

Tungaloy

Member IMC Group

Keeping the Customer First

Tungaloy Report No.005-USA

May 2007

Revised: April 2009

CVD Grade for Turning Cast Iron and Ductile Cast Iron

T5100

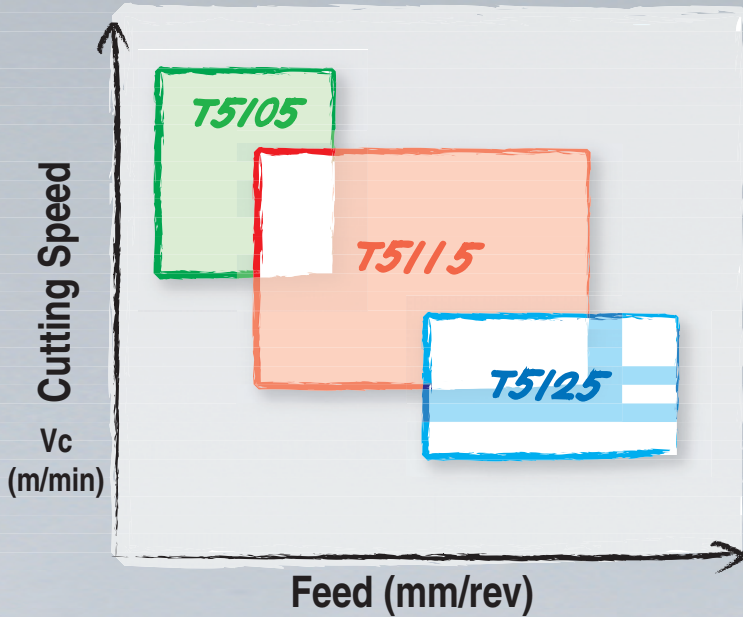
A new grade & chipbreaker series for all types of work and processing conditions



Tungaloy America, Inc.

T5100

■ Applicable Areas



● T5115 - First Choice

This multi-purpose grade provides stable processing in a wide range of areas, from continuous to interrupted cutting.

● T5105 - High Wear Resistance

Exhibits superior wear and plastic deformation resistance in high speed continuous cutting.

● T5125 - High Impact Resistance

Tough grade prevents sudden breakage and is suited for heavy interrupted cutting.

The fine grain and high carbonization coating of the **T5100 Series** greatly improves performance and the 3 chipbreaker types yield excellent results.

Enhanced chip welding resistance

Smooth outermost coating layer

■ Comparison of coating surfaces



Conventional Type

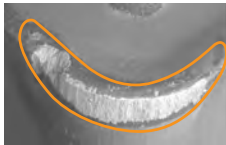


T5100

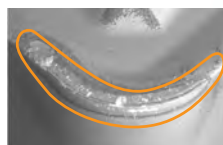
■ Comparison of chip welding resistance

The smooth coating surface suppresses chip welding improving the work surface finish.

Insert: CNMG 433 CM
Grade: T5115
Work Material: FCD600
Work Process: Continuous and Interrupted Cutting
Cutting Speed: $v_c=500$ SFM
Depth of Cut: $a_p=.080"$
Feed: $f=.014$ IPR
Coolant: Water Soluble



Conventional Type



T5115

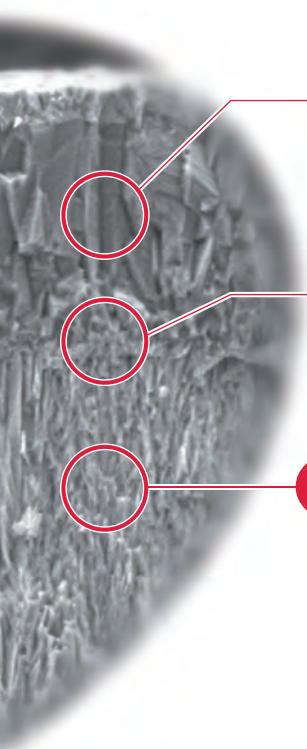
Comparison of chip welding after 40 minutes of processing

■ Standard Cutting Conditions

Grade	Cutting Speed v_c m/min (inch)		ISO Code	Substrate			Coating Layers	
	Cast Iron	Ductile Cast Iron		Specific Gravity	Hardness (HRA)	Tensile Strength (GPa)	Main Component	Thickness
T5105	180 - 480 (600 - 1600)	180 - 400 (600 - 1300)	K05-K15	15.0	92.5	2.4	Fine columnar TiCN + Al ₂ O ₃	16
T5115	140 - 400 (450 - 1300)	140 - 370 (450 - 1200)	K10-K20	14.8	91.5	2.7		16
T5125	120 - 300 (400 - 1000)	120 - 250 (400 - 820)	K15-K30	14.0	90.5	2.8		16



Increases wear and impact resistance. Specific applications of the 3 grade types performance on normal and ductile cast iron.



Improved chipping resistance



Smooth aluminum oxide coating layer

Stronger coating adhesion



Higher adhesion and microparticles in the superior bridge layer

Improved wear resistance



High carbon and fine columnar TiCN coating layer

Comparison of wear resistance

The hardness is greatly increased through the high carbonization of the columnar TiCN coating.

Insert: CNMG 433 CM
Work Material: FCD600
Work Process: Continuous
Coolant: Water Soluble

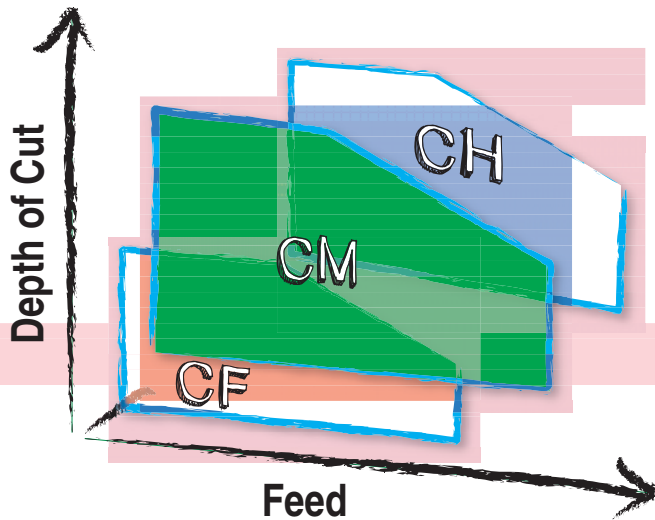
Cutting Speed: $vc = 660$ SFM
Feed: $f = .014$ IPR
Depth of Cut: $ap = .080$ "

Comparison of grades K5~10

	Competitor A	Competitor B	T5105
10 min.			
30 min.			

Comparison of grades K10~20

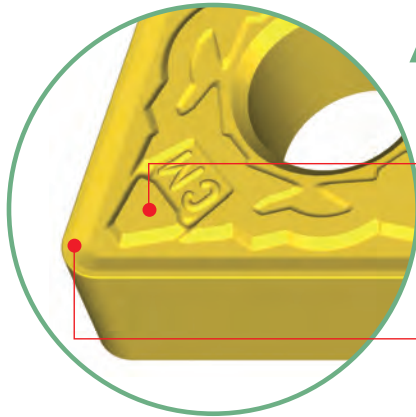
	Competitor A	Competitor B	T5115
10 min.			
30 min.			



CM Chipbreaker

First Choice

All-Around Chipbreaker

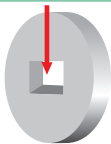


Close fitting seat

The relief surface extends optimally close to the end of the cutting edge while avoiding direct impact from the chips. Stabilizes insert tool life by suppressing vibration when cutting.

Positive land

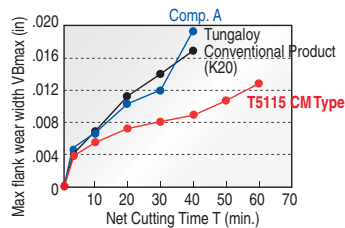
The excellent cutting edge shape offers a balance of low resistance and breakage resistance. Applicable for a wide range of processes from continuous to interrupted cutting.



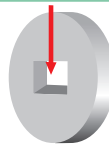
Long tool life in continuous and interrupted cutting.

The CM type chipbreaker shows its superiority in processes that combine continuous and interrupted cutting.

Insert: CNMG 433 CM
Grade: T5115
Toolholder: ACLNR2525M12
Work Material: FCD600
Cutting Speed: $v_c=500$ SFM
Depth of Cut: $a_p=.080$ "
Feed: $f=.014$ IPR
Coolant: Water Soluble



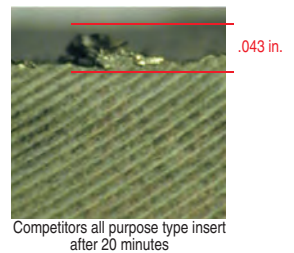
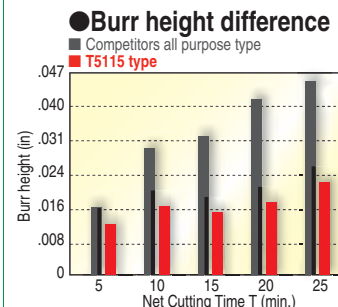
	Tungloy Conventional Product	Competitor A	T5115 CM Type
35 min.			
40 min.			
60 min.			



Burr preventive effect.

The optimal edge control of the CM chipbreaker prevents burr and edge breakout. Moreover, in combination with the T5100 series, consistency improves.

Insert: CNMG 433 CM
Grade: T5115
Toolholder: ACLNR2525M12
Work Material: FCD600
Cutting Speed: $v_c=500$ SFM
Depth of Cut: $a_p=.080$ "
Feed: $f=.014$ IPR
Coolant: Water Soluble



Competitors all purpose type insert after 20 minutes

60% Reduction



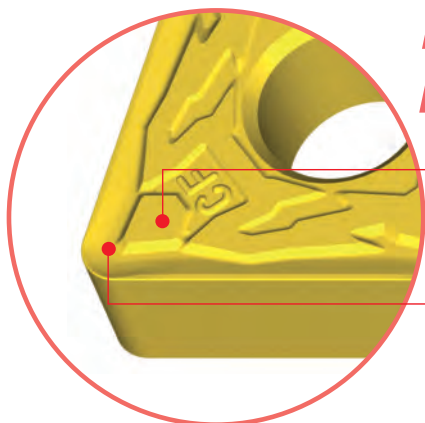
T5115 CM type after 20 minutes



CF Chipbreaker

Low Resistance Chipbreaker

Ideal for thin work material and preventing burr



Close fitting seat

The relief surface extends optimally close to the end of the cutting edge while avoiding direct impact from the chips. Stabilizes insert tool life by suppressing vibration when cutting.

Arc-shaped relief

Relief angle of practically 20°. Prevents chatter in low rigidity work materials and deformation of thin work material. Improves wear resistance in finishing processes.



Burr-preventing effect

The sharp edge of the CF chipbreaker prevents burr and edge breakout on the workpiece

Insert: CNMG 433 CF
Grade: T5115
Toolholder: ACLNR2525M12
Work Material: FCD600
Continuous and Interrupted Cutting

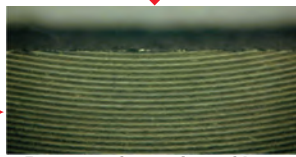
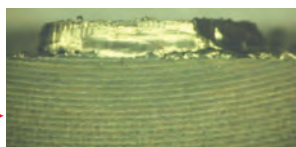
Cutting Speed: $vc=500$ SFM
Depth of Cut: $ap=.080$ "
Feed: $f=.014$ IPR
Coolant: Water Soluble



Competitor B



T5115 CF Type



Prevents formation of burr due to sudden downward pressure.

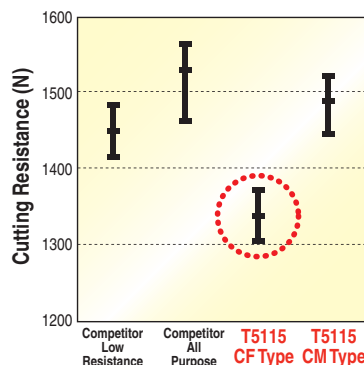


Reduced cutting resistance

Compared with competitor chipbreakers, the CF reduces resistance by more than 100 N.

Insert: CNMG 433 CF
Grade: T5115
Toolholder: ACLNR2525M12
Work Material: FCD600
Continuous

Cutting Speed: $vc=660$ SFM
Depth of Cut: $ap=.020$ "
Feed: $f=.012$ IPR
Coolant: Water Soluble



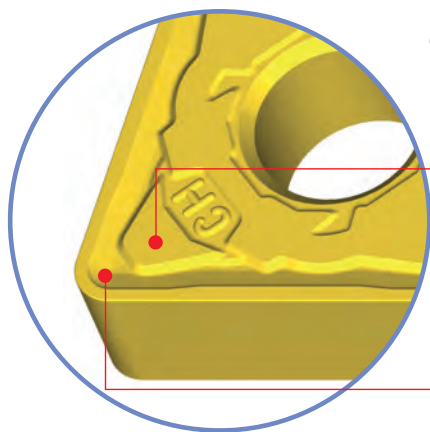
Arc-shaped relief of practically 20°



CH Chipbreaker

Strengthened Edge Chipbreaker

Chipbreaker for interrupted high feed processing



Close fitting seat

The relief surface extends optimally close to the end of the cutting edge while avoiding direct impact from the chips. Stabilizes insert tool life by suppressing vibration when cutting.

Wide land and land support

Use of wide negative land - Achieves a cutting edge that does not break under high feed and heavy interrupted cutting.

Use of land support - Prevents vibration of the cutting edge caused by overload when cutting at high speeds and depths of cut. Increases resistance to breakage, prolongs tool life.

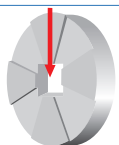
Strong Support

Insert maintains edge contact with the holder even under heavy machining conditions.

Conventional
3-dimensional
chipbreaker



CH
chipbreaker



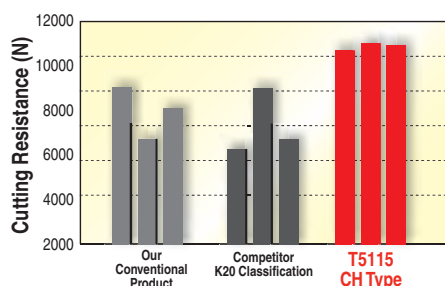
Insert:
Grade:
Toolholder:
Work Material:

Longer tool life with interrupted cutting.

The combination of the **CH chipbreaker** and the **T5125 grade** prevents chipping and chip welding in heavy interrupted process, achieving 1.5 times the tool life of conventional or competing products.

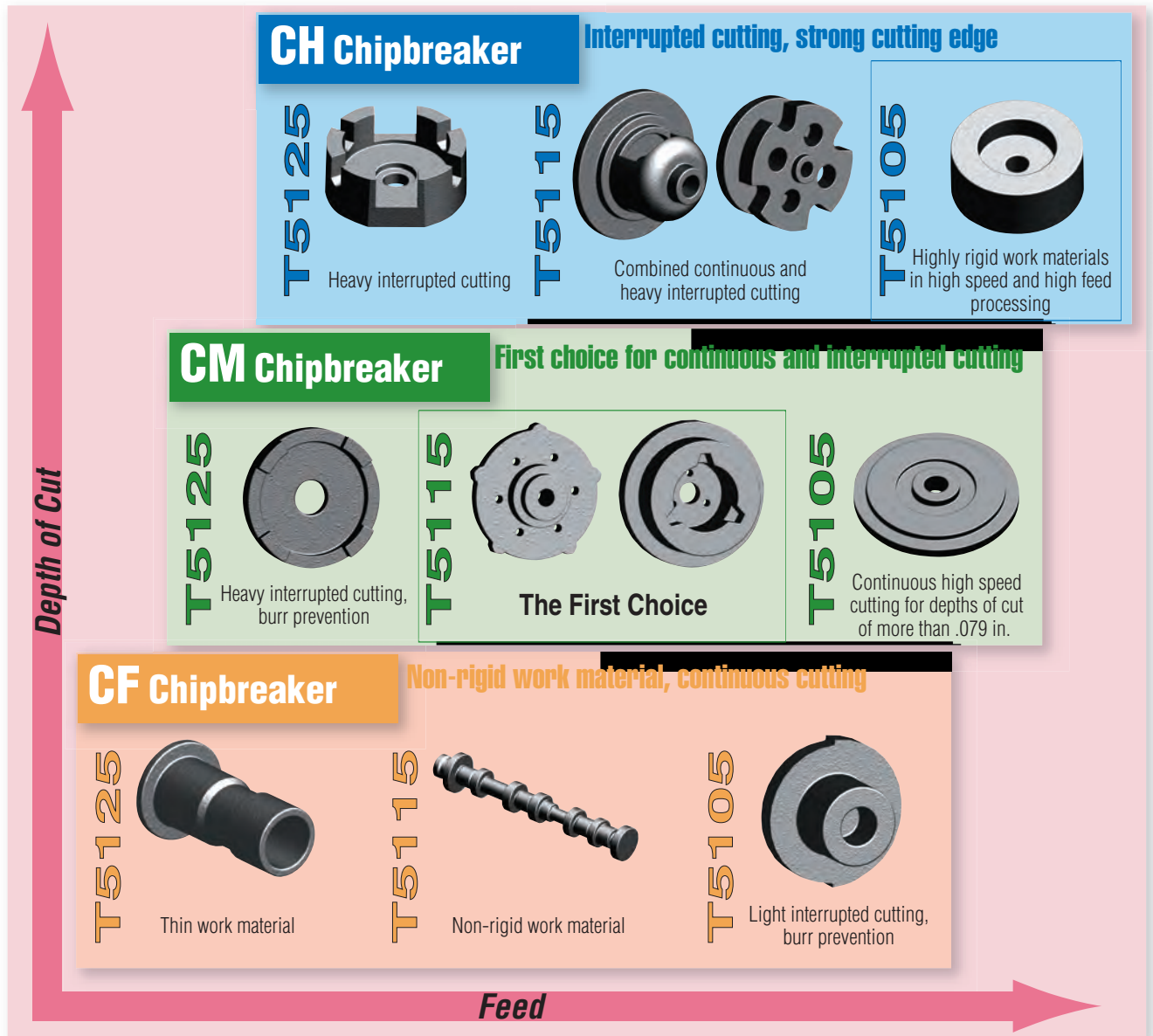
CNMG 433 CH
T5125
ACLNR2525M12
FCD600
Interrupted Cutting

Cutting Speed: $vc=500$ SFM
Depth of Cut: $ap=.080$ "
Feed: $f=.014$ IPR
Coolant: Water Soluble



	Tungaloy Conventional Product	Competitor K20 Classification	T5125 CH Type
5 min	Chipping	Chipping	Normal Wear
15 min	Big Chip Welding	Big Chip Welding	Small Chip Welding
Final	20min	23min	30min Normal Wear

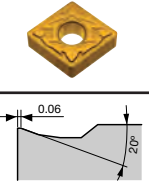
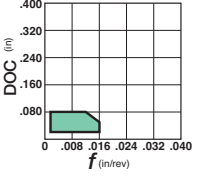
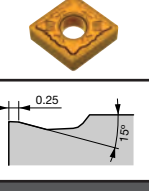
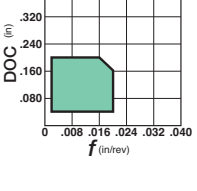
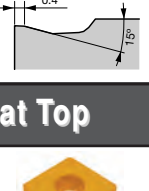
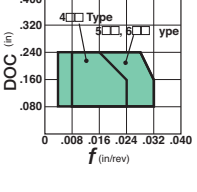
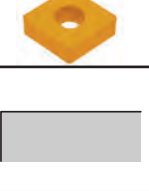
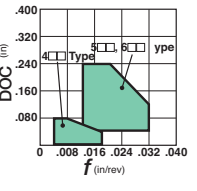
Selection Guide



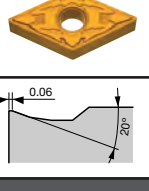
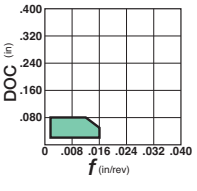
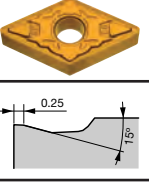
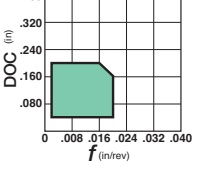
General Cutting Conditions

Chipbreaker	Nose Radius		Depth of Cut		Feed Rate	
	inch	mm	inch	mm	inch	mm/rev
CM	.016	0.4	.04 - .200	1.0 - 5.0	.002 - .008	0.05 - 0.2
	.031	0.8			.006 - .016	0.15 - 0.4
	.047	1.2			.006 - .020	0.15 - 0.5
	.062	1.6			.002 - .008	0.05 - 0.2
CF	.016	0.4	.02 - .080	0.5 - 2.0	.004 - .014	0.1 - 0.35
	.031	0.8			.004 - .016	0.1 - 0.4
	.047	1.2			.004 - .012	0.1 - 0.3
	.062	1.6			.008 - .018	0.2 - 0.45
CH	.016	0.4	.080 - .240	2.0 - 6.0	.008 - .024	0.2 - 0.6
	.031	0.8			.012 - .032	0.3 - 0.8
	.047	1.2			.004 - .012	0.1 - 0.3
	.062	1.6			.008 - .018	0.2 - 0.45
Flat Top	.016	0.4	.002 - .080	0.05 - 2.0	.012 - .032	0.3 - 0.8
	.031	0.8			.012 - .032	0.3 - 0.8
	.047	1.2			.012 - .032	0.3 - 0.8
	.062	1.6			.012 - .032	0.3 - 0.8

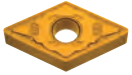
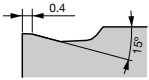
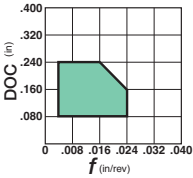
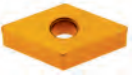
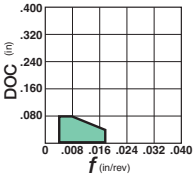
Rhombic 80° - Negative

Application	Chipbreaker Appearance (Cross Section)	$a_p - f$	Insert Cat. No (Inch)	Insert Cat. No (Metric)	Corner Radius	Stocked Grades Coated		
						T5105	T5115	T5125
Finishing	CF Chipbreaker 		CNMG 431 CF	CNMG120404-CF	.016	●	●	
			CNMG 432 CF	CNMG120408-CF	.031	●	●	
			CNMG 433 CF*	CNMG120412-CF	.047	●	●	
Medium	CM Chipbreaker 		CNMG 431 CM	CNMG120404-CM	.016	●	●	●
			CNMG 432 CM	CNMG120408-CM	.032	●	●	●
			CNMG 433 CM*	CNMG120412-CM	.047	●	●	●
			CNMG 542 CM	CNMG160608-CM	.032	●	●	●
			CNMG 543 CM	CNMG160612-CM	.047	●	●	●
Roughing	CH Chipbreaker 		CNMG 431 CH	CNMG120404-CH	.016	○	●	●
			CNMG 432 CH	CNMG120408-CH	.031	●	●	●
			CNMG 433 CH*	CNMG120412-CH	.047	●	●	●
			CNMG 543 CH	CNMG160612-CH	.047	●	●	●
			CNMG 544 CH	CNMG160616-CH	.062	○	○	○
			CNMG 643 CH	CNMG190612-CH	.047	●	●	●
			CNMG 644 CH	CNMG190616-CH	.062	●	●	●
Finish-Medium	Flat Top 		CNMA 431	CNMA120404	.016	●	●	●
			CNMA 432	CNMA120408	.031	●	●	●
			CNMA 433	CNMA120412	.047	●	●	●
			CNMA 434	CNMA120416	.062	●	●	●
			CNMA 542	CNMA160608	.031	●	●	●
			CNMA 543	CNMA160612	.047	●	●	●
			CNMA 544	CNMA160616	.062	●	●	●
			CNMA 643	CNMA190612	.047	●	●	●
			CNMA 644	CNMA190616	.062	○	○	○

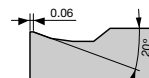
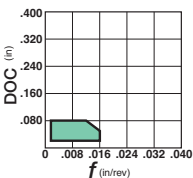
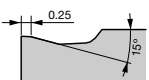
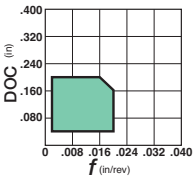
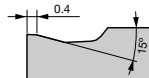
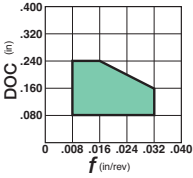
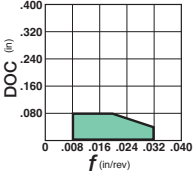
Rhombic 55° - Negative

Application	Chipbreaker Appearance (Cross Section)	$a_p - f$	Insert Cat. No (Inch)	Insert Cat. No (Metric)	Corner Radius	Stocked Grades Coated		
						T5105	T5115	T5125
Finishing	CF Chipbreaker 		DNMG 431 CF	DNMG150404-CF	.016	●	●	
			DNMG 432 CF	DNMG150408-CF	.031	●	●	
			DNMG 433 CF*	DNMG150412-CF	.047	●	●	
			DNMG 441 CF	DNMG150604-CF	.016	○	○	
			DNMG 442 CF	DNMG150608-CF	.032	○	○	
			DNMG 443 CF	DNMG150612-CF	.047	○	○	
Medium	CM Chipbreaker 		DNMG 431 CM	DNMG150404-CM	.016	●	●	●
			DNMG 432 CM	DNMG150408-CM	.031	○	●	●
			DNMG 433 CM	DNMG150412-CM	.047	●	●	●
			DNMG 441 CM	DNMG150604-CM	.016	○	●	●
			DNMG 442 CM	DNMG150608-CM	.031	○	●	●
			DNMG 443 CM	DNMG150612-CM	.047	○	●	●

Note: The cross section drawing shown corresponds to the item number containing the *.

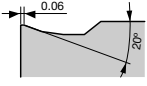
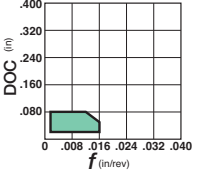
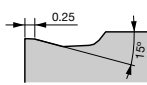
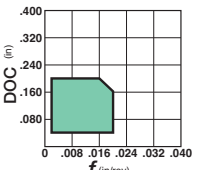
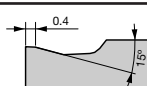
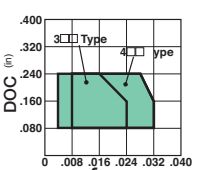
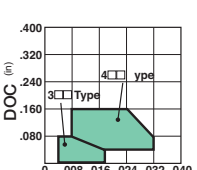
Application	Chipbreaker Appearance (Cross Section)	$a_p - f$	Insert Cat. No (Inch)	Insert Cat. No (Metric)	Corner Radius	Stocked Grades Coated		
						T5105	T5115	T5125
Roughing	CH Chipbreaker  		DNMG 431 CH	DNMG150404-CH	.016	○	●	●
			DNMG 432 CH	DNMG150408-CH	.031	●	●	●
			DNMG 433 CH*	DNMG150412-CH	.047	●	●	●
			DNMG 441 CH	DNMG150604-CH	.016	○	●	●
			DNMG 442 CH	DNMG150608-CH	.031	○	●	●
			DNMG 443 CH	DNMG150612-CH	.047	●	○	●
Finish - Medium	Flat Top  		DNMA 431	DNMA150404	.016	●	●	●
			DNMA 432	DNMA150408	.031	●	●	●
			DNMA 433	DNMA150412	.047	●	●	●
			DNMA 441	DNMA150604	.016	○	●	●
			DNMA 442	DNMA150608	.032	○	●	●
			DNMA 443	DNMA150612	.047	●	○	○

■ Square 90° - Negative

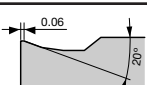
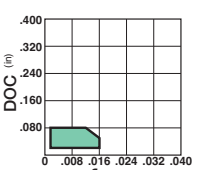
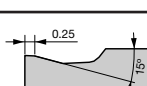
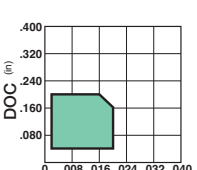
Application	Chipbreaker Appearance (Cross Section)	$a_p - f$	Insert Cat. No (Inch)	Insert Cat. No (Metric)	Corner Radius	Stocked Grades Coated		
						T5105	T5115	T5125
Finishing	CF Chipbreaker  		SNMG 432 CF	SNMG120408-CF	.031	●	●	
			SNMG 433 CF*	SNMG120412-CF	.047	●	●	
Finishing	CM chipbreaker  		SNMG 432 CM	SNMG120408-CM	.031	●	●	●
			SNMG 433 CM*	SNMG120412-CM	.047	●	●	●
Roughing	CH Chipbreaker  		SNMG 432 CH	SNMG120408-CH	.031	●	●	●
			SNMG 433 CH*	SNMG120412-CH	.047	●	●	●
			SNMG 434 CH	SNMG120416-CH	.062	●	●	●
Finish-Medium	Flat Top  		SNMA 322	SNMA090308	.031	●	●	●
			SNMA 323	SNMA090312	.047	●	●	●
			SNMA 431	SNMA120404	.016	●	●	●
			SNMA 432	SNMA120408	.031	●	●	●
			SNMA 433	SNMA120412	.047	●	●	●
			SNMA 434	SNMA120416	.062	●	●	●
			SNMA 543	SNMA150612	.047	●	●	●
			SNMA 643	SNMA190612	.047	●	●	●

Note: The cross section drawing shown corresponds to the item number containing the *.

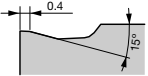
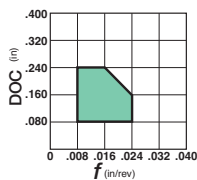
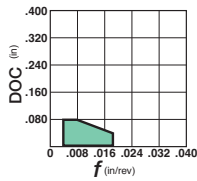
Triangle 60° - Negative

Application	Chipbreaker Appearance (Cross Section)	$a_p - f$	Insert Cat. No (Inch)	Insert Cat. No (Metric)	Corner Radius	Stocked Grades Coated		
						T5105	T5115	T5125
Finishing	CF Chipbreaker	 	TNMG 331 CF	TNMG160404-CF	.016	●	●	
			TNMG 332 CF*	TNMG160408-CF	.031	●	●	
Medium	CM Chipbreaker	 	TNMG 331 CM	TNMG160404-CM	.016	●	●	●
			TNMG 332 CM	TNMG160408-CM	.031	●	●	●
			TNMG 333 CM*	TNMG160412-CM	.047	●	●	●
			TNMG 432 CM	TNMG220408-CM	.031	●	●	●
			TNMG 433 CM	TNMG220412-CM	.047	●	●	●
Roughing	CH Chipbreaker	 	TNMG 331 CH	TNMG160404-CH	.016	○	○	○
			TNMG 332 CH	TNMG160408-CH	.031	●	●	●
			TNMG 333 CH*	TNMG160412-CH	.047	●	●	●
			TNMG 432 CH	TNMG220408-CH	.031	●	●	●
			TNMG 433 CH	TNMG220412-CH	.047	●	●	●
			TNMG 434 CH	TNMG220416-CH	.062	●	●	●
Finish-Medium	Flat Top	 	TNMA 331	TNMA160404	.016	●	●	●
			TNMA 332	TNMA160408	.031	●	●	●
			TNMA 333	TNMA160412	.047	●	●	●
			TNMA 334	TNMA160416	.062	●	●	●
			TNMA 431	TNMA220404	.016	●	●	●
			TNMA 432	TNMA220408	.031	●	●	●
			TNMA 433	TNMA220412	.047	●	●	●
			TNMA 434	TNMA220416	.062	●		●

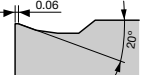
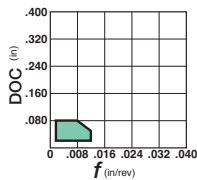
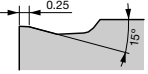
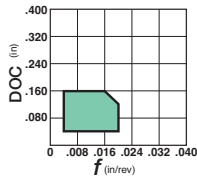
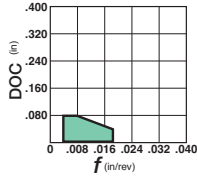
Trigon 80° - Negative

Application	Chipbreaker Appearance (Cross Section)	$a_p - f$	Insert Cat. No (Inch)	Insert Cat. No (Metric)	Corner Radius	Stocked Grades Coated		
						T5105	T5115	T5125
Finishing	CF Chipbreaker	 	WNMG 431 CF	WNMG080404-CF	.016	●	●	
			WNMG 432 CF	WNMG080408-CF	.031	●	●	
			WNMG 433 CF*	WNMG080412-CF	.047	●	●	
Medium	CM Chipbreaker	 	WNMG 432 CM	WNMG080408-CM	.031	●	●	●
			WNMG 433 CM*	WNMG080412-CM	.047	●	●	●

Note: The cross section drawing shown corresponds to the item number containing the *.

Application	Chipbreaker Appearance (Cross Section)	$a_p - f$	Insert Cat. No (Inch)	Insert Cat. No (Metric)	Corner Radius	Stocked Grades Coated		
						T5105	T5115	T5125
Roughing	CH Chipbreaker	 	WNMG 432 CH	WNMG080408-CH	.031	●	●	●
			WNMG 433 CH*	WNMG080412-CH	.047	●	●	●
Finish - Medium	Flat Top	 	WNMA 431	WNMA080404	.016	●	●	●
			WNMA 432	WNMA080408	.031	●	●	●
			WNMA 433	WNMA080412	.047	●	●	●
			WNMA 434	WNMA080416	.062	●	●	●

■ Rhombic 35° - Negative

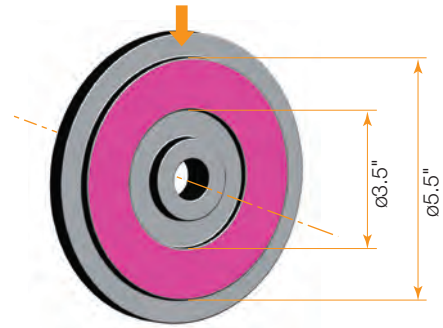
Application	Chipbreaker Appearance (Cross Section)	$a_p - f$	Insert Cat. No (Inch)	Insert Cat. No (Metric)	Corner Radius	Stocked Grades Coated		
						T5105	T5115	T5125
Finishing	CF Chipbreaker	 	VNMG 331 CF	VNMG160404-CF	.016	●	●	
			VNMG 332 CF*	VNMG160408-CF	.031	●	●	
Medium	CM chipbreaker	 	VNMG 332 CM	VNMG160408-CM	.031	●	●	●
			VNMG 333 CM*	VNMG160412-CM	.047	●	●	●
Finish - Medium	Flat Top	 	VNMA 331	VNMA160404	.016	●	●	●
			VNMA 332	VNMA160408	.031	●	●	●

■ Practical Examples

Insert: CNMG 433 CM T5105

Toolholder: ACLNR2525M12

Work Material: Ductile Cast Iron FCD600
 Work Piece Type: Automotive Part
 Tool Life Criteria: Tolerance
 Cutting Speed: $vc=1500$ SFM
 Feed: $f=.020$ IPR
 Depth of Cut: $ap=.080$ "
 Dry Cutting



Continuous Face Turning

Results: Through its stability in high speed processing, the T5105 was able to reach a tool life of 2.7 times that of conventional products.

100 pcs. → 270 pcs.

Insert: CNMG 433 CM T5115

Toolholder: ACLNR2525M12

Work Material: Ductile Cast Iron FCD600
 Work Piece Type: Automotive Part
 Tool Life Criteria: Surface Roughness
 Cutting Speed: $vc=980$ SFM
 Feed: $f=.012\sim.016$ IPR
 Depth of Cut: $ap=.020$ "
 Dry Cutting



Lightly Interrupted Face Turning

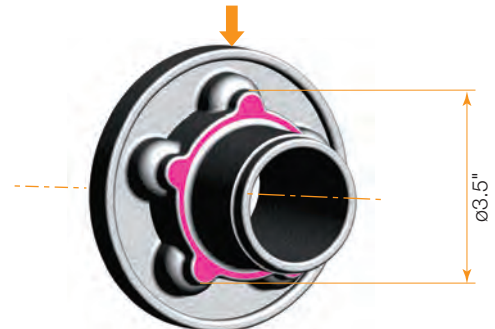
Results: In processing spots of interrupted cutting in which work surface precision was required, competitor products were unable to reach constant precision. The T5115 CM type chipbreaker yields stable precision and tool life is also 1.7 times better than the competition.

100 pcs. → 170 pcs.

Insert: CNMG 433 CM T5125

Toolholder: ACLNR2525M12

Work Material: Ductile Cast Iron FCD600
 Work Piece Type: Automotive Part
 Tool Life Criteria: Tolerance
 Cutting Speed: $vc=280\sim560$ SFM
 Feed: $f=.010$ IPR
 Depth of Cut: $ap=.080\sim.120$ "
 Dry Cutting



Heavy Interrupted Face Turning

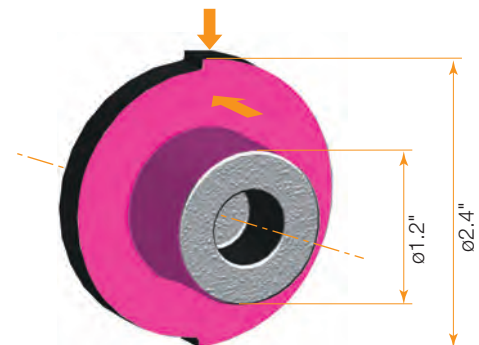
Results: The part with interrupted face turning is an unstable cutting process; conventional products showed chipping and irregularities on the cutting edge. The T5125 CM type chipbreaker shows no chipping, and its tool life is 2 times better.

70 pcs. → 140 pcs.

Insert: DNMG 432 CF T5105

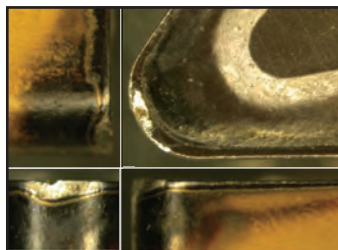
Toolholder: ADJNR2525M15

Work Material: Ductile Cast Iron FCD450
 Work Piece Type: Construction Machine Parts
 Tool Life Criteria: Burr and Tolerance
 Cutting Speed: 600~725 SFM
 Feed: .010 IPR
 Depth of Cut: .003~.006"
 Water Soluble



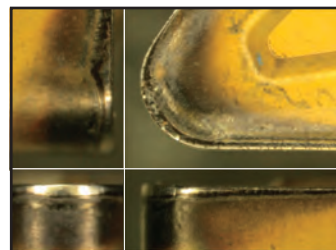
Continuous and Light
Interrupted Face Turning

Results: Interrupted face cutting process that does not allow for tolerance variances in external turning or burr. The T5105 CF type chipbreaker shows good wearability and gives 1.8 times better performance than competitor products.



Competitor Product

No. of pieces processed: 200



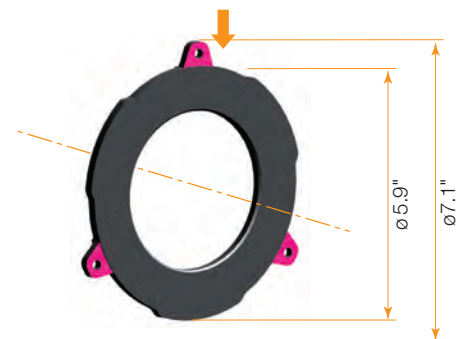
T5105 - CF Chipbreaker

No. of pieces processed: 370

Insert: WNMG 433 CH T5115

Toolholder: AWLNR2525M08

Work Material: Normal Cast Iron FC200
 Work Piece Type: Machine Parts
 Tool Life Criteria: Appearance of Finished Surface
 Cutting Speed: 850 SFM
 Feed: .012 IPR
 Depth of Cut: .160"
 Dry Cutting



Heavy Interrupted Face Turning

Results: The strong interrupted process with severe variations resulted in the competitors insert breaking. The T5115 CH type chipbreaker showed no breakage, making it possible to stabilize the process.

Stable Processing

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