CBN Inserts for Machining Hardened Material

H Chipbreaker Series

NEW

Unique Molded Chipbreaker Provides Excellent Chip Control when Machining Hardened Material

Excellent Chip Control with Molded Chipbreaker

3 Chipbreaker Styles 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

1st Recommendation

HH Chipbreaker
(55HRC~)

HL Chipbreaker
(~55HRC)

Large D.O.C., for Removing the Carburized Layer

HD Chipbreaker

CBN Inserts for Machining Hardened Material

H Chipbreaker Series

Unique Molded Chipbreaker Provides Excellent Chip Control when Machining Hardened Material
3 Chipbreaker Styles for a Wide Range of Machining Applications

1 Excellent Chip Control with Molded Chipbreaker

Molded chipbreaker delivers excellent chip control and low cutting force with edge preparation and sharp cutting performance

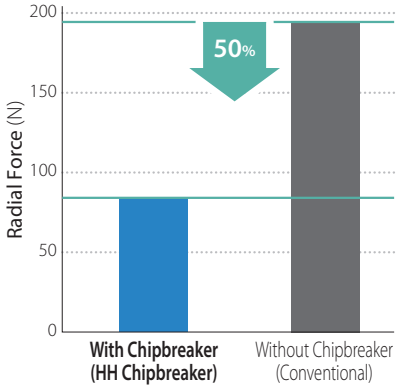
Chip Control Comparison (Internal Evaluation)

With Chipbreaker
(HH Chipbreaker)

Without Chipbreaker
(Conventional)

Cutting Conditions: Vc = 150 m/min, ap = 0.2 mm,
f = 0.15 mm/rev, 60HRC, Wet, CN**120408 Type after 21min Workpiece: SCM415, 60HRC

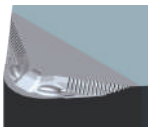
Cutting Force Comparison (Internal Evaluation)



Cutting Conditions: Vc = 150 m/min, ap = 0.2 mm,
f = 0.15 mm/rev, Wet, CN**120408 Type
Workpiece: SCM415, 60HRC

2 3 Chipbreaker Styles 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)

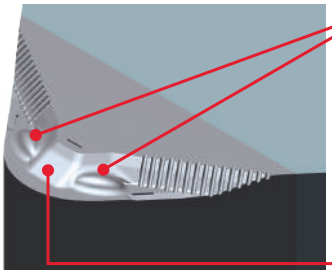
3 HH/HL Chipbreaker Hardened Steel Finishing

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

Molded chipbreaker provides excellent chip control and Low cutting force when machining hardened material

1st Recommendation

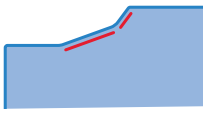
HH Chipbreaker (Workpiece 55HRC or more)



Twin Dots
Breaks chips into small pieces

Wide Bump
Provides stable chip curls

Chipbreaker cross-section



2-step rising face prevents chip clogging

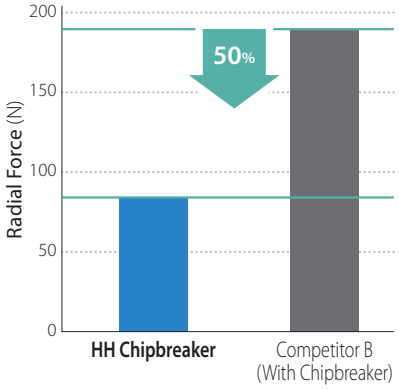
Stable chip control for hardened workpieces which are 55HRC or more

Chip Control Comparison (Internal Evaluation)

HH Chipbreaker | Competitor A (With Chipbreaker)

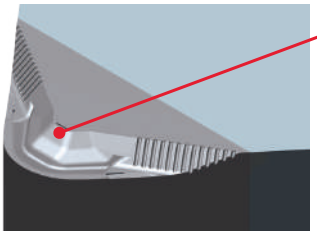
Cutting Conditions: Vc = 150 m/min, ap = 0.2 mm, f = 0.20 mm/rev, Wet, CN**120408 Type
Workpiece: SCM415H, 55HRC

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: SCM415H, 60HRC

HL Chipbreaker (Workpiece 55HRC or less)



Wide Bump

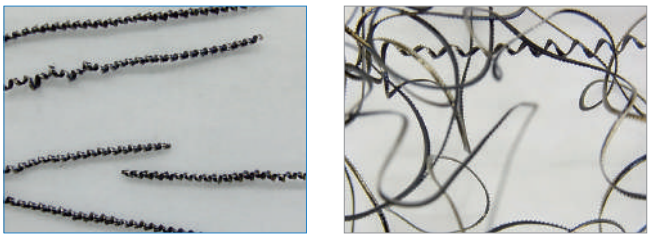
Chipbreaker cross-section

Rake Surface

Stable chip control for softer interior of hardened materials

Stable chip curls for workpieces which are 55HRC or less

Chip Control Comparison (Internal Evaluation)



HL Chipbreaker | Competitor C (With Chipbreaker)

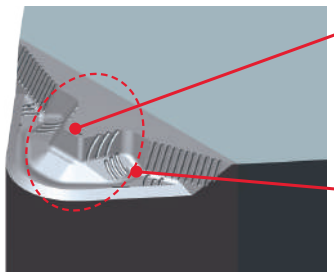
Cutting Conditions: Vc = 150 m/min, ap = 0.2 mm, f = 0.20 mm/rev, Wet, CN**120408 Type Workpiece: SCM415H, 50HRC

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

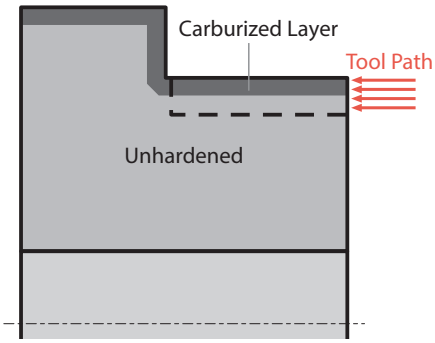
Good for a wide range of conditions

Chipbreaker cross-section

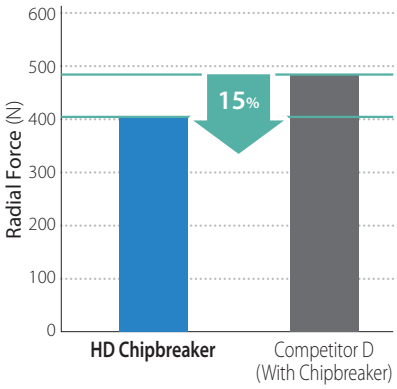
Rake Surface

Stable chip control for softer interior of hardened materials

Tool Path Example

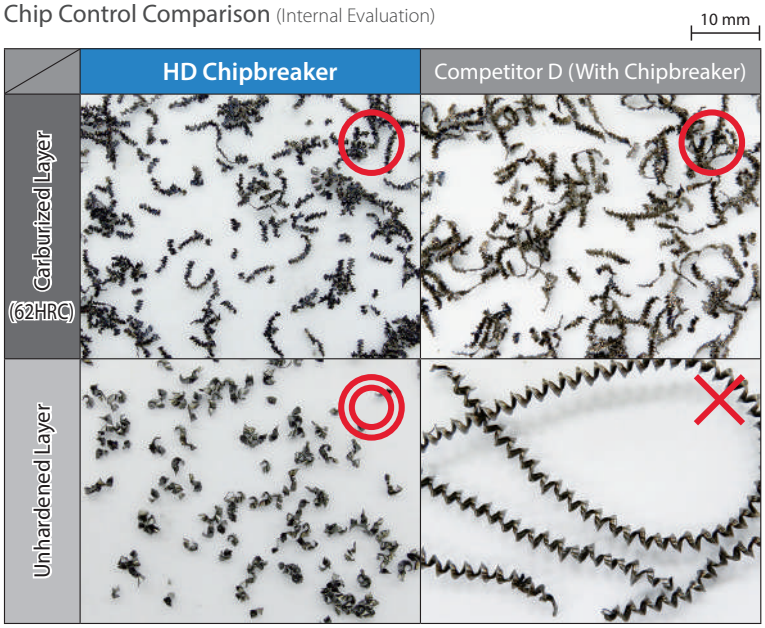


Cutting Force in Unhardened Layer Comparison
(Internal Evaluation)



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: SCM415H

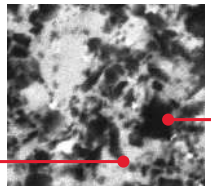
MEGACOAT CBN KBN05M

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 resistance characteristics.



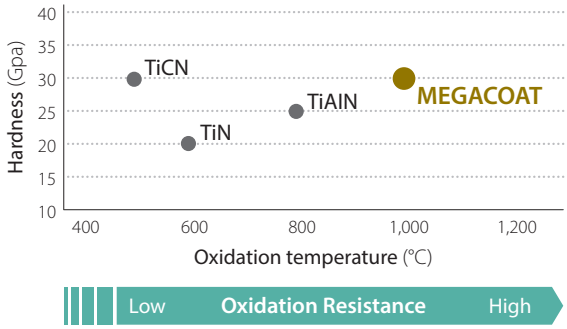
<Thermal Conductivity>

Coarse grain CBN quickly transfers heat

MEGACOAT

Superior Oxidation Resistance and Wear Resistance

Coating Properties

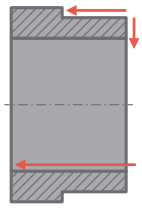


Case Studies

Pinion Chromium Molybdenum Hardened Steel (55 ~ 62HRC)

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

CNGM120408ME-HH



Tool Life

HH Chipbreaker	70 pcs/edge	Tool Life 2.3x
Competitor F (Without Chipbreaker)	30 pcs/edge	

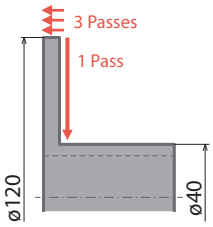
The HH chipbreaker maintained 2.3 times longer tool life than Competitor F.
The molded chipbreaker provided stable chip control.

(User Evaluation)

Plate Chromium Steel Carburizing Treatment (Surface Hardness 550Hv or more)

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

CNGM120408ME-HD

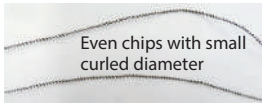


Tool Life

HD Chipbreaker	500 pcs/edge	Tool Life 1.3x
Competitor E (Without Chipbreaker)	400 pcs/edge	

Chip Control

HD Chipbreaker



Competitor E

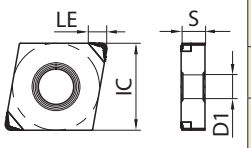
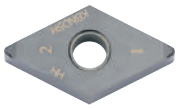
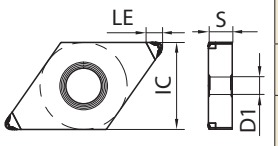
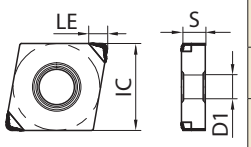
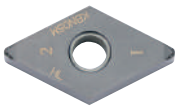
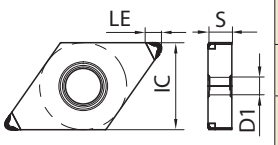
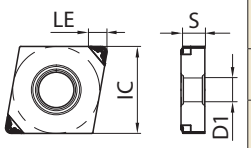
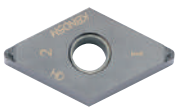
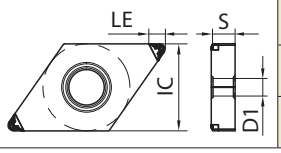
The HD chipbreaker maintained 1.3 times longer tool life than Competitor E. Chip control was stable.

(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	Dimensions (mm) IC	S	D1	RE	LE	No. of Cutting edge	MEGACOAT CBN KBN05M
				H	Hardened Material (Continuous/Interruption)						★
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		●

● : Standard Stock

Recommended Cutting Conditions

Chipbreaker	Workpiece	Application	Insert Grades	Min. - Recommendation - Max. Cutting Speed Vc (m/min)	ap (mm)	f (mm/rev)
HH	Hardened Material (55HRC or more)	Finishing	KBN05M	100-150-200	0.1-0.2-0.3	0.1-0.15-0.25
HL	Hardened Material (55HRC 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