

MILLLINE Shoulder milling cutter

TUNG-TRI

NEW

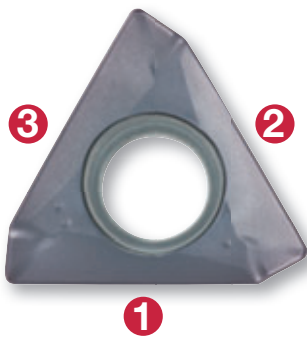
Economical shoulder milling cutter with anti-chatter design!



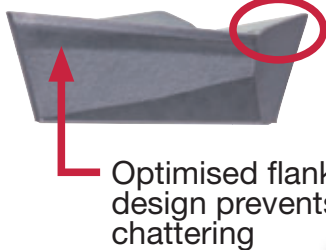
Innovative shoulder milling series with 3 cornered insert with economical advantages and wide application range

Improved economics and cutting performance

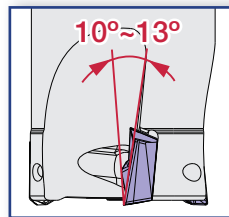
- Economical 3 cornered insert
- Large rake angle on cutting edges drastically reduces cutting force
- Excellent chip formation



Positive inclination of wiper edge moves swarf away from cutting zone improving surface finish



Optimised flank face design prevents chattering



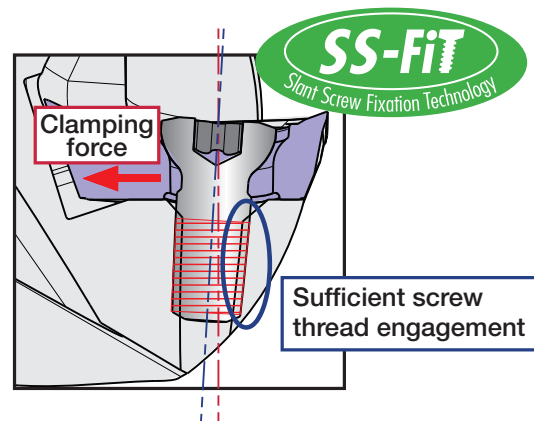
Large rake angle

Helical cutting edge provides low cutting forces at all depths of cut



High reliability

- Large size clamping screw with SS-FiT technology offers high clamping rigidity



SS-FiT
Slant Screw Fixation Technology

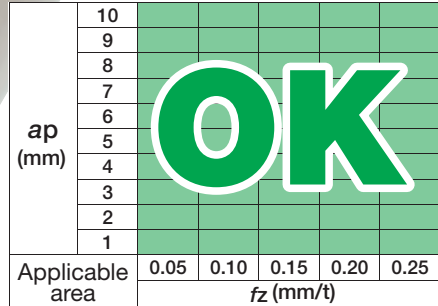
Clamping force

Sufficient screw thread engagement

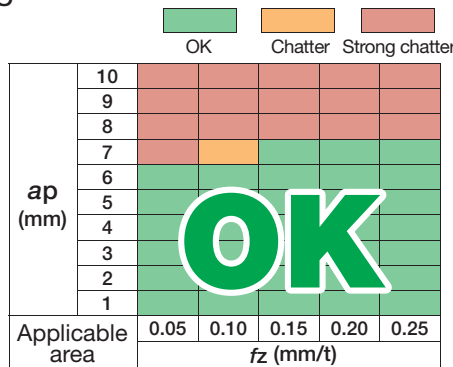
Applicable for a wide range of cutting conditions

- Optimised flank face design prevents chattering
- Irregular pitch positioning breaks the harmonics avoiding vibration during machining

Cutting performance

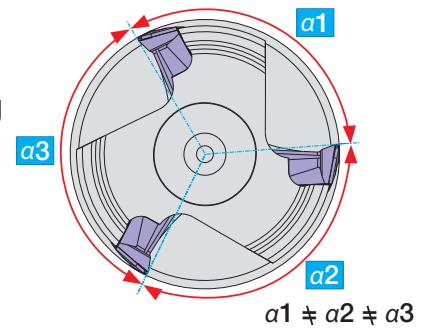


TUNG-TRI



Competitor

Irregular pitch

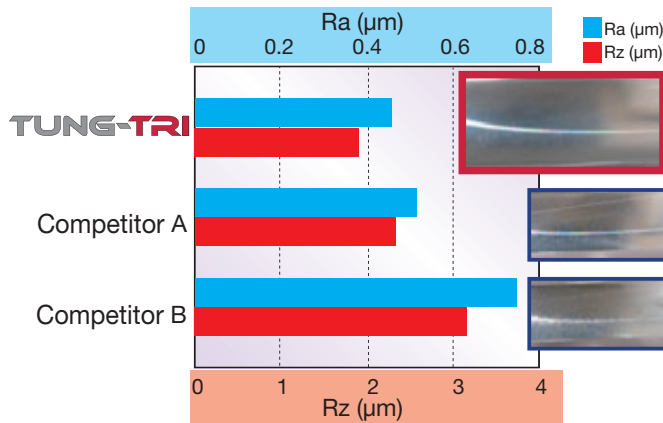


Cutter : EPA10R032M32.0-03N ($\phi D_c = 32$ mm, $z = 3$)
 Insert : TOMT100404PDER-MJ
 Grade : AH3135
 Work material: S55C / C55 (200 HB)
 Cutting speed: $V_c = 150$ m/min
 Width of cut : $a_e = 32$ mm
 Machine : Vertical M/C, BT50

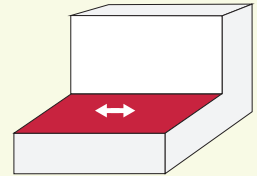
Excellent surface finish and high wall accuracy

- Cutting edge geometry for low cutting force and positive larger wiper edge provides outstanding surface finish

Bottom surface finish

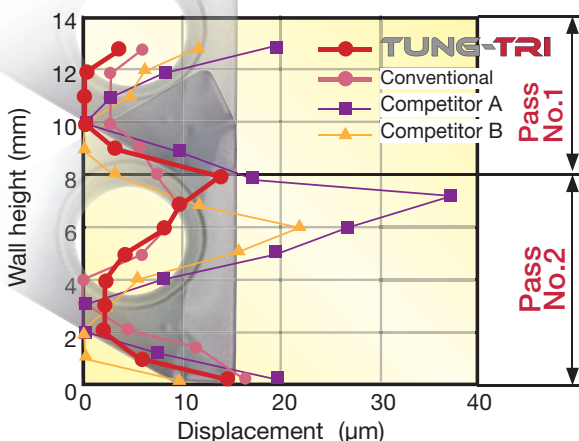


Cutter : EPA10R032M32.0-03N ($\phi D_c = 32$ mm, $z = 3$)
 Insert : TOMT100404PDER-MJ
 Grade : AH3135
 Work material : S55C / C55 (200HB)
 Cutting speed : $V_c = 150$ m/min
 Feed per tooth : $f_z = 0.1$ mm/t
 Depth of cut : $a_p = 5$ mm
 Width of cut : $a_e = 21$ mm
 Machine : Vertical M/C, BT50

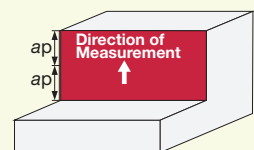


- Optimised cutting edge and helical angle lead to high wall accuracy surface

Accuracy



Cutter : EPA10R032M32.0-03N ($\phi D_c = 32$ mm, $z = 3$)
 Insert : TOMT100404PDER-MJ
 Grade : AH3135
 Work material : S55C / C55 (200HB)
 Cutting speed : $V_c = 150$ m/min
 Feed per tooth : $f_z = 0.1$ mm/t
 Depth of cut : $a_p = 8$ mm x 2 pass
 Width of cut : $a_e = 5$ mm
 Machine : Vertical M/C, BT50



New coated grade offers longer tool life

New

AH3135

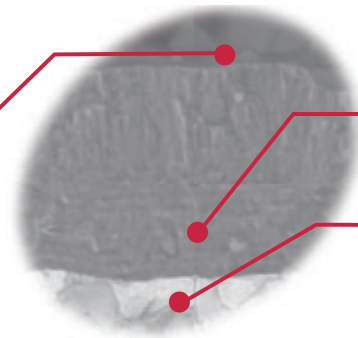


Special Surface Technology

PREMIUMTEC

TUNGALOY

Smooth insert surface prevents chip adhesion!



Multi-layered coating with higher chipping resistance

Exclusive carbide substrate with incredible toughness

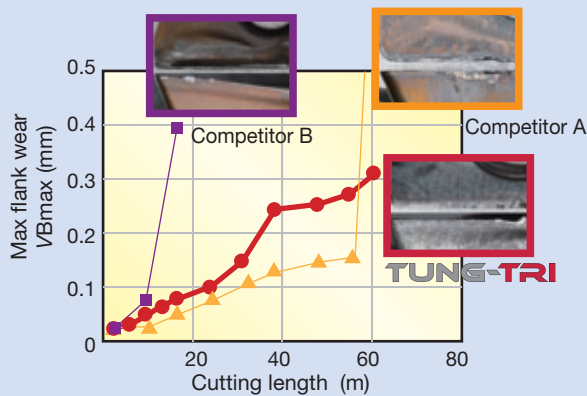
Brand-new grade for steel and stainless steel machining

● Dramatically improved chipping and fracture resistance

- Multi-layered coating prevents crack expansion which causes chipping and fracture
- Cobalt enriched carbide substrate improves impact resistance and toughness

● Longer tool life due to high wear resistance

■ Tool life



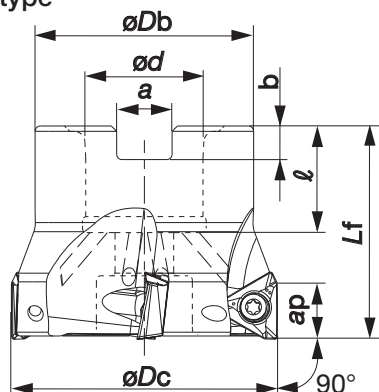
Cutter : EPA10R032M32.0-03N
 (øDc = 32 mm, z = 3)
 Insert : TOMT100404PDER-MJ
 Grade : AH3135
 Work material : S55C / C55 (200HB)
 Cutting speed : Vc = 150 m/min
 Feed per tooth : fz = 0.15 mm/t
 Depth of cut : ap = 6 mm
 Width of cut : ae = 10.5 mm
 Coolant : Dry
 Machine : Vertical M/C, HSK63

● Specification of AH3135

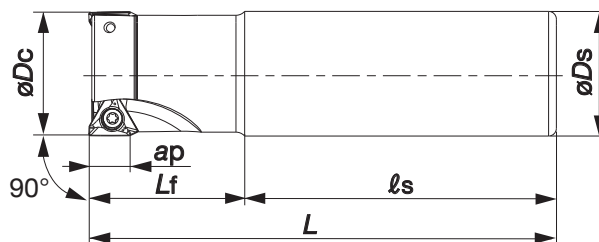
Application	Grade	Substrate			Coating layer		Features
	Application code	Specific gravity	Hardness (HRA)	T.R.S. (GPa)	Main Composition	Thickness (µm)	
	AH3135	14.0	89.5	2.8	(Ti, Al)N Multi-layer	4	Brand-new grade for steel and stainless steel machining Dramatically improved chipping and fracture resistance
	P30 - P40						
	AH120	14.5	90.8	2.8	(Ti, Al)N	3	General grade Well balanced general purpose grade with both wear resistance and impact resistance
	K15 - K30						

Cutter

Bore type



Shank type



Parts

Descriptions		Parts Cat. No.	
Applicable cutter		T/EPA10	T/EPA15
Clamping screw		SR14-562/S	TS45120I
Wrench	Torx bit	BLDT10/S7	BT20S
	Grip	SW6-SD	H-TBS

Max. depth of cut :
 T/EPA10: Max. $ap = 10$ mm
 T/EPA15: Max. $ap = 15$ mm

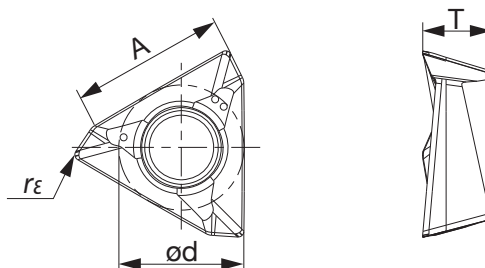
Bore type

Cat. No.	Stock	No. of Inserts	Dimensions (mm)						Air hole	Center bolt	Applicable Insert	
			$\varnothing Dc$	$\varnothing Db$	$\varnothing d$	ℓ	L_f	b				a
TPA10R040M16.0E04	●	4	40	35	16	18	40	5.6	8.4	with	CM8X30H	TOMT10040* PDER-MJ
TPA10R050M22.0E04	●	4	50	41	22	20	40	6.3	10.4		CM10X30H	
TPA10R063M22.0E06	●	6	63	41	22	20	40	6.3	10.4		CM10X30H	
TPA15R050M22.0E04	●	4	50	41	22	20	40	6.3	10.4	with	FSHM10-40H	TOMT15060* PDER-MJ
TPA15R063M22.0E05	●	5	63	41	22	20	40	6.3	10.4		CM10X30H	
TPA15R080M27.0E06	●	6	80	50	27	22	50	7	12.4		CM12X30H	
TPA15R100M32.0E07	●	7	100	60	32	28.5	50	8	14.4		TMBA-M16H	
TPA15R080M25.4-06	●	6	80	46	25.4	26	50	6	9.5		CM12X30H	
TPA15R100M31.7-07	●	7	100	60	31.75	32	50	8	12.7		TMBA-M16H	

Shank type

Cat. No.	Stock	No. of Inserts	Dimensions (mm)					Air hole	Applicable Insert
			$\varnothing Dc$	$\varnothing Ds$	ℓ_s	L_f	L		
EPA10R025M25.0-02N	●	2	25	25	80	35	115	without	TOMT10040* PDER-MJ
EPA10R032M32.0-03N	●	3	32	32	80	40	120		
EPA10R040M32.0-04N	●	4	40	32	80	40	120		
EPA15R040M32.0-03N	●	3	40	32	80	40	120	without	TOMT15060* PDER-MJ
EPA15R050M32.0-04N	●	4	50	32	80	40	120		

Inserts



Cat. No.	Accuracy	Honing	Grades		Dimensions (mm)				Cutter
			AH3135	AH120	A	$\varnothing d$	T	r_ϵ	
TOMT100404PDER-MJ	M	with	●	●	10.5	8.6	4.7	0.4	TPA10R... EPA10R...
TOMT100408PDER-MJ			●	●				0.8	
TOMT150604PDER-MJ	M	with	●	●	15.7	12.7	6	0.4	TPA15R... EPA15R...
TOMT150608PDER-MJ			●	●				0.8	

● : Offered items

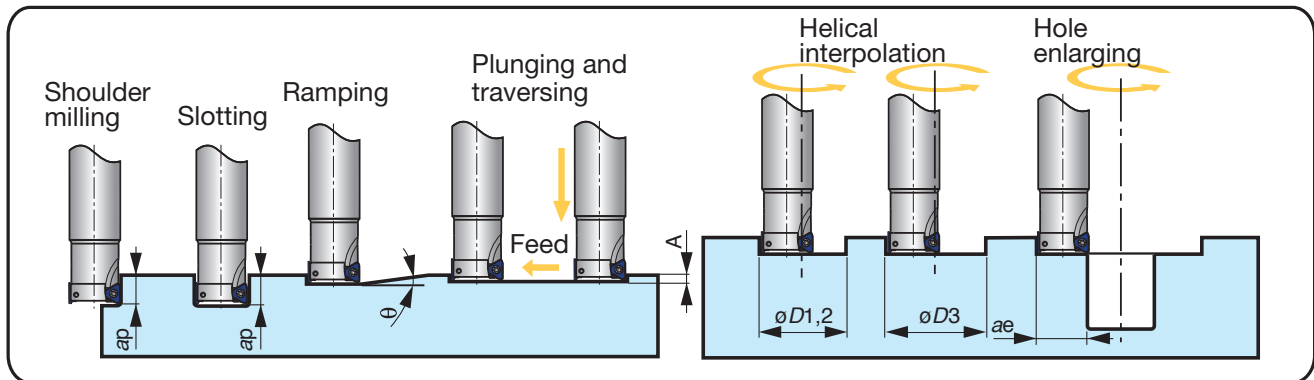
Standard cutting conditions

Workpiece materials	Hardness (HB)	Grades	Cutting speed: Vc (m/min)		Feed per tooth: fz (mm/t)	
			T/EPA10	T/EPA15	T/EPA10	T/EPA15
Low carbon steels SS400, S15C etc. / E275A, C15E etc.	- 200	AH3135	100 - 250	100 - 250	0.08 - 0.2	0.08 - 0.25
High carbon steels S45C etc. / C45 etc.	200 - 300		100 - 200	100 - 230		
Alloyed steels SCM440 etc. / 42CrMo4 etc.			100 - 150	100 - 180		
Tool steels SKD61 etc. / X40CrMoV5-1 etc.	150 - 300					
Stainless steels SUS304 etc. / X5CrNi18-9 etc.	-	AH3135	80 - 200	90 - 200	0.08 - 0.2	0.08 - 0.2
Grey cast irons FC250 etc. / GG25 etc.	150 - 250	AH120	100 - 250	140 - 250	0.12 - 0.2	0.08 - 0.25
Ductile cast irons FCD450 etc. / GGG45			80 - 200	110 - 200		
Titanium alloy Ti-6Al-4V etc.	-	AH120	20 - 60	20 - 60	0.08 - 0.15	0.08 - 0.18
Heat-resistance alloy Inconel 718 etc.			20 - 40	20 - 40	0.08 - 0.13	0.08 - 0.15

- To remove excessive chip accumulation use an air blast.
- When cutting an interrupted surface or a casted skin, the feed per tooth (fz) should be reduced to the lower recommended value shown in the above table.

- Cutting conditions are limited by machine power, workpiece rigidity, and spindle output. When the cutting width, depth, or overhang length is large, set Vc and fz to the lower recommended values and check the machine power and vibration.

Machining applications

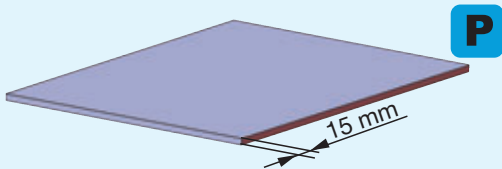
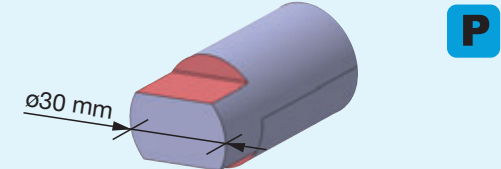
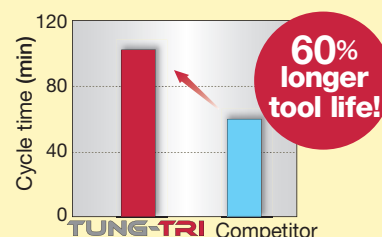


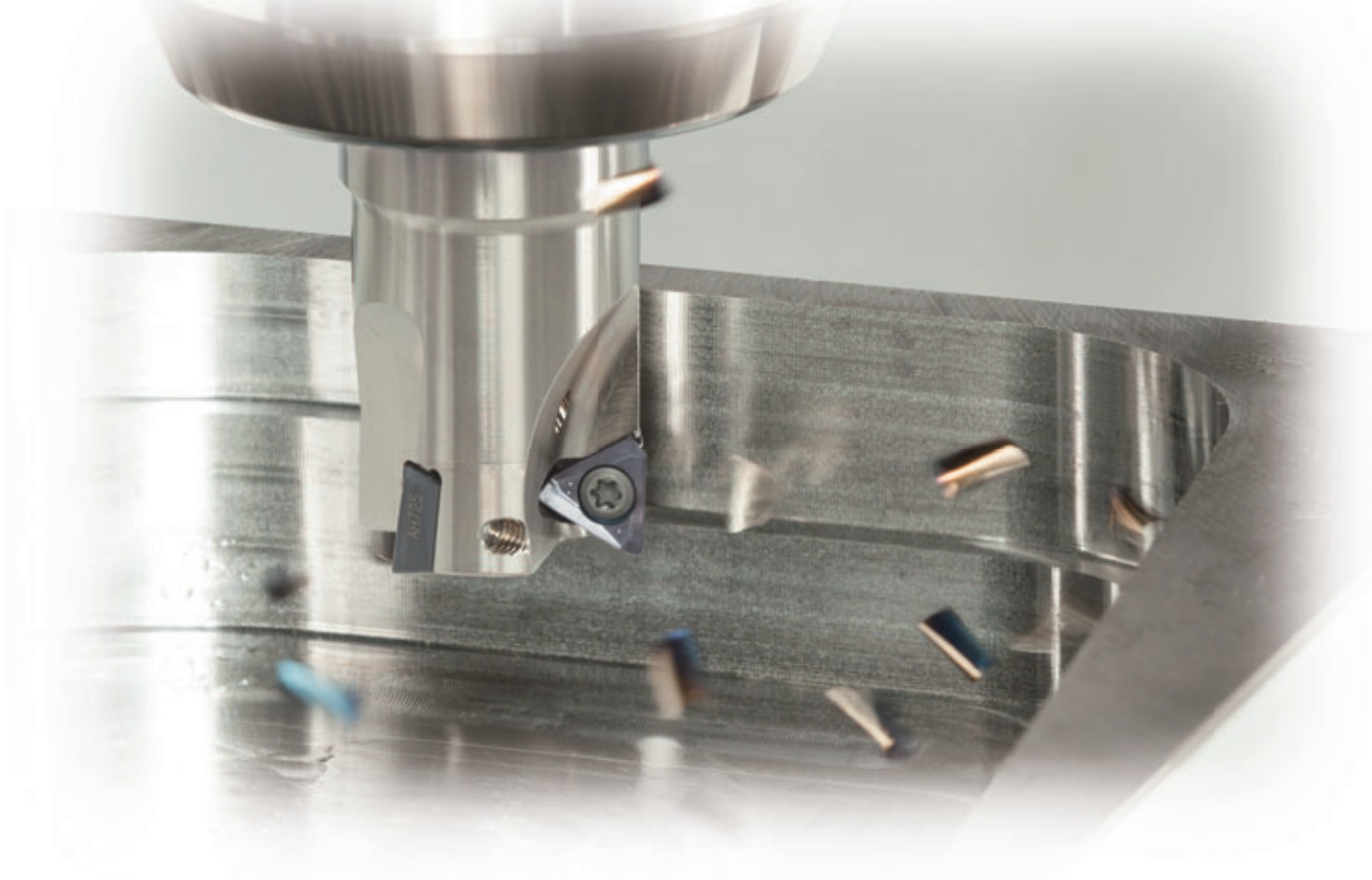
Cat. No.	Tool-ø øDc (mm)	Max. depth of cut ap (mm)	Max. ramping angle θ	Max. plunging A (mm)	Min. machining øD1 (mm)	Max. machining øD2 (mm)	*Max. machining øD3 (mm)	Max. cutting width in enlarging ae (mm)
EPA10R025...	ø25	10	2°	0.6	42.1	49.6	47	24.5
EPA10R032...	ø32	10	2°	0.6	56.1	63.6	61	31.5
E/TPA10R040...	ø40	10	1.4°	0.6	72.1	79.6	77	39.5
TPA10R050...	ø50	10	0.9°	0.6	92.1	99.6	97	49.5
TPA10R063...	ø63	10	0.8°	0.6	118.1	125.6	123	62.5
EPA15R040...	ø40	15	2.3°	0.8	68.5	79.2	75.5	39
E/TPA15R050...	ø50	15	1.7°	0.8	88.5	99.2	95.5	49
TPA15R063...	ø63	15	1.4°	0.8	114.5	125.2	121.5	62
TPA15R080...	ø80	15	1°	0.8	148.5	159.2	155.5	79
TPA15R100...	ø100	15	0.8°	0.8	188.5	199.2	195.5	99

*Flat bottom hole

Notes: Corner rε for dimensions of øD1, øD2, and øD3: rε = 0.4 for T/EPA10 and rε = 0.8 for T/EPA15.

Practical examples

Workpiece type		Base	Machine parts									
Cutter		EPA10R032M32.0-03N (ø32, z = 3)	EPA10R032M32.0-03N (ø32, z = 3)									
Insert		TOMT100404PDER-MJ	TOMT100404PDER-MJ									
Grade		AH3135	AH3135									
Workpiece material		S50C / C50	S45C / C45									
												
Cutting conditions	Cutting speed: V_c (m/min)	130	150									
	Feed per tooth: f_z (mm/t)	0.1	0.19									
	Feed speed: V_f (mm/min)	390	836									
	Depth of cut: a_p (mm)	1.5	1									
	Width of cut: a_e (mm)	25	5									
	Method of machining	Shoulder milling	Shoulder milling									
	Coolant	External air	External air									
	Machine	Vertical M/C	Turn-Mill center									
Results		 <p>Tung-Tri provided 60% longer tool life than competitor's cutter due to the superior wear resistance of grade AH3135.</p>	<table border="1"> <thead> <tr> <th>Conditions</th> <th>Burr</th> <th>Wall surface finish</th> </tr> </thead> <tbody> <tr> <td>TUNG-TRI</td> <td>Small</td> <td>Better</td> </tr> <tr> <td>Competitor</td> <td>Big</td> <td>Worse</td> </tr> </tbody> </table> <p>Due to the low cutting force, Tung-Tri formed a smaller burr than competitor's. The wall surface finish of Tung-Tri is also better than competitor's.</p>	Conditions	Burr	Wall surface finish	TUNG-TRI	Small	Better	Competitor	Big	Worse
		Conditions	Burr	Wall surface finish								
TUNG-TRI	Small	Better										
Competitor	Big	Worse										





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