H chipbreaker series

Excellent chip control when machining hardened material

3 chipbreaker for a wide range of machining applications

KBN05M insert grade with superior oxidation resistance and wear resistance

Small D.O.C.

For hardened steel finishing

HH chipbreaker
55 HRC or more
1st recommendation

HL chipbreaker
55 HRC or less

Large D.O.C.

For removing the carburized layer

HD chipbreaker

CBN inserts for machining hardened material

H chipbreaker series

Excellent chip control when machining hardened material. 3 Chipbreaker for a wide range of applications.

1 Excellent chip control

Excellent chip control and low cutting force with edge preparation and sharp cutting performance.

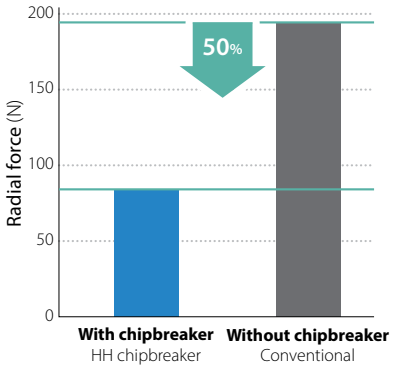
Chip control comparison (Internal evaluation)

With chipbreaker
HH chipbreaker

Without chipbreaker
Conventional

Cutting conditions: Vc = 150 m/min, ap = 0.2 mm,
f = 0.15 mm/rev, 60 HRC, wet, CN**120408 type, after 21 min, workpiece: 15CrMo4

Cutting force comparison (Internal evaluation)



Cutting conditions: Vc = 150 m/min, ap = 0.2 mm,
f = 0.15 mm/rev, wet, CN**120408 type
workpiece: 15CrMo4, 60 HRC

2 3 chipbreaker for a wide range of machining applications

Various applications and cutting conditions are possible with 3 unique chipbreaker designs

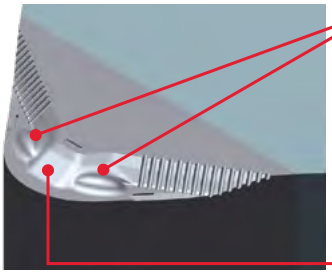
Chipbreaker	Application	Recommended cutting range
HH (1st recommendation) 	Hardened steel finishing 55HRC or more	Small D.O.C. ap = 0.1 ~ 0.3 mm
HL 	Hardened steel finishing 55HRC or less	
HD 	Removing the carburized layer From carburized layer to unhardened layer	Large D.O.C. ap = 0.3 ~ 0.7 mm

3 HH/HL chipbreaker for hardened steel finishing

Small D.O.C.
(ap = 0.1 ~ 0.3 mm)

Excellent chip control and Low cutting force when machining hardened material

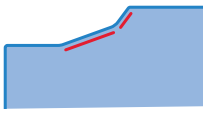
1st recommendation HH chipbreaker (55HRC or more)



Twin dots
Breaks chips into small pieces

Wide bump
Provides stable chip curls

Chipbreaker cross-section

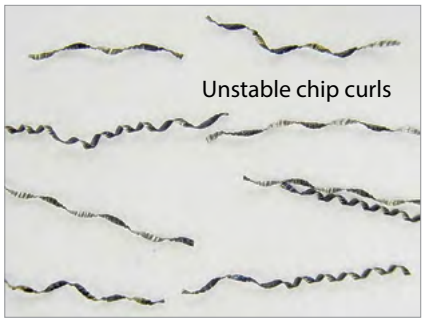


2-step rising face prevents chip clogging

Stable chip control for hardened workpieces which are 55 HRC or more

Chip control comparison (Internal evaluation)

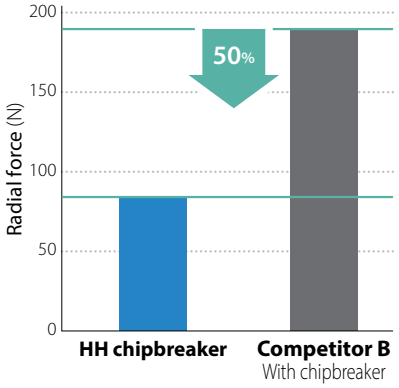
HH chipbreaker



Competitor A
With chipbreaker

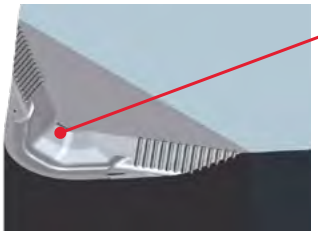
Cutting conditions: Vc = 150 m/min, ap = 0.2 mm, f = 0.20 mm/rev, wet, CN**120408 type
Workpiece: 15CrMo4, 55 HRC

Cutting force comparison (Internal evaluation)



Cutting conditions: Vc = 150 m/min, ap = 0.2 mm,
f = 0.15 mm/rev, wet, CN**120408 type
Workpiece: 15CrMo4, 60 HRC

HL chipbreaker (Workpiece 55 HRC or less)



Wide bump

Chipbreaker cross-section

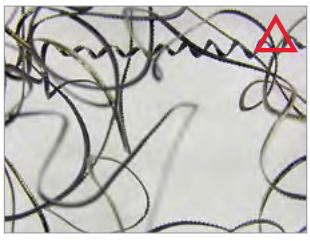
Rake surface

The rake can scoop up and control chips of softer material

Stable chip curls for workpieces which are 55 HRC or less

Chip Control Comparison (Internal Evaluation)

HL chipbreaker



Competitor C (With chipbreaker)

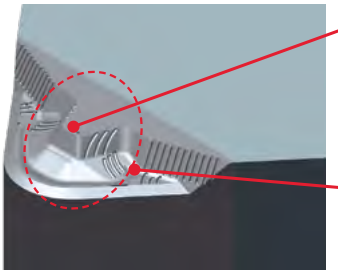
Cutting conditions: Vc = 150 m/min, ap = 0.2 mm, f = 0.20 mm/rev, wet, CN**120408 type workpiece: 15CrMo4, 50 HRC

4 HD chipbreaker for removing the carburized layer

Large D.O.C.
(ap = 0.3 ~ 0.7 mm)

Maintains stable machining during applications with several passes and varied hardness

HD chipbreaker for carburized layer to unhardened layer



Wide bump

Multi-step structure

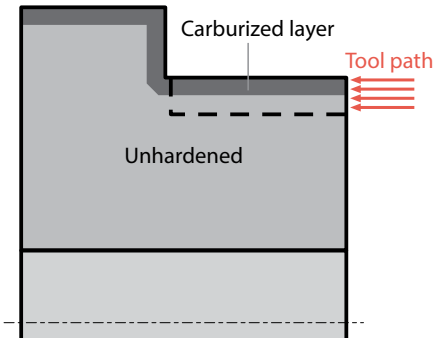
Good for a wide range of conditions

Chipbreaker cross-section

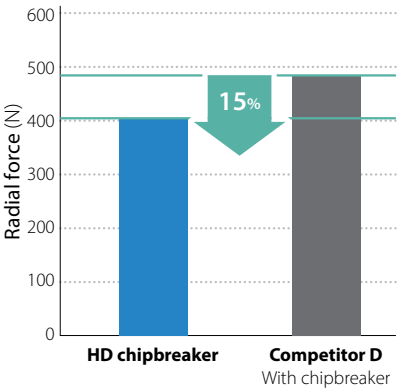
Rake surface

The rake can scoop up and control chips even for unhardened material

Tool path example

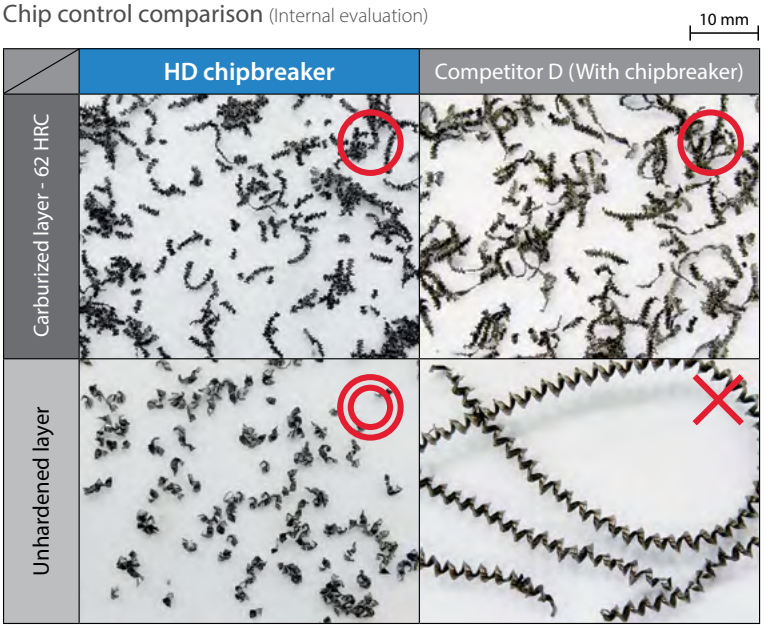


Cutting force in unhardened layer comparison
(Internal evaluation)



Breaks chips into small pieces at different D.O.C. and hardness

Chip control comparison (Internal evaluation)



Cutting conditions: Vc = 150 m/min, ap = 0.5 mm, f = 0.15 mm/rev, wet, CN**120408 type
Workpiece: 15CrMo4

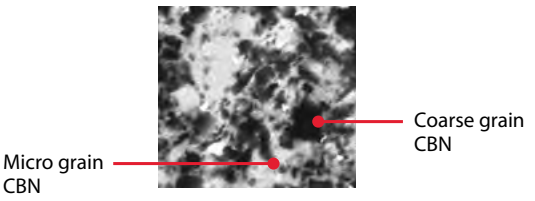
MEGACOAT CBN - KBN05M

Hybrid grain structure for high hardness and high strength
MEGACOAT ensures longer tool life

Combination of a hybrid grain structure and MEGACOAT provides superior oxidation resistance and wear resistance

Hybrid grain structure

Mixed structure of micro grain CBN and coarse grain CBN provides high hardness, toughness and thermal shock resistance characteristics.



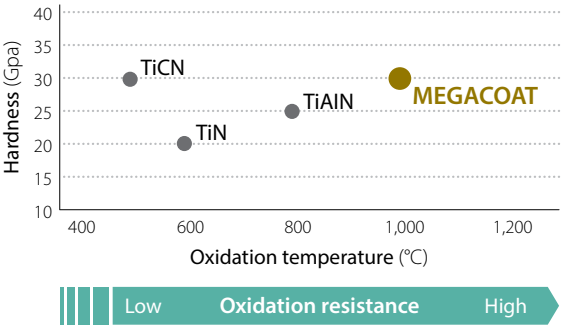
Thermal conductivity

Coarse grain CBN quickly transfers heat

MEGACOAT

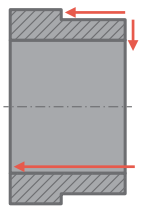
Superior Oxidation Resistance and Wear Resistance

Coating properties



Case Studies

Pinion: Chromium molybdenum Hardened steel (55 ~ 62 HRC)



Vc = 130 m/min
ap = 0.05 mm
f = 0.08 mm/rev
Dry

CNGM120408ME-HH

Tool life

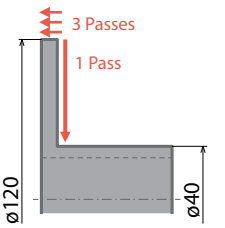
HH chipbreaker	**70** pcs/edge	2.3x
Competitor F Without chipbreaker	**30** pcs/edge	

The HH chipbreaker achieved 2.3 times longer tool life than Competitor F. The molded chipbreaker provided stable chip control.

(User evaluation)

Plate: Chromium steel carburizing treatment

Surface hardness 550 Hv or more



Vc = 160 m/min
ap = 0.5 mm
f = 0.2 mm/rev
Wet

CNGM120408ME-HD

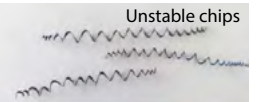
Tool life

HD chipbreaker	**500** pcs/edge	1.3x
Competitor E Without chipbreaker	**400** pcs/edge	

Chip control

HD chipbreaker

Competitor E



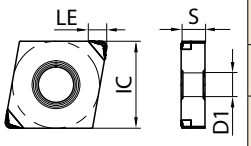
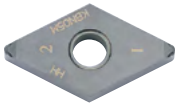
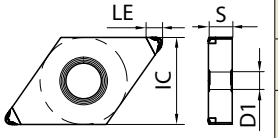
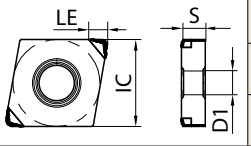
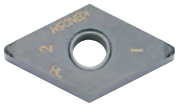
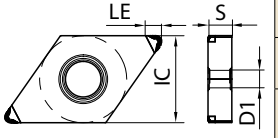
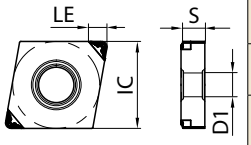
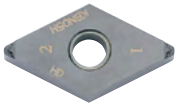
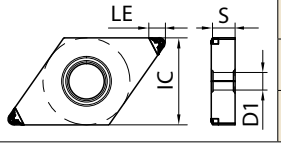
The HD chipbreaker achieved 1.3 times longer tool life than competitor E. Chip control was stable.

(User evaluation)

H chipbreaker series description

Edge preparation	Cutting edge spec.
E	Honed
S01235	0.12 × 35° chamfered and honed

★: 1st recommendation

Shape			Description	Edge preparation	H	Hardened material (Continuous/Interruption)					★
					Dimensions (mm)					No. of cutting edge	MEGACOAT CBN
					IC	S	D1	RE	LE		KBN05M
55HRC~	 Small D.O.C.		CNGM120404ME-HH	E	12.7	4.76	5.16	0.4	2.6	2	●
			CNGM120408ME-HH					0.8	2.6		●
			CNGM120412ME-HH					1.2	2.5		●
	 Small D.O.C.		DNGM150404ME-HH					0.4	2.6		●
			DNGM150408ME-HH					0.8	2.2		●
			DNGM150412ME-HH					1.2	1.9		●
~55HRC	 Small D.O.C.		CNGM120404ME-HL	E	12.7	4.76	5.16	0.4	2.6	2	●
			CNGM120408ME-HL					0.8	2.6		●
			CNGM120412ME-HL					1.2	2.5		●
	 Small D.O.C.		DNGM150404ME-HL					0.4	2.6		●
			DNGM150408ME-HL					0.8	2.2		●
			DNGM150412ME-HL					1.2	1.9		●
Carburized layer to unhardened layer	 Large D.O.C.		CNGM120404ME-HD	S01235	12.7	4.76	5.16	0.4	2.6	2	●
			CNGM120408ME-HD					0.8	2.6		●
			CNGM120412ME-HD					1.2	2.5		●
	 Large D.O.C.		DNGM150404ME-HD					0.4	2.6		●
			DNGM150408ME-HD					0.8	2.2		●
			DNGM150412ME-HD					1.2	1.9		●

●: Availability

Recommended cutting conditions

Chipbreaker	Workpiece	Application	Insert grades	Min. - Recommendation - Max.		
				Vc (m/min)	ap (mm)	f (mm/rev)
HH	Hardened material (55 HRC or more)	Finishing	KBN05M	100-150-200	0.1-0.2-0.3	0.1-0.15-0.25
HL	Hardened material (55 HRC or less)					
HD	Hardened material From carburized layer to unhardened layer	Removing the carburized layer	KBN05M	100-150-200	0.3-0.5-0.7	0.1-0.15-0.25