



Square shoulder milling cutter

TUNG^{ORCE}**FREC**

Tungaloy Report No. 506-US

Shoulder milling cutter with unique V-shaped bottom inserts for maximum efficiency — **Introducing robust Size 18 insert with outstanding stability and productivity**







TUNG F ORCE REC



Unique insert clamping ensures high reliability and efficiency machining

A wider application range with four insert sizes

Insert size 04

First-choice indexable solution for
6 - 10 mm diameter endmills



Tool diameter: $\phi 6$ - $\phi 16$ mm

P.6 -

Insert size 06

Provides superior surface quality
as solid carbide endmills



Tool diameter: $\phi 0.313$ - $\phi 1.000$ "

P.10 -

Insert size 12

Extreme productivity and part quality



Tool diameter: $\phi 0.625$ - $\phi 2.000$ "

P.18 -

New

Insert size 18

Introducing strong Size 18 insert
for unparalleled stability



Tool diameter: $\phi 1.000$ - $\phi 6.000$ "

P.26 -

Tool diameters and number of teeth for each insert size (Metric)

Insert size	Max. depth of cut	Corner radius	Workpiece material	Tool diameter (mm)					
				$\phi 6$	$\phi 8$	$\phi 10$	$\phi 12$	$\phi 14$	$\phi 16$
04	4 mm	0.4 mm 0.8 mm	P M K S H	1	2	3 2	4 3		5 4

Tool diameters and number of teeth for each insert size (Inch)

Insert size	Max. depth of cut	Corner radius (inch)	Workpiece material	Tool diameter (inch)												
				ø0.313	ø0.375	ø0.500	ø0.625	ø0.750	ø1.000	ø1.250	ø1.500	ø2.000	ø3.000	ø4.000	ø5.000	ø6.000
06	0.236"	0, 0.008 0.016, 0.031	P M K N S H	1	1	2 3	3 4	4 5	4 5 6							
12	0.453"	0.016, 0.031 0.047, 0.063 0.079, 0.118	P M K N S H				2 3	3 4	3 4 6	3 4 6 8	5	5 12				
New 18	0.650"	0.016, 0.031 0.047, 0.063 0.079, 0.094 0.122	P M K N S H						2	2 3	2 5	7	8	10	12	12

Note: Numbers in the table indicate the number of teeth.

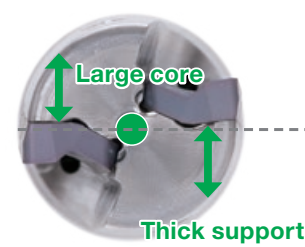
Unique V-shaped bottom insert for machining security

Strong cutter body design

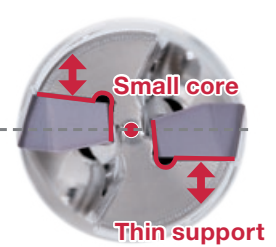
V shape insert design enables the cutter to have a thick core and insert backing.

Ensures high productivity and stability.

TUNG F^{ORCE} REC



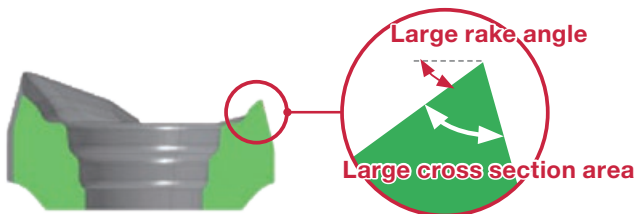
Competitor



Sharp and strong cutting edge for increased productivity

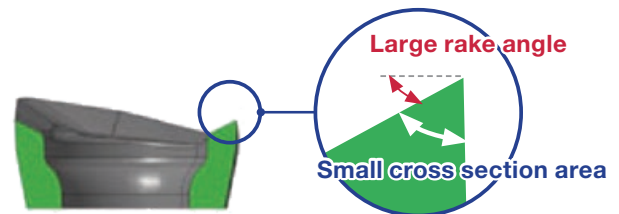
TUNG F^{ORCE} REC

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.

Lineup of versatile grades for a wide range of materials

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

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

AH8015 H K S

- Incorporates a hard coating layer and carbide substrate
- Strong resistance to wear, heat, and built-up edge, ideal for machining hard or difficult materials

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

T1215 K

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

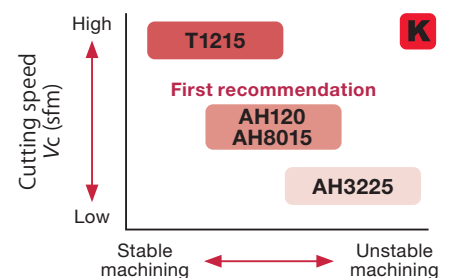
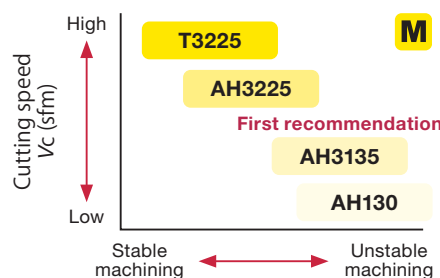
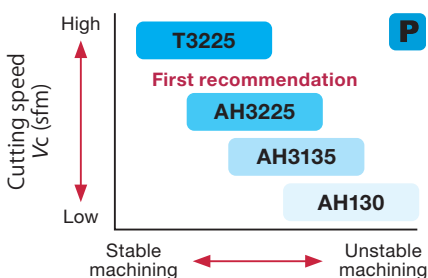
T3225 P M

- CVD grade with high chipping and fracture resistance

KS05F N

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

APPLICATION AREAS





First-choice indexable solution for 6 - 10 mm diameter endmills

Small diameter endmill with high stiffness

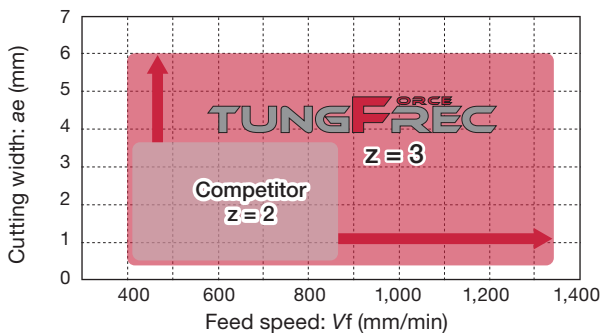
Thanks to unique V-bottom design, the smallest inserts available for the series can provide maximum productivity during shoulder milling operations

Comparison of core thickness



CUTTING PERFORMANCE

Comparison with the competitor's tool (ø10 mm)



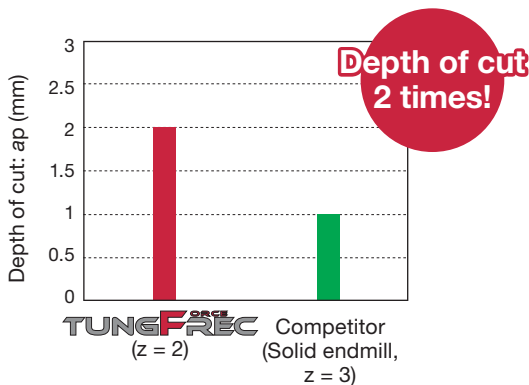
Shoulder milling



Cutter	: EPAV04M010C10.0R03 (ø10 mm, z = 3)
Insert	: AVMT040204PPER-MM AH3225
Workpiece material	: S55C / C55
Cutting speed	: Vc = 200 m/min (660 sfm)
Feed per tooth	: fz = 0.07 mm/t (0.0027 ipt)
Depth of cut	: ap = 4 mm (0.157")
Overhang length	: 20 mm (0.787")
Coolant	: Air blast
Machine	: Vertical M/C, HSK63A
Tool life criteria	: Chatter generation

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

TungForce-Rec performance in slot milling vs solid carbide endmill ø8 mm



Slotting

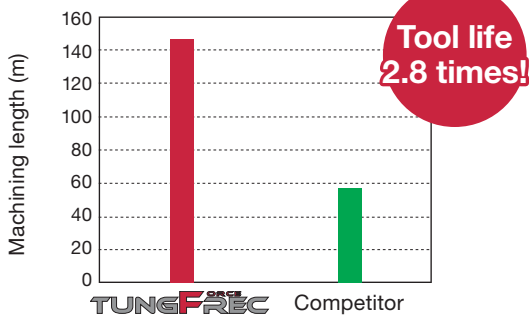


Cutter	: EPAV04M008C08.0R02 (ø8 mm, z = 2)
Insert	: AVMT040204PPER-MM AH3225
Workpiece material	: S55C / C55
Cutting speed	: Vc = 100 m/min (330 sfm)
Feed speed	: Vf = 448 mm/min (17.63 ipm)
Overhang length	: 20 mm (0.787")
Coolant	: Air blast
Machine	: Vertical M/C, BT30
Tool life criteria	: Chatter generation

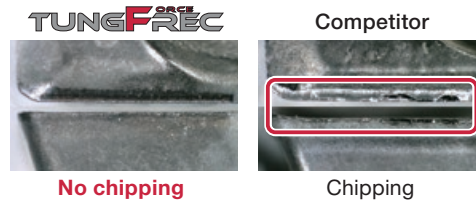
Highly rigid cutter body allows more productivity compared to solid carbide endmill.

■ Tool life comparison

P S55C / C55



Damage on cutting edges at the same machining time

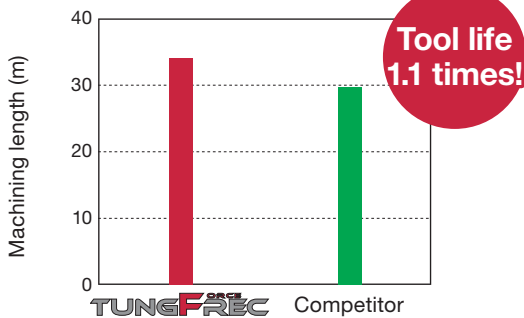


Shoulder milling

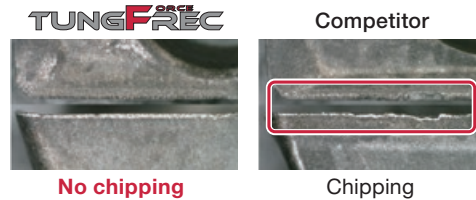
Cutter : EPAV04M010C10.0R03 ($\phi 10$ mm, $z = 3$)
 Insert : AVMT040204PPER-MM AH3225
 Cutting speed : $V_c = 200$ m/min (660 sfm)
 Feed per tooth : $f_z = 0.07$ mm/t (0.0027 ipt)
 Depth of cut : $a_p = 3$ mm (0.118")
 Cutting width : $a_e = 2.7$ mm (0.106")
 Coolant : Air blast

Obtuse flank surface prevents chipping and achieves stable tool life.

M SUS304 / X5CrNi18-9



Damage on cutting edges at the same machining time

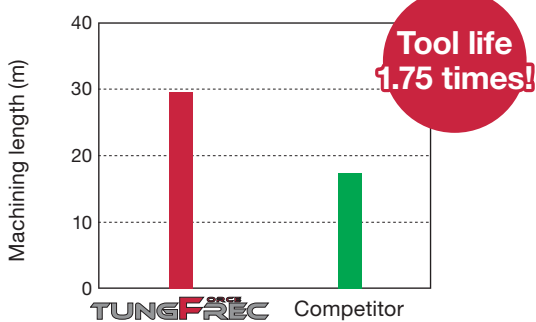


Shoulder milling

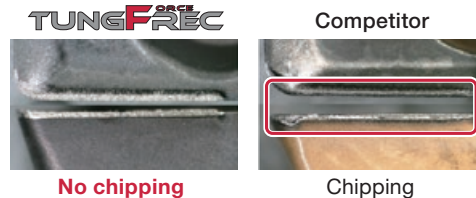
Cutter : EPAV04M010C10.0R03 ($\phi 10$ mm, $z = 3$)
 Insert : AVMT040208PPER-MM AH3225
 Cutting speed : $V_c = 120$ m/min (394 sfm)
 Feed per tooth : $f_z = 0.07$ mm/t (0.0027 ipt)
 Depth of cut : $a_p = 3$ mm (0.118")
 Cutting width : $a_e = 2.7$ mm (0.106")
 Coolant : Air blast

Robust cutting edge due to obtuse flank surface provides stable and long tool life.

K FC250 / 250



Damage on cutting edges at the same machining time



Shoulder milling

Cutter : EPAV04M010C10.0R03 ($\phi 10$ mm, $z = 3$)
 Insert : AVMT040208PPER-MM AH120
 Cutting speed : $V_c = 300$ m/min (984 sfm)
 Feed per tooth : $f_z = 0.07$ mm/t (0.0027 ipt)
 Depth of cut : $a_p = 3$ mm (0.118")
 Cutting width : $a_e = 2.7$ mm (0.106")
 Coolant : Air blast

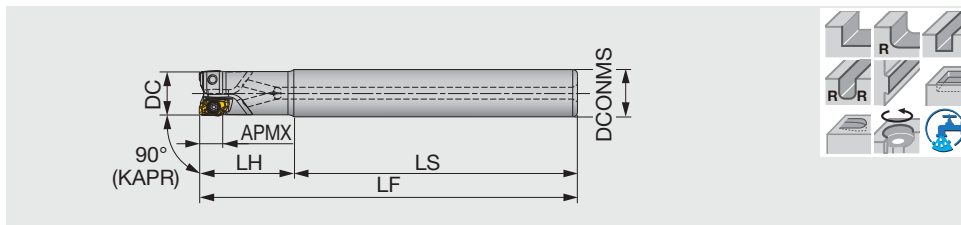
Low cutting force and obtuse flank surface offers long and stable tool life.

Insert size 04

EPAV04

Square shoulder endmill, shank type, with screw clamp system

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



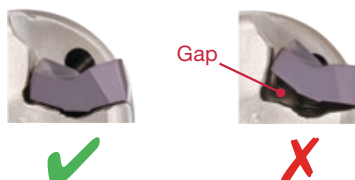
Metric Designation	APMX	DC	CICT	DCONMS	LS	LH	LF	WT(kg)	Air hole	Insert
EPAV04M006C06.0R01	4	6	1	6	48	12	60	0.01	With	AVMT04...
EPAV04M008C08.0R02	4	8	2	8	48	12	60	0.02	With	AVMT04...
EPAV04M008C08.0R02L	4	8	2	8	60	20	80	0.03	With	AVMT04...
EPAV04M010C10.0R02	4	10	2	10	60	20	80	0.04	With	AVMT04...
EPAV04M010C10.0R03	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

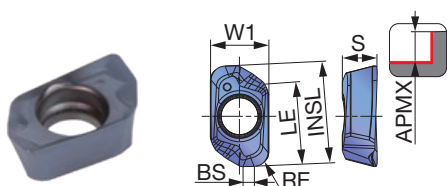
*Recommended clamping torque (N·m): CSPB-1.8L3.3, CSPB-1.8L3.6 = 0.5

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



INSERT

AVMT04-MM (for general purpose)



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

★ : First choice
☆ : Second choice

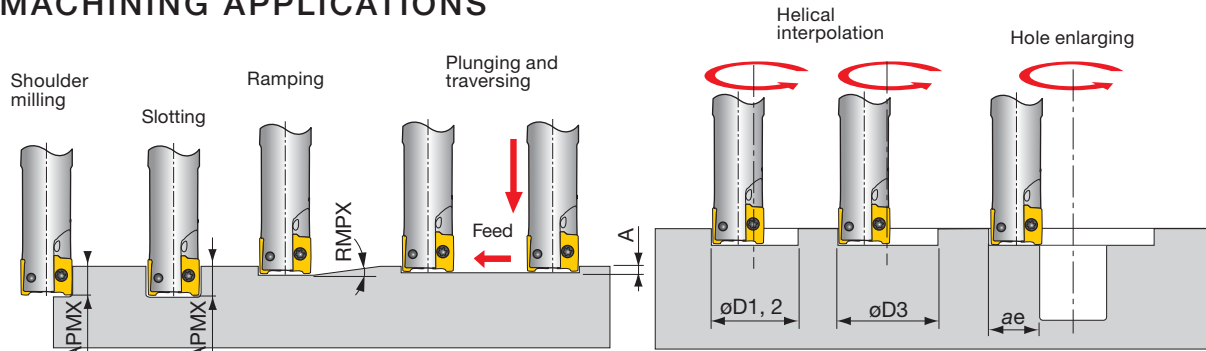
Chipbreaker	Designation	RE (inch)	APMX (inch)	Coated		W1 (inch)	INSL (inch)	S (inch)	BS (inch)	LE (inch)
				AH120	AH3225					
General-purpose MM	AVMT040204PPER-MM	0.0157	0.157	●	●	0.138	0.238	0.083	0.039	0.173
	AVMT040208PPER-MM	0.0315	0.157	●	●	0.138	0.238	0.083	0.024	0.173

● : Line up

STANDARD CUTTING CONDITIONS

ISO	Workpiece materials		Hardness	Priority	Grades	Cutting speed Vc (sfm)	Feed per tooth fz (ipt)
P	Low carbon steel S15C, SS400, etc. C15E, C15E4, E275A, etc.		- 200 HB	First choice	AH3225	328 - 984	0.002 - 0.005
	Carbon steel and alloy steel S55C, SCM440, etc. C55, 42CrMo4, etc.		- 300 HB	First choice	AH3225	328 - 820	0.002 - 0.005
	Prehardened steel NAK80, PX5, etc.		30 - 40 HRC	First choice	AH3225	328 - 656	0.002 - 0.004
M	Stainless steel SUS304, SUS316, etc. X5CrNi18-9, X5CrNiMo17-12-3, etc.		-	First choice	AH3225	262 - 591	0.002 - 0.004
K	Grey cast iron FC250, FC300, etc. GG25, GG30, etc. 250, 300, etc.		150 - 250 HB	First choice	AH120	328 - 984	0.002 - 0.005
	Ductile cast iron FCD400, FCD600, etc. GGG60, 600-3, etc.		150 - 250 HB	First choice	AH120	328 - 820	0.002 - 0.005
S	Titanium alloys Ti-6Al-4V, etc.		-	First choice	AH3225	66 - 197	0.002 - 0.003
	Superalloys Inconel 718, etc.		-	First choice	AH120	66 - 131	0.002 - 0.003
H	Hardened steel	SKD61, X40CrMoV5-1, etc.	40 - 50 HRC	First choice	AH120	164 - 492	0.002 - 0.003
		SKD11, X153CrMoV12, etc.	50 - 60 HRC	First choice	AH120	131 - 230	0.002 - 0.003

MACHINING APPLICATIONS



		Max. depth of cut	Max. ramping angle	Max. plunging	Min. machining	Max. machining		Max. cutting width in enlarging
Metric Designation	DC	APMX	RMPX	A	øD1	øD2	øD3*	ae
EPAV04M006...	6	4	0.4°	0.03	9.3	11.6	9.9	5.5
EPAV04M008...	8	4	0.5°	0.04	12.7	15.6	13.6	7.5
EPAV04M010**R02, R02L	10	4	4.1°	0.4	15.3	19.6	17.5	9.5
EPAV04M010**R03	10	4	1.7°	0.2	16.1	19.6	17.5	9.5
EPAV04M012**R03, R03L	12	4	2.7°	0.4	19.3	23.6	21.5	11.5
EPAV04M012**R04	12	4	1.3°	0.2	20.1	23.6	21.5	11.5
EPAV04M016...	16	4	2°	0.4	27.2	31.6	29.5	15.5

*Flat bottom hole

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

Recommended chip thickness

Feed per tooth fz (ipt)	Cutting width (%): ae (in) / Tool dia.: DC (in)														
	1%	2%	2.5%	3%	4%	5%	10%	15%	20%	25%	30%	35%	40%	45%	50% -
0.001	0.0002	0.0003	0.0004	0.0004	0.0005	0.0005	0.0007	0.0008	0.0009	0.0010	0.0011	0.0011	0.0011	0.0012	0.0012
0.002	0.0004	0.0006	0.0006	0.0007	0.0008	0.0009	0.0012	0.0014	0.0016	0.0017	0.0018	0.0019	0.0019	0.0020	0.0020
0.003	0.0006	0.0009	0.0010	0.0011	0.0012	0.0014	0.0019	0.0022	0.0025	0.0027	0.0029	0.0030	0.0031	0.0031	0.0031
0.004	0.0008	0.0011	0.0012	0.0013	0.0015	0.0017	0.0024	0.0028	0.0031	0.0034	0.0036	0.0037	0.0039	0.0039	0.0039
0.005	0.0009	0.0013	0.0015	0.0016	0.0019	0.0020	0.0028	0.0034	0.0038	0.0041	0.0043	0.0045	0.0046	0.0047	0.0047
0.006	0.0012	0.0017	0.0019	0.0020	0.0023	0.0026	0.0035	0.0042	0.0047	0.0051	0.0054	0.0056	0.0058	0.0059	0.0059
0.007	0.0014	0.0020	0.0022	0.0024	0.0028	0.0031	0.0043	0.0051	0.0057	0.0061	0.0065	0.0068	0.0069	0.0070	0.0071
0.008	0.0016	0.0022	0.0024	0.0027	0.0031	0.0034	0.0047	0.0056	0.0063	0.0068	0.0072	0.0075	0.0077	0.0078	0.0079
0.009	0.0017	0.0024	0.0027	0.0030	0.0034	0.0038	0.0052	0.0062	0.0069	0.0075	0.0080	0.0083	0.0085	0.0086	0.0087
0.010	0.0020	0.0028	0.0031	0.0033	0.0039	0.0043	0.0059	0.0070	0.0079	0.0085	0.0090	0.0094	0.0096	0.0098	0.0098
0.011	0.0022	0.0031	0.0034	0.0038	0.0043	0.0048	0.0066	0.0079	0.0088	0.0095	0.0101	0.0105	0.0108	0.0110	0.0110
0.012	0.0024	0.0033	0.0037	0.0040	0.0046	0.0052	0.0071	0.0084	0.0094	0.0102	0.0108	0.0113	0.0116	0.0117	0.0118
0.013	0.0031	0.0044	0.0049	0.0054	0.0062	0.0069	0.0094	0.0113	0.0126	0.0136	0.0144	0.0150	0.0154	0.0157	0.0157

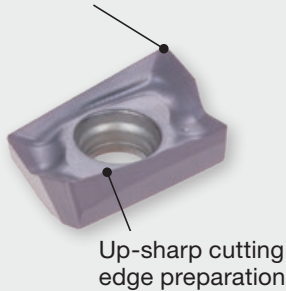


Provides superior surface quality as solid carbide endmills

High machining accuracy

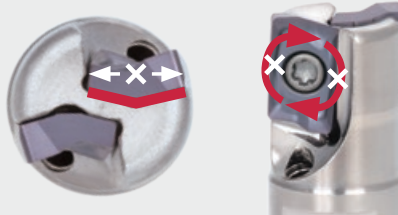
1 High precision insert

All nose radii are ground to precision



2 Extremely secure insert clamping

- V shape design prevents insert movement during machining.

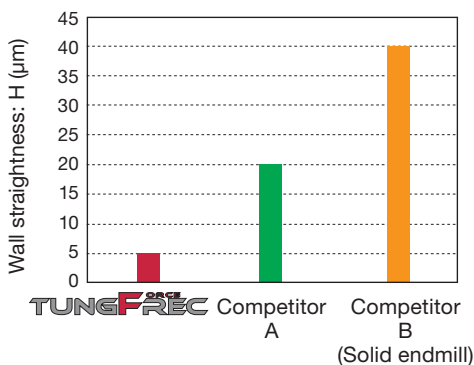


- M2 screws reduce screw neck shears under high cutting forces. Large-sized screws enhance insert fixture and facilitates handlings.



CUTTING PERFORMANCE

Wall straightness: Carbon steel



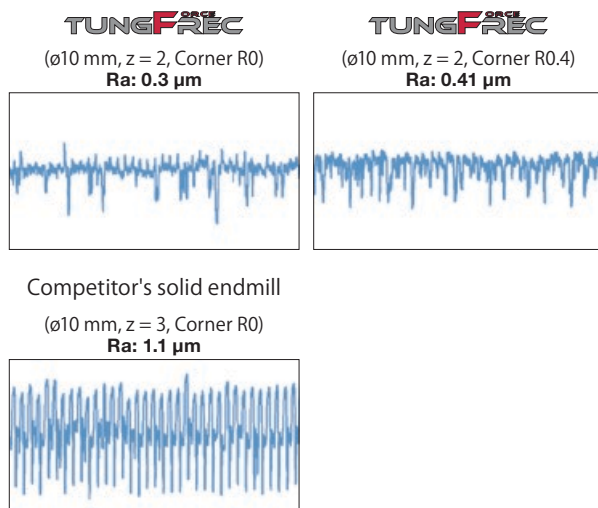
Shoulder milling



Cutter : EPAV06U0.50C0.50R03 (ø0.500", z = 3)
 Insert : AVGT060304PBER-MJ AH3135
 Workpiece material : 1055 (180HB)
 Cutting speed : Vc = 1083 sfm (Competitor B: 197 sfm)
 Feed per tooth : fz = 0.004 ipt (Competitor B: 0.0016 ipt)
 Depth of cut : ap = 0.157" x 3 pass (Competitor B: 0.472")
 Cutting width : ae = 0.079"
 Coolant : Dry
 Machine : Vertical M/C, BT40

TungForce-Rec has achieved the best wall finish quality.

Surface roughness comparison (in machining steel)



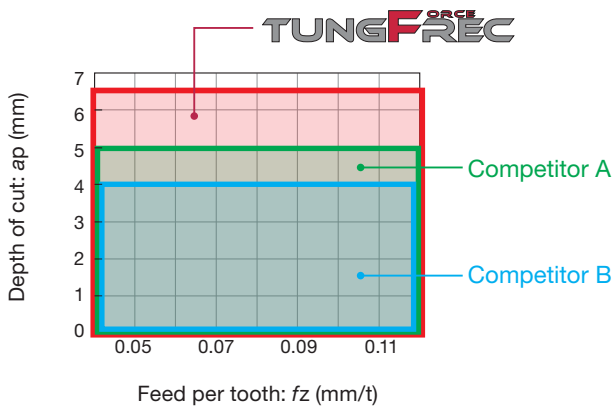
Face milling



Cutter : HPAV06M010S06R02 (ø10 mm, z = 2)
 Insert : AVGT060300PBER-MJ AH3135
 AVGT060304PBER-MJ AH3135
 Shank : VER16CL010S06-S
 Workpiece material : S45C / C45
 Cutting speed : Vc = 60 m/min (197 sfm)
 Feed : f = 0.1 mm/rev (0.004 ipr)
 Feed speed : Vf = 191 mm/min (7.520 ipm)
 Depth of cut : ap = 1 mm (0.039")
 Width of cut : ae = 4 mm (0.157")
 Machine : Swiss lathe

R0 insert achieved better surface quality than solid endmill.

■ Performance comparison - Depth of cut vs Table feed (ø10 mm)



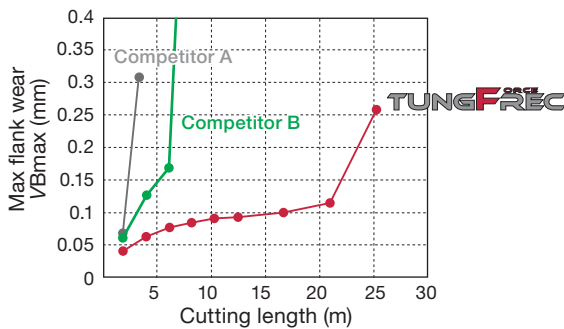
Slotting

Cutter	: EPAV06M010C10.0R02 (ø10 mm)
Insert	: AVGT060302PBER-MJ AH3135
Workpiece material	: S55C / C55
Cutting speed	: $V_c = 270$ m/min (886 sfm)
Cutting width	: $a_e = 10$ mm (0.394")
Coolant	: Dry
Machine	: Vertical M/C, BT40 18.5kW

TungForce-Rec is applicable for a wider range of cutting condition than competitors'.

■ Tool life comparison

M SUS304 / X5CrNi18-9

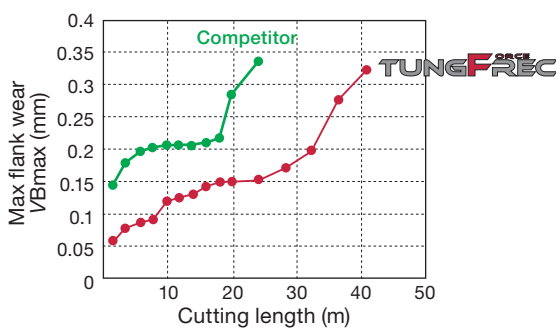


Shoulder milling

Cutter	: EPAV06M010C10.0R02 (ø10 mm, $z = 2$)
Insert	: AVGT060302PBER-MJ AH3135
Cutting speed	: $V_c = 260$ m/min (853 sfm)
Feed per tooth	: $f_z = 0.07$ mm/t (0.0028 ipt)
Depth of cut	: $a_p = 3$ mm (0.118")
Cutting width	: $a_e = 2.9$ mm (0.114")
Coolant	: Dry
Machine	: Vertical M/C, BT40

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

S Ti-6Al-4V



Shoulder milling

Cutter	: EPAV06M016C16.0R04 (ø16 mm, $z = 4$)
Insert	: AVGT060304PBER-MJ AH130
Cutting speed	: $V_c = 80$ m/min (262 sfm)
Feed per tooth	: $f_z = 0.08$ mm/t (0.0031 ipt)
Depth of cut	: $a_p = 5$ mm (0.197")
Cutting width	: $a_e = 5$ mm (0.197")
Coolant	: Wet
Machine	: Vertical M/C, BT40, 18.5 kW

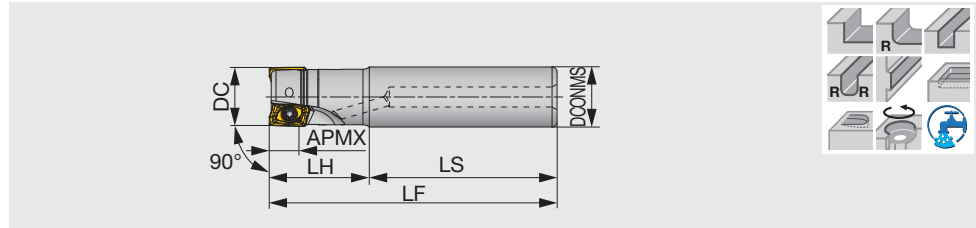
Highly wear resistant in a wet cutting, AH130 has dramatically improved the tool life.

EPAV06

Insert size 06

Square shoulder endmill, shank type, with screw clamp system

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



Inch Designation	APMX	DC	CICT	DCONMS	LS	LH	LF	WT(lb)	Insert
EPAV06U0.31C0.37R01	0.236	0.313	1	0.375	2.463	0.787	3.250	0.09	AVGT06...
EPAV06U0.37C0.37R01	0.236	0.375	1	0.375	2.463	0.787	3.250	0.09	AVGT06...
EPAV06U0.37C0.37R01L	0.236	0.375	1	0.375	2.622	1.378	4.000	0.11	AVGT06...
EPAV06U0.50C0.50R02	0.236	0.500	2	0.500	2.463	0.787	3.250	0.15	AVGT06...
EPAV06U0.50C0.50R03	0.236	0.500	3	0.500	2.463	0.787	3.250	0.15	AVGT06...
EPAV06U0.50C0.50R02L	0.236	0.500	2	0.500	3.388	1.362	4.750	0.22	AVGT06...
EPAV06U0.62C0.62R03	0.236	0.625	3	0.625	2.713	0.787	3.500	0.26	AVGT06...
EPAV06U0.62C0.62R04	0.236	0.625	4	0.625	2.713	0.787	3.500	0.26	AVGT06...
EPAV06U0.62C0.62R03L	0.236	0.625	3	0.625	4.122	1.378	5.500	0.42	AVGT06...
EPAV06U0.75C0.62R04	0.236	0.750	4	0.625	2.815	1.185	4.000	0.33	AVGT06...
EPAV06U0.75C0.75R04	0.236	0.750	4	0.750	2.815	1.185	4.000	0.44	AVGT06...
EPAV06U0.75C0.75R05	0.236	0.750	5	0.750	2.815	1.185	4.000	0.44	AVGT06...
EPAV06U0.75C0.75R04L	0.236	0.750	4	0.750	6.500	1.375	7.875	0.90	AVGT06...
EPAV06U1.00C0.75R06	0.236	1.000	6	0.750	3.125	1.375	4.500	0.55	AVGT06...
EPAV06U1.00C1.00R05	0.236	1.000	5	1.000	3.125	1.375	4.500	0.93	AVGT06...
EPAV06U1.00C1.00R06	0.236	1.000	6	1.000	3.125	1.375	4.500	0.93	AVGT06...
EPAV06U1.00C1.00R04L	0.236	1.000	4	1.000	6.425	1.575	8.000	1.68	AVGT06...

Metric 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

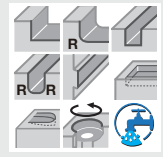
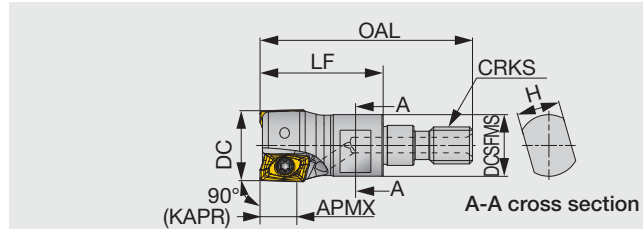
Designation	Clamping screw	Lubricant	Wrench
EPAV06...	CSPB-2H	M-1000	IP-6DB

*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°



Metric 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...

See page 34 - 36 for TungFlex shank.

SPARE PARTS



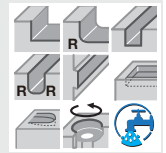
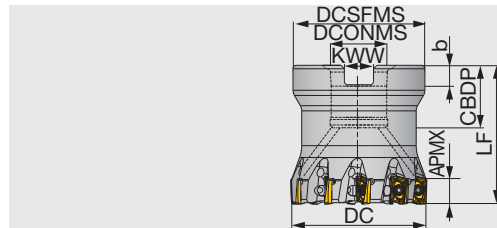
Designation	Clamping screw	Lubricant	Wrench
HPAV06M...	CSPB-2H	M-1000	IP-6DB

*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°



Metric 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

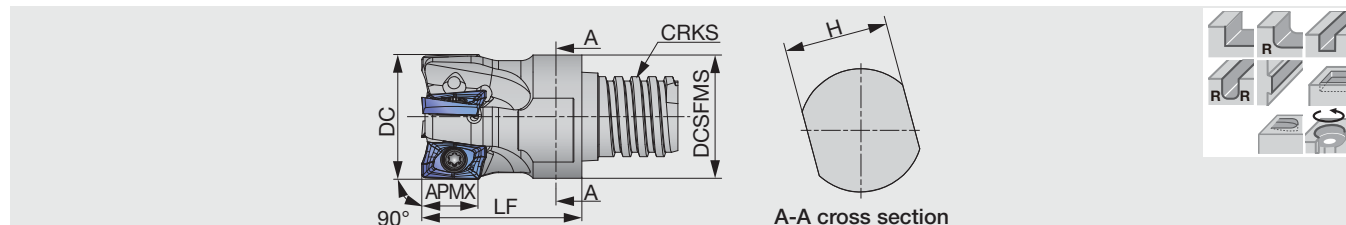
*Recommended clamping torque (N·m): CSPB-2H = 0.7

Insert size 06

HPAV06-S

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

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



Metric 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

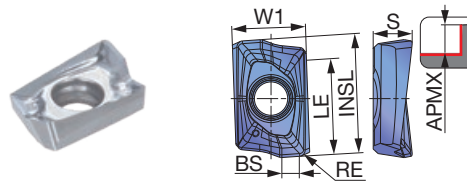
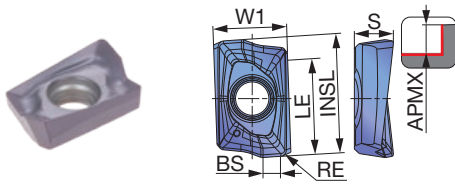
Designation	Clamping screw	Lubricant	Wrench
HPAV06M...	CSPB-2H	M-1000	IP-6DB

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

INSERT

AVGT06-MJ (for general purpose)

AVGT06-AJ (for non-ferrous machining)



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

★ : First choice
☆ : Second choice

Chipbreaker	Inch Designation	RE	APMX	Coated		Carbide	LE	IC	S	BS
				AH120	AH130	AH3135				
General-purpose MJ	AVGT060300PBER-MJ	0.000	0.236			●	0.315	0.197	0.106	0.063
	AVGT060302PBER-MJ	0.008	0.236	●	●	●	0.315	0.197	0.106	0.059
	AVGT060304PBER-MJ	0.016	0.236	●	●	●	0.315	0.197	0.106	0.051
	AVGT060308PBER-MJ	0.031	0.236	●	●	●	0.315	0.197	0.102	0.035
Non-ferrous machining AJ	AVGT060300PBFR-AJ	0.000	0.236			●	0.315	0.197	0.106	0.063
	AVGT060302PBFR-AJ	0.008	0.236			●	0.315	0.197	0.106	0.059
	AVGT060304PBFR-AJ	0.016	0.236			●	0.315	0.197	0.106	0.051
	AVGT060308PBFR-AJ	0.031	0.236			●	0.315	0.197	0.102	0.035

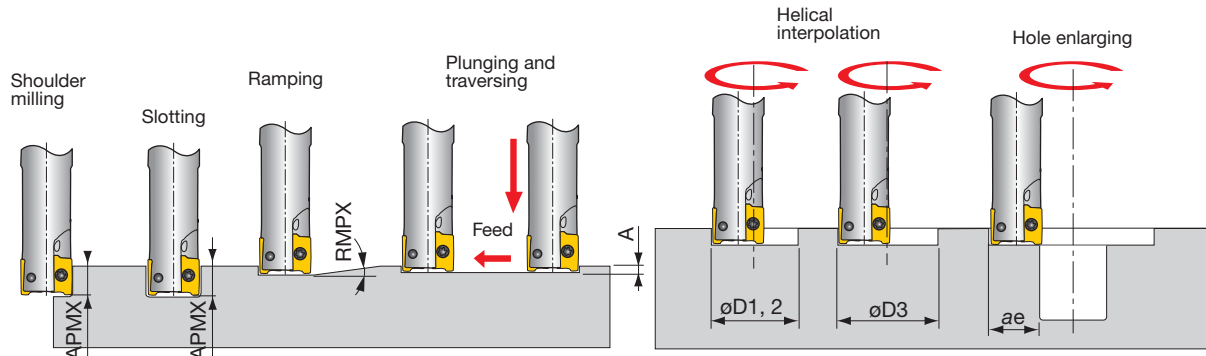
● : Line up

STANDARD CUTTING CONDITIONS

ISO	Workpiece materials	Hardness	Priority	Grades	Cutting speed Vc (sfm)	Feed per tooth fz (ipt)
P	Low carbon steels (1018, 1026, etc.)	- 200 HB	First choice	AH3225	755 - 1410	0.003 - 0.005
	Carbon steel and alloy steel (1055, 4140, etc.)	- 300 HB	First choice	AH3225	490 - 1150	0.003 - 0.005
	Prehardened steel (H-13, P-20, etc.)	30 - 40 HRC	First choice	AH3225	325 - 750	0.003 - 0.005
M	Stainless steel (304, 316, etc.)	-	First choice	AH3135	490 - 720	0.003 - 0.004
K	Gray cast iron (Class 25, Class 30, etc.)	150 - 250 HB	First choice	AH120	655 - 1080	0.003 - 0.005
	Ductile cast iron (60-40-12, 80-55-06, etc.)	150 - 250 HB	First choice	AH120	490 - 785	0.003 - 0.005
N	Aluminum allows (Si < 13%)	-	First choice	KS05F	2130 - 3280	0.003 - 0.005
	Aluminum alloys (Si > 13%)	-	First choice	KS05F	325 - 750	0.003 - 0.005
S	Titanium alloys (Ti-6Al-4V, etc.)	-	First choice	AH130	130 - 295	0.0016 - 0.004
	Superalloys (Inconel718, etc.)	-	First choice	AH130	145 - 210	0.0016 - 0.004
H	Hardened steel	(H13, etc.) 40 - 50 HRC	First choice	AH120	145 - 225	0.002 - 0.004
		(H13, etc.) 50 - 60 HRC	First choice	AH120	130 - 210	0.0016 - 0.003

Insert size 06

MACHINING APPLICATIONS



Inch Designation	DC	Max. depth of cut APMX	Max. ramping angle RMPX	Max. plunging A	Min. machining $\phi D1$	Max. machining $\phi D2$	Max. machining $\phi D3^*$	Max. cutting width in enlarging ae
EPAV06U0.31...	0.313	0.236	-	-	-	-	-	-
EPAV06U0.37...	0.375	0.236	3°	0.012	0.591	0.748	0.709	0.374
EPAV06U0.50...	0.500	0.236	3°	0.012	0.709	0.906	0.866	0.453
EPAV06U0.62...	0.625	0.236	2.3°	0.012	1.026	1.220	1.181	0.610
EPAV06U0.75...	0.750	0.236	2°	0.012	1.276	1.460	1.421	0.730
EPAV06U1.00...	1.000	0.236	1.6°	0.012	1.775	1.960	1.921	0.980

*Flat bottom hole

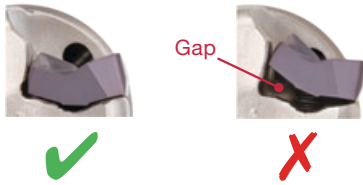
Estimation of chip thickness - calculated from feed per tooth (fz) and cutting width (ae) data

Recommended chip thickness

Feed per tooth fz (ipt)	Cutting width (%): ae (in) / Tool dia.: DC (in)														
	1%	2%	2.5%	3%	4%	5%	10%	15%	20%	25%	30%	35%	40%	45%	50% -
0.001	0.0002	0.0003	0.0004	0.0004	0.0005	0.0005	0.0007	0.0008	0.0009	0.0010	0.0011	0.0011	0.0011	0.0012	0.0012
0.002	0.0004	0.0006	0.0006	0.0007	0.0008	0.0009	0.0012	0.0014	0.0016	0.0017	0.0018	0.0019	0.0019	0.0020	0.0020
0.003	0.0006	0.0009	0.0010	0.0011	0.0012	0.0014	0.0019	0.0022	0.0025	0.0027	0.0029	0.0030	0.0031	0.0031	0.0031
0.004	0.0008	0.0011	0.0012	0.0013	0.0015	0.0017	0.0024	0.0028	0.0031	0.0034	0.0036	0.0037	0.0039	0.0039	0.0039
0.005	0.0009	0.0013	0.0015	0.0016	0.0019	0.0020	0.0028	0.0034	0.0038	0.0041	0.0043	0.0045	0.0046	0.0047	0.0047
0.006	0.0012	0.0017	0.0019	0.0020	0.0023	0.0026	0.0035	0.0042	0.0047	0.0051	0.0054	0.0056	0.0058	0.0059	0.0059
0.007	0.0014	0.0020	0.0022	0.0024	0.0028	0.0031	0.0043	0.0051	0.0057	0.0061	0.0065	0.0068	0.0069	0.0070	0.0071
0.008	0.0016	0.0022	0.0024	0.0027	0.0031	0.0034	0.0047	0.0056	0.0063	0.0068	0.0072	0.0075	0.0077	0.0078	0.0079
0.009	0.0017	0.0024	0.0027	0.0030	0.0034	0.0038	0.0052	0.0062	0.0069	0.0075	0.0080	0.0083	0.0085	0.0086	0.0087
0.010	0.0020	0.0028	0.0031	0.0033	0.0039	0.0043	0.0059	0.0070	0.0079	0.0085	0.0090	0.0094	0.0096	0.0098	0.0098
0.011	0.0022	0.0031	0.0034	0.0038	0.0043	0.0048	0.0066	0.0079	0.0088	0.0095	0.0101	0.0105	0.0108	0.0110	0.0110
0.012	0.0024	0.0033	0.0037	0.0040	0.0046	0.0052	0.0071	0.0084	0.0094	0.0102	0.0108	0.0113	0.0116	0.0117	0.0118
0.016	0.0031	0.0044	0.0049	0.0054	0.0062	0.0069	0.0094	0.0113	0.0126	0.0136	0.0144	0.0150	0.0154	0.0157	0.0157

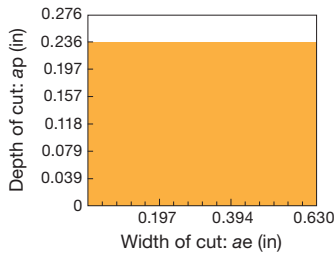
CAUTION

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



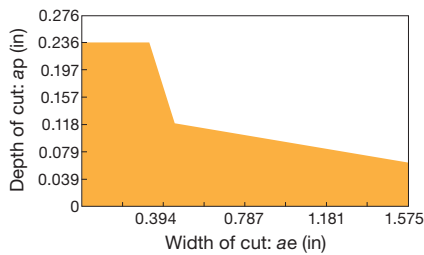
- When using a cutter diameter over 18 mm (0.709"), please note that the applicable range of cutting depth significantly drops as the cutting width applied increases, thus an additional finishing process may be required.

Cutting depth in relation to cutting width (for up to $\varnothing 16$ mm (0.625"))



Cutter	: EPAV06U0.62C0.62R04 ($\varnothing 0.625$ ", z = 4)
Insert	: AVGT060304PBER-MJ AH3135
Workpiece material	: 1055
Cutting speed	: Vc = 820 sfm
Feed per tooth	: fz = 0.003 ipt
Machining	: Slotting
Coolant	: Dry
Machine	: Vertical M/C, BT40, 18.5 kW

Cutting depth in relation to cutting width (for $\varnothing 18$ mm and up (0.709" and up))



Cutter	: EPAV06U1.00C1.00R06 (1.000", z = 6)
Insert	: AVGT060304PBER-MJ AH3135
Workpiece material	: 1055
Cutting speed	: Vc = 820 sfm
Feed per tooth	: fz = 0.003 ipt
Coolant	: Dry
Machine	: Vertical M/C, BT40, 18.5 kW



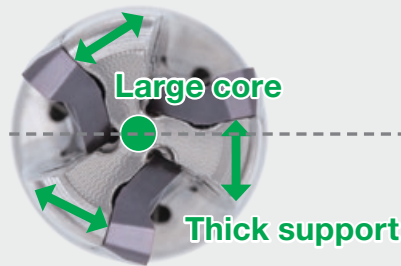
Extreme productivity and part quality

High productivity and stability

Robust and high-density cutter body design

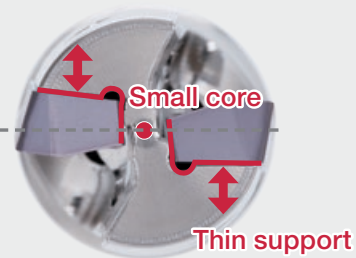
TUNGF^{ORCE}REC

The use of V-shaped insert bottom allows the cutter to retain a **large core and thick supporting material** for high tool rigidity



Conventional

Small core diameter and thin supporting material leads to tool vibration and chatter



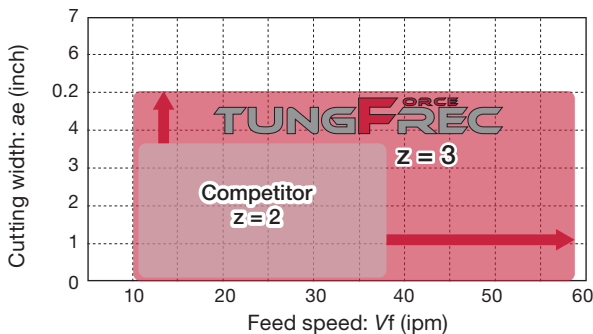
High cutter density x high rigidity tool design = super high feed shouldering

Comparison of cutters' insert-per-diameter density

Tool dia. (inch)	No. of inserts		Competitor	Productivity improvement compared to competitor
	TUNG ^{ORCE} REC Coarse pitch	TUNG ^{ORCE} REC Close pitch		
ø0.625	2	3	2	1.5 times
ø0.750	3	4	3	1.33 times
ø1.000	3	6	4	1.5 times
ø1.250	4	8	6	1.33 times

CUTTING PERFORMANCE

Performance comparison - Cutting width vs Table feed (ø0.625")



Shoulder milling

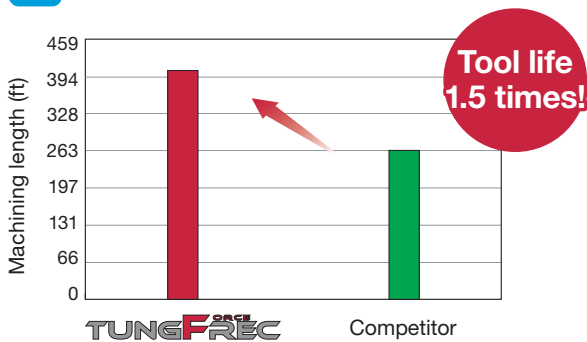


Cutter : EPAV12U0.62W062R03 (ø0.625", z = 3)
 Insert : AVMT120408PBER-MM AH3225
 Workpiece material : 1055
 Cutting speed : Vc = 525 sfm
 Feed per tooth : fz = 0.005 ipt
 Depth of cut : ap = 0.354"
 Overhang length : 1.378"
 Coolant : Dry

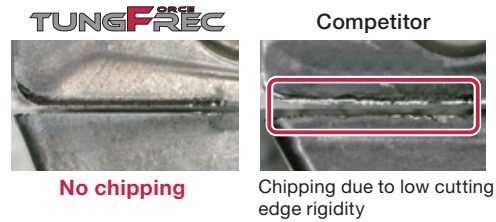
TungForce-Rec enables high efficiency machining of up to 1.4x greater cutting width at a maximum of 1.5x faster table feed.

■ Tool life comparison

P S55C / C55



Insert wear modes after machining 263 feet



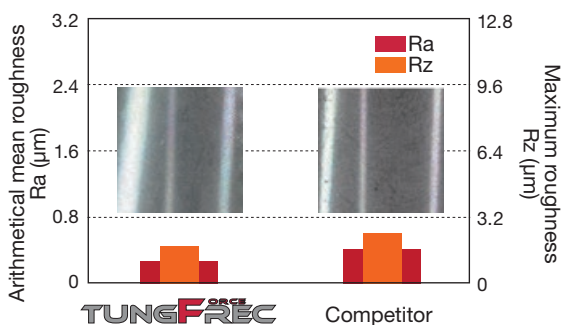
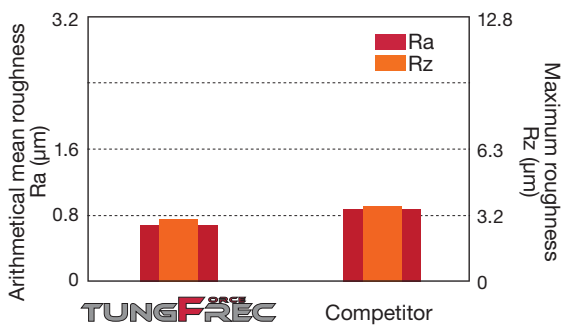
Shoulder milling

Cutter : EPAV12U0.75W0.75R03 ($\phi 0.750''$, $z = 3$)
 Insert : AVMT120408PBER-MM AH3225
 Cutting speed : $V_c = 591$ sfm
 Feed per tooth : $f_z = 0.005$ ipt
 Depth of cut : $a_p = 0.236''$
 Cutting width : $a_e = 0.236''$
 Coolant : Dry
 Performed with only one insert on the cutter

Low cutting force and obtuse flank surface offers long and stable tool life.

■ Performance comparison - Precision machining

Surface finishing



Face milling



Cutter : EPAV12M020C20.0R03 ($\phi 20$ mm, $z = 3$)
 Insert : AVMT120408PBER-MM AH3225
 Workpiece material : S55C / C55
 Cutting speed : $V_c = 180$ m/min (591 sfm)
 Feed per tooth : $f_z = 0.1$ mm/t (0.004 ipt)
 Depth of cut : $a_p = 1$ mm (0.039")
 Cutting width : $a_e = 16$ mm (0.630")
 Coolant : Dry

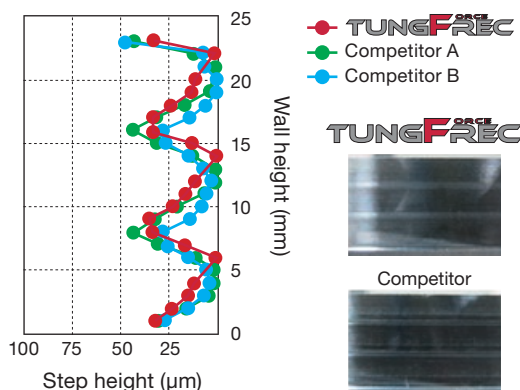
Better surface quality vs the competitor.



Cutter : EPAV12M020C20.0R03 ($\phi 20$ mm, $z = 3$)
 Insert : AVGT120408PDFR-AM KS05F
 Workpiece material : ADC12
 Cutting speed : $V_c = 800$ m/min (2625 sfm)
 Feed per tooth : $f_z = 0.1$ mm/t (0.004 ipt)
 Depth of cut : $a_p = 2$ mm (0.079")
 Cutting width : $a_e = 16$ mm (0.630")
 Coolant : Wet (Internal)

Better surface quality vs the competitor.

Wall finishing



Shoulder milling



Cutter : EPAV12M020C20.0R03 ($\phi 20$ mm, $z = 3$)
 Insert : AVMT120408PBER-MM AH3225
 Workpiece material : S55C / C55
 Cutting speed : $V_c = 180$ m/min (590 sfm)
 Feed per tooth : $f_z = 0.1$ mm/t (0.004 ipt)
 Depth of cut : $a_p = 8$ mm (0.315")
 Cutting width : $a_e = 3$ mm (0.118")
 Coolant : Dry

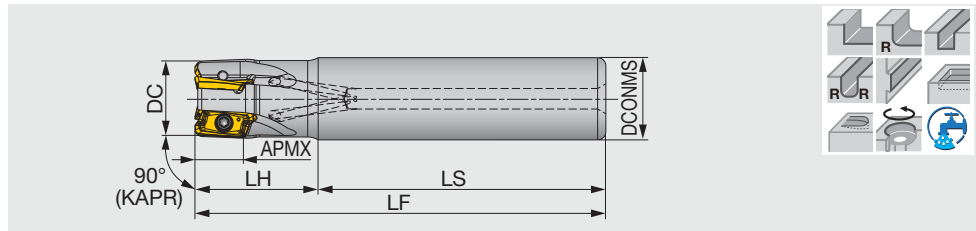
Equal or better wall step than competitors.

EPAV12

Insert size 12

Square shoulder endmill, shank type, with screw clamp system

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



Inch Designation	APMX	DC	CICT	DCONMS	LS	LH	LF	WT(lb)	Air Hole	Insert
EPAV12U0.62W0.62R02	0.453	0.625	2	0.625	1.906	1.000	2.906	0.220	with	AVM/GT12...
EPAV12U0.62W0.62R03	0.453	0.625	3	0.625	1.906	1.000	2.906	0.220	with	AVM/GT12...
EPAV12U0.75W0.75R03	0.453	0.750	3	0.750	2.031	1.250	3.281	0.330	with	AVM/GT12...
EPAV12U0.75W0.75R04	0.453	0.750	4	0.750	2.031	1.250	3.281	0.330	with	AVM/GT12...
EPAV12U1.00W1.00R03	0.453	1.000	3	1.000	2.281	1.500	3.781	0.710	with	AVM/GT12...
EPAV12U1.00W1.00R04	0.453	1.000	4	1.000	2.281	1.500	3.781	0.710	with	AVM/GT12...
EPAV12U1.00W1.00R06	0.453	1.000	6	1.000	2.281	1.500	3.781	0.710	with	AVM/GT12...
EPAV12U1.25W1.25R04	0.453	1.250	4	1.250	2.281	1.500	3.781	1.100	with	AVM/GT12...
EPAV12U1.25W1.25R06	0.453	1.250	6	1.250	2.281	1.500	3.781	1.120	with	AVM/GT12...
EPAV12U1.25W1.25R08	0.453	1.250	8	1.250	2.281	1.500	3.781	1.150	with	AVM/GT12...
EPAV12U0.62C0.62R02L	0.453	0.625	2	0.625	4.250	1.500	5.750	0.440	with	AVM/GT12...
EPAV12U0.75C0.75R03L	0.453	0.750	3	0.750	5.250	2.000	7.250	0.790	with	AVM/GT12...
EPAV12U1.00C1.00R03L	0.453	1.000	3	1.000	5.750	2.750	8.500	1.650	with	AVM/GT12...
EPAV12U1.25C1.25R03L	0.453	1.250	3	1.250	7.000	3.000	10.000	3.150	with	AVM/GT12...
Metric 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



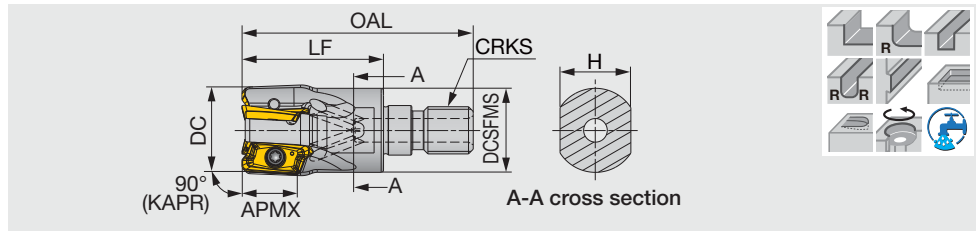
Designation	Clamping screw	Wrench
EPAV12M012C12.0R01	CSPB-2.5	IP-8D
EPAV12M016C16.0R02	CSPB-2.5	IP-8D
EPAV12M016C16.0R03	CSPB-2.5S	IP-8D
EPAV12M016C16.0R02L	CSPB-2.5	IP-8D
EPAV12M020C20.0R03	CSPB-2.5	IP-8D
EPAV12M020C20.0R04	CSPB-2.5S	IP-8D
EPAV12M020C20.0R02L	CSPB-2.5	IP-8D
EPAV12M025C25.0R04	CSPB-2.5	IP-8D
EPAV12M025C25.0R06	CSPB-2.5S	IP-8D
EPAV12M025C25.0R03L	CSPB-2.5	IP-8D
EPAV12M032C32.0R06	CSPB-2.5	IP-8D
EPAV12M032C32.0R08	CSPB-2.5S	IP-8D
EPAV12M032C32.0R03L	CSPB-2.5	IP-8D
EPAV12U0.62W0.62R03	CSPB-2.5S	IP-8D
EPAV12U0.75W0.75R04	CSPB-2.5S	IP-8D
EPAV12U1.00W1.00R06	CSPB-2.5S	IP-8D
EPAV12U1.25W1.25R08	CSPB-2.5S	IP-8D
EPAV12U0.62C0.62R02L	CSPB-2.5	IP-8D
EPAV12U0.75C0.75R03L	CSPB-2.5	IP-8D
EPAV12U1.00C1.00R03L	CSPB-2.5	IP-8D
EPAV12U1.25C1.25R03L	CSPB-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°



Metric 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...

See page 34 - 36 for TungFlex shank.

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

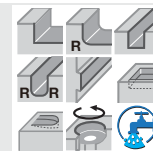
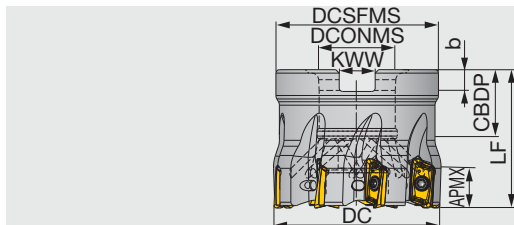
*Recommended clamping torque (N·m): CSPB-2.5, CSPB-2.5S = 1.3

Insert size 12

TPAV12

Square shoulder mill, bore type, with screw clamp system

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



Inch Designation	APMX	DC	CICT	DCSFMS	DCONMS	CDDP	LF	KWW	b	WT(lb)	Air Hole	Insert
TPAV12U1.50B0.50R05	0.453	1.500	5	1.417	0.500	0.630	1.575	0.258	0.157	0.460	with	AVM/GT12...
TPAV12U2.00B0.75R05	0.453	2.000	5	1.772	0.750	0.750	1.575	0.315	0.197	0.770	with	AVM/GT12...
TPAV12U2.00B0.75R12	0.453	2.000	12	1.772	0.750	0.750	1.575	0.315	0.197	0.840	with	AVM/GT12...

Metric Designation	APMX	DC	CICT	DCSFMS	DCONMS	CDDP	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

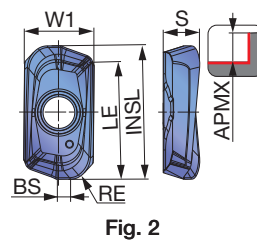
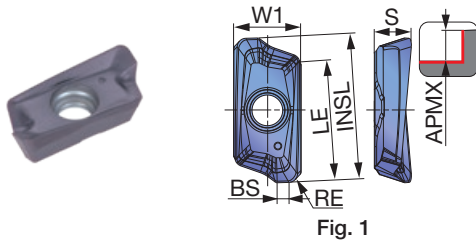


Designation	Clamping screw	Wrench	Shell locking bolt
TPAV12...	CSPB-2.5	IP-8D	CM10x30H

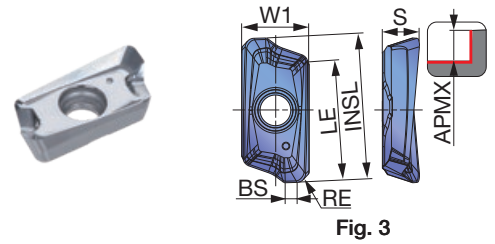
*Recommended clamping torque (N·m): CSPB-2.5, CSPB-2.5S = 1.3

INSERT

AVMT12-MM (for general purpose)



AVGT12-AM (for non-ferrous machining)



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

★ : First choice
☆ : Second choice

Chipbreaker	Inch Designation	RE	APMX	Coated					Carbide		W1	INSL	S	BS	LE	Fig.
				AH120	AH3225	T1215	T3225	KS05F								
General-purpose MM	AVMT120404PDER-MM	0.016	0.453	●	●	●	●				0.260	0.559	0.142	0.059	0.465	1
	AVMT120408PDER-MM	0.031	0.453	●	●	●	●				0.260	0.559	0.142	0.043	0.465	1
	AVMT120412PDER-MM	0.047	0.453	●	●	●	●				0.260	0.559	0.142	0.028	0.465	1
	AVMT120416PDER-MM	0.063	0.453	●	●	●	●				0.260	0.559	0.142	0.012	0.465	1
	AVMT120420PDER-MM	0.079	0.413	●	●	●	●				0.260	0.500	0.134	0.047	0.437	2
	AVMT120430PDER-MM	0.118	0.413	●	●	●	●				0.260	0.500	0.134	0.008	0.437	2
Non-ferrous machining AM	AVGT120404PDFR-AM	0.016	0.453					●			0.260	0.559	0.142	0.059	0.465	3
	AVGT120408PDFR-AM	0.031	0.453					●			0.260	0.559	0.142	0.043	0.465	3

● : Line up

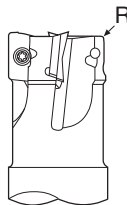
Insert size 12

STANDARD CUTTING CONDITIONS

ISO	Workpiece materials		Hardness	Priority	Grades	Cutting speed Vc (sfm)	Feed per tooth fz (ipt)
P	Low carbon steel 1028, etc.		- 200 HB	First choice	AH3225	328 - 984	0.002 - 0.009
			- 200 HB	Wear resistance	T3225	656 - 1312	0.002 - 0.007
	Carbon steel and alloy steel 1045, etc.		- 300 HB	First choice	AH3225	328 - 820	0.002 - 0.009
			- 300 HB	Wear resistance	T3225	656 - 1312	0.002 - 0.007
	Prehardend steel NAK80, PX5, etc.		30 - 40 HRC	First choice	AH3225	328 - 656	0.002 - 0.009
			30 - 40 HRC	Wear resistance	T3225	656 - 1312	0.002 - 0.006
M	Stainless steel 304SS, etc.		-	First choice	AH3225	262 - 591	0.003 - 0.008
K	Gray cast iron No. 250B, etc.		150 - 250 HB	First choice	AH120	328 - 984	0.002 - 0.007
			150 - 250 HB	Wear resistance	T1215	656 - 1312	0.002 - 0.005
	Ductile cast iron 60-40-18, etc.		150 - 250 HB	First choice	AH120	328 - 820	0.002 - 0.007
			150 - 250 HB	Wear resistance	T1215	492 - 984	0.002 - 0.005
N	Aluminum alloys Si < 13%		-	First choice	KS05F	984 - 4921	0.002 - 0.013
	Aluminum alloys Si ≥ 13%		-	First choice	KS05F	328 - 656	0.002 - 0.013
S	Titanium alloys Ti-6Al-4V, etc.		- 40 HRC	First choice	AH3225	66 - 197	0.002 - 0.006
	Superalloys Inconel718, etc.		- 40 HRC	First choice	AH120	66 - 131	0.002 - 0.006
H	Hardened steel	H13, etc/	40 - 50 HRC	First choice	AH120	164 - 492	0.002 - 0.003
		D2, etc.	50 - 60 HRC	First choice	AH120	131 - 230	0.002 - 0.003

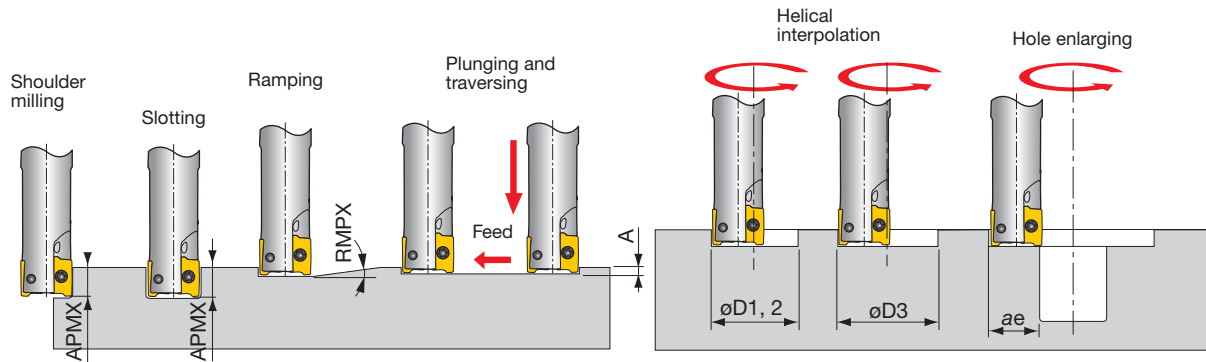
Cautionary point in modifying cutter bodies

When using inserts with corner radius
 $RE \geq 0.0787"$, standard cutter bodies have to be
 modified "R". (EPAV12, TPAV12, HPAV12)



Corner radius RE (inch)	The dimension of modifying (inch)
0.0157 - 0.0623	Unnecessary
0.0787 - 0.1181	0.0787

MACHINING APPLICATIONS

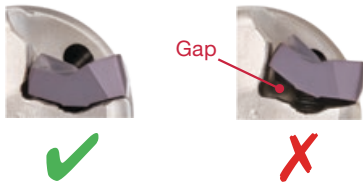


Inch Designation	DC	Max. depth of cut APMX	Max. ramping angle RMPX	Max. plunging A	Min. machining øD1	Max. machining		Max. cutting width in enlarging ae
						øD2	øD3*	
EPAV12U0.62...	0.625	0.453	3.5°	0.020	0.986	1.211	1.171	0.586
EPAV12U0.75...	0.750	0.453	3°	0.020	1.224	1.461	1.421	0.711
EPAV12U1.00...	1.000	0.453	2.5°	0.020	1.709	1.961	1.921	0.961
EPAV12U1.25...	1.250	0.453	2°	0.020	2.201	2.461	2.421	1.211
TPAV12U1.50...	1.500	0.453	1.7°	0.020	2.700	2.961	2.921	1.461
TPAV12U2.00...	2.000	0.453	1.2°	0.020	3.750	3.961	3.921	1.961

*Flat bottom hole

*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 (ipt)	Cutting width (%): ae (in) / Tool dia.: DC (in)														
	1%	2%	2.5%	3%	4%	5%	10%	15%	20%	25%	30%	35%	40%	45%	50% -
0.001	0.0002	0.0003	0.0004	0.0004	0.0005	0.0005	0.0007	0.0008	0.0009	0.0010	0.0011	0.0011	0.0011	0.0012	0.0012
0.002	0.0004	0.0006	0.0006	0.0007	0.0008	0.0009	0.0012	0.0014	0.0016	0.0017	0.0018	0.0019	0.0019	0.0020	0.0020
0.003	0.0006	0.0009	0.0010	0.0011	0.0012	0.0014	0.0019	0.0022	0.0025	0.0027	0.0029	0.0030	0.0031	0.0031	0.0031
0.004	0.0008	0.0011	0.0012	0.0013	0.0015	0.0017	0.0024	0.0028	0.0031	0.0034	0.0036	0.0037	0.0039	0.0039	0.0039
0.005	0.0009	0.0013	0.0015	0.0016	0.0019	0.0020	0.0028	0.0034	0.0038	0.0041	0.0043	0.0045	0.0046	0.0047	0.0047
0.006	0.0012	0.0017	0.0019	0.0020	0.0023	0.0026	0.0035	0.0042	0.0047	0.0051	0.0054	0.0056	0.0058	0.0059	0.0059
0.007	0.0014	0.0020	0.0022	0.0024	0.0028	0.0031	0.0043	0.0051	0.0057	0.0061	0.0065	0.0068	0.0069	0.0070	0.0071
0.008	0.0016	0.0022	0.0024	0.0027	0.0031	0.0034	0.0047	0.0056	0.0063	0.0068	0.0072	0.0075	0.0077	0.0078	0.0079
0.009	0.0017	0.0024	0.0027	0.0030	0.0034	0.0038	0.0052	0.0062	0.0069	0.0075	0.0080	0.0083	0.0085	0.0086	0.0087
0.010	0.0020	0.0028	0.0031	0.0033	0.0039	0.0043	0.0059	0.0070	0.0079	0.0085	0.0090	0.0094	0.0096	0.0098	0.0098
0.011	0.0022	0.0031	0.0034	0.0038	0.0043	0.0048	0.0066	0.0079	0.0088	0.0095	0.0101	0.0105	0.0108	0.0110	0.0110
0.012	0.0024	0.0033	0.0037	0.0040	0.0046	0.0052	0.0071	0.0084	0.0094	0.0102	0.0108	0.0113	0.0116	0.0117	0.0118
0.016	0.0031	0.0044	0.0049	0.0054	0.0062	0.0069	0.0094	0.0113	0.0126	0.0136	0.0144	0.0150	0.0154	0.0157	0.0157

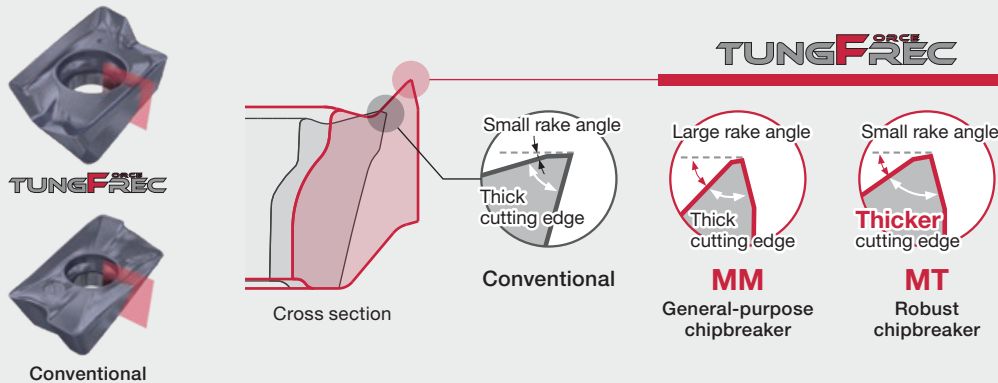


Introducing strong Size 18 insert for unparalleled stability

Enhanced tool stiffness

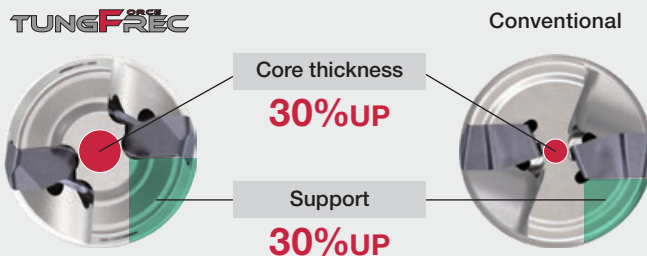
1 Strong insert design

Now available with MT geometry, TungForce-Rec ensures stability and long tool life during demanding machining with heavy cutting loads.



2 Thicker core diameter and insert support

The use of unique V bottom inserts allows the cutter to have a thicker core diameter and more support material that supports the inserts.



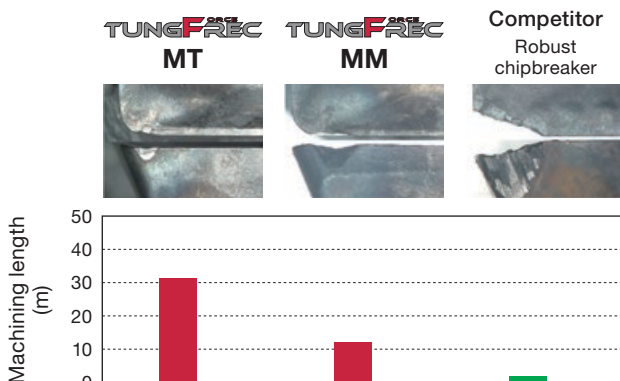
3 Secure insert clamping

Large-sized screws (M5) enhances insert fixture and facilitates handlings.



CUTTING PERFORMANCE

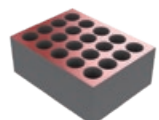
Cutting edge strength comparison



Shoulder milling

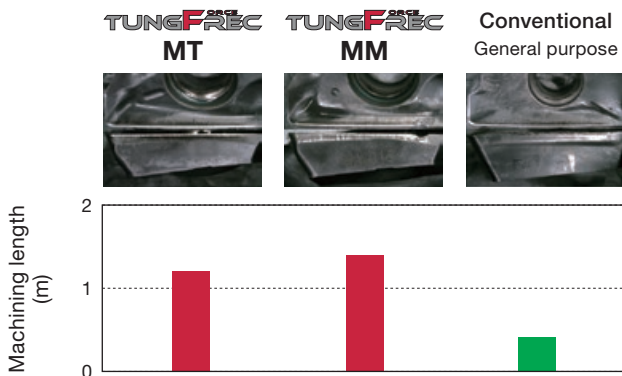
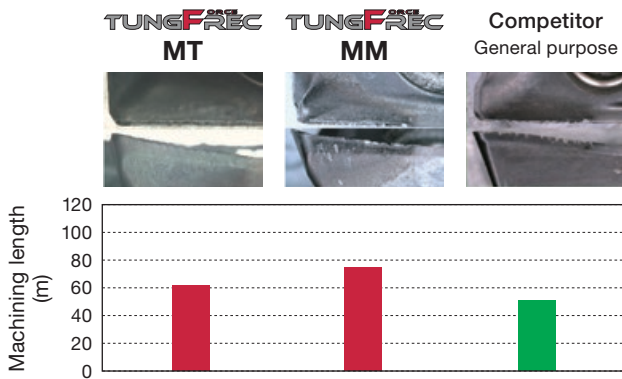


Cutter : TPAV18M050B22.0R05 ($\phi 50$ mm, $z = 5$)
 Insert : AVMT180708PDER-MM AH3225
 AVMT180708PDER-MT AH3225
 Workpiece material : SCM440 / 42CrMo4 (250 HB), Interrupted cuts
 Cutting speed : $V_c = 160$ m/min (525 sfm)
 Feed per tooth : $f_z = 0.2$ mm/t (0.008 ipt)
 Depth of cut : $a_p = 2$ mm (0.079")
 Width of cut : $a_e = 35$ mm (1.378")
 Coolant : Dry
 Performed with only one insert on the cutter



MM provided 10x tool life increase, while MT 26x increase.
 The competitor's insert was fractured so severely that it could not be securely fixed in the pocket when indexed for the second edge.
 MM and MT inserts were both left undamaged and completed the cuts.

Tool life comparison



Shoulder milling



Cutter : TPAV18M050B22.0R05 (ø50 mm, z = 5)
 Insert : AVMT180708PDER-MM AH3225
 AVMT180708PDER-MT AH3225
 Workpiece material: S55C / C55
 Cutting speed : $V_c = 160$ m/min (525 sfm)
 Feed per tooth : $f_z = 0.2$ mm/t (0.008 ipt)
 Depth of cut : $a_p = 2$ mm (0.079")
 Width of cut : $a_e = 35$ mm (1.378")
 Coolant : Dry
 Performed with only one insert on the cutter

MM chipbreaker provided 1.5x tool life increase, MT 1.2x.

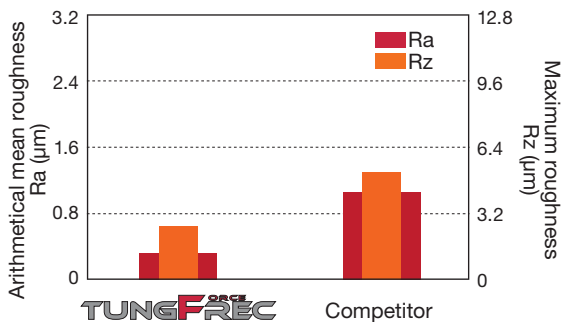


Cutter : TPAV18M050B22.0R05 (ø50 mm, z = 5)
 Insert : AVMT180708PDER-MM AH8015
 AVMT180708PDER-MT AH8015
 Workpiece material: Inconel 718 (38 HRC)
 Cutting speed : $V_c = 15$ m/min (49 sfm)
 Feed per tooth : $f_z = 0.08$ mm/t (0.003 ipt)
 Depth of cut : $a_p = 15$ mm (0.591")
 Width of cut : $a_e = 10$ mm (0.394")
 Coolant : Wet
 Performed with only one insert on the cutter

MM chipbreaker provided 3.5x tool life increase, MT 3.0x.

Performance comparison - Precision machining

Surface finishing



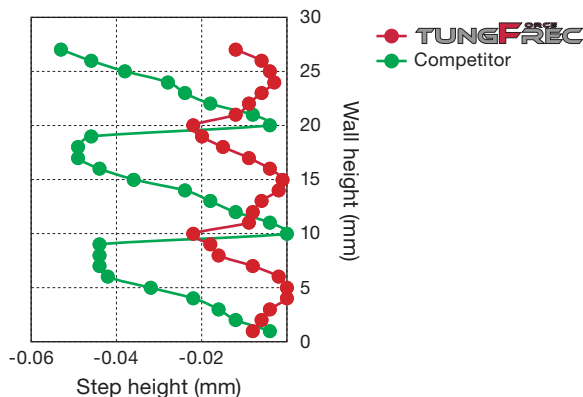
Face milling



Cutter : TPAV18M050B22.0R05 (ø50 mm, z = 5)
 Insert : AVMT180708PDER-MM AH3225
 Workpiece material: S55C / C55
 Cutting speed : $V_c = 120$ m/min (394 sfm)
 Feed per tooth : $f_z = 0.15$ mm/t (0.006 ipt)
 Depth of cut : $a_p = 15$ mm (0.591")
 Cutting width : $a_e = 20$ mm (0.787")
 Coolant : Dry

Better surface quality vs the competitor.

Wall finishing



Shoulder milling



Cutter : TPAV18M050B22.0R05 (ø50 mm, z = 5)
 Insert : AVMT180708PDER-MM AH3225
 Workpiece material: S55C / C55
 Cutting speed : $V_c = 120$ m/min (394 sfm)
 Feed per tooth : $f_z = 0.15$ mm/t (0.006 ipt)
 Depth of cut : $a_p = 15$ mm (0.591")
 Cutting width : $a_e = 20$ mm (0.787")
 Coolant : Dry

Better wall step than the competitor.

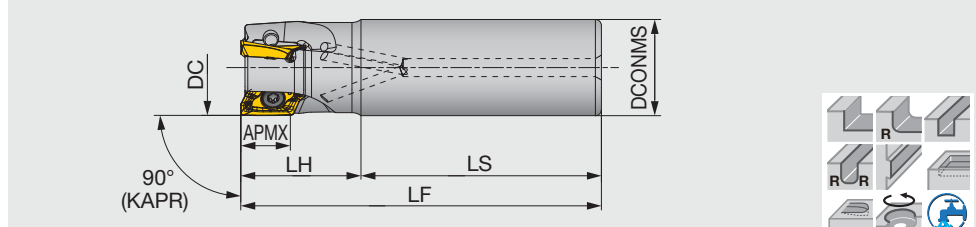
New

EPAV18

Insert size 18

Square shoulder endmill, shank type, with screw clamp system

GAMP = +12.2° ~ +12.1°, GAMF = -35.7° ~ -29.2°



Inch Designation	APMX	DC	CICT	DCONMS	LS	LH	LF	WT(lb)	Air hole	Insert
EPAV18U1.00W1.00R02	0.649	1.000	2	1.000	2.250	1.750	4.000	0.728	With	AVM/GT18...
EPAV18U1.00W1.00R02L	0.649	1.000	2	1.000	2.250	2.750	5.000	0.904	With	AVM/GT18...
EPAV18U1.25W1.25R03	0.649	1.250	3	1.250	2.250	2.250	4.500	1.320	With	AVM/GT18...
EPAV18U1.25W1.25R02L	0.649	1.250	2	1.250	2.250	4.250	6.500	1.920	With	AVM/GT18...
EPAV18U1.50W1.25R05	0.649	1.500	5	1.250	2.250	2.250	4.500	1.410	With	AVM/GT18...
EPAV18U1.50W1.25R02L	0.649	1.500	2	1.250	2.250	4.250	6.500	2.030	With	AVM/GT18...

Metric Designation	APMX	DC	CICT	DCONMS	LS	LH	LF	WT(kg)	Air hole	Insert
EPAV18M025C25.0R02	16.5	25	2	25	80	35	115	0.38	With	AVM/GT18...
EPAV18M025C25.0R02L	16.5	25	2	25	150	70	220	0.74	With	AVM/GT18...
EPAV18M030C25.0R03	16.5	30	3	25	80	40	120	0.42	With	AVM/GT18...
EPAV18M030C25.0R02L	16.5	30	2	25	175	80	255	0.91	With	AVM/GT18...
EPAV18M032C32.0R02	16.5	32	2	32	80	40	120	0.68	With	AVM/GT18...
EPAV18M032C32.0R03	16.5	32	3	32	80	40	120	0.66	With	AVM/GT18...
EPAV18M032C32.0R02L	16.5	32	2	32	175	80	255	1.47	With	AVM/GT18...
EPAV18M040C32.0R03	16.5	40	3	32	80	40	120	0.72	With	AVM/GT18...
EPAV18M040C32.0R05	16.5	40	5	32	80	40	120	0.72	With	AVM/GT18...
EPAV18M040C32.0R03L	16.5	40	3	32	205	50	255	1.53	With	AVM/GT18...
EPAV18M050C32.0R06	16.5	50	6	32	80	40	120	0.85	With	AVM/GT18...
EPAV18M050C32.0R07	16.5	50	7	32	80	40	120	0.85	With	AVM/GT18...
EPAV18M063C32.0R06	16.5	63	6	32	80	45	125	1.07	With	AVM/GT18...
EPAV18M063C32.0R08	16.5	63	8	32	80	45	125	1.11	With	AVM/GT18...

SPARE PARTS



Designation	Clamping screw	Grip (Optional)	Torx bit (Optional)
EPAV18M025C25.0R02	CSTB-5	(H-TB2W)	(BT20S)
EPAV18M025C25.0R02L	CSTB-5	(H-TB2W)	(BT20S)
EPAV18M030C25.0R03	CSTB-5L085	(H-TB2W)	(BT20S)
EPAV18M030C25.0R02L	CSTB-5	(H-TB2W)	(BT20S)
EPAV18M032C32.0R02	CSTB-5	(H-TB2W)	(BT20S)
EPAV18M032C32.0R03	CSTB-5S	(H-TB2W)	(BT20S)
EPAV18M032C32.0R02L	CSTB-5	(H-TB2W)	(BT20S)
EPAV18M040C32.0R03	CSTB-5	(H-TB2W)	(BT20S)
EPAV18M040C32.0R05	CSTB-5S	(H-TB2W)	(BT20S)
EPAV18M040C32.0R03L	CSTB-5	(H-TB2W)	(BT20S)
EPAV18M050C32.0R06	CSTB-5	(H-TB2W)	(BT20S)
EPAV18M050C32.0R07	CSTB-5S	(H-TB2W)	(BT20S)
EPAV18M063C32.0R06	CSTB-5	(H-TB2W)	(BT20S)
EPAV18M063C32.0R08	CSTB-5	(H-TB2W)	(BT20S)

*Recommended clamping torque (N·m): CSTB-5, CSTB-5L085 = 5

SPARE PARTS



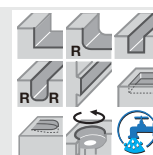
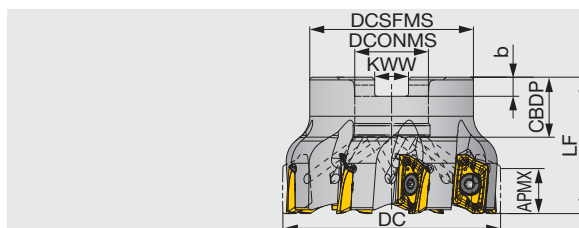
Designation	Clamping screw	Grip (Optional)	Torx bit (Optional)
EPAV18U1.00W1.00R02	CSTB-5	(H-TB2W)	(BT20S)
EPAV18U1.00W1.00R02L	CSTB-5	(H-TB2W)	(BT20S)
EPAV18U1.25W1.25R03	CSTB-5S	(H-TB2W)	(BT20S)
EPAV18U1.25W1.25R02L	CSTB-5	(H-TB2W)	(BT20S)
EPAV18U1.50W1.25R05	-	(H-TB2W)	(BT20S)
EPAV18U1.50W1.25R02L	CSTB-5	(H-TB2W)	(BT20S)

*Recommended clamping torque (N·m): CSTB-5, CSTB-5L085 = 5

New**TPAV18**

Square shoulder mill, bore type, with screw clamp system

GAMP = +12.2° ~ +12.1°, GAMF = -35.7° ~ -29.2°



Inch Designation	APMX	DC	CICT	DCSFMS	DCONMS	CBDP	LF	KWW	b	WT(lb)	Air hole	Insert
TPAV18U2.00B0.75R07	0.650	2.000	7	1.772	0.750	0.750	1.570	0.315	0.197	0.794	With	AVM/GT18...
TPAV18U3.00B1.00R08	0.650	3.000	8	2.165	1.000	0.750	1.750	0.374	0.236	1.896	With	AVM/GT18...
TPAV18U4.00B1.50R10N	0.650	4.000	10	3.071	1.500	1.060	2.000	0.626	0.394	3.373	Without	AVM/GT18...
TPAV18U5.00B1.50R12N	0.650	5.000	12	3.071	1.500	1.060	2.000	0.626	0.394	5.445	Without	AVM/GT18...
TPAV18U6.00B2.00R12N	0.650	6.000	12	3.858	2.000	1.060	2.000	0.748	0.433	7.518	Without	AVM/GT18...

Metric Designation	APMX	DC	CICT	DCSFMS	DCONMS	CBDP	LF	KWW	b	WT(kg)	Air hole	Insert
TPAV18M040B16.0R05	16.5	40	5	38	16	18	40	8.4	5.6	0.23	With	AVM/GT18...
TPAV18M050B22.0R05	16.5	50	5	47	22	20	40	10.4	6.3	0.32	With	AVM/GT18...
TPAV18M050B22.0R07	16.5	50	7	47	22	20	40	10.4	6.3	0.34	With	AVM/GT18...
TPAV18M063B22.0R06	16.5	63	6	47	22	20	40	10.4	6.3	0.57	With	AVM/GT18...
TPAV18M063B22.0R08	16.5	63	8	47	22	20	40	10.4	6.3	0.52	With	AVM/GT18...
TPAV18M080B27.0R08	16.5	80	8	60	27	22	50	12.4	7	1.07	With	AVM/GT18...
TPAV18J080B25.4R08	16.5	80	8	50	25.4	26	50	9.5	6	0.97	With	AVM/GT18...
TPAV18M100B32.0R10	16.5	100	10	66	32	28.5	50	14.4	8	1.49	With	AVM/GT18...
TPAV18J100B31.7R10	16.5	100	10	64	31.75	32	50	12.7	8	1.53	With	AVM/GT18...
TPAV18M125B40.0R10	16.5	125	10	85	40	32	63	16.4	9	3.02	With	AVM/GT18...
TPAV18J125B38.1R10	16.5	125	10	80	38.1	38	63	15.9	10	3.04	With	AVM/GT18...
TPAV18M160B40.0R12N	16.5	160	12	100	40	29	63	16.4	9	4.91	Without	AVM/GT18...
TPAV18J160B50.8R12N	16.5	160	12	100	50.8	46	63	19	11	5.1	Without	AVM/GT18...

SPARE PARTS

Inch Designation	Clamping screw	Grip (Optional)	Torx bit (Optional)	Shell locking bolt
TPAV18U2.00B0.75R07	CSTB-5S	(H-TB2W)	(BT20S)	C0.375X1.125H
TPAV18U3.00B1.00R08	CSTB-5	(H-TB2W)	(BT20S)	C0.500X1.375H
TPAV18U4.00B1.50R10N	CSTB-5	(H-TB2W)	(BT20S)	-
TPAV18U5.00B1.50R12N	CSTB-5	(H-TB2W)	(BT20S)	-
TPAV18U6.00B2.00R12N	CSTB-5	(H-TB2W)	(BT20S)	-

*Recommended clamping torque (N·m): CSTB-5, CSTB-5S = 5

SPARE PARTS

Metric Designation	Clamping screw	Grip (Optional)	Torx bit (Optional)	Shell locking bolt
TPAV18M040B16.0R05	CSTB-5S	(H-TB2W)	(BT20S)	FSHM8-30H
TPAV18M050B22.0R05	CSTB-5	(H-TB2W)	(BT20S)	CM10x30H
TPAV18M050B22.0R07	CSTB-5S	(H-TB2W)	(BT20S)	CM10x30H
TPAV18M063B22.0R06	CSTB-5	(H-TB2W)	(BT20S)	CM10x30H
TPAV18M063B22.0R08	CSTB-5	(H-TB2W)	(BT20S)	CM10x30H
TPAV18M080B27.0R08	CSTB-5	(H-TB2W)	(BT20S)	CM12x30H
TPAV18J080B25.4R08	CSTB-5	(H-TB2W)	(BT20S)	CM12x30H
TPAV18M100B32.0R10	CSTB-5	(H-TB2W)	(BT20S)	TMBA-M16H
TPAV18J100B31.7R10	CSTB-5	(H-TB2W)	(BT20S)	TMBA-M16H
TPAV18M125B40.0R10	CSTB-5	(H-TB2W)	(BT20S)	TMBA-M20H
TPAV18J125B38.1R10	CSTB-5	(H-TB2W)	(BT20S)	TMBA-M20H
TPAV18M160B40.0R12N	CSTB-5	(H-TB2W)	(BT20S)	-
TPAV18J160B50.8R12N	CSTB-5	(H-TB2W)	(BT20S)	-

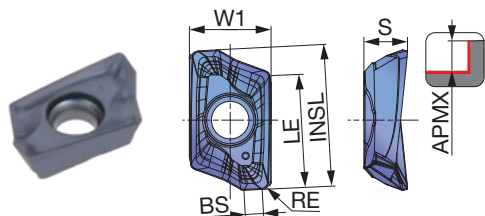
*Recommended clamping torque (N·m): CSTB-5, CSTB-5S = 5

Insert size 18

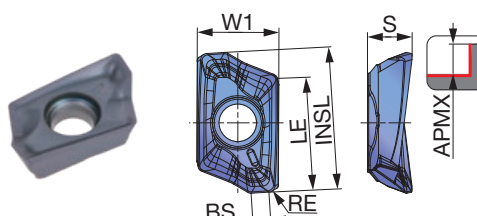
New

INSERT

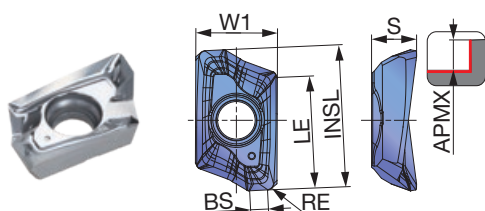
AVMT18-MM (for general purpose)



AVMT18-MT (Robust chipbreaker)



AVGT18-AM (for non-ferrous machining)



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

★ : First choice
☆ : Second choice

Chipbreaker	Inch Designation	RE	APMX	Coated			Carbide		W1	INSL	S	BS	LE
				AH3225	AH8015	T1215	KS05F						
General-purpose MM	AVMT180704PDER-MM	0.0157	0.650	●	●				0.488	0.850	0.264	0.122	0.673
	AVMT180708PDER-MM	0.0315	0.650	●	●	●			0.488	0.850	0.260	0.106	0.673
	AVMT180712PDER-MM	0.0472	0.650	●					0.488	0.850	0.260	0.087	0.673
	AVMT180716PDER-MM	0.0630	0.650	●	●				0.488	0.850	0.256	0.071	0.673
	AVMT180720PDER-MM	0.0787	0.650	●	●				0.488	0.850	0.256	0.055	0.673
	AVMT180724PDER-MM	0.0945	0.650	●					0.488	0.850	0.256	0.039	0.673
	AVMT180731PDER-MM	0.1220	0.650	●	●				0.488	0.850	0.252	0.008	0.673
Robust chipbreaker MT	AVMT180704PDER-MT	0.0157	0.650	●	●				0.488	0.850	0.264	0.122	0.673
	AVMT180708PDER-MT	0.0315	0.650	●	●				0.488	0.850	0.260	0.106	0.673
Non-ferrous machining AM	AVGT180704PDFR-AM	0.0157	0.650				●		0.488	0.850	0.260	0.122	0.673
	AVGT180708PDFR-AM	0.0315	0.650				●		0.488	0.850	0.260	0.106	0.673

● : New product

STANDARD CUTTING CONDITIONS

ISO	Workpiece materials	Hardness	Priority	Grades	Cutting speed Vc (sfm)	Feed per tooth: fz (ipt)		
						MM	MT	AM
P	Low carbon steel S15C, S400, etc. C15E, C15E4, E275A, etc.	- 200 HB	First choice	AH3225	328 - 984	0.0024 - 0.0086	0.0028 - 0.0110	-
	Carbon steel and alloy steel S55C, SCM440, etc. C55, 42CrMo4, etc.	- 300 HB	First choice	AH3225	328 - 820	0.0024 - 0.0086	0.0028 - 0.0110	-
	Prehardened steel NAK80, PX5, etc.	30 - 40 HRC	First choice	AH3225	328 - 656	0.0024 - 0.0086	0.0028 - 0.0110	-
M	Stainless steel SUS304, SUS316, etc. X5CrNi18-9, X5CrNiMo17-12-3, etc.	-	First choice	AH3225	262 - 591	0.0028 - 0.0079	0.0028 - 0.0098	-
K	Grey cast iron FC250, FC300, etc. GG25, GG30, etc. 250, 300, etc.	150 - 250 HB	First choice	AH8015	328 - 984	0.0020 - 0.0086	0.0024 - 0.0110	-
		150 - 250 HB	Wear resistance	T1215	656 - 1312	0.0020 - 0.007	-	-
	Ductile cast iron FCD400, FCD600, etc. GGG60, 600-3, etc.	150 - 250 HB	First choice	AH8015	328 - 820	0.0020 - 0.0086	0.0024 - 0.0110	-
		150 - 250 HB	Wear resistance	T1215	492 - 984	0.0020 - 0.007	-	-
N	Aluminium alloys Si < 13%	-	First choice	KS05F	984 - 4921	-	-	0.0020 - 0.0126
	Aluminium alloys Si ≥ 13%	-	First choice	KS05F	328 - 656	-	-	0.0020 - 0.0126
S	Titanium alloys Ti-6Al-4V, etc.	-	First choice	AH8015	66 - 197	0.0016 - 0.006	-	-
	Superalloys Inconel 718, etc.	-	First choice	AH8015	66 - 131	0.0016 - 0.006	0.0020 - 0.0071	-
H	Hardened steel	SKD61, X40CrMoV5-1, etc.	40 - 50 HRC	First choice	AH8015	164 - 492	0.0016 - 0.0028	0.0020 - 0.0039
		SKD11, X153CrMoV12, etc.	50 - 60 HRC	First choice	AH8015	131 - 230	0.0016 - 0.0028	0.0020 - 0.0039

Insert size 18

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

MM chipbreaker

Recommended chip thickness

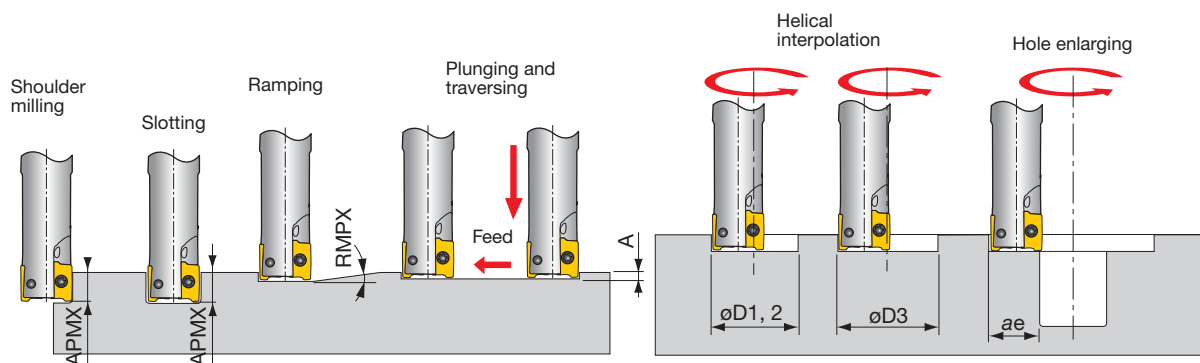
Feed per tooth fz (ipt)	Cutting width (%): ae (inch) / Tool dia.: DC (inch)														
	1%	2%	2.5%	3%	4%	5%	10%	15%	20%	25%	30%	35%	40%	45%	50% -
0.001	0.0002	0.0003	0.0004	0.0004	0.0005	0.0005	0.0007	0.0008	0.0009	0.0010	0.0011	0.0011	0.0011	0.0012	0.0012
0.002	0.0004	0.0006	0.0006	0.0007	0.0008	0.0009	0.0012	0.0014	0.0016	0.0017	0.0018	0.0019	0.0019	0.0020	0.0020
0.003	0.0006	0.0009	0.0010	0.0011	0.0012	0.0014	0.0019	0.0022	0.0025	0.0027	0.0029	0.0030	0.0031	0.0031	0.0031
0.004	0.0008	0.0011	0.0012	0.0013	0.0015	0.0017	0.0024	0.0028	0.0031	0.0034	0.0036	0.0037	0.0039	0.0039	0.0039
0.005	0.0009	0.0013	0.0015	0.0016	0.0019	0.0020	0.0028	0.0034	0.0038	0.0041	0.0043	0.0045	0.0046	0.0047	0.0047
0.006	0.0012	0.0017	0.0019	0.0020	0.0023	0.0026	0.0035	0.0042	0.0047	0.0051	0.0054	0.0056	0.0058	0.0059	0.0059
0.007	0.0014	0.0020	0.0022	0.0024	0.0028	0.0031	0.0043	0.0051	0.0057	0.0061	0.0065	0.0068	0.0069	0.0070	0.0071
0.008	0.0016	0.0022	0.0024	0.0027	0.0031	0.0034	0.0047	0.0056	0.0063	0.0068	0.0072	0.0075	0.0077	0.0078	0.0079
0.009	0.0017	0.0024	0.0027	0.0030	0.0034	0.0038	0.0052	0.0062	0.0069	0.0075	0.0080	0.0083	0.0085	0.0086	0.0087
0.010	0.0020	0.0028	0.0031	0.0033	0.0039	0.0043	0.0059	0.0070	0.0079	0.0085	0.0090	0.0094	0.0096	0.0098	0.0098
0.011	0.0022	0.0031	0.0034	0.0038	0.0043	0.0048	0.0066	0.0079	0.0088	0.0095	0.0101	0.0105	0.0108	0.0110	0.0110
0.012	0.0024	0.0033	0.0037	0.0040	0.0046	0.0052	0.0071	0.0084	0.0094	0.0102	0.0108	0.0113	0.0116	0.0117	0.0118
0.016	0.0031	0.0044	0.0049	0.0054	0.0062	0.0069	0.0094	0.0113	0.0126	0.0136	0.0144	0.0150	0.0154	0.0157	0.0157

MT chipbreaker

Recommended chip thickness

Feed per tooth fz (ipt)	Cutting width (%): ae (inch) / Tool dia.: DC (inch)														
	1%	2%	2.5%	3%	4%	5%	10%	15%	20%	25%	30%	35%	40%	45%	50% -
0.001	0.0002	0.0003	0.0004	0.0004	0.0005	0.0005	0.0007	0.0008	0.0009	0.0010	0.0011	0.0011	0.0011	0.0012	0.0012
0.002	0.0004	0.0006	0.0006	0.0007	0.0008	0.0009	0.0012	0.0014	0.0016	0.0017	0.0018	0.0019	0.0019	0.0020	0.0020
0.003	0.0006	0.0009	0.0010	0.0011	0.0012	0.0014	0.0019	0.0022	0.0025	0.0027	0.0029	0.0030	0.0031	0.0031	0.0031
0.004	0.0008	0.0011	0.0012	0.0013	0.0015	0.0017	0.0024	0.0028	0.0031	0.0034	0.0036	0.0037	0.0039	0.0039	0.0039
0.005	0.0009	0.0013	0.0015	0.0016	0.0019	0.0020	0.0028	0.0034	0.0038	0.0041	0.0043	0.0045	0.0046	0.0047	0.0047
0.006	0.0012	0.0017	0.0019	0.0020	0.0023	0.0026	0.0035	0.0042	0.0047	0.0051	0.0054	0.0056	0.0058	0.0059	0.0059
0.007	0.0014	0.0020	0.0022	0.0024	0.0028	0.0031	0.0043	0.0051	0.0057	0.0061	0.0065	0.0068	0.0069	0.0070	0.0071
0.008	0.0016	0.0022	0.0024	0.0027	0.0031	0.0034	0.0047	0.0056	0.0063	0.0068	0.0072	0.0075	0.0077	0.0078	0.0079
0.009	0.0017	0.0024	0.0027	0.0030	0.0034	0.0038	0.0052	0.0062	0.0069	0.0075	0.0080	0.0083	0.0085	0.0086	0.0087
0.010	0.0020	0.0028	0.0031	0.0033	0.0039	0.0043	0.0059	0.0070	0.0079	0.0085	0.0090	0.0094	0.0096	0.0098	0.0098
0.011	0.0022	0.0031	0.0034	0.0038	0.0043	0.0048	0.0066	0.0079	0.0088	0.0095	0.0101	0.0105	0.0108	0.0110	0.0110
0.012	0.0024	0.0033	0.0037	0.0040	0.0046	0.0052	0.0071	0.0084	0.0094	0.0102	0.0108	0.0113	0.0116	0.0117	0.0118
0.016	0.0031	0.0044	0.0049	0.0054	0.0062	0.0069	0.0094	0.0113	0.0126	0.0136	0.0144	0.0150	0.0154	0.0157	0.0157

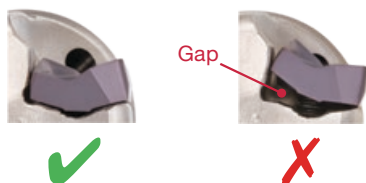
MACHINING APPLICATIONS

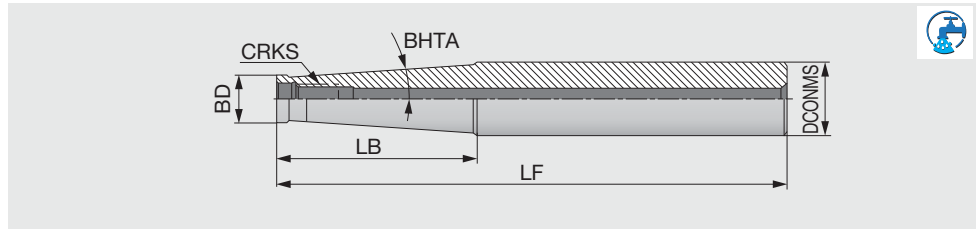


Inch Designation	DC	Max. depth of cut APMX	Max. ramping angle RMPX	Max. plunging A	Min. machining øD1	Max. machining		Max. cutting width in enlarging ae
EPAV18U1.00...	1.000	0.650	4.5	0.039	1.157	1.929	1.890	0.945
EPAV18U1.25...	1.250	0.650	3	0.039	2.125	2.480	1.221	1.221
EPAV18U1.50...	1.500	0.650	2.4	0.039	2.760	3.110	3.071	1.535
TPAV18U2.00...	2.000	0.650	1.5	0.039	3.543	3.898	3.858	1.929
TPAV18U3.00...	3.000	0.650	1	0.039	5.906	6.260	6.221	3.110
TPAV18U4.00...	4.000	0.650	0.8	0.039	7.480	7.835	7.795	3.898
TPAV18U5.00...	5.000	0.650	0.6	0.039	9.449	9.803	9.764	4.882
TPAV18U6.00...	6.000	0.650	0.5	0.039	12.205	12.559	12.520	6.260

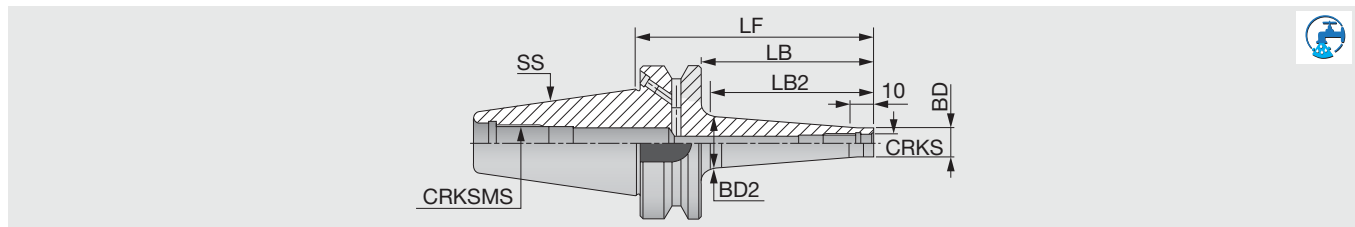
*Flat bottom hole

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





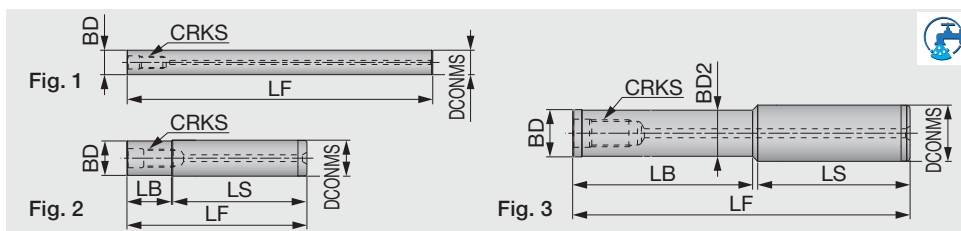
Inch Designation	DCONMS	BD	LF	LB	BHTA	CRKS
SM06-L60C10	0.394	0.382	2.362	0.787	0°	M6
SM06-L105-C12	0.472	0.382	4.134	2.362	1.2°	M6
SM06-L125-C16	0.63	0.382	4.921	2.362	3.3°	M6
SM08-L73C16	0.63	0.512	2.874	0.984	0°	M8
SM08-L128-C16	0.63	0.512	5.039	3.15	0.9°	M8
SM08-L170-C20	0.787	0.512	6.693	2.63	3.3°	M8
SM10-L80-C20	0.787	0.709	3.15	1.181	0°	M10
SM10-L130-C20	0.787	0.709	5.118	3.15	0.6°	M10
SM10-L200-C25	0.984	0.748	7.874	2.252	3.3°	M10
SM12-L86-C25	0.984	0.827	3.386	1.181	5.1°	M12
SM12-L200-C32	1.26	0.827	7.874	3.071	4.4°	M12
SM16-L95-C32	1.26	1.142	3.74	1.378	1.7°	M16
SM16-L230-C32	1.26	1.142	9.055	1.969	1.8°	M16



Inch Designation	SS	CRKS	BD	BD2	LF	LB	LB2	CRKSMS
BT40ODP6X66	40	M6	0.386	0.512	2.598	1.535	1.181	M16
BT40ODP6X106	40	M6	0.386	0.906	4.173	3.11	2.756	M16
BT40ODP8X66	40	M8	0.512	0.591	2.598	1.535	1.181	M16
BT40ODP8X106	40	M8	0.512	0.906	4.173	3.11	2.756	M16
BT40ODP10X66	40	M10	0.709	0.787	2.598	1.535	1.181	M16
BT40ODP10X106	40	M10	0.709	1.102	4.173	3.11	2.756	M16
BT40ODP12X66	40	M12	0.827	0.945	2.598	1.535	1.181	M16
BT40ODP12X106	40	M12	0.827	1.22	4.173	3.11	2.756	M16
BT40ODP16X66	40	M16	1.142	1.126	2.598	1.535	0	M16
BT40ODP16X106	40	M16	1.142	1.339	4.173	3.11	2.756	M16
BT50ODP12X94	50	M12	0.906	1.181	3.701	2.205	1.969	M24
BT50ODP12X144 ⁽¹⁾	50	M12	0.906	1.575	5.669	4.173	3.937	M24
BT50ODP12X194 ⁽¹⁾	50	M12	0.906	1.575	7.638	6.142	5.906	M24
BT50ODP16X94 ⁽¹⁾	50	M16	1.142	1.339	3.701	2.205	1.969	M24
BT50ODP16X144 ⁽¹⁾	50	M16	1.142	1.575	5.669	4.173	3.937	M24
BT50ODP16X194 ⁽¹⁾	50	M16	1.142	2.165	7.638	6.142	5.906	M24
BT50ODP16X244 ⁽¹⁾	50	M16	1.142	2.362	9.606	8.11	7.874	M24

Applicable for 10 MPa pressure coolant

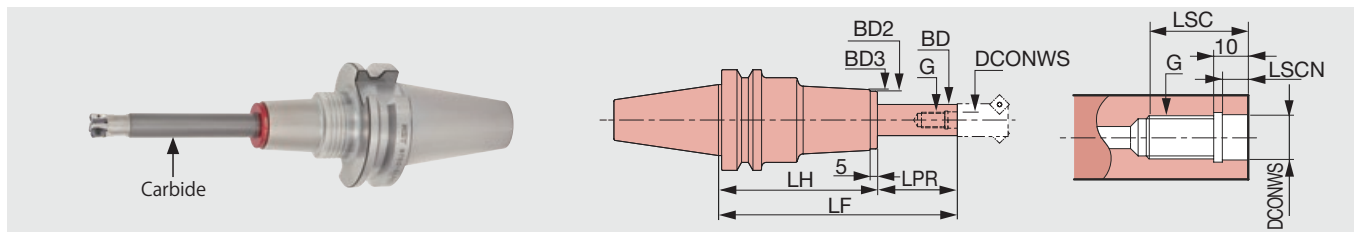
(1) Balanced to G6.3 at 12,000 min⁻¹



Metric Designation	CRKS	DCONMS	LF	LB	LS	BD	BD2	Fig.
SM06-L100-C10-C-H	M6	10	100	-	-	10	-	1
SM06-L150-C10-C-H	M6	10	150	-	-	10	-	1
SM06-L100-C12-C-H	M6	12	100	-	-	12	-	1
SM06-L150-C12-C-H	M6	12	150	-	-	12	-	1
SM08-L80-20-C16-C-H	M8	16	80	20	59.6	15.3	-	2
SM08-L100-40-C16-C-H	M8	16	100	40	59.6	15.3	-	2
SM08-L150-80-C16-C-H	M8	16	150	80	69.6	15.3	-	2
SM08-L200-100-C16-C-H	M8	16	200	100	98.2	13	12.5	3
SM08-L200-140-C16-C-H	M8	16	200	140	59.6	15.3	-	2
SM08-L250-180-C16-C-H	M8	16	250	180	69.6	15.3	-	2
SM10-L80-20-C20-C-H	M10	20	80	20	59.2	18.5	-	2
SM10-L100-40-C20-C-H	M10	20	100	40	59.2	18.5	-	2
SM10-L150-80-C20-C-H	M10	20	150	80	69.2	18.5	-	2
SM10-L200-100-C20-C-H	M10	20	200	100	99.2	18.5	-	2
SM10-L200-140-C20-C-H	M10	20	200	140	58.7	18	17.5	3
SM10-L200-140-C20-C-H-N	M10	20	200	140	59.2	18.5	-	2
SM10-L250-130-C20-C-H	M10	20	250	130	118.7	18	17.5	3
SM10-L250-180-C20-C-H	M10	20	250	180	68.7	18	17.5	3
SM10-L250-180-C20-C-H-N	M10	20	250	180	69.2	18.5	-	2
SM10-L300-180-C20-C-H	M10	20	300	180	118.7	18	17.5	3
SM10-L300-230-C20-C-H	M10	20	300	230	68.7	18	17.5	3
SM12-L100-40-C25-C-H	M12	25	100	40	59.5	24	-	2
SM12-L150-80-C25-C-H	M12	25	150	80	67.7	21	20.5	3
SM12-L150-80-C25-C-H-N	M12	25	150	80	69.5	24	-	2
SM12-L200-100-C25-C-H	M12	25	200	100	97.7	21	20.5	3
SM12-L200-100-C25-C-H-N	M12	25	200	100	99.5	24	-	2
SM12-L200-140-C25-C-H	M12	25	200	140	57.7	21	20.5	3
SM12-L250-130-C25-C-H	M12	25	250	130	117.7	21	20.5	3
SM12-L250-180-C25-C-H	M12	25	250	180	69.5	24	-	2
SM12-L300-180-C25-C-H	M12	25	300	180	117.7	21	20.5	3
SM12-L300-180-C25-C-H-N	M12	25	300	180	119.5	24	-	2
SM12-L300-230-C25-C-H	M12	25	300	230	67.7	21	20.5	3
SM16-L100-40-C32-C-H	M16	32	100	40	58.5	29	-	2
SM16-L150-80-C32-C-H	M16	32	150	80	68.5	29	-	2
SM16-L200-100-C32-C-H	M16	32	200	100	98.5	29	-	2
SM16-L200-140-C32-C-H	M16	32	200	140	58.5	29	-	2
SM16-L250-130-C32-C-H	M16	32	250	130	118.5	29	-	2
SM16-L250-180-C32-C-H	M16	32	250	180	68.5	29	-	2
SM16-L300-180-C32-C-H	M16	32	300	180	118.5	29	-	2
SM16-L300-230-C32-C-H	M16	32	300	230	68.5	29	-	2
SM16-L350-230-C32-C-H	M16	32	350	230	118.5	29	-	2
SM16-L350-280-C32-C-H	M16	32	350	280	68.5	29	-	2

BT-RSG (Screw clamping head holder)

TungFlex modular tooling system with BT shank



Metric 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

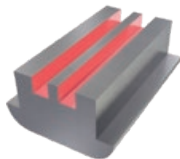
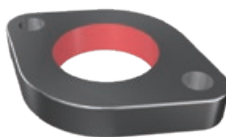
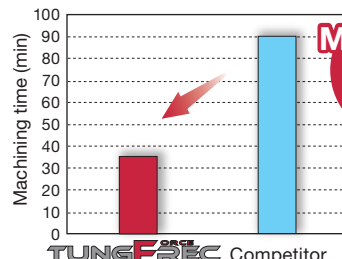
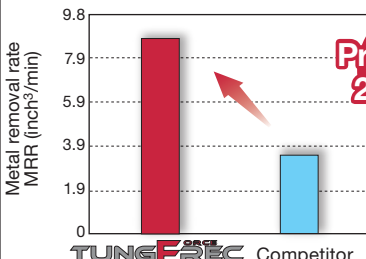
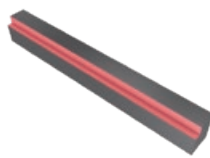
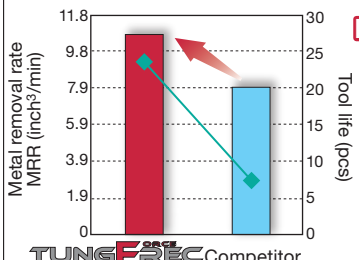
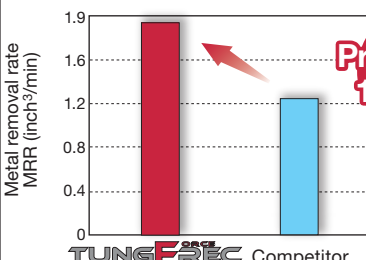
Manufactured by: **MST** corporation

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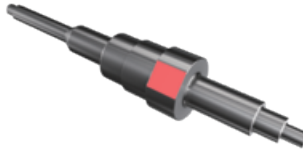
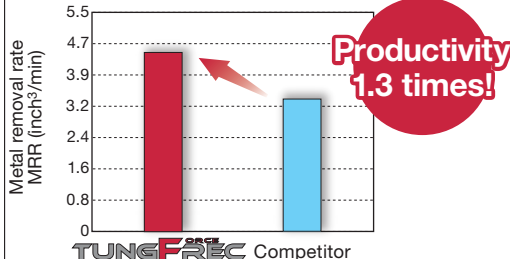
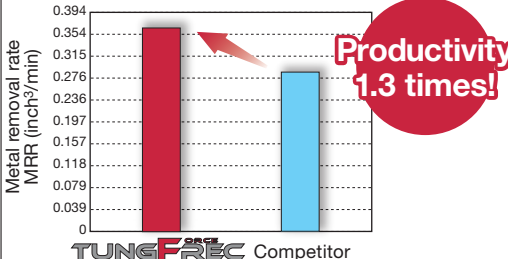
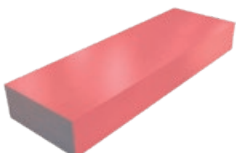
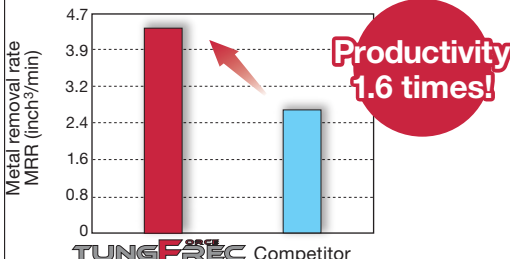
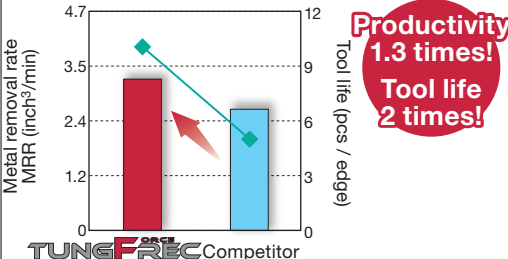
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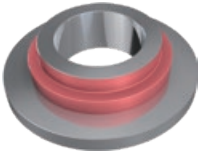
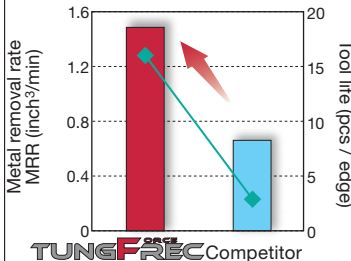
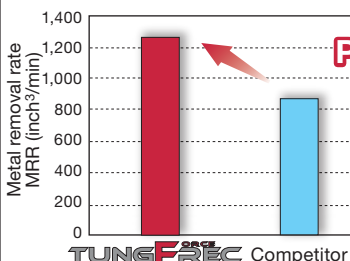
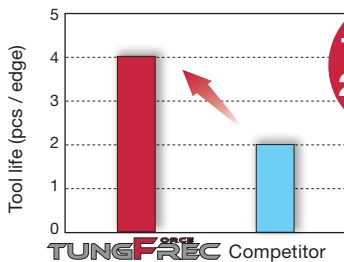
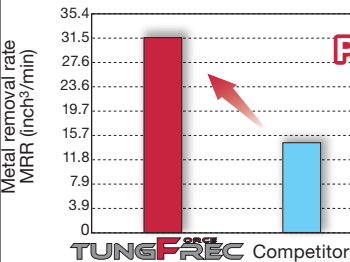


PRACTICAL EXAMPLES

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 / C50
		 M	 P
Cutting conditions	Cutting speed : Vc (sfm)	495	828
	Feed per tooth : fz (ipt)	0.0031	0.0027
	Feed speed : Vf (ipm)	35.2	55.18
	Depth of cut : ap (inch)	0.055	0.078
	Width of cut : ae (inch)	0.315	0.315
	Machining	Slotting	Slotting
	Coolant	Air blast	Air blast
	Machine	Vertical M/C, BT50	Vertical M/C, BT50
Results		 Machining time 1/3! TungForce-Rec endmill with high rigidity shortened the machining time to 1/3 compared to the solid endmill.	 Productivity 2.6 times! TungForce-Rec endmill machines with 2.6 times higher productivity due to the incredible rigidity.
Workpiece type		Machine parts	Spindle shaft
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)
		 P	 P
Cutting conditions	Cutting speed : Vc (sfm)	871	471
	Feed per tooth : fz (ipt)	0.0049	0.0015
	Feed speed : Vf (ipm)	59.05	23.66
	Depth of cut : ap (inch)	0.236	0.039
	Width of cut : ae (inch)	0.118	0.062
	Machining	Shoulder milling	Shoulder milling
	Coolant	Wet (External)	Dry
	Machine	Vertical M/C, BT40	Vertical M/C, BT30
Results		 Productivity 1.4 times! Tool life 3 times! TungForce-Rec endmill achieves 3 times longer tool life and 140% productivity compared to the solid endmill, thanks to AH3225 grade with high wear resistance.	 Productivity 1.6 times! The sharp cutting edge geometry has enabled smoother, vibration-free cutting at higher parameters even on a low rigidity machine.

PRACTICAL EXAMPLES

Workpiece type		Blocks	Machine parts
Cutter		EPAV06U0.62C0.62R04 ($\phi 0.625"$, $z = 4$)	EPAV06M010C10.0R02 ($\phi 10$ mm, $z = 2$)
Insert		AVGT060308PBER-MJ	AVGT060302PBER-MJ
Grade		AH130	AH3135
Workpiece material		Ti-6Al-4V	SUS304 / X5CrNi18-9
		 S	 M
Cutting conditions	Cutting speed : V_c (sfm)	164 (Competitor: $V_c = 131$)	308 (Competitor: $V_c = 164$)
	Feed per tooth : f_z (ipt)	0.005	0.002 (Competitor: $f_z = 0.001$)
	Feed speed : V_f (ipm)	18.819	11.772 (Competitor: $V_f = 9.409$)
	Depth of cut : a_p (inch)	0.059 (Competitor: $a_p = 0.020$)	0.020
	Width of cut : a_e (inch)	0.630	0.248
	Machining	Shoulder milling	Face milling
	Coolant	Wet (Internal)	Wet (External)
	Machine	With angle head, BT50	Lathe (Swiss type)
Results		 High wear and fracture resistant, AH130 has enabled a high M.R.R. with stability, eliminating premature insert failures.	 Enhanced machining stability has improved the MRR at high cutting parameters.
Workpiece type		Plate for mold	Turbine blade
Cutter		EPAV12U0.75W0.75R04 ($\phi 0.75"$, $z = 4$)	EPAV12U0.62W0.62R02 ($\phi 0.625"$, $z = 2$)
Insert		AVMT120408PDER-MM	AVMT120412PDER-MM
Grade		AH3225	T3225
Workpiece material		NAK80 / Prehardened steel	SUS316L / 316L
		 P	 M
Cutting conditions	Cutting speed : V_c (sfm)	236	427
	Feed per tooth : f_z (ipt)	0.004	0.004
	Feed speed : V_f (ipm)	18.032	20.354
	Depth of cut : a_p (inch)	0.157	0.039
	Width of cut : a_e (inch)	0.236	0.630
	Machining	Face milling	Slotting
	Coolant	Air blast	Wet (Internal)
	Machine	Vertical M/C, BT50	Turning center, BT50
Results		 Thanks to dense number of teeth and robust cutting edge, TungForce-Rec offered high productivity without chipping.	 Thanks to light cutting action and robust cutting edge, TungForce-Rec offered high productivity without chattering and chipping.

Workpiece type		Parts for power generation	Machine parts
Cutter		EPAV12U1.00W1.00R06 (ø1.000", z = 6)	TPAV12U2.00B0.75R12 (ø2.000", z = 12)
Insert		AVMT120420PDER-MM	AVGT120408PDFR-AM
Grade		AH120	KS05F
Workpiece material		Hastelloy X	Cast aluminium
		 S	 N
Cutting conditions	Cutting speed : Vc (sfm)	148	3117
	Feed per tooth : fz (ipt)	0.004	0.006
	Feed speed : Vf (ipm)	13.543	433.071
	Depth of cut : ap (inch)	0.236	0.236
	Width of cut : ae (inch)	0.071	1.378
	Machining	Shoulder milling	Face milling
	Coolant	Wet (Internal)	Wet (External)
Machine		Vertical M/C, BT50	Vertical M/C, BT50
Results		 Productivity 2.3 times! Tool life 5 times! TungForce-Rec Competitor Thanks to light cutting action and rigid cutter body, TungForce-Rec offered high productivity without chattering and chipping.	 Productivity 1.5 times! TungForce-Rec Competitor Dense number of teeth and rigid tool design allowed TungForce-Rec to offer high productivity in cast aluminium machining.
Workpiece type		Frame for heavy equipment	Casing
Cutter		New TPAV18M050B22.0R05 (ø50 mm, z = 5)	New TPAV18U4.00B1.50R10N (ø4.000", z = 10)
Insert		AVMT180708PDER-MT	AVMT180708PDER-MM
Grade		AH3225	AH3225
Workpiece material		Alloy steel	SS400 / E275A
		 P	 P
Cutting conditions	Cutting speed : Vc (sfm)	655	823
	Feed per tooth : fz (ipt)	0.006	0.004
	Feed speed : Vf (ipm)	39.370	31.457
	Depth of cut : ap (inch)	0.118	0.079
	Width of cut : ae (inch)	1.575	1.969
	Machining	Shoulder milling	Shoulder milling
	Coolant	Wet (External)	Wet (External)
Machine		Vertical M/C, BT50	Vertical M/C, BT50
Results		 Tool life 2 times! TungForce-Rec Competitor TungForce-Rec, with its strong cutting edges, provided process security while eliminating edge chipping.	 Productivity 2.1 times! TungForce-Rec Competitor TungForce-Rec eliminated chatter with its MM chipbreaker, allowing increased number of teeth and higher feed rate. As the result, 2.1x increase in metal removal rate was achieved.

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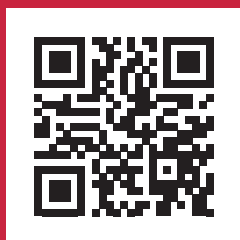
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