TurnLine

T515

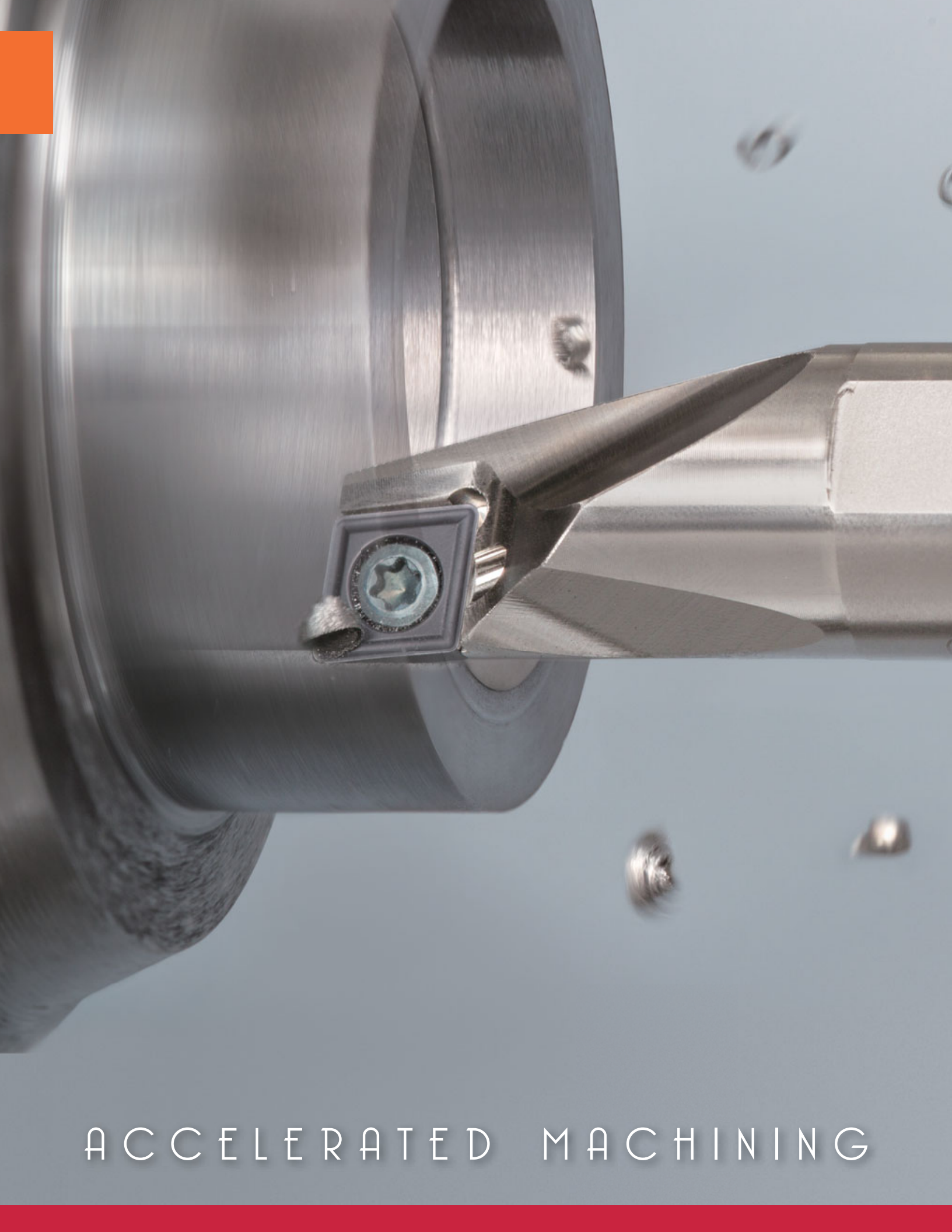
www.tungaloyamerica.com

Tungaloy Report No. 433-US

New grade for cast iron turning

Member IMC Group

Tungaloy


ACCELERATED MACHINING

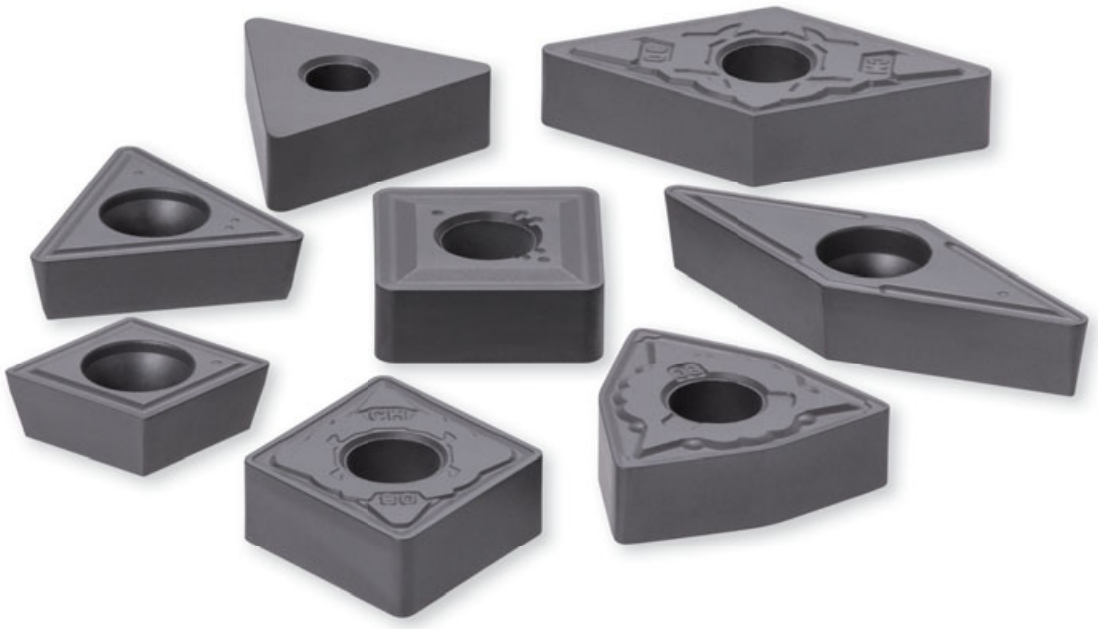
TurnLine

T515

TUNGALOY

TUNGTURN FORCE

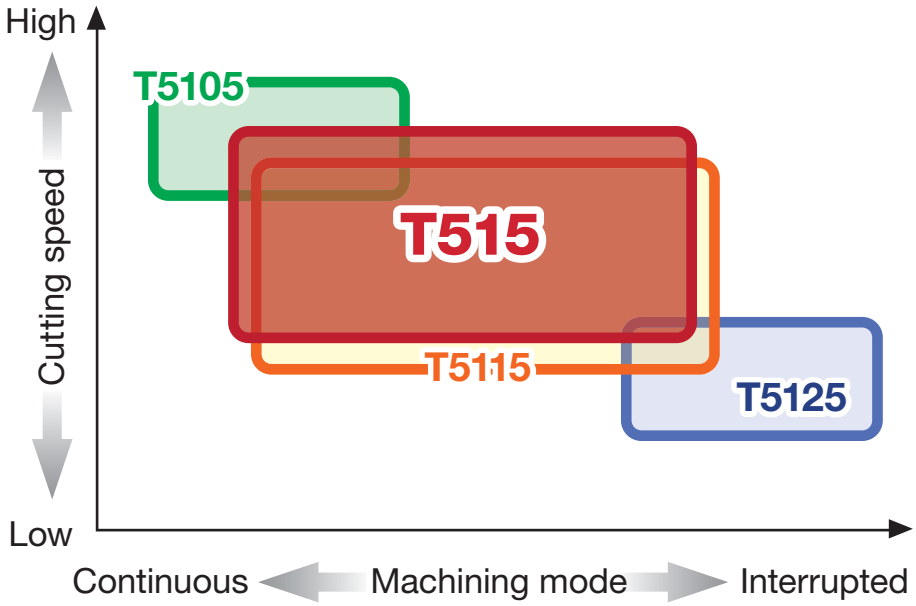
ACCELERATED MACHINING

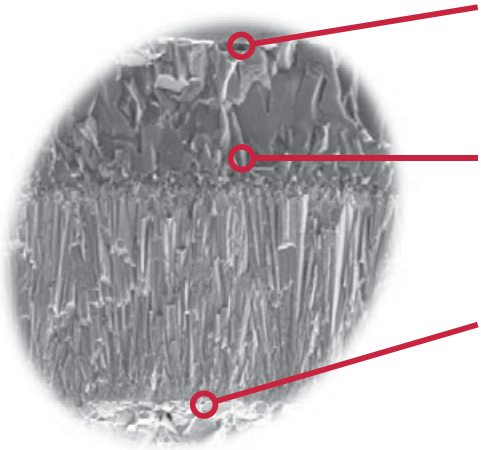


Versatile grade for high-speed turning of cast iron

Versatile grade for cast iron turning at high speed, complementing T5115

APPLICATION AREA





Smooth surface reduces chipping and chip welding!

PremiumTec, smooth surface technology, improves surface roughness.

Excellent wear resistance in high-speed cutting!

Al_2O_3 layer is 1.7 times thicker than the conventional coating.

Incredible chipping and fracture resistance!

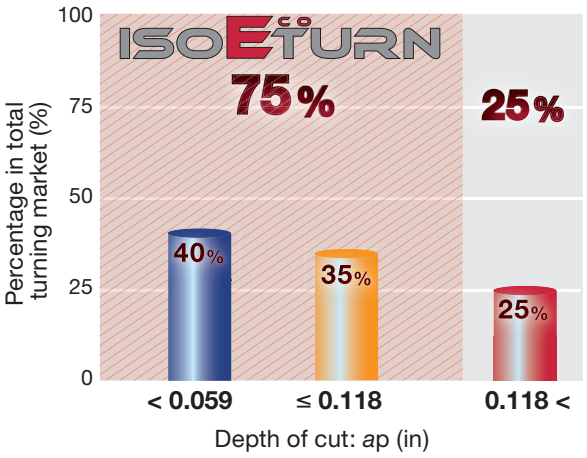
Strong adhesion between coating and substrate delivers remarkable toughness.

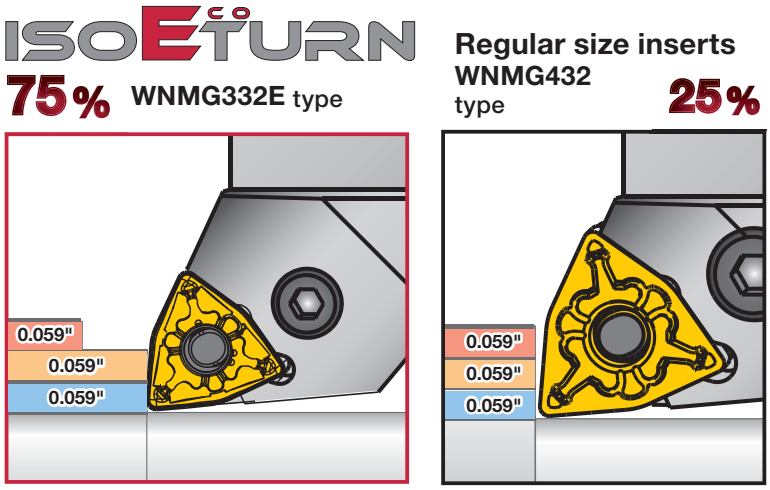
Application	Grade	Substrate			Coating layer	
		Specific gravity	Hardness (HRA)	T.R.S. (GPa)	Main Composition	Thickness (µm)
K	**T515**	**14.8**	**91.5**	**2.7**	**Continuously formed columnar crystal TiCN + Al_2O_3**	**16**
	T5115	14.8	91.5	2.7	Continuously formed columnar crystal TiCN + Al_2O_3	16

ISO-EcoTurn small size inserts, for an economical advantage

Over 75%* of the turning market only uses a depth of cut at or less than 0.118"

* Based on Tungaloy market research.



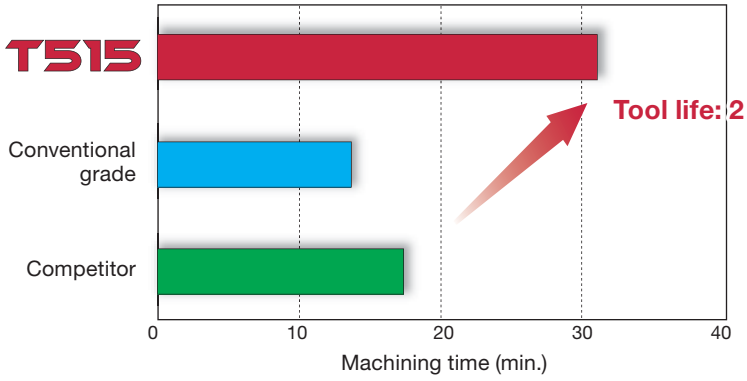


CUTTING PERFORMANCE

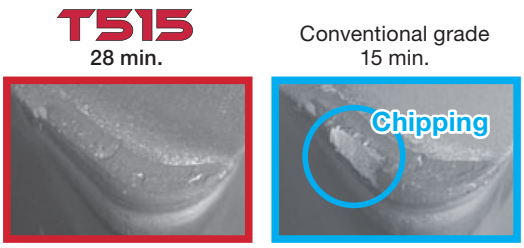
T515 achieves stable, long tool life in both continuous and interrupted machining!

K Gray cast iron (No.200B)

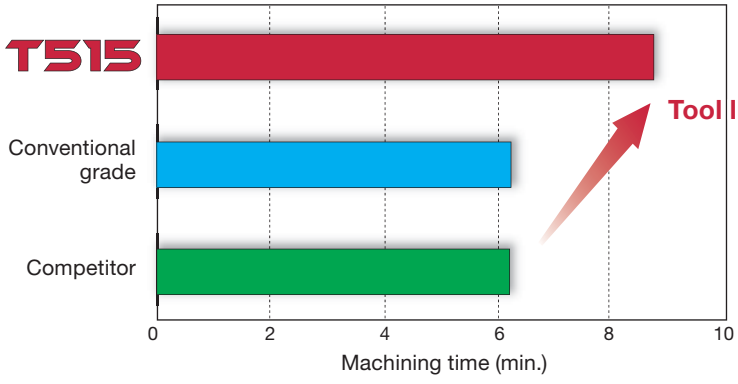
Excellent wear resistance in continuous cutting at high speed!



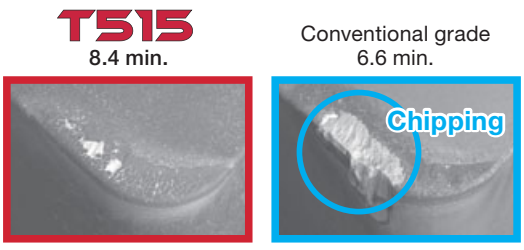
Insert	: CNMA432
Cutting speed	: *Vc* = 2300 sfm
Feed	: *f* = 0.012 ipr
Machining	: Continuous cutting
Coolant	: Wet



Incredible chipping resistance in interrupted cutting!

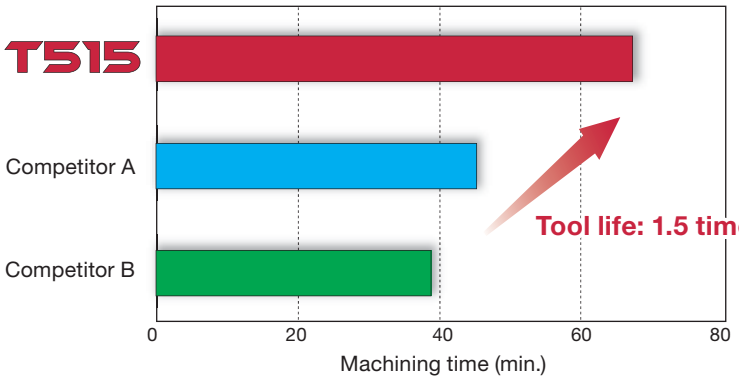


Insert	: CNMA432
Cutting speed	: *Vc* = 1300 sfm
Feed	: *f* = 0.014 ipr
Machining	: Interrupted cutting
Coolant	: Wet

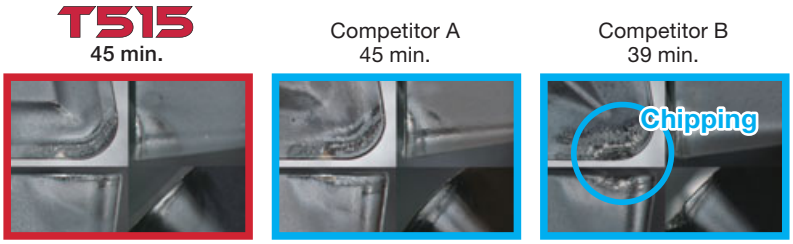


Continuous internal machining

K Grey cast iron (No. 250B)

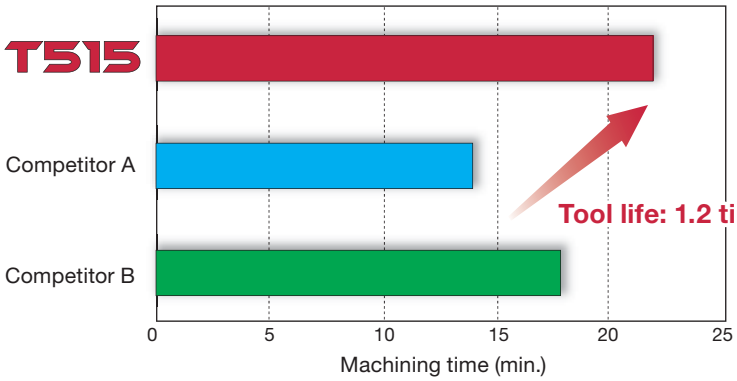


Insert	: CCMT09T308-*
Cutting speed	: *Vc* = 980 sfm
Feed	: *f* = 0.008 ipr
Depth of cut	: *ap* = 0.059"
Machining	: Continuous Internal cutting
Coolant	: Wet

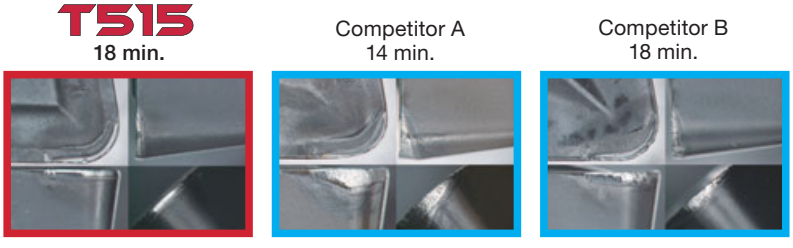


Continuous internal machining

K Ductile cast iron (80-55-06)



Insert	: CCMT09T308-*
Cutting speed	: *Vc* = 660 sfm
Feed	: *f* = 0.008 ipr
Depth of cut	: *ap* = 0.059"
Machining	: Continuous internal cutting
Coolant	: Wet



STANDARD CUTTING CONDITIONS

For negative inserts

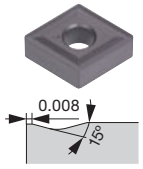
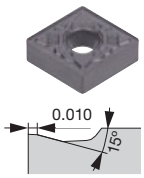
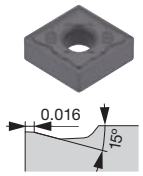
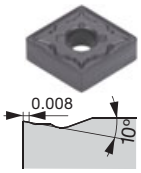
Chipbreaker	Grades	Corner radius r_ε (inch)	Depth of cut a_p (inch)	Feed f (ipr)	Cutting speed: V_c (sfm)	
					Gray cast iron	Ductile cast iron
CM	T515	0.031	0.004 - 0.197	0.006 - 0.016	490 - 2300	490 - 980
	T515	0.047	0.004 - 0.197	0.006 - 0.020	490 - 2300	490 - 980
CH	T515	0.016	0.008 - 0.236	0.004 - 0.012	490 - 2300	490 - 980
	T515	0.031	0.008 - 0.236	0.008 - 0.018	490 - 2300	490 - 980
	T515	0.047	0.008 - 0.236	0.008 - 0.024	490 - 2300	490 - 980
All-round	T515	0.016	0.004 - 0.236	0.008 - 0.012	490 - 2300	490 - 980
	T515	0.031	0.004 - 0.236	0.008 - 0.020	490 - 2300	490 - 980
	T515	0.047	0.004 - 0.236	0.008 - 0.020	490 - 2300	490 - 980
	T515	0.062	0.004 - 0.236	0.012 - 0.020	490 - 2300	490 - 980
Flat-top	T515	0.031	0.002 - 0.079	0.008 - 0.018	490 - 2300	490 - 980
	T515	0.047	0.002 - 0.079	0.012 - 0.031	490 - 2300	490 - 980

For positive insert

Chipbreaker	Grades	Corner radius r_ε (inch)	Depth of cut a_p (inch)	Feed f (ipr)	Cutting speed: V_c (sfm)	
					Gray cast iron	Ductile cast iron
CM	T515	0.016	0.002 - 0.08	0.002 - 0.008	490 - 2300	490 - 980
	T515	0.031	0.002 - 0.08	0.002 - 0.012	490 - 2300	490 - 980
	T515	0.047	0.002 - 0.08	0.002 - 0.012	490 - 2300	490 - 980

INSERTS - NEGATIVE TYPE

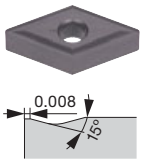
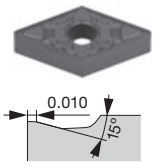
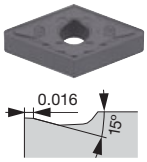
Rhombic , 80°

Application	Chipbreaker Appearance (Cross section)	Cat. No	Grade Coated T515	I.C.dia ød	Thickness s	Hole dia ød1	Corner radius rε
Medium cutting	All-round	CNMG 431	✓	0.500	0.187	0.203	0.016
		*CNMG 432	✓	0.500	0.187	0.203	0.031
		CNMG 433	✓	0.500	0.187	0.203	0.047
		CNMG 434	✓	0.500	0.187	0.203	0.063
		CNMG 543	✓	0.625	0.250	0.250	0.047
		CNMG 544	✓	0.625	0.250	0.250	0.063
		CNMG 643	✓	0.750	0.250	0.312	0.047
		CNMG 644	✓	0.750	0.250	0.312	0.063
	CM	CNMG 431 CM New	✓	0.500	0.187	0.203	0.016
		*CNMG 432 CM	✓	0.500	0.187	0.203	0.031
		CNMG 433 CM	✓	0.500	0.187	0.203	0.047
		CNMG 543 CM New	✓	0.625	0.250	0.250	0.047
Medium to heavy cutting	CH	*CNMG 432 CH	✓	0.500	0.187	0.203	0.031
		CNMG 433 CH	✓	0.500	0.187	0.203	0.047
Finishing to medium cutting	SW (Wiper)	*CNMG 432 SW	✓	0.500	0.187	0.203	0.031
		CNMG 433 SW	✓	0.500	0.187	0.203	0.047
	- (Flat-top)	CNMA 331E New	✓	0.375	0.187	0.150	0.016
		CNMA 332E New	✓	0.375	0.187	0.150	0.031
		CNMA 333E New	✓	0.375	0.187	0.150	0.047
		CNMA 334E New	✓	0.375	0.187	0.150	0.063
		*CNMA 432	✓	0.500	0.187	0.203	0.031
		CNMA 433	✓	0.500	0.187	0.203	0.047
		CNMA 543	✓	0.625	0.250	0.250	0.047
		CNMA 544	✓	0.625	0.250	0.250	0.063
		CNMA 643	✓	0.750	0.250	0.312	0.047
		CNMA 644	✓	0.750	0.250	0.312	0.063

*Note: Chipbreaker cross sections are of the inserts marked *

✓ : Stocked items

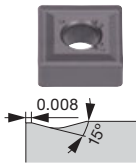
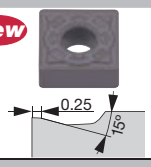
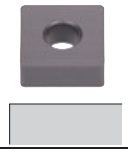
Rhombic , 55°

Application	Chipbreaker Appearance (Cross section)	Cat. No	Grade Coated T515	I.C.dia ød	Thickness s	Hole dia ød1	Corner radius r_ε
Medium cutting	**All-round**	***DNMG 432**	✓	0.500	0.187	0.203	0.031
		**DNMG 433**	✓	0.500	0.187	0.203	0.047
		DNMG 442	✓	0.500	0.250	0.203	0.031
		DNMG 443	✓	0.500	0.250	0.203	0.047
	CM	**DNMG 431 CM** New	✓	0.500	0.187	0.203	0.016
		***DNMG 432 CM**	✓	0.500	0.187	0.203	0.031
		DNMG 433 CM	✓	0.500	0.187	0.203	0.047
Medium to heavy cutting	**CH**	***DNMG 432 CH**	✓	0.500	0.187	0.203	0.031
		**DNMG 433 CH**	✓	0.500	0.187	0.203	0.047
Finishing to medium cutting	**- (Flat-top)**	**DNMA 331E** New	✓	0.375	0.187	0.150	0.016
		**DNMA 332E** New	✓	0.375	0.187	0.150	0.031
		DNMA 333E New	✓	0.375	0.187	0.150	0.047
		DNMA 431	✓	0.500	0.187	0.203	0.016
		***DNMA 432**	✓	0.500	0.187	0.203	0.031
		**DNMA 441**	✓	0.500	0.250	0.203	0.016
		DNMA 442	✓	0.500	0.250	0.203	0.031

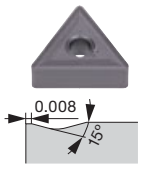
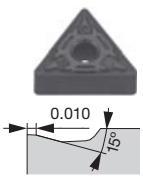
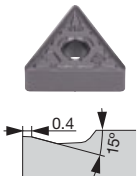
*Note: Chipbreaker cross sections are of the inserts marked *

✓ : Stocked items

Square , 90°

Application	Chipbreaker / Appearance (Cross section)	Cat. No	Grade: Coated T515	I.C.dia ød	Thickness s	Hole dia ød1	Corner radius r_ε
Medium cutting	All-round	*SNMG 432	✓	0.500	0.187	0.203	0.031
		SNMG 433	✓	0.500	0.187	0.203	0.047
		SNMG 543	✓	0.625	0.250	0.250	0.047
		SNMG 544	✓	0.625	0.250	0.250	0.063
		SNMG 643	✓	0.750	0.250	0.312	0.047
		SNMG 644	✓	0.750	0.250	0.312	0.063
	CM	SNMG 432 CM	✓	0.500	0.187	0.203	0.031
	New 	SNMG 433 CM	✓	0.500	0.250	0.203	0.047
Finishing to medium cutting	- (Flat-top)	*SNMA 432	✓	0.500	0.187	0.203	0.031
		SNMA 433	✓	0.500	0.250	0.203	0.047

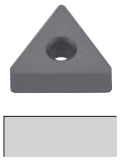
Triangular , 60°

Application	Chipbreaker / Appearance (Cross section)	Cat. No	Grade: Coated T515	I.C.dia ød	Thickness s	Hole dia ød1	Corner radius r_ε
Medium cutting	All-round	TNMG 331	✓	0.375	0.187	0.150	0.016
		*TNMG 332	✓	0.375	0.187	0.150	0.031
		TNMG 333	✓	0.375	0.187	0.150	0.047
	CM	TNMG 331 CM	✓	0.375	0.187	0.150	0.016
		*TNMG 332 CM	✓	0.375	0.187	0.150	0.031
		TNMG 333 CM	✓	0.375	0.187	0.150	0.047
Finishing to medium cutting	CH	TNMG 331 CH	✓	0.375	0.187	0.150	0.016
		*TNMG 332 CH	✓	0.375	0.187	0.150	0.031
		TNMG 333 CH	✓	0.375	0.187	0.150	0.047

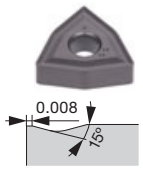
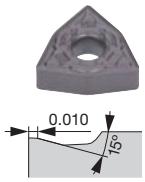
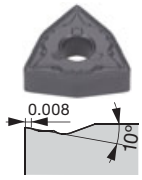
*Note: Chipbreaker cross sections are of the inserts marked *

✓ : Stocked items

Triangular , 60°

Application	Chipbreaker Appearance (Cross section)	Cat. No	Grade Coated T515	I.C.dia ød	Thickness s	Hole dia ød1	Corner radius rε
Finishing to medium cutting	- (Flat-top)	TNMA 231E New	✓	0.250	0.187	0.089	0.016
		TNMA 232E New	✓	0.250	0.187	0.089	0.031
		TNMA 233E New	✓	0.250	0.187	0.089	0.047
		TNMA 331	✓	0.375	0.187	0.150	0.016
		*TNMA 332	✓	0.375	0.187	0.150	0.031
		TNMA 333	✓	0.375	0.187	0.150	0.047

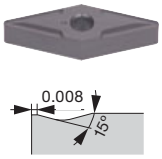
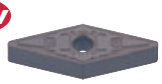
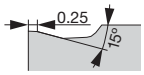
Trigon , 80°

Application	Chipbreaker Appearance (Cross section)	Cat. No	Grade Coated T515	I.C.dia ød	Thickness s	Hole dia ød1	Corner radius rε
Medium cutting	All-round	WNMG 431	✓	0.500	0.187	0.203	0.016
		*WNMG 432	✓	0.500	0.187	0.203	0.031
		WNMG 433	✓	0.500	0.187	0.203	0.047
		WNMG 434	✓	0.500	0.187	0.203	0.063
	CM	*WNMG 432 CM	✓	0.500	0.187	0.203	0.031
		WNMG 433 CM	✓	0.500	0.187	0.203	0.047
	SW	*WNMG 432 SW	✓	0.500	0.187	0.203	0.031
		WNMG 433 SW	✓	0.500	0.187	0.203	0.047
Finishing to medium cutting	- (Flat-top)	WNMA 331E New	✓	0.375	0.187	0.150	0.016
		WNMA 332E New	✓	0.375	0.187	0.150	0.031
		WNMA 333E New	✓	0.375	0.187	0.150	0.047
		WNMA 334E New	✓	0.375	0.187	0.150	0.063
		*WNMA 432	✓	0.500	0.187	0.203	0.031
		WNMA 433	✓	0.500	0.187	0.203	0.047
		WNMA 434	✓	0.500	0.187	0.203	0.063

*Note: Chipbreaker cross sections are of the inserts marked *

✓ : Stocked items

Rhombic , 35°

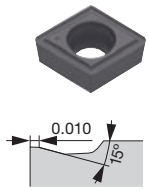
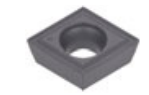
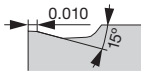
Application	Chipbreaker Appearance (Cross section)	Cat. No	Grade Coated T515	I.C.dia ød	Thickness s	Hole dia ød1	Corner radius r_ε
Medium cutting	**All-round**	**VNMG 331**	✓	0.375	0.187	0.150	0.016
		***VNMG 332**	✓	0.375	0.187	0.150	0.031
		VNMG 333	✓	0.375	0.187	0.150	0.047
	CM	**VNMG 332 CM**	✓	0.375	0.187	0.150	0.031
	New 						
							
	- (Flat-top)	**VNMA 2.331E**	✓	0.281	0.187	0.150	0.016
	New	***VNMA 2.332E**	✓	0.281	0.187	0.150	0.031
							
							

*Note: Chipbreaker cross sections are of the inserts marked *

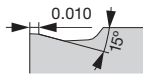
✓ : Stocked items

INSERTS - POSITIVE TYPE

Rhombic , 80°

Application	Chipbreaker Appearance (Cross section)	Cat. No	Grade Coated T515	I.C.dia *ød*	Thickness s	Hole dia *ød*1	Corner radius r_ε
Finishing to medium cutting	**CM**	**CCMT060204-CM**	✓	0.250	0.094	0.110	0.016
		**CCMT060208-CM**	✓	0.250	0.094	0.110	0.031
		CCMT09T304-CM	✓	0.375	0.156	0.173	0.016
		***CCMT09T308-CM**	✓	0.375	0.156	0.173	0.031
	CM	***CPMT09T304-CM**	✓	0.375	0.156	0.173	0.016
		**CPMT09T308-CM**	✓	0.375	0.156	0.173	0.031
							

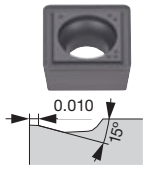
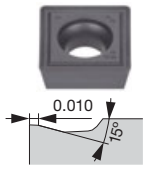
Rhombic , 55°

Application	Chipbreaker Appearance (Cross section)	Cat. No	Grade Coated T515	I.C.dia *ød*	Thickness s	Hole dia *ød*1	Corner radius r_ε
Finishing to medium cutting	**CM**	**DCMT11T304-CM**	✓	0.375	0.156	0.173	0.016
		***DCMT11T308-CM**	✓	0.375	0.156	0.173	0.031
							

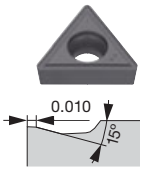
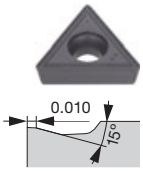
*Note: Chipbreaker cross sections are of the inserts marked *

✓ : Stocked items

Square , 90°

Application	Chipbreaker Appearance (Cross section)	Cat. No	Grade Coated T515	I.C.dia ød	Thickness s	Hole dia ød1	Corner radius rε
Finishing to medium cutting	CM 	SCMT09T304-CM	✓	0.375	0.156	0.173	0.016
		*SCMT09T308-CM	✓	0.375	0.156	0.173	0.031
		SCMT120404-CM	✓	0.500	0.187	0.217	0.016
		SCMT120408-CM	✓	0.500	0.187	0.217	0.031
	CM 	SPMT120404-CM	✓	0.500	0.187	0.217	0.016
		*SPMT120408-CM	✓	0.500	0.187	0.217	0.031

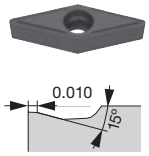
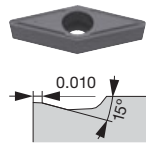
Triangular , 60°

Application	Chipbreaker Appearance (Cross section)	Cat. No	Grade Coated T515	I.C.dia ød	Thickness s	Hole dia ød1	Corner radius rε
Finishing to medium cutting	CM 	TCMT16T304-CM	✓	0.375	0.156	0.173	0.016
		*TCMT16T308-CM	✓	0.375	0.156	0.173	0.031
		TCMT16T312-CM	✓	0.375	0.156	0.173	0.047
	CM 	TPMT16T304-CM	✓	0.375	0.156	0.173	0.016
		*TPMT16T308-CM	✓	0.375	0.156	0.173	0.031
		TPMT16T312-CM	✓	0.375	0.156	0.173	0.047

*Note: Chipbreaker cross sections are of the inserts marked *

✓ : Stocked items

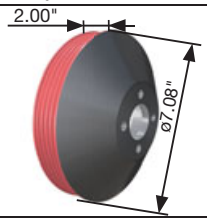
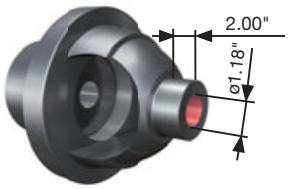
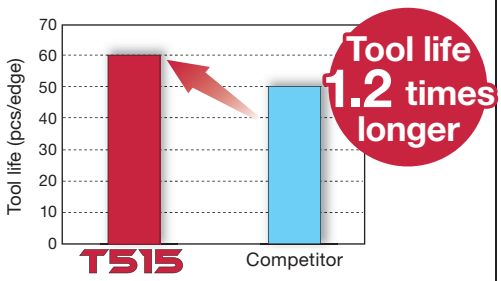
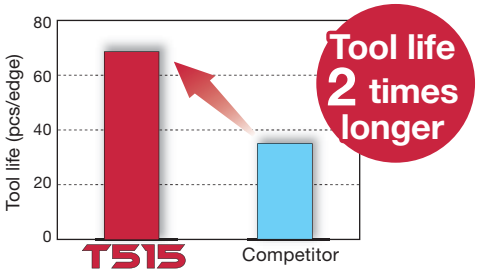
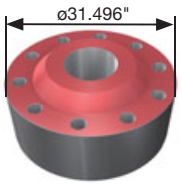
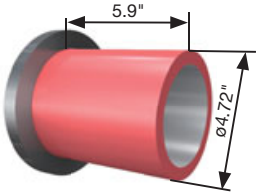
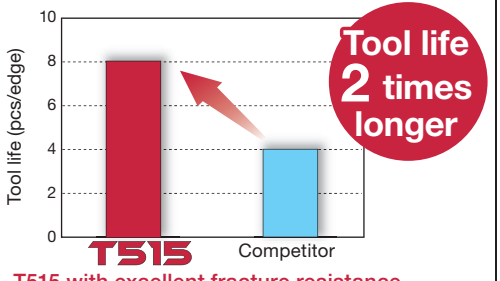
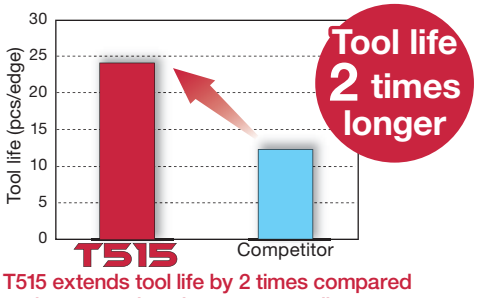
Rhombic , 35°

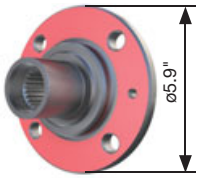
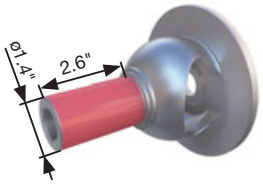
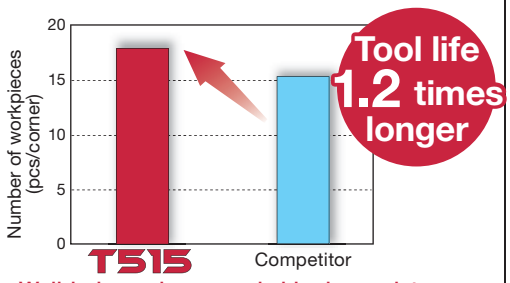
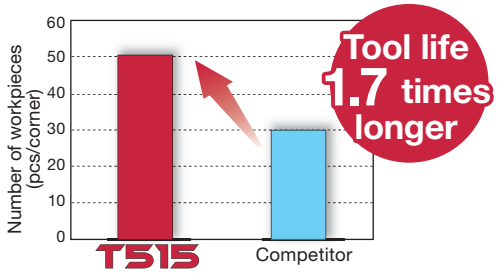
Application	Chipbreaker Appearance (Cross section)	Cat. No	Grade Coated T515	I.C.dia ød	Thickness s	Hole dia ød1	Corner radius rε
Finishing to medium cutting	**CM**	**VBMT160404-CM**	✓	0.375	0.187	0.173	0.016
		***VBMT160408-CM**	✓	0.375	0.187	0.173	0.031
		VBMT160412-CM	✓	0.375	0.187	0.173	0.047
	CM	**VCMT160404-CM**	✓	0.375	0.187	0.173	0.016
		***VCMT160408-CM**	✓	0.375	0.187	0.173	0.031

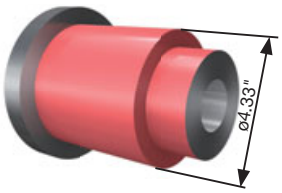
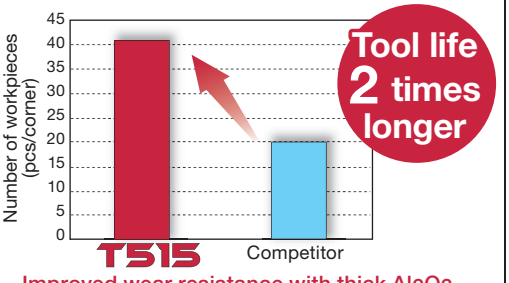
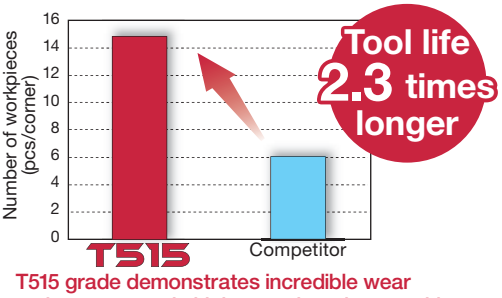
*Note: Chipbreaker cross sections are of the inserts marked *

✓ : Stocked items

PRACTICAL EXAMPLES

Workpiece type		Water pump parts	Differential case
Insert		VBMT160408-CM	TCMT16T308-CM
Grade		T515	T515
Workpiece material		Gray cast iron	Gray cast iron
			
Cutting conditions	Cutting speed: *Vc* (sfm)	689	623
	Feed : *f* (ipr)	0.004	0.012
	Depth of cut : *ap* (in)	1.575	0.079
	Machining	External & V-groove machining	Internal machining
	Coolant	Wet	Wet
Results		 T515's excellent wear resistance helps increase productivity with the ability to withstand higher cutting speed and extends tool life by 1.2 times.	 T515 provides remarkable wear resistance, which doubles tool life compared to the competitor.
Workpiece type		Machine	Machine
Insert		CNMG543	CNMG434
Grade		T515	T515
Workpiece material		Grey cast iron	Ductile cast iron
			
Cutting conditions	Cutting speed: *Vc* (sfm)	590	328
	Feed : *f* (ipr)	0.016	0.016
	Depth of cut : *ap* (in)	1.575" x 3passes	0.069
	Machining	Facing	External and face turning
	Coolant	Wet	Wet
Results		 T515 with excellent fracture resistance delivers stable machining and double tool life.	 T515 extends tool life by 2 times compared to the competitor due to outstanding wear resistance.

	Workpiece type	Hub	Differential case
	Insert	CNMG432	CNMG434
	Grade	T515	T515
	Workpiece material	60-40-18	Ductile cast iron
			
Cutting conditions	Cutting speed: *Vc* (sfm)	850	460
	Feed : *f* (ipr)	0.010	0.010
	Depth of cut : *ap* (in)	0.12	0.04
	Machining	Face turning	External turning
	Coolant	Wet	Wet
	Results	 Well-balanced wear and chipping resistance extends tool life by 1.2 times in interrupted machining of ductile cast iron.	 T515 grade with remarkable wear resistance provides tool life that is 1.7 times longer than the competitor.

	Workpiece type	Cam shaft	Automotive part
	Insert	TNMG333	CNMG434
	Grade	T515	T515
	Workpiece material	Gray cast iron	Gray cast iron
			
Cutting conditions	Cutting speed: *Vc* (sfm)	460	1700
	Feed : *f* (ipr)	0.014	0.016
	Depth of cut : *ap* (in)	0.08	0.039 - 0.059
	Machining	External turning	External and face turning
	Coolant	Wet	Wet
	Results	 Improved wear resistance with thick Al_2O_3 layer prolongs tool life by 200%.	 T515 grade demonstrates incredible wear resistance even in high-speed cutting, resulting in 230% longer tool life than the competitor.

MEMO

Check our site and our App to get more info!

Tungaloy America, Inc.

3726 N Ventura Drive, Arlington Heights, IL 60004, U.S.A.
Inside Sales: +1-888-554-8394
Technical Support: +1-888-554-8391
Fax: +1-888-554-8392
www.tungaloyamerica.com

Tungaloy Canada

432 Elgin St. Unit 3, Brantford, Ontario N3S 7P7, Canada
Phone: +1-519-758-5779 Fax: +1-519-758-5791
www.tungaloy.co.jp/ca

Tungaloy de Mexico S.A.

C Los Arellano 113, Parque Industrial Siglo XXI
Aguascalientes, AGS, Mexico 20290
Phone:+52-449-929-5410 Fax:+52-449-929-5411
www.tungaloy.co.jp/mx

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