



For more information

External turning tool

ADD^{ULTI}MTURN

Tungaloy Report No. 550-US

ULTIMATE SOLUTION FOR MULTI-DIRECTIONAL TURNING





INDUSTRY 4.0
FEED the SPEED!



ADD^{ULTI}M TURN

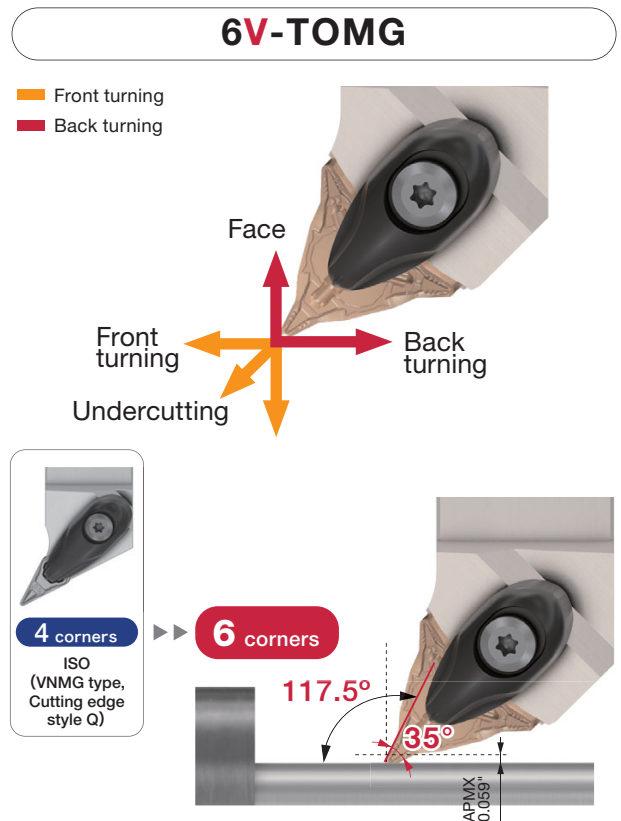
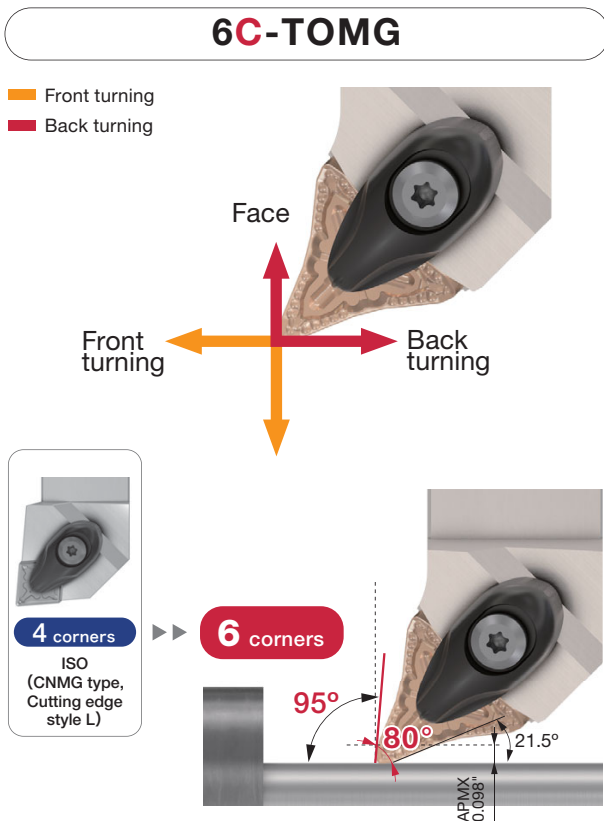


Ultra high productivity of Front Turning, Back Turning, Profiling,
and Face Turning with **ONE SINGLE TOOL**

Innovative geometry for high productivity and process security

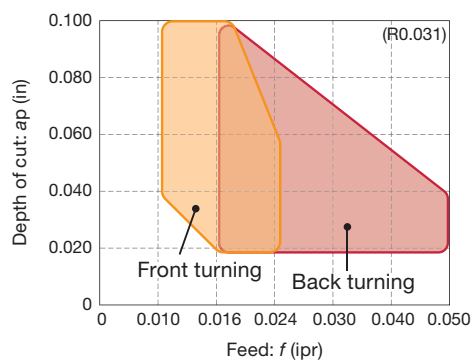
Double-sided 6-corner insert with 80° or 35° corner angle for versatile applications

- **Back (pull) turning:** High feed designed cutting edge improves productivity about 200% higher than existing ISO tools with no need for special programming.
- **Front (push) turning:** Same machining process is available using the same cutting edge angle as standard ISO tools.

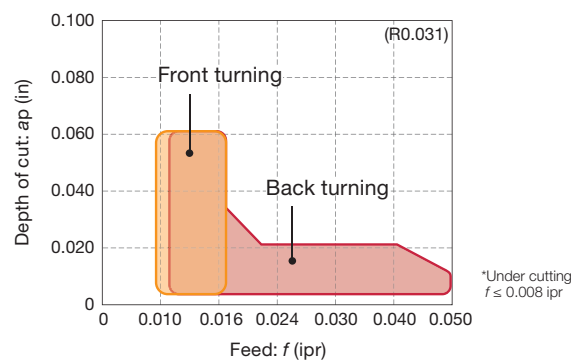


APPLICATION RANGE

Corner angle 80° + TM chipbreaker



Corner angle 35° + TSF chipbreaker



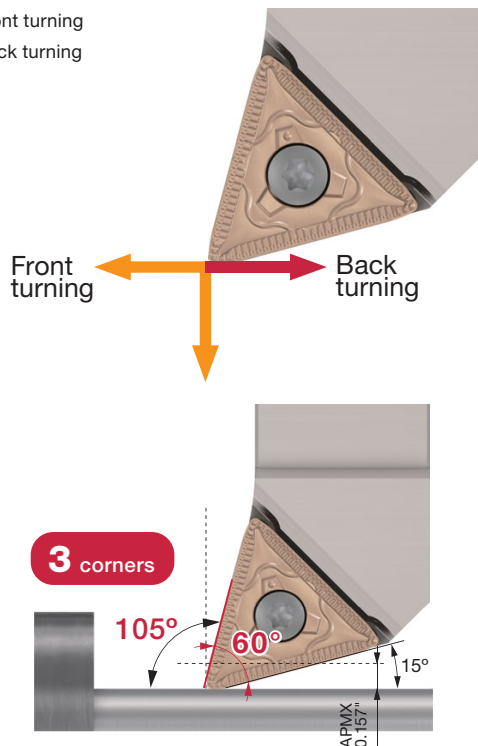
New

Single-sided 3-corner insert for super high productivity

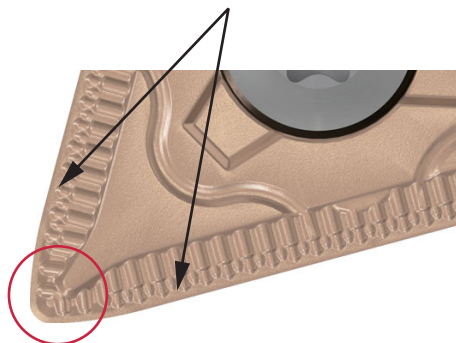
- Back (pull) turning: High feed designed cutting edge improves productivity 300 - 400% higher than standard ISO tools.
- Front (push) turning: Applicable to great D.O.C.

3C-TCMT

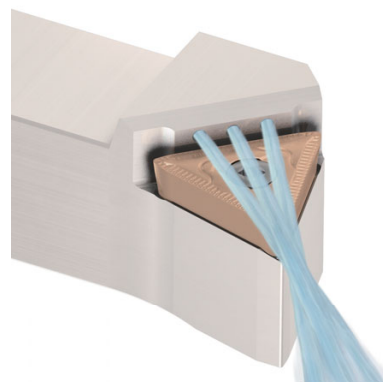
Front turning
Back turning



Unique cutting edge (Corner R + large radius arc) enables higher feed rates to be applied and better wear resistance for long tool life

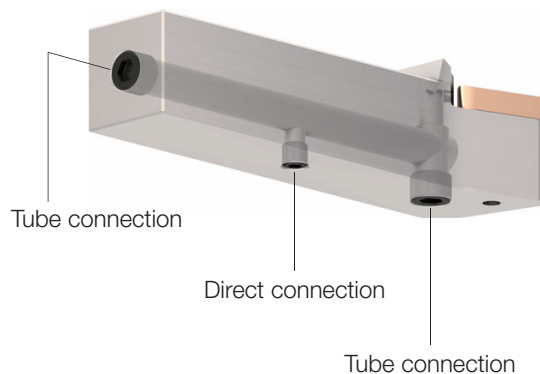
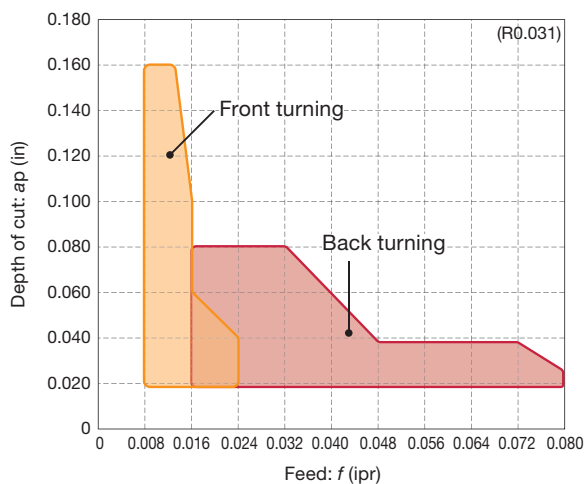


Internal coolant toolholder prevents chip jamming and maximizes performance during back turning operations



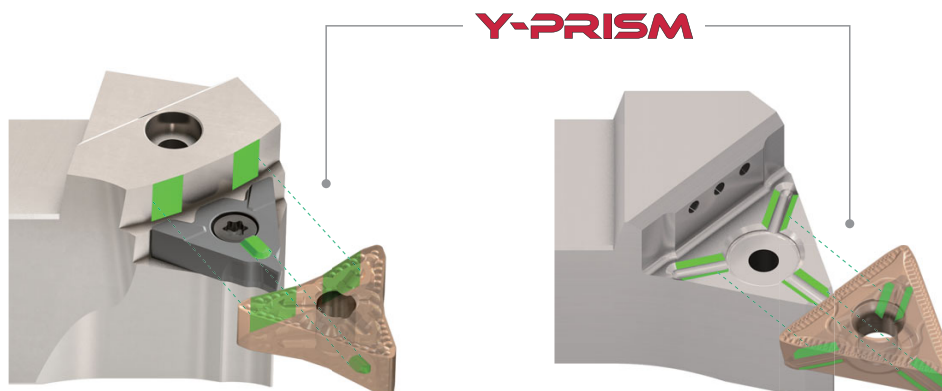
APPLICATION RANGE

Single-sided 3-corner + TM chipbreaker



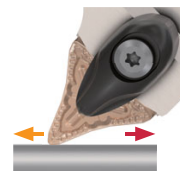
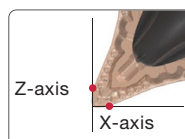
I Y-PRISM Secure insert clamping system

- **Y-PRISM**'s safe lock design has a rail on the shim/toolholder and matching slot on the insert for tight interlocking and secure clamping.
- Prevents the cutting forces from affecting the tool position in any direction and ensures high stability.

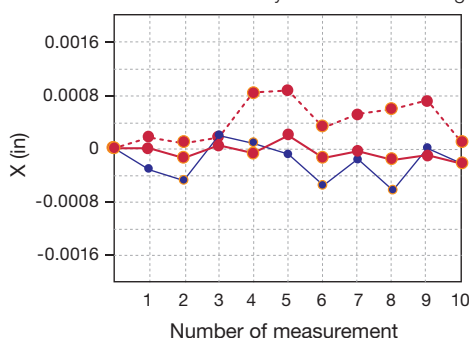
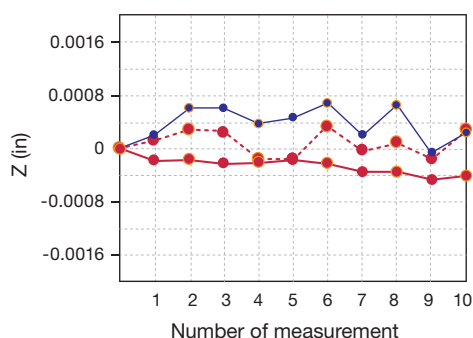


Clamp rigidity – cutting point displacements after machining (Back turning → Front turning)

Y-PRISM achieved high accuracy cutting edge position!!



Odd cycles: for back turning
Even cycles: for front turning



- **ADDMULTURN**
Insert: 6C-TOMG250608M-TM
- **ADDMULTURN**
Insert: 3C-TCMT29X608-TM
- Competitor

Workpiece material : 1045
Cutting speed : $V_c = 820$ sfm

Back turning

Feed : $f = 0.039$ ipr
Depth of cut : $a_p = 0.039$ "

Front turning

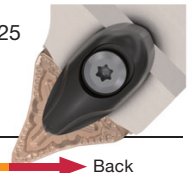
Feed : $f = 0.016$ ipr
Depth of cut : $a_p = 0.059$ "

■ Chip control

■ Double-sided 6-corner insert

ADD^{ULTI}TURN
6C-TOMG**-TM

Insert : 6C-TOMG250608M-TM T9225
Workpiece material : 1045
Cutting speed : $V_c = 656$ sfm
Coolant : Wet



Front turning

Depth of cut: ap (in)	0.100		
	0.080		
	0.060		
	0.040		
	0.020		
		0.008	0.016
		Feed: f (ipr)	

Back turning

Depth of cut: ap (in)	0.100					
	0.080					
	0.060					
	0.040					
	0.020					
		0.016	0.024	0.031	0.039	0.047
		Feed: f (ipr)				

Front turning ← → Back turning

Medium operation

- Front turning: Excellent chip control
- Back turning: Excellent chip control in high feed

ADD^{ULTI}TURN
6V-TOMG**-TSF

Insert : 6V-TOMG250608F-TSF T9225
Workpiece material : 1045
Cutting speed : $V_c = 820$ sfm
Coolant : Wet



Front turning

Depth of cut: ap (in)	0.060		
	0.040		
	0.020		
	0.010		
		0.008	0.012
		Feed: f (ipr)	

Back turning

Depth of cut: ap (in)	0.060					
	0.040					
	0.020					
	0.010					
		0.016	0.024	0.031	0.039	0.047
		Feed: f (ipr)				

Front turning ← → Back turning

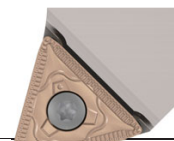
Finishing operation

- Front turning: Excellent chip control also in small D.O.C.
- Back turning: Excellent chip control in high feed

■ Single-sided 3-corner insert

ADDMULTITURN
3C-TCMT**-TM

Insert : 3C-TCMT29X608-TM T9215
Workpiece material : 1045
Cutting speed : $V_c = 656$ sfm
Coolant : Wet



Front turning

Depth of cut: ap (in)	0.160		
	0.120		
	0.080		
	0.060		
	0.040		
		0.008	0.016
		Feed: f (ipr)	

Back turning

Depth of cut: ap (in)	0.100					
	0.080					
	0.060					
	0.040					
	0.020					
		0.016	0.031	0.047	0.063	0.079
		Feed: f (ipr)				

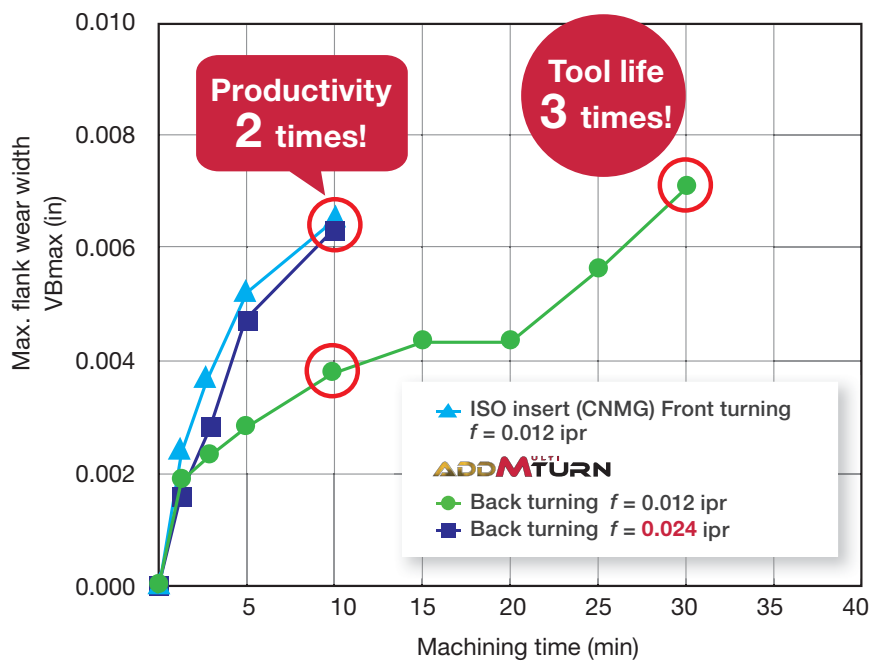
Front turning ← → Back turning

Medium operation

- Front turning: Excellent chip control, covers high D.O.C.
- Back turning: Excellent chip control in high feed, covers high feed rate

■ Tool life

■ Double-sided 6-corner insert



AddMultiTurn insert provided triple tool life when fed at the same feed rate as ISO insert.
Double the feed rate with AddMultiTurn compared with ISO insert without compromising tool life.

Insert : 6C-TOMG**-TM T9225
Workpiece material : 1045
Cutting speed : $V_c = 820$ sfm
Depth of cut : $a_p = 0.059$ "
Coolant : Wet

ISO insert (CNMG)
Front turning (10 minutes)



Feed: $f = 0.012$ ipr

ADDMULTURN
Back turning (10 minutes)

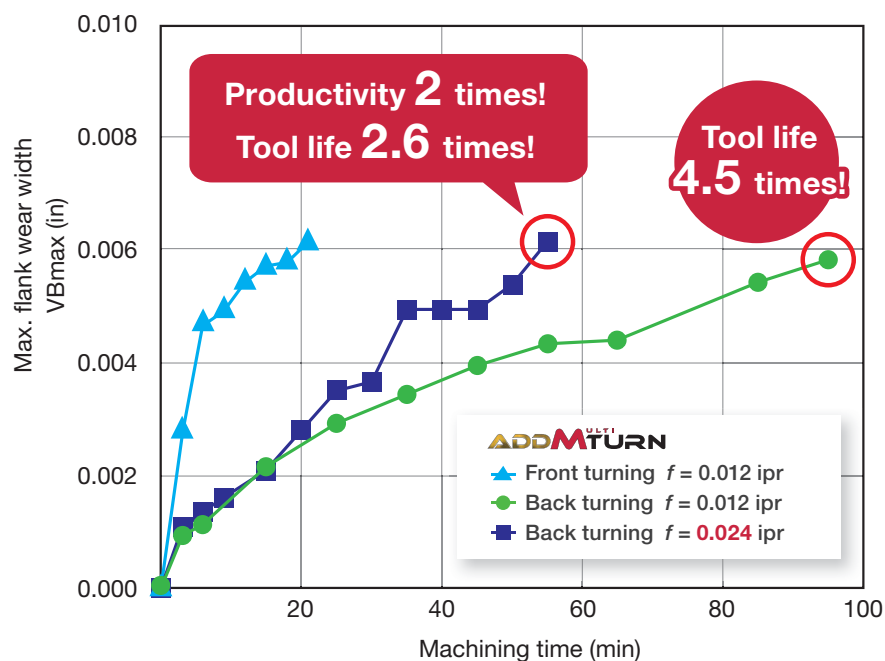


Feed: $f = 0.012$ ipr



Feed: $f = 0.024$ ipr

■ Single-sided 3-corner insert



Using back turning method, AddMultiTurn single-sided insert provided 4.5 times longer tool life, compared with when being fed forward at the same feed rate. Also, AddMultiTurn provided 2.6 times longer tool life when double the feed rate.

Insert : 3C-TCMT29X608-TM
T9215
Workpiece material : 1045
Cutting speed : $V_c = 591$ sfm
Depth of cut : $a_p = 0.039$ "
Coolant : Wet

ADDMULTURN
Front turning (20 minutes)



Feed: $f = 0.012$ ipr

Back turning (20 minutes)



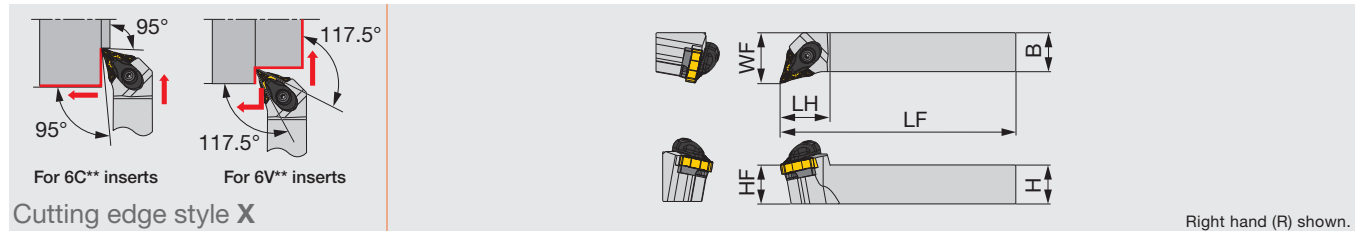
Feed: $f = 0.012$ ipr



Feed: $f = 0.024$ ipr

ATXOR/L

Double-clamp toolholder with 95° and 117.5° approach angle, for negative 80° and 35° triangular inserts



Inch	H	B	LF	LH	HF	WF	RE**	Insert	Torque
ATXOR/L128-A	0.750	0.750	4.500	1.260	0.750	1.000	0.031	6C/6V-TOMG2506...	2.21
ATXOR/L168-A	1.000	1.000	6.000	1.260	1.000	1.250	0.031	6C/6V-TOMG2506...	2.21
ATXOR/L208-A	1.250	1.250	7.000	1.260	1.250	1.500	0.031	6C/6V-TOMG2506...	2.21

Metric	H	B	LF	LH	HF	WF	RE**	Insert	Torque*
ATXOR/L2020K25-A	20	20	125	32	20	25	0.8	6C/6V-TOMG2506...	3
ATXOR/L2525M25-A	25	25	150	32	25	32	0.8	6C/6V-TOMG2506...	3
ATXOR/L3232P25-A	32	32	170	32	32	40	0.8	6C/6V-TOMG2506...	3

Torque: Recommended clamping torque: lbs-ft (*N·m)

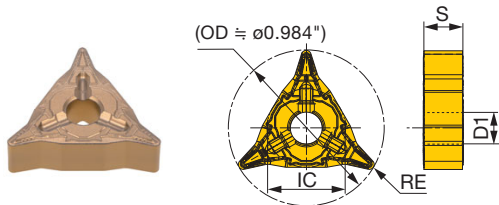
RE**: Standard corner radius

SPARE PARTS

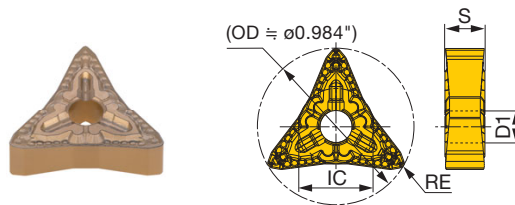
Designation	Clamp	Clamp screw	Spring	Spring pin	Shim	Shim screw	Wrench
ATXOR/L**8-A ATXOR/L**25-A	ACP4S	ACS-5W	BP-7	SP-2.5	LST33 KS15F	CSTB-3.5	T-15F

INSERT

6V-TOMG**F-TSF



6C-TOMG**M-TM



P	Steel	★	★						
M	Stainless	☆		☆					
K	Cast iron	☆							
N	Non-ferrous								
S	Superalloys			★					
H	Hard materials								

★ : First choice
☆ : Second choice

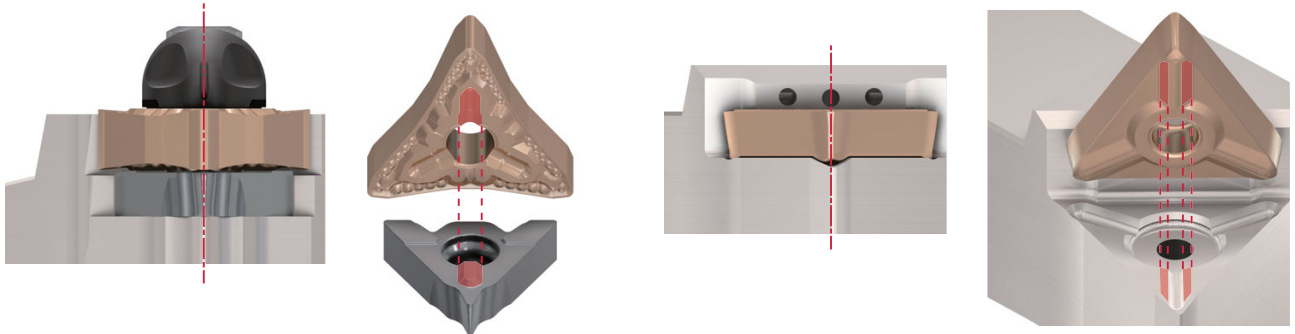
Designation	RE	Coated								IC	S	D1
		T9215	T9225	AH8015								
6V-TOMG250604F-TSF	0.016	●	●	●						0.500	0.250	0.203
6V-TOMG250608F-TSF	0.031	●	●	●						0.500	0.250	0.203
6C-TOMG250608M-TM	0.031	●	●	●						0.476	0.250	0.203
6C-TOMG250612M-TM	0.047	●	●	●						0.476	0.250	0.203

Please note, when machining with pull face-turning method, that 6V-TOMG2506... insert may interfere with the workpiece whose external diameter is 2.756" or smaller and that 6C-TOMG2506... insert 1.181" or smaller.

● : Line up

■ Cautions when mounting the insert on the holder

- 1 Ensure that the rail on the shim/toolholder is positioned on the matching slot on the insert

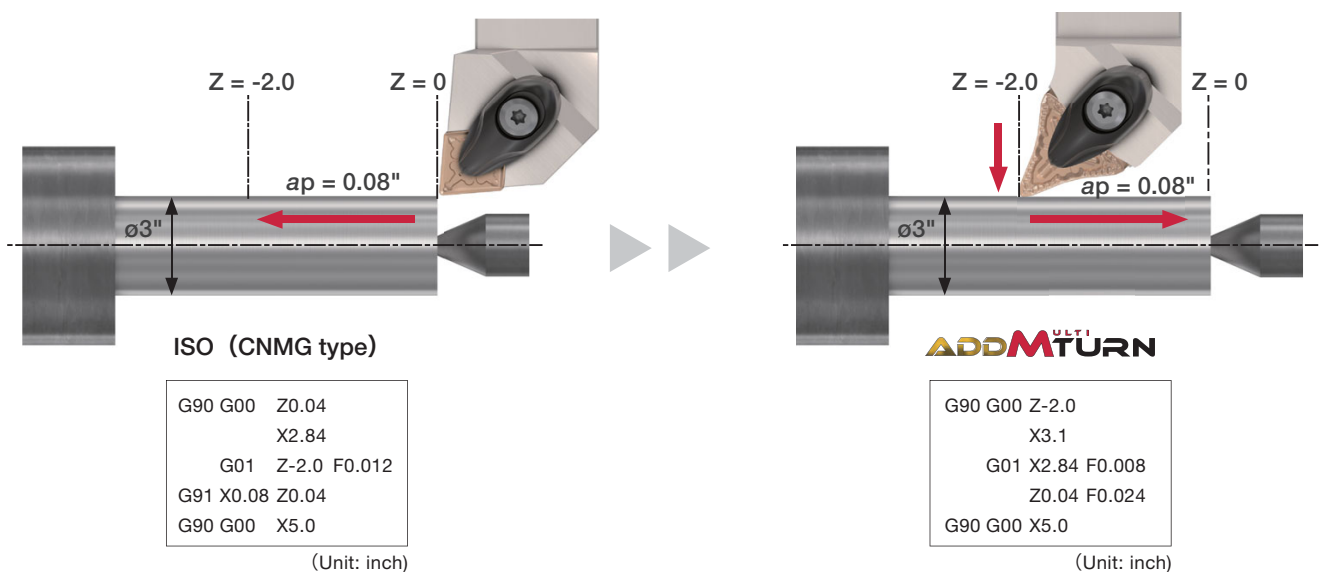


- 2 Ensure that the clamp is tightened on the shim and insert using the proper torque



Note: As the insert and shim/toolholder are interlocked on the rail and slot, it is no problem to have the clearance shown above.

- 3 Programming sample to change from front turning to back turning



*When entering the cut, feed the tool at 0.008 ipr or use roll-in approach.
 *When turning away from the main chuck, the cutting edge contact with the workpiece becomes larger, generating greater cutting load than when turning towards the chuck. Always use the tailstock support.

GRADES

Grade	Recommended workpiece material	Feature
PREMIUMTEC T9215	P M K	- Well-balanced wear and chipping resistance - First choice for steel - High versatility for a wide range of applications
PREMIUMTEC T9225	P	- First choice for roughing to medium cutting - High fracture resistance
PREMIUMTEC AH8015	M S	- PVD coated grade with a balanced resistance to wear and fracture - First choice for stainless steel and heat-resistant superalloys

STANDARD CUTTING CONDITIONS

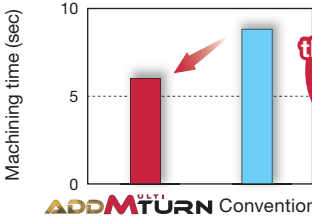
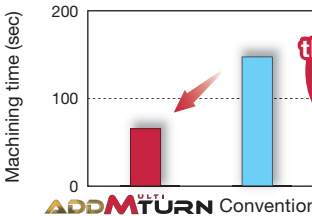
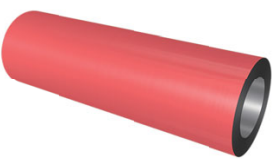
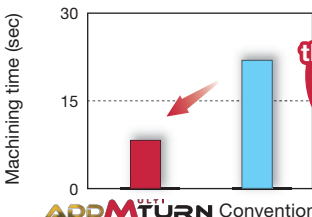
Double-sided 6-corner insert

ISO	Operation	Chipbreaker	Grade	Depth of cut: a_p (in)		Feed: f (ipr)		Cutting speed
				Front turning	Back turning	Front turning	Back turning	V_c (sfm)
P	Finishing	TSF	T9215	0.008 - 0.059	0.008 - 0.059	0.003 - 0.016	0.008 - 0.047	492 - 1312
		TSF	T9225	0.008 - 0.059	0.008 - 0.059	0.003 - 0.016	0.008 - 0.047	262 - 984
	Medium to heavy cutting	TM	T9215	0.02 - 0.098	0.02 - 0.098	0.008 - 0.024	0.016 - 0.047	492 - 1312
		TM	T9225	0.02 - 0.098	0.02 - 0.098	0.008 - 0.024	0.016 - 0.047	262 - 984
M	Finishing	TSF	T9215	0.008 - 0.059	0.008 - 0.059	0.003 - 0.016	0.008 - 0.047	328 - 820
		TSF	AH8015	0.008 - 0.059	0.008 - 0.059	0.003 - 0.016	0.008 - 0.047	295 - 623
	Medium to heavy cutting	TM	T9215	0.02 - 0.098	0.02 - 0.098	0.008 - 0.024	0.016 - 0.047	328 - 820
		TM	AH8015	0.02 - 0.098	0.02 - 0.098	0.008 - 0.024	0.016 - 0.047	295 - 623
K	Finishing	TSF	T9215	0.008 - 0.059	0.008 - 0.059	0.003 - 0.016	0.008 - 0.047	459 - 1640
	Medium to heavy cutting	TM	T9215	0.02 - 0.098	0.02 - 0.098	0.008 - 0.024	0.016 - 0.047	459 - 1640
S	Finishing	TSF	AH8015	0.008 - 0.059	0.008 - 0.059	0.003 - 0.016	0.008 - 0.047	66 - 262
	Medium to heavy cutting	TM	AH8015	0.02 - 0.098	0.02 - 0.098	0.008 - 0.024	0.016 - 0.047	66 - 262

Single-sided 3-corner insert

ISO	Operation	Chipbreaker	Grade	Depth of cut: a_p (in)		Feed: f (ipr)		Cutting speed
				Front turning	Back turning	Front turning	Back turning	V_c (sfm)
P	Medium to heavy cutting	TM	T9215	0.02 - 0.157	0.02 - 0.079	0.008 - 0.024	0.016 - 0.079	492 - 1312
M	Medium to heavy cutting	TM	T9215	0.02 - 0.157	0.02 - 0.079	0.008 - 0.024	0.016 - 0.079	328 - 820
K	Medium to heavy cutting	TM	T9215	0.02 - 0.157	0.02 - 0.079	0.008 - 0.024	0.016 - 0.079	459 - 1640

PRACTICAL EXAMPLES

Workpiece type		Input shaft	Gear part
Toolholder		ATXOL2525M25-A	ATXOR2525M25-A
Insert		6C-TOMG250608M-TM	6V-TOMG250604F-TSF
Grade		T9215	T9215
Workpiece material		5120	1025
			
Cutting conditions	Cutting speed : V_c (sfm)	482	656
	Feed : f (ipr)	Face turning: 0.014, External turning: 0.020	Roughing : 0.024 x 2 passes, Finishing : 0.004 x 1 pass
	Depth of cut : a_p (in)	Face turning: 0.039" - 0.079", External turning: 0.020"	0.020" x 3 passes
	Machining	Face turning, External turning	External turning
	Coolant	Wet (External coolant)	Wet (External coolant)
Results		 Reduced the machining time 32% AddMultiTurn reduced machining time by 32% and prevented burr formation thanks to high-feed back turning.	 Reduced the machining time 55% AddMultiTurn reduced machining time by 55% thanks to high-feed back turning.
Workpiece type		Machine part	
Toolholder		STXCR169-CHP-MC	
Insert		3C-TCMT29X608-TM	
Grade		T9215	
Workpiece material		4140	
			
Cutting conditions	Cutting speed : V_c (sfm)	656	
	Feed : f (ipr)	0.031	
	Depth of cut : a_p (in)	0.079"	
	Machining	External turning	
	Coolant	Wet (Internal coolant)	
Results		 Reduced the machining time 63% New AddMultiTurn single-sided insert reduced machining time by 63% thanks to high feed geometry (small entry angle) specification.	

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