

MillLine

TUNGTRI^{RI}SHRED

www.tungaloyamerica.com

Tungaloy Report No. 505-US

TUNGTRI-SHRED

Highly productive roughing cutter with serrated edges





ACCELERATED MACHINING

MillLine

TUNG^{TRI}SHRED
TUNGALOY

TUNG^{FORCE}MILL
ACCELERATED MACHINING



TungTri-Shred combines the advantages of Triangular insert with **chip splitting technology** for rough machining **with long overhang**.

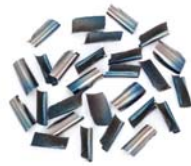
Long-edge rough milling with small chips effectively prevents chatter

Anti Chatter Design

- Wavy cutting edge shape creates smaller chips reducing chatter.



TUNGTRI SHRED



Conventional

- Triangular insert shape and pocket seating ensures rigid clamping during heavy duty machining.

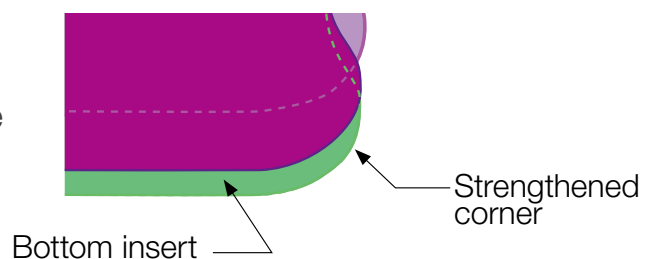
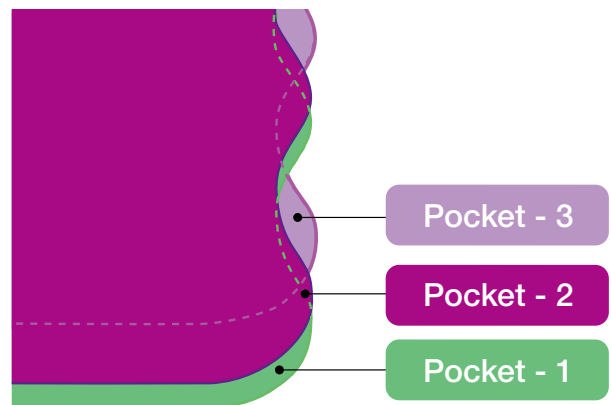
Intelligent and User friendly design

- Each flute (adjacent pockets in radial direction) in the cutter body is offsetted in Z direction. This positioning ensures that the insert in the adjacent flute removes the crest left by the previous insert. Thus, the surface of machined wall is close to be flat.

- No specific insert positioning required as positioning is done on the cutter.

- All cutting edges of the Inserts are identical.

- Insert corner is strengthened to resist corner chip off for the bottom most insert. (the bottom most insert is a single effective corner and withstands the feed equal to feed/rev)



Insert Varieties

2 types of insert fit on the same cutter body providing option for roughing as well as finishing.



TCMT-NMJ

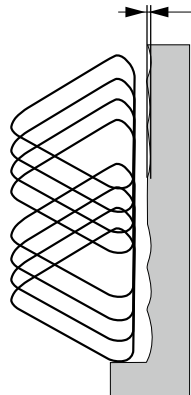
For roughing operation with serrated edges
 - Low cutting force



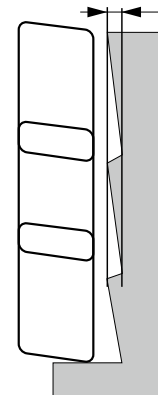
TCGT-MJ

Suitable for finishing operation or general shoulder square milling.
 - Low cutting force with large rake angle
 - Precise periphery ground insert and unique off-setted positioning of the pocket ensures minimal gap on the machined wall.

Small gap



Large gap

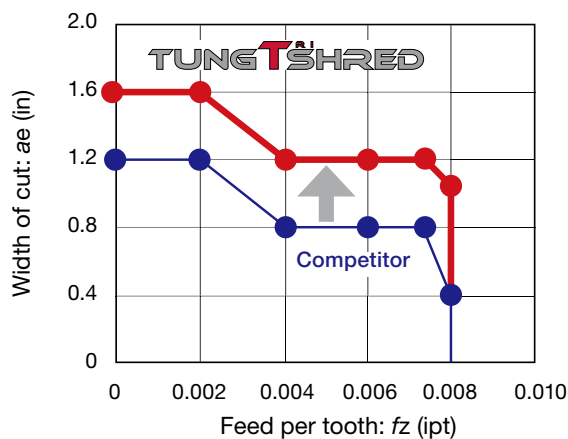


TUNGTRI-SHRED

Conventional, Competitor

CUTTING PERFORMANCE

Comparison of application range



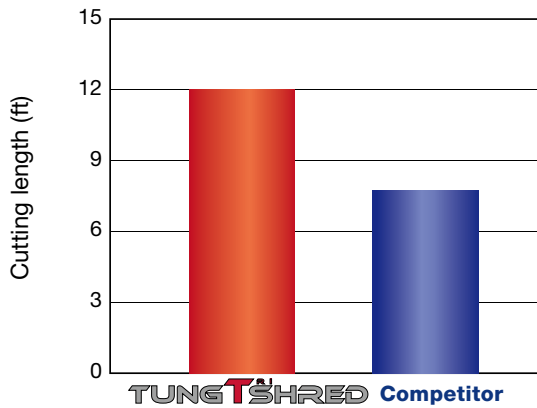
Cutter : LPTC16U3.00B1.25L3.0R04 ($\phi Dc = 3.0"$, $z = 4$)
 Insert : TCMT160620PDER-NMJ
 Workpiece material : 4140H (270HB)
 Cutting speed : $Vc = 330$ sfm
 Depth of cut : $ap = 2.76"$
 Machine : Vertical M/C (CAT50, 37 kw)

TungTri-Shred can be applied for a wider cutting area.

CUTTING PERFORMANCE

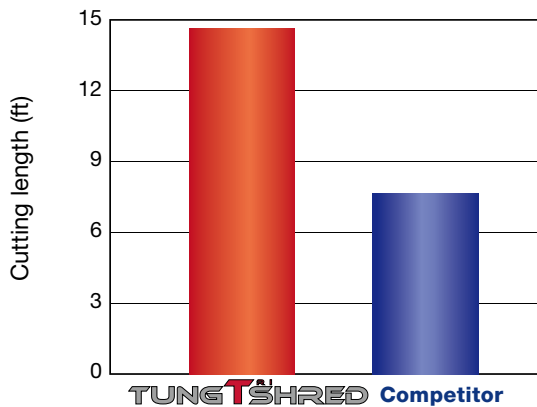
Tool life

P Carbon steel with NMJ type



Cutter : LPTC16U3.00B1.25L3.0R04 ($\phi Dc = 3.0"$, $z = 4$)
 Insert : TCMT160620PDER-NMJ AH3135
 Workpiece material : 1055 (200HB)
 Cutting speed : $Vc = 490$ sfm
 Feed per tooth : $fz = 0.007$ ipt
 Depth of cut : $ap = 10.394"$
 Width of cut : $ae = 1.5"$
 Coolant : Dry
 Machine : Vertical M/C, CAT50, 30kW
 Machining : Heavy interrupted
 Tool life criteria : Chipping on edge

P Alloy steel with MJ type

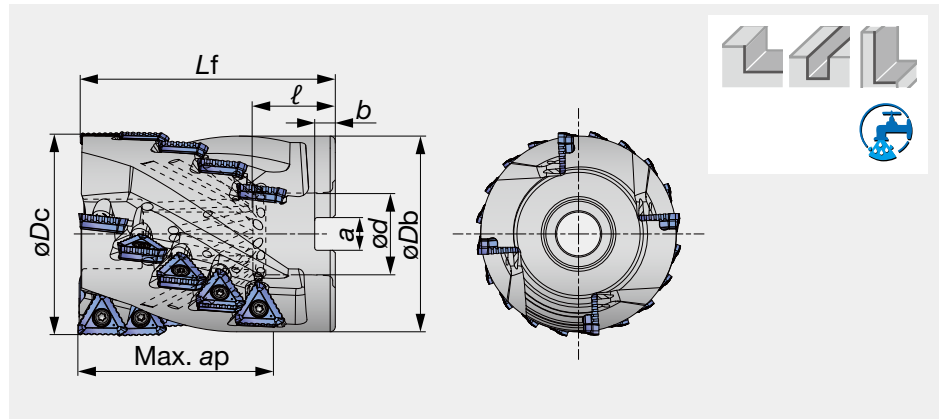


Cutter : LPTC16U3.00B1.25L3.0R04 ($\phi Dc = 3.0"$, $z = 4$)
 Insert : TCGT160608PDER-MJ AH3135
 Workpiece material : 4140 (270HB)
 Cutting speed : $Vc = Vc = 490$ sfm
 Feed per tooth : $fz = 0.006$ ipt
 Depth of cut : $ap = 10.394"$
 Width of cut : $ae = 1.5"$
 Coolant : Dry
 Machine : Vertical M/C, CAT50, 30kW
 Machining : Heavy interrupted
 Tool life criteria : Chipping on edge

Square shoulder milling cutters for roughing with shred insert

CUTTER - ROUGHING TYPE - BORE

TungTri-Shred LPTC16



Designation	Max. ap	øDc	Z eff	z	øDb	Lf	od	l	a	b	Kg	C.bolt	Insert
LPTC16U2.50B1.00L2.4R03	2.402	2.500	3	12	2.350	3.350	1.000	1.024	0.374	0.236	2.82	C0.500x2.125	TC*T16
LPTC16U3.00B1.25L3.0R04	2.992	3.000	4	12	2.839	4.000	1.250	1.260	0.500	0.315	4.67	SD10-54	TC*T16

SPARE PARTS

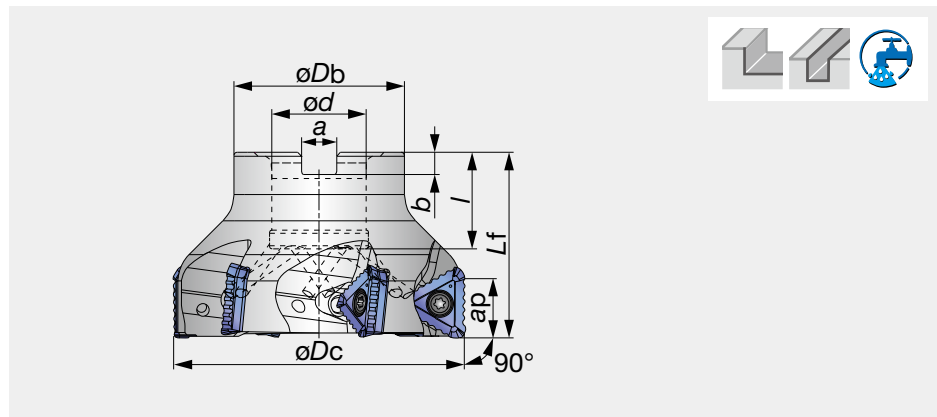


Clamping screw	Wrench	
	Torx Bit	Grip
TS 40B100I	BT15S	H-TB2W

Square shoulder milling cutters with shred insert

CUTTER - BORE TYPE

TungTri-Shred TPTC16



Designation	Max. ap	ϕDc	z	ϕDb	L_f	ϕd	ℓ	a	b	lb	C.bolt	Insert
TPTC16U2.00B0.75R04	0.63	2.000	4	1.625	1.570	0.750	0.750	0.315	0.197	0.71	(TCS9.525-35-I)	TC*T16**
TPTC16U2.50B0.75R05	0.63	2.500	5	2.125	1.570	0.750	0.750	0.315	0.197	1.26	(C0.375X1.125H)	TC*T16**
TPTC16U3.00B1.00R06	0.63	3.000	6	2.250	1.752	1.000	1.024	0.374	0.236	1.81	(C0.500X1.375H)	TC*T16**
TPTC16U4.00B1.50R07	0.63	4.000	7	3.000	2.000	1.500	1.193	0.626	0.394	3.17	-	TC*T16**

SPARE PARTS

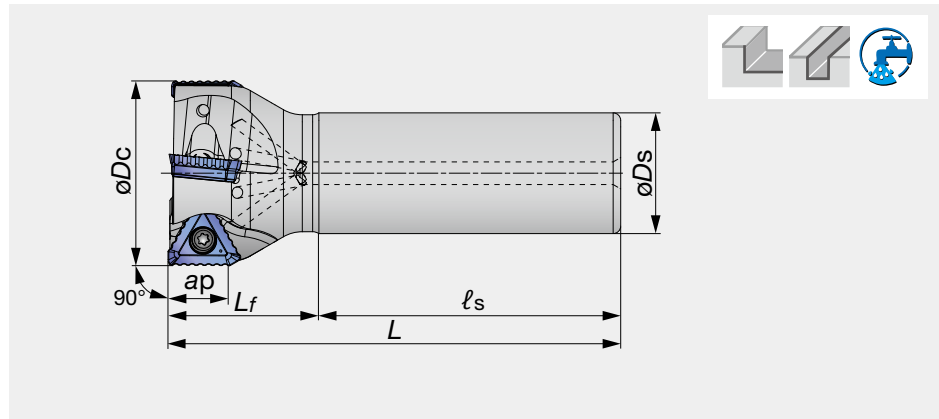


Clamping screw	Wrench	
	Torx Bit	Grip
TS 40B100I	BT15S	H-TB2W

Square shoulder milling cutters with shred insert

CUTTER - SHANK TYPE

TungTri-Shred EPTC16



Designation	Max. ap	ϕD_c	z	ϕD_s	l_s	L_f	L	l_b	Insert
EPTC16U2.00W1.25R04	0.63	2.000	4	1.250	2.250	2.250	4.500	1.70	TC*T16**

SPARE PARTS



Clamping screw	Wrench	
	Torx Bit	Grip
TS 40B100I	BT15S	H-TB2W

INSERTS



Designation	Max. ap	A	ød	T	rε	bs	AH3135	AH120
TCGT160608PDER-MJ	0.630	0.630	0.539	0.228	0.031	0.039	● ● ● ● ● ●	○ ● ● ● ● ●
TCMT160620PDER-NMJ	0.630	0.630	0.524	0.228	0.079	0.079	● ● ● ● ● ●	○ ● ● ● ● ●

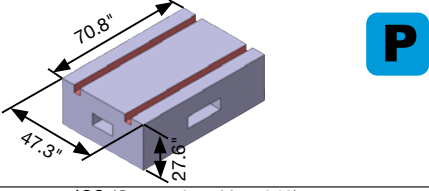
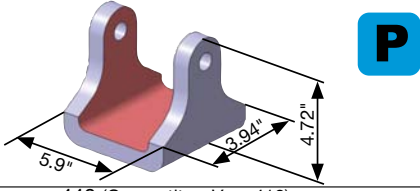
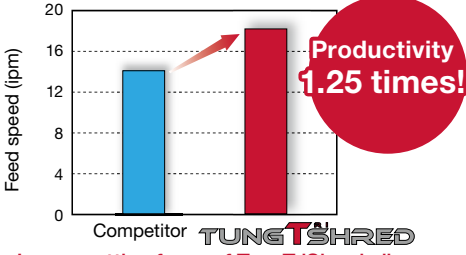
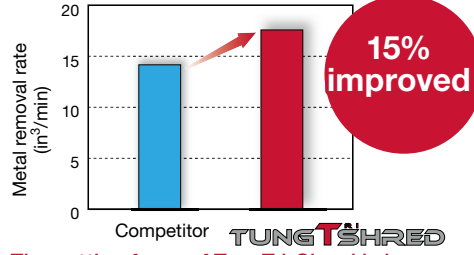
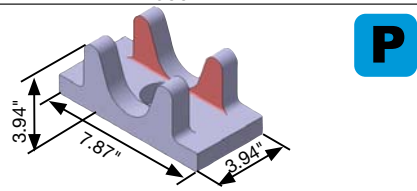
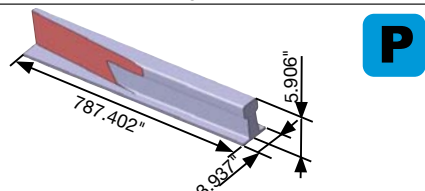
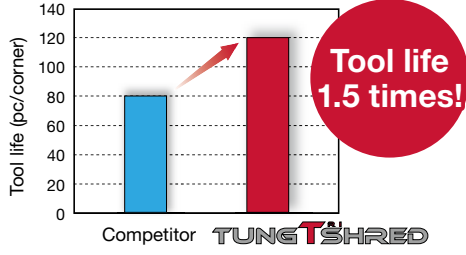
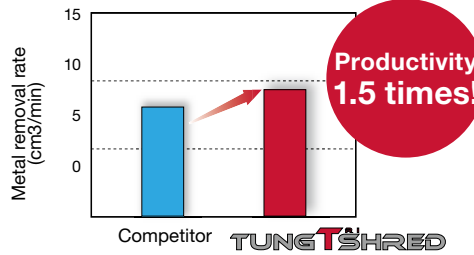
● First choice

STANDARD CUTTING CONDITIONS

ISO	Workpiece materials	Hardness	Priority	Grades	Chip-breaker	Cutting speed Vc (sfm)	Feed per tooth fz (ipt)
P	Low carbon steels (1015, 1020, etc.)	- 300 HB	First choice	AH3135	NMJ*	330 - 830	0.003 - 0.006
		- 300 HB	For finishing	AH3135	MJ	330 - 830	0.003 - 0.008
	Carbon steels, Alloy steels (1055, 4140, etc.)	- 300 HB	First choice	AH3135	NMJ*	330 - 760	0.003 - 0.006
		- 300 HB	For finishing	AH3135	MJ	330 - 760	0.003 - 0.008
	Prehardened steel (NAK80, PX5, etc.)	30 - 40 HRC	First choice	AH3135	NMJ*	330 - 590	0.003 - 0.006
		30 - 40 HRC	For finishing	AH3135	MJ	330 - 590	0.003 - 0.008
M	Stainless steels (304, 316, etc.)	-	First choice	AH3135	NMJ*	300 - 660	0.003 - 0.006
		-	For finishing	AH3135	MJ	90 - 200	0.003 - 0.008
K	Grey cast irons (No.25, No.30, etc.)	150 - 250 HB	First choice	AH120	NMJ*	460 - 830	0.003 - 0.006
		150 - 250 HB	For finishing	AH120	MJ	460 - 830	0.003 - 0.010
	Ductile cast irons (60-40-18, 80-55-06, etc.)	150 - 250 HB	First choice	AH120	NMJ*	460 - 830	0.003 - 0.006
		150 - 250 HB	For finishing	AH120	MJ	460 - 830	0.003 - 0.010
S	Titanium alloys (Ti-6Al-4V, etc.)	-	First choice	AH120	NMJ*	70 - 200	0.003 - 0.006
		-	For finishing	AH120	MJ	70 - 200	0.003 - 0.007
	Heat-resistant alloys (Inconel718, etc.)	-	First choice	AH120	NMJ*	70 - 130	0.003 - 0.005
		-	For finishing	AH120	MJ	70 - 130	0.003 - 0.006

* When you use the NMJ chipbreaker, please set up the feed less than 0.006 ipt.

PRACTICAL EXAMPLES

Workpiece type	Machine parts	Blacket	
Holder	LPTC16U2.50B1.00L2.4R03 (ø2.5", z = 3)	LPTC16U3.00B1.25L3.0R04 (ø3.0", z = 4)	
Insert	TCMT160620PDER-NMJ	TCMT160620PDER-NMJ	
Grade	AH3135	AH3135	
Workpiece material	Low carbon steel	Low carbon steel	
Workpiece material			
Cutting conditions	Cutting speed: Vc (sfm)	490 (Competitor: Vc = 340)	440 (Competitor: Vc = 410)
	Feed per tooth: fz (ipt)	0.008	0.013 (Competitor: fz = 0.012)
	Feed speed: Vf (ipm)	18	27.9
	Depth of cut: ap (in)	1.969	2.953
	Width of cut: ae (in)	0.394	0.197
	Method of machining	Shoulder milling	Shoulder milling
	Coolant	Air	Air
Machine	Tower M/C, BT50	Vertical M/C, BT40	
Results	 Lower cutting force of TungTriShred allows increasing the cutting speed by 25% and eventually achieving high productivity.	 The cutting force of TungTri-Shred is lower than competitors, allowing productivity improvement of 15%. This reduces customer's process cost.	
Workpiece type	Flange	Rail	
Holder	TPTC16U2.00B0.75R04 (ø2.0", z = 4)	LPTC16U3.00B1.25L3.0R04 (ø3.0", z = 4)	
Insert	TCMT160620PDER-NMJ	TCGT160608PDER-MJ	
Grade	AH120	AH120	
Workpiece material	300	E1101	
Workpiece material			
Cutting conditions	Cutting speed: Vc (sfm)	490	410 (Competitor: Vc = 187)
	Feed per tooth: fz (ipt)	0.007	0.006
	Feed speed: Vf (ipm)	27.559	9.449
	Depth of cut: ap (in)	0.079	1.772
	Width of cut: ae (in)	0.394	0.591
	Method of machining	Shoulder milling	Shoulder milling
	Coolant	Wet	Air
Machine	Horizontal M/C, BT40	Tower M/C, BT50	
Results	 Smaller chip size and reduced cutting forces improves tool life by 1.5 times.	 Cutting sound and forces were low allowing increase of cutting speed and subsequently improving productivity. Wall surface finish achieved with MJ insert was very good.	

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