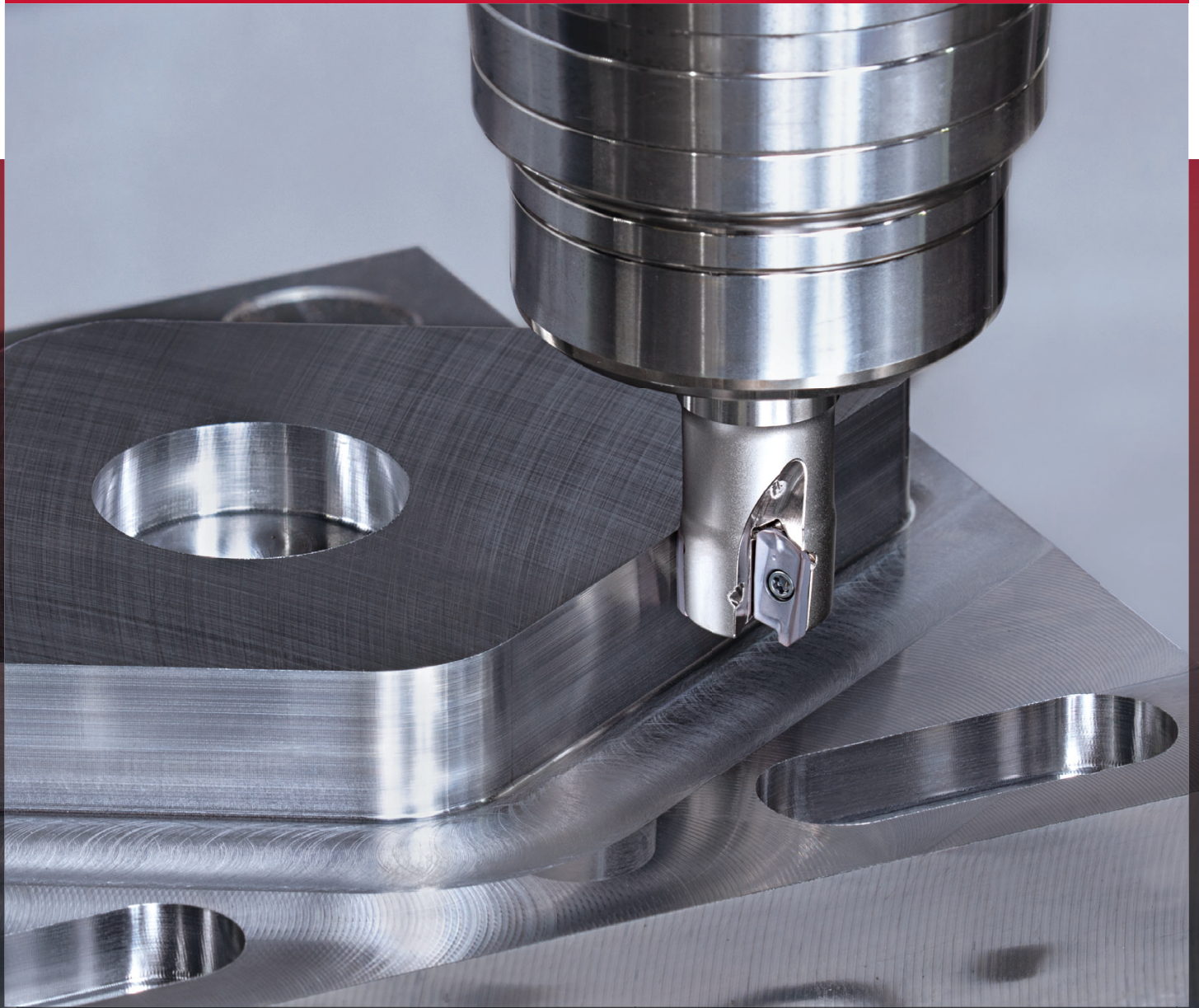


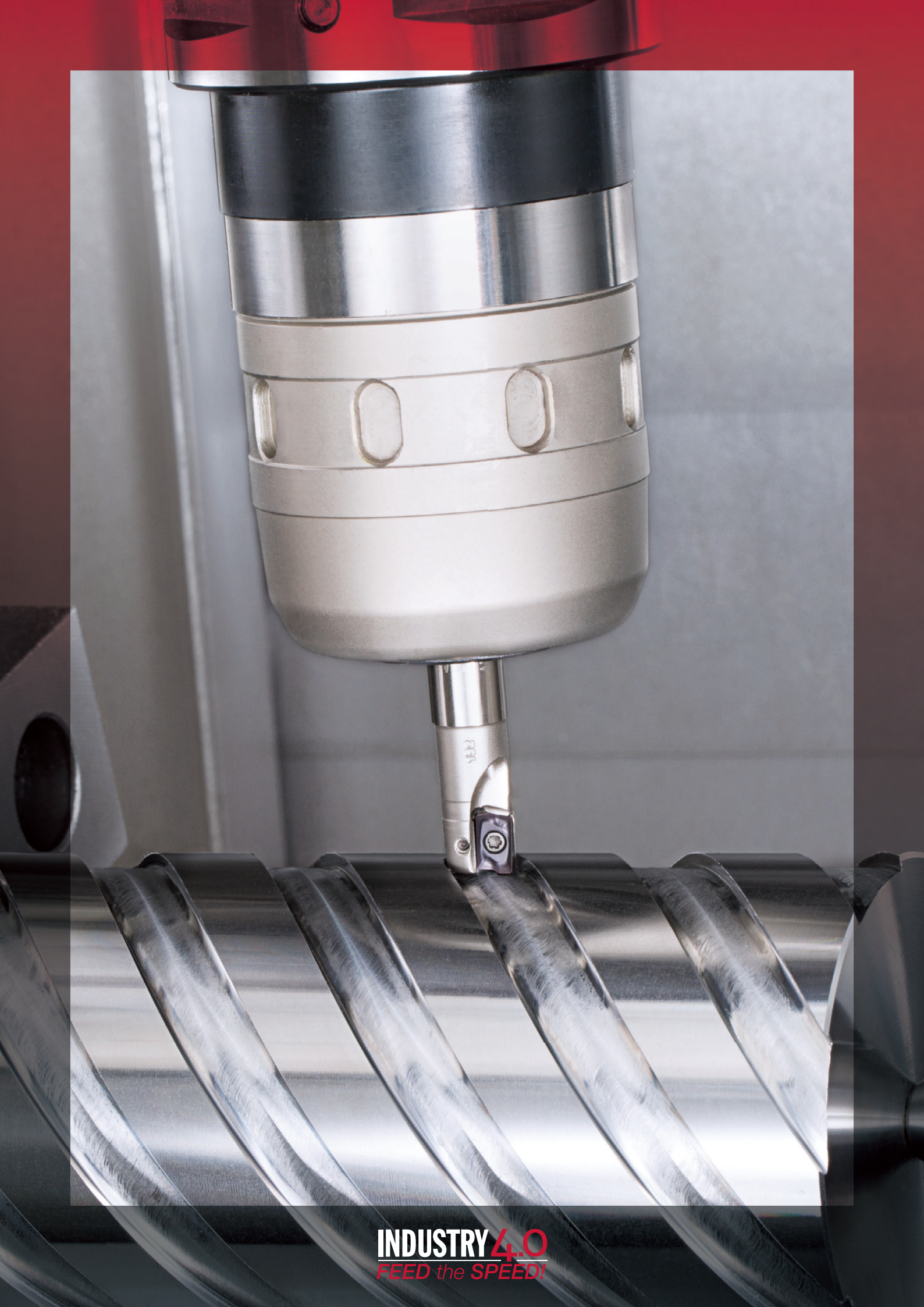
Square shoulder milling cutter

**TUNG**<sup>ORCE</sup>**FREC**

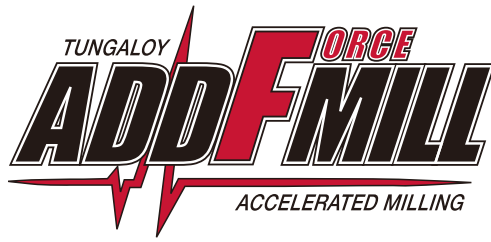
Tungaloy Report No. 506-G

Extremely versatile shoulder milling cutter with unique V shape inserts - **Now offering size 04 inserts for small diameter cutters**





**INDUSTRY 4.0**  
*FEED the SPEED!*



TUNG **FORCE** REC

---



Unique insert clamping ensures high precision and efficiency machining with stability

## New Size-04 inserts are now available for small-diameter cutters covering **a wider application range with three insert sizes**



- Tool diameters **as small as  $\phi 6$  mm** available as standard
- Perfect replacement for solid carbide endmills
- **Better cost-per-edge economy** than solid endmills or shoulder mills with larger inserts when used at light depth of cut  $\leq 4$  mm
- **Precision-ground insert** for high part quality
- Creates **virtually step-free wall and bottom surfaces**
- Inserts available in **R0 nose radii**
  - perfect for machining small parts in **Swiss machines**
- **Robust cutter body design**
- **Close pitch cutter for high productivity**
- **Extensive lineup of insert nose radii and grades** for a wide application coverage

### Lineup of each insert size

Size	Max. depth of cut (mm)	Corner radius (mm)	Workpiece material	Tool diameter (mm) Number of inserts										
<b>New</b> 04	4	0.4 / 0.8	<b>P M K</b> <b>S H</b>	$\phi 6$ 1	$\phi 8$ 2	$\phi 10$ 2, 3	$\phi 12$ 3, 4	$\phi 16$ 4, 5						
06	6	0 / 0.2 0.4 / 0.8	<b>P M K</b> <b>S N H</b>	$\phi 8$ 1 $\phi 10$ 2 $\phi 12$ 2, 3 $\phi 14$ 2, 3 $\phi 16$ 3, 4 $\phi 18$ 3, 4 $\phi 20$ 4, 5 $\phi 22$ 4, 5 $\phi 25$ 4, 5, 6 $\phi 32$ 6, 8 $\phi 40$ 10										
12	11.5	0.4 / 0.8 1.2 / 1.6 2 / 3	<b>P M K</b> <b>S N H</b>	$\phi 12$ 1 $\phi 16$ 2, 3 $\phi 20$ 3, 4 $\phi 25$ 3, 4, 6 $\phi 32$ 3, 6, 8 $\phi 40$ 6, 8 $\phi 50$ 8, 12 $\phi 63$ 8, 14										

## Unique V shape insert for machining security

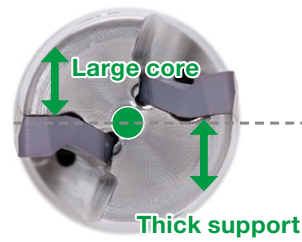
### Strong cutter body design

V shape insert design enables the cutter to have a thick core and insert backing.

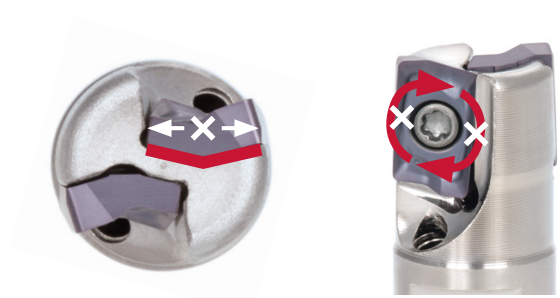
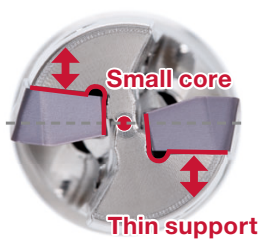
### Extremely secure insert clamping

V shape design prevents insert movement during machining.

TUNG FALLOY



Competitor



Ensures high productivity and stability.

Eliminates premature insert failure, while providing machining stability.

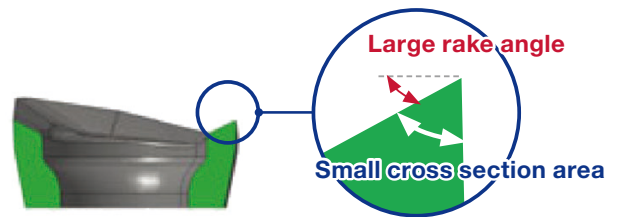
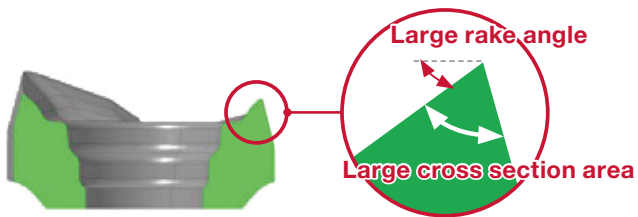
## Sharp and strong cutting edge for increased productivity

TUNG FALLOY

Large rake angle and obtuse flank surface provide low cutting force and anti-chipping performance.

Competitor

Large rake angle offers low cutting force but small cross section area leads to chipping on the edge.



High productivity and stability are achieved with the unique cutting edge design.

## GRADES

### Addition of AH3225 grade for enhanced insert grade lineup

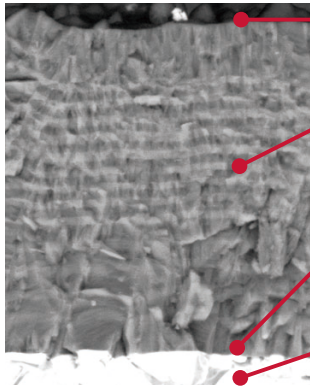
Offering four PVD grades, two CVD grades, and one uncoated carbide grade

New

## AH3225

**P M**

- Nano multi-layer coating technology with three major properties for optimal cutting edge integrity
- Increased resistance to wear, fracture, oxidation, built-up edge, and delamination



#### Resistance to built-up edge

The coating surface prevents built-up edge

#### Resistance to wear, oxidation, and fracture

Multi-layered coating is designed to resist wear and oxidation, while preventing micro-cracks from propagating in the coating layer for improved resistance to edge chipping

#### Strong coating / substrate adhesion

Coating is optimized for strong adhesion property with substrate to maintain strong cutting edge integrity

#### Carbide substrate

High resistance to fracture

## PREMIUMTEC

### AH3135 **P M**

- PVD grade for high fracture resistance
- Most suitable for steel and stainless steel in general cutting parameters

### AH120 **P K**

- PVD grade with well-balanced wear and fracture resistance
- Ideal for general machining of steel and cast iron

### T1215 **K**

- CVD grade with outstanding wear and chipping resistance
- Best for cast iron at high-speed machining

### T3225 **P M**

- CVD grade with high chipping and fracture resistance

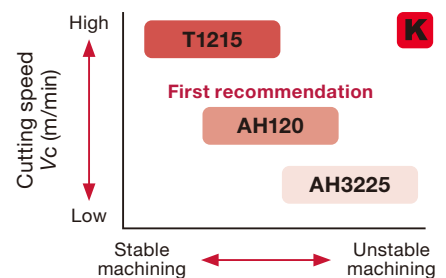
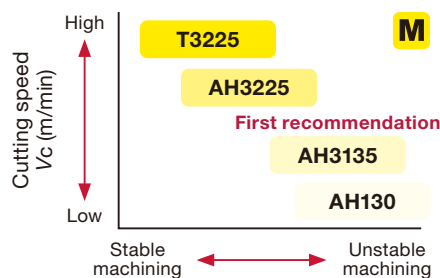
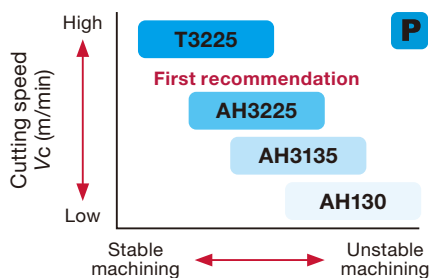
### AH130 **P M S**

- Demonstrates high wear and chipping resistance in the machining of Titanium alloy or heat-resistant alloys
- Remarkable reliability in wet machining

### KS05F **N**

- Fine-grained cemented carbide grade with high wear resistance
- Extremely sharp edge is suitable for non-ferrous materials

## APPLICATION AREAS



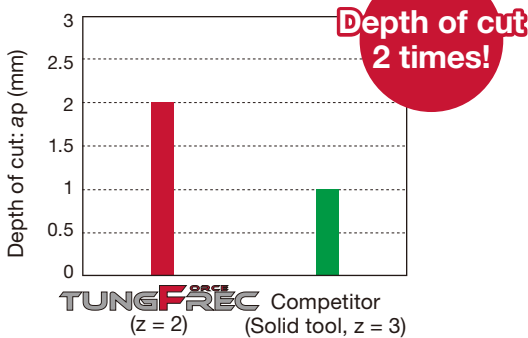
## CUTTING PERFORMANCE

### Size 04 - First choice for cutter diameters $\phi 6$ - $\phi 10$ mm

#### TungForce-Rec performance in slot milling vs solid carbide endmill $\phi 8$ mm



Slotting



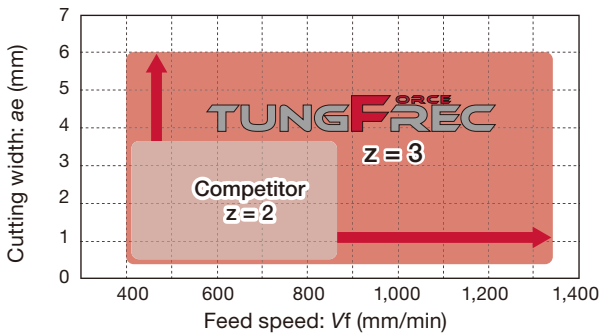
Cutter : EPAV04M008C08.0R02 ( $\phi 8$  mm, z = 2)  
 Insert : AVMT040204PPER-MM AH3225  
 Workpiece material : S55C / C55  
 Cutting speed :  $V_c = 100$  m/min  
 Feed speed :  $V_f = 448$  mm/min  
 Overhang length : 20 mm  
 Coolant : Air blast  
 Machine : Vertical M/C, BT30  
 Tool life criteria : Chatter generation

#### Boosts productivity for shoulder milling thanks to increased tooth density and tool rigidity

#### Comparison with the competitor's tool ( $\phi 10$ mm)



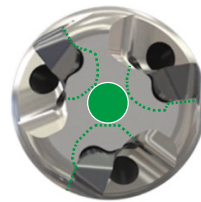
Shoulder milling



#### Comparison of web thickness

TUNGFORCE

Competitor

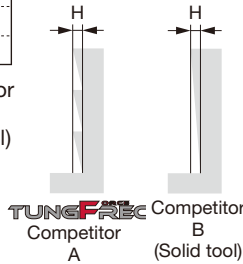
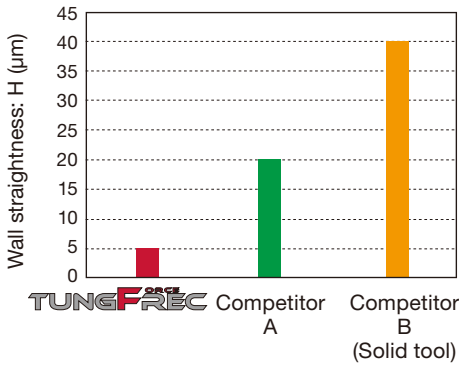


Cutter : EPAV04M010C10.0R03 ( $\phi 10$  mm, z = 3)  
 Insert : AVMT040204PPER-MM AH3225  
 Workpiece material : S55C / C55  
 Cutting speed :  $V_c = 200$  m/min  
 Feed per tooth :  $f_z = 0.07$  mm/t  
 Depth of cut :  $a_p = 4$  mm  
 Overhang length : 20 mm  
 Coolant : Air blast  
 Machine : Vertical M/C, HSK63A  
 Tool life criteria : Chatter generation

## CUTTING PERFORMANCE

### Size 06 - For outstanding part quality

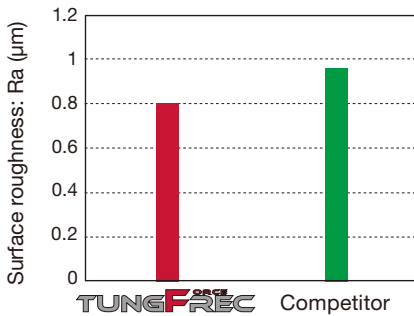
#### Wall straightness: Carbon steel



**P** Cutter : EPAV06M012C12.0R03 (ø12 mm, z = 3)  
 Insert : AVGT060304PBER-MJ AH3135  
 Workpiece material : S55C / C55 (180HB)  
 Cutting speed :  $V_c = 330$  m/min (Competitor B: 60 m/min)  
 Feed per tooth :  $f_z = 0.1$  mm/t (Competitor B: 0.04 mm/t)  
 Depth of cut :  $a_p = 4$  mm x 3 pass (Competitor B: 12 mm)  
 Cutting width :  $a_e = 2$  mm  
 Coolant : Dry  
 Machine : Vertical M/C, BT40

**TungForce-Rec has achieved the best wall finish quality.**

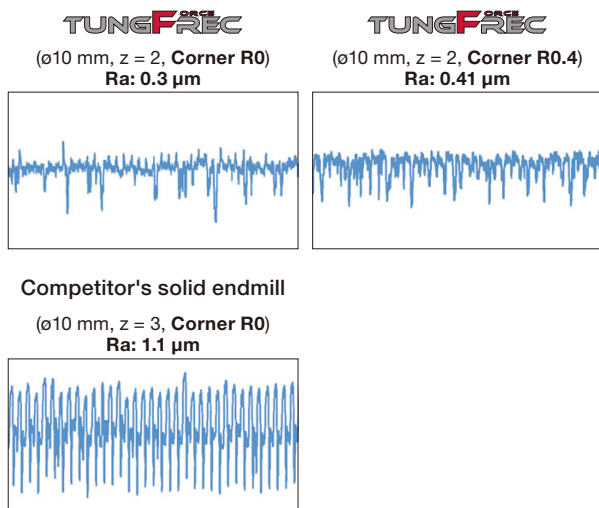
#### Surface finish: Carbon steel



**P** Cutter : EPAV06M010C10.0R02 (ø10 mm, z = 2)  
 Insert : AVGT060302PBER-MJ AH3135  
 Workpiece material : S55C / C55 (180HB)  
 Cutting speed :  $V_c = 270$  m/min  
 Feed per tooth :  $f_z = 0.07$  mm/t  
 Depth of cut :  $a_p = 2$  mm  
 Cutting width :  $a_e = 7$  mm  
 Coolant : Dry  
 Machine : Vertical M/C, BT40

**TungForce-Rec provides good surface finish compared with the competitors.**

#### Surface roughness comparison (in machining steel)



**P** Cutter : HPAV06M010S06R02 (ø10 mm, z = 2)  
 Insert : AVGT060300PBER-MJ AH3135  
 AVGT060304PBER-MJ AH3135  
 Shank : VER16CLO10S06-S  
 Workpiece material : S45C / C45  
 Cutting speed :  $V_c = 60$  m/min  
 Feed :  $f = 0.1$  mm/rev  
 Feed speed :  $V_f = 191$  mm/min  
 Depth of cut :  $a_p = 1$  mm  
 Width of cut :  $a_e = 4$  mm  
 Machine : Swiss lathe

**R0 insert achieved better surface quality than solid endmill.**



## Size 12 - For extreme productivity and part quality

### Close pitch cutter body design

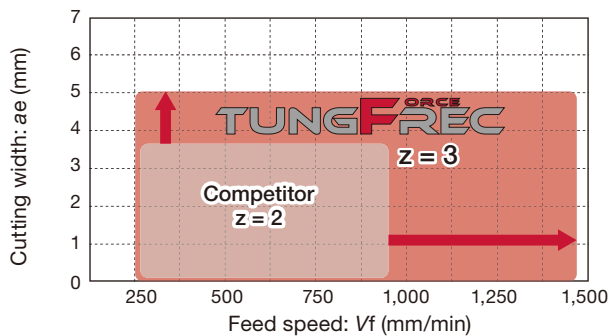
The use of V shape inserts enables TungForce-Rec to have higher tooth density than competitors' shoulder mills.

Tool dia. (mm)	No. of inserts		Competitor	Productivity improvement compared to competitor
	TUNGFORCE			
	Coarse pitch	Close pitch		
ø16	2	3	2	1.5 times
ø20	3	4	3	1.33 times
ø25	4	6	4	1.5 times
ø32	6	8	6	1.33 times
ø40	6	8	6	1.33 times
ø50	8	12	8	1.5 times
ø63	8	14	8	1.75 times

### Performance comparison - Cutting width vs Table feed (ø16 mm)



Shoulder milling

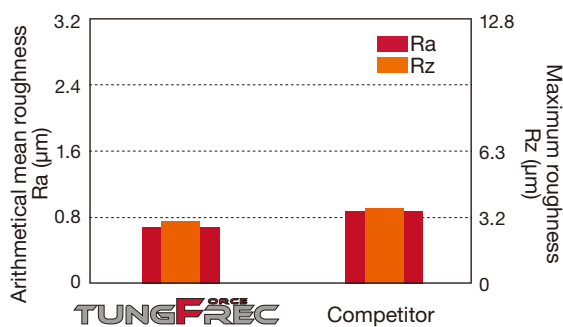


**P** Cutter : EPAV12M016C16.0R03 (ø16 mm, z = 3)  
 Insert : AVMT120408PBER-MM AH3225  
 Workpiece material : S55C / C55  
 Cutting speed :  $V_c = 16$  m/min  
 Feed per tooth :  $f_z = 0.12$  mm/t  
 Depth of cut :  $a_p = 9$  mm  
 Overhang length : 35 mm  
 Coolant : Dry

**TungForce-Rec enables high efficiency machining of up to 1.4x greater cutting width at a maximum of 1.5x faster table feed.**

### Performance comparison - Precise machining

#### Surface finishing

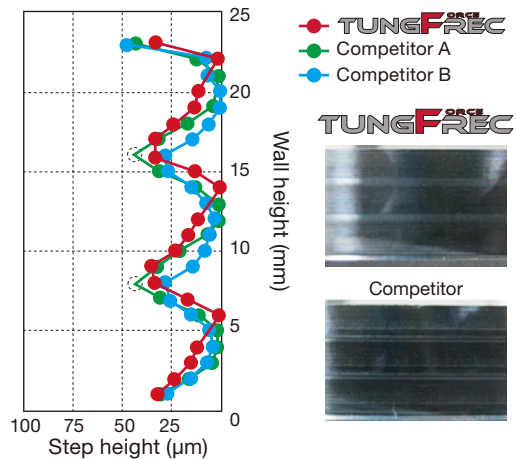


**P**

Cutter : EPAV12M020C20.0R03 (ø20 mm, z = 3)  
 Insert : AVMT120408PBER-MM AH3225  
 Workpiece material : S55C / C55  
 Cutting speed :  $V_c = 180$  m/min  
 Feed per tooth :  $f_z = 0.1$  mm/t  
 Depth of cut :  $a_p = 1$  mm  
 Cutting width :  $a_e = 16$  mm  
 Coolant : Dry

**Better surface quality vs the competitor.**

#### Wall finishing



**P**

Cutter : EPAV12M020C20.0R03 (ø20 mm, z = 3)  
 Insert : AVMT120408PBER-MM AH3225  
 Workpiece material : S55C / C55  
 Cutting speed :  $V_c = 180$  m/min  
 Feed per tooth :  $f_z = 0.1$  mm/t  
 Depth of cut :  $a_p = 8$  mm  
 Cutting width :  $a_e = 3$  mm  
 Coolant : Dry

**Equal or better wall step than competitors.**

## CUTTING PERFORMANCE

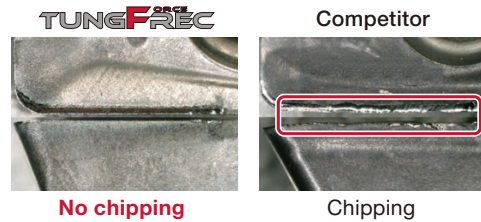
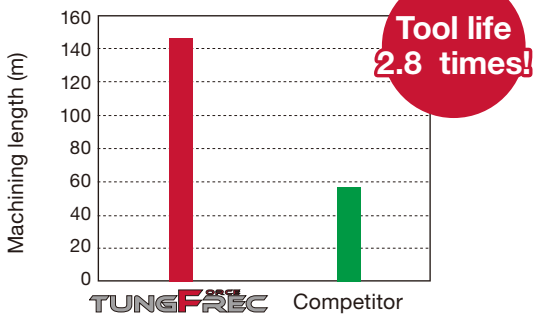
### Tool life



Shoulder milling

**P** S55C / C55

Size 04



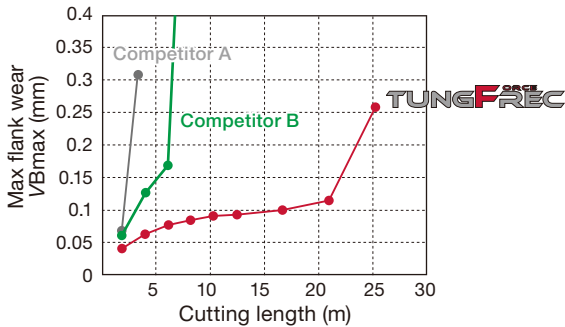
Damage on cutting edges at the same machining time

Cutter : EPAV04M008C08.0R02 (ø8 mm, z = 2)  
 Insert : AVMT040204PPER-MM AH3225  
 Cutting speed :  $V_c = 200$  m/min  
 Feed per tooth :  $f_z = 0.07$  mm/t  
 Depth of cut :  $a_p = 3$  mm  
 Cutting width :  $a_e = 2.7$  mm  
 Coolant : Air blast

Soft cutting geometry with strong cutting edge design provide long and predictable tool life.

**M** SUS304 / X5CrNi18-9

Size 06

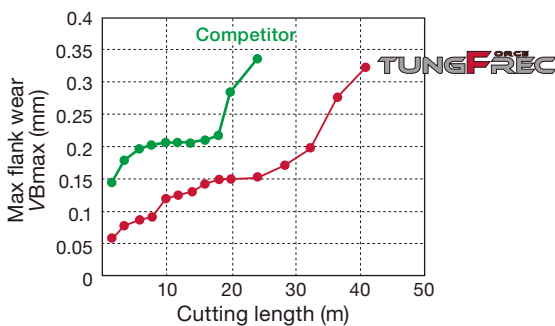


Cutter : EPAV06M010C10.0R02 (ø10 mm, z = 2)  
 Insert : AVGT060302PBER-MJ AH3135  
 Cutting speed :  $V_c = 260$  m/min  
 Feed per tooth :  $f_z = 0.07$  mm/t  
 Depth of cut :  $a_p = 3$  mm  
 Cutting width :  $a_e = 2.9$  mm  
 Coolant : Dry  
 Machine : Vertical M/C, BT40

Light cutting action, reduced built-up edge and thermal cracking, and improved insert life.

**S** Ti6Al4V

Size 06



Cutter : EPAV06M016C16.0R04 (ø16 mm, z = 4)  
 Insert : AVGT060304PBER-MJ AH130  
 Cutting speed :  $V_c = 80$  m/min  
 Feed per tooth :  $f_z = 0.08$  mm/t  
 Depth of cut :  $a_p = 5$  mm  
 Cutting width :  $a_e = 5$  mm  
 Coolant : Wet  
 Machine : Vertical M/C, BT40, 18.5 kW

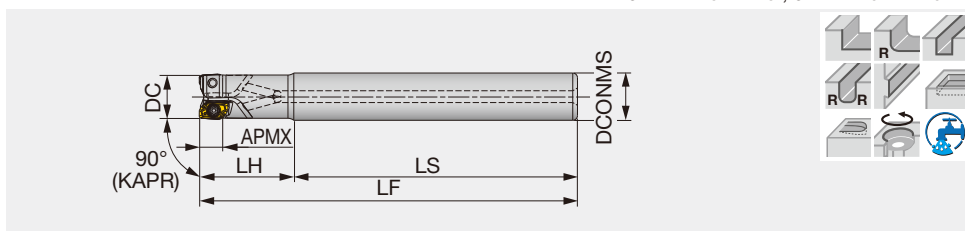
Highly wear resistant in a wet cutting, AH130 has dramatically improved the tool life.

**New**

## EPAV04

Square shoulder endmill, shank type, with screw clamp system

GAMP = +6°~ +7.6°, GAMF = -37.1°~ -32.4°



Designation	APMX	DC	CICT	DCONMS	LS	LH	LF	WT(kg)	Air hole	Insert
EPAV04M006C06.0R01	4	6	1	6	48	12	60	0.01	With	AVMT04...
EPAV04M008C08.0R02	4	8	2	8	48	12	60	0.02	With	AVMT04...
EPAV04M008C08.0R02L	4	8	2	8	60	20	80	0.03	With	AVMT04...
EPAV04M010C10.0R02	4	10	2	10	60	20	80	0.04	With	AVMT04...
EPAV04M010C10.0R03	4	10	3	10	60	20	80	0.04	With	AVMT04...
EPAV04M010C10.0R02L	4	10	2	10	65	35	100	0.05	With	AVMT04...
EPAV04M012C12.0R03	4	12	3	12	60	20	80	0.06	With	AVMT04...
EPAV04M012C12.0R04	4	12	4	12	60	20	80	0.06	With	AVMT04...
EPAV04M012C12.0R03L	4	12	3	12	85	35	120	0.09	With	AVMT04...
EPAV04M016C16.0R04	4	16	4	16	70	20	90	0.12	With	AVMT04...
EPAV04M016C16.0R05	4	16	5	16	70	20	90	0.12	With	AVMT04...
EPAV04M016C16.0R04L	4	16	4	16	105	35	140	0.19	With	AVMT04...

### SPARE PARTS

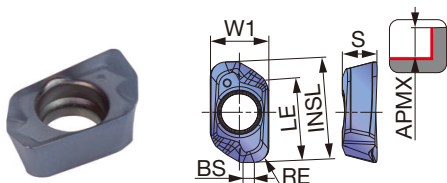


Designation	Clamping screw	Wrench
EPAV04M006C06.0R01	CSPB-1.8L3.3	IP-6DB
EPAV04M008... - EPAV04M016...	CSPB-1.8L3.6	IP-6DB

\*Recommended clamping torque (N·m): CSPB-1.8L3.3, CSPB-1.8L3.6 = 0.5

## INSERT

### AVMT04-MM



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

★ : First choice  
☆ : Second choice

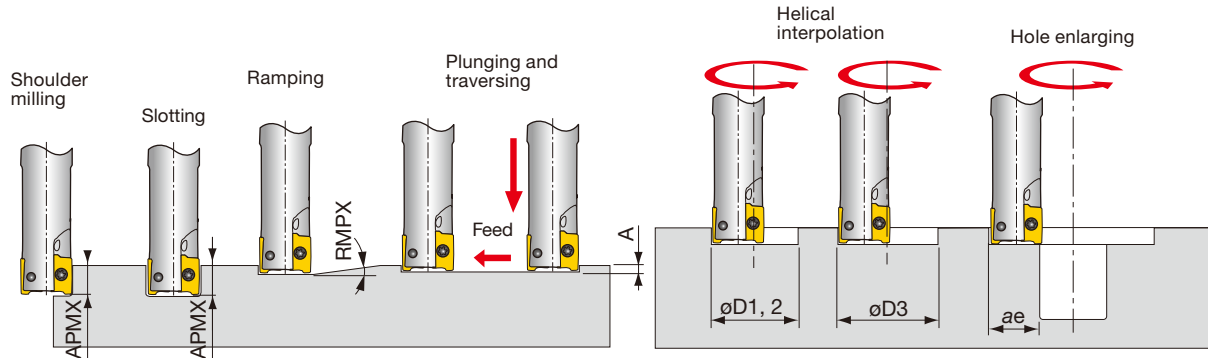
Designation	RE	APMX	Coated		W1	INSL	S	BS	LE
			AH120	AH3225					
AVMT040204PPER-MM	0.4	4	●	●	3.5	6.05	2.1	1	4.4
AVMT040208PPER-MM	0.8	4	●	●	3.5	6.05	2.1	0.6	4.4

● : New product

## STANDARD CUTTING CONDITIONS

ISO	Workpiece materials	Hardness	Priority	Grades	Cutting speed Vc (m/min)	Feed per tooth fz (mm/t)
<b>P</b>	Low carbon steel S15C, SS400, etc. C15E, C15E4, E275A, etc.	- 200 HB	First choice	AH3225	100 - 300	0.05 - 0.12
	Carbon steel and alloy steel S55C, SCM440, etc. C55, 42CrMo4, etc.	- 300 HB	First choice	AH3225	100 - 250	0.05 - 0.12
	Prehardened steel NAK80, PX5, etc.	30 - 40 HRC	First choice	AH3225	100 - 200	0.05 - 0.1
<b>M</b>	Stainless steel SUS304, SUS316, etc. X5CrNi18-9, X5CrNiMo17-12-3, etc.	-	First choice	AH3225	80 - 180	0.05 - 0.1
<b>K</b>	Grey cast iron FC250, FC300, etc. G25, GG30, etc. 250, 300, etc.	150 - 250 HB	First choice	AH120	100 - 300	0.05 - 0.12
	Ductile cast iron FCD400, FCD600, etc. GGG60, 600-3, etc.	150 - 250 HB	First choice	AH120	100 - 250	0.05 - 0.12
<b>S</b>	Titanium alloys Ti-6Al-4V, etc.	-	First choice	AH3225	20 - 60	0.04 - 0.07
	Superalloys Inconel 718, etc.	-	First choice	AH120	20 - 40	0.04 - 0.07
<b>H</b>	Hardened steel	SKD61, X40CrMoV5-1, etc.	40 - 50 HRC	First choice	AH120	50 - 150
		SKD11, X153CrMoV12, etc.	50 - 60 HRC	First choice	AH120	40 - 70

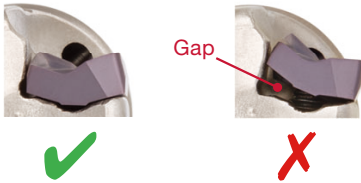
# MACHINING APPLICATIONS



Designation	DC	Max. depth of cut		Max. ramping angle	Max. plunging	Min. machining		Max. machining		Max. cutting width in enlarging
		APMX	RMPX			$\phi D1$	$\phi D2$	$\phi D3^*$	$ae$	
EPAV04M006C06.0R01	6	4	0.4°	0.03	9.3	11.6	9.9	5.5		
EPAV04M008C08.0R02	8	4	0.5°	0.04	12.7	15.6	13.6	7.5		
EPAV04M008C08.0R02L	8	4	0.5°	0.04	12.7	15.6	13.6	7.5		
EPAV04M010C10.0R02	10	4	4.1°	0.4	15.3	19.6	17.5	9.5		
EPAV04M010C10.0R03	10	4	1.7°	0.2	16.1	19.6	17.5	9.5		
EPAV04M010C10.0R02L	10	4	4.1°	0.4	16.1	19.6	17.5	9.5		
EPAV04M012C12.0R03	12	4	2.7°	0.4	19.3	23.6	21.5	11.5		
EPAV04M012C12.0R04	12	4	1.3°	0.2	20.1	23.6	21.5	11.5		
EPAV04M012C12.0R03L	12	4	2.7°	0.4	19.3	23.6	21.5	11.5		
EPAV04M016C16.0R04	16	4	2°	0.4	27.2	31.6	29.5	15.5		
EPAV04M016C16.0R05	16	4	2°	0.4	27.2	31.6	29.5	15.5		
EPAV04M016C16.0R04L	16	4	2°	0.4	27.2	31.6	29.5	15.5		

\*Flat bottom hole

When clamping the insert, please confirm that there is no gap between the cutter body and the insert as shown in the picture.



## Estimation of chip thickness - calculated from feed per tooth (fz) and cutting width (ae) data

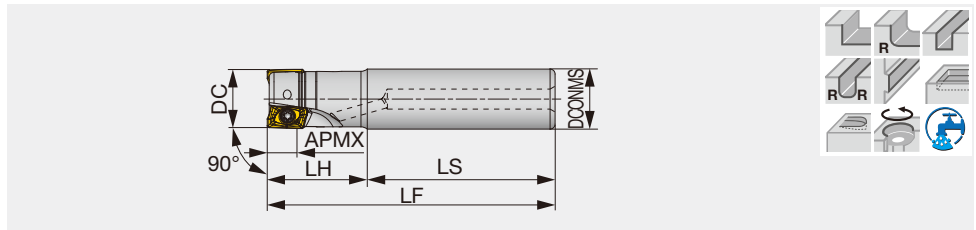
Recommended chip thickness

Feed per tooth fz (mm/t)	Cutting width (%): ae (mm) / Tool dia.: DC (mm)														
	1%	2%	2.5%	3%	4%	5%	10%	15%	20%	25%	30%	35%	40%	45%	50% -
0.03	0.006	0.008	0.009	0.01	0.012	0.013	0.018	0.021	0.024	0.026	0.027	0.029	0.029	0.03	0.03
0.05	0.01	0.014	0.016	0.017	0.02	0.022	0.03	0.036	0.04	0.043	0.046	0.048	0.049	0.05	0.05
0.08	0.016	0.022	0.025	0.027	0.031	0.035	0.048	0.057	0.064	0.069	0.073	0.076	0.078	0.08	0.08
0.1	0.02	0.028	0.031	0.034	0.039	0.044	0.06	0.071	0.08	0.087	0.092	0.095	0.098	0.099	0.1
0.12	0.024	0.034	0.037	0.041	0.047	0.052	0.072	0.086	0.096	0.104	0.11	0.114	0.118	0.119	0.12
0.15	0.03	0.042	0.047	0.051	0.059	0.065	0.09	0.107	0.12	0.13	0.137	0.143	0.147	0.149	0.15
0.18	0.036	0.05	0.056	0.061	0.071	0.078	0.108	0.129	0.144	0.156	0.165	0.172	0.176	0.179	0.18
0.2	0.04	0.056	0.062	0.068	0.078	0.087	0.12	0.143	0.16	0.173	0.183	0.191	0.196	0.199	0.2
0.22	0.044	0.062	0.069	0.075	0.086	0.096	0.132	0.157	0.176	0.191	0.202	0.21	0.216	0.219	0.22
0.25	0.05	0.07	0.078	0.085	0.098	0.109	0.15	0.179	0.2	0.217	0.229	0.238	0.245	0.249	0.25
0.28	0.056	0.078	0.087	0.096	0.11	0.122	0.168	0.2	0.224	0.242	0.257	0.267	0.274	0.279	0.28
0.3	0.06	0.084	0.094	0.102	0.118	0.131	0.18	0.214	0.24	0.26	0.275	0.286	0.294	0.298	0.3
0.4	0.08	0.112	0.125	0.136	0.157	0.174	0.24	0.286	0.32	0.346	0.367	0.382	0.392	0.398	0.4

## EPAV06

Square shoulder endmill, shank type, with screw clamp system

GAMP = +6°~ +7.7°, GAMF = -37.1°~ -30°



Designation	APMX	DC	CICT	DCONMS	LS	LH	LF	WT(kg)	Insert
EPAV06M008C10.0R01	6	8	1	10	60	20	80	0.04	AVGT06...
EPAV06M010C10.0R02	6	10	2	10	60	20	80	0.04	AVGT06...
EPAV06M010C10.0R02L	6	10	2	10	65	35	100	0.06	AVGT06...
EPAV06M010C08.0R02L	6	10	2	8	80	20	100	0.04	AVGT06...
EPAV06M012C12.0R02	6	12	2	12	60	20	80	0.06	AVGT06..
EPAV06M012C12.0R03	6	12	3	12	60	20	80	0.06	AVGT06...
EPAV06M012C12.0R02L	6	12	2	12	85	35	120	0.09	AVGT06...
EPAV06M012C10.0R02L	6	12	2	10	100	20	120	0.07	AVGT06...
EPAV06M012C10.0R03	6	12	3	10	60	20	80	0.04	AVGT06...
EPAV06M014C12.0R03	6	14	3	12	60	20	80	0.07	AVGT06...
EPAV06M014C12.0R03L	6	14	3	12	120	20	140	0.11	AVGT06...
EPAV06M016C16.0R03	6	16	3	16	70	20	90	0.12	AVGT06...
EPAV06M016C16.0R04	6	16	4	16	70	20	90	0.12	AVGT06...
EPAV06M016C16.0R03L	6	16	3	16	105	35	140	0.20	AVGT06...
EPAV06M018C16.0R03	6	18	3	16	70	20	90	0.13	AVGT06...
EPAV06M018C16.0R04	6	18	4	16	70	20	90	0.13	AVGT06...
EPAV06M018C16.0R03L	6	18	3	16	160	20	180	0.26	AVGT06...
EPAV06M020C20.0R04	6	20	4	20	70	30	100	0.23	AVGT06...
EPAV06M020C20.0R05	6	20	5	20	70	30	100	0.21	AVGT06...
EPAV06M020C20.0R04L	6	20	4	20	165	35	200	0.45	AVGT06...
EPAV06M020C16.0R04	6	20	4	16	80	30	110	0.17	AVGT06...
EPAV06M025C25.0R05	6	25	5	25	80	35	115	0.4	AVGT06...
EPAV06M025C25.0R06	6	25	6	25	80	35	115	0.4	AVGT06...
EPAV06M025C25.0R04L	6	25	4	25	160	40	200	0.72	AVGT06...
EPAV06M025C20.0R06	6	25	6	20	80	35	115	0.27	AVGT06...
EPAV06M032C32.0R08	6	32	8	32	80	40	120	0.7	AVGT06...
EPAV06M032C32.0R06L	6	32	6	32	155	45	200	1.2	AVGT06...

### SPARE PARTS

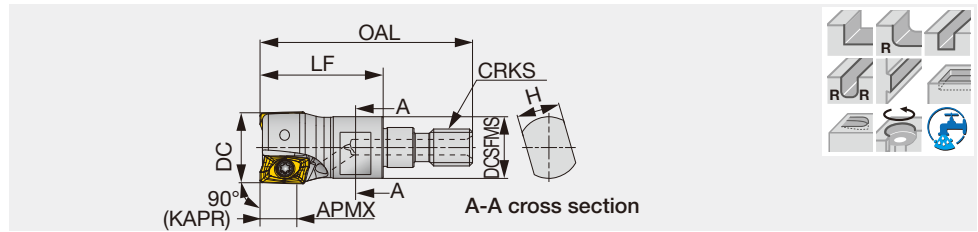
Designation	Clamping screw	Lubricant	Wrench
EPAV06M...	CSPB-2H	M-1000	IP-6DB

\*Recommended clamping torque (N·m): CSPB-2H = 0.7

## HPAV06-M

Square shoulder endmill, modular type (TungFlex), with screw clamp system

GAMP = +6.9°~ +7.6°, GAMF = -35.2°~ -32.4°



Designation	APMX	DC	CICT	OAL	LF	H	DCSFMS	CRKS	WT(kg)	Insert
HPAV06M010M06R02	6	10	2	34.5	20	7	9.5	M6	0.01	AVGT06...
HPAV06M012M06R02	6	12	2	34.5	20	7	10	M6	0.01	AVGT06...
HPAV06M012M06R03	6	12	3	34.5	20	7	10	M6	0.01	AVGT06...
HPAV06M016M08R03	6	16	3	42	25	10	13	M8	0.03	AVGT06...
HPAV06M016M08R04	6	16	4	42	25	10	13	M8	0.03	AVGT06...

For metric shank details, please refer to TungFlex series in TR419 TungFlex

### SPARE PARTS



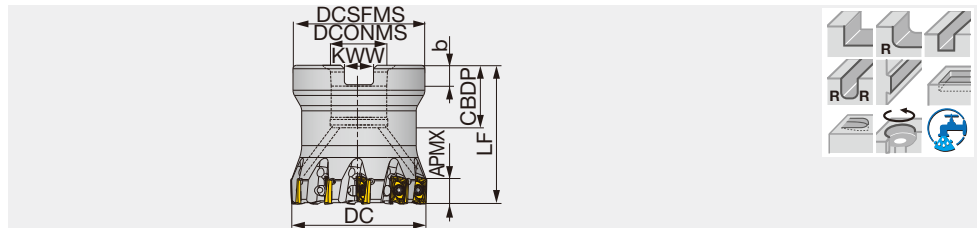
Designation	Clamping screw	Lubricant	Wrench
HPAV06M...	CSPB-2H	M-1000	IP-6DB

\*Recommended clamping torque (N·m): CSPB-2H = 0.7

## TPAV06

Square shoulder mill, bore type, with screw clamp system

GAMP = +7.7°, GAMF = -29.8°



Designation	APMX	DC	CICT	DCSFMS	DCONMS	CBDP	LF	KWW	b	WT(kg)	Insert
TPAV06M040B16.0R10	6	40	10	38	16	18	40	8.4	5.6	0.24	AVGT06...

### SPARE PARTS



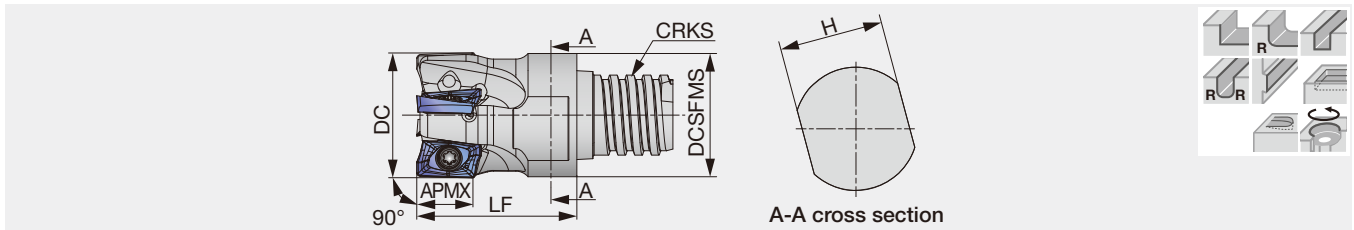
Designation	Clamping screw	Lubricant	Wrench	Center bolt
TPAV06M040B16.0R10	CSPB-2H	M-1000	IP-6DB	CM8X30H

\*Recommended clamping torque (N·m): CSPB-2H = 0.7

## HPAV06-S

Square shoulder endmill, modular type (TungMeister), with screw clamp system

GAMP = +6.9°~ +7.6°, GAMF = -35.2°~ -32.4°



Designation	APMX	DC	CICT	LF	H	DCSFMS	CRKS	WT(kg)	Insert
HPAV06M010S05R02	6	10	2	10	8	8	S05	0.01	AVGT06...
HPAV06M010S06R02	6	10	2	16	8	9.8	S06	0.01	AVGT06...
HPAV06M012S08R02	6	12	2	18	10	11.7	S08	0.02	AVGT06...
HPAV06M012S08R03	6	12	3	18	10	11.7	S08	0.02	AVGT06...
HPAV06M016S10R03	6	16	3	20	13	15.4	S10	0.03	AVGT06...
HPAV06M016S10R04	6	16	4	20	13	15.4	S10	0.03	AVGT06...

- For shank details, please refer to TR381 TungMeister  
Shank types: VSSD, VTSD, VSC, VSTD, VER
- For connections between metric shank and TungMeister thread, please use VAD-M type connector

Designation	Wrench*	
HPAV06M010S...	KEYV-S06	
HPAV06M012S...	KEYV-S08	
HPAV06M016S...	KEYV-S10	

\*sold separately

### SPARE PARTS

Designation	Clamping screw	Lubricant	Wrench
HPAV06M...	CSPB-2H	M-1000	IP-6DB

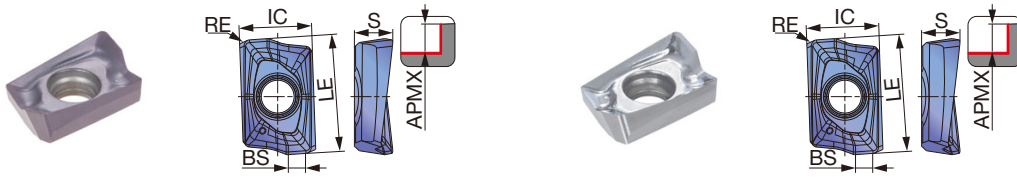
\*Recommended clamping torque (N·m): CSPB-2H = 0.7



# INSERT

## AVGT-MJ

## AVGT-AJ



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

★ : First choice  
☆ : Second choice

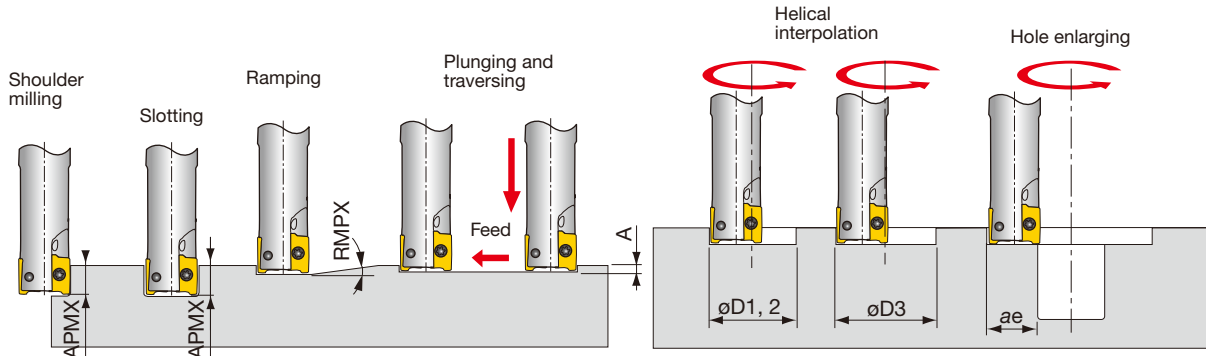
Designation	RE	APMX	Coated				Carbide	LE	IC	S	BS
			AH120	AH130	AH3135	AH3225	KS05F				
AVGT060300PBER-MJ	0.0	6			●	●		8	5	2.7	1.6
AVGT060302PBER-MJ	0.2	6	●	●	●	●		8	5	2.7	1.5
AVGT060304PBER-MJ	0.4	6	●	●	●	●		8	5	2.7	1.3
AVGT060308PBER-MJ	0.8	6	●	●	●	●		8	5	2.6	0.9
AVGT060300PBFR-AJ	0.0	6				●		8	5	2.7	1.6
AVGT060302PBFR-AJ	0.2	6				●		8	5	2.7	1.5
AVGT060304PBFR-AJ	0.4	6				●		8	5	2.7	1.3
AVGT060308PBFR-AJ	0.8	6				●		8	5	2.6	0.9

● : New product  
● : Line up

# STANDARD CUTTING CONDITIONS

ISO	Workpiece materials	Hardness	Priority	Grades	Cutting speed Vc (m/min)	Feed per tooth fz (mm/t)	
<b>P</b>	Low carbon steel S15C, SS400, etc. C15E, C15E4, E275A, etc.	- 200 HB	First choice	AH3225	230 - 430	0.07 - 0.12	
	Carbon steel and alloy steel S55C, SCM440, etc. C55, 42CrMo4, etc.	- 300 HB	First choice	AH3225	150 - 350	0.07 - 0.12	
	Prehardened steel NAK80, PX5, etc.	30 - 40 HRC	First choice	AH3225	100 - 230	0.07 - 0.12	
<b>M</b>	Stainless steel SUS304, SUS316, etc. X5CrNi18-9, X5CrNiMo17-12-3, etc.	-	First choice	AH3135	150 - 220	0.06 - 0.1	
<b>K</b>	Grey cast iron FC250, FC300, etc. GG25, GG30, etc. 250, 300, etc.	150 - 250 HB	First choice	AH120	200 - 330	0.07 - 0.12	
	Ductile cast iron FCD400, FCD600, etc. GGG60, 600-3, etc.	150 - 250 HB	First choice	AH120	150 - 240	0.07 - 0.12	
<b>N</b>	Aluminium alloys Si < 13%	-	First choice	KS05F	650 - 1000	0.07 - 0.12	
	Aluminium alloys Si ≥ 13%	-	First choice	KS05F	100 - 230	0.04 - 0.12	
<b>S</b>	Titanium alloys Ti-6Al-4V, etc.	-	First choice	AH130	40 - 90	0.04 - 0.1	
	Superalloys Inconel 718, etc.	-	First choice	AH130	45 - 65	0.04 - 0.09	
<b>H</b>	Hardened steel	SKD61, X40CrMoV5-1, etc.	40 - 50 HRC	First choice	AH120	45 - 70	0.04 - 0.08
		SKD11, X153CrMoV12, etc.	50 - 60 HRC	First choice	AH120	40 - 65	0.04 - 0.06

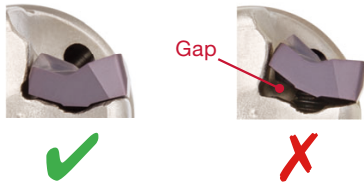
## MACHINING APPLICATIONS



Designation	DC	Max. depth of cut		Max. plunging	Min. machining	Max. machining		Max. cutting width in enlarging
		APMX	RMPX			$\phi D1$	$\phi D2$	
EPAV06M008...	8	6	-	-	-	-	-	-
EPAV/HPAV06M010...	10	6	3°	0.3	15	19	18	9.5
EPAV/HPAV06M012...	12	6	3°	0.3	18	23	22	11.5
EPAV/HPAV06M014...	14	6	2.3°	0.3	22	27	26	13.5
EPAV/HPAV06M016...	16	6	2°	0.3	28	31	30	15.5
EPAV/HPAV06M018...	18	6	1.6°	0.3	30	35	34	17.5
EPAV/HPAV06M020...	20	6	1.4°	0.3	34	39	38	19.5
EPAV/HPAV06M025...	25	6	1.1°	0.3	44	49	48	24.5
EPAV/HPAV06M032...	32	6	0.8°	0.3	58	63	62	31.5
TPAV06M040...	40	6	0.6°	0.3	74	79	78	39.5

\*Flat bottom hole

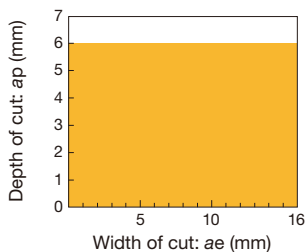
When clamping the insert, please confirm that there is no gap between the cutter body and the insert as shown in the picture.



### Caution for using a large diameter cutter (over $\phi 18$ mm)

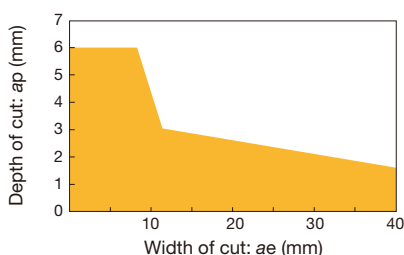
When using a cutter diameter over 18 mm, please note that the applicable range of cutting depth significantly drops as the cutting width applied increases, thus an additional finishing process may be required.

#### Cutting depth in relation to cutting width (for up to $\phi 16$ mm)



Cutter : EPAV06M016C16.0R04 ( $\phi 16$  mm,  $z = 4$ )  
 Insert : AVGT060304PBER-MJ AH3135  
 Workpiece material : S55C / C55  
 Cutting speed :  $V_c = 250$  m/min  
 Feed per tooth :  $f_z = 0.07$  mm/t  
 Machining : Slotting  
 Coolant : Dry  
 Machine : Vertical M/C, BT40, 18.5 kW

#### Cutting depth in relation to cutting width (for $\phi 18$ mm and up)

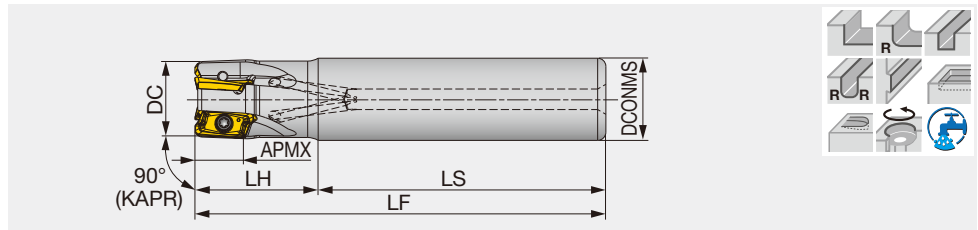


Cutter : EPAV06M032C32.0R08 ( $\phi 32$  mm,  $z = 8$ )  
 Insert : AVGT060304PBER-MJ AH3135  
 Workpiece material : S55C / C55  
 Cutting speed :  $V_c = 250$  m/min  
 Feed per tooth :  $f_z = 0.07$  mm/t  
 Coolant : Dry  
 Machine : Vertical M/C, BT40, 18.5 kW

## EPAV12

Square shoulder endmill, shank type, with screw clamp system

GAMP = +6°~ +7.6°, GAMF = -37.1°~ -32.4°



Designation	APMX	DC	CICT	DCONMS	LS	LH	LF	WT(kg)	Air hole	Insert
EPAV12M012C12.0R01	11.5	12	1	12	60	25	85	0.06	With	AVM/GT12...
EPAV12M016C16.0R02	11.5	16	2	16	60	25	85	0.12	With	AVM/GT12...
EPAV12M016C16.0R03	11.5	16	3	16	60	25	85	0.12	With	AVM/GT12...
EPAV12M016C16.0R02L	11.5	16	2	16	105	40	145	0.20	With	AVM/GT12...
EPAV12M020C20.0R03	11.5	20	3	20	70	30	100	0.22	With	AVM/GT12...
EPAV12M020C20.0R04	11.5	20	4	20	70	30	100	0.21	With	AVM/GT12...
EPAV12M020C20.0R02L	11.5	20	2	20	135	50	185	0.41	With	AVM/GT12...
EPAV12M025C25.0R04	11.5	25	4	25	80	35	115	0.38	With	AVM/GT12...
EPAV12M025C25.0R06	11.5	25	6	25	80	35	115	0.39	With	AVM/GT12...
EPAV12M025C25.0R03L	11.5	25	3	25	150	70	220	0.74	With	AVM/GT12...
EPAV12M032C32.0R06	11.5	32	6	32	80	40	120	0.68	With	AVM/GT12...
EPAV12M032C32.0R08	11.5	32	8	32	80	40	120	0.68	With	AVM/GT12...
EPAV12M032C32.0R03L	11.5	32	3	32	175	80	255	1.47	With	AVM/GT12...

### SPARE PARTS



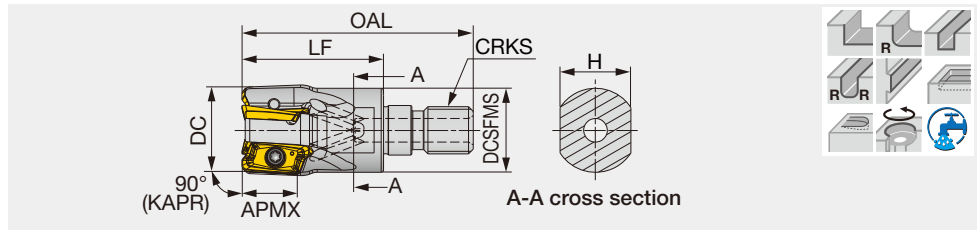
Designation	Clamping screw	Wrench
EPAV12M012C12.0R01	CPSB-2.5	IP-8D
EPAV12M016C16.0R02	CPSB-2.5	IP-8D
EPAV12M016C16.0R03	CPSB-2.5S	IP-8D
EPAV12M016C16.0R02L	CPSB-2.5	IP-8D
EPAV12M020C20.0R03	CPSB-2.5	IP-8D
EPAV12M020C20.0R04	CPSB-2.5S	IP-8D
EPAV12M020C20.0R02L	CPSB-2.5	IP-8D
EPAV12M025C25.0R04	CPSB-2.5	IP-8D
EPAV12M025C25.0R06	CPSB-2.5S	IP-8D
EPAV12M025C25.0R03L	CPSB-2.5	IP-8D
EPAV12M032C32.0R06	CPSB-2.5	IP-8D
EPAV12M032C32.0R08	CPSB-2.5S	IP-8D
EPAV12M032C32.0R03L	CPSB-2.5	IP-8D

\*Recommended clamping torque (N·m): CSPB-2.5, CSPB-2.5S = 1.3

## HPAV12-M

Square shoulder endmill, modular type (TungFlex), with screw clamp system

GAMP = +6°~ +7.6°, GAMF = -37.1°~ -32.4°



Designation	APMX	DC	CICT	OAL	LF	H	DCSFMS	CRKS	WT(kg)	Air hole	Insert
HPAV12M016M08R02	11.5	16	2	42	25	10	14.5	M8	0.03	With	AVM/GT12...
HPAV12M016M08R03	11.5	16	3	42	25	10	14.5	M8	0.03	With	AVM/GT12...
HPAV12M020M10R03	11.5	20	3	49	30	15	17.8	M10	0.06	With	AVM/GT12...
HPAV12M020M10R04	11.5	20	4	49	30	15	17.8	M10	0.05	With	AVM/GT12...
HPAV12M025M12R04	11.5	25	4	57	35	17	23	M12	0.1	With	AVM/GT12...
HPAV12M025M12R06	11.5	25	6	57	35	17	23	M12	0.1	With	AVM/GT12...
HPAV12M032M16R06	11.5	32	6	63	40	22	28.8	M16	0.21	With	AVM/GT12...
HPAV12M032M16R08	11.5	32	8	63	40	22	28.8	M16	0.21	With	AVM/GT12...
HPAV12M040M16R06	11.5	40	6	63	40	22	28.8	M16	0.25	With	AVM/GT12...
HPAV12M040M16R08	11.5	40	8	63	40	22	28.8	M16	0.24	With	AVM/GT12...

### SPARE PARTS



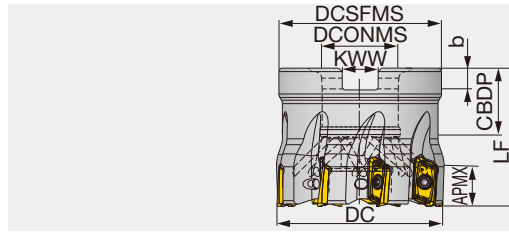
Designation	Clamping screw	Wrench
HPAV12M016M08R02	CSPB-2.5	IP-8D
HPAV12M016M08R03	CSPB-2.5S	IP-8D
HPAV12M020M10R03	CSPB-2.5	IP-8D
HPAV12M020M10R04	CSPB-2.5S	IP-8D
HPAV12M025M12R04	CSPB-2.5	IP-8D
HPAV12M025M12R06	CSPB-2.5S	IP-8D
HPAV12M032M16R06	CSPB-2.5	IP-8D
HPAV12M032M16R08	CSPB-2.5S	IP-8D
HPAV12M040M16R06	CSPB-2.5	IP-8D
HPAV12M040M16R08	CSPB-2.5	IP-8D

\*Recommended clamping torque (N·m): CSPB-2.5, CSPB-2.5S = 1.3

# TPAV12

Square shoulder mill, bore type, with screw clamp system

GAMP = +6°~ +7.6°, GAMF = -37.1°~ -32.4°



Designation	APMX	DC	CICT	DCSFMS	DCONMS	CBDP	LF	KWW	b	WT(kg)	Air hole	Insert
TPAV12M050B22.0R08	11.5	50	8	47	22	20	40	10.4	6.3	0.37	With	AVM/GT12...
TPAV12M050B22.0R12	11.5	50	12	47	22	20	40	10.4	6.3	0.37	With	AVM/GT12...
TPAV12M063B22.0R08	11.5	63	8	47	22	20	40	10.4	6.3	0.52	With	AVM/GT12...
TPAV12M063B22.0R14	11.5	63	14	47	22	20	40	10.4	6.3	0.54	With	AVM/GT12...

## SPARE PARTS

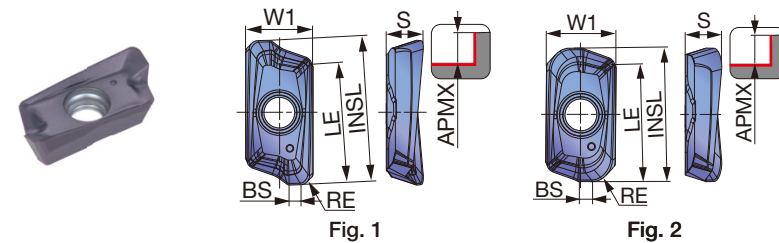


Designation	Clamping screw	Wrench	Shell locking bolt
TPAV12M...	CSPB-2.5	IP-8D	CM10x30H

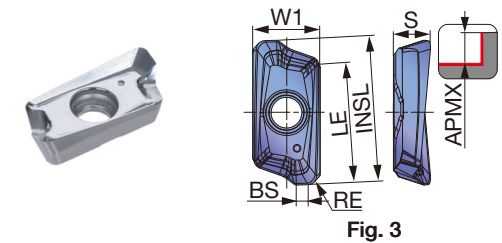
\*Recommended clamping torque (N·m): CSPB-2.5, CSPB-2.5S = 1.3

## INSERT

### AVMT-MM



### AVGT-AM



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

★ : First choice  
☆ : Second choice

Designation	RE	APMX	Coated		Carbide	W1	INSL	S	BS	LE	Fig.
			AH120	AH3225	T1215						
AVMT120404PDER-MM	0.4	11.5	●	●	●	6.6	14.2	3.6	1.5	11.8	1
AVMT120408PDER-MM	0.8	11.5	●	●	●	6.6	14.2	3.6	1.1	11.8	1
AVMT120412PDER-MM	1.2	11.5	●	●	●	6.6	14.2	3.6	0.7	11.8	1
AVMT120416PDER-MM	1.6	11.5	●	●	●	6.6	14.2	3.6	0.3	11.8	1
AVMT120420PDER-MM	2	10.5	●	●	●	6.6	12.7	3.4	1.2	11.1	2
AVMT120430PDER-MM	3	10.5	●	●	●	6.6	12.7	3.4	0.2	11.1	2
AVGT120404PDFR-AM	0.4	11.5			●	6.6	14.2	3.6	1.5	11.8	3
AVGT120408PDFR-AM	0.8	11.5			●	6.6	14.2	3.6	1.1	11.8	3

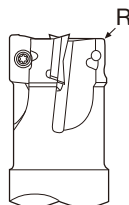
● : Line up

## STANDARD CUTTING CONDITIONS

ISO	Workpiece materials	Hardness	Priority	Grades	Cutting speed Vc (m/min)	Feed per tooth fz (mm/t)	
P	Low carbon steel S15C, SS400, etc. C15E, C15E4, E275A, etc.	- 200 HB	First choice	AH3225	100 - 300	0.06 - 0.22	
		- 200 HB	Wear resistance	T3225	200 - 400	0.06 - 0.18	
	Carbon steel and alloy steel S55C, SCM440, etc. C55, 42CrMo4, etc.	- 300 HB	First choice	AH3225	100 - 250	0.06 - 0.22	
		- 300 HB	Wear resistance	T3225	200 - 400	0.06 - 0.18	
	Prehardened steel NAK80, PX5, etc.	30 - 40 HRC	First choice	AH3225	100 - 200	0.06 - 0.22	
		30 - 40 HRC	Wear resistance	T3225	200 - 400	0.06 - 0.15	
M	Stainless steel SUS304, SUS316, etc. X5CrNi18-9, X5CrNiMo17-12-3, etc.	-	First choice	AH3225	80 - 180	0.07 - 0.2	
K	Grey cast iron FC250, FC300, etc. GG25, GG30, etc. 250, 300, etc.	150 - 250 HB	First choice	AH120	100 - 300	0.05 - 0.12	
		150 - 250 HB	Wear resistance	T1215	200 - 400	0.05 - 0.18	
	Ductile cast iron FCD400, FCD600, etc. GGG60, 600-3, etc.	150 - 250 HB	First choice	AH120	100 - 250	0.05 - 0.12	
		150 - 250 HB	Wear resistance	T1215	150 - 300	0.05 - 0.18	
N	Aluminum alloys Si < 13%	-	First choice	KS05F	300 - 1500	0.05 - 0.32	
	Aluminum alloys Si ≥ 13%	-	First choice	KS05F	100 - 200	0.05 - 0.32	
S	Titanium alloys Ti-6Al-4V, etc.	- 40 HRC	First choice	AH3225	20 - 60	0.04 - 0.15	
	Superalloys Inconel 718, etc.	- 40 HRC	First choice	AH120	20 - 40	0.04 - 0.15	
H	Hardened steel	SKD61, X40CrMoV5-1, etc.	40 - 50 HRC	First choice	AH120	50 - 150	0.04 - 0.07
		SKD11, X153CrMoV12, etc.	50 - 60 HRC	First choice	AH120	40 - 70	0.04 - 0.07

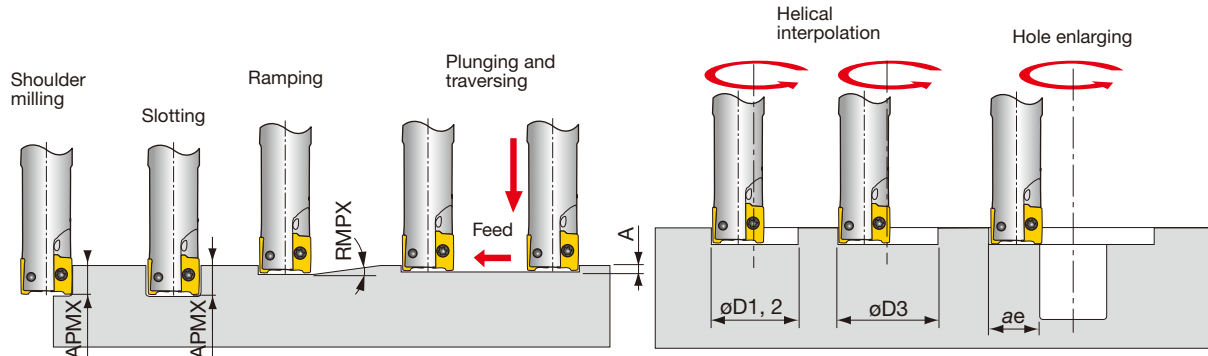
### Cautionary point in modifying cutter bodies

When using inserts with corner radius  
RE ≥ 2 mm, standard cutter bodies have to be  
modified "R". (EPAV12, TPAV12, HPAV12)



Corner radius RE (mm)	The dimension of modifying (mm)
0.4 - 1.6	Unnecessary
2 - 3	2

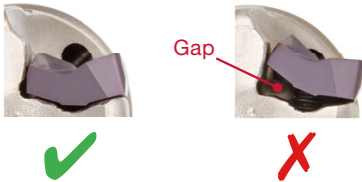
## MACHINING APPLICATIONS



Designation	DC	Max. depth of cut		Max. plunging	Min. machining	Max. machining		Max. cutting width in enlarging
		APMX	RMPX			øD1	øD2	
EPAV12M012...	12	11.5	4.5°	0.5	17.8	23	22	11
E/HPAV12M016...	16	11.5	3.5°	0.5	25.3	31	30	15
E/HPAV12M020...	20	11.5	3°	0.5	33	39	38	19
E/HPAV12M025...	25	11.5	2.5°	0.5	42.6	49	48	24
E/HPAV12M032...	32	11.5	2°	0.5	56.4	63	62	31
HPAV12M040...	40	11.5	2°	0.5	71.5	78	77	39
TPAV12M050...	50	11.5	2°	0.5	90.4	99	98	49
TPAV12M063...	63	11.5	1.8°	0.5	115.6	125	124	62

\*Flat bottom hole

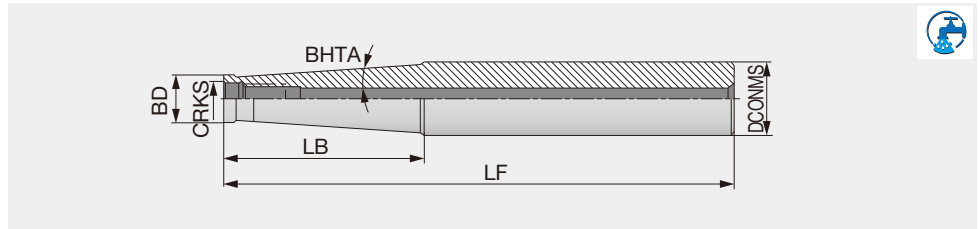
When clamping the insert, please confirm that there is no gap between the cutter body and the insert as shown in the picture.



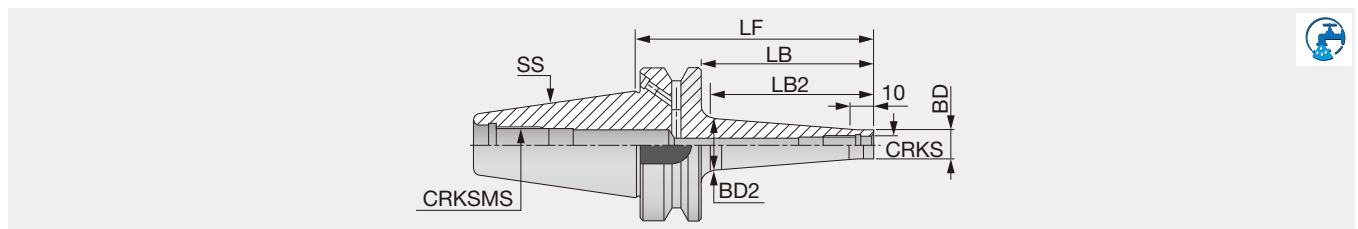
### Estimation of chip thickness - calculated from feed per tooth ( $f_z$ ) and cutting width ( $ae$ ) data

Recommended chip thickness

Feed per tooth $f_z$ (mm/t)	Cutting width (%): $ae$ (mm) / Tool dia.: DC (mm)														
	1%	2%	2.5%	3%	4%	5%	10%	15%	20%	25%	30%	35%	40%	45%	50% -
0.03	0.006	0.008	0.009	0.01	0.012	0.013	0.018	0.021	0.024	0.026	0.027	0.029	0.029	0.03	0.03
0.05	0.01	0.014	0.016	0.017	0.02	0.022	0.03	0.036	0.04	0.043	0.046	0.048	0.049	0.05	0.05
0.08	0.016	0.022	0.025	0.027	0.031	0.035	0.048	0.057	0.064	0.069	0.073	0.076	0.078	0.08	0.08
0.10	0.02	0.028	0.031	0.034	0.039	0.044	0.06	0.071	0.08	0.087	0.092	0.095	0.098	0.099	0.1
0.12	0.024	0.034	0.037	0.041	0.047	0.052	0.072	0.086	0.096	0.104	0.11	0.114	0.118	0.119	0.12
0.15	0.03	0.042	0.047	0.051	0.059	0.065	0.09	0.107	0.12	0.13	0.137	0.143	0.147	0.149	0.15
0.18	0.036	0.05	0.056	0.061	0.071	0.078	0.108	0.129	0.144	0.156	0.165	0.172	0.176	0.179	0.18
0.20	0.04	0.056	0.062	0.068	0.078	0.087	0.12	0.143	0.16	0.173	0.183	0.191	0.196	0.199	0.2
0.22	0.044	0.062	0.069	0.075	0.086	0.096	0.132	0.157	0.176	0.191	0.202	0.21	0.216	0.219	0.22
0.25	0.05	0.07	0.078	0.085	0.098	0.109	0.15	0.179	0.2	0.217	0.229	0.238	0.245	0.249	0.25
0.28	0.056	0.078	0.087	0.096	0.11	0.122	0.168	0.2	0.224	0.242	0.257	0.267	0.274	0.279	0.28
0.30	0.06	0.084	0.094	0.102	0.118	0.131	0.18	0.214	0.24	0.26	0.275	0.286	0.294	0.298	0.3
0.40	0.08	0.112	0.125	0.136	0.157	0.174	0.24	0.286	0.32	0.346	0.367	0.382	0.392	0.398	0.4



Designation	DCONMS	BD	LF	LB	BHTA	CRKS
SM06-L60C10	10	9.7	60	20	0°	M6
SM06-L105-C12	12	9.7	105	60	1.2°	M6
SM06-L125-C16	16	9.7	125	60	3.3°	M6
SM08-L73C16	16	13	73	25	0°	M8
SM08-L128-C16	16	13	128	80	0.9°	M8
SM08-L170-C20	20	13	170	66.8	3.3°	M8
SM10-L80-C20	20	18	80	30	0°	M10
SM10-L130-C20	20	18	130	80	0.6°	M10
SM10-L200-C25	25	19	200	57.2	3.3°	M10
SM12-L86-C25	25	21	86	30	5.1°	M12
SM12-L200-C32	32	21	200	78	4.4°	M12
SM16-L95-C32	32	29	95	35	1.7°	M16
SM16-L230-C32	32	29	230	50	1.8°	M16



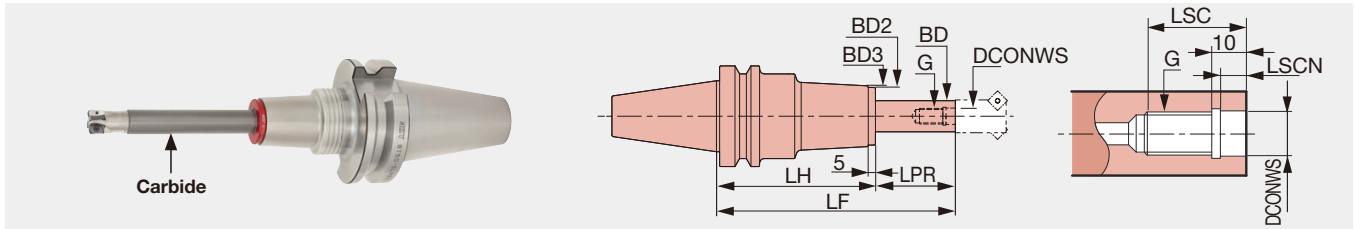
Designation	SS	CRKS	BD	BD2	LF	LB	LB2	CRKSMS
BT40ODP6X66	40	M6	9.8	13	66	39	30	M16
BT40ODP6X106	40	M6	9.8	23	106	79	70	M16
BT40ODP8X66	40	M8	13	15	66	39	30	M16
BT40ODP8X106	40	M8	13	23	106	79	70	M16
BT40ODP10X66	40	M10	18	20	66	39	30	M16
BT40ODP10X106	40	M10	18	28	106	79	70	M16
BT40ODP12X66	40	M12	21	24	66	39	30	M16
BT40ODP12X106	40	M12	21	31	106	79	70	M16
BT40ODP16X66	40	M16	29	28.6	66	39	-	M16
BT40ODP16X106	40	M16	29	34	106	79	70	M16
BT50ODP12X94	50	M12	23	30	94	56	50	M24
BT50ODP12X144 <sup>(1)</sup>	50	M12	23	40	144	106	100	M24
BT50ODP12X194 <sup>(1)</sup>	50	M12	23	40	194	156	150	M24
BT50ODP12X244 <sup>(1)</sup>	50	M12	23	46	244	206	200	M24
BT50ODP16X94 <sup>(1)</sup>	50	M16	29	34	94	56	50	M24
BT50ODP16X144 <sup>(1)</sup>	50	M16	29	40	144	106	100	M24
BT50ODP16X194 <sup>(1)</sup>	50	M16	29	55	194	156	150	M24
BT50ODP16X244 <sup>(1)</sup>	50	M16	29	60	244	206	200	M24

Applicable for 10 MPa pressure coolant  
 (1) Balanced to G6.3 at 12,000 min<sup>-1</sup>



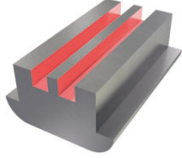
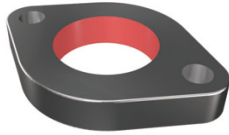
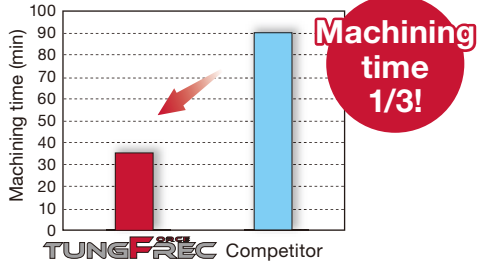
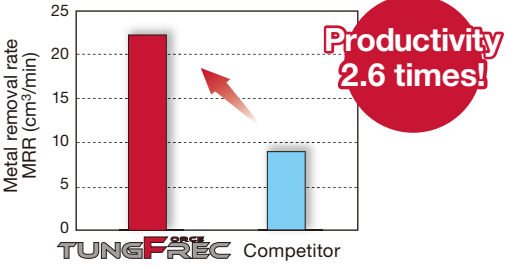
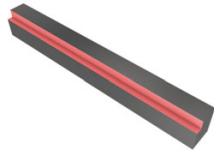

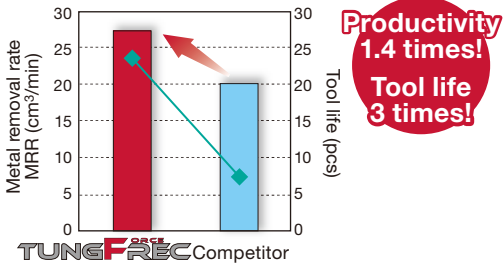
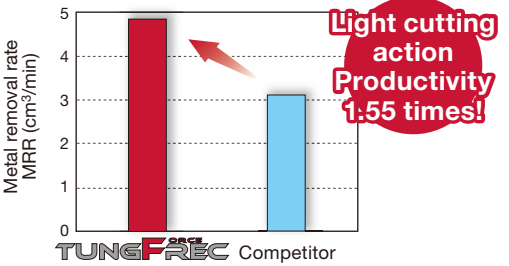
## BT-RSG (Screw clamping head holder)

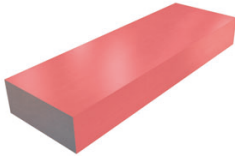
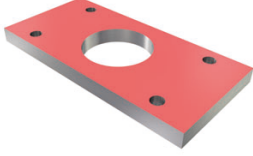
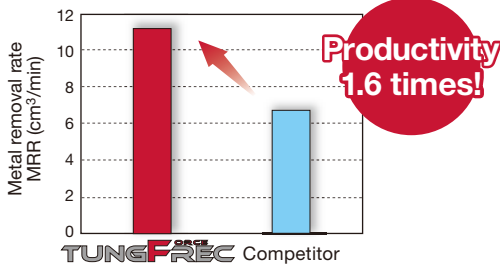
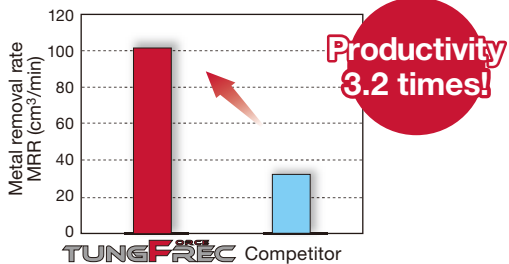
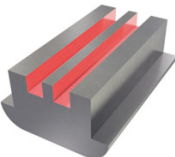
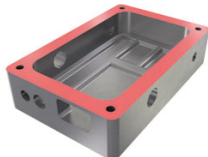
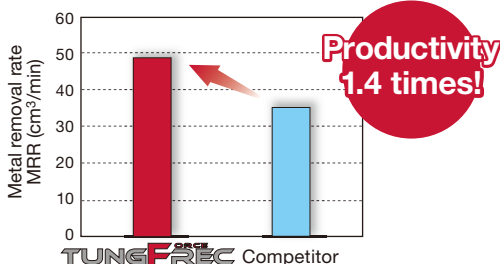
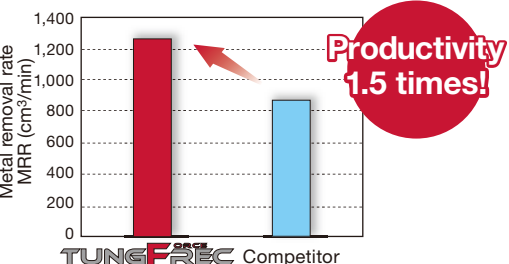
TungFlex modular tooling system with BT shank



Designation	DCONWS	LSC	LSCN	BD	LF	LPR	LH	BD2	BD3	WT (kg)	G
BT40-RSG 8-105-M 25	8.5	18	6.5	15	105	25	80	30	32	1.4	M8
BT40-RSG 8-135-M 25	8.5	18	6.5	15	135	25	110	30	32	1.8	M8
BT40-RSG 8-130-M 50	8.5	18	6.5	15	130	50	80	30	32	1.4	M8
BT40-RSG 8-160-M 50	8.5	18	6.5	15	160	50	110	30	32	1.8	M8
BT40-RSG 8-155-M 75	8.5	18	6.5	15	155	75	80	30	32	1.5	M8
BT40-RSG 8-185-M 75	8.5	18	6.5	15	185	75	110	30	32	1.9	M8
BT40-RSG 10-125-M 25	10.5	22	6.5	19	125	25	100	36	38	1.8	M10
BT40-RSG 10-155-M 25	10.5	22	6.5	19	155	25	130	36	38	2.2	M10
BT40-RSG 10-150-M 50	10.5	22	6.5	19	150	50	100	36	38	1.9	M10
BT40-RSG 10-180-M 50	10.5	22	6.5	19	180	50	130	36	38	2.3	M10
BT40-RSG 10-175-M 75	10.5	22	6.5	19	175	75	100	36	38	2	M10
BT40-RSG 10-205-M 75	10.5	22	6.5	19	205	75	130	36	38	2.4	M10
BT40-RSG 10-200-M100	10.5	22	6.5	19	200	100	100	36	38	2	M10
BT40-RSG 10-230-M100	10.5	22	6.5	19	230	100	130	36	38	2.4	M10
BT40-RSG 12-125-M 25	12.5	22	6	24	125	25	100	43	45	2	M12
BT40-RSG 12-155-M 25	12.5	22	6	24	155	25	130	43	45	2.4	M12
BT40-RSG 12-150-M 50	12.5	22	6	24	150	50	100	43	45	2.1	M12
BT40-RSG 12-180-M 50	12.5	22	6	24	180	50	130	43	45	2.5	M12
BT40-RSG 12-175-M 75	12.5	22	6	24	175	75	100	43	45	2.3	M12
BT40-RSG 12-205-M 75	12.5	22	6	24	205	75	130	43	45	2.7	M12
BT40-RSG 12-200-M100	12.5	22	6	24	200	100	100	43	45	2.4	M12
BT40-RSG 12-230-M100	12.5	22	6	24	230	100	130	43	45	2.8	M12
BT50-RSG 8-120-M 25	8.5	18	6.5	15	120	25	95	30	32	4	M8
BT50-RSG 8-150-M 25	8.5	18	6.5	15	150	25	125	30	32	4.3	M8
BT50-RSG 8-145-M 50	8.5	18	6.5	15	145	50	95	30	32	4	M8
BT50-RSG 8-175-M 50	8.5	18	6.5	15	175	50	125	30	32	4.3	M8
BT50-RSG 8-170-M 75	8.5	18	6.5	15	170	75	95	30	32	4.1	M8
BT50-RSG 8-200-M 75	8.5	18	6.5	15	200	75	125	30	32	4.4	M8
BT50-RSG 10-140-M 25	10.5	22	6.5	19	140	25	115	36	38	4.3	M10
BT50-RSG 10-170-M 25	10.5	22	6.5	19	170	25	145	36	38	4.6	M10
BT50-RSG 10-165-M 50	10.5	22	6.5	19	165	50	115	36	38	4.4	M10
BT50-RSG 10-195-M 50	10.5	22	6.5	19	195	50	145	36	38	4.7	M10
BT50-RSG 10-190-M 75	10.5	22	6.5	19	190	75	115	36	38	4.5	M10
BT50-RSG 10-220-M 75	10.5	22	6.5	19	220	75	145	36	38	4.8	M10
BT50-RSG 10-215-M100	10.5	22	6.5	19	215	100	115	36	38	4.5	M10
BT50-RSG 10-245-M100	10.5	22	6.5	19	245	100	145	36	38	4.8	M10
BT50-RSG 12-140-M 25	12.5	22	6	24	140	25	115	43	45	4.6	M12
BT50-RSG 12-170-M 25	12.5	22	6	24	170	25	145	43	45	5	M12
BT50-RSG 12-165-M 50	12.5	22	6	24	165	50	115	43	45	4.7	M12
BT50-RSG 12-195-M 50	12.5	22	6	24	195	50	145	43	45	5.1	M12
BT50-RSG 12-190-M 75	12.5	22	6	24	190	75	115	43	45	4.9	M12
BT50-RSG 12-220-M 75	12.5	22	6	24	220	75	145	43	45	5.3	M12
BT50-RSG 12-215-M100	12.5	22	6	24	215	100	115	43	45	5	M12
BT50-RSG 12-245-M100	12.5	22	6	24	245	100	145	43	45	5.4	M12
BT50-RSG 12-240-M125	12.5	22	6	24	240	125	115	43	45	5.2	M12
BT50-RSG 16-140-M 25	17	25	6	29	140	25	115	52	54	5.4	M16
BT50-RSG 16-165-M 50	17	25	6	29	165	50	115	52	54	5.6	M16
BT50-RSG 16-190-M 75	17	25	6	29	190	75	115	52	54	5.8	M16
BT50-RSG 16-215-M100	17	25	6	29	215	100	115	52	54	6	M16
BT50-RSG 16-240-M125	17	25	6	29	240	125	115	52	54	6.2	M16

## ■ PRACTICAL EXAMPLES

Workpiece type		Machine parts	Machine parts
Cutter		EPAV04M008C08.0R02 (ø8 mm, z=2)	EPAV04M008C08.0R02L (ø8 mm, z=2)
Insert		AVMT040204PPER-MM	AVMT040204PPER-MM
Grade		AH3225	AH3225
Workpiece material		SUS304 / X5CrNiMo18-9	S50C
		 <b>M</b>	 <b>P</b>
Cutting conditions	Cutting speed : Vc (m/min)	150	251
	Feed per tooth : fz (mm/t)	0.08	0.07
	Feed speed : Vf (m/min)	895	1,400
	Depth of cut : ap (mm)	1.429	2
	Width of cut : ae (mm)	8	8
	Machining	Slotting	Slotting
	Coolant	Air blast	Air blast
	Machine	Vertical M/C, BT50	Vertical M/C, BT50
Results			
		<p>TungForce-Rec endmill with high rigidity shortened the machining time to 1/3 compared to the solid endmill.</p>	<p>TungForce-Rec endmill machines with 2.6 times higher productivity due to the incredible rigidity.</p>
Workpiece type		Machine parts	Spindle
Cutter		EPAV06M014C12.0R03 (ø14 mm, z=3)	EPAV06M012C12.0R03 (ø12 mm, z = 3)
Insert		AVGT060302PBER-MJ	AVGT060304PBER-MJ
Grade		AH3225	AH3135
Workpiece material		SS400 / E275A	Alloy steel (Low carbon, 30HRC)
		 <b>P</b>	 <b>P</b>
Cutting conditions	Cutting speed : Vc (m/min)	264	143
	Feed per tooth : fz (mm/t)	0.125	0.04
	Feed speed : Vf (m/min)	1,500	601
	Depth of cut : ap (mm)	6	1
	Width of cut : ae (mm)	3	1.6
	Machining	Shoulder milling	Shoulder milling
	Coolant	Wet (External)	Dry
	Machine	Vertical M/C, BT40	Vertical M/C, BT30
Results			
		<p>TungForce-Rec endmill achieves 3 times longer tool life and 140 % productivity compared to the solid endmill, thanks to the latest AH3225 grade with high performance.</p>	<p>The sharp cutting edge geometry has enabled smoother, vibration-free cutting at higher parameters even on a low power machine.</p>

Workpiece type		Plate for mold	Machine parts
Cutter		EPAV12M20C20.0R04 (ø20 mm, z = 4)	TPAV12M050B22.0R12 (ø50 mm, z = 12)
Insert		AVMT120408PDER-MM	AVMT120408PDER-MM
Grade		AH3225	AH3225
Workpiece material		Prehardened steel	SS400 / E275A
		 <b>P</b>	 <b>P</b>
Cutting conditions	Cutting speed : Vc (m/min)	72	157
	Feed per tooth : fz (mm/t)	0.1	0.12
	Feed speed : Vf (m/min)	458	1,440
	Depth of cut : ap (mm)	4	2
	Width of cut : ae (mm)	6	35
	Machining	Face milling	Face milling
	Coolant	Air blast	Air blast
Machine		Vertical M/C, BT50	Vertical M/C, BT40
Results		 <p>Thanks to dense number of teeth and robust cutting edge, TungForce-Rec offered high productivity without chipping.</p>	 <p>Dense number of teeth and large rake angle allowed TungForce-Rec to offer high productivity without chattering.</p>
		<p><b>Workpiece type</b></p> <p><b>Cutter</b></p> <p><b>Insert</b></p> <p><b>Grade</b></p>	
Machine parts		Machine parts	Machine parts
Cutter		EPAV12M20C20.0R04 (ø20 mm, z = 4)	TPAV12M050B22.0R12 (ø50 mm, z = 12)
Insert		AVMT120408PDER-MM	AVGT120408PDFR-AM
Grade		AH3225	KS05F
Workpiece material		SNCM431 / 30CrNiMo8	Cast aluminum
		 <b>P</b>	 <b>N</b>
Cutting conditions	Cutting speed : Vc (m/min)	157	950
	Feed per tooth : fz (mm/t)	0.12	0.15
	Feed speed : Vf (m/min)	1,200	11,000
	Depth of cut : ap (mm)	2	6
	Width of cut : ae (mm)	20	35
	Machining	Slotting	Face milling
	Coolant	Air blast	Wet (External)
Machine		Vertical M/C, BT40	Vertical M/C, BT50
Results		 <p>Dense number of teeth and rigid tool design allowed TungForce-Rec to offer high productivity in slotting operation.</p>	 <p>Dense number of teeth and rigid tool design allowed TungForce-Rec to offer high productivity in cast aluminum machining.</p>

### **Tungaloy Corporation (Head office)**

11-1 Yoshima-Kogyodanchi  
Iwaki-city, Fukushima 970-1144 Japan  
Phone: +81-246-36-8501  
Fax: +81-246-36-8542  
www.tungaloy.co.jp

### **Tungaloy America, Inc.**

3726 N Ventura Drive  
Arlington Heights, IL 60004, U.S.A.  
Phone: +1-888-554-8394  
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

### **Tungaloy do Brasil Ltda.**

Avd. Independencia N4158 Residencial Flora  
13280-000 Vinhedo, São Paulo, Brasil  
Phone: +55-19-38262757  
Fax: +55-19-38262757  
www.tungaloy.com/br

### **Tungaloy Germany GmbH**

An der Alten Ziegelei 1  
D-40789 Monheim, Germany  
Phone: +49-2173-90420-0  
Fax: +49-2173-90420-19  
www.tungaloy.com/de

### **Tungaloy France S.A.S.**

ZA Courtaboëuf - Le Rio  
1 rue de la Terre de feu  
F-91952 Courtaboëuf Cedex, France  
Phone: +33-1-6486-4300  
Fax: +33-1-6907-7817  
www.tungaloy.com/fr

### **Tungaloy Italia S.r.l.**

Via E. Andolfato 10  
I-20126 Milano, Italy  
Phone: +39-02-252012-1  
Fax: +39-02-252012-65  
www.tungaloy.com/it

### **Tungaloy Czech s.r.o.**

Turanka 115  
CZ-627 00 Brno, Czech Republic  
Phone: +420-532 123 391  
Fax: +420-532 123 392  
www.tungaloy.com/cz

### **Tungaloy Ibérica S.L.**

C/Miquel Servet, 43B, Nau 7  
Pol. Ind. Bufalvent  
ES-08243 Manresa (BCN), Spain  
Phone: +34 93 113 1360  
Fax: +34 93 876 2798  
www.tungaloy.com/es

### **Tungaloy Scandinavia AB**

Bultgatan 38  
442 40 Kungälv, Sweden  
Phone: +46-462119200  
Fax: +46-462119207  
www.tungaloy.com/se

### **Tungaloy Rus, LLC**

Andropova avenue, h.18/7,  
11 floor, office 3, 115432,  
Moscow, Russia  
Phone: +7-499-683-01-80  
Fax: +7-499-683-01-81  
www.tungaloy.com/ru

### **Tungaloy Polska Sp. z o.o.**

Ul. Irysowa 1, 55-040 Bielany  
Wroclawskie, Poland  
Phone: +48 607 907 237  
www.tungaloy.com/pl

### **Tungaloy U.K. Ltd**

Gallan Park, Watling Street,  
Cannock, WS110XG, UK  
Phone: +44 121 4000 231  
Fax: +44 121 270 9694  
www.tungaloy.com/uk

### **Tungaloy Hungary Kft**

Erzsébet királyné útja 125  
H-1142 Budapest, Hungary  
Phone: +36 1 781-6846  
Fax: +36 1 781-6866  
www.tungaloy.com/hu

### **Tungaloy Turkey**

Serifali Mah.bayraktar Bulvari Kule Sk. No:26  
34775 Umraniye / Istanbul / Turkey  
Phone: +90 216 540 04 67  
Fax: +90 216 540 04 87  
www.tungaloy.com/tr

### **Tungaloy Benelux b.v.**

Tjalk 70  
NL-2411 NZ Bodegraven, Netherlands  
Phone: +31 172 630 420  
Fax: +31 172 630 429  
www.tungaloy.com/nl

### **Tungaloy Croatia**

Ulica bana Josipa Jelačića 87,  
10430, Samobor, Croatia  
Phone: +385 1 3326 604  
Fax: +385 1 3327 683  
www.tungaloy.com/hr

### **Tungaloy Cutting Tool (Shanghai) Co.,Ltd.**

Rm No 401 No.88 Zhabei  
Jiangchang No.3 Rd  
Shanghai 200436, China  
Phone: +86-21-3632-1880  
Fax: +86-21-3621-1918  
www.tungaloy.com/cn

### **Tungaloy Cutting Tools (Taiwan) Co.,Ltd.**

9F, No.293, Zhongyang Rd,  
Xinzhuan Dist, New Taipei City,  
24251 Taiwan  
Phone: +886-2-8521-9986  
Fax: +886-2-8521-8935  
www.tungaloy.com/tw

### **Tungaloy Cutting Tools (Thailand) Co.,Ltd.**

Interlink tower 4th Fl.  
1858/5-7 Bangna-Trad Road  
km.5 Bangna, Bangna, Bangkok 10260  
Thailand  
Phone: +66-2-751-5711  
Fax: +66-2-751-5715  
www.tungaloy.com/th

### **Tungaloy Singapore (Pte.), Ltd.**

62 Ubi Road 1, #06-11 Oxley BizHub 2  
Singapore 408734  
Phone: +65-6391-1833  
Fax: +65-6299-4557  
www.tungaloy.com/sing

### **Tungaloy Vietnam**

LE04.38, Lexington Residence  
67 Mai Chi Tho St., Dist. 2,  
Ho Chi Minh City, Vietnam  
Phone: +84-2837406660  
www.tungaloy.com/sing

### **Tungaloy India Pvt. Ltd.**

One International Center,  
Unit # 902-A, 9th Floor,  
Tower 1, Senapati Bapat Marg,  
Elphinstone Road (West),  
Mumbai-400013, India  
Phone: +91-22-6124-8804  
Fax: +91-22-6124-8899  
www.tungaloy.com/in

### **Tungaloy Korea Co., Ltd**

#1312, Byucksan Digital Valley 5-cha  
Beotkkot-ro 244, Geumcheon-gu  
153-788 Seoul, Korea  
Phone: +82-2-2621-6161  
Fax: +82-2-6393-8952  
www.tungaloy.com/kr

### **Tungaloy Malaysia Sdn Bhd**

50 K-2, Kelana Mall, Jalan SS6/14  
Kelana Jaya, 47301  
Petaling Jaya, Selangor Darul Ehsan  
Malaysia  
Phone: +603-7805-3222  
Fax: +603-7804-8563  
www.tungaloy.com/my

### **Tungaloy Australia Pty Ltd**

Unit 68 1470 Ferntree Gully Road  
Knoxfield 3180 Victoria, Australia  
Phone: +61-3-9755-8147  
Fax: +61-3-9755-6070  
www.tungaloy.com/au

### **PT. Tungaloy Indonesia**

Kompleks Grand Wisata Block AA-10 No.3-5  
Cibitung  
Bekasi 17510, Indonesia  
Phone: +62-21-8261-5808  
Fax: +62-21-8261-5809  
www.tungaloy.com/id



[www.tungaloy.com](http://www.tungaloy.com)

follow us at:

[facebook.com/tungaloyjapan](https://facebook.com/tungaloyjapan)

[twitter.com/tungaloyjapan](https://twitter.com/tungaloyjapan)

[www.youtube.com/tungaloycorporation](https://www.youtube.com/tungaloycorporation)

Distributed by:



 FIND US ON THE CLOUD!  
[machingcloud.com](http://machingcloud.com)



AS9100 Certified  
78006  
2015.11.04  
ISO14001 Certified  
EC97J1123  
1997.11.26

Produced from Recycled paper

Dec. 2021 (TJ)