



For more information

High speed milling cutter

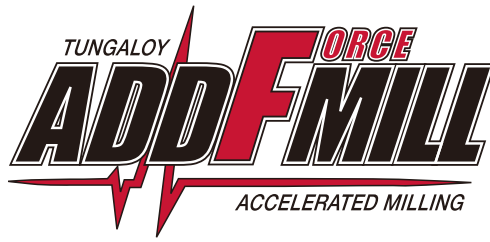
TUNGALUMILL

Tungaloy Report No. 429-G

Introducing modular milling head with TungFlex connection for machining non-ferrous materials







TUNGALU^{LU}MILL

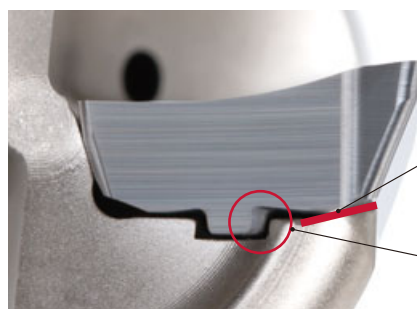
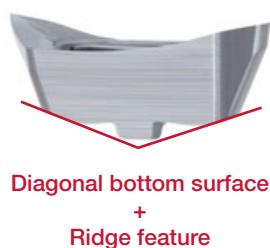


Maximum productivity and reliability
for your non-ferrous applications

Optimized geometry for maximum efficiency in non-ferrous applications

■ Upgraded insert and pocket seat designs for safer and higher efficiency machining

Enables approximately 30% higher maximum RPM compared to previous designs.



TPXV/EPXV cutter + XVCT-AM insert

■ Improvements of maximum RPMs and cutting speeds

	New Upgraded designs		Previous designs	
Tool diameter DC (mm)	ø25	ø50	ø25	ø50
Max. RPM (min ⁻¹)	52,000	36,800	38,000	27,000
Max. cutting speed V _c (m/min)	4,084	5,780	2,985	4,241

Note: Make sure to check the recommended cutting data and maximum RPM (n [min⁻¹]) of the machine spindle to be applied in the list on P.10 - 11 before using the cutter.

Machining at increased cutting data is possible with the upgraded tools.

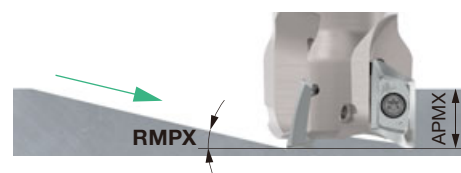
■ Excellent cutting edge geometry for non-ferrous materials

- High-precision ground flank face
- The rake face features a mirror finish that provides the cutting edge with built-up edge resistance
- Helical cutting edge and high positive rake angle



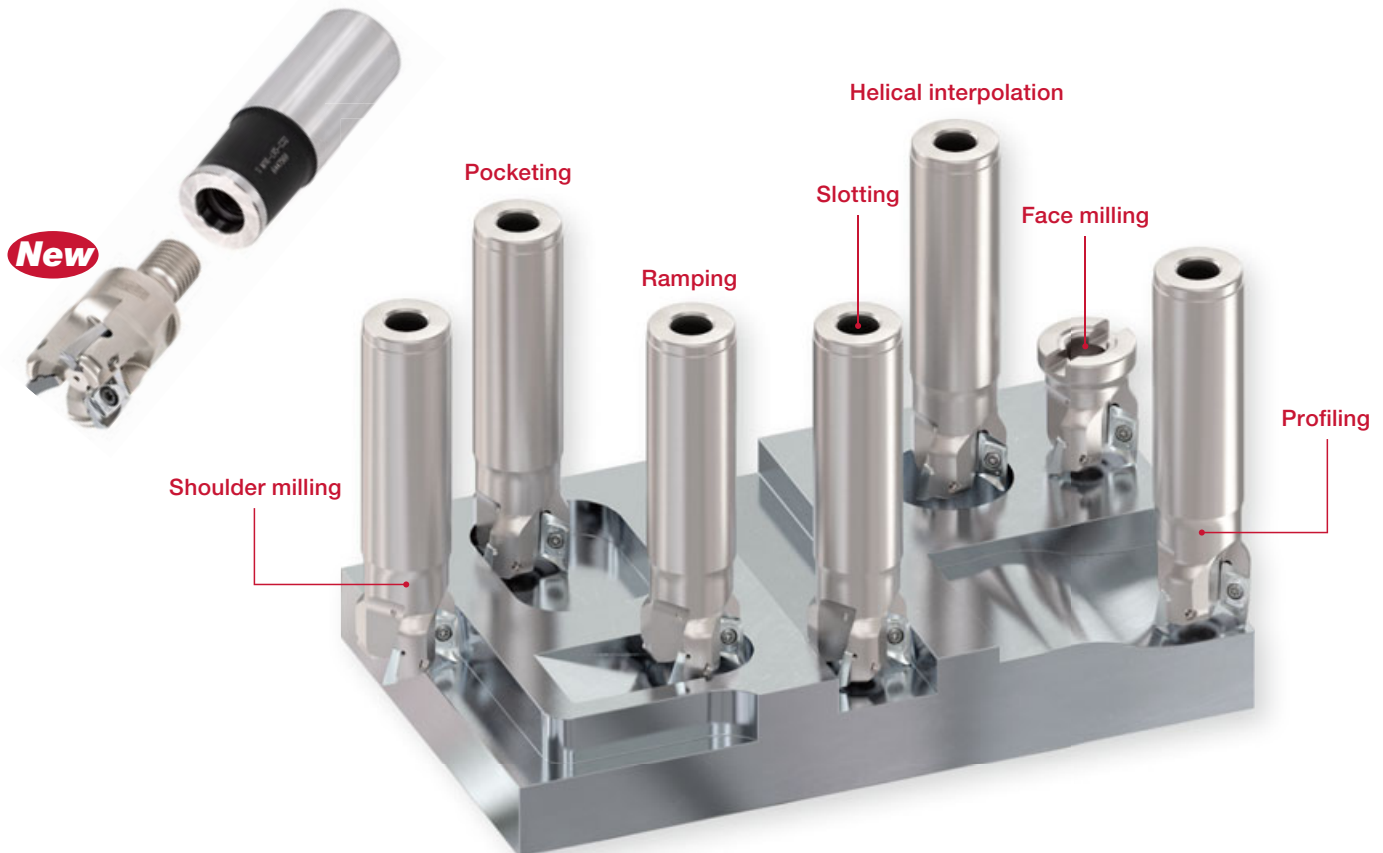
■ Comparison of maximum ramping angle

Tool diameter DC = 40 mm	TUNGALUMILL	Competitor		
Max. ramping angle RMPX	11.5°	A	B	C
		11°	9°	9°



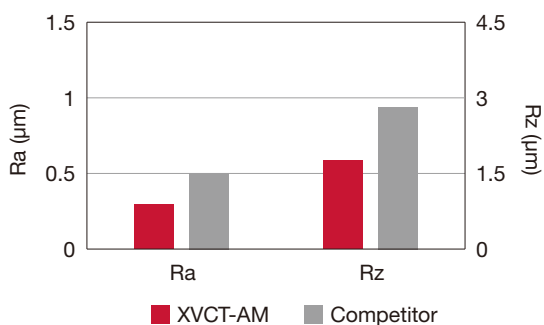
■ Applicable for a wide range of machining

- Unmatched machining efficiency in non-ferrous applications
- The inserts are available with ten standard nose radius (RE) options, ranging from 0.4 mm to 5.0 mm
- New** - Achieve optimal tool length consistently by combining the modular cutter head with existing TungFlex holders.

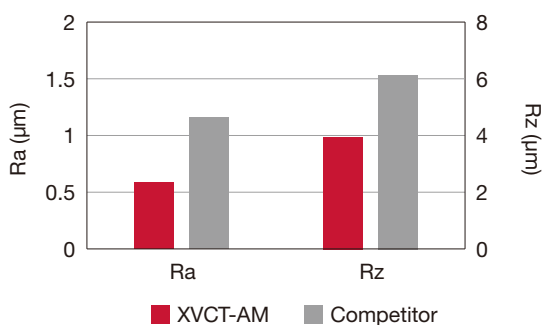


■ CUTTING PERFORMANCE

■ Comparison of surface roughness



N Cutter : TPXV16M050B22.0R04 (DC = 50 mm, CICT = 4)
 Insert : XVCT160508PEFR-AM TH10
 Workpiece material : A5052
 Cutting speed : $V_c = 1000$ m/min
 Feed per tooth : $f_z = 0.16$ mm/t
 Depth of cut : $a_p = 0.5$ mm
 Width of cut : $a_e = 35$ mm
 Coolant : Wet
 Machine : Vertical M/C, BT50

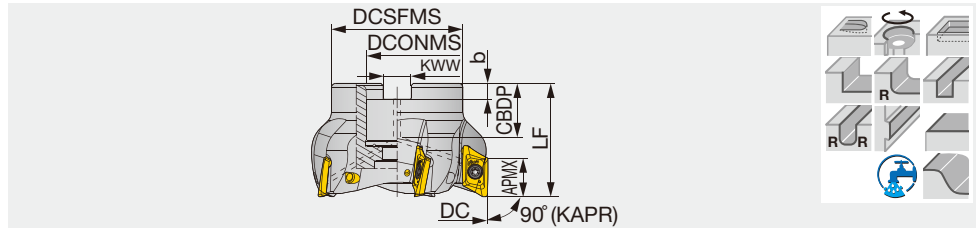


N Cutter : TPXV16M032B22.0R03 (DC = 32 mm, CICT = 3)
 Insert : XVCT160524PEFR-AM TH10
 Workpiece material : ADC12
 Cutting speed : $V_c = 1155$ m/min
 Feed per tooth : $f_z = 0.17$ mm/t
 Depth of cut : $a_p = 3$ mm
 Width of cut : $a_e = 22$ mm
 Coolant : Wet
 Machine : Vertical M/C, BT50

TPXV16

90° shoulder mill for non-ferrous machining, with screw clamp system

GAMP = +10° ~ +11°, GAMF = -9° ~ -5.5°



Designation	DC	CICT	DCSFMS	DCONMS	CBDP	LF	b	KWW	WT(kg)	Air hole	Max. RPM (min ⁻¹)	Insert
TPXV16M040B16.0R03	40	3	38	16	20	50	5.6	8.4	0.23	With	41,200	XVCT16**-AM
TPXV16M050B22.0R04	50	4	45	22	22	50	6.3	10.4	0.33	With	36,800	XVCT16**-AM
TPXV16M063B22.0R05	63	5	47	22	22	50	6.3	10.4	0.54	With	32,700	XVCT16**-AM
TPXV16M080B27.0R05	80	5	58	27	28	50	7	12.4	0.86	With	29,000	XVCT16**-AM
TPXV16M100B32.0R06	100	6	66	32	26	63	8	14.4	1.55	With	26,000	XVCT16**-AM
TPXV16M125B40.0R07	125	7	85	40	32	63	9	16.4	2.53	With	23,200	XVCT16**-AM

SPARE PARTS

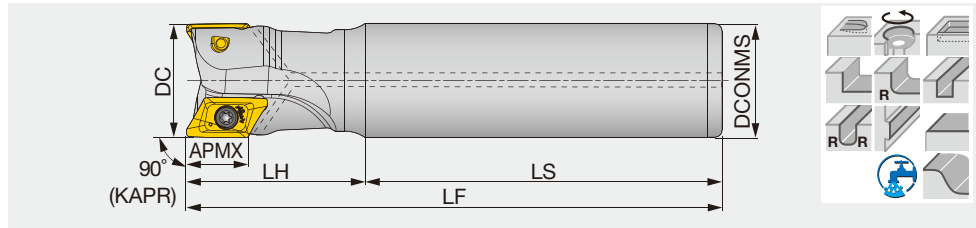
Designation	Clamping screw	Grip	Shell locking bolt	Torx bit
TPXV16M040...	TS40093I/HG	H-TBS	SHM8X1.25X35-C	BT15S
TPXV16M050... TPXV16M063...	TS40093I/HG	H-TBS	SHM10X1.5X30-C	BT15S
TPXV16M080...	TS40093I/HG	H-TBS	LHM12X1.75X30-C	BT15S
TPXV16M100...	TS40093I/HG	H-TBS	SHM16X2X35-C	BT15S
TPXV16M125...	TS40093I/HG	H-TBS	SHM20X2.5X40-C	BT15S

Recommended clamping torque: 4.5 N·m

EPXV16

90° shoulder endmill for non-ferrous machining, shank type, with screw clamp system

GAMP = +6° ~ +10°, GAMF = -12° ~ -9°



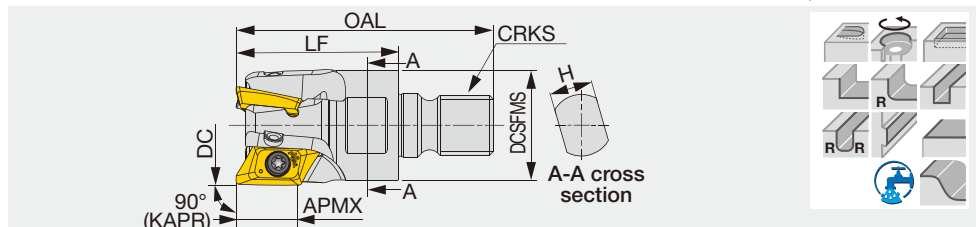
Designation	DC	CICT	DCONMS	LS	LH	LF	WT(kg)	Air hole	Max. RPM (min ⁻¹)	Insert
EPXV16M025C25.0R02	25	2	25	70	55	125	0.37	With	52,000	XVCT16**-AM
EPXV16M025C25.0R02L	25	2	25	100	70	170	0.53	With	52,000	XVCT16**-AM
EPXV16M032C32.0R03	32	3	32	100	50	150	0.76	With	46,000	XVCT16**-AM
EPXV16M032C32.0R03L	32	3	32	120	80	200	1.03	With	46,000	XVCT16**-AM
EPXV16M040C32.0R03	40	3	32	115	55	170	0.94	With	41,200	XVCT16**-AM

New

HPXV16-M

90° shoulder endmill for non-ferrous machining, modular type

GAMP = +6° ~ +10°, GAMF = -12° ~ -9°



Designation	DC	CICT	OAL	LF	H	DCSFMS	CRKS	WT(kg)	Air hole	Insert
HPXV16M025M12R02	25	2	65	43	17	21	M12	0.11	With	XVCT16**-AM
HPXV16M032M16R03	32	3	68	43	22	29	M16	0.2	With	XVCT16**-AM
HPXV16M040M16R03	40	3	68	43	22	29	M16	0.25	With	XVCT16**-AM

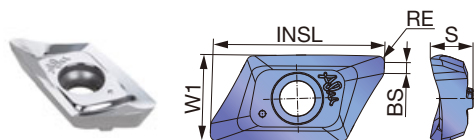
SPARE PARTS

Designation	Clamping screw	Grip	Torx bit
E/HPXV16M025...	TS40085/HG	H-TBS	BT15S
E/HPXV16M032...	TS40093/HG	H-TBS	BT15S
E/HPXV16M040...			

Recommended clamping torque: 4.5 N·m

INSERT

XVCT16-AM



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

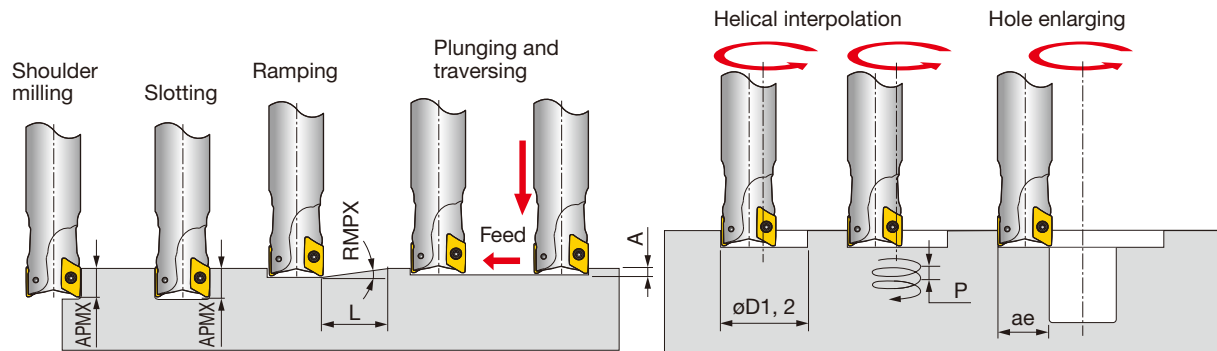
★ : First choice

Designation	RE	APMX	Uncoated							INSL	W1	S	BS
			TH10										
XVCT160504PEFR-AM	0.4	16	●							22.2	11.2	5.5	1.5
XVCT160508PEFR-AM	0.8	16	●							22.2	11.2	5.5	1.1
XVCT160512PEFR-AM	1.2	16	●							21.8	11.2	5.5	1.1
XVCT160516PEFR-AM	1.6	16	●							21.2	11.2	5.5	1.1
XVCT160520PEFR-AM	2	15.5	●							20.8	11.2	5.4	1.1
XVCT160525PEFR-AM	2.5	14.5	●							20.2	11.2	5.3	1.1
XVCT160530PEFR-AM	3	14.5	●							19.6	11.2	5.2	1
XVCT160532PEFR-AM	3.2	14.5	●							19.2	11.2	5.2	1.1
XVCT160540PEFR-AM	4	14.5	●							18.5	11.2	5.2	1.5
XVCT160550PEFR-AM	5	14.5	●							18.3	11.2	5.1	0.6

When using inserts with corner radius $RE \geq 3.2$ mm,
standard cutter body has to be modified with "R". "R" = $RE - 0.3$ mm

● : Line up

APPLICATION RANGE



Designation	DC	Straight ramp down					Step down		Helical ramp down			Hole enlarging
		Corner radius	Max. depth of cut	Max. ramping angle	Min. length	Max. plunging depth	Min. machining	Max. pitch/rev	Max. machining	Max. pitch/rev	Max. width	
		RE	APMX	RMPX	L	A	$\phi D1$	P	$\phi D2$	P	ae	
E/HPXV16R025...	25	0.4, 0.8	16	22	40	4.2	29.1	4.4	49	13.6	22.5	
E/HPXV16R025...	25	1.2	15.5	22	40	4.2	29.1	4.4	49	13.6	22.5	
E/HPXV16R025...	25	1.6	15	22	38	3.7	29.1	4.4	49	13.2	22.5	
E/HPXV16R025...	25	2	14.5	22	38	3.7	29.1	4.4	49	13.2	22.5	
E/HPXV16R025...	25	2.5, 3, 3.2	14	21	38	2.5	29.1	4.2	49	12.3	22.5	
E/HPXV16R025...	25	4, 5	13	18.5	40	2.3	29.1	3.7	49	12.3	22.5	
E/HPXV16R032...	32	0.4, 0.8	16	16.5	54	4	43.1	8.8	63	13.6	28.8	
E/HPXV16R032...	32	1.2	15.5	16.5	54	4	43.1	8.8	63	13.6	28.8	
E/HPXV16R032...	32	1.6	15	16	54	3.5	43.1	8.5	63	13.2	28.8	
E/HPXV16R032...	32	2	14.5	16	54	3.5	43.1	8.5	63	13.2	28.8	
E/HPXV16R032...	32	2.5, 3, 3.2	14	15	54	3	43.1	7.9	63	12.3	28.8	
E/HPXV16R032...	32	4, 5	13	13.5	56	2.5	43.1	7.1	63	12.3	28.8	
T/E/HPXV16R040...	40	0.4, 0.8	16	11.5	79	4	59.1	10.4	79	13.6	36	
T/E/HPXV16R040...	40	1.2	15.5	11.5	79	4	59.1	10.4	79	13.6	36	
T/E/HPXV16R040...	40	1.6	15	11	80	3.5	59.1	9.9	79	13.2	36	
T/E/HPXV16R040...	40	2	14.5	11	80	3.5	59.1	9.9	79	13.2	36	
T/E/HPXV16R040...	40	2.5, 3, 3.2	14	10	82	3	59.1	9	79	12.3	36	
T/E/HPXV16R040...	40	4, 5	13	8.5	90	2.5	59.1	7.6	79	12.3	36	
TPXV16R050...	50	0.4, 0.8	16	9.5	96	4	79.1	13	99	13.6	45	
TPXV16R050...	50	1.2	15.5	9.5	96	4	79.1	13	99	13.6	45	
TPXV16R050...	50	1.6	15	9	98	3.5	79.1	12.3	99	13.2	45	
TPXV16R050...	50	2	14.5	9	98	3.5	79.1	12.3	99	13.2	45	
TPXV16R050...	50	2.5, 3, 3.2	14	8	103	3	79.1	10.9	99	12.3	45	
TPXV16R050...	50	4, 5	13	7	110	2.5	79.1	9.5	99	12.3	45	
TPXV16R063...	63	0.4, 0.8	16	7	130	4	105.1	13.6	125	13.6	56.7	
TPXV16R063...	63	1.2	15.5	7	130	4	105.1	13.6	125	13.6	56.7	
TPXV16R063...	63	1.6	15	6.5	136	3.5	105.1	12.8	125	13.2	56.7	
TPXV16R063...	63	2	14.5	6.5	136	3.5	105.1	12.8	125	13.2	56.7	
TPXV16R063...	63	2.5, 3, 3.2	14	6	136	3	105.1	11.8	125	12.3	56.7	
TPXV16R063...	63	4, 5	13	5.5	140	2.5	105.1	10.8	125	12.3	56.7	
TPXV16R080...	80	0.4, 0.8	16	5	183	4	139.1	13.6	159	13.6	72	
TPXV16R080...	80	1.2	15.5	5	183	4	139.1	13.6	159	13.6	72	
TPXV16R080...	80	1.6	15	4.5	197	3.5	139.1	12.4	159	13.2	72	
TPXV16R080...	80	2	14.5	4.5	197	3.5	139.1	12.4	159	13.2	72	
TPXV16R080...	80	2.5, 3, 3.2	14	4	207	3	139.1	11	159	12.3	72	
TPXV16R080...	80	4, 5	13	3.5	221	2.5	139.1	9.6	159	12.3	72	
TPXV16R100...	100	0.4, 0.8	16	3.5	262	4	179.1	12.9	199	13.6	90	
TPXV16R100...	100	1.2	15.5	3.5	262	4	179.1	12.9	199	13.6	90	
TPXV16R100...	100	1.6	15	3	296	3.5	179.1	11.1	199	13.2	90	
TPXV16R100...	100	2	14.5	3	296	3.5	179.1	11.1	199	13.2	90	
TPXV16R100...	100	2.5, 3, 3.2	14	2.5	332	3	179.1	9.2	199	12.3	90	
TPXV16R100...	100	4, 5	13	2.5	309	2.5	179.1	9.2	199	11.6	90	
TPXV16R125...	125	0.4, 0.8	16	2.5	367	4	229.1	12.1	249	13.6	112.5	
TPXV16R125...	125	1.2	15.5	2.5	367	4	229.1	12.1	249	13.6	112.5	
TPXV16R125...	125	1.6	15	2	444	3.5	229.1	9.7	249	13.2	112.5	
TPXV16R125...	125	2	14.5	2	444	3.5	229.1	9.7	249	13.2	112.5	
TPXV16R125...	125	2.5, 3, 3.2	14	1.5	554	3	229.1	7.3	249	8.7	112.5	
TPXV16R125...	125	4, 5	13	1.5	516	2.5	229.1	7.3	249	8.7	112.5	

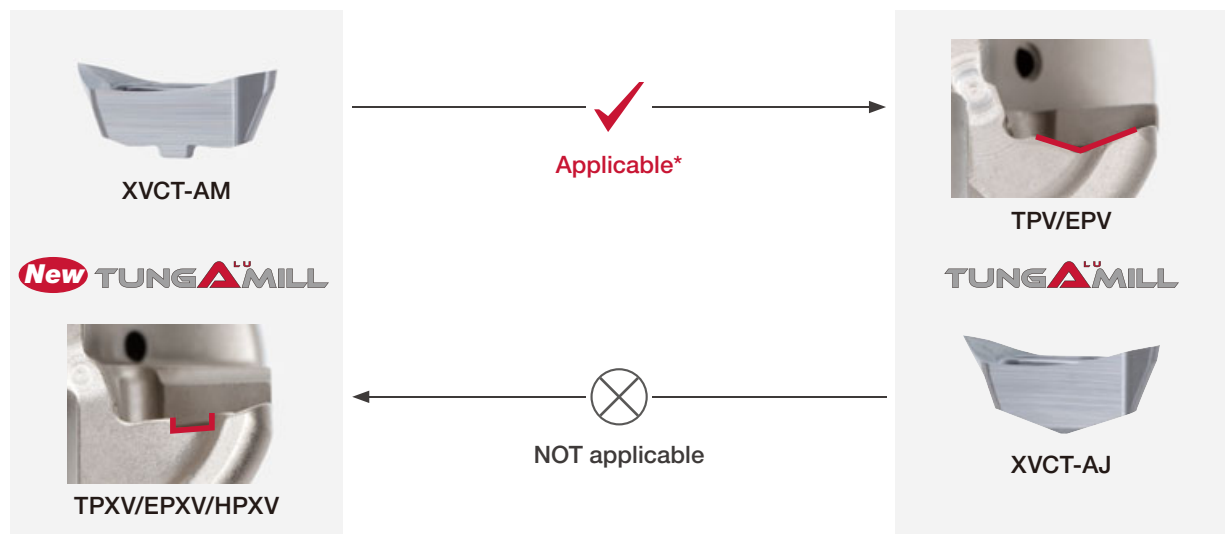
STANDARD CUTTING CONDITIONS

ISO	Workpiece material	Hardness HB	Grade	Chipbreaker	Cutting speed Vc (m/min)	Feed per tooth fz (mm/t)
N	Aluminium alloy	60	TH10	AM	300 - 5000	0.15 - 0.35
		100	TH10	AM	200 - 2000	0.1 - 0.25
	Cast aluminium alloy Si ≤ 12%	75	TH10	AM	200 - 2000	0.15 - 0.3
		90	TH10	AM	200 - 1500	0.1 - 0.25
	Cast aluminium alloy Si > 12%	130	TH10	AM	200 - 1000	0.07 - 0.15
	Copper alloys Pb > 1%	110	TH10	AM	200 - 800	0.07 - 0.15
	Copper alloys	90	TH10	AM	300 - 1000	0.1 - 0.15
		100	TH10	AM	300 - 800	0.1 - 0.15
	Duroplastics, fiber plastics	-	TH10	AM	100 - 500	0.1 - 0.15
	Hard rubber	-	TH10	AM	100 - 300	0.1 - 0.15

Safety guidelines

1. Use only the original inserts, cutters and spare parts.
2. Insert pocket must be cleaned before clamping the insert.
3. Clamp torque of screw should be 4.5 N·m.
4. For safety reasons, use a new screw when changing the insert.
5. Maximum RPM values are determined based on the burst test. Using RPM beyond maximum values may cause insert breakage, machine damage or personal injury.
6. XVCT insert has sharp cutting edges. Always wear gloves for protection from injury when handling.

Interchangeability of the new designs and previous designs



*Note: DO NOT mix the XVCT-AM and XVCT-AJ inserts on the same cutter. The difference of the insert weights will deteriorate the dynamic balance of the tool, resulting in poor surface finish.

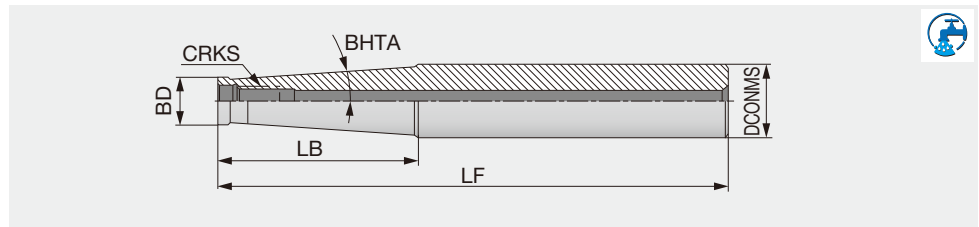
Tool dia.: DC (mm), Number of revolutions: n (min^{-1}), Feed speed: V_f (mm/min), Depth of cut: $a_p = 2.0$ mm, Number of inserts: CICT

$\phi 25$		$\phi 32$		$\phi 40$		$\phi 50$		$\phi 63$		$\phi 80$		$\phi 100$		$\phi 125$	
CICT = 2		CICT = 3		CICT = 3		CICT = 4		CICT = 5		CICT = 5		CICT = 6		CICT = 7	
n	V_f	n	V_f	n	V_f	n	V_f	n	V_f	n	V_f	n	V_f	n	V_f
19100	9600	14900	11200	11900	8900	9500	9500	7600	9500	6000	7500	4800	7200	3800	6700
$V_c = 1500 \text{ m/min}, f_z = 0.25 \text{ mm/t}$															
12700	5100	9900	5900	8000	4800	6400	5100	5100	5100	4000	4000	3200	3800	2500	3500
$V_c = 1000 \text{ m/min}, f_z = 0.2 \text{ mm/t}$															
12700	5100	9900	5900	8000	4800	6400	5100	5100	5100	4000	4000	3200	3800	2500	3500
$V_c = 1000 \text{ m/min}, f_z = 0.2 \text{ mm/t}$															
10200	3100	8000	3600	6400	2900	5100	3100	4000	3000	3200	2400	2500	2300	2000	2100
$V_c = 800 \text{ m/min}, f_z = 0.15 \text{ mm/t}$															
7600	1500	6000	1800	4800	1400	3800	1500	3000	1500	2400	1200	1900	1100	1500	1100
$V_c = 600 \text{ m/min}, f_z = 0.1 \text{ mm/t}$															
6400	1300	5000	1500	4000	1200	3200	1300	2500	1300	2000	1000	1600	1000	1300	900
$V_c = 500 \text{ m/min}, f_z = 0.1 \text{ mm/t}$															
7600	1800	6000	2200	4800	1700	3800	1800	3000	1800	2400	1400	1900	1400	1500	1300
$V_c = 600 \text{ m/min}, f_z = 0.12 \text{ mm/t}$															
6400	1500	5000	1800	4000	1400	3200	1500	2500	1500	2000	1200	1600	1200	1300	1100
$V_c = 500 \text{ m/min}, f_z = 0.12 \text{ mm/t}$															
3800	900	3000	1100	2400	900	1900	900	1500	900	1200	700	1000	700	800	700
$V_c = 300 \text{ m/min}, f_z = 0.12 \text{ mm/t}$															
2500	600	2000	700	1600	600	1300	600	1000	600	800	500	600	400	500	400
$V_c = 200 \text{ m/min}, f_z = 0.12 \text{ mm/t}$															

TUNGFLEX

SM

Steel modular shank

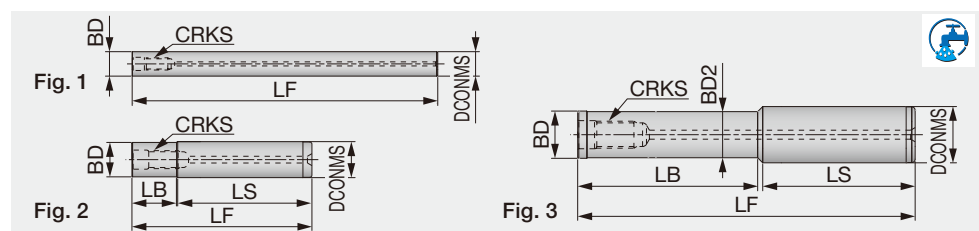


Designation	CRKS	DCONMS	LF	LB	BD	BHTA	Shank type
SM12-L86-C25	M12	25	86	30	21	5.1°	Cylindrical
SM12-L200-C32	M12	32	200	78	21	4.4°	Cylindrical
SM16-L95-C32	M16	32	95	35	29	1.7°	Cylindrical
SM16-L230-C32	M16	32	230	50	29	1.8°	Cylindrical

TUNGFLEX

SM-C-H

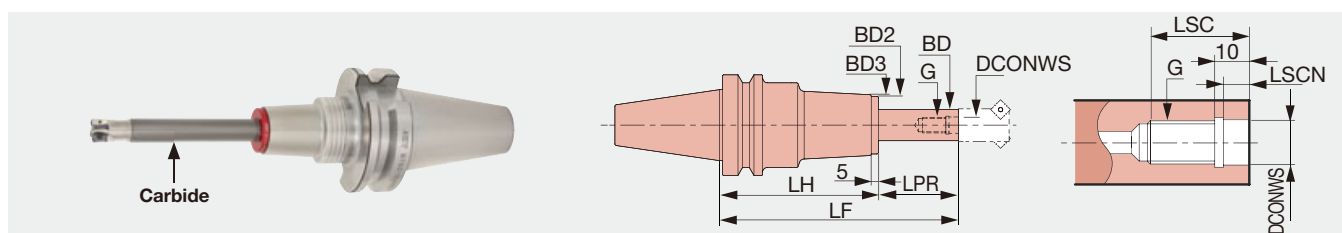
Carbide modular shank



Designation	CRKS	DCONMS	LF	LB	LS	BD	BD2	Fig.
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



Designation	DCONWS	LSC	LSCN	BD	LF	LPR	LH	BD2	BD3	WT (kg)	G
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 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

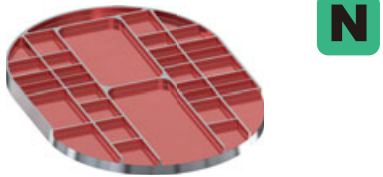
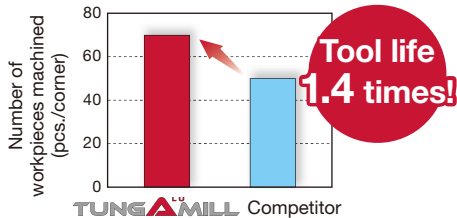
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Manufactured by: **MST** corporation

PRACTICAL EXAMPLES

Workpiece type		Airplane part
Cutter	EPXV16M032C32.0R03 (DC = 32 mm, CICT = 3)	
Insert	XVCT160530PEFR-AM	
Grade	TH10	
Workpiece material	A7050 / AlZn5.5MgCu	
		
Cutting conditions	Cutting speed: V_c (m/min)	950
	Feed per tooth: f_z (mm/t)	0.14
	Depth of cut : a_p (mm)	2.5
	Width of cut : a_e (mm)	18
	Machining	Pocketing
	Coolant	Wet
	Machine	Vertical M/C, BT50
Results		 Tool life 1.4 times! A sharp cutting edge has drastically reduced cutting forces, achieving longer tool life.



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