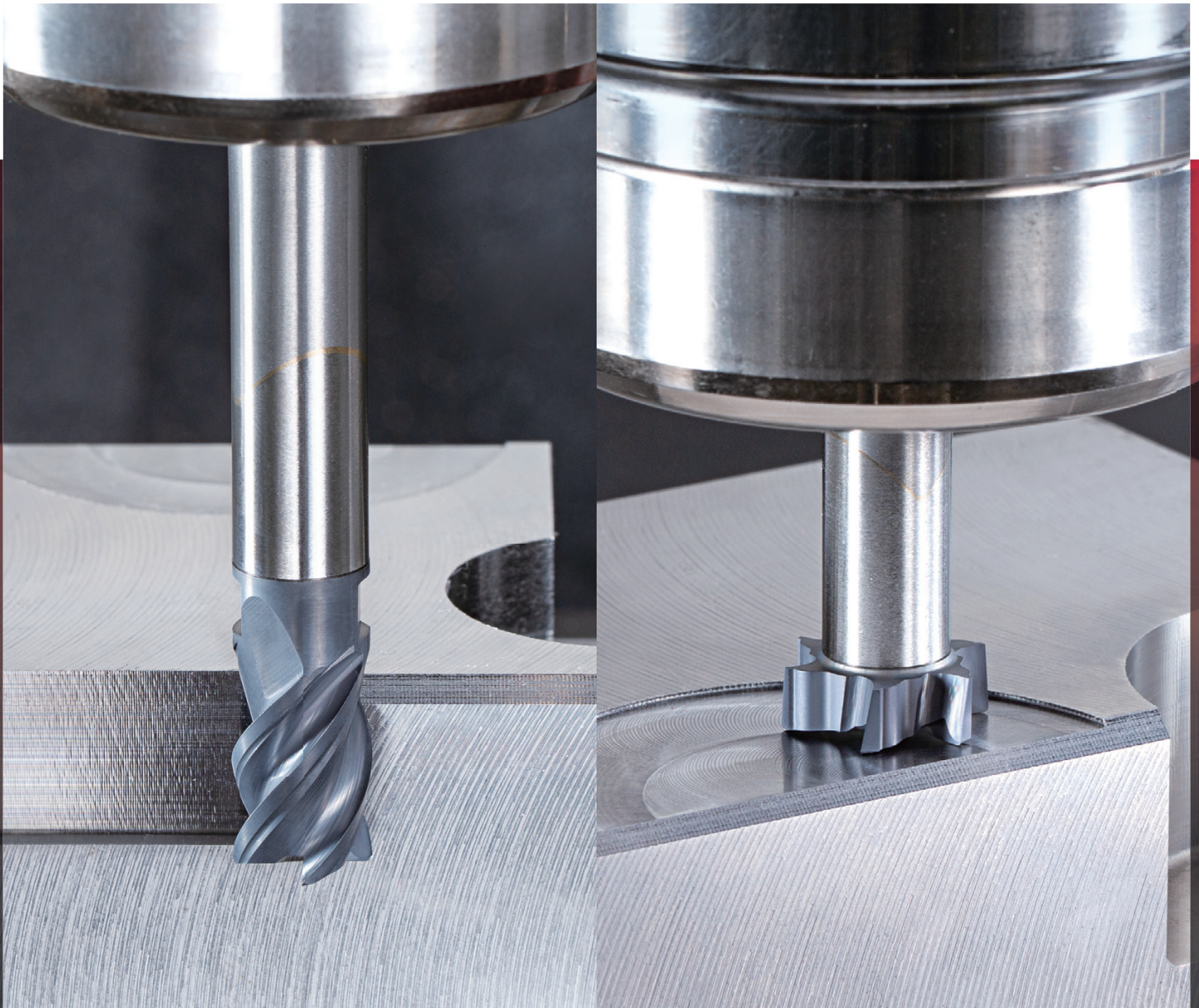


TUNGMEISTER

Tungaloy Report No. 381S2-US

Now offers **exchangeable heads with long cutting edge** and **face milling capability**



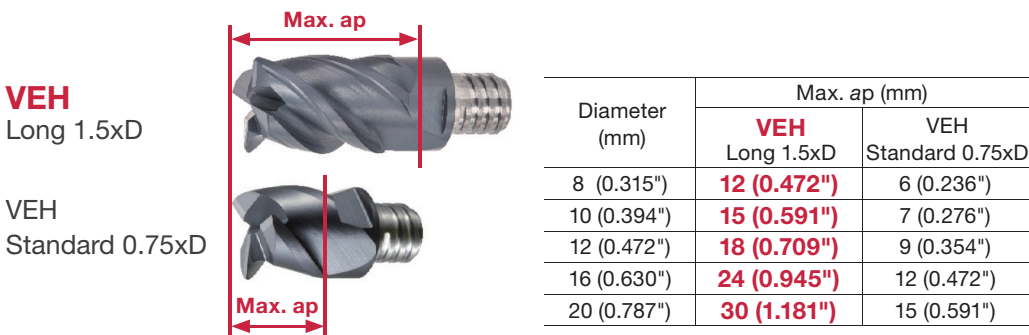


Expansion to TungMeister series: New VEH milling head with 1.5xD flute length and highrigidity shanks

New TungMeister **VEH** style milling head features 1.5xD flute length. This design ensures chatter-free roughing and finishing operations at double DOC compared to existing milling heads of the same diameters. Combined with a new highrigidity shank holder, TungMeister further expands its application coverage.

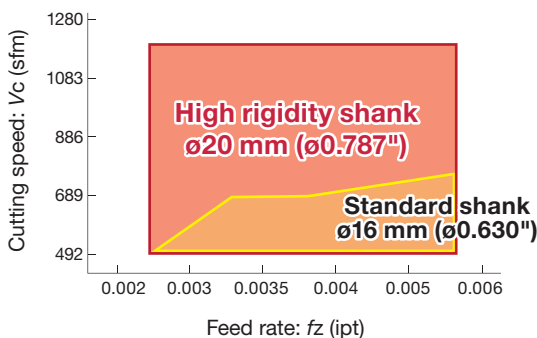
Long flute with 1.5xD

The new **VEH** head enables deep wall cutting thanks to long effective cutting edges.



Benefit of new highrigidity shank

The new **VEH** head enables a broader application range when combined with the high rigidity shank holder. Large diameter shank provides increased rigidity.



- P** Workpiece material : 1055 (204HB)
 Tool dia. : ø0.630"
 Tool overhang : 2.126"
 Depth of cut : ap = 0.630"
 Width of cut : ae = 0.157"
 Coolant : Dry
 Machine : Vertical M/C (BT40)



Long tool life

The **new VEH** head 1.5xD is available in **AH715** - Tungaloy's latest PVD grade for milling applications.

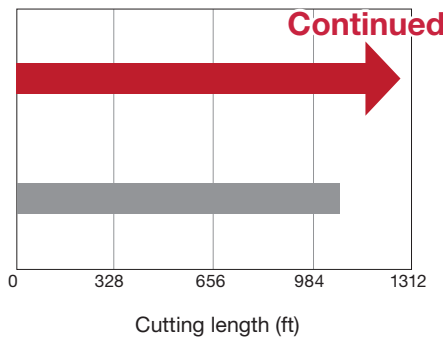
Tool life comparisons in carbon steel: 1055 (206HB)

VEH head

Head:
VEH160L24.0R05I04S10
Shank:
VSSD16L100S10-S

Competitor

Head:
ø16 mm (0.630"), z = 4
Shank:
ø16 mm (0.630"), steel



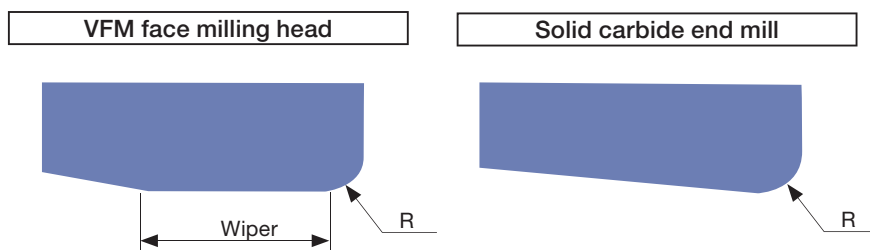
Cutting speed : $V_c = 492$ sfm
Holder : BBT40-MEGA20D-75
Tool overhang : 1.417"
Feed per tooth : $f_z = 0.006$ ipt
Depth of cut : $a_p = 0.630$ "
Width of cut : $a_e = 0.079$ "
Coolant : Dry
Machine : Horizontal M/C (BT40)

Expansion to TungMeister series: New VFM face milling head

New TungMeister **VFM** face milling head features an optimal cutting edge geometry that is designed to improve integrity of the worked surface when the surface quality requirement is not satisfied with an existing end mill. The cutter head has a 6-flute close-pitch design allowing high productivity machining.

Optimal wiper design

The **VFM** cutting edge incorporates a built-in wiper that will provide better surface quality during face milling applications than standard solid carbide end mills.



The head diameter is designed to be larger than the shank diameter to avoid interference with the part or fixture

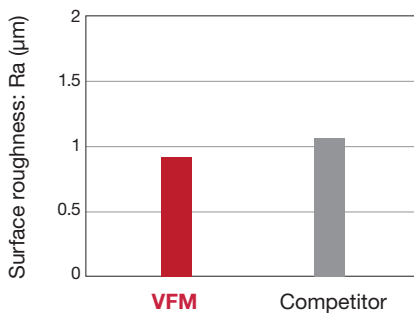
Suited for machining close to the wall or long reach face milling with a small entrance



Head \varnothing > Shank \varnothing

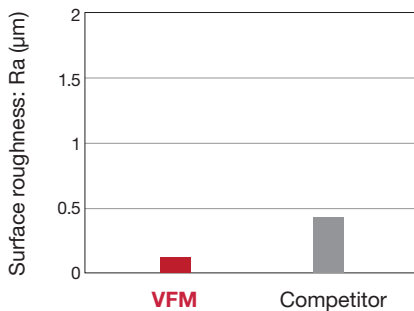
Excellent surface finish

P 1055 (204HB)



Tool dia. : $\varnothing 0.787''$
 Shank dia. : $\varnothing 0.472''$
 Tool overhang : 1.181"
 Cutting speed : $V_c = 656 \text{ sfm}$
 Feed per tooth : $f_z = 0.004 \text{ ipt}$
 Depth of cut : $a_p = 0.039''$
 Width of cut : $a_e = 0.472''$
 Coolant : Dry
 Machine : Vertical M/C (BT30)

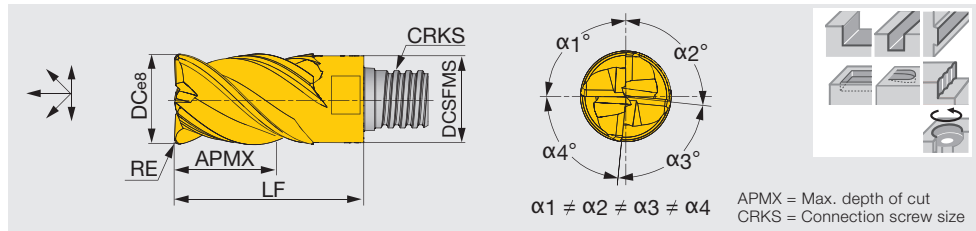
M 304SS



Tool dia. : $\varnothing 0.787''$
 Shank dia. : $\varnothing 0.472''$
 Tool overhang : 1.181"
 Cutting speed : $V_c = 328 \text{ sfm}$
 Feed per tooth : $f_z = 0.002 \text{ ipt}$
 Depth of cut : $a_p = 0.039''$
 Width of cut : $a_e = 0.472''$
 Coolant : Wet
 Machine : Vertical M/C (BT30)

VEH...

4 flute square head, long cutting edge, for general purpose



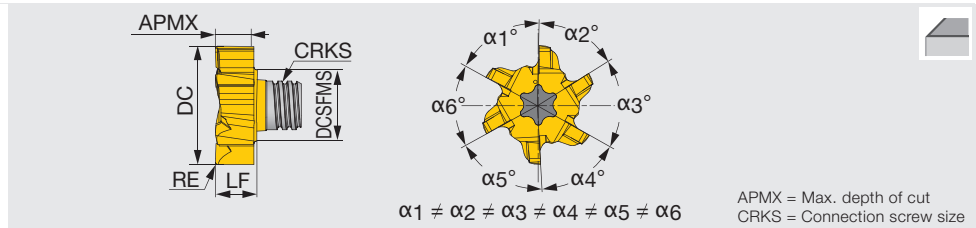
Metric	AH715	NOF	FHA	DC	DCSFMS	APMX	RE	CRKS	LF	Wrench	Torque*
VEH080L12.0R05I04S05	●	4	41 - 45°	8	7.7	12	0.5	S05	18	KEYV-S05	7
VEH080L12.0R10I04S05	●	4	41 - 45°	8	7.7	12	1.0	S05	18	KEYV-S05	7
VEH100L15.0R05I04S06	●	4	41 - 45°	10	9.7	15	0.5	S06	22	KEYV-S06	10
VEH100L15.0R10I04S06	●	4	41 - 45°	10	9.7	15	1.0	S06	22	KEYV-S06	10
VEH120L18.0R05I04S08	●	4	41 - 45°	12	11.7	18	0.5	S08	27	KEYV-S08	15
VEH120L18.0R10I04S08	●	4	41 - 45°	12	11.7	18	1.0	S08	27	KEYV-S08	15
VEH160L24.0R05I04S10	●	4	41 - 45°	16	15.3	24	0.5	S10	33.5	KEYV-S10	28
VEH160L24.0R10I04S10	●	4	41 - 45°	16	15.3	24	1.0	S10	33.5	KEYV-S10	28
VEH200L30.0R05I04S12	●	4	41 - 45°	20	18.45	30	0.5	S12	41	KEYV-S12	28
VEH200L30.0R10I04S12	●	4	41 - 45°	20	18.45	30	1.0	S12	41	KEYV-S12	28

*Torque: Recommended torque (N-m) for clamping.
 Package quantity:
 VEH080, VEH100, VEH120 and VEH160 = 2 pcs.
 VEH200 = 1 pc.

●: New

VFM...

6 flute face milling head



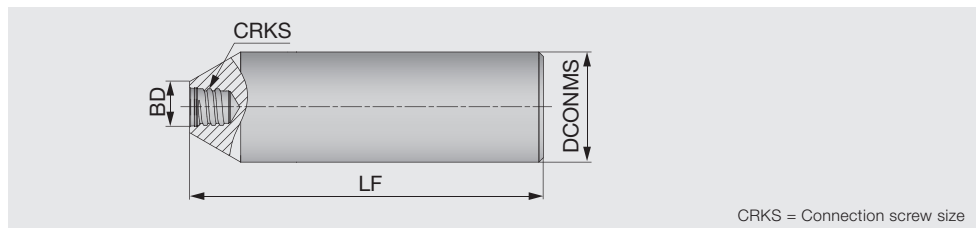
Metric	AH715	NOF	FHA	DC	DCSFMS	APMX	RE	CRKS	LF	Wrench	Torque*
VFM120L03.6R02I06S05	●	6	10°	12	7.7	3.6	0.2	S05	4.4	KEYV-T20	7
VFM160L04.8R04I06S06	●	6	10°	16	9.7	4.8	0.4	S06	5.6	KEYV-T25	10
VFM200L06.0R04I06S08	●	6	10°	20	11.7	6	0.4	S08	7	KEYV-T40L	15

*Torque: Recommended torque (N-m) for clamping.
 Package quantity = 2 pcs.

●: New

VSSD...

High rigidity shank



Metric	DCONMS	BD	LF	CRKS	Type	Material
VSSD10L055S05-S	10	7.6	55	S05	Cylindrical	Steel
VSSD12L065S06-S	12	9.6	65	S06	Cylindrical	Steel
VSSD16L065S08-S	16	11.6	65	S08	Cylindrical	Steel
VSSD20L070S10-S	20	15.3	70	S10	Cylindrical	Steel
VSSD25L075S12-S	25	18.3	75	S12	Cylindrical	Steel
VSSD32L100S15-S	32	23.9	100	S15	Cylindrical	Steel

STANDARD CUTTING CONDITIONS

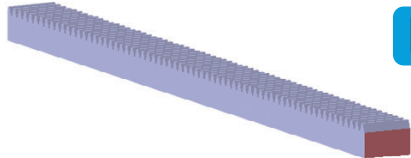
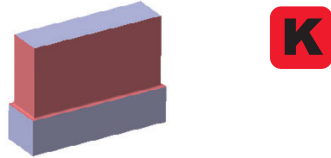
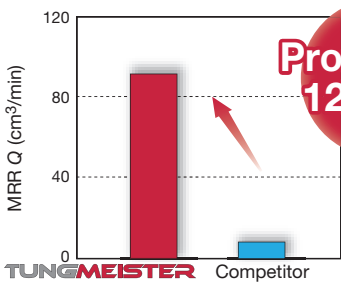
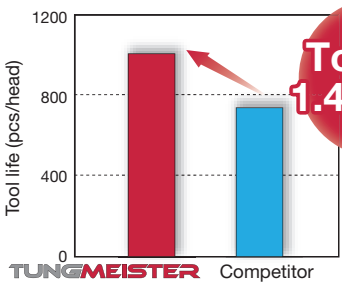
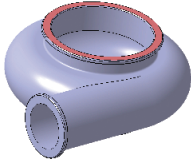
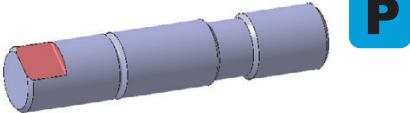
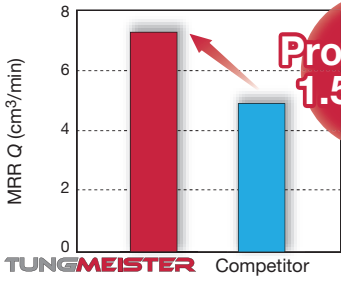
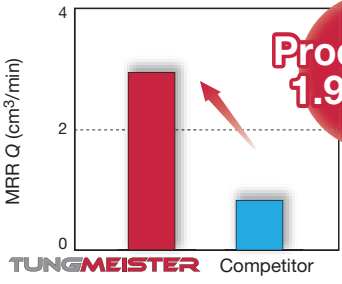
Shoulder milling

ISO	Workpiece material	Hardness	Cutting speed Vc (sfm)	Feed per tooth: fz (ipt)					Depth of cut ap (in)	Pick feed Pf (in)
				Tool diameter: DC (in)						
				8	10	12	16	20		
P	Low carbon steels 1045, 1055, etc.	- 300 HB	260 - 590	0.002 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	1 x øDc	0.25 x øDc
	High carbon steels 4140, 5120, etc.	- 300 HB	200 - 460	0.002 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	1 x øDc	0.25 x øDc
	Prehardened steel PX5, NAK80, etc.	30 - 40 HRC	200 - 400	0.002 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	1 x øDc	0.25 x øDc
M	Stainless steels S30400, S31600, etc.	- 200 HB	130 - 330	0.002 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	1 x øDc	0.25 x øDc
K	Grey cast irons No.250B, No.300B, etc.	150 - 250 HB	260 - 660	0.002 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	1 x øDc	0.25 x øDc
	Ductile cast irons 60-40-18, etc.	150 - 250 HB	260 - 660	0.002 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	1 x øDc	0.25 x øDc
N	Aluminum alloys Si < 13%	-	660 - 2297	0.002 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	1 x øDc	0.25 x øDc
	Aluminum alloys Si ≥ 13%	-	330 - 980	0.002 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	1 x øDc	0.25 x øDc
S	Titanium alloys Ti-6Al-4V, etc.	-	130 - 260	0.002 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	1 x øDc	0.05 x øDc
	Heat-resistant alloys Inconel 718, etc.	-	66 - 130	0.002 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	1 x øDc	0.05 x øDc
H	Hardened steel H13, etc.	40 - 50 HRC	130 - 260	0.002 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	1 x øDc	0.05 x øDc
	Hardened steel D2, etc.	50 - 60 HRC	66 - 200	0.002 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	1 x øDc	0.05 x øDc

Slot milling

ISO	Workpiece material	Hardness	Cutting speed Vc (sfm)	Feed per tooth: fz (ipt)					Depth of cut ap (in)
				Tool diameter: DC (in)					
				8	10	12	16	20	
P	Low carbon steels 1045, 1055, etc.	- 300 HB	260 - 590	0.002 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	0.5 x øDc
	High carbon steels 4140, 5120, etc.	- 300 HB	200 - 460	0.002 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	0.5 x øDc
	Prehardened steel PX5, NAK80, etc.	30 - 40 HRC	200 - 400	0.002 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	0.5 x øDc
M	Stainless steels S30400, S31600, etc.	- 200 HB	130 - 330	0.002 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	0.5 x øDc
K	Grey cast irons No.250B, No.300B, etc.	150 - 250 HB	260 - 660	0.002 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	0.5 x øDc
	Ductile cast irons 60-40-18, etc.	150 - 250 HB	260 - 660	0.002 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	0.5 x øDc
N	Aluminum alloys Si < 13%	-	660 - 2297	0.002 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	0.5 x øDc
	Aluminum alloys Si ≥ 13%	-	330 - 980	0.002 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	0.5 x øDc
S	Titanium alloys Ti-6Al-4V, etc.	-	130 - 260	0.002 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	0.5 x øDc
	Heat-resistant alloys Inconel 718, etc.	-	66 - 130	0.002 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	0.5 x øDc
H	Hardened steel H13, etc.	40 - 50 HRC	130 - 260	0.002 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	0.2 x øDc
	Hardened steel D2, etc.	50 - 60 HRC	66 - 200	0.002 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	0.2 x øDc

PRACTICAL EXAMPLES

Workpiece type		Rack	Small part
Shank		VSSD25L075S12-S (ø25, ø0.984")	VSSD16L130S10-C (ø16, ø0.630")
Head		VEH200L30.0R05I04S12 (ø20, ø0.787")	VEH160L24.0R05I04S10 (ø16, ø0.630")
Grade		AH715	AH715
Workpiece material		4140 	60-40-18 
Cutting conditions	Cutting speed : Vc (sfm)	459	328
	Feed per tooth : fz (ipt)	0.003	0.002
	Depth of cut : ap (in)	0.945	0.591
	Width of cut : ae (in)	0.217	0.039
	Coolant	Wet	Wet
Results		 <p>TungMeister can improve width of cut thanks to excellent anti-vibration design.</p>	 <p>The nano-multilayer PVD coating of AH715 provides improved wear resistance. The result was 1.4 times longer tool life than conventional tool with better surface finish.</p>
Workpiece type		Housing	Shaft
Shank		VSSD10L075S06-S (ø10, ø0.394")	VER11CL020S05-S (ø8, ø0.315")
Head		VFM160L04.8R04I06S06 (ø16, ø0.630")	VFM120L03.6R02I06S05 (ø12, ø0.472")
Grade		AH715	AH715
Workpiece material		Cast stainless steel 	1045 
Cutting conditions	Cutting speed : Vc (sfm)	328	197
	Feed per tooth : fz (ipt)	0.004	0.002
	Depth of cut : ap (in)	0.020	0.039
	Width of cut : ae (in)	0.472	0.236
	Coolant	Wet	Wet
Results		 <p>150% productivity has been achieved due to increased number of cutting edges. The latest AH715 grade and reduced work per cutting edge have enabled longer tool life with no compromise to surface finish.</p>	 <p>The customer had to use a small diameter end mill because of machine limitation. TungMeister VFM has allowed a larger diameter and reduced tool passes. Vibration has been eliminated thanks to irregular pitch despite 6 flutes. The result: 190% productivity with 1/3 machining time.</p>

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.tungaloy.com/us

Tungaloy Canada

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



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