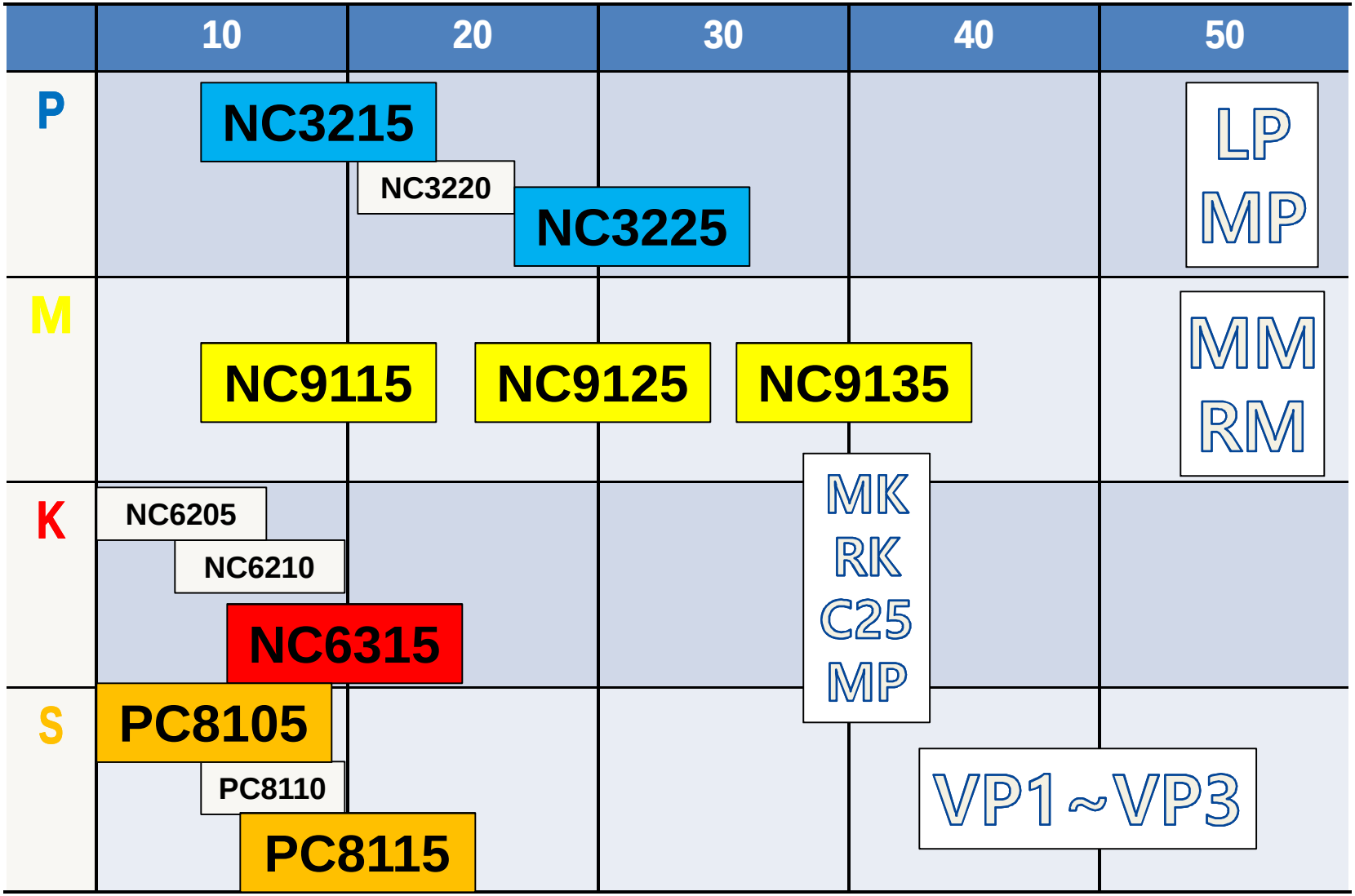
ISO TURNING
New Grades and ChiPbreakers

SUMMARY

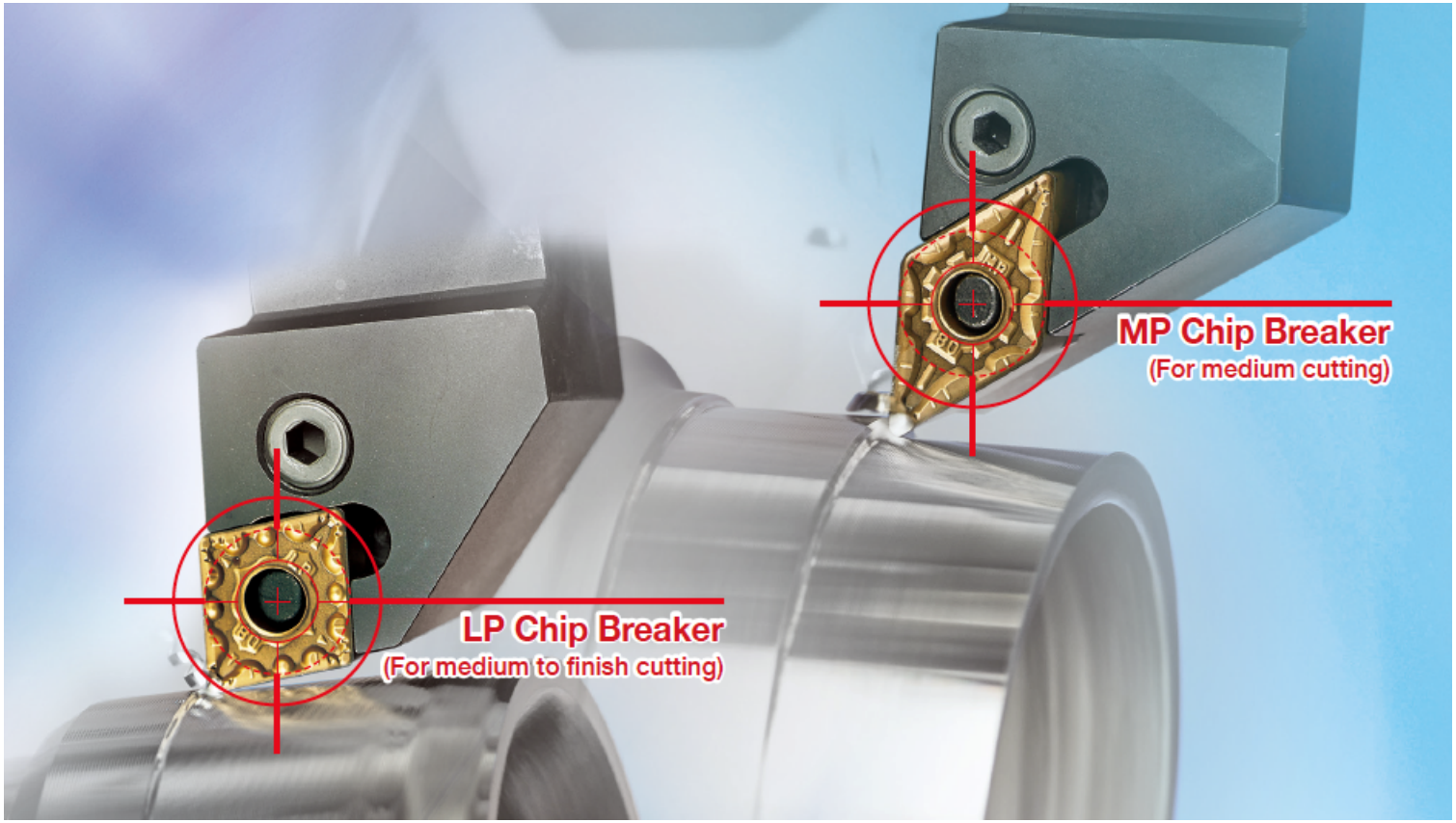
GRADES / PRODUCTS	APPLICATION	REMARKS
NC3215 & NC3225	TURNING	STEEL –P15 , P25
NC9115, NC9125 & NC9135	TURNING	STAINLESS STEEL M15 , M25, M35
PC8105 & PC8115	TURNING	SUPER ALLOYS S05 , S15
CC1500 & CC2500	TURNING	COATED CERMET P10, P20
NC6315	TURNING	CAST IRON –K15

New Grades and Chipbreakers

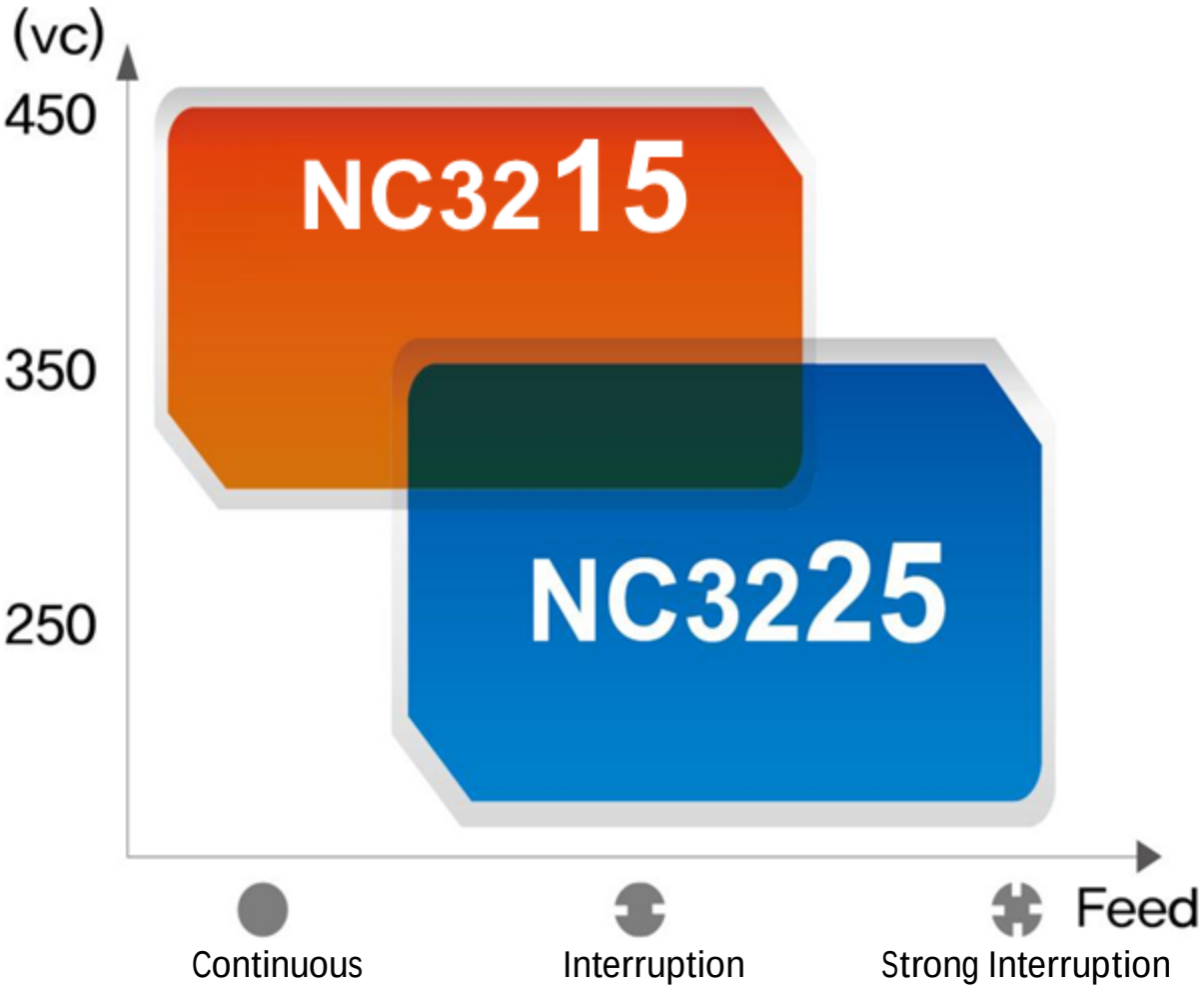


NC3215 & NC3225

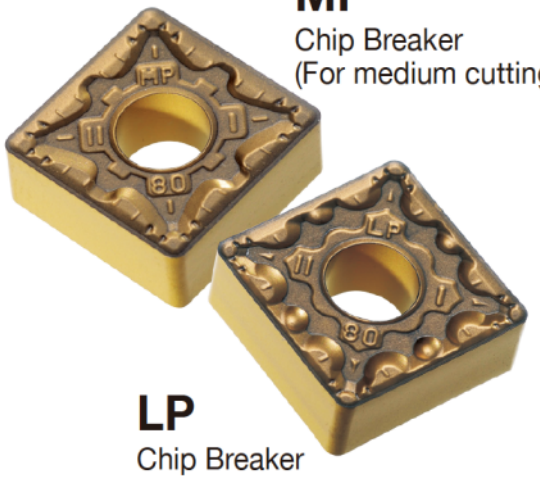
New High-Performance
CVD Grades for Turning



NC3215 & NC3225 : Introduction

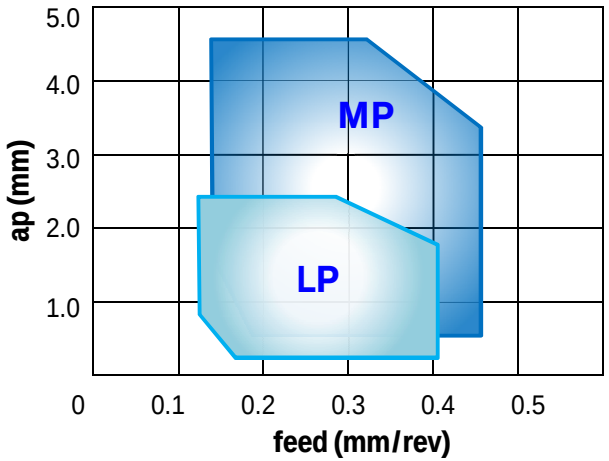


MP
Chip Breaker
(For medium cutting)

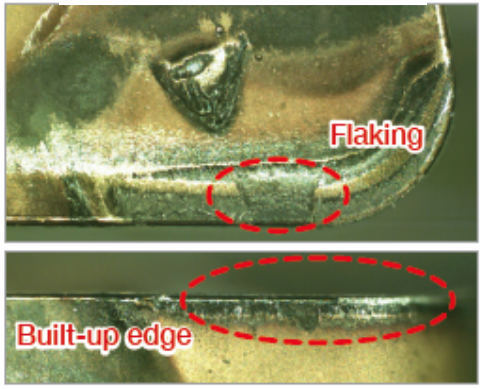
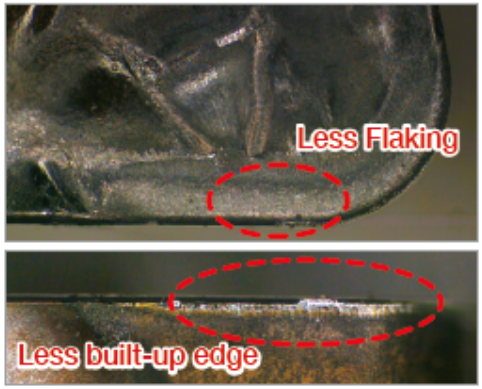
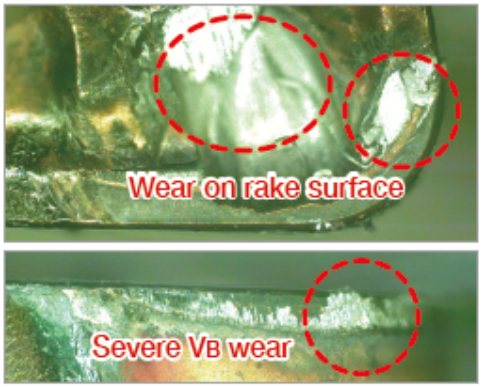
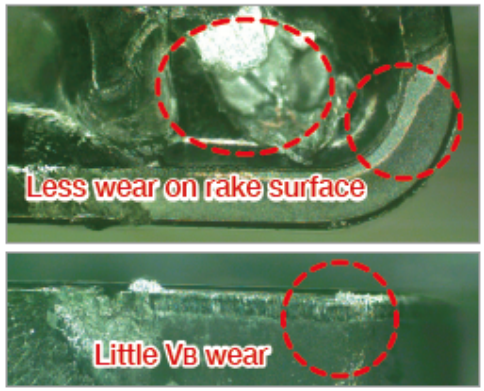


LP
Chip Breaker
(For medium to finish cutting)

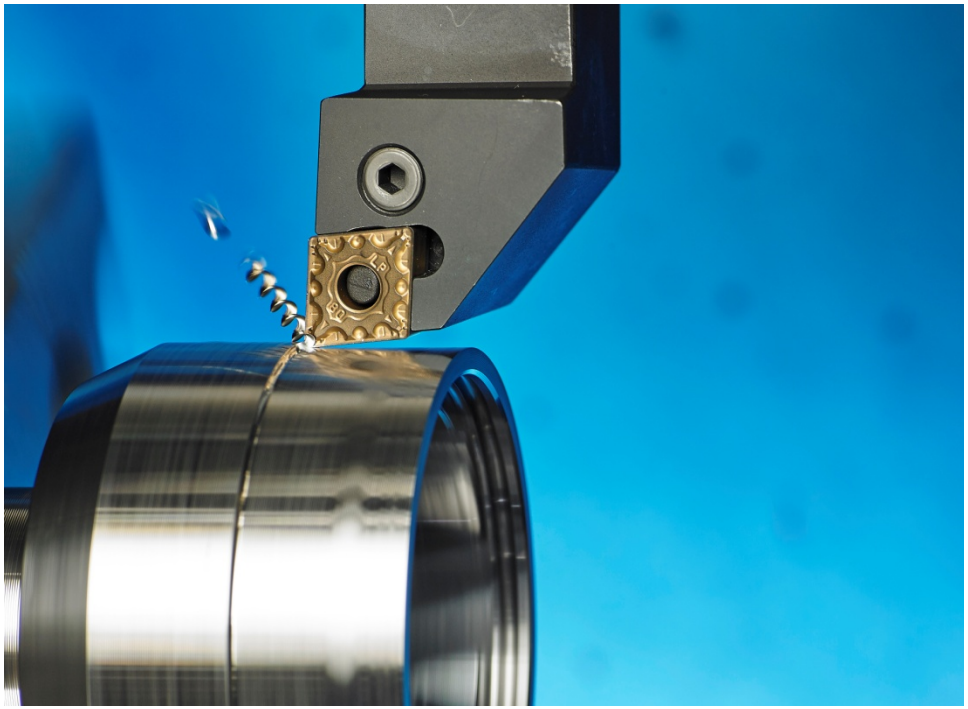
Application range(LP/MP)

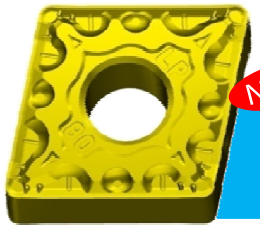


NC3215 & NC3225 : Key Features

Existing Situation	Development Concept	Effect
Unstable tool life	New coating	Reduced flaking
		
Wear resistance	Previous coating	High wear resistance
		

LP & MP CHIP BREAKER

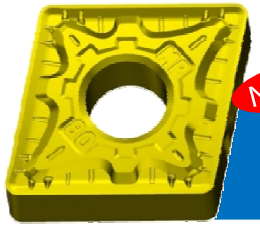




For medium cutting to Finishing

NEW

LP Chip Breaker

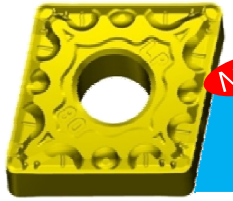


For medium cutting

NEW

MP Chip Breaker

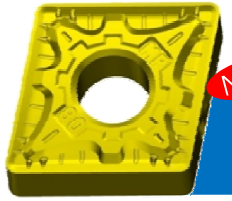
LP & MP Chip Breaker : Introduction



For medium cutting to Finishing

NEW

LP Chip Breaker

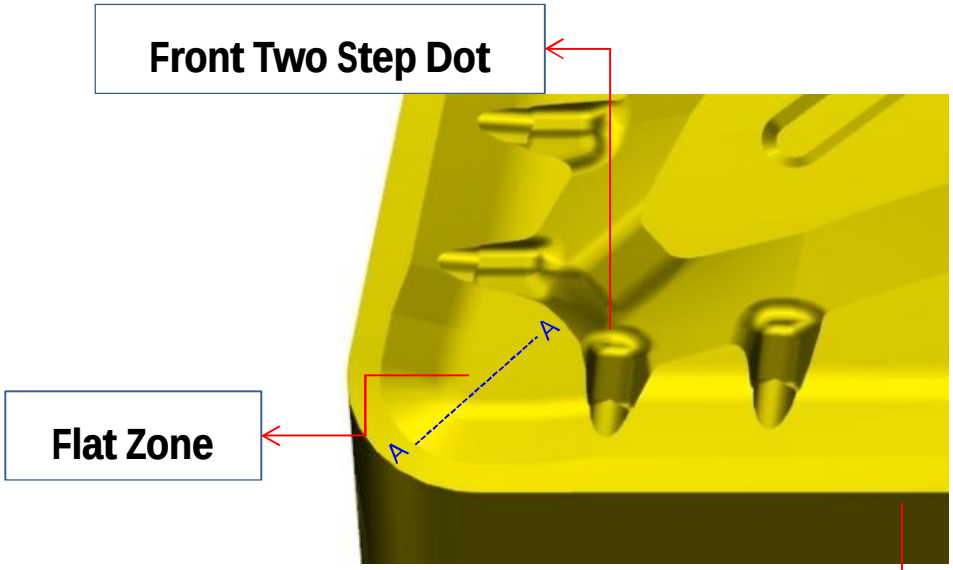


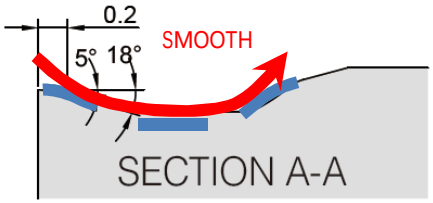
For medium cutting

NEW

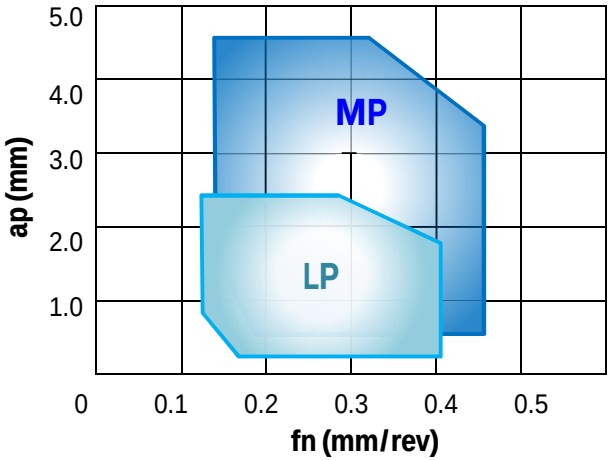
MP Chip Breaker

Features of LP/MP





Cutting Range(LP/MP)



Cutting Range	C/B	ap (mm)	fn (mm/rev)
Medium to Finishing	LP	0.3 ~ 2.5	0.15 ~ 0.4
Medium	MP	0.5 ~ 4.5	0.15 ~ 0.45

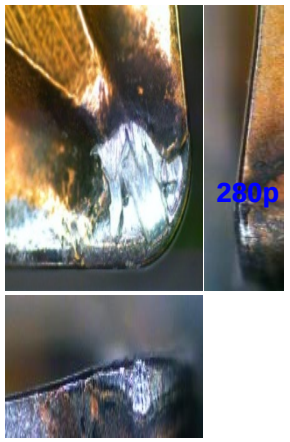
LP & MP Chip Breaker : Key Features

Existing Situation

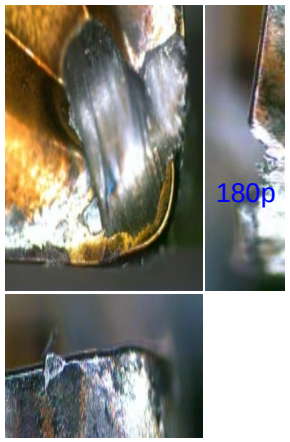
■ Field Test factors

■ Cutting Conditions

fn=0.25mm/rev



fn=0.35mm/rev



Tool Life1/3

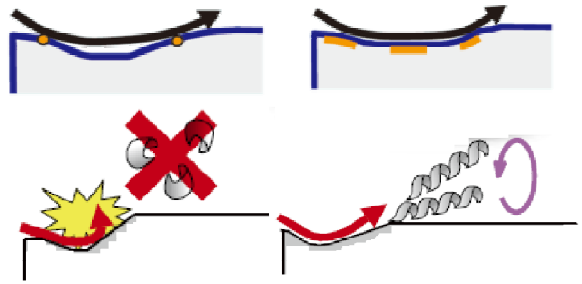
Development Concept

■ 3D Dot Design

[MP] [LP]

Chip Evacuation Improved

Cutting load decreased



[Competitor] [MP, LP]

Effect

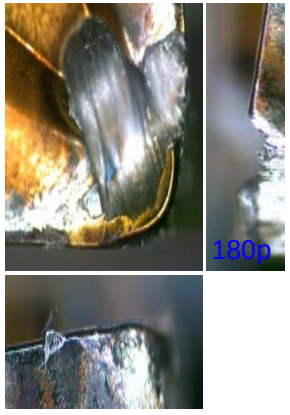
■ Cutting force decreased

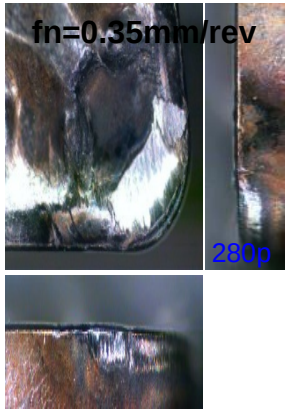
Cutting load decrease 20%

■ Tool Life improved

Tool Life improvement 35%

fn=0.35mm/rev





[Competitor]

MP-NC3225

LP, MP Chip Breaker

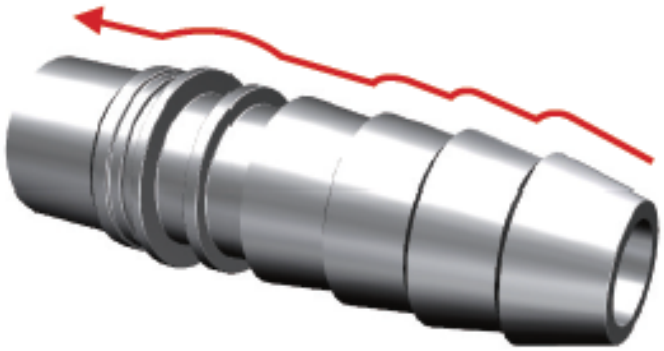
Comparison for chip breakers and grades to competitors

KORLOR		KYOCERA		TAEGUTEC		MITSUBISHI		SANDVIK	
Breaker	Grade	Breaker	Grade	Breaker	Grade	Breaker	Grade	Breaker	Grade
MP	NC5330	PS PG	CA5535 CA530	MT PC	TT8135	MA MP	UE6035	PM	GC4235 GC4335
	NC3225		CA5525 CA525		TT8125		UE6020 MC6025		GC4215 GC4325
	NC3215		CA5515 CA515		TT8115		UE6110 MC6015		GC4215 GC4315
LP	NC5330	CQ PQ	CA5535 CA530	MC FC	TT8135	SA LP	UE6035	PF	GC4235 GC4335
	NC3225		CA5525 CA525		TT8125		UE6020 MC6025		GC4215 GC4325
	NC3215		CA5515 CA515		TT8115		UE6110 MC6015		GC4215 GC4315

LP & MP Chip Breaker : Field Test

[Field Test-3]

- Insert : CNMG120412-MP (NC3215)
- Material : 1020 – Carbon Steel
- Workpiece : **Engine Parts (Nipple)**
- Cutting Conditions : vc = 250~380(m/min),
  fn = 0.20~0.30(mm/rev)
  ap = 1.5~2.0mm, wet



MP / NC3215		180ea/edge
Competitor / P15		150ea/edge

- Smooth Chip Evacuation, Stable Tool Life
- Tool life increased 120%

[Field Test-4]

- Insert : CNMG120408-MP (NC3225)
- Material : 5140 - Hot Forged Steel
- Workpiece : **Steering System(Wheel Bearing)**
- Cutting Conditions : vc = 230(m/min)
  fn = 0.3(mm/rev)
  ap = 0.5~1.5mm, wet

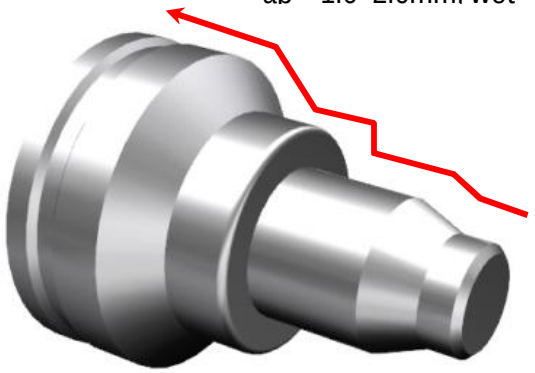
MP / NC3225		100ea/edge
Competitor / P30		80ea/edge

- Stable Tool Life on interrupted machining
- Tool life increased120%

LP & MP Chip Breaker : Field Test

[Field Test-5]

- Holder : DDJNR2525-P15
- Insert : DNMG150612-LP (NC3215)
- Material : 1045 - Cold Forged Steel
- Workpiece : **Steering System(BJ Case)**
- Cutting Conditions : vc = 250(m/min),
  fn = 0.25~0.35(mm/rev)
  ap = 1.0~2.0mm, wet

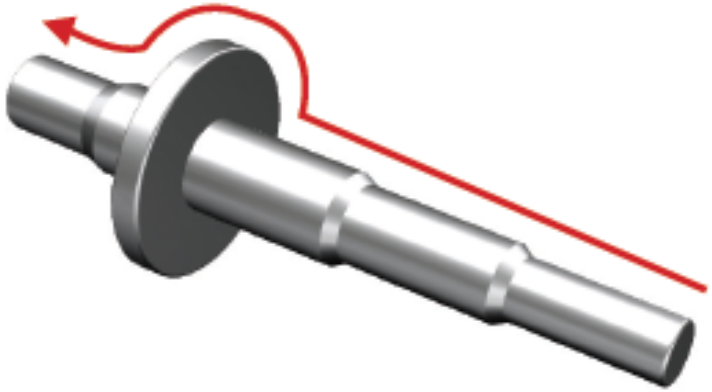


LP / NC3215		120ea/edge
Competitor / P15		90ea/edge

- Better Chip Evacuation. Lower Cutting Force
- Tool life increased 130%

[Field Test-6]

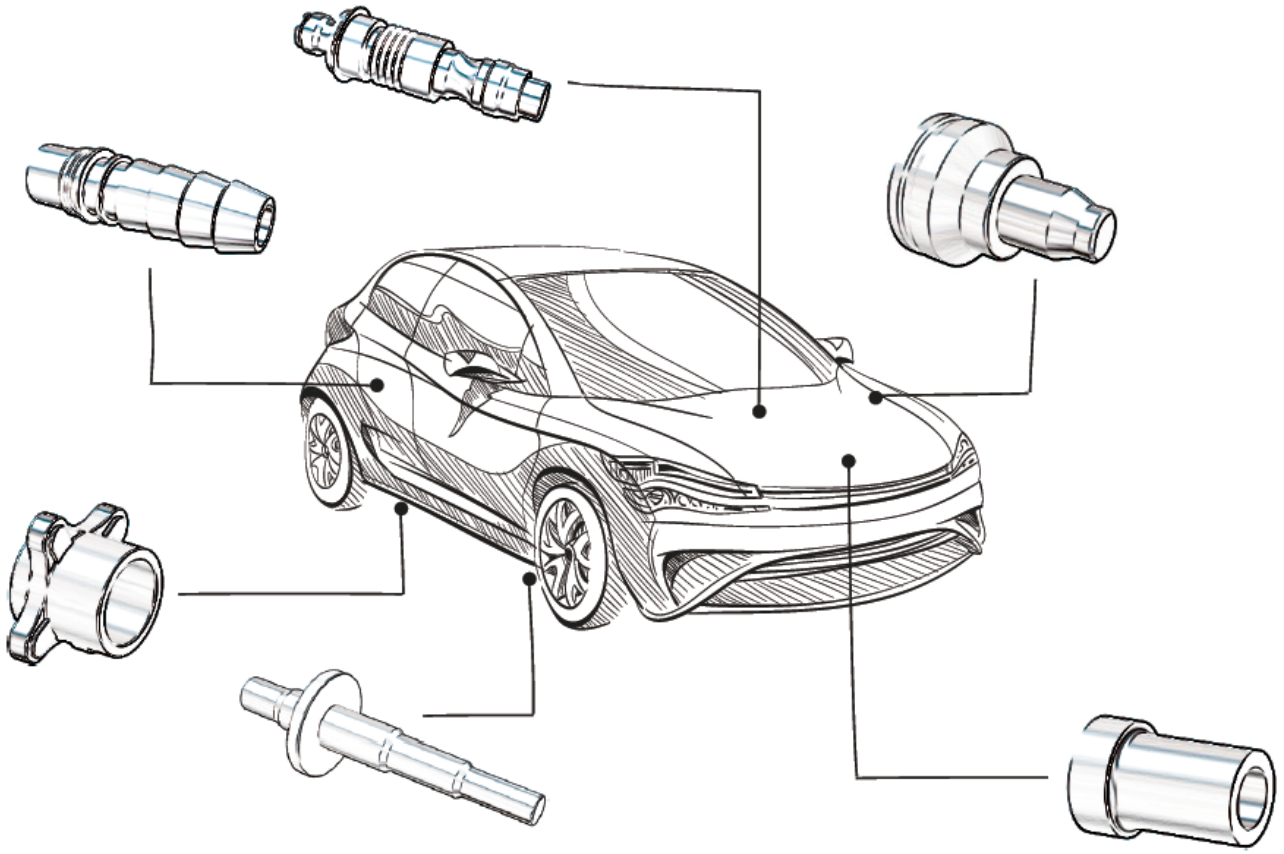
- Insert : DNMG150608-LP (NC3225)
- Material : 1040 - Cold Forged Steel
- Workpiece : **Mission part (Input Shaft)**
- Cutting Conditions : vc = 240(m/min)
  fn = 0.35(mm/rev)
  ap = 1.5.0mm, wet



LP / NC3225		110ea/edge
Competitor / P25		80ea/edge

- Stable in both interrupted and continuous machining
- Tool life increased130%

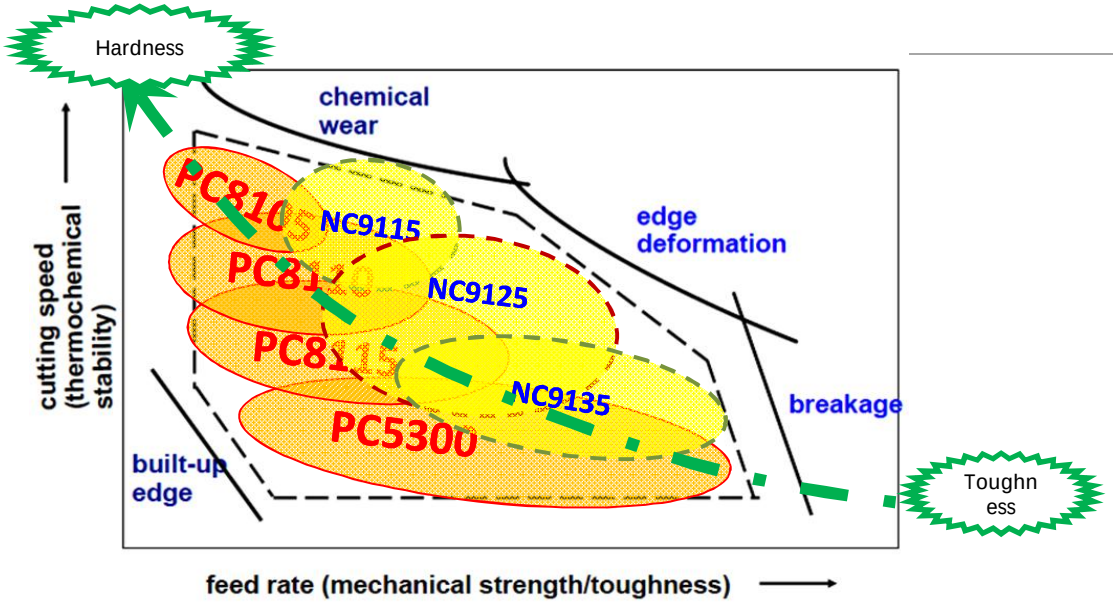
SOLUTION FOR THE INDUSTRY



NC9115, NC9125 & NC9135

New CVD Turning Grade For Stainless steel

Introduction of NC9000 series

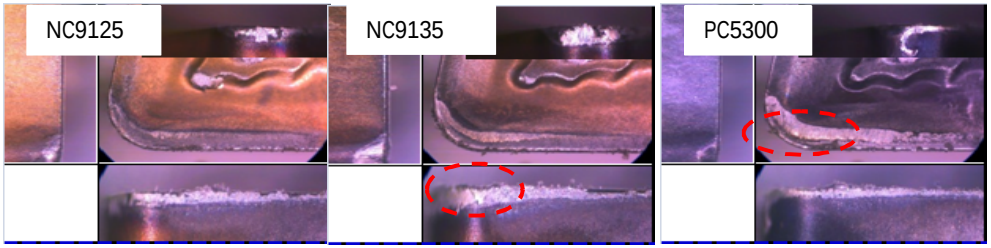


Recommended Cutting condition

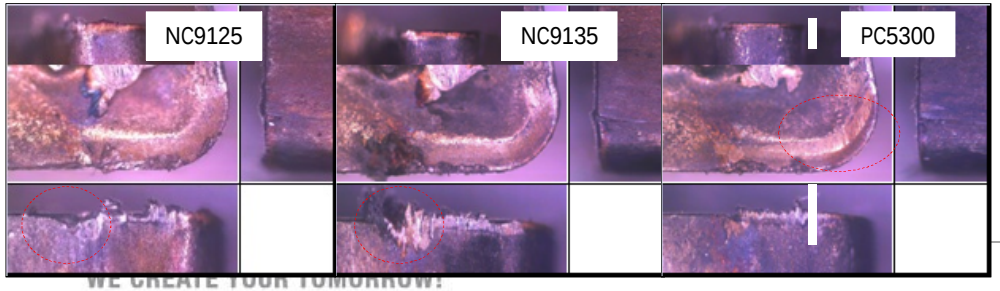
Grade	ISO	VC(m/min)
NC9115	M15	160-220
NC9125	M25	150-200
NC9135	M35	100-150

App	C/B	Ap	fn
Mid	**MM**	0.5~5.5(3.0)	0.12~0.45(0.25)
Rough	**RM**	2.0~6.0(3.0)	0.15~0.55(0.3)

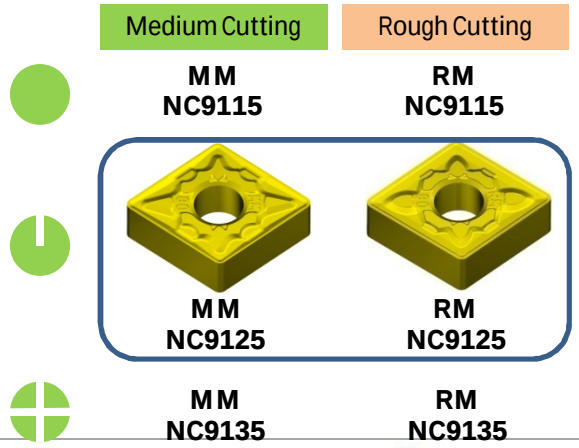
< Wear TEST , vc:200m/min>



<Toughness Test , vc:150m/min>



Application

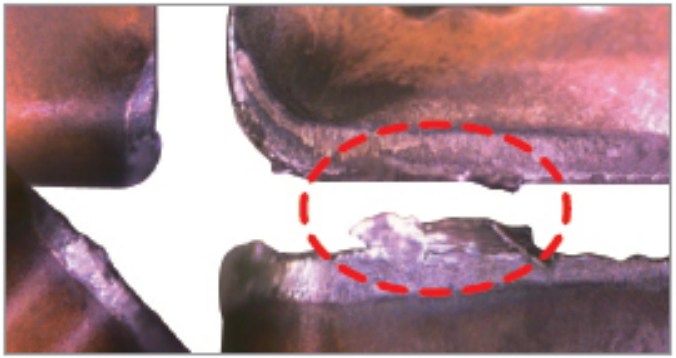


KORLOY

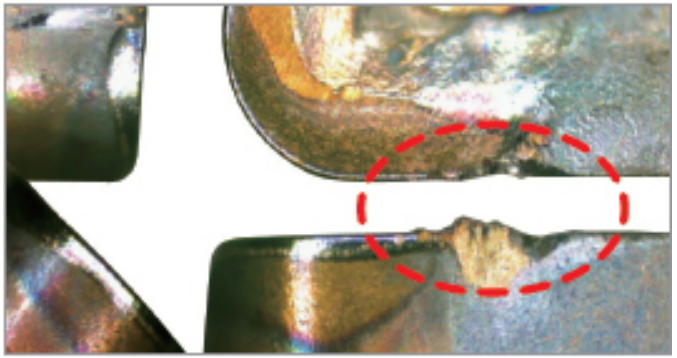
Common Problems while Machining Stainless Steel

1. Sheared chips impact cutting edges repeatedly and cause edge damage.
2. Difficult chip breakage leads to built-up edge, work hardening, and promotes excessive notch wear.

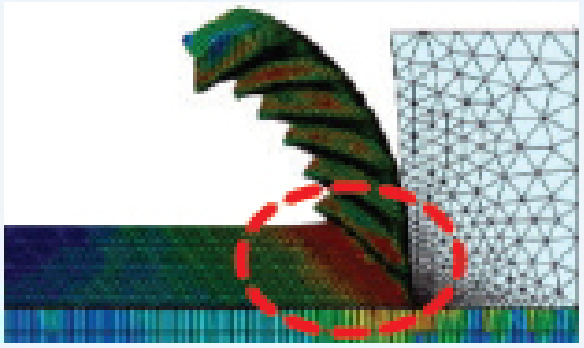
1. Built-up edge



2. Notch wear



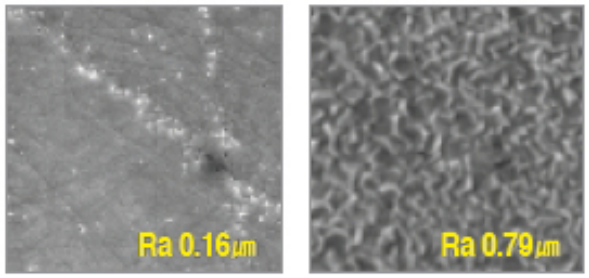
Low heat conductivity in Stainless steel machining involves high cutting heat a nd shear chips. These get concentrated on the cutting edge



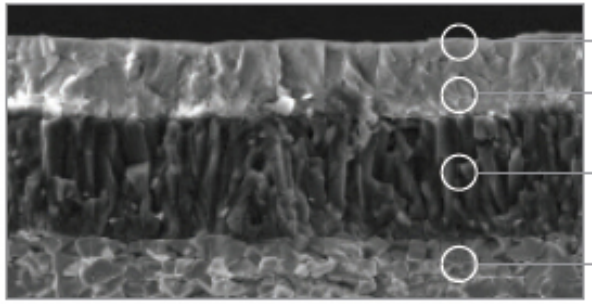
How to get rid of these problems with NC9000 series grade

• The NC9100 series shows improved surface finish compared to the existing coating film

Lubricative coating layer to prevent built-up edge

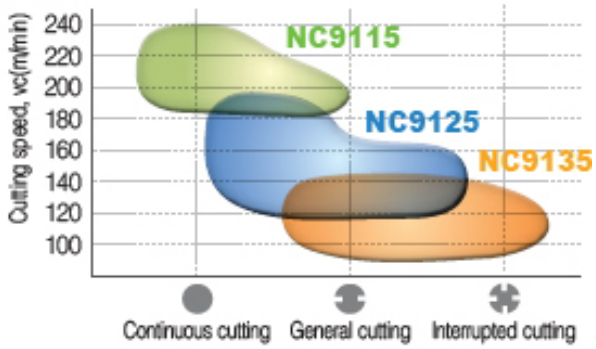


[NC9100 Series] [Existing coating]



① Top coat with higher welding resistance
② Alumina layer for high speed machining
③ MT CVD-TiCN layer with higher chipping resistance
④ High toughness substrate optimal for all continuous/low or high interrupted machining

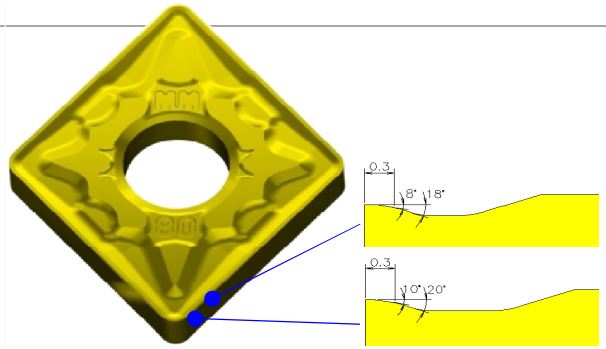
Grade lineup



- **Excellent coating layer for medium/rough turning of stainless steel**
- **Optimized substrate for different cutting speeds, feeds, and degrees of interruption.**

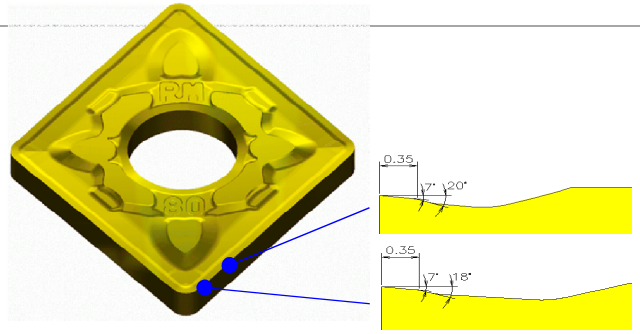
NC9000 Series & MM-RM Chip breaker

MM Chip breaker M

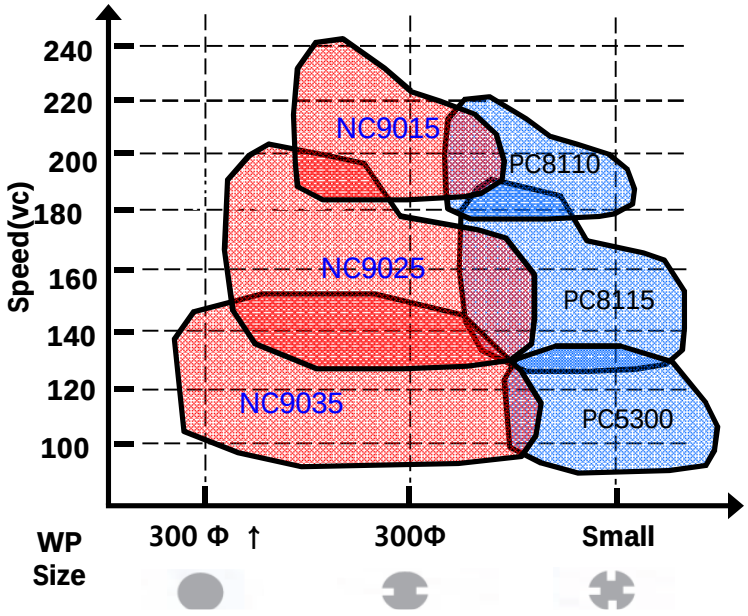


- 1st recommended Chip breaker
- Applied two step cutting land
- Wide chip pocket for chip evacuation

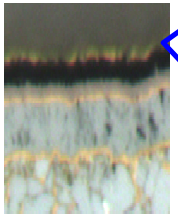
RM Chip breaker M



- For cutting roughing and interrupted condition
- Prevent burr in high speed
- Increasing tool life in high speed

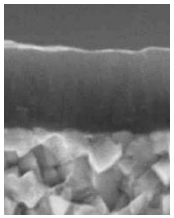


CVD



※ Al2O3 Coating
※Great Wear Resistance on upper surface
※**Tip**:
Big size W.P,
Heavy machining (Medium~Roughing,
High speed

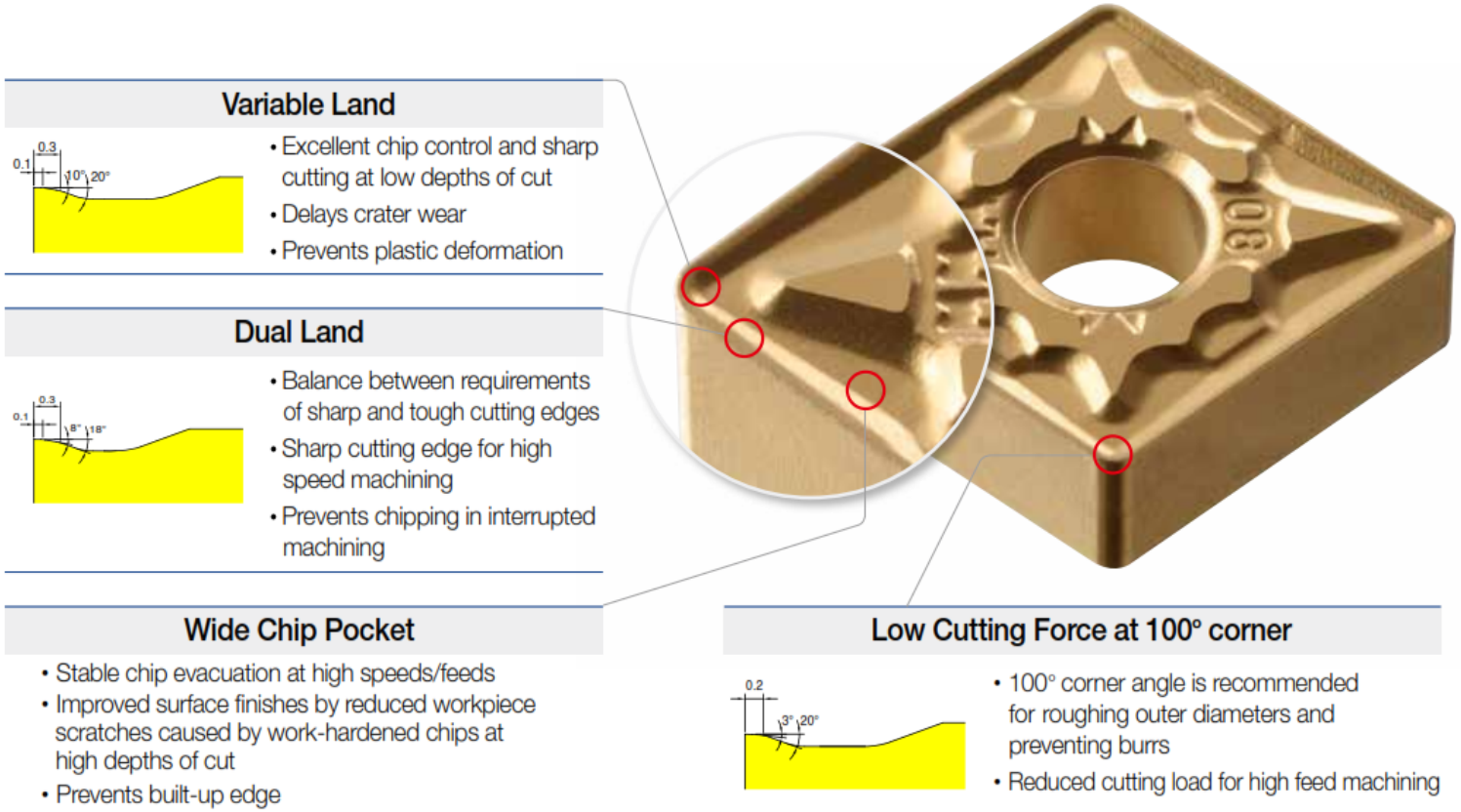
PVD



※TiAlN Coating
※Great Wear resistance and Toughness on rake face
※**Tip:**
Small size W.P,
Interrupted
Low~Medium Speed

NC9000 series – MM Chip breaker

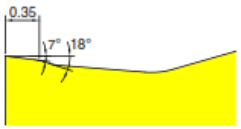
- It's dual land angle design allows for both sharp cutting performance and strong cutting edges , which promotes extended tool life and minimized cutting force and built-up edge.
- Wide chip pockets prevent chips from interrupting the minor cutting edges and instead lets the chips out of the cutting area.
- These chip breaker features help in preventing plastic deformation and excessive wear.



NC9000 series – RM Chip breaker

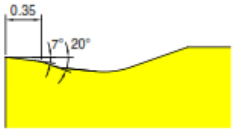
- The RM chip breaker for roughing is recommended in rough machining and in cases where burrs are an issue.
- It has a wide land and rake angle lowering cutting resistance.
- Cutting heats can flow around the gentle slope of rake surface and can be effectively dispersed and evacuated at high feeds and high depths of cut.

Variable Land



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

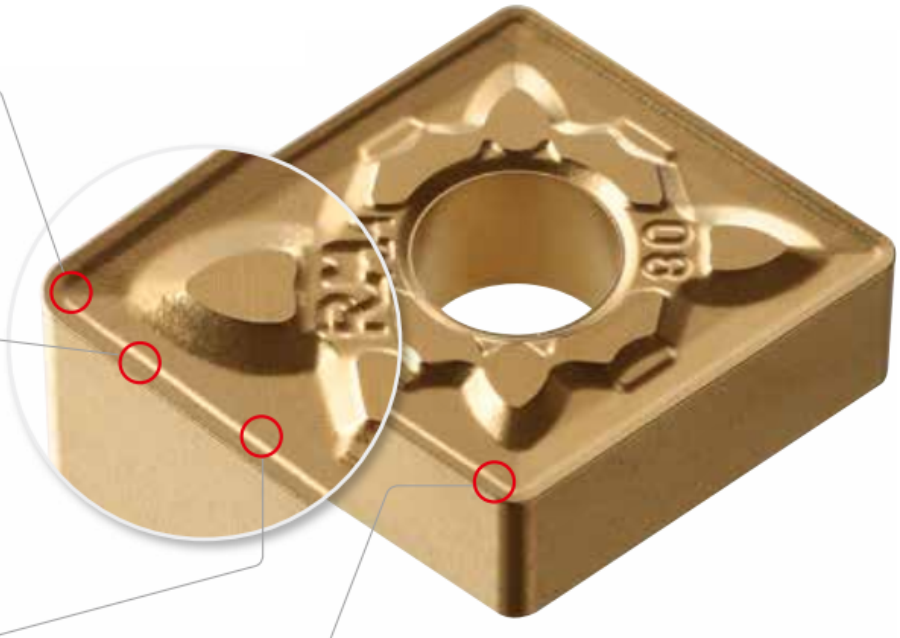
Wide Land & Gentle Front Angle



- Sharp cutting edges and 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



Low Cutting Force at 100° corner

- 100° corner angle is recommended for roughing outer diameters and preventing notch wear
- Stepped design reduces cutting load

PC8105 & PC8115

New PVD coating for Turning operations with hard to cut materials

PC8105 & PC8115 : Introduction

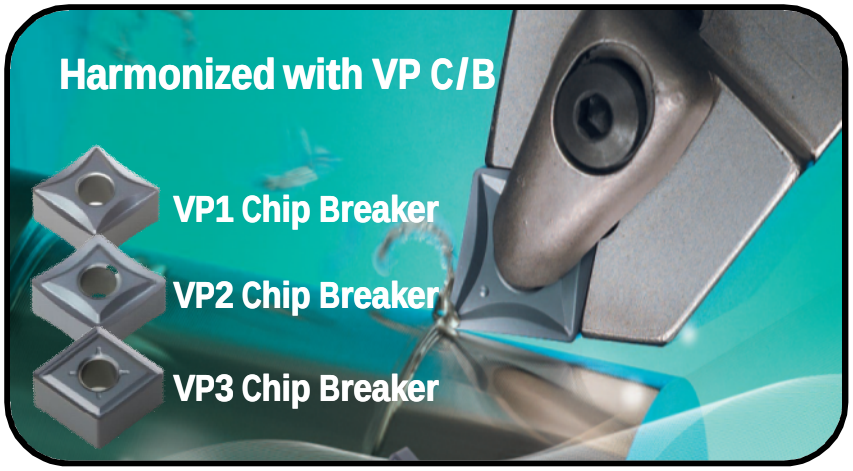
PC8105 & PC8115 with VP C/B

PC8105 (S05) :

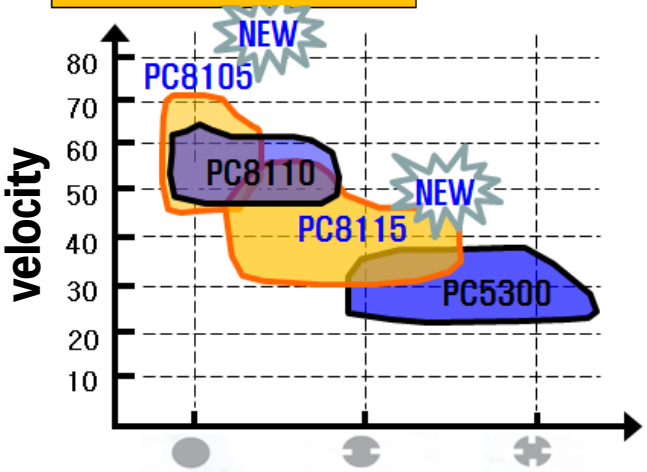
*High speed
*Continuous
*Finishing

PC8115 (S15) :

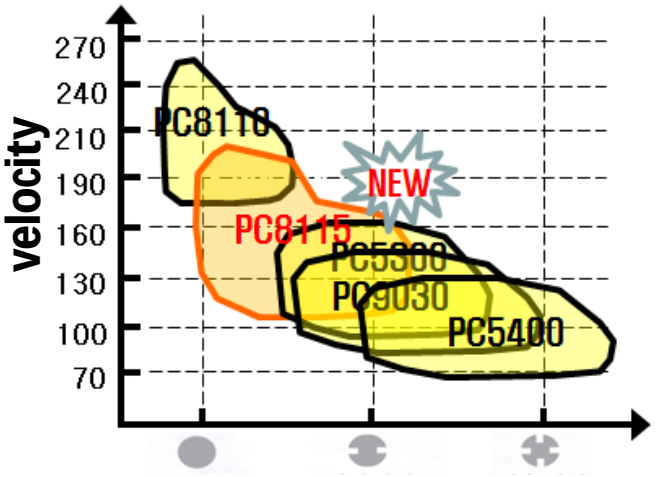
*Medium
*Interrupted



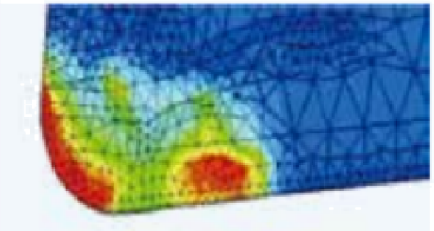
◆ Inconel 718



◆Stainless Steel

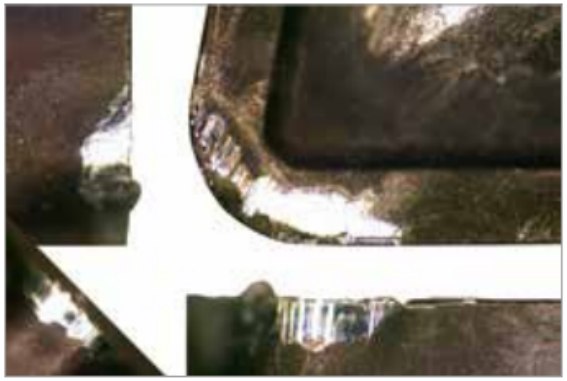


Problems in cutting hard to cut materials

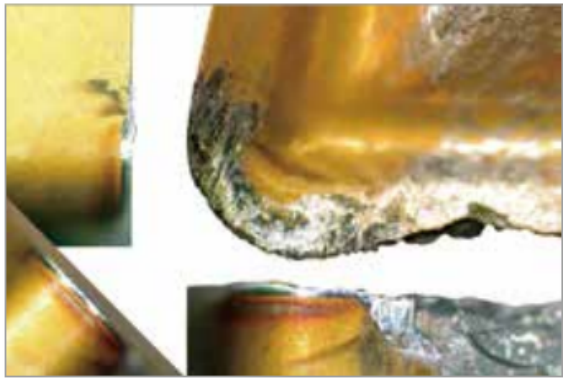


Hard-to-cut materials(Inconel, etc.) feature high hardness and low heat conductivity.
This results in concentrated heat on cutting edges and thus rapid wear at a high temperature over 800°.
In addition, thermal impact and work hardening cause involve chipping or breakage according to the depth of cut.

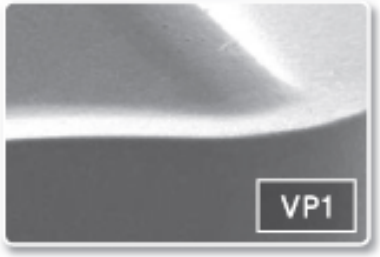
1. Severe wear

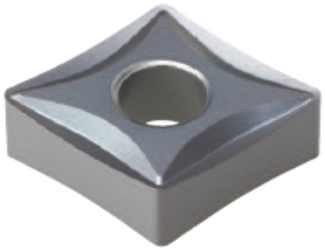


2. Chipping / fracture



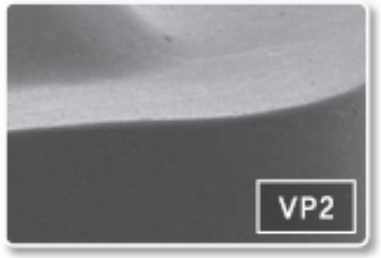
VP Series for Hard to cut materials

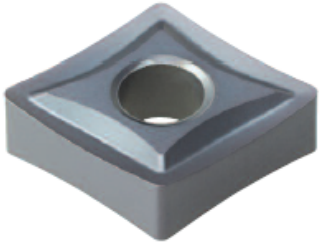




- **High positive cutting Edge**
- **Recommended cutting conditions**

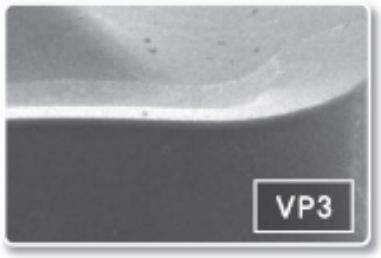
  fn(mm/rev) = 0.05~0.2, ap(mm) = 0.1~1.5

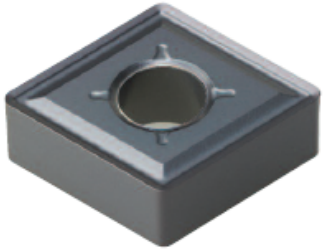




- **High positive cutting Edge / side rake angle**
- **Recommended cutting conditions**

  fn(mm/rev) = 0.1~0.4, ap(mm) = 0.5~4.5





- **High positive cutting Edge with wide land**
- **Recommended cutting conditions**

  fn(mm/rev) = 0.1~0.45, ap(mm) = 0.5~5.0

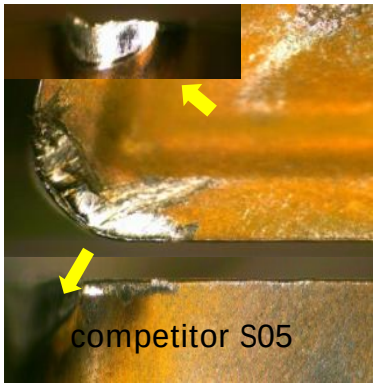
SHARP

LESS SHARP

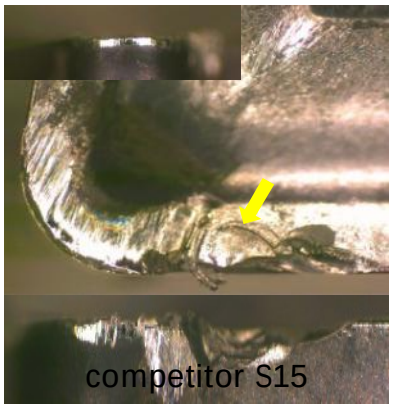
PC8105 & PC8115 : Key Features

Existing Situation

◆ HRSA in high speed

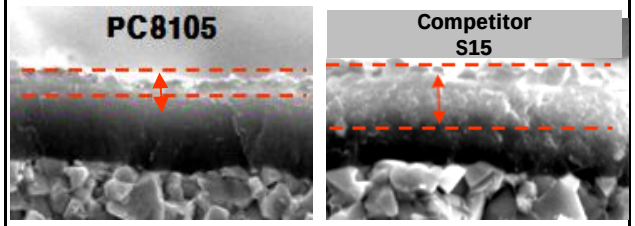


◆ HRSA, STS in high feed



Development Concept

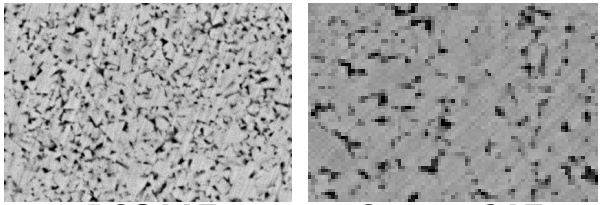
◆Superior PVD layer



heat treatment after 900 Celsius

heat treatment after 900 Celsius

◆ Ultra fine structure tech



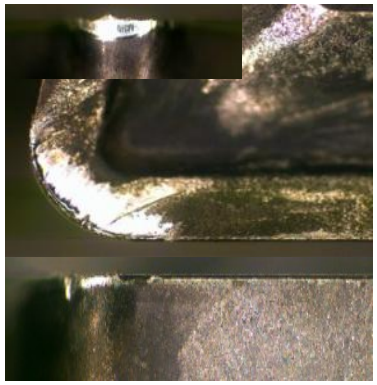
PC8115 **Comp. S15**

◆Specialized in HRSA

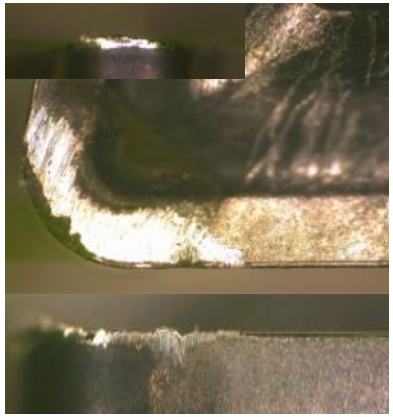
C/B designed with high positive angle

Effect

◆Superior wear & P.D



◆Anti chipping & fracture

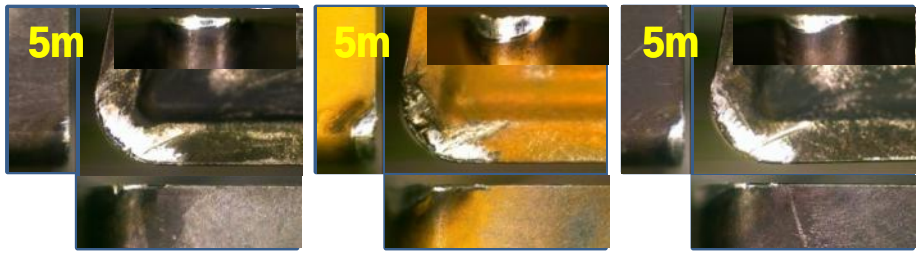


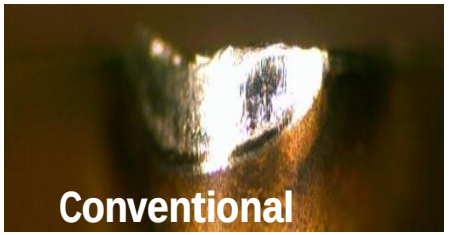
PC8105 & PC8115 : Field Test

[Home Test]

- Holder : PCLNR2525-M12
- I/S : CNMG120408-VP3 PC8105
- W.P : Inconel718 (H_RC50)
- Cutting conditions : vc = 50(m/min), fn = 0.15(mm/rev)
  ap = 0.5mm, wet

PC8105-VP3 | **Competitor A** | **Competitor B**

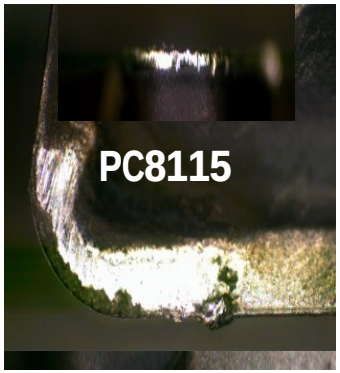


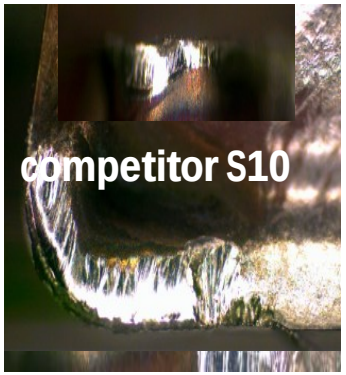


◀ Enlarged Photo of R

[Field Test]

- Holder : MTFNR2525-M16
- I/S : TNMG160408-VP3 PC8115
- W.P : Inconel625 (H_RC42)
- Cutting conditions : vc = 30(m/min), fn = 0.1(mm/rev)
  ap = 1.5mm, wet





W.P

CC1500 & CC2500

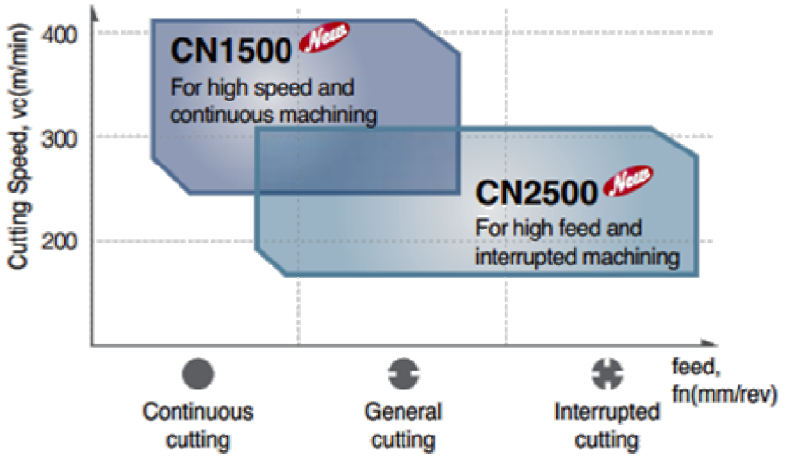
New PVD coated Cermet grades

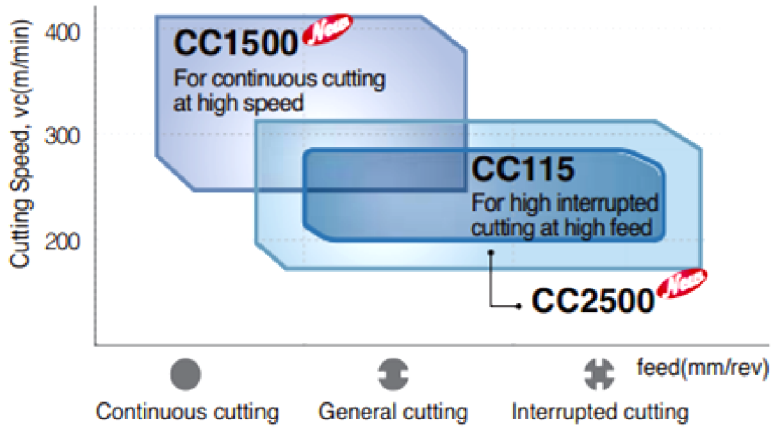
CC1500 & CC2500: Introduction

CC1500 & CC2500

CC1500 (P10)
- High speed
- Continuous

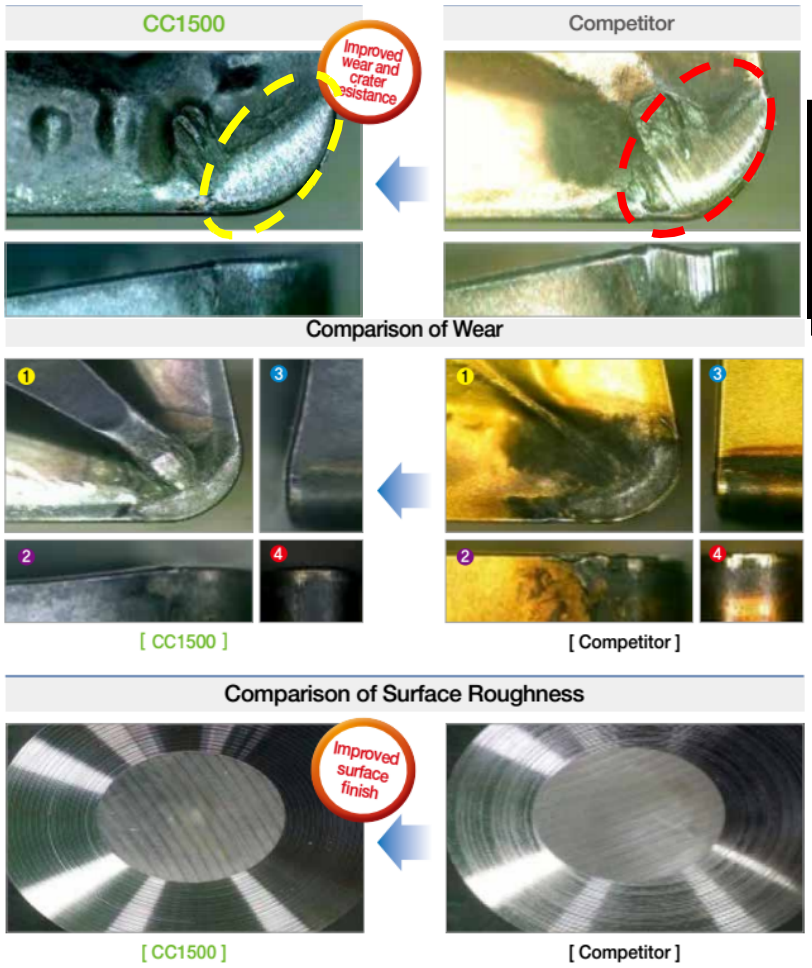
CC2500 (P20)
- High feed
- Interrupted
- For forged steel and sintered ferrous alloy

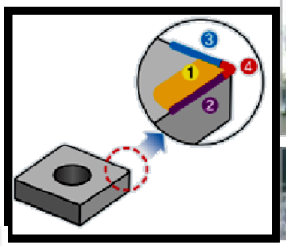




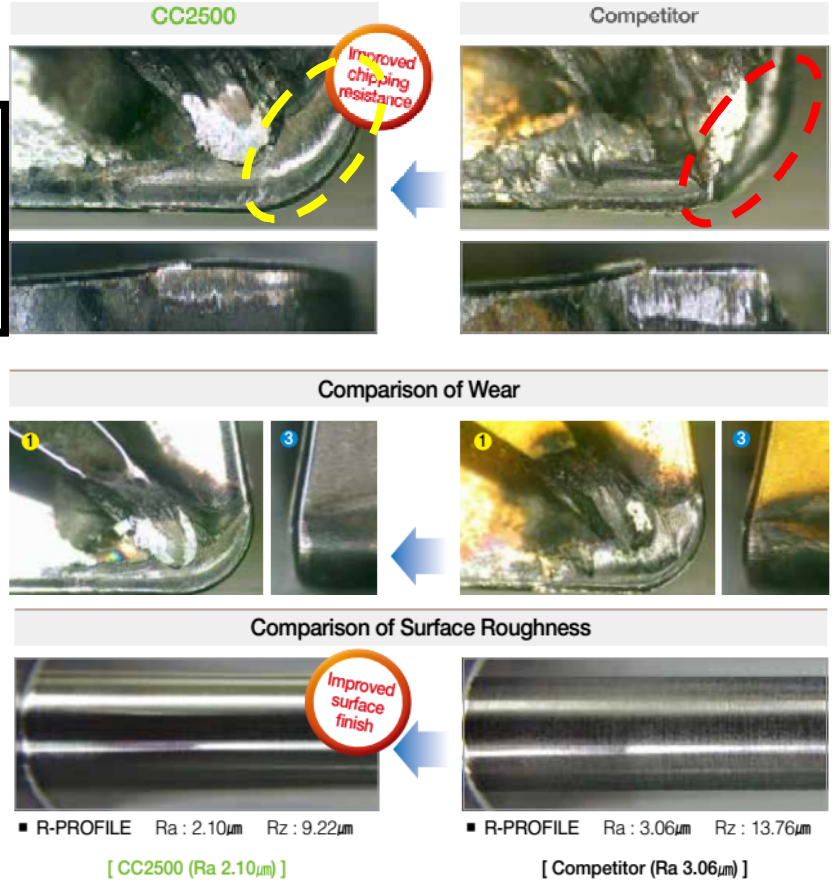
CC1500 & CC2500 : Key Features

Difference in crater wear



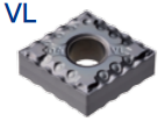
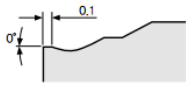
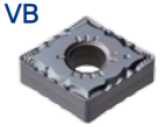
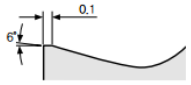
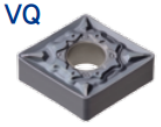
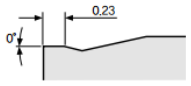
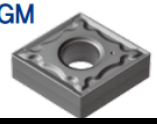
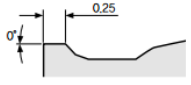
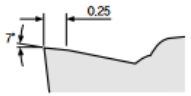
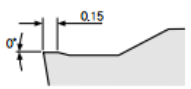


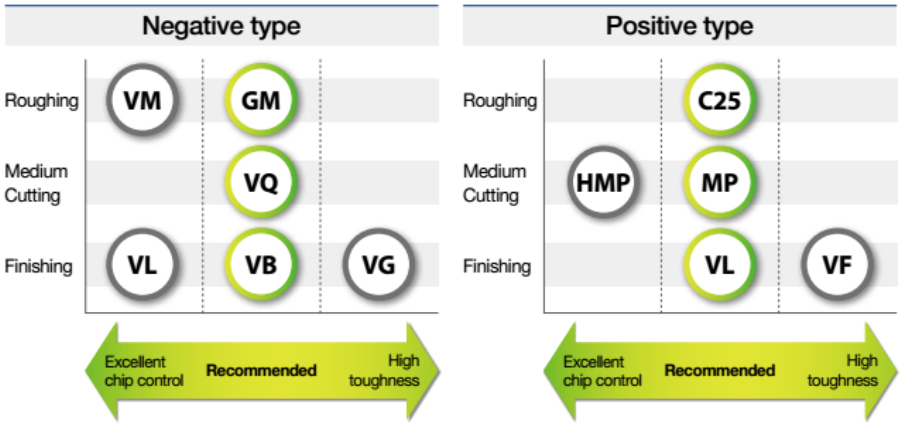
Fracture tendencies



Better wear resistance and fracture resistance can be seen in case of CC1500 and CC2500 respectively.

Compatible C/Bs with CC1500 and CC2500

Type	Chip breaker	Machining type	Cutting edge	Features
Negative type	VL 	Finishing		▪ Excellent chip control when machining tough materials such as low carbon steel, pipe, steel plate, etc. ▪ Improved chip control at low depth of cut
	VB 	Finishing		▪ Universal chip breaker with strong chip control at low depth of cut ▪ Excellent chip control on copying application and corner R machining
	VQ 	Medium cutting		▪ Improved chip control with optimized cutting edge design for medium to finish cutting
	GM 	Roughing		▪ Excellent for interrupted and high feed machining with strong cutting edge
Positive type	VL 	Finishing		▪ Improved chip control when machining low carbon steel, pipe, steel plate, etc.
	MP 	Medium cutting		▪ Special chip breaker geometry designed for various cutting conditions
	C25 	Roughing		▪ Strong cutting edge produces excellent cutting performance in interrupted cutting and cast iron machining



KORLOY

NC6315 : K15 GRADE

New CVD Turning Grade
For Cast Iron

Cast Iron application areas

-. Brake disk (FC_Grey Cast Iron)
-. Differential case (FCD, Ductile Cast Iron)
-. Knuckle and others (FCD, Ductile Cast Iron)

Competitor's

Company	MMC	TUNGALOY	GESAC
Geometry			
Grade	UC5115	T5115	GK5115

Weak points of NC6215

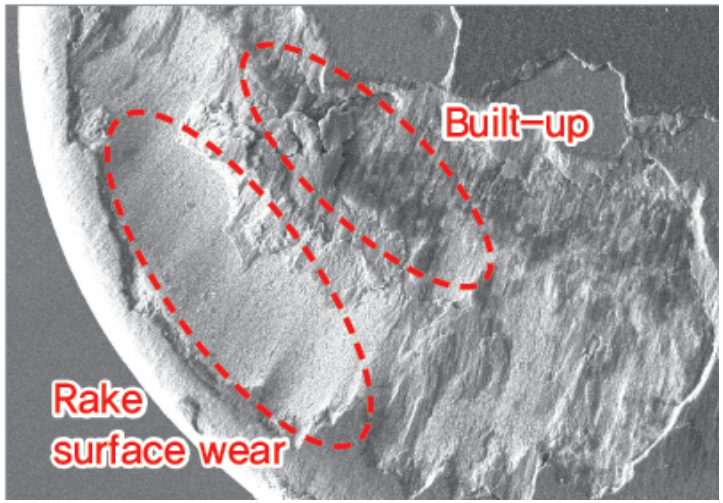
-. Adhesion property of the Alumina layer is weak.
-> Peeling phenomenon
(Tool life is low in case of FCD material in case of heavy interrupted cutting)
- Low wear resistance during high speed machining

Development background of NC6315

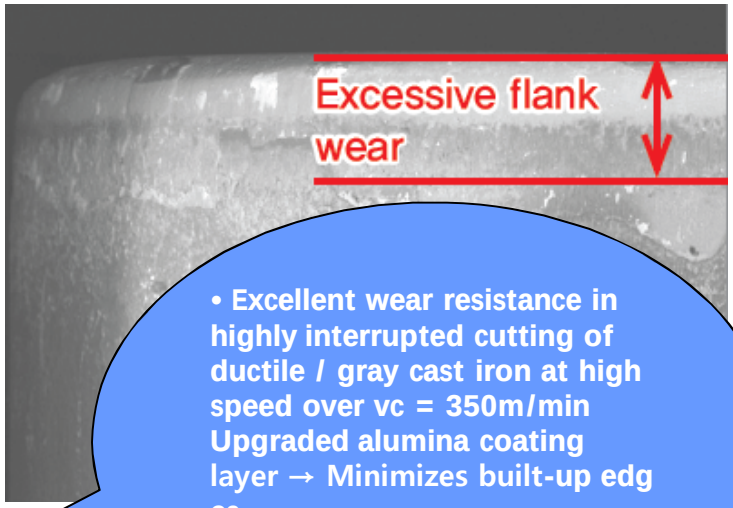
-. Improved toughness, chipping resistance from 80->100%, price remains the same

*. Disadvantage of the current tool

Crater wear



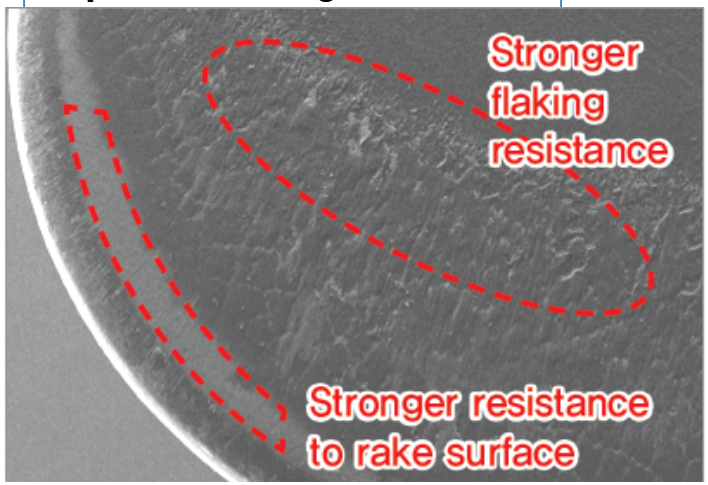
Flank wear



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

*. Improvement after development

Improved falking resistance



CB FOR NEGATIVE INSERT

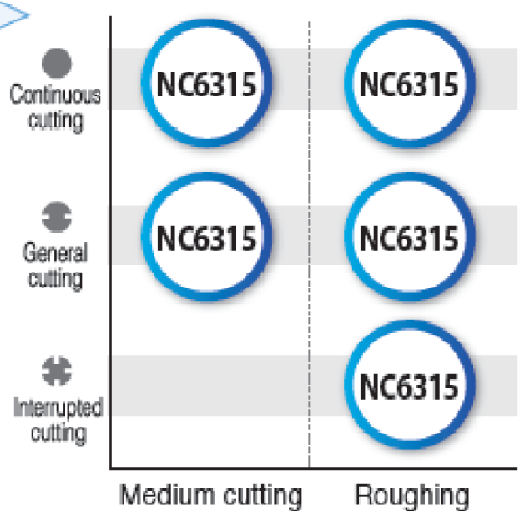
- Minimize insert deviation quality -> Ensure stable life
- Optimization of cutting edge -> Improvement of machining roughness and quality of workpiece
- Excellent kind of grade and chip breaker → Maximizing processability and tool life
- Applicable for various cast iron parts processing → Increase versatility for changing work material

CB FOR POSITIVE INSERT

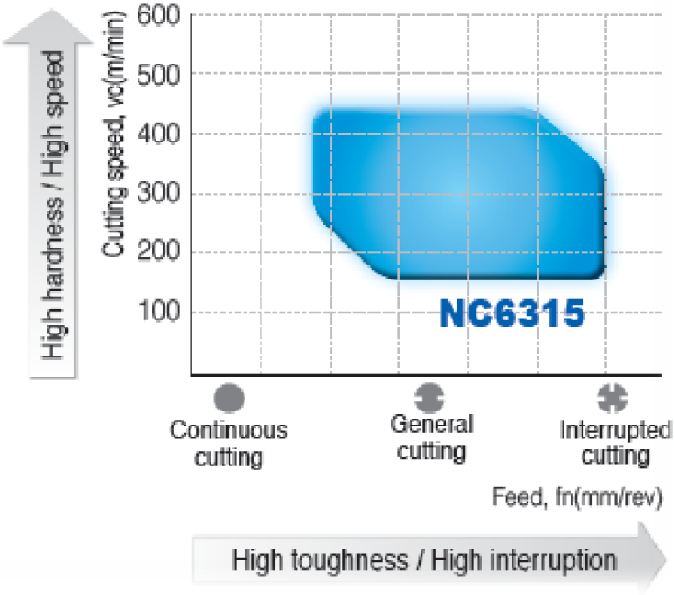
MP	Medium Cutting to Finishing
C25	Roughing

- NC6315 : The first recommended grade for general cutting

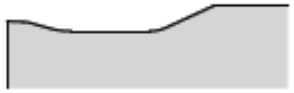
Application Range



Recommended Cutting Range



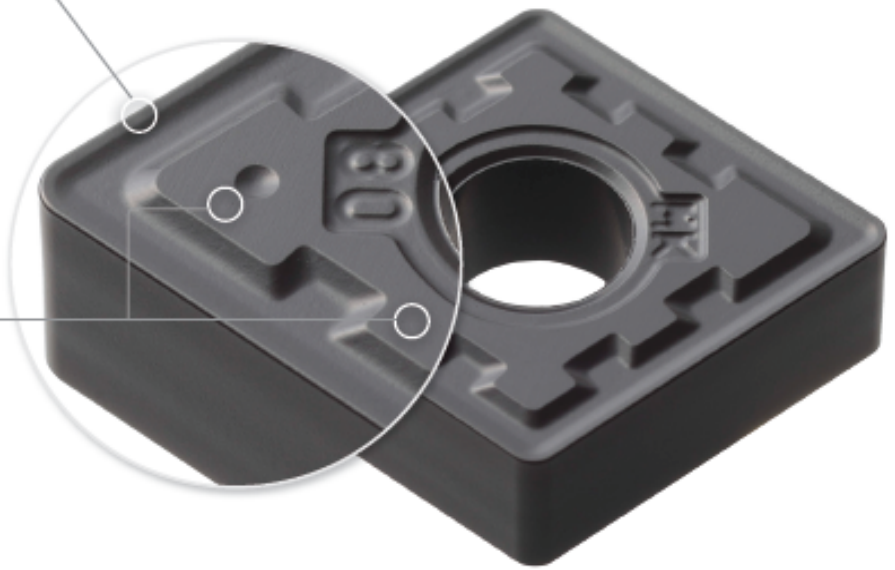
Angle land



- Sharper cutting performance thanks to applied angle lands
- Maximized wear resistance in continuous cutting
- High quality results in surface finish

Wide supporting area

- Higher clamping stability
- Prevents chipping at vibrations during operation



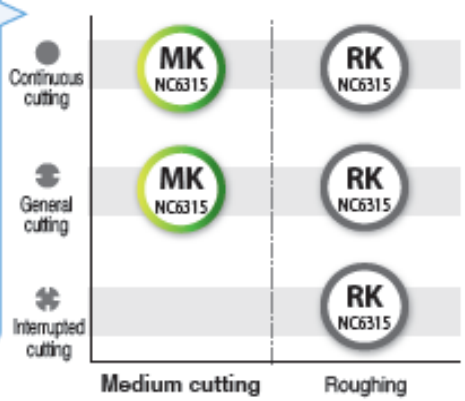
[Code system of chip breakers]

M K

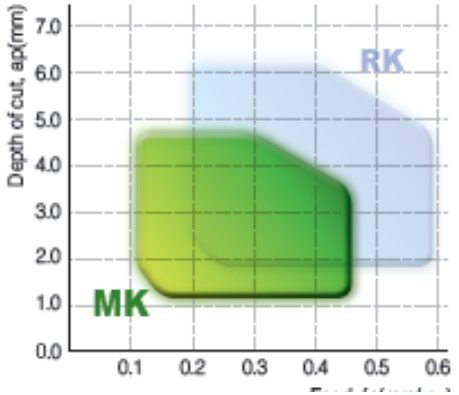
[Workpiece material]
- P: Steel
- M: Stainless steel
- **K : Cast iron**

[Application range]
- **M: Medium**
- R: Roughing

Application Range



Recommended Cutting Range



APPLICATION AREAS

1. Brake disk

2. Diff. case

3. Knuckle