



# CA3-Series

CVD Coated Carbide for Cast Iron



## Coated Carbide for Highly Stable Cast Iron Machining

**Improved Coating Adhesion Prevents Chipping and Provides Stable Machining**

**Micro TiCN Coating Provides Excellent Wear Resistance**

**Unique Insert Grades for Various Cast Iron Machining Applications  
(CA310 / CA315 / CA320)**

KQ Chipbreaker



Cast Iron Machining Chipbreaker  
K-Series

KH Chipbreaker



KG Chipbreaker



# CA3-Series

Coated Carbide for Highly Stable Cast Iron Machining  
CA3-Series Coated Carbidés Launched

## New Coated Carbide Grades CA3-Series for Reliable & Efficient Cast Iron Turning

### Prevents Adhesion due to Specialized Post-coating

#### Hard Surface Layer

Provides advanced wear resistance

#### High-Performance $\alpha$ -Al<sub>2</sub>O<sub>3</sub> Layer

Excellent Wear and Chipping Resistance

### Strong Intra-coating Adhesion

Higher adhesion between each layer with improved crystal structure

#### Micro TiCN Layer

Higher coating hardness is possible due to a micro TiCN crystal structure, resulting in increased wear resistance

## 1 High Coating Adhesion Results in Stable Machining

### Strong Intra-coating Adhesion

#### Micro Intra-coating Structure

Higher adhesion by increasing bonding surface with aluminum oxide layer

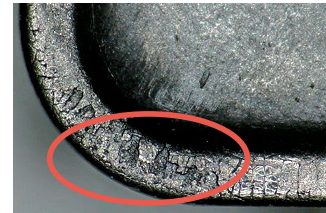
#### Impact-Resistant Intra-coating Structure

Interface strength is increased by 20% (compared to our products), which resists boundary destruction

Rake Face Condition (In-house Evaluation)



CA3-Series (CA315)

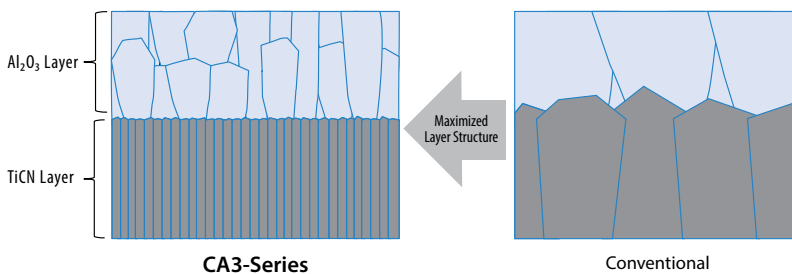


Competitor A

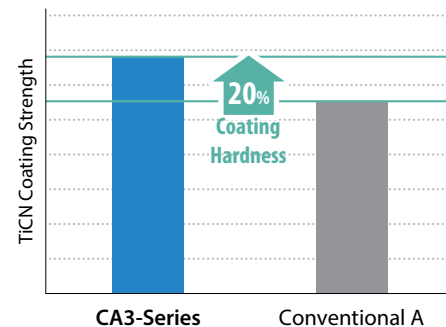
Cutting Conditions:  $V_c = 490$  sfm, D.O.C. =  $0.059^\circ$ ,  $f = 0.012$  ipr, Wet, CNMG432 Type, Facing, (After Withstanding 3,000 Impacts)  
Workpiece: 100-70-03 (8 Grooves in Workpiece)

## 2 Micro TiCN Coating Provides Excellent Wear Resistance

Maximized Layer Structure (Pattern diagram)

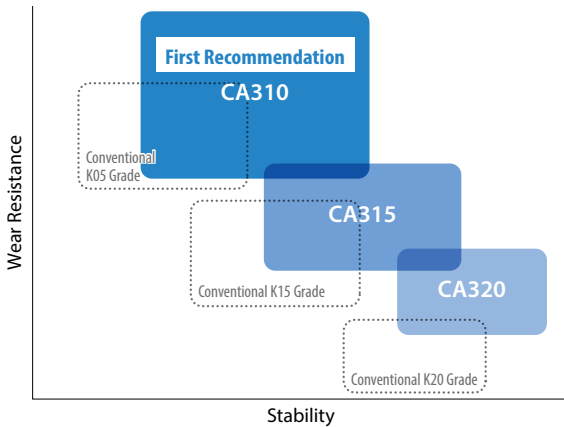


Coating Hardness Comparison (In-house Evaluation)

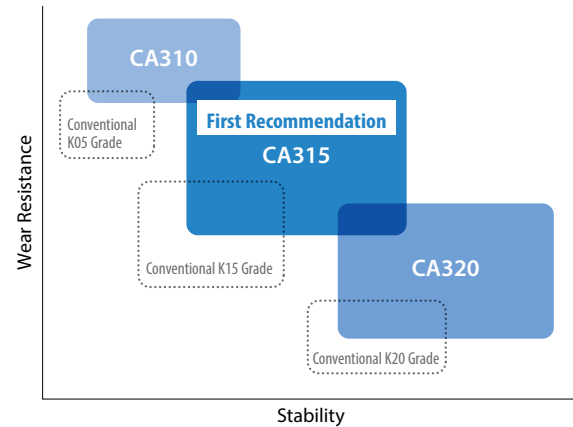


# 3 Unique Insert Grades For Various Cast Iron Machining Applications

## Gray Cast Iron - First Recommendation CA310



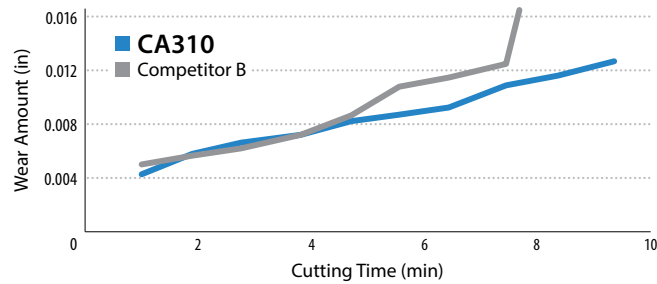
## Nodular Cast Iron - First Recommendation CA315



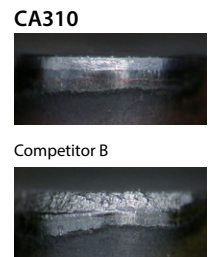
### CA310 Gray Cast Iron (First Recommendation)

Grade for high-speed continuous machining and improved tool life through the deposition of a thickened alumina coating layer.  
For finishing to roughing of gray cast iron.

Wear Resistance Comparison (In-house Evaluation)



Machining Duration: About 7.4 Minutes

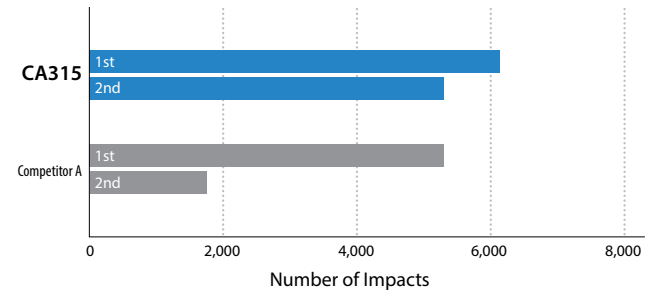


Cutting Conditions:  $V_c = 980$  sfm,  $D.O.C. = 0.059"$ ,  $f = 0.012$  ipr, Wet CNMG432 Type  
Workpiece: 100-70-03

### CA315 Nodular Cast Iron (First Recommendation)

For continuous to interrupted machining with a good balance of wear resistance and stability  
Excellent performance for machining gray and nodular cast iron by optimizing the total coating layer thickness  
High efficiency and long tool life

Fracture Resistance Comparison (In-house Evaluation)

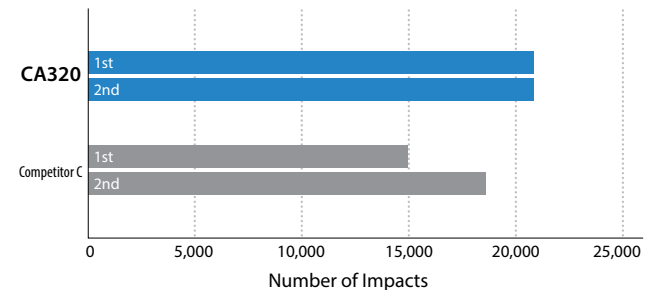


Cutting Conditions:  $V_c = 660$  sfm,  $D.O.C. = 0.059"$ ,  $f = 0.018$  ipr, Wet CNMG432 Type  
Workpiece: 100-70-03 (8 Grooves in Workpiece) Interruption Evaluation: 2 Times

### CA320 For Interrupted Machining

Improved stability with CVD layer structure with high adhesion  
Long tool life for nodular cast iron during heavily interrupted or high-speed machining

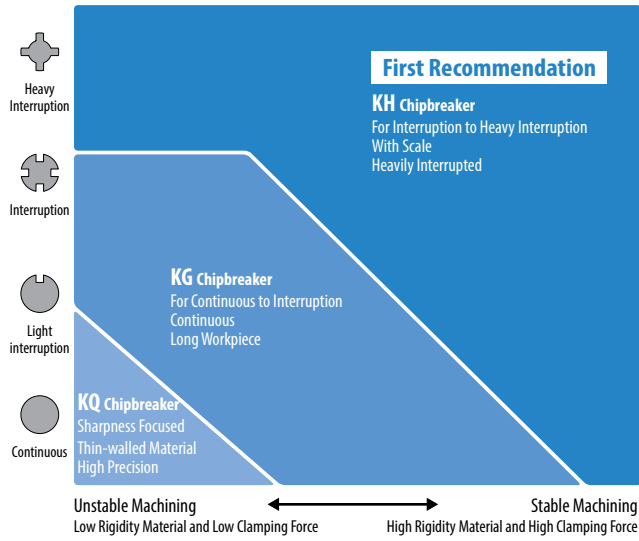
Fracture Resistance Comparison (In-house Evaluation)



Cutting Conditions:  $V_c = 490$  sfm,  $D.O.C. = 0.059"$ ,  $f = 0.012$  ipr, Wet CNMG432 Type  
Workpiece: 100-70-03 (8 Grooves in Workpiece) Interruption Evaluation: 2 Times

## Great for a Large Range of Heavy Machining Operations due to Improved Chipping Resistance

### Recommended K-Series Chipbreakers

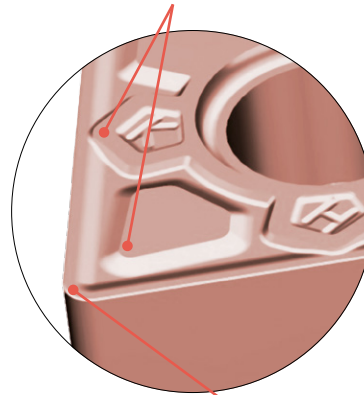
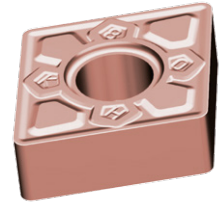


### First Recommendation

#### KH Chipbreaker (For Interruption to Heavy Interruption)

Good for Heavily Interrupted Machining  
 Focus on High Stability with Flat Land

Improved Locating / Seating in the Toolholder Pocket  
 Resists Vibration and Edge Location Movement



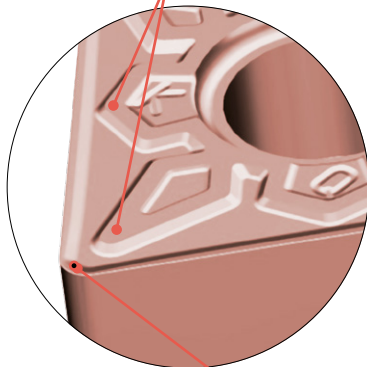
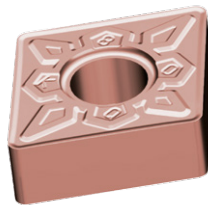
Flat Land

Tough and Reliable Edge Security  
 High Feed to Heavily Interrupted Machining  
 First Recommended Edge Preparation with Breakage Resistance

#### KQ Chipbreaker (Sharpness Focused)

Good for Machining when Sharpness is Necessary Such as Thin-walled Material  
 Good Balance of Low Cutting Forces and Edge Strength

Improved Locating / Seating in the Toolholder Pocket  
 Resists Machining Vibration



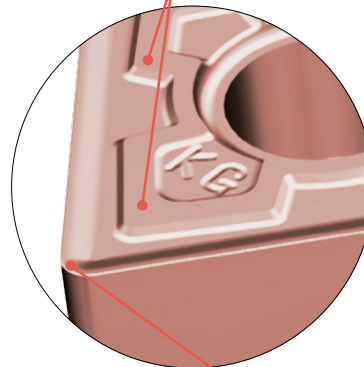
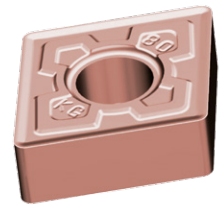
Balance of Sharpness and Strength

Edge Geometry is Appropriate for Thin-walled Workpieces

#### KG Chipbreaker (for Continuous to Interruption)

For Various Cast Iron Machining Applications  
 Chipping Resistance is Improved Despite Having a Positive Land




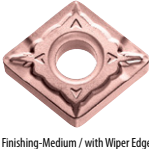
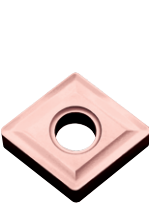

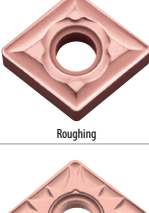
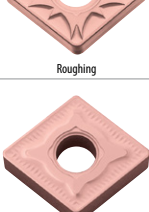
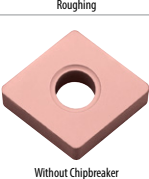
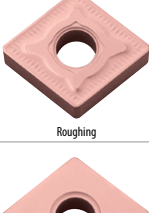
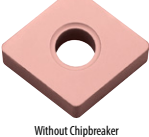
Improved Locating / Seating in the Toolholder Pocket  
 Resists machining vibration and great for a wide variety of machining operations



Positive Land





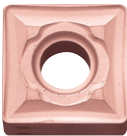
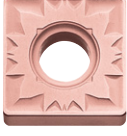
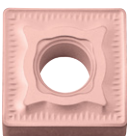
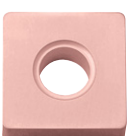

Excellent Balance of Sharpness and Strength  
 Machining from Continuous to Interruption







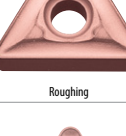
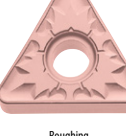
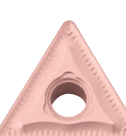
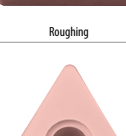
# Negative Inserts

Shape Right-hand Shown	Description	Dimensions (in)						CA310	CA315	CA320	Shape Right-hand Shown	Description	Dimensions (in)						CA310	CA315	CA320			
		I.C.	Thickness	Hole	Corner-R (r <sub>e</sub> )								I.C.	Thickness	Hole	Corner-R (r <sub>e</sub> )								
 Roughing	CNMG 432KH	1/2	3/16	0.203	1/32	●	●	●	DNMG 432KH	1/2	3/16	0.203	1/32	●	●	●	DNMG 442KH	1/2	1/4	0.203	1/32	●	●	●
	433KH				3/64	●	●	●					433KH	3/64	●	●					●			
	434KH				1/16	●	●	●		443KH	3/64	●	●	●										
 Roughing	CNMG 431KQ	1/2	3/16	0.203	1/64	●	●	●	DNMG 431KG	1/2	3/16	0.203	1/64	●	●	●	DNMG 441KG	1/2	1/4	0.203	1/64	●	●	●
	432KQ				1/32	●	●	●					432KG	1/32	●	●					●			
	433KQ				3/64	●	●	●					433KG	3/64	●	●					●			
 Sharp Edge	CNMG 431KG	1/2	3/16	0.203	1/64	●	●	●	DNMG 431KQ	1/2	3/16	0.203	1/64	●	●	●	DNMG 441KQ	1/2	1/4	0.203	1/64	●	●	●
	432KG				1/32	●	●	●					432KQ	1/32	●	●					●			
	433KG				3/64	●	●	●					442KQ	1/32	●	●					●			
 Finishing-Medium / with Wiper Edge	CNMG 432WQ	1/2	3/16	0.203	1/32	●	●	●	DNMG 431	1/2	3/16	0.203	1/64	●	●	●	DNMG 441	1/2	1/4	0.203	1/32	●	●	●
	433WQ				3/64	●	●	●					432	1/32	●	●					●			
 Roughing	CNMG 431	1/2	3/16	0.203	1/64	●	●	●	DNMG 441	1/2	1/4	0.203	1/64	●	●	●	DNMG 432PH	1/2	3/16	0.203	1/32	●	●	●
	432				1/32	●	●	●					442	1/32	●	●					●			
	433				3/64	●	●	●					443	3/64	●	●					●			
	434				1/16	●	●	●					DNMG 442PH	1/2	1/4	0.203					1/32	●	●	●
	CNMG 543	5/8	1/4	0.250	3/64	●	●	●	443PH	3/64	●	●					●							
	544				1/16	●	●	●																
 Roughing	CNMG 642	3/4	1/4	0.313	1/32	●	●	●	DNMG 431C	1/2	3/16	0.203	1/64	●	●	●	DNMG 442C	1/2	1/4	0.203	1/32	●	●	●
	643				3/64	●	●	●					432C	1/32	●	●					●			
	644				1/16	●	●	●					433C	3/64	●	●					●			
	CNMG 432PH				1/2	3/16	0.203	1/32					●	●	●	DNMG 441C					1/2	1/4	0.203	1/64
433PH		3/64	●	●				●	433ZS	3/64	●	●	●											
 Roughing	CNMG 543PH	5/8	1/4	0.250	3/64	●	●	●	DNMG 442ZS	1/2	1/4	0.203	1/32	●	●	●	DNMG 432GC	1/2	3/16	0.203	1/32	●	●	●
	544PH				1/16	●	●	●					443ZS	3/64	●	●					●			
 Roughing	CNMG 431C	1/2	3/16	0.203	1/64	●	●	●	DNMG 442GC	1/2	1/4	0.203	1/64	●	●	●	DNMA 431	1/2	3/16	0.203	1/64	●	●	●
	432C				1/32	●	●	●					432	1/32	●	●					●			
	433C				3/64	●	●	●					DNMA 441	1/2	1/4	0.203		1/64	●	●	●			
	434C				1/16	●	●	●										442	1/32	●	●	●		
 Roughing	CNMG 543C	5/8	1/4	0.250	3/64	●	●	●	RNMG 43	1/2	3/16	0.203	-	●	●	●	RNMG 54	5/8	1/4	0.250	-	●	●	●
	CNMG 432ZS				1/2	3/16	0.203	1/32					●	●	●	DNMG 432GC					1/2	3/16	0.203	1/32
433ZS	3/64	●	●	●																				
 Roughing	CNMG 432GC	1/2	3/16	0.203	1/32	●	●	●	DNMA 442	1/2	1/4	0.203	1/64	●	●	●	Without Chipbreaker	1/2	3/16	0.203	1/32	●	●	●
	433GC				3/64	●	●	●																
 Without Chipbreaker	CNMA 431	1/2	3/16	0.203	1/64	●	●	●	RNMG 54	5/8	1/4	0.250	-	●	●	●								
	432				1/32	●	●	●																
	433				3/64	●	●	●																
	434				1/16	●	●	●																

● : U.S. Stock









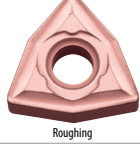
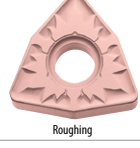


# Negative Inserts

Shape Right-hand Shown	Description	Dimensions (in)				CA310	CA315	CA320
		I.C.	Thickness	Hole	Corner-R (r <sub>e</sub> )			
 Roughing	SNMG 432KH	1/2	3/16	0.203	1/32	●	●	●
	433KH				3/64	●	●	●
	434KH				1/16	●	●	●
 Roughing	SNMG 432KG	1/2	3/16	0.203	1/32	●	●	●
	433KG				3/64	●	●	●
 Roughing	SNMG 322	3/8	1/8	0.150	1/32	●	●	●
	SNMG 431	1/2	3/16	0.203	1/64	●	●	●
	432				1/32	●	●	●
	433				3/64	●	●	●
	434				1/16	●	●	●
	435				5/64	●	●	●
 Roughing	SNMG 432PH	1/2	3/16	0.203	1/32	●	●	●
	433PH				3/64	●	●	●
	434PH				1/16	●	●	●
	SNMG 543PH	5/8	1/4	0.250	3/64	●	●	●
544PH				1/16	●	●	●	
 Roughing	SNMG 432C	1/2	3/16	0.203	1/32	●	●	●
	433C				3/64	●	●	●
 Roughing	SNMG 432ZS	1/2	3/16	0.203	1/32	●	●	●
	433ZS				3/64	●	●	●
 Roughing	SNMG 432GC	1/2	3/16	0.203	1/32	●	●	●
	433GC				3/64	●	●	●
 Without Chipbreaker	SNMA 431	1/2	3/16	0.203	1/64	●	●	●
	432				1/32	●	●	●
	433				3/64	●	●	●
	434				1/16	●	●	●
	435				5/64	●	●	●
 Without Chipbreaker	SNM 432	1/2	3/16	-	1/32	●	●	●
	433			3/64	●	●	●	

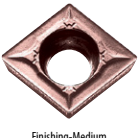
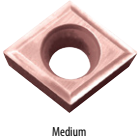
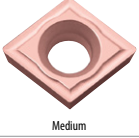

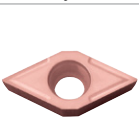
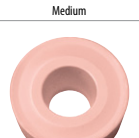

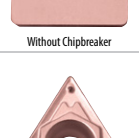
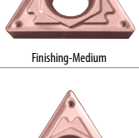
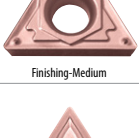
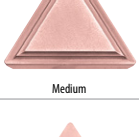


Shape Right-hand Shown	Description	Dimensions (in)				CA310	CA315	CA320
		I.C.	Thickness	Hole	Corner-R (r <sub>e</sub> )			
 Roughing	TNMG 332KH	3/8	3/16	0.150	1/32	●	●	●
	333KH				3/64	●	●	●
	334KH				1/16	●	●	●
 Roughing	TNMG 331KG	3/8	3/16	0.150	1/64	●	●	●
	332KG				1/32	●	●	●
	333KG				3/64	●	●	●
 Sharp Edge	TNMG 331KQ	3/8	3/16	0.150	1/64	●	●	●
	332KQ				1/32	●	●	●
 Roughing	TNMG 331	3/8	3/16	0.150	1/64	●	●	●
	332				1/32	●	●	●
	333				3/64	●	●	●
	334				1/16	●	●	●
	335				5/64	●	●	●
 Roughing	TNMG 431	1/2	3/16	0.203	1/64	●	●	●
	432				1/32	●	●	●
	433				3/64	●	●	●
 Roughing	TNMG 332PH	3/8	3/16	0.150	1/32	●	●	●
	333PH				3/64	●	●	●
 Roughing	TNMG 331C	3/8	3/16	0.150	1/64	●	●	●
	332C				1/32	●	●	●
	333C				3/64	●	●	●
 Roughing	TNMG 332ZS	3/8	3/16	0.150	1/32	●	●	●
	333ZS				3/64	●	●	●
 Roughing	TNMG 332GC	3/8	3/16	0.150	1/32	●	●	●
	333GC				3/64	●	●	●
 Without Chipbreaker	TNMA 331	3/8	3/16	0.150	1/64	●	●	●
	332				1/32	●	●	●
	333				3/64	●	●	●
	334				1/16	●	●	●
	335				5/64	●	●	●

● : U.S. Stock

## Negative Inserts

Shape Right-hand Shown	Description	Dimensions (in)						CA310	CA315	CA320
		I.C.	Thickness	Hole	Corner-R (r <sub>e</sub> )					
 Roughing	VNMG 332KH	3/8	3/16	0.150	1/32	●	●	●		
	333KH				3/64	●	●	●		
 Roughing	VNMG 332KG	3/8	3/16	0.150	1/32	●	●	●		
	333KG				3/64	●	●	●		
 Roughing	VNMG 331	3/8	3/16	0.150	1/64	●	●	●		
	332				1/32	●	●	●		
 Roughing	WNMG 432KH	1/2	3/16	0.203	1/32	●	●	●		
	433KH				3/64	●	●	●		
	434KH				1/16	●	●	●		
 Roughing	WNMG 431KG	1/2	3/16	0.203	1/64	●	●	●		
	432KG				1/32	●	●	●		
	433KG				3/64	●	●	●		
 Sharp Edge	WNMG 431KQ	1/2	3/16	0.203	1/64	●	●	●		
	432KQ				1/32	●	●	●		
	433KQ				3/64	●	●	●		
 Roughing	WNMG 431	1/2	3/16	0.203	1/64	●	●	●		
	432				1/32	●	●	●		
	433				3/64	●	●	●		
 Roughing	WNMG 432PH	1/2	3/16	0.203	1/32	●	●	●		
	433PH				3/64	●	●	●		
 Roughing	WNMG 431C	1/2	3/16	0.203	1/64	●	●	●		
	432C				1/32	●	●	●		
	433C				3/64	●	●	●		
 Roughing	WNMG 432ZS	1/2	3/16	0.203	1/32	●	●	●		
	433ZS				3/64	●	●	●		
 Roughing	WNMG 432GC	1/2	3/16	0.203	1/32	●	●	●		
	433GC				3/64	●	●	●		
 Without Chipbreaker	WNMA 432	1/2	3/16	0.203	1/32	●	●	●		
	433				3/64	●	●	●		

## Positive Inserts

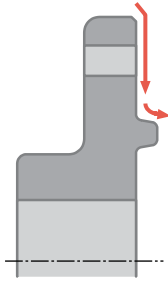
Shape Right-hand Shown	Description	Dimensions (in)						CA310	CA315	CA320
		I.C.	Thickness	Hole	Corner-R (r <sub>e</sub> )	Relief Angle				
 Finishing-Medium	CCMT 2151GK	1/4	3/32	0.110	1/64	7°	●	●	●	
	CCMT 3251GK	3/8	5/32	0.173	1/64	7°	●	●	●	
	CCMT 431GK 432GK	1/2	3/16	0.217	1/64 1/32	7°	●	●	●	
 Medium	CCMT 3252	3/8	5/32	0.173	1/32	7°	●	●	●	
 Medium	CPMH 25151	5/16	3/32	0.138	1/64	11°	●	●	●	
	25152				1/32	●	●	●		
 Medium	CPMH 321	3/8	1/8	0.177	1/64	11°	●	●	●	
	322				1/32	●	●	●		
 Finishing-Medium	DCMT 2151GK	1/4	3/32	0.110	1/64	7°	●	●	●	
	2152GK	3/8	5/32	0.173	1/32	7°	●	●	●	
	DCMT 3251GK 3252GK				1/64 1/32	7°	●	●	●	
 Medium	DCMT 3252	3/8	5/32	0.173	1/32	7°	●	●	●	
 Medium	RCMX 1204M0	0.472	3/16	0.165	-	7°	●	●	●	
 Without Chipbreaker	SPM 421	1/2	1/8	-	1/64	11°	●	●	●	
	422				1/32	●	●	●		
	SPM 432 433	1/2	3/16	-	1/32 3/64	11°	●	●	●	
 Finishing-Medium	TCMT 2151HQ	1/4	3/32	0.110	1/64	7°	●	●	●	
	2152HQ				1/32	●	●	●		
	TCMT 3252HQ 3253HQ	3/8	5/32	0.173	1/32 3/64	7°	●	●	●	
 Finishing-Medium	TPMT 221HQ	1/4	1/8	0.130	1/64	11°	●	●	●	
	222HQ				1/32	●	●	●		
 Finishing-Medium	TPMT 321HQ	3/8	1/8	0.173	1/64	11°	●	●	●	
	322HQ				1/32	●	●	●		
 Medium	TPMR 221	1/4	1/8	-	1/64	11°	●	●	●	
	222				1/32	●	●	●		
 Medium	TPMR 321	3/8	1/8	-	1/64	11°	●	●	●	
	322				1/32	●	●	●		
	TPM 221 222				1/4	1/8	-	1/64 1/32	11°	●
 Without Chipbreaker	TPM 321	3/8	1/8	-	1/64	11°	●	●	●	
	322				1/32	●	●	●		
	323				3/64	●	●	●		

● : U.S. Stock

## Case Studies

### Differential Gear Case FCD450

Vc = 1,080 - 1,310 sfm  
D.O.C. = 0.059"  
f = 0.006 - 0.010 ipr Wet  
CNMG433KH (CA315)



Tool Life

**CA315**

**100 pcs /edge**

Tool Life



Competitor D

(Molded Chipbreaker)

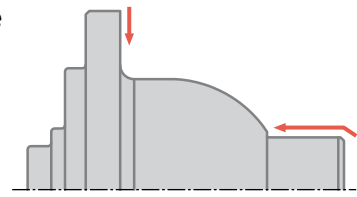
**50 pcs /edge**

CA315 KH Chipbreaker doubled tool life compared to competitor D.

(User Evaluation)

### Differential Gear Case FCD660

Vc = 590 sfm  
D.O.C. = 0.071"  
f = 0.012 ipr Wet  
WNMG433KH (CA315)



Tool Life

**CA315**

**20 pcs /edge**

Tool Life



Competitor E

(Molded Chipbreaker)

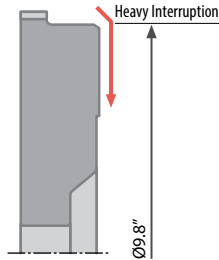
**10 pcs /edge**

Competitor E's insert broke after machining 10 pieces but CA315 with KH Chipbreaker doubled tool life without insert breakage.

(User Evaluation)

### Flywheel Gray Cast Iron

Vc = 980 sfm  
D.O.C. = 0.071"  
f = 0.012 - 0.014 ipr Dry  
WNMG433KH (CA315)



Tool Life

**CA315**

**100 pcs /edge**

Tool Life



Competitor F

(Molded Chipbreaker)

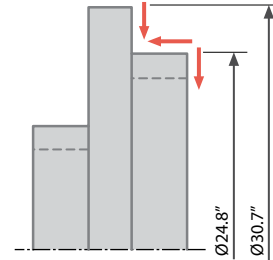
**50 pcs /edge**

Competitor F shows unstable tool life with insert breakage when machining over 50 pieces/edge but CA315 provides stable tool life while machining over 100 pieces/edge.

(User Evaluation)

### Disc Nodular Cast Iron

Vc = 460 sfm  
D.O.C. = 0.098"  
f = 0.011 - 0.018ipr Wet  
CNMG433KH (CA315)



Tool Life

**CA315**

**10 pcs/edge**

Tool Life



Competitor G

(Molded Chipbreaker)

**7 pcs/edge**

CA315 achieves 1.4 times the tool life of competitor G.

(User Evaluation)



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