



H Chipbreaker Series

CBN Inserts for Machining Hardened Materials



Economical Double-sided Multi-edge Inserts Added to the KBN05M Lineup

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



HH Chipbreaker
(55HRC~)



HL Chipbreaker
(~55HRC)

Large D.O.C.

for Removing the Carburized Layer



HD Chipbreaker



1st Recommendation

H Chipbreaker Series

CBN Inserts for Machining Hardened Material

Unique Molded Chipbreaker Provides Excellent Chip Control when Machining Hardened Material
3 Chipbreaker Styles Available 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)



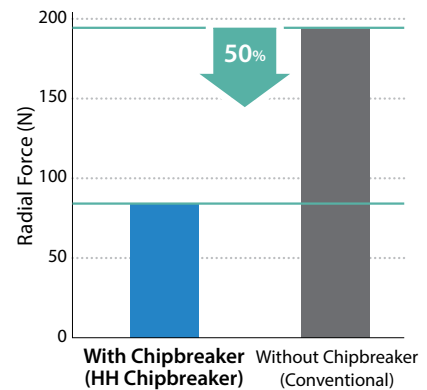
With Chipbreaker
(HH Chipbreaker)



Without Chipbreaker
(Conventional)

Cutting Conditions: $V_c = 490$ sfm, D.O.C. = 0.008"
 $f = 0.006$ ipr, 60HRC, Wet, CN**432 Type after 21min Workpiece: 4131, 60HRC

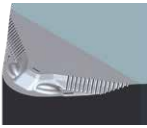
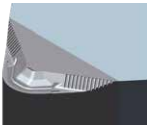
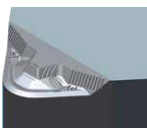
Cutting Force Comparison (Internal Evaluation)



Cutting Conditions: $V_c = 490$ sfm, D.O.C. = 0.008"
 $f = 0.006$ ipr, Wet, CN**432 Type
Workpiece: 4131, 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. (D.O.C. = 0.004" ~ 0.012")
HL 	Hardened Steel Finishing 55HRC or less	
HD 	Removing the Carburized Layer (From Carburized Layer to Unhardened Layer)	Large D.O.C. ($a_p = 0.012" \sim 0.028"$)

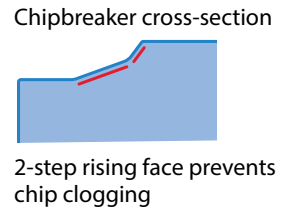
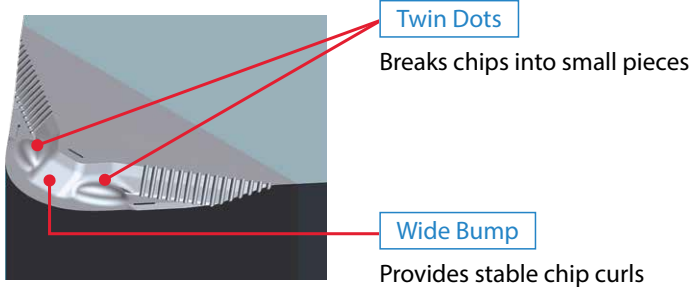
3

HH / HL Chipbreaker for Hardened Steel Finishing

Small D.O.C.
(D.O.C. = 0.004" ~ 0.012")

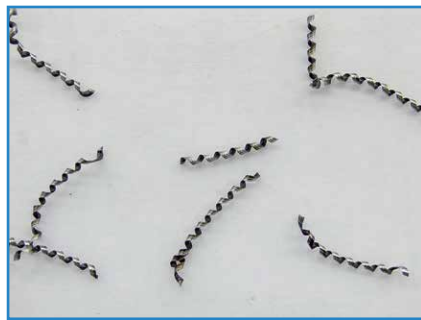
Molded chipbreaker provides excellent chip control and low cutting force when machining hardened material

1st Recommendation **HH Chipbreaker** (Workpiece 55HRC or more)



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

Chip Control Comparison (Internal Evaluation)

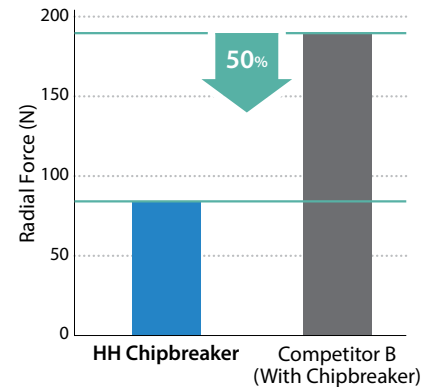


HH Chipbreaker



Competitor A
(With Chipbreaker)

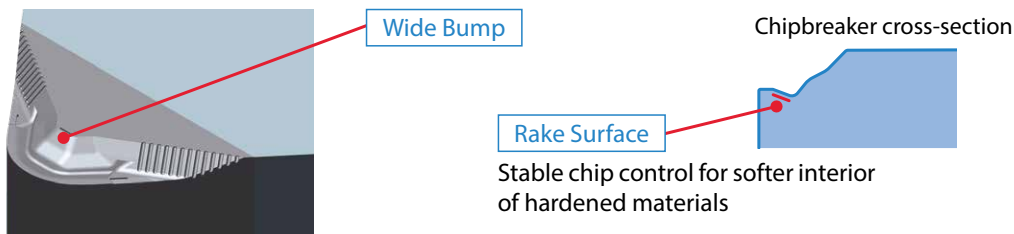
Cutting Force Comparison (Internal Evaluation)



Cutting Conditions: $V_c = 490$ sfm, D.O.C. = 0.008", $f = 0.008$ ipr, Wet, CN**432 Type
Workpiece: 4131H, 55HRC

Cutting Conditions: $V_c = 490$ sfm, D.O.C. = 0.008"
 $f = 0.006$ ipr, Wet, CN**432 Type
Workpiece: 4131H, 60HRC

HL Chipbreaker (Workpiece 55HRC or less)



Stable chip curls for workpieces which are 55HRC or less

Chip Control Comparison (Internal Evaluation)



HL Chipbreaker

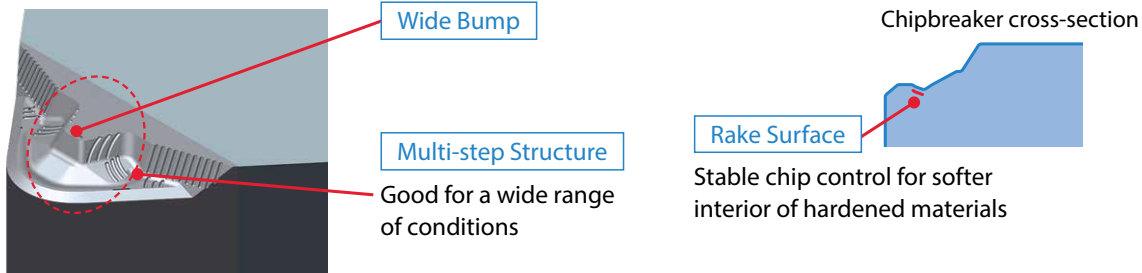


Competitor C (With Chipbreaker)

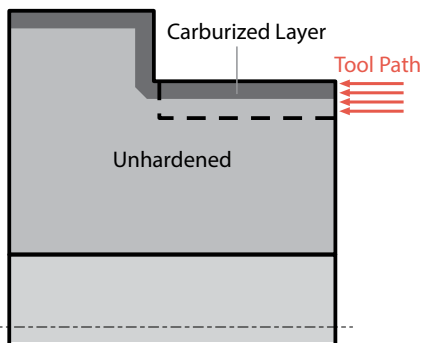
Cutting Conditions: $V_c = 490$ sfm, D.O.C. = 0.008", $f = 0.008$ ipr, Wet, CN**432 Type Workpiece: 4131H, 50HRC

Maintains stable machining during applications with several passes and varied hardness

HD Chipbreaker for Carburized Layer to Unhardened Layer

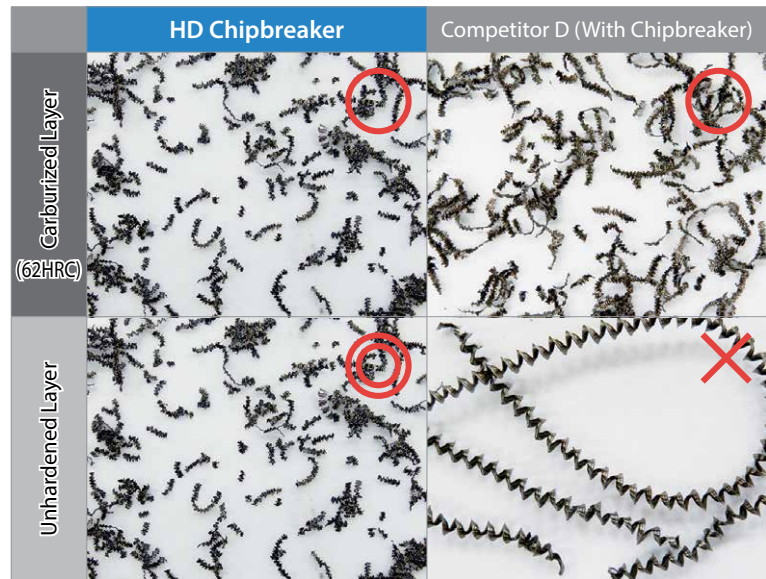


Tool Path Example

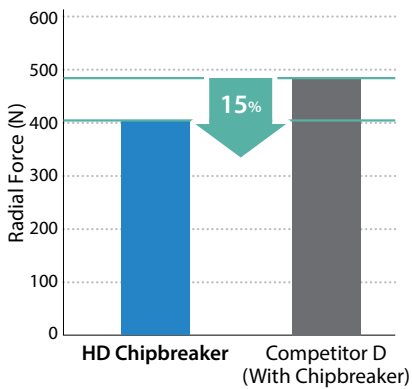


Breaks chips into small pieces at different D.O.C. and hardness

Chip Control Comparison (Internal Evaluation)



Cutting Force in Unhardened Layer Comparison (Internal Evaluation)



Cutting Conditions: $V_c = 490$ sfm, $D.O.C. = 0.020"$, $f = 0.006$ ipr, Wet, CN**432 Type
Workpiece: 4131H

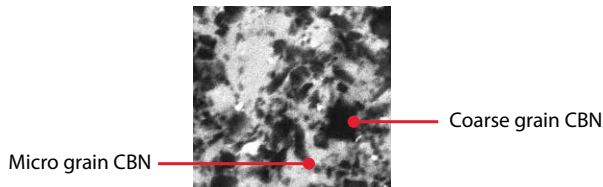
MEGACOAT CBN KBN05M

Hybrid Grain Structure for High Hardness and High Strength
MEGACOAT Coating Technology Ensures Longer Tool Life

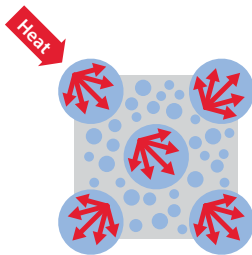
Combination of a Hybrid Grain Structure and MEGACOAT Provides Superior Oxidation Resistance and Wear Resistance

Hybrid Grain Structure

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



High Thermal Conductivity

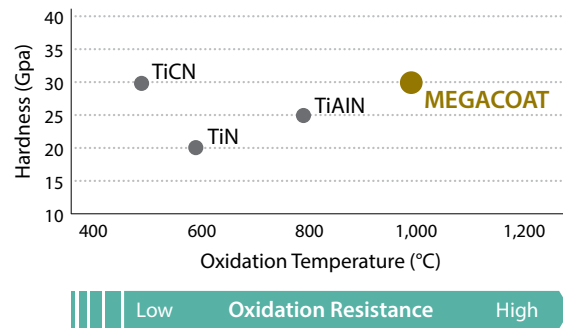


Coarse grain CBN quickly transfers heat

MEGACOAT

Superior Oxidation Resistance and Wear Resistance

Coating Properties

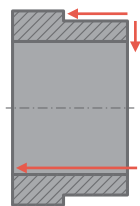


Case Studies

Pinion - Chromium Molybdenum Hardened Steel (55 ~ 62HRC)

Vc = 430 sfm
D.O.C. = 0.002"
f = 0.003 ipr
Dry

CNGM120408ME-HH



Tool Life

HH Chipbreaker

70 pcs/edge

Tool Life
2.3x

Competitor F
(Without Chipbreaker)

30 pcs/edge

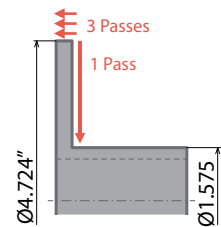
The HH chipbreaker maintained 2.3 times longer tool life than Competitor F. The molded chipbreaker provided stable chip control.

(User Evaluation)

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

Vc = 530 sfm
D.O.C. = 0.020"
f = 0.008 ipr
Wet

CNGM120408ME-HD



Tool Life

HD Chipbreaker

500 pcs/edge

Tool Life
1.3x

Competitor E
(Without Chipbreaker)

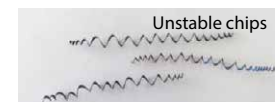
400 pcs/edge

Chip Control

HD Chipbreaker




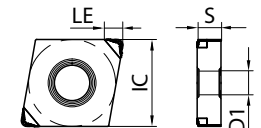

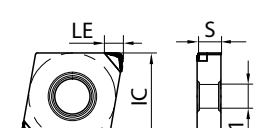

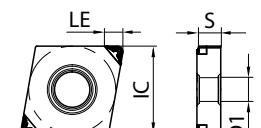
Competitor E



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

(User Evaluation)

Negative Inserts

Edge Preparation		Cutting Edge Specification		★ : 1st Recommendation	H	Hardened Material					★			
E		Honed				Edge Prep	Dimensions (in)					No. of Edges	MEGACOAT CBN KBN05M	
S00535		0.005" X 35°					I.C.	S	D1	RE				LE
Shape		Part Number												
55HRC-			CNGM431ME-HH	E	1/2	3/16	0.203	1/64	0.102	2	○			
			CNGM432ME-HH					1/32	0.102		○			
			CNGM433ME-HH					3/64	0.098		○			
			DNGM431ME-HH					1/64	0.102		○			
			DNGM432ME-HH					1/32	0.087		○			
			DNGM433ME-HH					3/64	0.075		○			
~55HRC			CNGM431ME-HL	E	1/2	3/16	0.203	1/64	0.102	2	○			
			CNGM432ME-HL					1/32	0.102		○			
			CNGM433ME-HL					3/64	0.098		○			
			DNGM431ME-HL					1/64	0.102		○			
			DNGM432ME-HL					1/32	0.087		○			
			DNGM433ME-HL					3/64	0.075		○			
Carburized Layer to Unhardened Layer			CNGM431ME-HD	S00535	1/2	3/16	0.203	1/64	0.102	2	○			
			CNGM432ME-HD					1/32	0.102		○			
			CNGM433ME-HD					3/64	0.098		○			
			DNGM431ME-HD					1/64	0.102		○			
			DNGM432ME-HD					1/32	0.087		○			
			DNGM433ME-HD					3/64	0.075		○			

○ : World Express (Shipping: 7-10 Business Days)

Recommended Cutting Conditions

Chipbreaker	Workpiece	Application	Insert Grade	MIN - Recommendation - MAX		
				Cutting Speed Vc (sfm)	D.O.C. (mm)	f (ipr)
HH	Hardened Material (55HRC or more)	Finishing	KBN05M	330 - 490 - 660	0.004 - 0.008 - 0.012	0.004 - 0.006 - 0.010
HL	Hardened Material (55HRC or less)					
HD	Hardened Material (Machining from the carburized layer to the unhardened layer)	Removing Carburized Layer	KBN05M	330 - 490 - 660	0.012 - 0.020 - 0.028	0.004 - 0.006 - 0.010



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