavy duty cutting
															6.0~	15.0		Designed specifically for heavy machining     Specialized chip breaker for the heavy industries like Ship building, Power plant industry
	VT										0.75-	.1 60						For Heavy duty cutting
															7.0	~17.(	)	Designed specifically for heavy machining     Specialized chip breaker for the heavy industries like     Ship building, Power plant industry
	VP1				0.05~	0.20												For Finishing
							.5											High positive cutting edge     Reduced contract chip minimizes temperature to improve tool life
	VP2				05.0	40											For Medium to finish cutting	
						.05~0.	40		0.5~	~4.0								Stable chip control and high machinability in copying with various depths of cut



Notice: Application ranges are based on main cutting material



Notice: Application ranges are based on main cutting material





Notice: Application ranges are based on main cutting material





# Chip breaker for milling

							A	oplica	ation	range	)									
		<b>.</b>					f	eed rate	e fn (m	m/rev)						<b>_</b> .				
	Geometry	Cutting edge	0.04	0.063	0.10	0.16	0.25	0.4	0.63	1.0	1.6	2.5	4.0	6.3	1	Features				
								depth o	f cut ap	(mm)										
			0.1	0.16	0.25	0.4	0.63	1.0	1.6	2.5	4.0	6.3	10.0	11.0	5 13					
S	MX					0.10	0.00									For Roughing				
MX seri						0.10~	0.30		1	.0~5.0						Possible to increase productivity through increase feed and depth				
																Excellent heat resistance due to the special chip breaker design of top face of insert				
	MA	_														For Aluminum milling				
					0.0	5~0 4	0													
8					0.0	J-0.4	•													
eries-RM	a de									1.0~	8.0					Sharp cutting edge for low cutting load, which is ideal for machining steel, hard-to-cut materials and aluminum				
ch Mill s	ML															For machining hard-to-cut materials				
ï					0.05	~0.30														
														1.0~	8.0					<ul> <li>Low cutting resistance for light cutting and machining hard-to-cut materials with excellent tool life and surface roughness</li> </ul>

Notice: Application ranges are based on main cutting material



# Chip breaker for milling



## Chip breaker for milling



Notice: Application ranges are based on main cutting material

## Chip breaker for milling



Notice: Application ranges are based on main cutting material



# Chip breaker for drilling



Notice : Application ranges are based on main cutting material



#### **Turning Chip Breakers**

- B02 Application range of KORLOY Main Chip Breakers
- BO4 Recommended Chip Breakers for workpiece
- B12 Feature of Chip Breakers

#### Inserts

- B24 Turning Insert Code System (ISO)
- B26 Turning Insert (Negative)
- B62 Turning Insert (Positive)
- B86 Aluminum Insert (Positive)
- B94 cBN Insert
- B98 PCD Insert

#### **SAVE TURN**

- B100 Technical Information for Save Turn
- B101 Save Turn Insert
- B102 Save Turn Holder
- B105 Save Turn Boring Bar

#### **Auto Tools**

- B107 Technical Information for Auto Tools
- B108 ISO Type
- B115 Blade Type
- B118 Multi Utility Type
- B121 KGT/MGT Type
- B124 MSB Tool
- B130 Sleeve

#### **Multi Turn**

- B131 Technical Information for Multi Turn
- B133 Multi Turn

#### **Bearing Solutions**

- B134 Technical Information for Bearing Solution
- B135 Bearing Solution
- B141 Special Order Form for Bearing Inserts

#### **External Tool Holder**

- B142 External Tool Holder Code System (ISO)
- B143 Index for External Holder
- B146 Instruction of External Holder
- B147 Features of Double Clamp / Lever lock System
- B148 Double Clamp System
- B153 Lever Lock System
- B161 Wedge Clamp System
- B163 Clamp On System
- B165 Multi Lock System
- B172 Screw On System
- B179 Ceramic Holder

#### **Boring Bar**

- B181 Boring Bar Code System (ISO)
- B182 Index for Boring Bar
- B184 Instruction of Boring Bar assembly
- B185 Double Clamp System
- B187 Lever Lock System

#### **Boring Bar**

- B191 Clamp On System
- B192 Multi Lock System
- B194 Screw On System
- B194 Carbide shank Boring Bar
- B204 Compact Mini

#### **HSK/KM** Tooling System

- B207 Technical Information for HSK/KM Tooling System
- B209 Index for HSK / KM Tooling System
- B210 HSK Tooling System
- B216 KM Tooling System

#### Cartridges

- B220 Cartridge Code System (ISO)
- B221 Index for Cartridge
- B222 Clamp On System
- B224 Screw On System

# TURNING

Korloy turning tools cover a wide application range with a full line-up of ISO tools that produce high quality and high precision parts for all manufacturers' requirements.



# Applications range of chip breakers

#### Negative inserts



Ш В 2

# Applications range of chip breakers

#### Positive inserts



Turning

Workpiece P Steel

# Materials: SM10C, SM15C, SM25C, SS400, SCr415, SCM415, etc. Soft steel Hardness: under 180HB

C	epth of					Cutting			Inser	t shape		
	cut (mm)	C/B	Cutting edge	Feed (mm/rev)	Grades	Speed (m/min)	<b>180°</b>	55°	- ⁹ 90°	60°	35°	80°
	$0.2 \sim$ 0.8 $\sim 1.5$ Finishing	VL		0.1 ~ 0.2 ~ 0.35	NC3215 NC3225 CN1500 CN2500	305 250 260 230	CNMG p. B27	DNMG 2007 p. B34	SNMG p. B43	TNMG p. B51	P. B56	WNMG p. B58
	0.5 ~ 1.0 ~ 1.5 Finishing	VF		0.05 ~ 0.15 ~ 0.35	NC3215 NC3220 NC3225 NC5330	305 270 270 210	CNMG	DNMG p. B34	SNMG Difference p. B43	TNMG p. B51	VNMG p. B56	WNMG p. B58
	0.5 ~ 1.0 ~ 2.0 Finishing	VB		0.15~ <mark>0.2</mark> ~0.4	NC3215 NC3225 CN1500 CN2500	340 250 240 210	CNMG p. B26	DNMG 2007 p. B33		TNMG p. B50		WNMG p. B58
	0.5 ~ 1.5 ~ 3.5 Medium to finishing	VC		0.12 ~ 0.25 ~ 0.45	NC3215 NC3220 NC3225 NC5330	285 250 255 200	CNMG DOG p. B27	DNMG p. B35	SNMG p. B43	TNMG p. B52	p. B56	WNMG p. B59
jative	0.5 ~ 1.0 ~ 2.5 Medium	LP		0.10 ~ 0.25 ~ 0.40	NC3215 NC3225 NC5330	300 250 200	p. B27	p. B35	5NMG p. B43	p. B51	vnmg p. B56	илмд р. В59
Neg	0.5 ~ 1.5 ~ 4.5 Medium	MP		0.15 ~ 0.30 ~ 0.45	NC3215 NC3225 NC5330	300 265 200	CNMG p. B29	DNMG p. B36	sNMG p. B45	p. B53	p. B57	WNMG p. B60
	1.0 ~ 2.5 ~ 5.0 Medium	VM		0.10 ~ 0.25 ~ 0.50	NC3215 NC3220 NC3225 NC5330 CN1500 CN2500	295 260 205 220 200	CNMG	DNMG	SNMG	TNMG	vnmg	P. B60
	$\begin{array}{c} 1.0 \sim \\ 3.0 \\ \sim 4.5 \\ \text{Medium to} \\ \text{roughing} \end{array}$	GR		0.20 ~ 0.35 ~ 0.50	NC6205 NC6210 NC6215	180~370 150~330 130~280	CNMG p. B30	DNMG p. B38	SNMG p. B46	TNMG p. B54		WNMG p. B60
	6.0 ~ <u>10.0</u> ~ 15.0 Heavy (general)	VH		0.7 ~ 1.0 ~ 1.4	NC3215 NC3030 NC500H NC5330	50~250 50~150 50~150 50~150	СNMM		SNMM p. B47			
	7.0 ~ 12.0 ~ 17.0 Heavy (high feed cutting)	VT		0.75~ 1.2 ~1.6	NC3215 NC3030 NC500H NC5330	50~250 50~150 50~150 50~150	CNMM p. B32		SNMM p. B47			

P Negative







#### •: The first recommended cutting condition

H



# Materials: SM10C, SM15C, SM25C, SS400, SCr415, SCM415, etc. Soft steel Hardness: under 180HB

[	)epth of					Cuttina	Insert shape								
	cut (mm)	C/B	Cutting edge	Feed (mm/rev)	Grades	Speed (m/min)	80°	55	- ⁹ 90°	60°	,35°	80°			
	0.1 ~ 0.5 ~ 1.0 Finishing	VL		0.05 ~ 0.1 ~ 0.2	NC3215 NC3220 NC3225 NC5330 CN1500 CN2500	305 270 270 210 260 240	ССМТ р. B64	DCMT	SCMT	тсмт р. в75	p. B81				
	0.1 ~ 0.5 ~ 1.5 Finishing	VF		0.05 ~ 0.15 ~ 0.25	NC3215 NC3220 NC3225 NC5330 CC1500 CN1500 CN2500	305 270 210 260 250 230	ССМТ р. B64	<b>DCMT</b> р. B68	SCMT	ТС(Р)МТ Доба р. в75	VB(C)МТ				
Positive	0.5 ~ 1.0 ~ 3.0 Medium to finishing	MP		0.1 ~ 0.2 ~ 0.35	NC3215 NC3225 CN1500 CN2500	300 250 240 200	ССМТ р. B65	<b>DCMT</b> р. B69	SCMT	ТС(Р)МТ Доба	VB(C)MT				
	0.5 ~ 1.5 ~ 3.0 Medium to finishing	HMP		0.08 ~ 0.20 ~ 0.40	NC3215 NC3220 NC3225 NC5330 CN1500 CN2500	320 285 285 225 240 220	ССМТ ДОД р. B64	DCMT	SCMT	тсмт р. B75	VB(C)MT				
	1.0 ~ 2.0 ~ 3.0 Medium	C25		0.10 ~ 0.25 ~ 0.35	NC3215 NC3220 NC3225 NC5330 CN1500 CN2500	320 285 285 225 230 210	ССМТ р. B65	DСМТ ДОЛ р. B69	SCMT	тсмт . В76					

•: The first recommended cutting condition



Workpiece P Steel

#### Materials: S45C, S55C, SCM430, SCM440, etc. General steel Hardness: under 180~260HB

Depth of				Feed		Cutting	Insert shape					
	cut (mm)	C/B	Cutting edge	(mm/rev)	Grades	Speed (m/min)	80°	55	- ⁴ 90°	60°	,35°	80°
	0.5 ~ <u>1.0</u> ~ 1.5 Finishing	VF		0.05 ~ 0.15 ~ 0.35	NC3215 NC3225 NC5330	305 <mark>270</mark> 250	CNMG p. B26	DNMG 	SNMG p. B43	TNMG p. B51	VNMG p. B56	WNMG p. B58
	0.5 ~ 1.0 ~ 2.0 Finishing	VB		0.15 ~ 0.2 ~ 0.4	NC3215 NC3225 CN1500 CN2500	340 250 230 190	CNMG p. B26	DNMG 007 p. B33		TNMG p. B50		WNMG p. B58
	0.5 ~ 1.0 ~ 2.5 Medium			0.10 ~ 0.25 ~ 0.40	NC3215 NC3225 NC5330	300 250 200	P. B27	p. B35	p. B43	p. B51	p. B56	p. B59
(J)	0.5 ~ 1.5 ~ 4.5 Medium	MP		0.15 ~ 0.30 ~ 0.45	NC3215 NC3225 NC5330	300 250 200	р. B29	р. B36	p. B45	p. B53	p. B57	p. B60
Negativ	0.5 ~ 1.5 ~ 3.5 Medium to finishing	VC		0.12 ~ 0.25 ~ 0.45	NC3215 NC3220 NC3225 NC5330	285 255 250 200	CNMG p. B27	DNMG p. B35	SNMG p. B43	TNMG p. B52	VNMG p. B56	WNMG p. B59
	1.0 ~ 2.5 ~ 5.0 Medium	VM		0.10 ~ 0.25 ~ 0.50	NC3215 NC3220 NC3225 NC5330 CN1500 CN2500	260 245 245 205 210 170	CNMG p. B30	DNMG 	SNMG p. B45	TNMG p. B53	VNMG p. B57	WNMG p. B60
	$1.0 \sim$ $3.0 \sim$ $\sim 4.5$ Medium to roughing	GR		0.20 ~ 0.35 ~ 0.50	NC6205 NC6210 NC6215	180~370 150~330 130~280	CNMG	DNMG p. B38	SNMG	TNMG p. B54		WNMG p. B60
	6.0 ~ 10.0 ~ 15.0 Heavy (general)	VH		0.7 ~ 1.0 ~ 1.4	NC3215 NC3030 NC500H NC5330	50~250 50~150 50~150 50~150	CNMM		SNMM <b>D</b> <b>p. B47</b>			
	7.0 ~ 12.0 ~ 17.0 Heavy (high feed cutting)	TV		0.75~ 1.2 ~ 1.6	NC3215 NC3030 NC500H NC5330	50~250 50~150 50~150 50~150	СNММ р. В32		SNMM p. B47			
	0.1 ~ 0.5 ~ 1.0 Finishing	VL		0.05 ~ 0.1 ~ 0.2	NC3215 NC3220 NC3225 NC5330 CN1500 CN2500	345 310 310 240 250 210	ССМТ р. B64	р. B69	SCMT	ТСМТ р. В75	VB(C)MT	
tive	0.1 ~ 0.5 ~ 1.5 Finishing	VF		0.05 ~ 0.15 ~ 0.25	NC3215 NC3220 NC3225 NC5330 CC1500 CN1500 CN2500	265 300 230 260 240 210	ССМТ р. B64	DСМТ  р. B68	SCMT	тс(Р)МТ Доба р. В75	VСМТ	
Posit	0.30 ~ 1.5 ~ 3.0 Medium to finishing	MP		0.05 ~ 0.15 ~ 0.35	NC3215 NC3225	300 250	ССМТ	р. B69	SCMT р. B71	ТС(Р)МТ р. В76	VB(C)МТ р. B81	
	1.0 ~ 2.0 ~ 3.0 Medium	C25		0.1 ~ 0.15 ~ 0.35	NC3215 NC3220 NC3225 NC5330 CN1500 CN2500	320 285 285 225 230 200	ССМТ	DСМТ р. B69	SCMT	ТСМТ р. В76		

Turning

•: The first recommended cutting condition



#### Materials: SNC415, SNC815, SNCM240, SNCM439, STS12, STS61, etc

SCM440, Hardened steel

Hardness: 260~350HB

Depth of				Facel		Cutting	Insert shape						
	cut (mm)	C/B	Cutting edge	(mm/rev)	Grades	Speed (m/min)	<b>1</b> 80°	55°	- ⁴ 90°	60°	35°	80°	
	0.5 ~ 1.0 ~ 1.5 Finishing	VF		0.08 ~ 0.15 ~ 0.30	NC3215 NC3220 NC3225	180 159 159	CNMG p. B26	DNMG p. B34	SNMG p. B43	TNMG p. B51	VNMG  p. B56	WNMG p. B58	
	0.5 ~ <u>1.0</u> ~ 2.0 Finishing	VB		0.15~ 0.2 ~ 0.4	NC3215 NC3225 CN1500 CN2500	200 148 220 200	CNMG p. B26	DNMG DDNMG p. B33		TNMG p. B50		WNMG p. B58	
	0.5 ~ 1.5 ~ 3.5 Medium to finishing	VC		0.12 ~ 0.25 ~ 0.45	NC3215 NC3220 NC3225 NC5330	168 148 150 200	CNMG p. B27	DNMG p. B35	SNMG p. B43	TNMG p. B52	VNMG p. B56	WNMG p. B59	
Ø	0.5 ~ 1.0 ~ 2.5 Medium			0.10 ~ 0.25 ~ 0.40	NC3215 NC3225 NC5330	250 200 200	CNMG p. B27	DNMG p. B35	SNMG p. B43	TNMG p. B51	P. B56	WNMG p. B59	
Negativ	0.5 ~ 1.5 ~ 4.5 Medium	MP		0.15 ~ 0.30 ~ 0.45	NC3215 NC3225 NC5330	250 200 200	cNMG	DNMG p. B36	SNMG p. B45	p. B53	P. B57	wnmg p. B60	
	1.0 ~ 2.5 ~ 5.0 Medium	VM		0.15 ~ 0.25 ~ 0.50	NC3215 NC3220 NC3225 CN1500 CN2500	174 153 153 120 100	CNMG p. B30	DNMG p. B37	SNMG p. B45	TNMG p. B53	VNMG p. B57	WNMG p. B60	
	$1.0 \sim$ $3.0 \sim$ 4.5 Medium to roughing	GR		0.20 ~ 0.35 ~ 0.50	NC6205 NC6210 NC6215	180~370 150~330 130~280	CNMG	DNMG 	SNMG	TNMG p. B54		WNMG p. B60	
	6.0 ~ 10.0 ~ 15.0 Heavy (general)	VH		0.7 ~ 1.0 ~ 1.4	NC3215 NC3030 NC500H NC5330	50~250 50~150 50~150 50~150 50~150	CNMM p. B32		SNMM <b>D</b> <b>p. B47</b>				
	7.0 ~ <u>12.0</u> ~ 17.0 Heavy (high feed cutting)	T		0.75 ~ <mark>1.2</mark> ~ 1.6	NC3215 NC3030 NC500H NC5330	50~250 50~150 50~150 50~150 50~150	CNMM p. B32		SNMM p. B47				
	0.1 ~ 0.5 ~ 1.0 Finishing	VL		0.05 ~ 0.1 ~ 0.2	NC3215 NC3220 NC3225 NC5330 CN1500 CN2500	305 310 240 210 190	ССМТ р. B64	р. B69	SCMT	тсмт р. в75	VB(C)MT		
Ve	0.1 ~ 0.5 ~ 1.5 Finishing	VF		0.05 ~ 0.15 ~ 0.25	NC3215 NC3220 NC3225 NC5330 CC1500 CN1500 CN2500	330 300 230 260 250 240	ССМТ р. B64	DСМТ	SCMT	ТС(Р)МТ	VB(C)MT		
Positi	0.30 ~ 1.5 ~ 3.0 Medium to finishing	MP		0.05 ~ 0.15 ~ 0.35	NC3215 NC3225 NC5300 CN1500 CN2500	305 285 225 240 220	ССМТ р. B65	р. B69	SCMT	ТС(Р)МТ р. В76	VB(C)MT		
	1.0 ~ 2.0 ~ 3.0 Medium	C25		0.1 ~ 0.15 ~ 0.35	NC3215 NC3220 NC3225 NC5330 CN1500 CN2500	320 285 285 225 100 80	ССМТ ГОЛ р. B65	DСМТ ДОЛ р. B69	SCMT р. B71	тсмт р. в76			

•: The first recommended cutting condition

Turning

M Stainless steel

Workpiece

#### Materials: STS304, STS316, STS430, STS630

Ferrite, austenite, martensite, precipitation hardening stainless steels

Hardness: 135~300HB



M Negative



#### M Positive



•: The first recommended cutting condition



#### Materials: GC250, GC300, GCD400, GCD700, etc : Gray cast iron, Ductile cast iron Hardness: 135~185HB Tensile strengt: 450N/mm²

Depth of cut (mm)		C/B	Cutting edge	Feed (mm/rev)	Grades	Cutting	Insert shape						
						Speed (m/min)	<b>1</b> 80°	55°	<b>90°</b>	60°	35°	80°	
	$1.0 \sim$ 2.5 $\sim 6.0$ Roughing	C/B 無		0.15 ~ 0.30 ~ 0.60	DBNX10 DBN500 DBN700 NC6205 NC6210 NC6215	150 ~ 200 200 ~ 500 500 ~ 2000 170 ~ 420 140 ~ 350 120 ~ 290	СЛМА	DNMA	SNMA	тма			
e	1.5 ~ 3.0 ~ 6.0 Roughing	RK		0.20 ~ 0.30 ~ 0.60	NC6315	150~450	CNMG p. B31	DNMG p. B38	SNMG p. B46	TNMG p. B54		WNMG p. B61	
Negativ	$1.0 \sim$ $3.0$ $\sim 4.5$ Roughing	VR		0.2 ~ 0.35 ~ 0.60	NC6215	200~250	CNMG DO p. B31	DNMG DNMG p. B39	SNMG p. B47	TNMG p. B54		WNMG p. B61	
	$0.5 \sim$ 2.0 $\sim 3.5$ Medium to finishing	B25		0.2 ~ 0.35 ~ 0.60	NC6205 NC6210 NC6215	170~380 140~320 120~290	CNMG	DNMG	SNMG p. B45	TNMG p. B53			
	$1.0 \sim$ $2.5 \sim 5.0$ Medium to finishing	МК		0.10 ~ 0.25 ~ 0.50	NC6315	150~450	CNMG p. B28	DNMG DNMG p. B36	SNMG p. B44	TNMG p. B52	VNMG p. B57	WNMG p. 859	
Positive	0.30 ~ 1.5 ~ 3.0 Medium to finishing	MP		0.1 ~ 0.2 ~ 0.35	NC6215	200- 250	ССМТ р. B65	р. B69	SCMT	ТС(Р)МТ р. В76	VB(C)MT		
	1.0 ~ 2.0 ~ 3.5 Medium	C25		0.10 ~ 0.25 ~ 0.40	NC6205 NC6210 NC6215	340 285 200	ССМТ р. B65	DСМТ  р. B69	SCMT	ТСМТ р. В76			

•: The first recommended cutting condition









Workpiece N Aluminum alloy

Materials: Aluminum alloy Hardness: 20~110HB

Depth of cut (mm)				Fred		Cutting						
		C/B	Cutting edge	(mm/rev)	Grades	Speed (m/min)	80°	55	<b>90°</b>	60°	35°	80°
jative	0.5 ~ 2.0 ~ 6.0 Medium	HA		0.1 ~ 0.2 ~ 0.5	H01	500	CNMG p. B27	DNMG p. B34	SNMG p. B43	TNMG p. B51	VNMG p. B56	WNMG p. B58
Neg												
Positive	$0.1 \sim 1.0 \sim 4.0$ Medium to finishing	AK		0.03 ~ 0.2 ~ 0.4	H01 ND1000 PD1000	1000 1000 1000	CCGT	DCGT	SCGT	TCGT	VB(C)GT	RCGT
	$0.5 \sim$ 1.5 $\sim 4.0$ Medium	AR		0.05 ~ <mark>0.3</mark> ~ 0.5	H01 ND1000 PD1000	1000 1000 1000	CCGT	DCGT	SCGT	TCGT	VB(C)GT	RCGT

#### Materials: Copper Bronze alloy

Hardness: 20~110HB

Depth of cut (mm)		C/B	Cutting edge	Feed (mm/rev)	Grades	Cutting	Insert shape						
						Speed (m/min)	80°	55	<b>90°</b>	60°	35°	80°	
ative	$0.5 \sim 2.0 \ \sim 4.0$ Medium to finishing	HA		0.1 ~ 0.2 ~ 0.5	H01	1000	CNMG p. B27	DNMG p. B34	SNMG p. B43	TNMG p. B51	VNMG p. B56	WNMG p. B58	
Neg													
tive	$0.1 \sim 1.0 \sim 3.0$ Medium to finishing	AK		0.03 ~ 0.2 ~ 0.3	H01	1000	CCGT	DCGT	SCGT	TCGT	VB(C)GT	RCGT	
Posi	0.5 ~ 1.5 ~ 3.0 Medium	AR		0.05 ~ 0.25 ~ 0.4	H01	1000	CCGT	DCGT	SCGT	TCGT	VB(C)GT	RCGT	

Negative



#### N Positive



#### •: The first recommended cutting condition

20

Ы



Materials: Inconel, Nimonic, Stellite, Ti alloy Hardness: 160~350HB



•: The first recommended cutting condition







#### **Features of Chip Breaker**

# LP Chip Breaker (For medium cutting to finishing]

- Chip breaker for forged steel of automobile parts and normal steel
- · Quad dots improve productivity through efficient chip control at high feed
- Angle land minimizes cutting force

#### Features of LP chip breaker

#### ► Front dot

- · Higher stability of chip curls at high feed
- Excellent chip control when copying
- Lower cutting force at low depth of cut and high feed

#### ► Variable land

- · Less crater wear
- · Prevents chipping on minor cutting edge

#### ► Flat zone



 Larger chip pocket for better chip evacuation at high feed

- at nightieeu
- Reduced cutting force with larger contact

surface of chips

#### Performance evaluation (Evaluation of cutting force)

- Workpiece SM45C (C
- Cutting conditionTools
- SM45C (Carbon steal), Ø100, External machining vc (m/min) = 250, ap (mm) = 1.0, fn (mm/rev) = 0.25/0.40, wet CNMG120408- $\Box$

#### Medium feed (0.25mm/rev)





#### Application range



TT

### Features of Chip Breaker

# MP Chip Breaker (For medium cutting)

- Chip breaker for forged steel of automobile parts and all other steels
- Quad dots improve productivity through efficient chip control at high feed
- Angle land minimizes cutting force

#### Features of MP chip breaker

#### ► Front two step dot

- · Higher stability of chip curls at high feed
- · Excellent chip control when copying
- · Lower cutting force at high depth of cut

#### Variable land

- · Less crater wear
- Prevents chipping on minor cutting edge
- · Higher toughness at high depth of cut and interrupted cutting

#### Flat zone



- · Larger chip pocket for better chip evacuation at high feed
- · Reduced cutting force with larger contact surface of chips

#### Performance evaluation (Evaluation of wear resistance)

- Workpiece
- SCM440 (Alloy steel), Ø100, Outer diameter machining vc (m/min) = 280, ap (mm) = 1.5, fn (mm/rev) = 0.25/0.40, wet

#### Cutting condition Tools

25 5 75

MP

10 125 15

Cutting time (min)

Competitor A --- Competitor B

CNMG120408-

#### Application range





CNMG120408-MP (NC3225)

Competitor A (P25)

#### Turning

Competitor B (P25)
# MM Chip Breaker w [For medium cutting]

- The 1st recommended chip breaker for stainless steel machining
- · Change to: A dual land achieves sharp cutting performance and insert toughness
- Wide chip pockets for stable chip evacuation at high feeds/depths of cut

## Features of MM chip breaker

#### ► Variable Land

- · Excellent chip control and sharp cutting at low depths of cut
- · Delays crater wear
- Prevents plastic deformation

#### ► Dual Land

- Balance between requirements of sharp and tough cutting edges
- Sharp cutting edge for high speed machining
- Prevents chipping in interrupted machining

#### ▶ Wide Chip Pocket

- Stable chip evacuation at high speeds/feeds
- Improved surface finishes by reduced workpiece scratches caused by work-hardened chips at high depths of cut
- · Prevents built-up edge

## Performance evaluation

### Built-up edge

- Workpiece X6CrAl13 (Ferrite)
- Cutting vc (m/min) = 180, fn (mm/rev) = 0.3, ap (mm) = 3.0, wet
- Tools Insert : CNMG120408-MM (NC9125) Holder : PCLNL2525-M12









#### Plastic deformation

- Workpiece X5CrNiMo17-12-2 (Austenite)
- Cutting vc (m/min) = 200, fn (mm/rev) = 0.35, ap (mm) = 2.0, dry
- Tools Insert : CNMG120408-MM (NC9135) Holder : PCLNL2525-M12





MM (NC9135)





Turning

90

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- The 1st recommended chip breaker for rough and interrupted machining of stainless steel
- Prevents notch wear and burrs at high feeds and depths of cut
- Reduced cutting force extends tool life in high feed machining

## Features of RM chip breaker

### ► Variable Land

- · Excellent chip control and sharp cutting at low depths of cut
- · Delays crater wear
- Prevents plastic deformation

### ► Wide land & Gentle front angle

- Sharp cutting edges and a wide land reduce cutting force
- Reduced burrs
- Dispersed cutting load enables higher toughness

### Stepped Design

- · Stepped design makes chip evacuation easier
- · Smooth chip evacuation prevents plastic deformation



## Performance evaluation

Notch	wear

- Workpiece X12Cr13 (Martensite)
- Cutting vc (m/min) = 150, fn (mm/rev) = 0.25, condition ap (mm) = 3.0, wet
- Tools Insert : CNMG120408-RM (NC9115) Holder : PCLNL2525-M12





RM (NC9115)

Competitor



Burr

- Workpiece Duplex
- Cutting vc (m/min) = 120, fn (mm/rev) = 0.2, condition ap (mm) = 2.0, dry
- Tools Insert : CNMG120408-RM (NC9125) Holder : PCLNL2525-M12





RM (NC9125)





Turning

R

# MK Chip Breaker 🖤 [For medium cutting ]

- · Ideally suited for continuous cutting of ductile cast iron and gray cast iron
- Angle lands provide upgraded surface finish

## Features of MK chip breaker

## Angle land



- · Angle lands provide sharper cutting performance
- · Maximized wear resistance in continuous cutting
- · High quality results in surface finish

### Wide supporting area

- · Higher clamping stability
- · Prevents chipping at vibrations during operation

## Performance evaluation

### Wear resistance test

- Workpiece 500-7 (ISO), Ø90 (Spherical tube)  $\rightarrow$  Ø30 machining
- vc (m/min) = 400, fn (mm/rev) = 0.35, Cutting ap (mm) = 2.5, wet conditions
- Cutting time 30 passes with results of normal wear on rake/flank surface
- Insert : CNMG120408-MK (NC6315) Tools Holder : DCLNR2525-M12



MK (NC6315)







Existing product

## Recommended cutting range



Π

20

# RK Chip Breaker 🖤 [For roughing ]

- Ideally suited for high speed / high feed cutting of ductile cast iron and gray cast iron
- Flat lands provide upgraded toughness and chipping resistance

## Features of RK chip breaker



· Minimizes vibration and chipping.

## Performance evaluation

### Impact resistance test

- Workpiece 500-7 (ISO), Ø90 (Triangular tube) → Ø30 machining
- Cutting vc (m/min) = 380, fn (mm/rev) = 0.35, ap (mm) = 2, wet
- Cutting time 15 passes with results of normal rake surface wear and good chipping resistance
- Tools Insert : CNMG120408-RK (NC6315) Holder : DCLNR2525-M12



RK (NC6315)



Existing product

## Recommended cutting range











- VP2 Chip Breaker
- High-positive cutting edge design/Side rake angle applied
   Stable chip control improves machinability when ball machining at variable depths of cut
- Recommended cutting conditions: fn (mm/rev) = 0.1~0.4, ap (mm) = 0.5~4.5

## Features of VP2 chip breaker



 Improves cutting performance with its stable chip contro at varying depth of cuts

# VP3 Chip Breaker

- High-positive cutting edge design/Wide land applied
   Improved stability at interrupted cutting when toughness is required. Stable chip control and machinability at high depth of cut
- Recommended cutting conditions: fn (mm/rev) = 0.1~0.45, ap (mm) = 0.5~5.0

## Features of VP3 chip breaker

Chip pocket design leading to a R-shaped cutting edge



 Creates a stepped space between edge and land to make smooth chip flow at low and high depth of cuts



### High-positive blade design / Wide land

- · Minimize heat concentration at high depth of cut
- Improves stability in interrupted machining of a tough workpiece

# VP4 Chip Breaker 🔍

- The 1st recommended chip breakers for machining Inconel which remains highly resistant to and hard at high temperature
- Rough machining stability resulting from reinforced cutting edges and wide chip pockets

## Features of VP4 chip breaker

Rake angle design resistant to high hardness cutting



- Reinforces cutting edges and prevents notch wear in rough surface machining
- · Prevents chipping in interrupted cutting

#### Wide chip pockets

 Reduce cutting loads and improve stability even at high depth of cut in roughing



# Single-sided VL Chip Breaker

[For medium to finish cutting]

- The sharp flank surface and the chip breaker design significantly improve chip control when machining tough materials such as low carbon steel, pipe steel, and iron plates
- Sharp cutting edges reduce cutting resistance and provide excellent chip control at low depth of cuts, leading to stable machining on automated production lines

## Features of VL chip breaker

### Sharp cutting edges

- High rake cutting edges provide improved surface finishes
- Low cutting resistance reduces cutting heat
- · 2-step rear rake angle
- Stable chip control regardless of varying feed rates
- Excellent machinability even when machining mild workpieces

## Chip control test

- Workpiece SCM440(Alloy steel), Ø50, Internal diameter turning
- Cutting condition vc = 250 m/min, ap = 0.3~1.5 mm, fn = 0.05~0.25 mm/rev
- Tools
- CCMT09T304-VL

# (u)u)dr thorough 1.5 1.0 0.5 0.3 0.05 0.10 0.15 0.20 0.25

feed, fn (mm/rev)

# Single-sided MP Chip Breaker

[For medium cutting]

- · For continuous cutting of forged steel at high feed
- Turning insert for internal machining of automobile components

## Features of MP chip breaker

### Three-dimensional 2 step chip breaker

- Stable chip control in unstable internal machining
- Prevents chip blocking at internal diameter at varying depth of cut and feed.
- · Stronger cutting edge and wide chip pocket
- Increased chipping resistance in unstable internal machining

## Chip control test

- Workpiece
  - SCM440
- Cutting condition vc = 200 m/min, ap = 0.5~2.5 mm, fn = 0.05~0.25 mm/rev
- Tools CCMT09T304-MP



feed, fn (mm/rev)



# VL Chip Breaker [For mild steel]

- Improved chip control for machining material that have high toughness such as low carbon steel, pipe, steel plate etc
- Improved chip control and decreased cutting load on external, facing, and copying applications
- Improved strength of the cutting edge for measurable efficiency in automated production

## Features of VC chip breaker

- · 2 steps designed chip-breaker Suitable Mild steel
  - Stable chip control on the low feed and cutting depth
    - Stable chip breaking on the low cutting depth
- · Designed with special dots · Applied side rake angle
- Improved chip control on facing, copying applications
- Decreased cutting load and better surface finish

## Chip control test

- Workpiece SM20C
- Cutting conditions

Tools

- vc = 250 m/min, ap = 0.5 mm fn = 0.2 mm/rev (Side), wet DNMG150408-VL



Competitor C

VL Competitor A **Chip Breakers** 

Competitor B

## FEM Cutting simulation analysis in the design

- · For design of geometry, chip shapes and chip flow are predictable
- · Optimal chip breaker design by various cutting conditions and workpieces







- Excellent chip evacuation in continuous and high speed machining of various workpieces
- 3-dimensional chip breaker achieves lower cutting resistance, high rigidity of the cutting edge, and longer tool life
- Stable chip control in copying and internal machining

## Features of VB chip breaker

- Superior chip control and chip cutting in copying with various depths of cut 6 bumps on the insert corner
- Side rake angle
- Superb chip cutting in facing and copying. Superior tool life due to improved surface roughness and lower cutting resistance
- Excellent chip evacuation and toughness in machining with high depth of cut Cutting edge on 100° part for medium machining (For CNMG)

## Performance

Better machining **Better Chip control** Longer tool life





**VB Chip Breakers** 



Conventional chip breaker





# VC Chip Breaker [For medium to finish cutting]

- Superior chip evacuation in high speed and continuous machining of various workpieces (carbon steel, alloy steel etc.)
- Korloy 3 dimensional chip breaker ensures longer tool life due to low cutting load and improved cutting edge strength
- Stable chip control in copying and internal machining

## Features of VC chip breaker

- · 4 bums on the insert corner
- Excellent chip control in various depths of cut and superb chip cutting in external, internal, copy machining and facing

## Evaluation of chip control (Copying)



Conventional chip breaker



# VQ Chip Breaker [For medium to finish cutting]

- Excellent cutting performance and reinforced cutting edges
- · Improved chip control at low depth of cuts

## Features of VQ chip breaker

- · Three dimensional rake angle
- Improved surface finish thanks to sharp cutting performance
- Less cutting heat and longer tool life thanks to low cutting resistance
- · Beveled protruding structure
- Smooth chip flow at low depth of cuts
- Wide application range









- condition
- Tools







# VH/VT Chip Breaker [For heavy duty machining]

- · Heavy duty chip breaker suitable for Heavy machining in the ship building and power plant industries
- Suitable for large vertical machines when machining shafts, rollers, rotors and optimal for the big flange machining

## Features of VH chip breaker

### · For good chip control in heavy machining (comprehensive type)



- Smooth chip control from the high rake angle
- Wider cutting edge land provides stronger cutting
- Unique cutting edge treatment provides smooth cutting
- Optimized chip pocket design provides smooth chip flow

## Features of VT chip breaker

For long tool life and stable cutting (higher feeds, big depth)
 in heavy machining



- Designed from the study of heavy cutting mechanism
- Strong edge design provides long and stable cutting (2 step rake angle of cutting edge)
- Varied cutting edge land strengthens the cutting edge
- The positioning of the chip breaking convex dot deflect the machining heat, optimizes inserts wear & absorb shock





feed, fn (mm/rev)

```
GH : ap (mm) = 5.0~12.0, fn (mm/rev) = 0.55~1.20
VH : ap (mm) = 6.0~15.0, fn (mm/rev) = 0.70~1.40
VT : ap (mm) = 7.0~17.0, fn (mm/rev) = 0.75~1.60
```

# LW/VW Chip Breaker [For high feed cutting]

- · Improved productivity with higher feed rates and surface finishes
- Improved wear resistance and toughness





### Features of VW chip breaker



## Curvilinear cutting edge

- Reduces cutting force
- Cutting edge design able to handle deeper depth of cuts
   lower cutting load & reduces heat
- Greater chip control at shallow depths of cuts
   Chip pocket design improves smooth chip flow
- For shallow depth cutting and low speed machining - 3D design at the corner
- Excellent Finishing applications
   Excellent chip control
- Insert design great for stable clmaping
   Chip breaker designed close to the cutting edge
- Similar cutting edge to C/B for medium - strong cutting edge
- 3 Dimensional dot design on cutting corner - reduces cutting force and good chip control at shallow depth of cut



- High productivity
- Improved surface roughness
- High feed-reducing machining time
- Improved tool life due to reduce cutting force



Turning