

MK / RK Chip Breaker



Turning Solution for Cast Iron

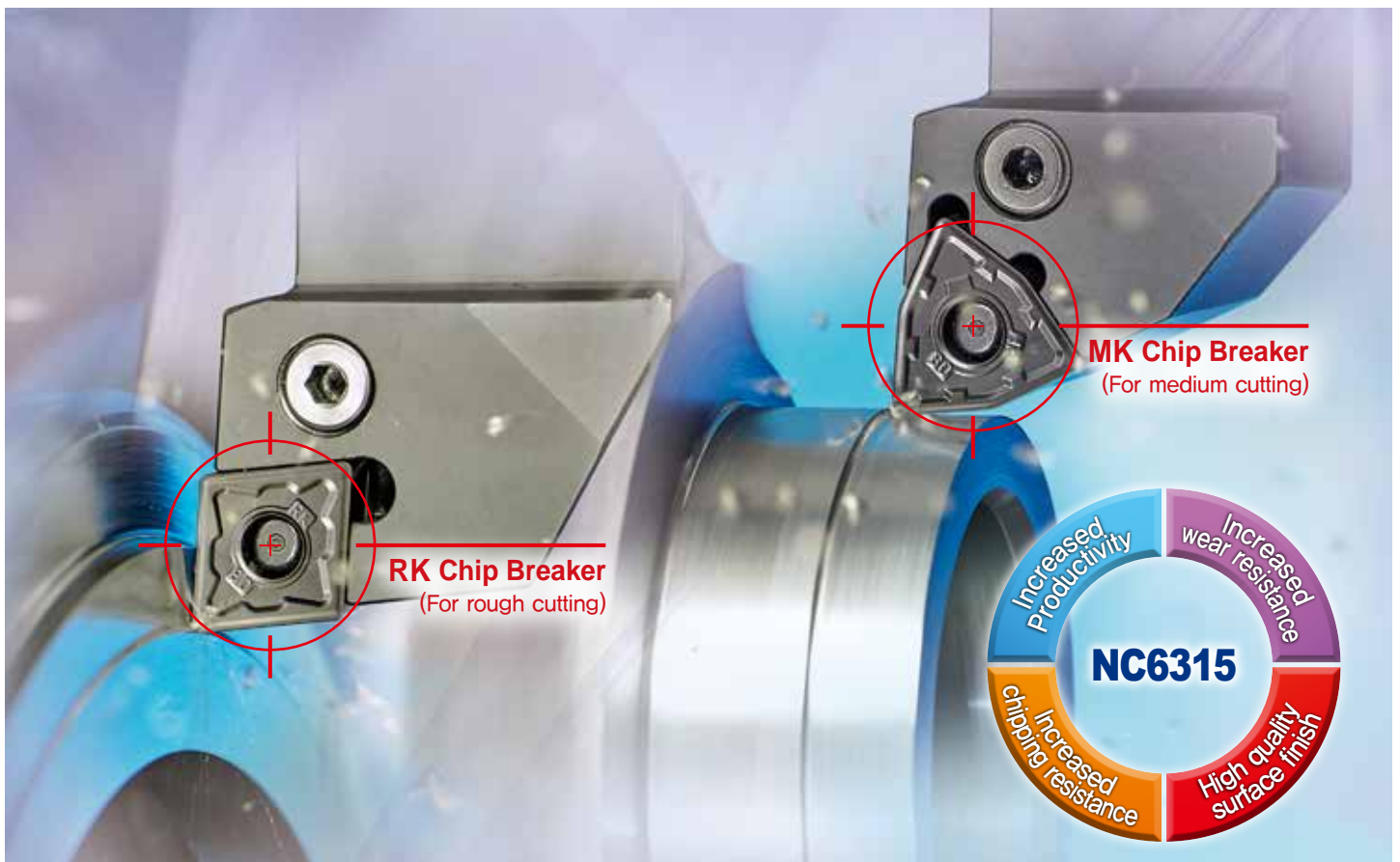
Advanced turning solution for cast iron under high speed, high feed, and interrupted cutting conditions

- **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



NC6315

For ductile cast iron and gray cast iron components for automobiles and machinery **CVD Coated Grade for High Efficiency and Quality Turning Application of Cast Iron**



MK Chip Breaker

For medium cutting



RK Chip Breaker

For rough cutting

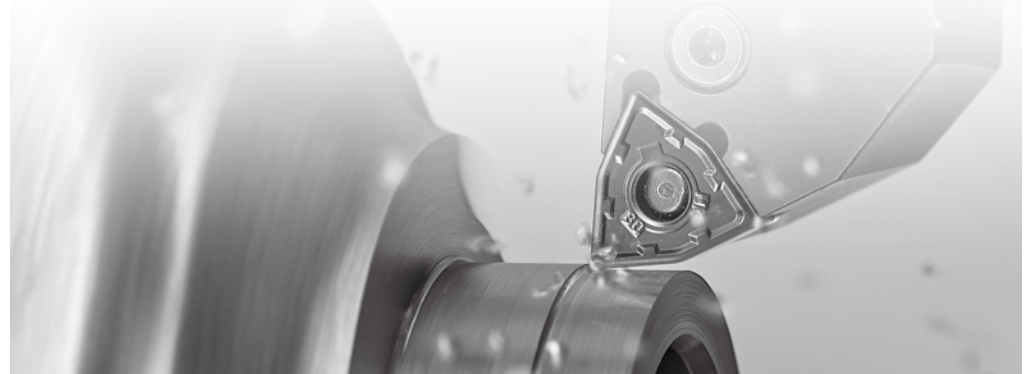
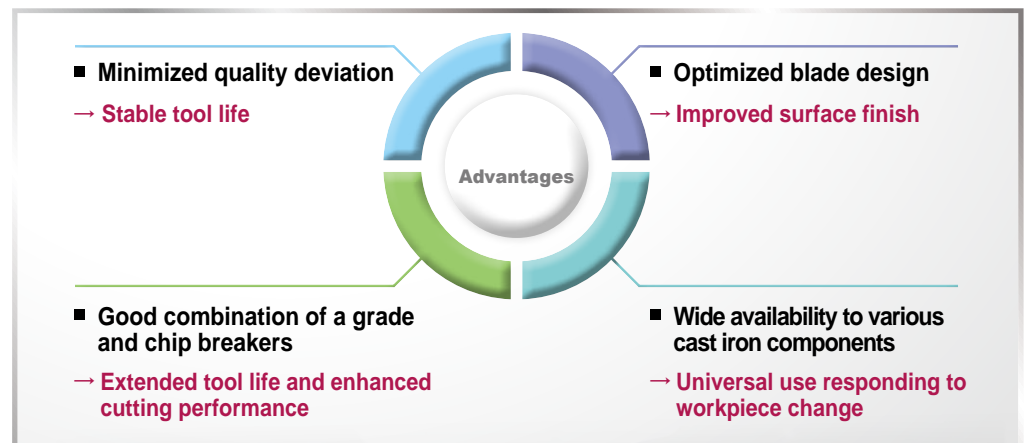
Cast iron refers to ferrous metal that contains more than 2% of carbon and can be sorted into ductile cast iron and gray cast iron. Ductile cast iron is commonly used in automobile and machinery components which require high resistance to heat and corrosion. Ductile cast iron is known for damage on cutting edge due to chipping on the rake and flank surface of an insert, or welding, more frequently than gray cast iron, it's spheroidal carbide contains silicon(Si) and magnesium(Mg) easily causing built-up edges between the tool and chips. Moreover it is prone to age hardening, the hardness of a cast iron workpiece increases at room temperature, or unstable tool life according to seasons. In contrast, gray cast iron is an acicular carbide readily cutting chips and causing less built-up edges than ductile cast iron.

NC6315 is a K15 grade with largely enhanced resistance to chipping and wear in high feed and highly interrupted machining of ductile cast iron and gray cast iron. It secures stable anti-fracture capability even with highly interrupted cast iron materials and with severe vibrations, making good use of the combination of a universal grade and new CVD coated layers.

MK chip breaker improves cutting performance and reduces cutting load during cast iron machining, leading to higher wear resistance and quality surface finish at high speed and continuous cutting. A wide supporting area was designed for solving unexpected tool breakage and edge chipping due to vibrations during machining, improving stability.

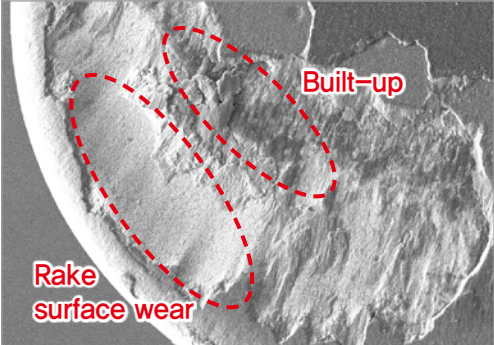
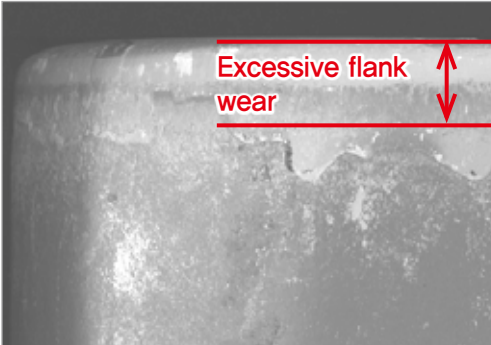
RK chip breaker features wide lands and supporting area that provide excellent toughness and fracture resistance under high cutting force such as high depth of cuts or high interruption. Its land was engineered to optimize edge toughness and cutting performance, and achieve stable tool life and higher chipping resistance for high feed applications.

The combination of MK / RK chip breakers and NC6315 answers your needs for higher productivity and high quality results.



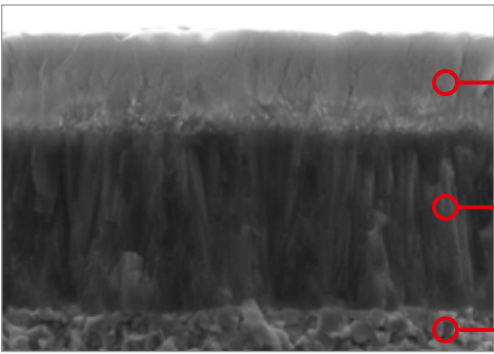
NC6315 CVD Coated Grade

Common Problems When Machining Cast Iron

1. Rake surface wear and built-up edge	2. Excessive flank wear
 <p>Rake surface wear</p> <p>Built-up</p>	 <p>Excessive flank wear</p>

Development of the NC6315

New coating layers

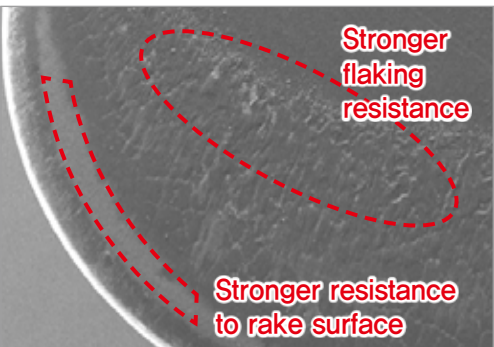



- ① An alumina layer with better surface finish and increased resistance to wear and welding
- ② A titanium layer with stronger anti-fracture
- ③ A functional substrate with optimized combination of hardness and toughness

Optimized CVD coated layers → Extended cutting life and exceptional performance → **Higher productivity**

Development Effect

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

1. Improved resistance to wear and flaking	2. Enhanced wear resistance
 <p>Stronger flaking resistance</p> <p>Stronger resistance to rake surface</p>	 <p>Normal wear on the flank</p>

NC6315

MK Chip Breaker (for medium cutting) **K**

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

⇒ MK Chip Breaker Features

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

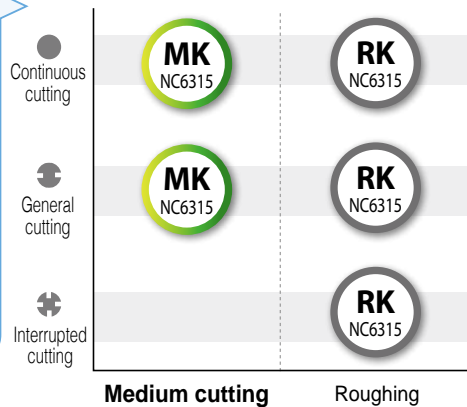
[Workpiece material]

- P: Steel
- M: Stainless steel
- **K : Cast iron**

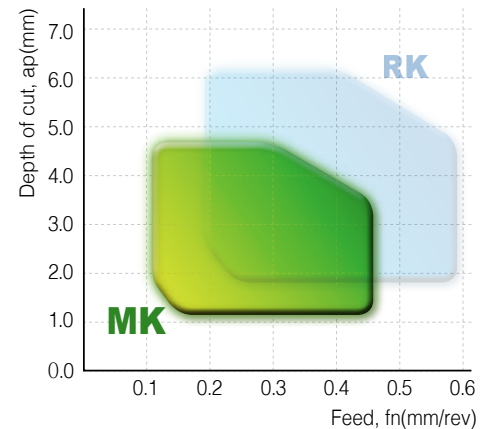
[Application range]

- **M: Medium**
- R: Roughing

⇒ Application Range



⇒ Recommended Cutting Range



⇒ Recommended Cutting Conditions

Application	Chip breaker	Recommended Cutting Conditions					
		Depth of cut, a_p (mm)			Feed, f_n (mm/rev)		
		Min.	Recommended	Max.	Min.	Recommended	Max.
For medium cutting	MK	1	2.5	5	0.1	0.25	0.5

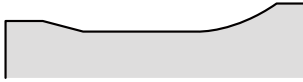
RK Chip Breaker (for roughing)



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

⇒ RK Chip Breaker Features

Flat land



- Upgraded toughness and chipping resistance thanks to flat lands applied
- Stable machining availability under high cutting loads at high depth of cuts or interrupted cutting
- Optimized land width for high feed machining

Wide supporting area

- Higher clamping stability
- Prevents chipping at vibrations during operation



[Code system of chip breakers]

R K

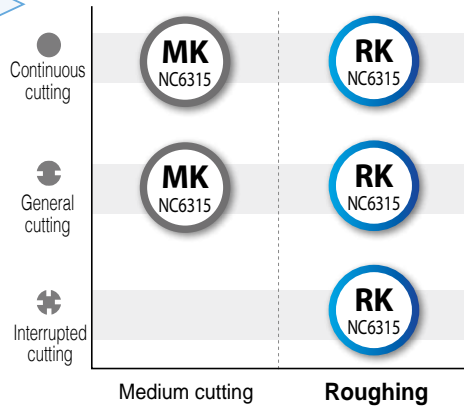
[Workpiece material]

- P: Steel
- M: Stainless steel
- **K : Cast iron**

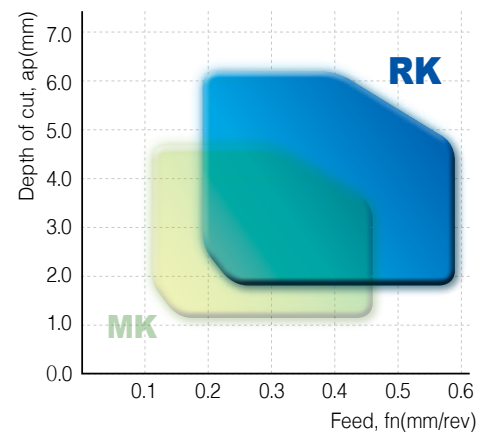
[Application range]

- **M: Medium**
- **R: Roughing**

⇒ Application Range



⇒ Recommended Cutting Range



⇒ Recommended Cutting Conditions

Application	Chip breaker	Recommended Cutting Conditions					
		Depth of cut, a_p (mm)			Feed, f_n (mm/rev)		
		Min.	Recommended	Max.	Min.	Recommended	Max.
For roughing	RK	1.5	3	6	0.2	0.3	0.6

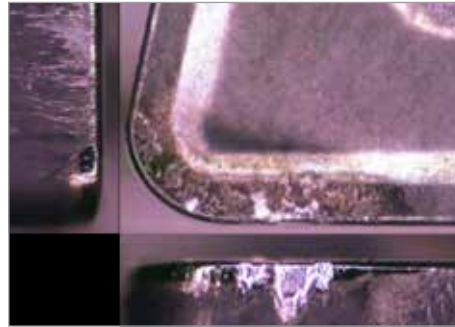
⇒ Cutting Performance



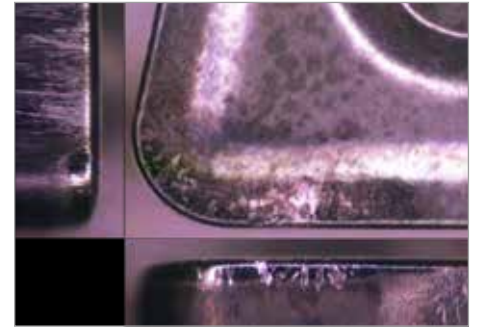
- Built-up edges easily occur when machining ductile cast iron in high interruption
→ Vulnerable to flaking of rake surface coatings
- An alumina coating applied to improve resistance to wear and welding
→ Exceptional chipping resistance
- A functional substrate with optimized combination of hardness and toughness
→ Augmented tool life stability and wear resistance

Impact resistance test

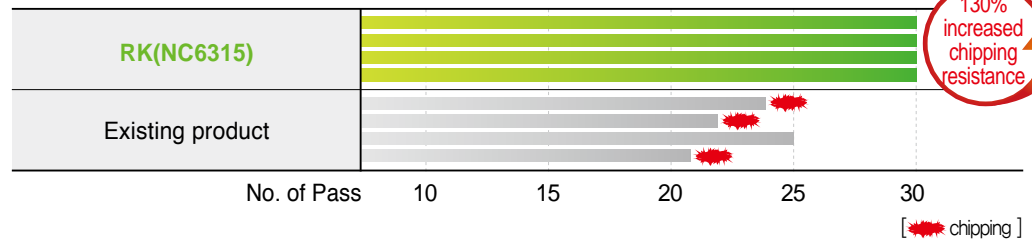
- **Workpiece** 500-7(ISO), Ø90 (Triangular tube) → Ø30 machining
- **Cutting conditions** $vc(m/min) = 380$, $fn(mm/rev) = 0.35$, $ap(mm) = 2$, wet
- **Cutting time** 15 passes with results of normal rake surface wear and good chipping resistance
- **Tools** **Insert** CNMG120408-RK (NC6315) **Holder**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



[Existing Product]



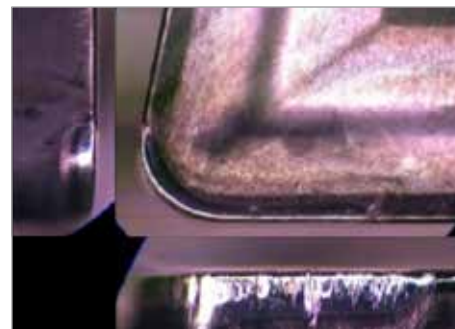
[RK(NC6315)]



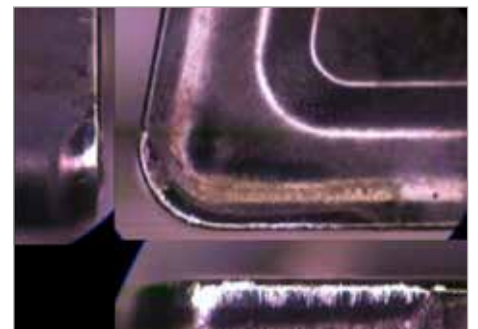
- Flank wear, edge peeling by chips and fine chipping occur in continuous cutting of ductile cast iron
- MK chip breaker with angle lands applied
→ Reduces cutting load and built-up edge
- Coating layers with exceptional welding resistance
→ Reduced edge peeling and fine chipping

Wear resistance test

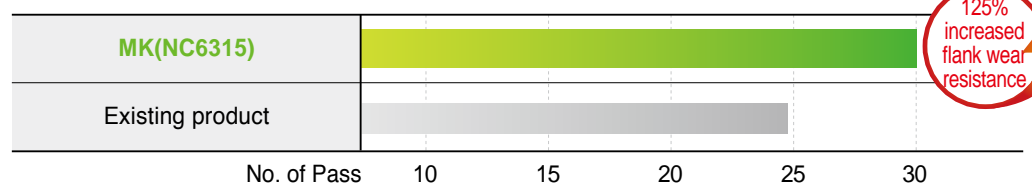
- **Workpiece** 500-7(ISO), Ø90 (Spherical tube) → Ø30 machining
- **Cutting conditions** $vc(m/min) = 400$, $fn(mm/rev) = 0.35$, $ap(mm) = 2.5$, wet
- **Cutting time** 30 passes with results of normal wear on rake / flank surface
- **Tools** **Insert** CNMG120408-MK (NC6315) **Holder** DCLNR2525-M12



[Existing Product]

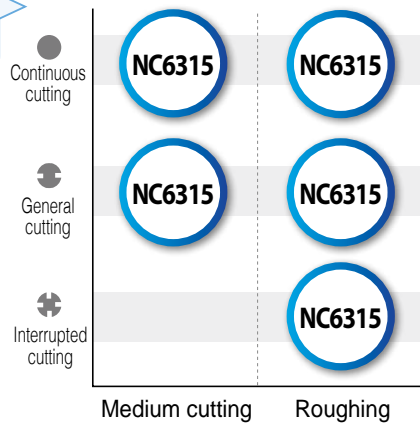


[MK(NC6315)]

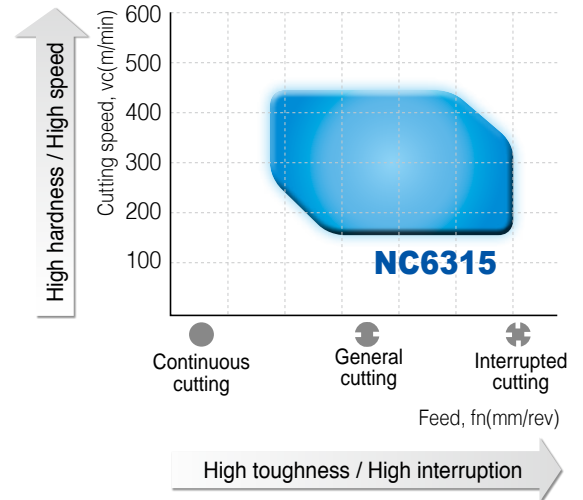


• NC6315 : The first recommended grade for general cutting

Application Range



Recommended Cutting Range



Grade Comparison

ISO	KORLOY	Competitor A	Competitor B	Competitor C	Competitor D	Competitor E	Competitor F	Competitor G
K15	NC6315	TT7015	GC3225	CA4515 CA315	UC5115 MC5015	TK2001	WKK20S	AC415K

Comparison of Turning Chip Breakers for Cast Iron (Negative Type)

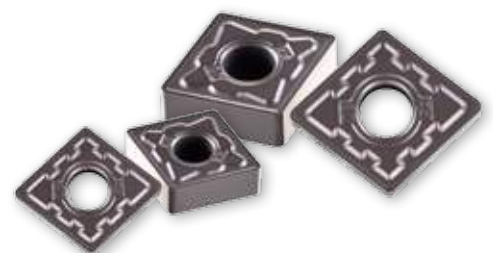
• MK : The first recommended chip breaker for general cutting

• RK : A chip breaker for high feed and highly interrupted cutting

Application	KORLOY	Competitor A	Competitor B	Competitor C	Competitor D	Competitor E	Competitor F	Competitor G
Medium cutting to finishing	MK	MT	KM, KF	KG, KQ	MK, LK	M5	NM5	UZ
Roughing cutting	RK	RT, KT	KR	KH	RK	MR7	-MA	GZ

Comparison of Turning Chip Breakers for Cast Iron (Positive Type)

Application	KORLOY	Competitor A	Competitor B	Competitor C	Competitor D	Competitor E	Competitor F	Competitor G
Medium cutting to finishing	MP	MT	KM	GK, HQ	MK	F2	PM5	MU
Roughing cutting	C25	-	KR	All round	-MW	-	-MW	-MW



➔ Recommended Cutting Conditions

- This table refers to recommended cutting conditions for maximizing tool life and productivity in medium and/or rough cutting with NC6315(K15).
- It is advised to utilize this information depending on your working environment.

	Workpiece (ISO)	Tensile strength (N/mm ²)	Hardness (HB)	Recommended cutting speed, vc(m/min)		
				Min.	Recommended	Max.
GCD (Ductile cast iron)	350-22	≥ 370	≤ 179	170	340	390
	400-15	≥ 400	≤ 201	160	325	370
	450-10	≥ 450	143~217	150	315	360
	500-7	≥ 500	170~241	150	305	340
	600-3	≥ 600	192~269	150	295	320
	700-2	≥ 700	229~302	150	290	310
	800-2	≥ 800	248~352	150	285	300
GC (Gray cast iron)	100	≥ 100	≤ 201	180	395	450
	150	≥ 186	≤ 241	180	370	400
		≥ 167	≤ 223	180	375	410
		≥ 150	≤ 212	180	380	420
		≥ 127	≤ 201	180	385	430
	200	≥ 235	≤ 255	160	345	370
		≥ 216	≤ 235	160	350	380
		≥ 200	≤ 223	160	355	390
		≥ 167	≤ 217	160	360	400
	250	≥ 275	≤ 269	150	340	370
		≥ 255	≤ 248	150	343	375
		≥ 250	≤ 241	150	345	380
		≥ 216	≤ 229	150	350	390
	300	≥ 304	≤ 269	150	330	350
		≥ 300	≤ 262	150	335	360
		≥ 260	≤ 248	150	340	370
	350	≥ 361	≤ 285	150	315	320
		≥ 350	≤ 277	150	325	340
		≥ 314	≤ 269	150	330	350

Application	Chip breaker	Recommended Cutting Conditions					
		Depth of cut, ap(mm)			Feed, fn(mm/rev)		
		Min.	Recommended	Max.	Min.	Recommended	Max.
For medium cutting	MK	1	2.5	5	0.1	0.25	0.5
For roughing	RK	1.5	3	6	0.2	0.3	0.6

⇒ Application Examples



Brake disk

- **Workpiece** Gray cast iron (250)
- **Cutting conditions** $vc(m/min) = 550$, $n(rpm) = 547$, $fn(mm/rev) = 0.3$, $ap(mm) = 3$, wet
- **Tools**
 - Insert** CNMG120412-RK (NC6315)
 - Holder** DCLNR2525

RK(NC6315) 30ea/edge
 Competitor 24ea/edge

25%
more

➔ 25% longer tool life compared to the competitor



Diff. case mission

- **Workpiece** Ductile cast iron (500-7)
- **Cutting conditions** $vc(m/min) = 250$, $n(rpm) = 800$, $fn(mm/rev) = 0.25$, $ap(mm) = 1.5$, wet
- **Tools**
 - Insert** CNMG120408-MK (NC6315)
 - Holder** DCLNR2525

MK(NC6315) 100ea/edge
 Competitor 70ea/edge

30%
more

➔ 30% longer tool life compared to the competitor



Fly wheel

- **Workpiece** Ductile cast iron (500-7)
- **Cutting conditions** $vc(m/min) = 400$, $n(rpm) = 398$, $fn(mm/rev) = 0.3$, $ap(mm) = 2$, wet
- **Tools**
 - Insert** CNMA120408 (NC6315)
 - Holder** DCLNR2525

NC6315 35ea/edge
 Competitor 30ea/edge

16%
more

➔ 16% longer tool life compared to the competitor



Knuckle

- **Workpiece** Ductile cast iron (500-7)
- **Cutting conditions** $vc(m/min) = 200$, $n(rpm) = 1100$, $fn(mm/rev) = 0.25$, $ap(mm) = 2$, wet
- **Tools**
 - Insert** DNMG150608-MK (NC6315)
 - Holder** DDJLNR2525

MK(NC6315) 110ea/edge
 Competitor 90ea/edge

22%
more

➔ 22% longer tool life compared to the competitor

NC6315

Available Stock [Negative]

(mm)

Type	Designation		Coated	Dimensions (mm)					Cutting conditions		Figure
			NC6315	l	d	t	r	d ₁	Depth of cut, a _p (mm)	Feed, f _n (mm/rev)	
C type	CNMG	120404-MK	●	12.4	12.7	4.76	0.4	5.16	0.9~4.0	0.05~0.30	
		120408-MK	●	12.0	12.7	4.76	0.8	5.16	1.0~5.0	0.10~0.50	
		120412-MK	●	11.6	12.7	4.76	1.2	5.16	1.3~5.0	0.13~0.60	
		120408-RK	●	12.0	12.7	4.76	0.8	5.16	1.5~6.0	0.20~0.50	
		120412-RK	●	11.6	12.7	4.76	1.2	5.16	1.8~6.0	0.28~0.53	
		120416-RK	●	11.3	12.7	4.76	1.6	5.16	2.0~6.0	0.28~0.63	
	CNMA	120408	●	12.0	12.7	4.76	0.8	5.16	1.0~6.0	0.15~0.60	
		120412	●	11.6	12.7	4.76	1.2	5.16	1.5~6.0	0.15~0.70	
		120416	●	11.3	12.7	4.76	1.6	5.16	1.5~6.0	0.20~0.70	
D type	DNMG	150604-MK	●	15.1	12.7	6.35	0.4	5.16	0.9~5.0	0.05~0.30	
		150608-MK	●	14.7	12.7	6.35	0.8	5.16	1.0~5.0	0.10~0.50	
		150612-MK	●	14.4	12.7	6.35	1.2	5.16	1.3~5.0	0.13~0.60	
		150608-RK	●	14.7	12.7	6.35	0.8	5.16	1.5~6.0	0.23~0.53	
		150612-RK	●	14.4	12.7	6.35	1.2	5.16	1.8~6.0	0.28~0.53	
	DNMA	150608	●	14.7	12.7	6.35	0.8	5.16	0.8~4.0	0.28~0.55	
		150612	●	14.4	12.7	6.35	1.2	5.16	1.2~4.0	0.25~0.65	
S type	SNMG	120408-MK	●	11.9	12.7	4.76	0.8	5.16	1.0~5.0	0.10~0.50	
		120412-MK	●	11.5	12.7	4.76	1.2	5.16	1.3~5.0	0.13~0.60	
		120408-RK	●	11.9	12.7	4.76	0.8	5.16	1.5~6.0	0.23~0.53	
		120412-RK	●	11.5	12.7	4.76	1.2	5.16	1.8~6.0	0.28~0.53	
		120416-RK	●	11.1	12.7	4.76	1.6	5.16	2.0~6.0	0.28~0.53	
	SNMA	120408	●	11.9	12.7	4.76	0.8	5.16	1.0~6.0	0.15~0.70	
		120412	●	11.5	12.7	4.76	1.2	5.16	1.5~6.0	0.20~0.80	
		120416	●	11.1	12.7	4.76	1.6	5.16	1.8~6.0	0.23~0.80	
	T type	TNMG	160404-MK	●	15.5	9.525	4.76	0.4	3.81	0.9~3.5	
160408-MK			●	14.5	9.525	4.76	0.8	3.81	1.0~4.0	0.10~0.50	
160412-MK			●	13.5	9.525	4.76	1.2	3.81	1.2~4.5	0.12~0.60	
160408-RK			●	14.5	9.525	4.76	0.8	3.81	1.5~5.0	0.23~0.53	
160412-RK			●	13.5	9.525	4.76	1.2	3.81	1.8~5.0	0.28~0.53	
160416-RK			●	12.6	9.525	4.76	1.6	3.81	1.8~5.0	0.28~0.53	
220408-RK			●	20.0	12.7	4.76	0.8	5.16	1.5~6.0	0.23~0.53	
220412-RK			●	19.0	12.7	4.76	1.2	5.16	1.8~6.0	0.28~0.53	
220416-RK			●	18.1	12.7	4.76	1.6	5.16	2.0~6.0	0.28~0.63	
TNMA		160408	●	14.5	9.525	4.76	0.8	3.81	1.0~4.0	0.10~0.40	
		160412	●	13.5	9.525	4.76	1.2	3.81	1.5~4.5	0.10~0.50	
		160416	●	12.6	9.525	4.76	1.6	3.81	1.5~4.5	0.15~0.55	
		220408	●	20.0	12.7	4.76	0.8	5.16	1.5~5.0	0.15~0.40	
		220412	●	19.0	12.7	4.76	1.2	5.16	1.5~5.0	0.20~0.50	
		220416	●	18.1	12.7	4.76	1.6	5.16	1.5~5.0	0.25~0.55	
V type	VNMG	160404-MK	●	15.6	9.525	4.76	0.4	3.81	0.5~3.0	0.08~0.45	
		160408-MK	●	14.6	9.525	4.76	0.8	3.81	1.0~3.5	0.10~0.50	
		160412-MK	●	13.1	9.525	4.76	1.2	3.81	1.5~4.0	0.20~0.50	

● : Managed stock

➔ Available Stock [Negative]

(mm)

Type	Designation		Coated	Dimensions (mm)					Cutting conditions		Figure
			NC6315	l	d	t	r	d ₁	Depth of cut, ap(mm)	Feed, fn(mm/rev)	
W type	WNMG	080404-MK	●	8.4	12.7	4.76	0.4	5.16	1.0~3.0	0.10~0.45	
		080408-MK	●	8.3	12.7	4.76	0.8	5.16	1.0~3.5	0.10~0.50	
		080412-MK	●	8.2	12.7	4.76	1.2	5.16	1.0~5.0	0.10~0.50	
		080408-RK	●	8.3	12.7	4.76	0.8	5.16	1.5~6.0	0.23~0.53	
		080412-RK	●	8.2	12.7	4.76	1.2	5.16	1.8~6.0	0.28~0.53	
		080416-RK	●	7.9	12.7	4.76	1.6	5.16	2.0~6.0	0.25~0.60	
	WNMA	080404	●	8.4	12.7	4.76	0.4	5.16	1.0~5.0	0.15~0.60	
		080408	●	8.3	12.7	4.76	0.8	5.16	1.0~6.0	0.15~0.60	
		080412	●	8.2	12.7	4.76	1.2	5.16	1.5~6.0	0.15~0.70	

➔ Available Stock [Positive]

(mm)

Type	Designation		Coated	Dimensions (mm)					Cutting conditions		Figure
			NC6315	l	d	t	r	d ₁	Depth of cut, ap(mm)	Feed, fn(mm/rev)	
C type	CCMT	060204-MP	●	6.0	6.35	2.38	0.4	2.8	0.3~1.5	0.05~0.15	
		060208-MP	●	5.8	6.35	2.38	0.8	2.8	0.5~2.0	0.08~0.20	
		09T304-MP	●	9.2	9.525	3.97	0.4	4.4	0.3~3.0	0.08~0.23	
		09T308-MP	●	8.8	9.525	3.97	0.8	4.4	0.5~3.0	0.10~0.30	
		120404-MP	●	12.5	12.7	4.76	0.4	5.5	0.6~3.5	0.10~0.32	
		120408-MP	●	12.1	12.7	4.76	0.8	5.5	1.2~3.5	0.12~0.36	
		060204-C25	●	6.0	6.35	2.38	0.4	2.8	0.4~2.0	0.03~0.12	
		09T304-C25	●	9.2	9.525	3.97	0.4	4.4	0.8~3.0	0.08~0.25	
		09T308-C25	●	8.8	9.525	3.97	0.8	4.4	1.0~3.0	0.10~0.30	
		120404-C25	●	12.5	12.7	4.76	0.4	5.5	0.8~3.0	0.10~0.32	
		120408-C25	●	12.1	12.7	4.76	0.8	5.5	1.2~3.5	0.12~0.36	
D type	DCMT	11T304-MP	●	11.2	9.525	3.97	0.4	4.4	0.5~2.3	0.08~0.20	
		11T308-MP	●	10.8	9.525	3.97	0.8	4.4	0.5~2.3	0.10~0.30	
		11T304-C25	●	11.2	9.525	3.97	0.4	4.4	0.8~3.0	0.08~0.30	
		11T308-C25	●	10.8	9.525	3.97	0.8	4.4	1.0~3.0	0.10~0.30	
S type	SCMT	09T304-MP	●	9.1	9.525	4.4	0.4	4.4	0.3~2.8	0.05~0.25	
		09T308-MP	●	8.7	9.525	4.4	0.8	4.4	0.5~2.8	0.10~0.30	
		120408-MP	●	11.9	12.7	5.5	0.8	5.5	0.8~3.5	0.15~0.35	
		09T304-C25	●	9.1	9.525	4.4	0.4	4.4	0.6~3.0	0.08~0.25	
		09T308-C25	●	8.7	9.525	4.4	0.8	4.4	1.0~3.0	0.10~0.30	
T type	TCMT	16T304-MP	●	15.5	9.523	3.97	0.4	4.4	0.3~2.5	0.08~0.20	
		16T308-MP	●	14.5	9.523	3.97	0.8	4.4	0.5~2.5	0.10~0.30	
		16T304-C25	●	15.5	9.523	3.97	0.4	4.4	0.8~3.0	0.08~0.28	
		16T308-C25	●	14.5	9.523	3.97	0.8	4.4	1.0~3.0	0.10~0.30	
		160404-MP	●	15.6	9.525	4.76	0.4	4.4	0.3~2.0	0.08~0.20	
V type	VCMT	160408-MP	●	14.6	9.525	4.76	0.8	4.4	0.5~2.3	0.10~0.25	

● : Managed stock

www.korloy.com



Holystar B/D, 1350, Nambusunhwan-ro, Geumcheon-gu, Seoul, 08536, Korea
Tel : +82-2-522-3181 Fax : +82-2-522-3184, +82-2-3474-4744 Web : www.korloy.com E-mail : export@korloy.com

 **KORLOY AMERICA**

620 Maple Avenue, Torrance, CA 90503, USA
Tel : +1-310-782-3800 Toll Free : +1-888-711-0001 Fax : +1-310-782-3885
www.korloyamerica.com E-mail : sales@korloy.us

 **KORLOY EUROPE**

Gablonzer Str. 25-27, 61440 Oberursel, Germany
Tel : +49-6171-277-83-0 Fax : +49-6171-277-83-59
www.korloyeurope.com E-mail : sales@korloyeurope.com

 **KORLOY INDIA**

Plot NO.415, Sector 8, IMT Manesar, Gurgaon 122051, Haryana, INDIA
Tel : +91-124-4391790 Fax : +91-124-4050032
www.korloyindia.com E-mail : sales.kip@korloy.com

 **KORLOY BRASIL**

Av. Aruana 280, conj.12, WLC, Alphaville, Barueri,
CEP06460-010, SP, Brasil
Tel : +55-11-4193-3810 E-mail : vendas@korloy.com