

PROVEN SOLUTIONS | ALWAYS AVAILABLE

# ISO TURNING SOLUTIONS

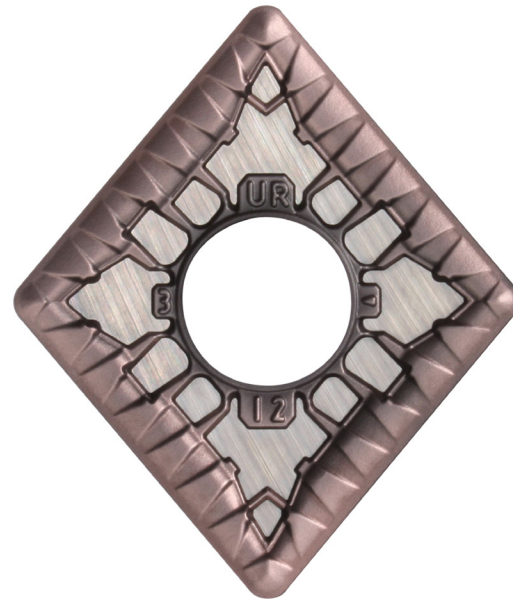
All-Star Focused Edition

**WIDIA** 

 **ALL-STAR**

WIDIA™ Victory™ ISO Turning inserts have been specially engineered to operate under an array of cutting conditions from finishing to roughing. These ISO Turning solutions can be applied to a wide group of industries across the planet, making them the ideal product to invest in.

WIDIA™ expanded its insert manufacturing plant to increase production while maintaining high quality standards that its known for. New modern capabilities enable this group of end-to-end manufacturing facilities to efficiently fulfill order requests in a timely manner.



The All-Star product line consists of specially selected products that are highly requested and always available to fill the demand.

At the heart of this strategically assembled group is a specific selection of the ISO Turning portfolio. This group contains a number of inserts for rough to finish turning of steel, cast iron, stainless steel, and high temp alloys.

All-Star products are always available, so testing a Victory™ turning insert is as easy as calling your local WIDIA expert or distributor. To view All-Star Victory™ Turning inserts visit [widia.com](http://widia.com) or NOVO™ and filter by All-Star.



Learn More About **WIDIA™**

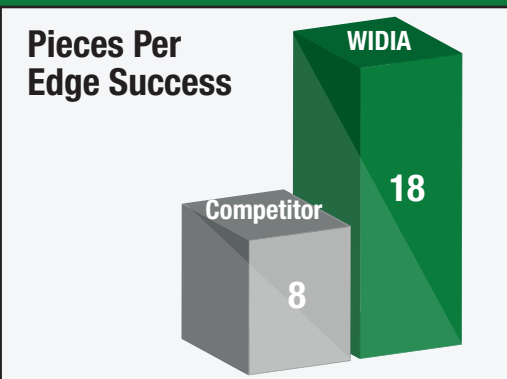
Contact a **WIDIA™** expert or local distributor for more information on All-Star. Review additional All-Star products using our digital solutions.

Visit [widia.com](http://widia.com).

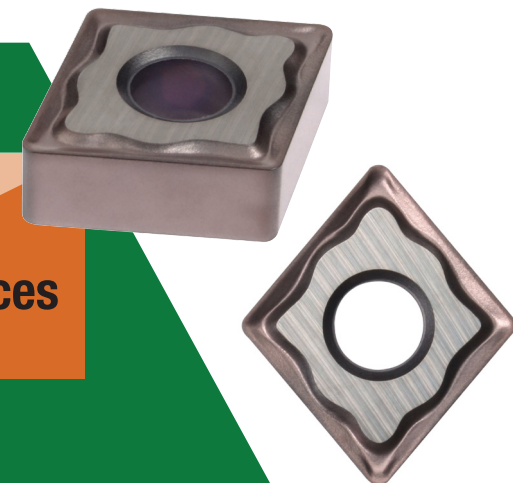


A-13-03128

Application Description:	Competitor	WIDIA
Facing and surfacing	—	WP15CT
Workpiece Diameter	75 mm / 2.95 in	75 mm / 2.95 in
Machining Speed	230 m/min / 754 sfm	230 m/min / 754 sfm
Machining Feed	0.28 mm/rev / 0.01 in/rev	0.32 mm/rev / 0.012 in/rev
Cutting Depth	2.8mm / 0.11 in	2.8 mm / 0.11 in
Customer Goal	—	Increase no. of pieces per edge



**225%**  
Increase of pieces per edge!

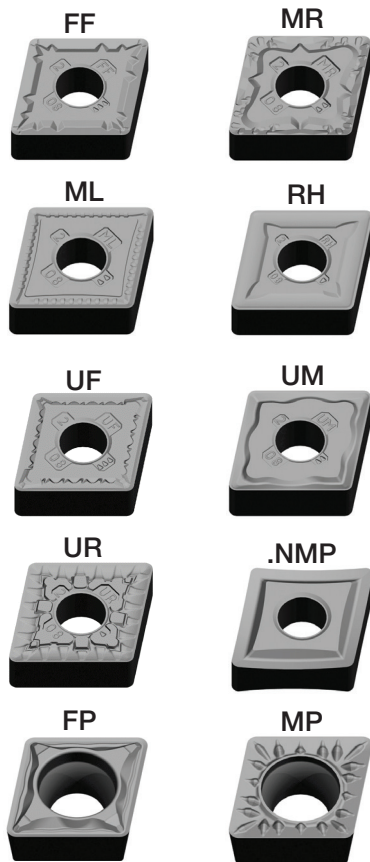




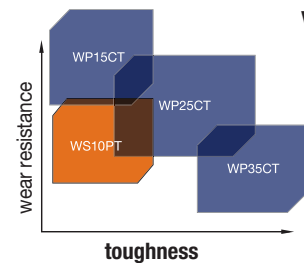
ISO Turning Products featured in the All-Star program provide solutions for applications in steel, stainless steel, cast iron and high-temp alloys.

Products featured are proven solutions that are always available to ship within 24 hours of ordering.

**Victory Geometries**

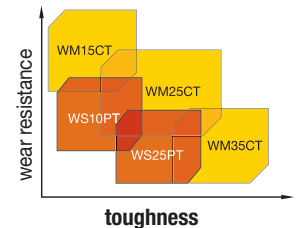


**Victory Toughness/Wear Resistance**



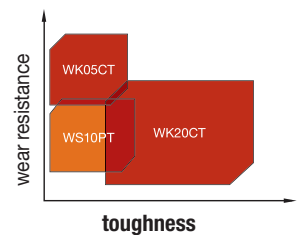
**WP Grades for Steel**

- Three grades and seven primary geometries for use in roughing to finishing operations. Increase cutting speed and/or feed rate to gain productivity.



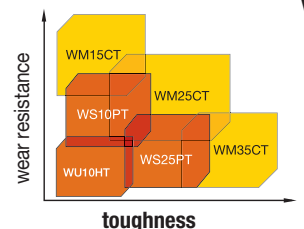
**WM Grades for Stainless Steel**

- Three grades across 12 geometries for use in roughing to finishing operations.
- Increase cutting speed and /or feed rate by up to 30% over similar competitive grades.



**WK Grades for Cast Iron**

- Two grades to cover all of our cast iron turning operations. Look out for the new grade WK15CT in Advances 2020.
- Very good balance of wear resistance and toughness for long predictable tool life. Flat top geometry for machining cast iron. For finishing to roughing applications.



**WS Grades for High-Temp Alloys**

- Two grades for use in roughing to finishing operations.
- Very good wear resistance for longer tool life.
- One uncoated grade for use in titanium.

Smooth Cut, Pre-Turned Surface	Lightly Interrupted Cut	Heavily Interrupted Cut	<b>P</b>
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Roughing (Steel)				
ANSI	ISO	WP15CT	WP25CT	WP35CT
CNMG432RH	CNMG120408RH	4170979	4171504	5684356
CNMG433RH	CNMG120412RH	4170980	4171505	4171698
CNMG434RH	CNMG120416RH	4170981	4171506	4171699
CNMG542RH	CNMG160608RH	4170982	4171507	4171700
CNMG543RH	CNMG160612RH	4170983	4171508	4171701
CNMG544RH	CNMG160616RH	4170984	4171509	4171702
CNMG642RH	CNMG190608RH	4170985	4171510	4171703
CNMG643RH	CNMG190612RH	4170986	4171511	4171704
CNMG644RH	CNMG190616RH	4170987	4171512	4171705
CNMG646RH	CNMG190624RH		4171523	
DNMG432RH	DNMG150408RH		4171524	4171707
DNMG442RH	DNMG150608RH	4170991	4171526	4171709
DNMG443RH	DNMG150612RH	4170992	4171527	4171710
RNMG43RH	RNMG120400RH	4170996	4171531	4171713
RNMG64RH	RNMG190600RH		4171532	4171714
SNMG432RH	SNMG120408RH	4170998	4171533	4171715
SNMG433RH	SNMG120412RH	4170999	4171534	4171716
SNMG434RH	SNMG120416RH	4171000	4171535	
SNMG542RH	SNMG150608RH	4171001	4171536	
SNMG543RH	SNMG150612RH	4171002	4171537	4171719
SNMG544RH	SNMG150616RH	4171003	4171538	4171720
SNMG643RH	SNMG190612RH	4171005	4171540	4171722
TNMG332RH	TNMG160408RH	4171007	4171542	4171724
TNMG333RH	TNMG160412RH		4171543	4171725
TNMG432RH	TNMG220408RH	4171009	4171544	4171726
TNMG433RH	TNMG220412RH	4171010	4171545	4171727
VNMG332RH	VNMG160408RH		4171550	4171732
VNMG432RH	VNMG220408RH		4171551	4171733
VNMG433RH	VNMG220412RH	4171017	4171552	4171734
WNMG432RH	WNMG080408RH	4171019	4171554	4171736
WNMG433RH	WNMG080412RH	4171020	4171555	4171737
WNMG434RH	WNMG080416RH		4171556	

All-Star program features only the most popular platforms, grades, and sizes. For the complete offering, visit WIDIA NOVO™ or widia.com.

Smooth Cut, Pre-Turned Surface	Lightly Interrupted Cut	Heavily Interrupted Cut	P

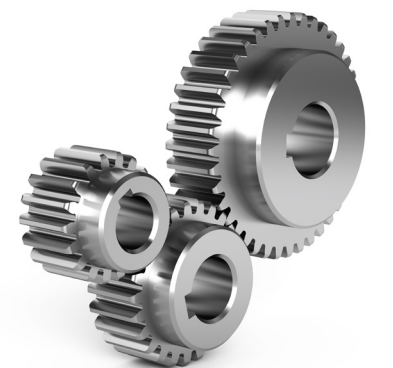
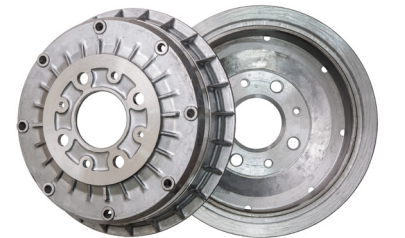
Medium Roughing (Steel)

ANSI	ISO			
CNMG431MR	CNMG120404MR	4171130	4170546	4170043
CNMG432MR	CNMG120408MR	4171131	4170547	4170044
CNMG433MR	CNMG120412MR	4171132	4170548	4170045
CNMG542MR	CNMG160608MR	4171134	4170549	
CNMG543MR	CNMG160612MR		4170550	4170046
CNMG544MR	CNMG160616MR	4171136	4170551	
CNMG643MR	CNMG190612MR	4171137	4170552	
CNMG644MR	CNMG190616MR	4171138	4170563	
DNMG431MR	DNMG150404MR	4171140	4170565	
DNMG432MR	DNMG150408MR	4171141	4170566	4170052
DNMG441MR	DNMG150604MR	4171143	4170568	4170054
DNMG442MR	DNMG150608MR	4171144	4170569	4170055
DNMG443MR	DNMG150612MR	4171145	4170570	
SNMG432MR	SNMG120408MR	4171146	4170571	4170057
SNMG433MR	SNMG120412MR		5684355	
SNMG543MR	SNMG150612MR	4171147		
SNMG643MR	SNMG190612MR	4171148	4170572	
TNMG331MR	TNMG160404MR	4171150	4170573	4170059
TNMG332MR	TNMG160408MR	4171151	4170574	4170060
TNMG333MR	TNMG160412MR	4171152	4170575	
TNMG432MR	TNMG220408MR	4171154	4170577	4170063
VNMG332MR	VNMG160408MR	4171157	4170580	4170066
WNMG432MR	WNMG080408MR	4171158	4170581	4170067
WNMG433MR	WNMG080412MR	4171159	4170582	4170068

Smooth Cut, Pre-Turned Surface	Lightly Interrupted Cut	Heavily Interrupted Cut	P

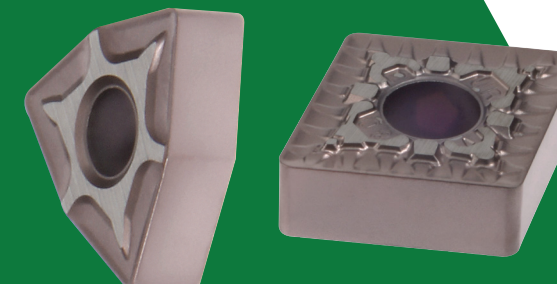
Finishing Positive (Steel)

ANSI	ISO		
CCMT21505FP	CCMT060202FP	4169857	4170140
CCMT2151FP	CCMT060204FP	4169858	4170141
CCMT2152FP	CCMT060208FP		4170142
CCMT32505FP	CCMT09T302FP		4170293
CCMT3251FP	CCMT09T304FP	4169860	4170294
CCMT3252FP	CCMT09T308FP	4169861	4170295
CCMT431FP	CCMT120404FP		4170296
CCMT432FP	CCMT120408FP	4169993	4170297
CPMT2151FP	CPMT060204FP	4170016	4170326
CPMT3252FP	CPMT09T308FP	4170019	4170329
DCMT21505FP	DCMT070202FP		4170299
DCMT2151FP	DCMT070204FP	4169995	4170300
DCMT32505FP	DCMT11T302FP	4169996	4170302
DCMT3251FP	DCMT11T304FP	4169997	4170303
DCMT3252FP	DCMT11T308FP	4169998	4170304
DCMT431FP	DCMT150404FP	4170000	4170306
DCMT432FP	DCMT150408FP	4170001	4170307
SCMT3252FP	SCMT09T308FP		4170309
SCMT432FP	SCMT120408FP		4170311
TCMT2151FP	TCMT110204FP	4170006	4170313
TCMT3251FP	TCMT16T304FP	4170008	4170315
TCMT3252FP	TCMT16T308FP		4170316
TCMT432FP	TCMT220408FP		4170317
VBMT221FP	VBMT110304FP	4170012	4170319
VBMT3305FP	VBMT160402FP		4170321
VBMT331FP	VBMT160404FP	4170013	4170322
VBMT332FP	VBMT160408FP	4170014	4170323



**93% Increase in tool life!**

Application Description:	Competitor	WIDIA
External Turning	—	WP25CT
Workpiece Diameter	22 mm / 0.87 in	22 mm / 0.87 in
Machining Speed	170 m/min / 558 sfm	180 m/min / 590 sfm
Machining Feed	0.25 mm/rev / 0.01 in/rev	0.25 mm/rev / 0.01 in/rev
Life (number of jobs)	400	770



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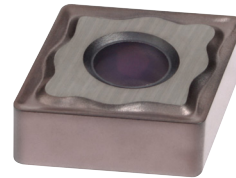
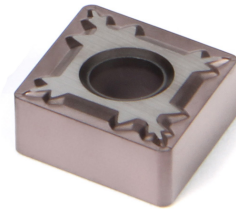
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			<b>P</b>	<b>M</b>
Smooth Cut, Pre-Turned Surface	Lightly Interrupted Cut	Heavily Interrupted Cut		

Finishing (Steel)



ANSI	ISO	WP15CT
CNMG431FF	CNMG120404FF	4171025
CNMG432FF	CNMG120408FF	4171026
CNMG433FF	CNMG120412FF	4171027
DNMG431FF	DNMG150404FF	4171030
DNMG441FF	DNMG150604FF	4171032
DNMG442FF	DNMG150608FF	4171043
DNMG443FF	DNMG150612FF	4171044
TNMG331FF	TNMG160404FF	4171050
TNMG332FF	TNMG160408FF	4171051
TNMG333FF	TNMG160412FF	4171052
WNMG331FF	WNMG060404FF	4171055
WNMG332FF	WNMG060408FF	4171056
WNMG431FF	WNMG080404FF	4171057
WNMG432FF	WNMG080408FF	4171058



Medium Machining (Stainless Steel)



ANSI	ISO	WS10PT	WM15CT	WM25CT	WM35CT
CNMG431UM	CNMG120404UM	5645217		4172380	4172410
CNMG432UM	CNMG120408UM		4172335	4172381	4172411
CNMG433UM	CNMG120412UM			4172382	
DNMG331UM	DNMG110404UM			4172383	4172413
DNMG332UM	DNMG110408UM		4172338	4172384	4172414
DNMG432UM	DNMG150408UM		4172341	4172387	
DNMG441UM	DNMG150604UM			4172389	
DNMG442UM	DNMG150608UM		4172364	4172390	4172420
SNMG431UM	SNMG120404UM			4172393	
SNMG432UM	SNMG120408UM		4172367	4172394	4172424
SNMG433UM	SNMG120412UM			4172395	4172425
TNMG331UM	TNMG160404UM	5550226	4172369	4172396	
TNMG332UM	TNMG160408UM	5550228	4172370	4172397	4172427
WNMG331UM	WNMG060404UM		4172375	4172403	4172432
WNMG431UM	WNMG080404UM		4172377	4172406	4172435
WNMG432UM	WNMG080408UM		4172378	4172407	4172436
WNMG433UM	WNMG080412UM	5645269		4172408	

			<b>M</b>
Smooth Cut, Pre-Turned Surface	Lightly Interrupted Cut	Heavily Interrupted Cut	

Roughing (Stainless Steel)

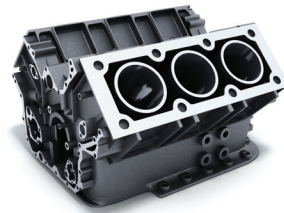
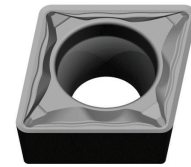


ANSI	ISO	WM15CT	WM25CT	WM35CT
CNMG431UR	CNMG120404UR	4169406	4169444	4169479
CNMG432UR	CNMG120408UR	4169407	4169445	4169480
CNMG433UR	CNMG120412UR	4169408	4169446	4169481
CNMG434UR	CNMG120416UR		4169447	4169482
CNMG542UR	CNMG160608UR	4169410	4169448	4169483
CNMG543UR	CNMG160612UR	4169411	4169449	4169484
CNMG544UR	CNMG160616UR		4169450	4169485
CNMG643UR	CNMG190612UR	4169412	4169451	4169486
CNMG644UR	CNMG190616UR	4169423	4169452	4169487
DNMG332UR	DNMG110408UR	4169424	4169453	4169488
DNMG432UR	DNMG150408UR		4169454	
DNMG442UR	DNMG150608UR	4169427	4169456	4169492
DNMG444UR	DNMG150616UR			4169494
SNMG432UR	SNMG120408UR	4169429	4169458	4169495
SNMG433UR	SNMG120412UR	4169430	4169459	4169496
SNMG434UR	SNMG120416UR		4169460	4169497
SNMG543UR	SNMG150612UR		4169461	4169498
SNMG643UR	SNMG190612UR	4169433	4169463	4169500
SNMG644UR	SNMG190616UR		4169464	4169501
TNMG332UR	TNMG160408UR	4169434	4169465	
TNMG333UR	TNMG160412UR		4169466	
VNMG332UR	VNMG160408UR	4169439	4169473	4169508
VNMG333UR	VNMG160412UR		4169474	
WNMG332UR	WNMG060408UR	4169441	4169475	
WNMG432UR	WNMG080408UR	4169442	4169476	4169509
WNMG433UR	WNMG080412UR		4169477	4169510



			<b>M</b>
Smooth Cut, Pre-Turned Surface	Lightly Interrupted Cut	Heavily Interrupted Cut	

			<b>K</b>
Smooth Cut, Pre-Turned Surface	Lightly Interrupted Cut	Heavily Interrupted Cut	



Finishing Positive (Stainless Steel)

ANSI	ISO			
ANSI	ISO	WM15CT	WM25CT	
CCMT21505FP	CCMT060202FP		4168778	
CCMT2151FP	CCMT060204FP	4168738	4168779	
CCMT2152FP	CCMT060208FP		4168780	
CCMT32505FP	CCMT09T302FP		4168781	
CCMT3251FP	CCMT09T304FP		4168782	
CCMT3252FP	CCMT09T308FP	4168741	4168783	
CCMT431FP	CCMT120404FP		4168784	
DCMT21505FP	DCMT070202FP		4168787	
DCMT2151FP	DCMT070204FP		4168788	
DCMT32505FP	DCMT11T302FP		4168790	
DCMT3251FP	DCMT11T304FP	4168765	4168791	
DCMT3252FP	DCMT11T308FP		4168792	
TCMT21505FP	TCMT110202FP		4168800	
TCMT2151FP	TCMT110204FP		4168801	
VBMT221FP	VBMT110304FP		4168807	
VBMT3305FP	VBMT160402FP		4168809	
VBMT331FP	VBMT160404FP	4168776	4168810	
VBMT332FP	VBMT160408FP		4168811	

Finishing (Stainless Steel)

ANSI	ISO			
ANSI	ISO	WS10PT	WM15CT	WM25CT
CNMG431UF	CNMG120404UF	5645600	4169353	4169379
CNMG432UF	CNMG120408UF	5645588	4169354	4169380
DNMG331UF	DNMG110404UF	5645603	4169356	4169382
DNMG431UF	DNMG150404UF		4169358	4169384
DNMG441UF	DNMG150604UF		4169361	4169387
DNMG442UF	DNMG150608UF		4169362	4169388
SNMG431UF	SNMG120404UF	5645610	4169364	4169390
TNMG331UF	TNMG160404UF	5432605	4169367	4169393
VNMG331UF	VNMG160404UF	5645616	4169372	4169398
WNMG431UF	WNMG080404UF	5645619	4169376	4169402
WNMG432UF	WNMG080408UF	5645623	4169377	4169403
WNMG433UF	WNMG080412UF		4169378	4169404



Holdings and Clamp Styles

D-Style Clamping

- Used for negative style inserts.
- Clamp assembly contains clamp, screw, and retaining ring.
- Quick insert indexing.
- Ensures insert repeatability and seating.
- Reduced chatter and extended tool life.

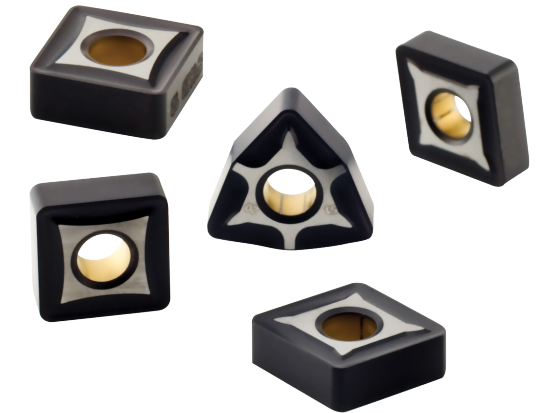
P-Style Clamping

- Lever-type clamping system for negative indexable inserts.
- No interference to chip flow.
- Fast insert changes.

*P-Style available in metric sizes only.*

S-Style Clamping

- Screw clamping system for positive indexable inserts.
- Compact design for high reliability and cost efficiency.
- Carbide shim for additional tool protection.



Roughing (Cast Iron)

ANSI	ISO			
ANSI	ISO	WK20CT		
CNMG432RH	CNMG120408RH	4171903		
CNMG433RH	CNMG120412RH	4171904		
CNMG434RH	CNMG120416RH	4171905		
CNMG542RH	CNMG160608RH	4171906		
CNMG543RH	CNMG160612RH	4171907		
CNMG544RH	CNMG160616RH	4171908		
CNMG643RH	CNMG190612RH	4171910		
CNMG644RH	CNMG190616RH	4171911		
DNMG442RH	DNMG150608RH	4171914		
DNMG443RH	DNMG150612RH	4171915		
DNMG444RH	DNMG150616RH	4171916		
SNMG432RH	SNMG120408RH	4171918		
SNMG433RH	SNMG120412RH	4171919		
SNMG542RH	SNMG150608RH	4171921		
SNMG543RH	SNMG150612RH	4171922		
SNMG544RH	SNMG150616RH	4171923		
SNMG643RH	SNMG190612RH	4171925		
SNMG644RH	SNMG190616RH	4171926		
TNMG332RH	TNMG160408RH	4171927		
WNMG432RH	WNMG080408RH	4171932		
WNMG433RH	WNMG080412RH	4171933		

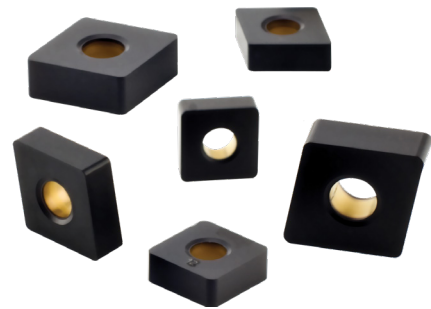
To view our holder offerings visit NOVO or widia.com.

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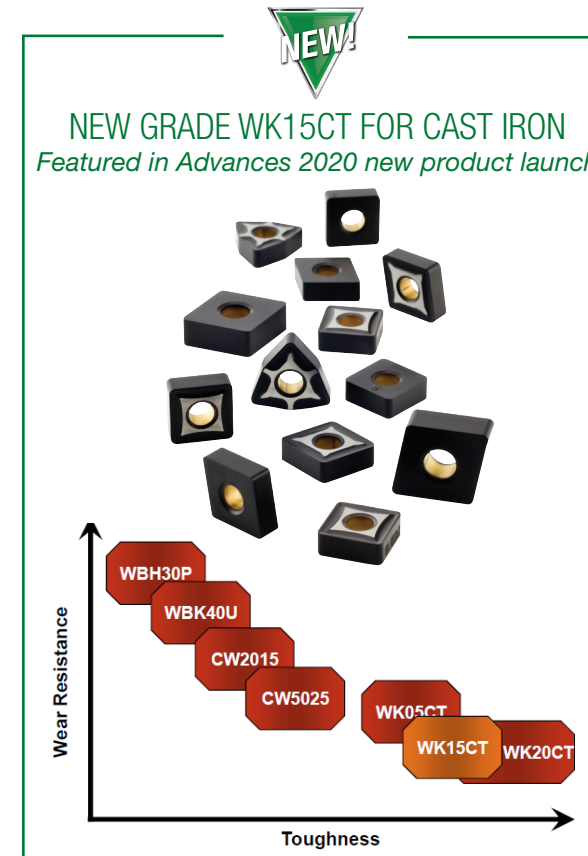
			<b>K</b>
Smooth Cut, Pre-Turned Surface	Lightly Interrupted Cut	Heavily Interrupted Cut	

Roughing (Cast Iron)

ANSI	ISO	WK05CT	WK20CT
CNMA432	CNMA120408	4171596	4171864
CNMA433	CNMA120412	4171597	4171865
CNMA434	CNMA120416	4171598	4171866
CNMA543	CNMA160612	4171599	4171868
CNMA544	CNMA160616		4171869
CNMA643	CNMA190612	4171602	4171871
CNMA644	CNMA190616		4171872
DNMA332	DNMA110408		4171873
DNMA442	DNMA150608	4171637	4171878
DNMA443	DNMA150612	4171638	4171879
DNMA444	DNMA150616		4171880
RNMA43	RNMA120400	4171639	4171881
SNMA432	SNMA120408	4171640	4171882
SNMA433	SNMA120412	4171641	4171883
SNMA542	SNMA150608		4171885
SNMA644	SNMA190616	4171646	4171889
TNMA332	TNMA160408	4171647	4171890
TNMA333	TNMA160412		4171891
TNMA433	TNMA220412	4172230	4171894
TNMA434	TNMA220416		4171895
VNMA332	VNMA160408	4171652	4171897
WNMA432	WNMA080408	4171654	4171900
WNMA433	WNMA080412	4171655	4171901



			<b>K</b>
Smooth Cut, Pre-Turned Surface	Lightly Interrupted Cut	Heavily Interrupted Cut	



Medium Machining (Cast Iron)

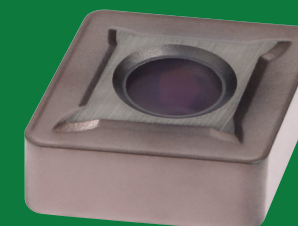
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CCMT2151MP	CCMT060204MP	4170237
CCMT3252MP	CCMT09T308MP	4170239
CCMT432MP	CCMT120408MP	4170240
CCMT433MP	CCMT120412MP	4170241
DCMT3251MP	DCMT11T304MP	4170242
DCMT3252MP	DCMT11T308MP	4170243
SCMT3252MP	SCMT09T308MP	4170245
SCMT432MP	SCMT120408MP	4170247
TCMT3252MP	TCMT16T308MP	4170251
TCMT3253MP	TCMT16T312MP	4170252
VBMT332MP	VBMT160408MP	4170254

Finishing to Medium Machining (Cast Iron)

ANSI	ISO	WK05CT	WK20CT
CNMG431ML	CNMG120404ML		4171390
CNMG432ML	CNMG120408ML	4171658	4171391
CNMG433ML	CNMG120412ML		4171392
DNMG331ML	DNMG110404ML	4171660	4171394
DNMG442ML	DNMG150608ML		4171400
SNMG431ML	SNMG120404ML		4171403
SNMG432ML	SNMG120408ML		4171404
TNMG332ML	TNMG160408ML	4171672	4171410
VNMG332ML	VNMG160408ML		4171414
WNMG431ML	WNMG080404ML	4171678	4171417
WNMG432ML	WNMG080408ML	4171679	4171418

**400% Increase in tool life!**

Application Description:	Competitor	WIDIA
O/D Turning	—	WP35CT
Machining Speed	60 m/mm / 197 sfm	60 m/mm / 197 sfm
Machining Feed	0.42 mm/rev / 0.017 in	0.42 mm/rev / 0.017 in
Cutting Depth	3.5 mm / 0.14 in	3.5 mm / 0.14 in
Customer Goal	—	Increase tool life in interrupted cut

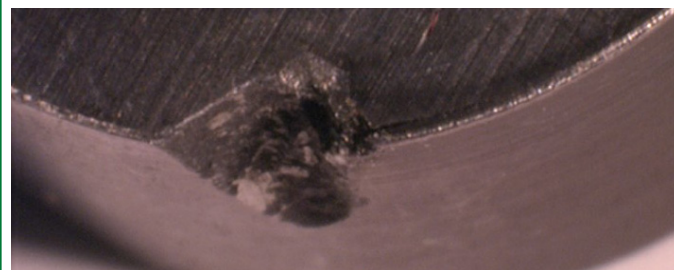


Troubleshooting should be performed in a sequential method to identify and solve your machining problems. These problems can be recognized as premature insert edge failure, part appearance, machine noise or vibration, and tool appearance. Successful troubleshooting requires correctly identifying the problem, then taking the necessary corrective action one step at a time. The four key areas of concern are: 1) Cutting tool material (Grade), 2) Machine, 3) Workpiece and 4) Set-up.

This section discusses possible causes and recommends corrective actions for each of the four areas. If more than one step is taken concurrently, the real cause of the problem may never be discovered. Always perform one corrective measure at a time.

### Depth-of-Cut Notching

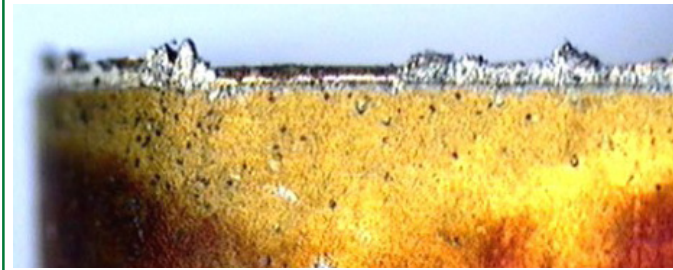
Appears when chipping or localized wear at the depth-of-cut line on the rake face and flank of the insert occurs. Notching is primarily caused by the condition of the workpiece material. Material conditions prone to depth-of-cut notch include an abrasive workpiece skin of scale, abrasive properties of high-temperatures alloys like INCONEL®, a work-hardened outer layer resulting from a previous machining operation, or heat-treated material above 55 HRC.



CAUSE	SOLUTION
Grade	Use a more wear-resistant grade of carbide.
Edge Prep	Use honed or T-land inserts.
Speed	Reduce speed.
Programming	Vary depth of cut on very abrasive materials.
Feed	Reduce feed.

### Built-Up Edge

This condition involves the adhesion of layers of workpiece material to the top surface of the insert. Hardened pieces of the adhered material periodically break free, leaving an irregularly shaped depression along the cutting edge. This causes damage to the part and insert. Cutting forces also will be increased due to built-up edge.

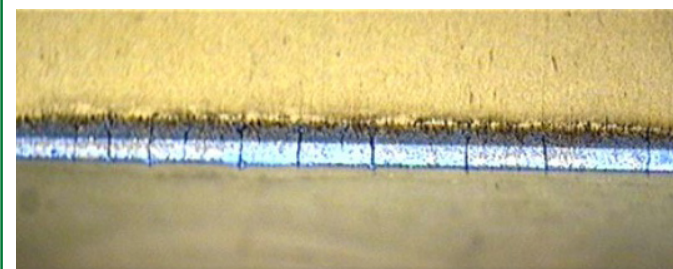


CAUSE	SOLUTION
Speed	Increase cutting speed.
Feed	Increase feed.
Coolant	Use mist or flood coolant to avoid chips sticking to the insert when machining stainless steel and aluminum alloys.
Edge-Prep	Use sharper edge, positive rake PVD insert; use polished inserts for non-ferrous materials.

### Thermal Cracks

These cracks run perpendicular to the insert's cutting edge and are caused by the extreme temperature variations.

These temperature variations create heat stresses in the insert, which can result in thermal cracks. To the untrained eye, advanced thermal cracking could appear as chipping.

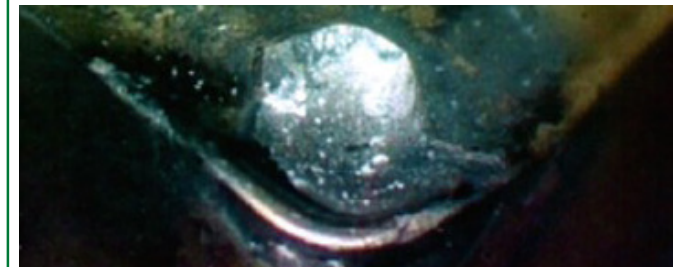


CAUSE	SOLUTION
Grade	Use coated grade.
Speed & Feed	Reduce speed and possibly the feed.
Coolant	Shut off coolant.

### Crater Wear

A relatively smooth, regular depression is produced on the insert's rake face. Crater wear occurs in two ways:

1. Material adhering to the insert's top surface is dislodged, carrying away minute fragments of the top surface of the insert.
2. Frictional heat builds up from the flow of chips over the top surface of the insert. Eventually, this heat buildup softens the insert behind the cutting edge and removes the minute particles of the insert until a crater forms.



CAUSE	SOLUTION
Grade	Use a more wear-resistant grade.
Speed	Reduce cutting speed.
Edge-Prep	Use smaller T-land or increase feed to proper range for T-land.

### Flank Wear

Uniform flank wear is the preferred method of insert failure because it can be predicted. Excessive flank wear increases cutting forces and contributes to poor surface finish. NOTE: Inserts should be indexed when roughing (.38mm-.50mm flank wear is reached) and finishing (.25mm-.38mm flank wear or sooner).



CAUSE	SOLUTION
Grade	Use more wear-resistant grade. Change to a coated grade if you are now using an uncoated grade.
Grade	Inspect insert to determine if proper style is being used.
Speed	Speed should be reduced without changing feed.
Feed	Increase feed.

### Multiple Factors

When wear, chipping, thermal cracking, and breakage occur at once, the machine operator must look behind the normal feed, speed, and depth-of-cut adjustments to find the root cause of the problem.



CAUSE	SOLUTION
Feed	Reduce feed rate to relieve cutting forces.
Insert/Grade	If possible, use a larger nose radius. Use T-land insert. Use a tougher grade of carbide.

### Chipping

Appears like normal flank wear to the untrained eye. Actually, normal flank wear lands have a fine, smooth wear pattern, while a land formed by chipping has a saw-toothed, uneven surface. If chipping is not detected soon enough, it may be perceived as depth-of-cut notching.



CAUSE	SOLUTION
Grade	Use a tougher grade.
Edge Prep	Use larger hone or T-land possible.
Built-Up Edge	Increase speed.
Chatter	Check system rigidity for proper part clamping. Correct worn gibs/bearings. Check for improper tool mounting.
Feed	Reduce feed.
Recutting Chips	Use air blast or coolant to remove chips.

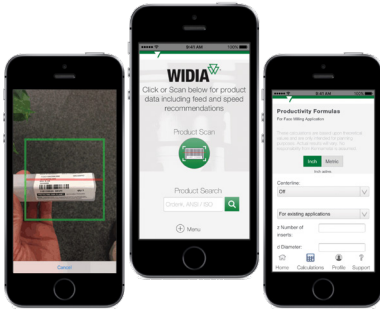


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