Tungaloy
Member IMC Group

Keeping the Customer First

Tungaloy Report No. 358-E

MILLLINE Screw-on type TAC Mills

TAW / EAW type
TPW / EPW type

The best solution for steel and cast iron milling!

Exact simulation analysis provides light weight cutter with low cutting

● Analysis of the load transmission route

Conventional face mill

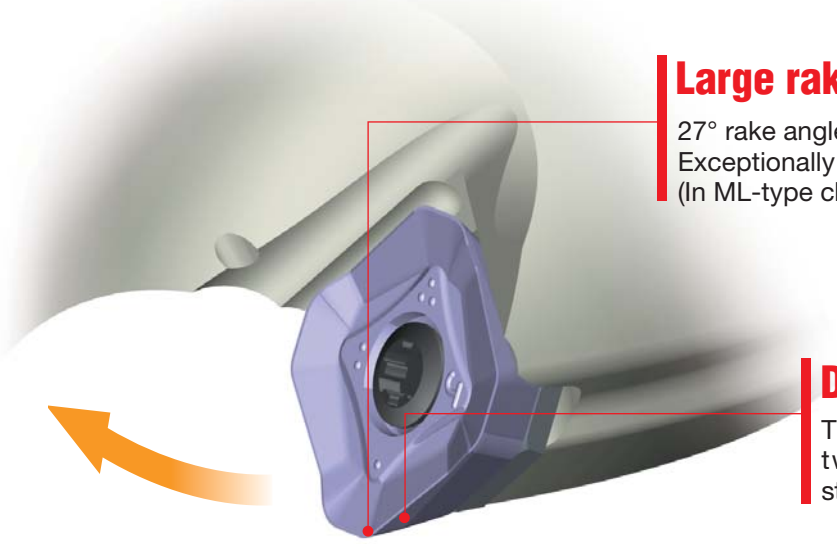
TAW13 type

20 to 30% lighter than competitors cutters.
Lighter than conventional TAC mills by 5 to 10%.

Features

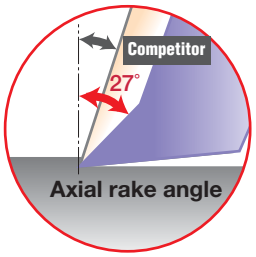
● Low cutting forces and reliability for impact resistance

Contributes to free cutting action with extremely high toughness levels.



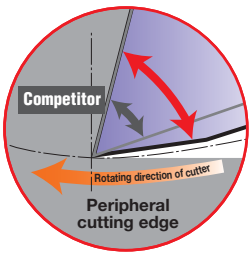
Large rake angle

27° rake angle!
Exceptionally low cutting forces!
(In ML-type chipbreaker)

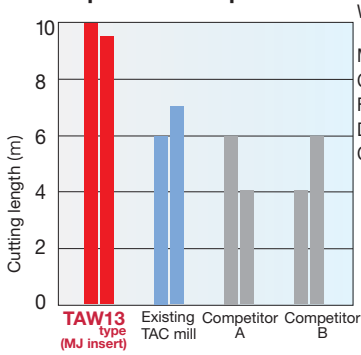


Double-relief geometry

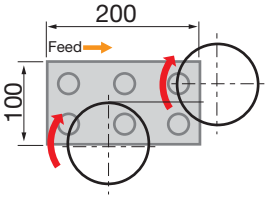
The peripheral cutting edges with two-step relief increase edge strength.



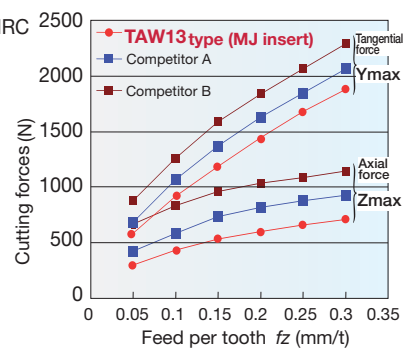
■Comparison of impact resistance



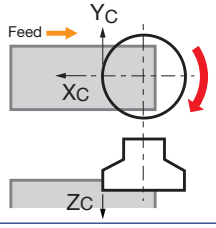
Work material : Carbon steel (JIS S50C), 280HRC
Machine : BT50
Cutting speed : *Vc* = 150 m/min
Feed rate : *fz* = 0.3 mm/t
Depth of cut : *ap* = 2.0 mm
Cutting width : *ae* = 50 mm



■Comparison of cutting forces



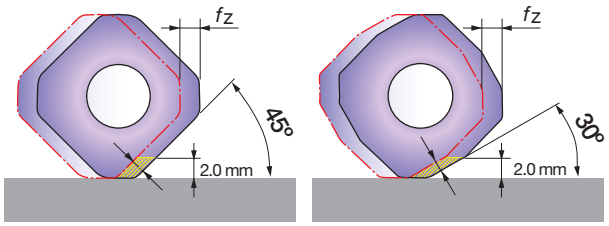
Work material : Carbon steel (JIS S55C), 280HB
Machine : BT50
Cutting speed : *Vc* = 150 m/min
Feed rate : *fz* = 0.05 ~ 0.3 mm/t
Depth of cut : *ap* = 3.0 mm
Cutting width : *ae* = 80 mm



a highly rigid, forces !!

● High productivity

Bodies are available in coarse, close, and extra-close (made to order) pitch design.
TAW / EAW13 type with 45° corner angle. **HJ-type** inserts for high feed milling are available.



CA 45° **HJ-type**

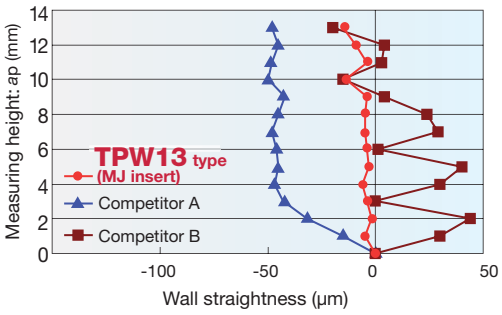
Productivity improved x 2 times!

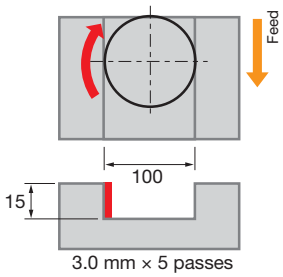
The HJ-type insert with a 30° cutting edge angle can reduce cutting load. Furthermore, the HJ-type allows feed rates to be improved 2 times.

● High accuracy

The body has a highly improved axial and radial run-out that can drastically improve surface quality.
TPW / EPW13 type with a 90° corner angle creates highly accurate wall straightness.

■ **Accuracy of wall straightness produced with 90° corner angle cutters.**





Work material : Carbon steel (JIS S55C), 210HB
Machine : BT50
Cutting speed : *Vc* = 100 m/min
Feed rate : *fz* = 0.1 mm/t
Depth of cut : *ap* = 3.0 mm × 5 passes
Width of cut : *ae* = 100 mm (slotting)

● Highly functional body design

Air-holes applicable for through-the-spindle coolant system. (For cutters smaller than ø125 mm)
Special surface treatment improves resistance to corrosion and rubbing.

Chipbreaker

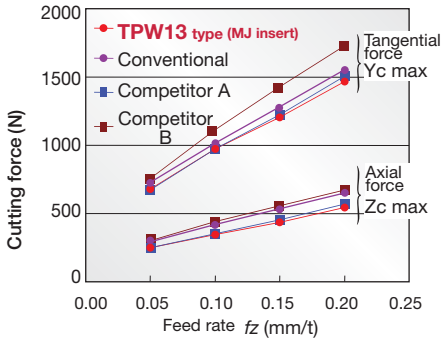
MJ type First choice

For general purpose well balanced impact resistance and low cutting forces.

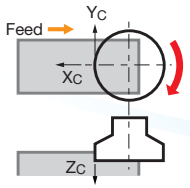
P Steel **AH120** : for general purpose.
T3130 : for high speed milling.
NS740 : for high quality surface finish.

M Stainless **AH130** PREMIUMTEC
K Cast Iron **T1115** PREMIUMTEC

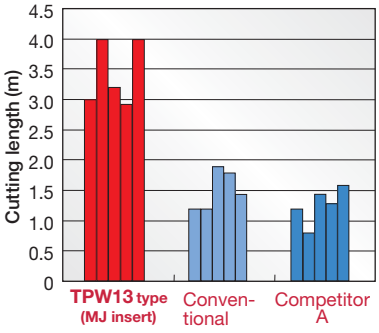
Cutting forces



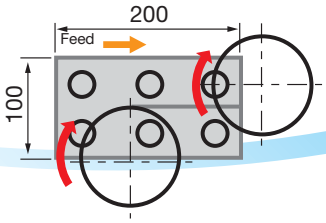
Work material : Carbon steel (JIS S55C)
Machine : BT50
Cutting speed : *Vc* = 150 m/min
Feed rate : *fz* = 0.05 ~ 0.2 mm/t
Depth of cut : *ap* = 3.0 mm
Cutting width : *ae* = 80 mm



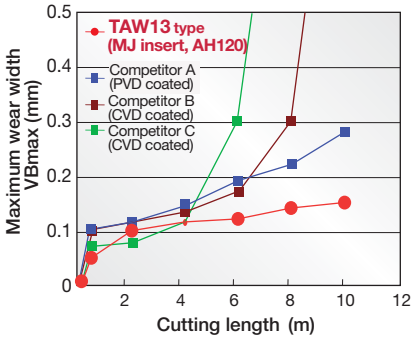
Impact resistance



Work material : Die steel (PX5)
Machine : BT50
Cutting speed : *Vc* = 150 m/min
Feed rate : *fz* = 0.2 mm/t
Depth of cut : *ap* = 3.0 mm
Cutting width : *ae* = 50 mm



Wear resistance



Work material : Chromium molybdenum steel equivalent to JIS SCM440, 280HB
Machine : BT40
Cutting speed : *Vc* = 150 m/min
Feed rate : *fz* = 0.25 mm/t
Depth of cut : *ap* = 2.0 mm
Cutting width : *ae* = 60 mm
Dry cutting

AJ type For machining aluminium alloys

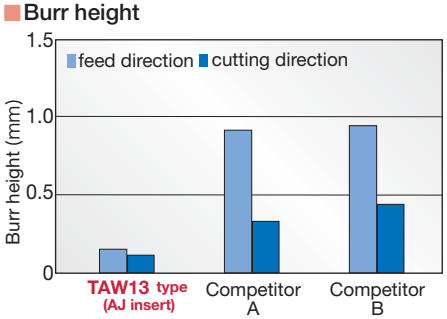
The DLC coated grades offer excellent welding resistance.

Excellent sharpness with the **AJ chipbreaker**
+
Excellent welding resistance
DLC coated grade **DS1100**

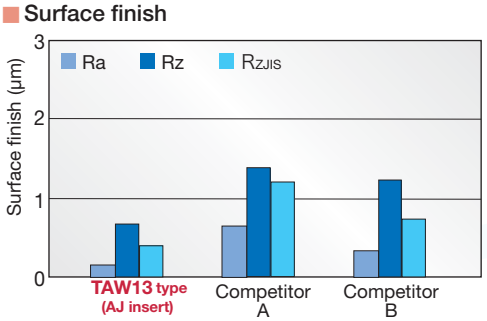
Longer tool life, Better surface finish & fewer burrs!!

N Non-ferrous **KS05F** : General purpose
DS1100 : High surface quality

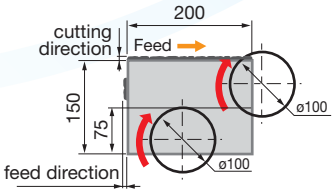
Burr height



Surface finish



Work material : Aluminium allloy (JIS A5052)
Machine : BT40
Cutting speed : *Vc* = 600 m/min
Feed rate : *fz* = 0.15 mm/t
Depth of cut : *ap* = 1.0 mm
Cutting width : *ae* = 75 mm



HJ type For high productivity

Allows 1.5 to 2 times higher feeds than conventional inserts. (Max. depth of cut: *ap* = 2 mm)
Excellent impact resistance and low cutting forces even under high cutting load in high feed milling.

P Steel **AH120** : for general purpose machining.
T3130 : for high speed machining.

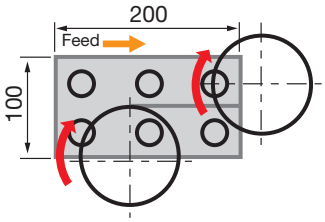
M Stainless **AH130** PREMIUMTEC TUNGALOY

K Cast Iron **T1115** PREMIUMTEC TUNGALOY

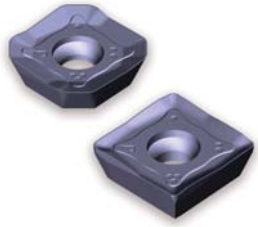
■Comparison of productivity

	Feed per tooth: *fz* (mm/t)				
	0.3	0.4	0.5	0.6	0.65
TAW13 (HJ insert)					
Competitor A					
Competitor B					

Work material : Chromium molybdenum steel (JIS SCM440), 30HRC
Machine : BT50
Cutting speed : *Vc* = 200 m/min
Feed rate : *fz* = 0.3 ~ 0.65 mm/t
Depth of cut : *ap* = 2.0 mm
Cutting width : *ae* = 50 mm



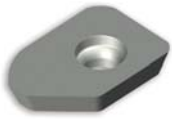
MJ type (G-class) For finishing and precision machining



Ground insert with high accuracy.
For high surface finish.

P Steel **AH120** : for general purpose machining.
NS740 : for high quality surface finishes.

Wiper insert For finishing



When combined with regular inserts it allows excellent surface finish.

P Steel **NS740**

M Stainless K Cast Iron **GH110**

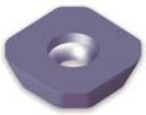
N Non-ferrous **KS05F** : for general purpose.
DX140 : for highquality surface finish.
DS1100 : for highquality surface finish.

ML type For low cutting forces and less rigid workpieces

Large rake angle contributes to low cutting forces.
Suitable for machining low rigid worlpieces.

P Steel **AH120**

Flat top type Priority on impact resistance



Flat-top insert provided with excellent impact resistance.
Most suitable for roughing of cast irons and steels.

P Steel **AH120** : for general purpose.
T3130 : for high speed machining.
NS740 : for high quality surface finishes.

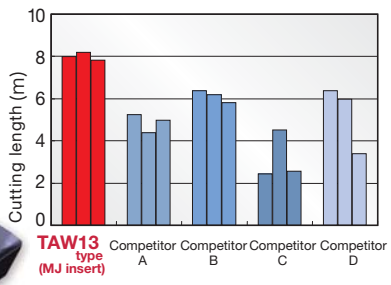
K Cast Iron **T1115** PREMIUMTEC TUNGALOY

MS type For machining stainless steels

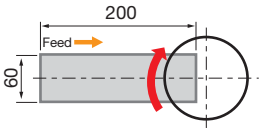
Suitable for machining stainless steel.
Sharp cutting edge and large rake angle eliminate burrs.
Suitable for machining stainless steel.
Sharp cutting edge and large rake angle eliminate burrs.

M Stainless **AH130** PREMIUMTEC TUNGALOY

■Wear resistance

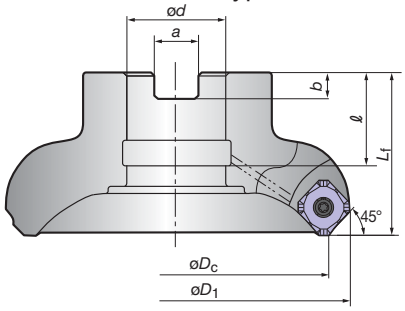


Work material : Stainless steel (JIS SUS304)
Machine : BT50
Cutting speed : *Vc* = 150 m/min
Feed rate : *fz* = 0.2 mm/t
Depth of cut : *ap* = 2.0 mm
Cutting width : *ae* = 60 mm

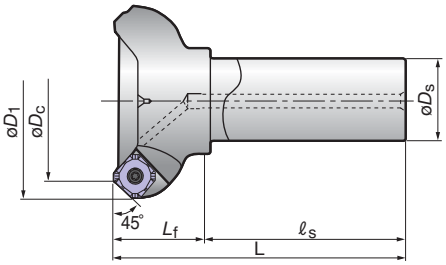


Cutter TAW / EAW 13 type

TAW13 type

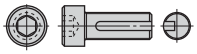


EAW13 type

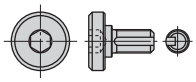


Cutter mounting bolts

CM10×30H
CM12×30H



TMBA-M16H
TMBA-M20H



Max. *ap* = 5 mm	Rake angle: A.R.+17°~ 20° R.R.-16° ~ 11°

TAW13 type (Bore type)

Pitch	Cat. No.	Stock	No. of inserts	Dimensions (mm)							Weight (kg)	Air hole	Cutter mounting bolts
				øDc	*øD1*	*ød*	*ℓ*	*Lf*	*b*	*a*			
Coarse	**TAW13R050M22.0-03**	●	3	50	63	22	20	40	6	10	0.4	With	CM10×30H
	TAW13R063M22.0-04	●	4	63	76	22	20	40	6	10	0.5	With	
	TAW13R080M25.4-04	●	4	80	94	25.4	26	50	6	9.5	1	With	CM12×30H
	TAW13R100M31.7-05	●	5	100	114	31.75	32	50	8	12.7	1.5	With	TMBA-M16H
	TAW13R125M38.1-06	●	6	125	139	38.1	38	63	10	15.9	2.8	With	TMBA-M20H
	TAW13R160M50.8-07	●	7	160	174	50.8	40	63	11	19	4.4	Without	—
	TAW13R200M47.6-08	●	8	200	213	47.625	38	63	14	25.4	8	Without	—
	TAW13R250M47.6-10		10	250	263	47.625	38	63	14	25.4	13.5	Without	—
	TAW13R315M47.6-14		14	315	328	47.625	38	63	14	25.4	22.5	Without	—
Close	**TAW13R050M22.0-04**	●	4	50	63	22	20	40	6	10	0.4	With	CM10×30H
	TAW13R063M22.0-05	●	5	63	76	22	20	40	6	10	0.6	With	
	TAW13R080M25.4-06	●	6	80	94	25.4	26	50	6	9.5	1	With	CM12×30H
	TAW13R100M31.7-07	●	7	100	114	31.75	32	50	8	12.7	1.5	With	TMBA-M16H
	TAW13R125M38.1-08	●	8	125	139	38.1	38	63	10	15.9	2.7	With	TMBA-M20H
	TAW13R160M50.8-10	●	10	160	174	50.8	40	63	11	19	4.4	Without	—
	TAW13R200M47.6-12		12	200	213	47.625	38	63	14	25.4	7.8	Without	—
	TAW13R250M47.6-14		14	250	263	47.625	38	63	14	25.4	13.3	Without	—
	TAW13R315M47.6-18		18	315	328	47.625	38	63	14	25.4	22.2	Without	—
Extra close	**TAW13R050M22.0-05**		5	50	63	22	20	40	6	10	0.4	With	CM10×30H
	TAW13R063M22.0-06		6	63	76	22	20	40	6	10	0.6	With	
	TAW13R080M25.4-08		8	80	94	25.4	26	50	6	9.5	1	With	CM12×30H
	TAW13R100M31.7-10		10	100	114	31.75	32	50	8	12.7	1.5	With	TMBA-M16H
	TAW13R125M38.1-12		12	125	139	38.1	38	63	10	15.9	3	With	TMBA-M20H
	TAW13R160M50.8-16		16	160	174	50.8	40	63	11	19	4.4	Without	—
	TAW13R200M47.6-20		20	200	213	47.625	38	63	14	25.4	8	Without	—
	TAW13R250M47.6-24		24	250	263	47.625	38	63	14	25.4	13.5	Without	—
	TAW13R315M47.6-28		28	315	328	47.625	38	63	14	25.4	22.6	Without	—

● : Stocked items

▶ Replacement parts

Descriptions	Coarse pitch type	Close pitch type	Extra close pitch type
Shim screw	DTS5-3.5SS	DTS5-3.5SS	DTS5-3.5SS
Shim	FSSA1102	FSSA1102	FSSA1102
Clamping screw	CSPB-3.5	CSPB-3.5	CSPB-3.5
Wrench	P-3.5 / IP-15D	P-3.5 / IP-15D	P-3.5 / IP-15D

EAW13 type (Shank type)

Pitch	Cat. No.	Stock	No. of inserts	Dimensions (mm)							Weight (kg)	Air hole
				øDc	øD1	ød	ℓ	Lf	b	a		
Coarse	EAW13R025M25.0-02	●	2	25	39	25	80	35	115	115	0.4	With
	EAW13R032M32.0-02	●	2	32	46	32	80	35	115	115	0.7	With
	EAW13R040M32.0-03	●	3	40	54	32	80	35	115	115	0.8	With
	EAW13R050M32.0-03	●	3	50	63	32	80	40	120	120	1	With
	EAW13R063M32.0-04	●	4	63	76	32	80	40	120	120	1.1	With
	EAW13R080M32.0-04	●	4	80	94	32	80	40	120	120	1.5	With
Close	EAW13R050M32.0-04	●	4	50	63	32	80	40	120	120	0.9	With
	EAW13R063M32.0-05	●	5	63	76	32	80	40	120	120	1.1	With
	EAW13R080M32.0-06	●	6	80	94	32	80	40	120	120	1.4	With

▶ Replacement parts

Descriptions	Coarse pitch type		Close pitch type
	EAW13R025 ~	EAW13R050 ~	EAW13R050 ~
Shim screw	-	DTS5-3.5SS	DTS5-3.5SS
Shim	-	FSSA1102	FSSA1102
Clamping screw	CSPB-3.5		CSPB-3.5
Wrench	IP-15D	P-3.5 / IP-15D	P-3.5 / IP-15D

Inserts

SWMT13T3AFPR-MJ

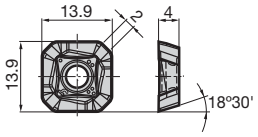


Fig.1

SWMT13T3AFER-ML

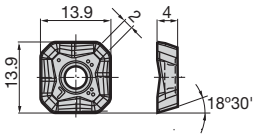


Fig.2

SWMW13T3AFTR

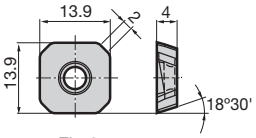


Fig.3

SWMT13T3AFPR-HJ

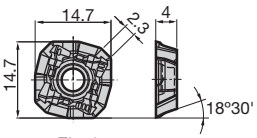


Fig.4

SWMT13T3AFPR-MS

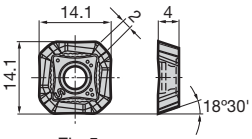


Fig.5

SWGT13T3AFFR-AJ

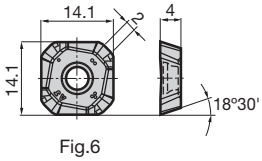


Fig.6

SWGT13T3AFPR-MJ

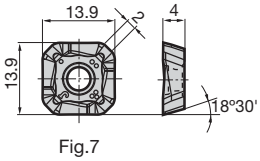


Fig.7

WWCW13T3AFE/FR-WS

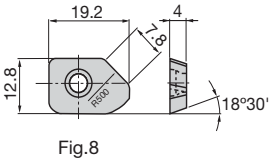


Fig.8

WWCW13T3AFFR-WD

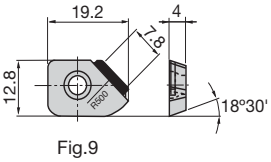


Fig.9

Type	Cat. No.	Accuracy	Honing	Stocked grades										Fig.
				Coated						DLC coat	Cermet	Uncoated	T-DIA	
				T3130	T1115	AH120	AH130	AH140	GH110	DS1100	NS740	KS05F	DX140	
Regular	SWMT13T3AFPR-MJ	M	With	●	●	●	●	●			●			1
	SWMT13T3AFER-ML	M	With			●								2
	SWMW13T3AFTR	M	With	●	●	●					●			3
	SWMT13T3AFPR-HJ	M	With	●	●	●	●	●						4
	SWMT13T3AFPR-MS	M	With				●	●						5
	SWGT13T3AFFR-AJ	G	Without							●		●		6
	SWGT13T3AFPR-MJ	G	With			●					●			7
Wiper	WWCW13T3AFER-WS	C	With						●		●			8
	WWCW13T3AFFR-WS	C	Without							●		●		
	WWCW13T3AFFR-WD	C	Without										●	9

● : Stocked items

Standard cutting conditions TAW / EAW 13 type

Work material	Recommended insert grade	Cutting speed *Vc* (m/min)	Roughing (Depth of cut: *ap* ≥ 1.0 mm) Feed per tooth: *fz* (mm/t)					
			MJ	ML	HJ	MS	Flat top	AJ
Mild steels Low carbon steels (< 180HB)	**AH120** (First choice)	180 (100 - 270)	0.2 (0.05 - 0.3)	0.15 (0.05 - 0.25)	0.4 (0.2 - 0.6)	—	0.2 (0.05 - 0.3)	—
	T3130 (Priority on wear resistance)	220 (150 - 300)	0.2 (0.05 - 0.3)	—	0.4 (0.2 - 0.6)	—	0.2 (0.05 - 0.3)	—
	AH130 / AH140 (Priority on impact resistance)	130 (80 - 180)	0.2 (0.05 - 0.3)	—	—	0.17 (0.1 - 0.25)	—	—
	NS740 (Priority on surface finish)	200 (100 - 300)	0.15 (0.05 - 0.23)	—	—	—	0.15 (0.05 - 0.23)	—
Carbon steels Alloy steels (< 300HB)	**AH120** (First choice)	150 (100 - 230)	0.17 (0.05 - 0.25)	0.12 (0.05 - 0.2)	0.3 (0.2 - 0.5)	—	0.17 (0.05 - 0.25)	—
	T3130 (Priority on wear resistance)	200 (150 - 280)	0.17 (0.05 - 0.25)	—	0.3 (0.2 - 0.5)	—	0.17 (0.05 - 0.25)	—
	AH130 / AH140 (Priority on impact resistance)	120 (80 - 150)	0.17 (0.05 - 0.25)	—	0.3 (0.2 - 0.5)	—	—	—
	NS740 (Priority on surface finish)	150 (100 - 230)	0.12 (0.05 - 0.2)	—	—	—	0.12 (0.05 - 0.2)	—
Die steels (< 30HRC)	**AH120** (First choice)	140 (100 - 180)	0.12 (0.05 - 0.2)	0.12 (0.05 - 0.2)	0.3 (0.2 - 0.4)	—	0.12 (0.05 - 0.2)	—
	T3130 (Priority on wear resistance)	140 (100 - 180)	0.12 (0.05 - 0.2)	—	0.3 (0.2 - 0.4)	—	0.12 (0.05 - 0.2)	—
Stainless steels (< 250HB)	**AH130 / AH140** (First choice)	150 (80 - 200)	0.17 (0.1 - 0.25)	—	0.3 (0.2 - 0.5)	0.15 (0.1 - 0.2)	–	—
	AH120 (Priority on wear resistance)	200 (150 - 250)	0.17 (0.1 - 0.25)	0.15 (0.1 - 0.2)	0.3 (0.2 - 0.5)	—	0.17 (0.1 - 0.25)	—
Grey cast irons Ductile cast irons	**T1115** (First choice)	180 (100 - 250)	0.17 (0.05 - 0.25)	–	0.4 (0.2 - 0.6)	—	0.17 (0.05 - 0.25)	—
	AH120 (Priority on impact resistance)	180 (100 - 250)	0.17 (0.05 - 0.25)	0.15 (0.05 - 0.2)	0.4 (0.2 - 0.6)	—	0.17 (0.05 - 0.25)	—
Aluminium alloys (Si < 13 %)	**DS1100 / KS05F** (First choice)	500 (300 - 1000)	—	—	—	—	—	0.12 (0.05 - 0.2)
Aluminium alloys (Si ≥ 13 %)	**DS1100 / KS05F** (First choice)	200 (80 - 300)	—	—	—	—	—	0.12 (0.05 - 0.2)
Copper alloys	**DS1100 / KS05F** (First choice)	350 (200 - 500)	—	—	—	—	—	0.12 (0.05 - 0.2)

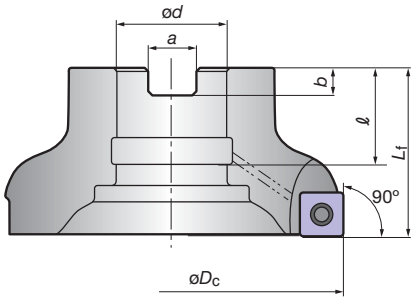
Work material	Recommended insert grade	Cutting speed *Vc* (m/min)	Light cutting to finishing (Depth of cut: *ap* ≥ 1.0 mm) Feed per tooth: *fz* (mm/t)					
			MJ	ML	HJ	MS	Flat top	AJ
Mild steels Low carbon steels (< 180HB)	**AH120** (First choice)	180 (100 - 270)	0.17 (0.05 - 0.25)	0.12 (0.05 - 0.2)	0.4 (0.2 - 0.6)	—	0.17 (0.05 - 0.25)	—
	T3130 (Priority on wear resistance)	220 (150 - 300)	0.17 (0.05 - 0.25)	—	0.4 (0.2 - 0.6)	—	0.17 (0.05 - 0.25)	—
	AH130 / AH140 (Priority on impact resistance)	130 (80 - 180)	0.17 (0.05 - 0.25)	—	—	0.15 (0.1 - 0.2)	—	—
	NS740 (Priority on surface finish)	200 (100 - 300)	0.12 (0.05 - 0.2)	—	—	—	0.12 (0.05 - 0.2)	—
Carbon steels Alloy steels (< 300HB)	**AH120** (First choice)	150 (100 - 230)	0.12 (0.05 - 0.2)	0.1 (0.05 - 0.15)	0.3 (0.2 - 0.5)	—	0.12 (0.05 - 0.2)	—
	T3130 (Priority on wear resistance)	200 (150 - 280)	0.12 (0.05 - 0.2)	—	0.3 (0.2 - 0.5)	—	0.12 (0.05 - 0.2)	—
	AH130 / AH140 (Priority on impact resistance)	120 (80 - 150)	0.12 (0.05 - 0.2)	—	0.3 (0.2 - 0.5)	—	—	—
	NS740 (Priority on surface finish)	150 (100 - 230)	0.12 (0.05 - 0.18)	—	—	—	0.12 (0.05 - 0.18)	—
Die steels (< 30HRC)	**AH120** (First choice)	140 (100 - 180)	0.12 (0.05 - 0.18)	0.1 (0.05 - 0.12)	0.3 (0.2 - 0.4)	—	0.12 (0.05 - 0.18)	—
	T3130 (Priority on wear resistance)	140 (100 - 180)	0.12 (0.05 - 0.18)	—	0.3 (0.2 - 0.4)	—	0.12 (0.05 - 0.18)	—
Stainless steels (< 250HB)	**AH130 / AH140** (First choice)	150 (80 - 200)	0.15 (0.1 - 0.2)	—	0.3 (0.2 - 0.5)	0.15 (0.1 - 0.18)	–	—
	AH120 (Priority on wear resistance)	200 (150 - 250)	0.15 (0.1 - 0.2)	0.15 (0.1 - 0.18)	0.3 (0.2 - 0.5)	—	0.15 (0.1 - 0.2)	—
Grey cast irons Ductile cast irons	**T1115** (First choice)	180 (100 - 250)	0.15 (0.05 - 0.2)	–	0.4 (0.2 - 0.6)	—	0.15 (0.05 - 0.2)	—
	AH120 (Priority on impact resistance)	180 (100 - 250)	0.15 (0.05 - 0.2)	0.12 (0.05 - 0.18)	0.4 (0.2 - 0.6)	—	0.15 (0.05 - 0.2)	—
Aluminium alloys (Si < 13 %)	**DS1100 / KS05F** (First choice)	500 (300 - 1000)	—	—	—	—	—	0.12 (0.05 - 0.2)
Aluminium alloys (Si ≥ 13 %)	**DS1100 / KS05F** (First choice)	200 (80 - 300)	—	—	—	—	—	0.12 (0.05 - 0.2)
Copper alloys	**DS1100 / KS05F** (First choice)	350 (200 - 500)	—	—	—	—	—	0.12 (0.05 - 0.2)

Notes:

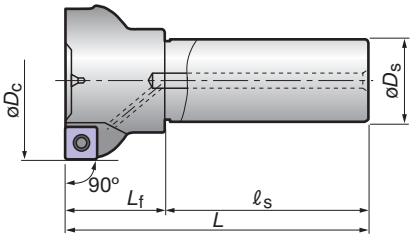
- When machining at large depth of cut or large cutting width, *Vc* and *fz* should be reduced.
- As a rule, dry machining (including air blow) is recommended. But, for excessive chip welding, such as when machining stainless steels, use a water soluble cutting fluid. In this case, use AH140 and set the cutting speed to *Vc* ≤ 100 m/min.
- When machining mild steel, carbon steel or alloy steel in wet conditions the T3130 is recommended. In this case, *Vc* and *fz* should be reduced.
- TAW13 type can not be used for ramping, plunging and drilling.

Cutter TPW / EPW 13 type

TPW13 type

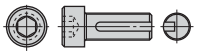


EPW13 type

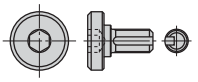


Cutter mounting bolts

CM10×30H
CM12×30H



TMBA-M16H
TMBA-M20H



Max. *ap* = 10 mm

Rake angle: A.R.+11.5° R.R.–13° ~ 10.5°

TPW13 type (Bore type)

Pitch	Cat. No.	Stock	No. of inserts	Dimensions (mm)						Weight (kg)	Air hole	Cutter mounting bolts
				øDc	ød	ℓ	Lf	b	a			
Coarse	TPW13R050M22.0-03	●	3	50	22	20	40	6	10	0.3	With	CM10×30H
	TPW13R063M22.0-04	●	4	63	22	20	40	6	10	0.5	With	
	TPW13R080M25.4-04	●	4	80	25.4	26	50	6	9.5	0.8	With	CM12×30H
	TPW13R100M31.7-05	●	5	100	31.75	38	50	8	12.7	1.2	With	TMBA-M16H
	TPW13R125M38.1-06	●	6	125	38.1	38	63	10	15.9	2.4	With	TMBA-M20H
	TPW13R160M50.8-08	●	8	160	50.8	38	63	11	19	4	Without	—
	TPW13R200M47.6-10	●	10	200	47.625	38	63	14	25.4	7.4	Without	—
	TPW13R250M47.6-12		12	250	47.625	38	63	14	25.4	12.6	Without	—
Close	TPW13R050M22.0-04	●	4	50	22	20	40	6	10	0.3	With	CM10×30H
	TPW13R063M22.0-05	●	5	63	22	20	40	6	10	0.4	With	
	TPW13R080M25.4-06	●	6	80	25.4	26	50	6	9.5	0.8	With	CM12×30H
	TPW13R100M31.7-07	●	7	100	31.75	38	50	8	12.7	1.2	With	TMBA-M16H
	TPW13R125M38.1-08	●	8	125	38.1	38	63	10	15.9	2.4	With	TMBA-M20H
	TPW13R160M50.8-12	●	12	160	50.8	38	63	11	19	4	Without	—
	TPW13R200M47.6-16		16	200	47.625	38	63	14	25.4	7.4	Without	—
	TPW13R250M47.6-18		18	250	47.625	38	63	14	25.4	12.7	Without	—
Extra close	TPW13R050M22.0-05		5	50	22	20	40	6	10	0.3	With	CM10×30H
	TPW13R063M22.0-06		6	63	22	20	40	6	10	0.4	With	
	TPW13R080M25.4-08		8	80	25.4	26	50	6	9.5	0.8	With	CM12×30H
	TPW13R100M31.7-10		10	100	31.75	38	50	8	12.7	1.2	With	TMBA-M16H
	TPW13R125M38.1-12		12	125	38.1	38	63	10	15.9	2.5	With	TMBA-M20H
	TPW13R160M50.8-15		15	160	50.8	38	63	11	19	4	Without	—

● : Stocked items

▶ Replacement parts

Descriptions	Coarse pitch type	Close pitch type	Extra close pitch type
Shim screw	DTS5-3.5SS	DTS5-3.5SS	DTS5-3.5SS
Shim	FSSP1102	FSSP1102	FSSP1102
Clamping screw	CSPB-3.5	CSPB-3.5	CSPB-3.5
Wrench	P-3.5 / IP-15D	P-3.5 / IP-15D	P-3.5 / IP-15D

EPW13 type (Shank type)

Pitch	Cat. No.	Stock	No. of inserts	Dimensions (mm)					Weight (kg)	Air hole
				øDc	øDs	ℓs	Lf	L		
Coarse	EPW13R025M25.0-01		1	25	25	80	35	115	0.4	With
	EPW13R032M32.0-02	●	2	32	32	80	35	115	0.6	With
	EPW13R040M32.0-03	●	3	40	32	80	35	115	0.7	With
	EPW13R050M32.0-03	●	3	50	32	80	40	120	0.9	With
	EPW13R063M32.0-04	●	4	63	32	80	40	120	1	With
	EPW13R080M32.0-04	●	4	80	32	80	40	120	1.3	With
Close	EPW13R050M32.0-04	●	4	50	32	80	40	120	0.9	With
	EPW13R063M32.0-05	●	5	63	32	80	40	120	1	With
	EPW13R080M32.0-06	●	6	80	32	80	40	120	0.8	With

▶ Replacement parts

Descriptions	Coarse pitch type		Close pitch type
	EPW13R025 ~	EPW13R050 ~	EPW13R050 ~
Shim screw	-	DTS5-3.5SS	DTS5-3.5SS
Shim	-	FSSP1102	FSSP1102
Clamping screw	CSPB-3.5		CSPB-3.5
Wrench	IP-15D	P-3.5 / IP-15D	P-3.5 / IP-15D

Inserts

SWMT1304PDPR-MJ

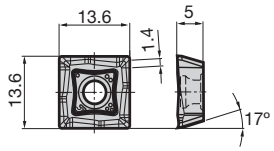


Fig.1

SWMT1304PDER-ML

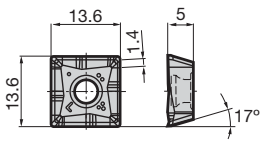


Fig.2

SWMT1304PDPR-MS

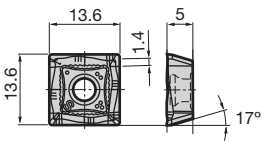


Fig.3

SWGT1304PDPR-MJ

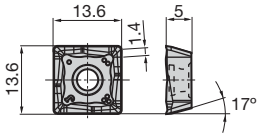


Fig.4

SWGT1304PDFR-AJ

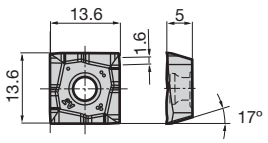


Fig.5

Cat. No.	Accuracy	Honing	Stocked grades								Fig.
			Coated					DLC coat	Cermet	Uncoated	
			T3130	T1115	AH120	AH130	AH140	DS1100	NS740	KS05F	
SWMT1304PDPR-MJ	M	With	●	●	●	●	●		●		1
SWMT1304PDER-ML	M	With			●						2
SWMT1304PDPR-MS	M	With				●	●				3
SWGT1304PDPR-MJ	G	With			●				●		4
SWGT1304PDFR-AJ	G	Without						●		●	5

● : Stocked items

Standard cutting conditions TPW / EPW 13 type

Work material	Recommended insert grade	Cutting speed *Vc* (m/min)	Roughing (Depth of cut: *ap* ≥ 1.0 mm)				Light cutting to finishing (Depth of cut: *ap* ≥ 1.0 mm)			
			Feed per tooth: *fz* (mm/t)				Feed per tooth: *fz* (mm/t)			
			MJ	ML	MS	AJ	MJ	ML	MS	AJ
Mild steels Low carbon steels (< 180HB)	**AH120** (First choice)	180 (100 - 270)	0.17 (0.05 - 0.25)	0.12 (0.05 - 0.2)	–	–	0.15 (0.05 - 0.2)	0.12 (0.05 - 0.18)	–	–
	T3130 (Priority on wear resistance)	220 (150 - 300)	0.17 (0.05 - 0.25)	–	–	–	0.15 (0.05 - 0.2)	–	–	–
	AH130 / AH140 (Priority on impact resistance)	130 (80 - 180)	0.17 (0.05 - 0.25)	–	0.12 (0.05 - 0.2)	–	0.15 (0.05 - 0.2)	–	0.12 (0.05 - 0.18)	–
	NS740 (Priority on surface finish)	200 (100 - 300)	0.1 (0.05 - 0.15)	–	–	–	0.1 (0.05 - 0.12)	–	–	–
Carbon steels Alloy steels (< 300HB)	**AH120** (First choice)	150 (100 - 230)	0.15 (0.05 - 0.2)	0.1 (0.05 - 0.15)	–	–	0.12 (0.05 - 0.18)	0.1 (0.05 - 0.12)	–	–
	T3130 (Priority on wear resistance)	200 (150 - 280)	0.15 (0.05 - 0.2)	–	–	–	0.12 (0.05 - 0.18)	–	–	–
	AH130 / AH140 (Priority on impact resistance)	120 (80 - 150)	0.15 (0.05 - 0.2)	–	–	–	0.12 (0.05 - 0.18)	–	–	–
	NS740 (Priority on surface finish)	150 (100 - 230)	0.1 (0.05 - 0.15)	–	–	–	0.08 (0.05 - 0.12)	–	–	–
Die steels (< 30HRC)	**AH120** (First choice)	140 (100 - 180)	0.1 (0.05 - 0.15)	0.08 (0.05 - 0.12)	–	–	0.08 (0.05 - 0.12)	0.08 (0.05 - 0.1)	–	–
	T3130 (Priority on wear resistance)	140 (100 - 180)	0.1 (0.05 - 0.15)	–	–	–	0.08 (0.05 - 0.12)	–	–	–
Stainless steels (< 250HB)	**AH130 / AH140** (First choice)	150 (80 - 200)	0.15 (0.05 - 0.2)	–	0.12 (0.05 - 0.18)	–	0.12 (0.05 - 0.18)	–	0.12 (0.05 - 0.15)	–
	AH120 (Priority on wear resistance)	200 (150 - 250)	0.15 (0.05 - 0.2)	0.1 (0.05 - 0.15)	–	–	0.12 (0.05 - 0.18)	0.08 (0.05 - 0.12)	–	–
Grey cast irons Ductile cast irons	**T1115** (First choice)	180 (100 - 250)	0.15 (0.05 - 0.2)	–	–	–	0.12 (0.05 - 0.18)	–	–	–
	AH120 (Priority on impact resistance)	180 (100 - 250)	0.15 (0.05 - 0.2)	0.1 (0.05 - 0.15)	–	–	0.12 (0.05 - 0.18)	0.08 (0.05 - 0.12)	–	–
Aluminium alloys (Si < 13 %)	**DS1100 / KS05F** (First choice)	500 (300 - 1000)	–	–	–	0.15 (0.05 - 0.2)	–	–	–	0.15 (0.05 - 0.2)
Aluminium alloys (Si ≥ 13 %)	**DS1100 / KS05F** (First choice)	200 (80 - 300)	–	–	–	0.15 (0.05 - 0.2)	–	–	–	0.15 (0.05 - 0.2)
Copper alloys	**DS1100 / KS05F** (First choice)	350 (200 - 500)	–	–	–	0.15 (0.05 - 0.2)	–	–	–	0.15 (0.05 - 0.2)

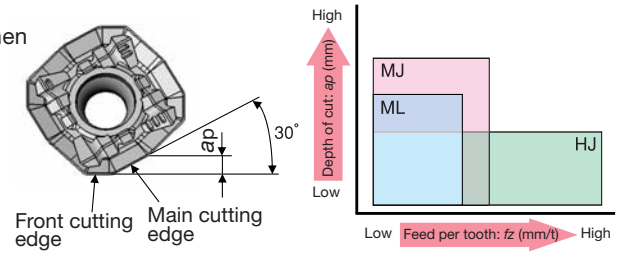
Notes:

- When machining at large depth of cut or large cutting width, *Vc* and *fz* should be reduced.
- As a rule, dry machining (including air blow) is recommended. But, for excessive chip welding, such as when machining stainless steels, use a water soluble cutting fluid. In this case, use AH140 and set the cutting speed to *Vc* ≤ 100 m/min.
- When machining mild steel, carbon steel or alloy steel in wet conditions the T3130 is recommended. In this case, *Vc* and *fz* should be reduced.
- TPW13 type can not be used for ramping, plunging and drilling.

Cautionary points when using HJ inserts

HJ-type inserts have a unique geometry for high feed machining. When using HJ inserts, care should be taken to the follow the below points:

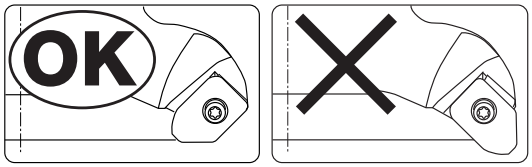
- Use the inserts within the maximum depth of cut, *ap* = 2 mm.
- Do not use the inserts together in the same cutter body with other insert types (such as MJ, MS, etc.)
- The peripheral shape of the HJ-type insert differs from other types (MJ, MS, etc.). However, it can be used in the same insert pocket.



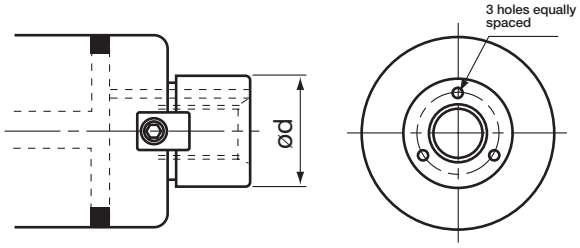
Cautionary points when using wiper inserts

- When a high surface finish is required, use of a wiper insert (WWCW13T3AF_R-W_) is recommended. In general, installing one wiper insert provides superior surface finish.
- When using the wiper insert, install the insert as shown in Fig.1. If the insert is installed as shown in Fig.2, insert breakage is inevitable and normal surface finish can not be obtained.
- The wiper insert has one wiping corner.
- The peripheral cutting edge of the wiper insert is retracted from the edge of the normal inserts. Therefore, the chip load of the normal insert next to the wiper insert is two times that of other normal inserts.
- When using the wiper insert, a depth of cut (ap) less than 1 mm is recommended.

Fig.1 Fig.2

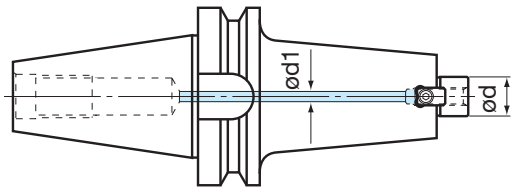


Face mill arbors with center through-coolant hole



Cutter diameter øD (mm)	50/63	80	100	125	160
Nominal diameter ød (mm)	22	25.4	31.75	38.1	50.8
Arbor type	FMH22	FMH25.4	FMH31.75	FMH38.1	FMH50.8

Notes on arbors: when using TAW13 or TPW13 type, use through center air.



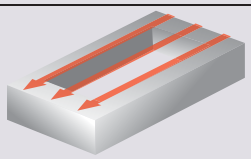
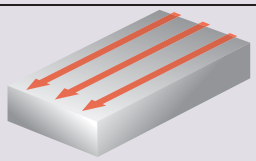
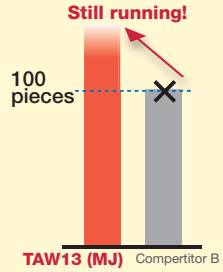
Nominal diameter ød (mm)	16	22	25.4	31.75	38.1	50.8
Applicable arbor types	SMA SM1	FMC SM1	FMA FMC	FMA SMB	FMA	FMA
Through hole diameter øD1 (mm)	4 ~ 6	5 ~ 8	6 ~ 9	10 ~ 13	10 ~ 15	10 ~ 15

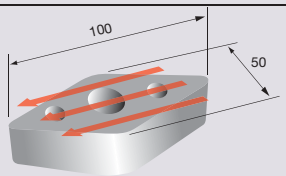
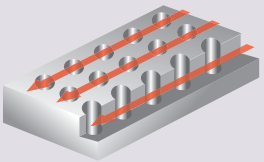
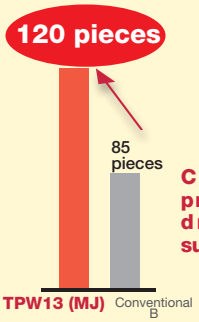
When using the TAW13 or TPW13 type with through center air (coolant or mist), the correct arbor must be used with through center air supplying.

Cautionary notes in use

- In slotting or pocketing, when chips are likely to remain in the cutting zone, internal air supplying or air blow is recommended to prevent chip recutting.
- Use of inserts other than those specified, can result in poor cutting and cause damage to the cutter body. Therefore, specified inserts from the Tungaloy catalogue must be used.
- Before changing or indexing the inserts, remove chips or other foreign matter from the insert, insert pocket and cutter body by using an air blast or cloth.
- The inserts should be clamped by using the wrench supplied with the TAC Mill.
- After a long period of use, the clamping screws and wrench may become deformed or damaged. These elements must be replaced as soon as possible.

Practical Examples

Part of workpiece		Machine component (structural part)	Plate for die
Milling cutter		TAW13R080M25.4-06 (ø80, z = 6)	TAW13R100M31.7-07 (ø100, z = 7)
Insert		SWMT13T3AFPR-MJ	SWMT13T3AFPR-HJ
Grade		AH120	T3130
Workpiece material		Chromium molybdenum steel (SCM415)	Carbon steel (JIS S55C)
			
Cutting conditions	Cutting speed: *Vc* (m/min)	180	240
	Feed rate: *fz* (mm/t)	0.15	0.6
	Feed speed: *Vf* (mm/min)	650	3,200
	Depth of cut: *ap* (mm)	2	2
	Cutting width: *ae* (mm)	-	~ 80
	Method of machining	Face milling	Face milling
	Coolant	Dry	Water soluble
	Machine	Vertical machining center BT50	Vertical machining center BT50
Results		 **180% tool life improvement!** **Smooth cutting without chattering makes tool life stable.**	**270% Productivity Improvement!!** **Feed speed: *Vf* = 1200 ⇨ 3200 mm/min. Even in high feed machining, the cutting is very smooth and silent.**

Part of workpiece		Hydraulic part	Machine component
Cutter		TPW13R080M25.4-04 (ø80, z = 4)	TPW13R080M25.4-06 (ø80, z = 6)
Insert		SWMT1304PDPR-MS	SWMT1304PDPR-MJ
Grade		AH140	AH140
Workpiece material		Chromium molybdenum steel (SCM415)	SUS316
			
Cutting conditions	Cutting speed: *Vc* (m/min)	120	100
	Feed rate: *fz* (mm/t)	0.18	0.1
	Feed speed: *Vf* (mm/min)	350	-
	Depth of cut: *ap* (mm)	1.2	2.8 x 5 Passes
	Cutting width: *ae* (mm)	~ 50	80
	Method of machining	Face milling	Face milling and shouldering
	Coolant	Dry	Water soluble
	Machine	-	Vertical machining center
Results		 **140% tool life improvement!** **Cutting with TPW13 proved very silent with drastically improved surface finish.**	**150% Productivity improvement!!** **In high impact heavy machining the TPW13 demonstrates stable tool life and reduced chipping.**

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