KYOCERA

H Chipbreaker Series

CBN Inserts for Machining Hardened Materials

Unique Molded Chipbreaker for Excellent Chip Control in 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

HH Chipbreaker
(55HRC~)

HL Chipbreaker
(~55HRC)

1st Recommendation

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

HD Chipbreaker

H Chipbreaker Series

CBN Inserts for Machining Hardened Material

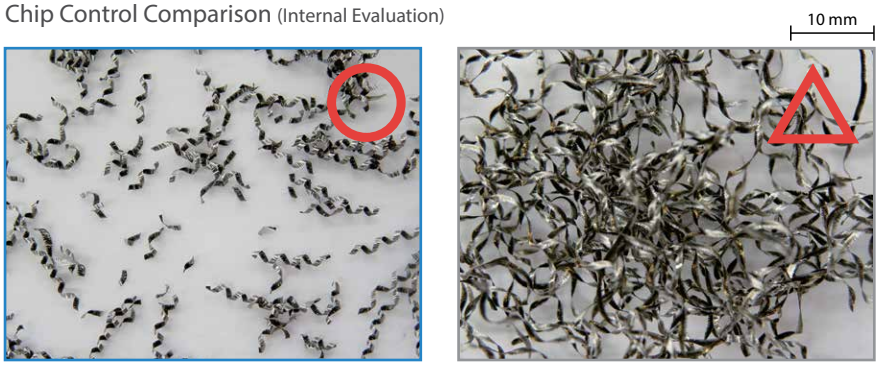
Unique Molded Chipbreaker Provides Excellent Chip Control when Machining Hardened Material

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)

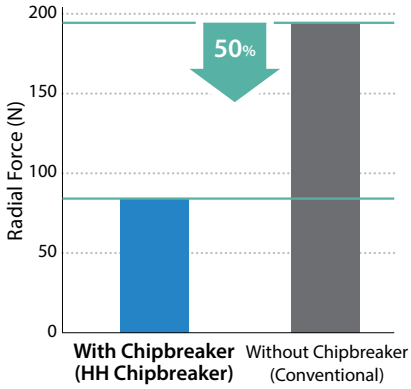


With Chipbreaker
(HH Chipbreaker)

Without Chipbreaker
(Conventional)

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

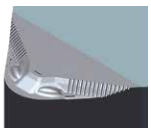
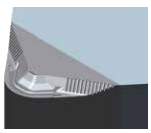
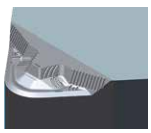
Cutting Force Comparison (Internal Evaluation)



Cutting Conditions: Vc = 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. (ap = 0.012" ~ 0.028")

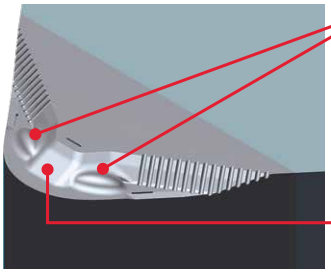
3 HH / HL Chipbreaker for Hardened Steel Finishing

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)



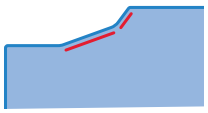
Twin Dots

Breaks chips into small pieces

Wide Bump

Provides stable chip curls

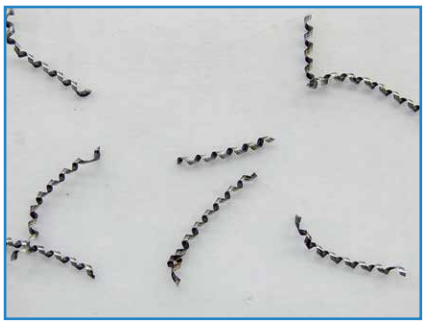
Chipbreaker cross-section



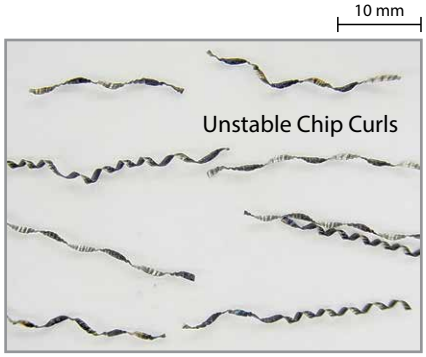
2-step rising face prevents chip clogging

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

Chip Control Comparison (Internal Evaluation)



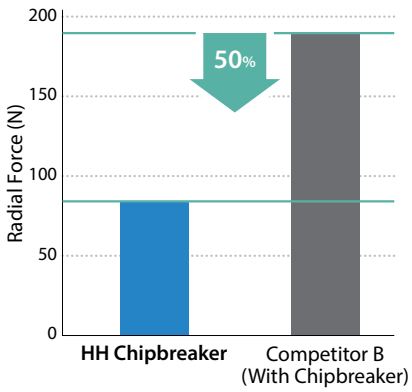
HH Chipbreaker



Competitor A
(With Chipbreaker)

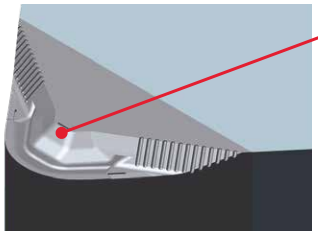
Cutting Conditions: Vc = 490 sfm, D.O.C. = 0.008", f = 0.008 ipr, Wet, CN**432 Type
Workpiece: 4131H, 55HRC

Cutting Force Comparison (Internal Evaluation)



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

HL Chipbreaker (Workpiece 55HRC or less)



Wide Bump

Chipbreaker cross-section

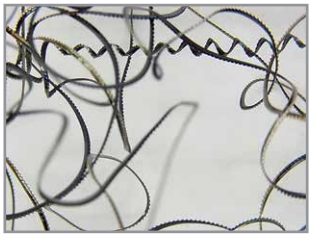
Rake Surface

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)

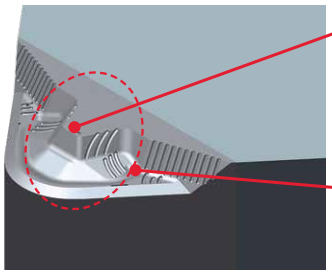
Cutting Conditions: Vc = 490 sfm, D.O.C. = 0.008", f = 0.008 ipr, Wet, CN**432 Type Workpiece: 4131H, 50HRC

4 HD Chipbreaker for Removing the Carburized Layer

Large D.O.C.
(D.O.C. = 0.012" ~ 0.028")

Maintains stable machining during applications with several passes and varied hardness

HD Chipbreaker for Carburized Layer to Unhardened Layer



Wide Bump

Multi-step Structure

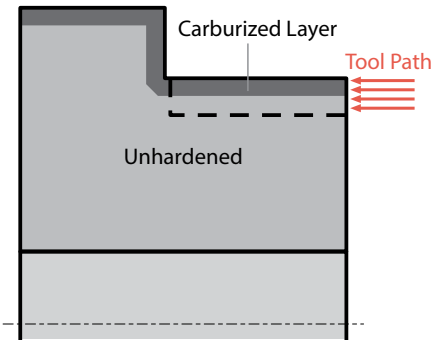
Good for a wide range of conditions

Chipbreaker cross-section

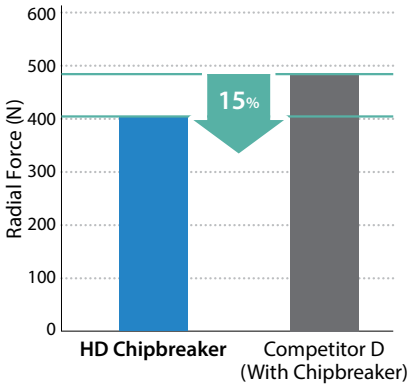
Rake Surface

Stable chip control for softer interior of hardened materials

Tool Path Example

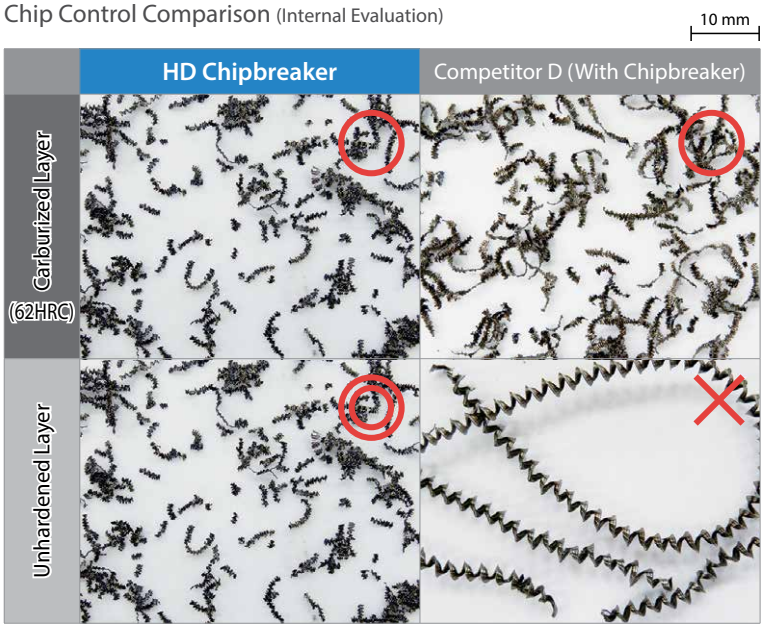


Cutting Force in Unhardened Layer Comparison
(Internal Evaluation)



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

Chip Control Comparison (Internal Evaluation)



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

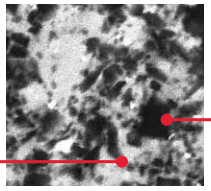
MEGACOAT CBN KBN05M

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

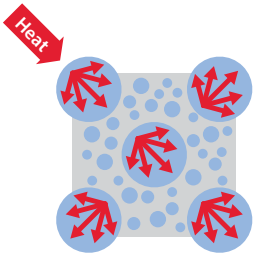
Combination of a Hybrid Grain Structure and MEGACOAT Provides Superior Oxidation Resistance and Wear Resistance

Hybrid Grain Structure

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



High Thermal Conductivity

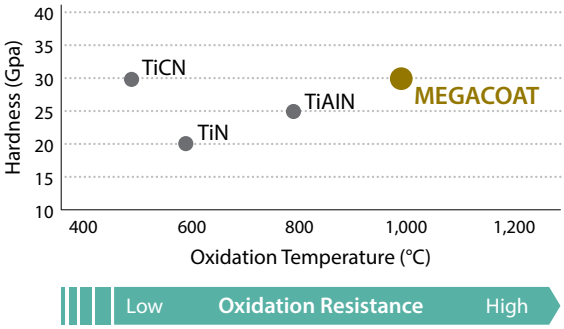


Coarse grain CBN quickly transfers heat

MEGACOAT

Superior Oxidation Resistance and Wear Resistance

Coating Properties

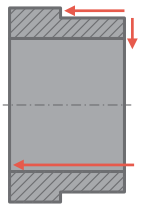


Case Studies

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

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

CNGM120408ME-HH



Tool Life

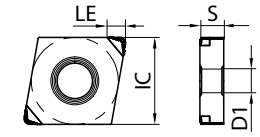
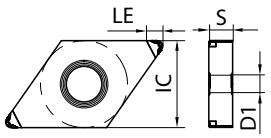
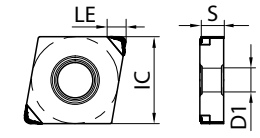
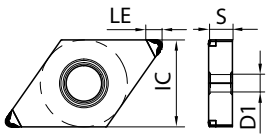
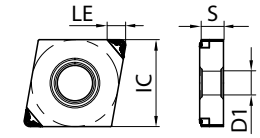
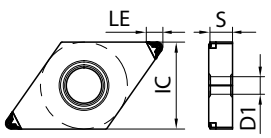
HH Chipbreaker	**70 pcs/edge**	Tool Life 2.3x
Competitor F (Without Chipbreaker)	30 pcs/edge	

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

(User Evaluation)

Negative Inserts

Edge Preparation	Cutting Edge Specification	★ : 1st Recommendation
E	Honed	
S00535	0.005" X 35°	

				H	Hardened Material						★
	Shape		Part Number	Edge Prep	Dimensions (in)					No. of Edges	MEGACOAT CBN
					IC	S	D1	RE	LE		KBN05M
55HRC~	Small D.O.C.		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		●
	Small D.O.C.		DNGM431ME-HH					1/64	0.102		●
			DNGM432ME-HH					1/32	0.087		●
			DNGM433ME-HH					3/64	0.075		●
~55HRC	Small D.O.C.		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		●
	Small D.O.C.		DNGM431ME-HL					1/64	0.102		●
			DNGM432ME-HL					1/32	0.087		●
			DNGM433ME-HL					3/64	0.075		●
Carburized Layer to Unhardened Layer	Large D.O.C.		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		●
	Large D.O.C.		DNGM431ME-HD					1/64	0.102		●
			DNGM432ME-HD					1/32	0.087		●
			DNGM433ME-HD					3/64	0.075		●

● : Standard Item

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

KYOCERA

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05/20