

TAW / EAW TPW / EPW

www.tungaloy.com/us

Tungaloy Report No. 358-US

The optimal solution for milling steel
and cast iron!



INDUSTRY 4.0
FEED the SPEED!

Exact simulation analysis provides a highly rigid, lightweight cutter with low cutting forces!

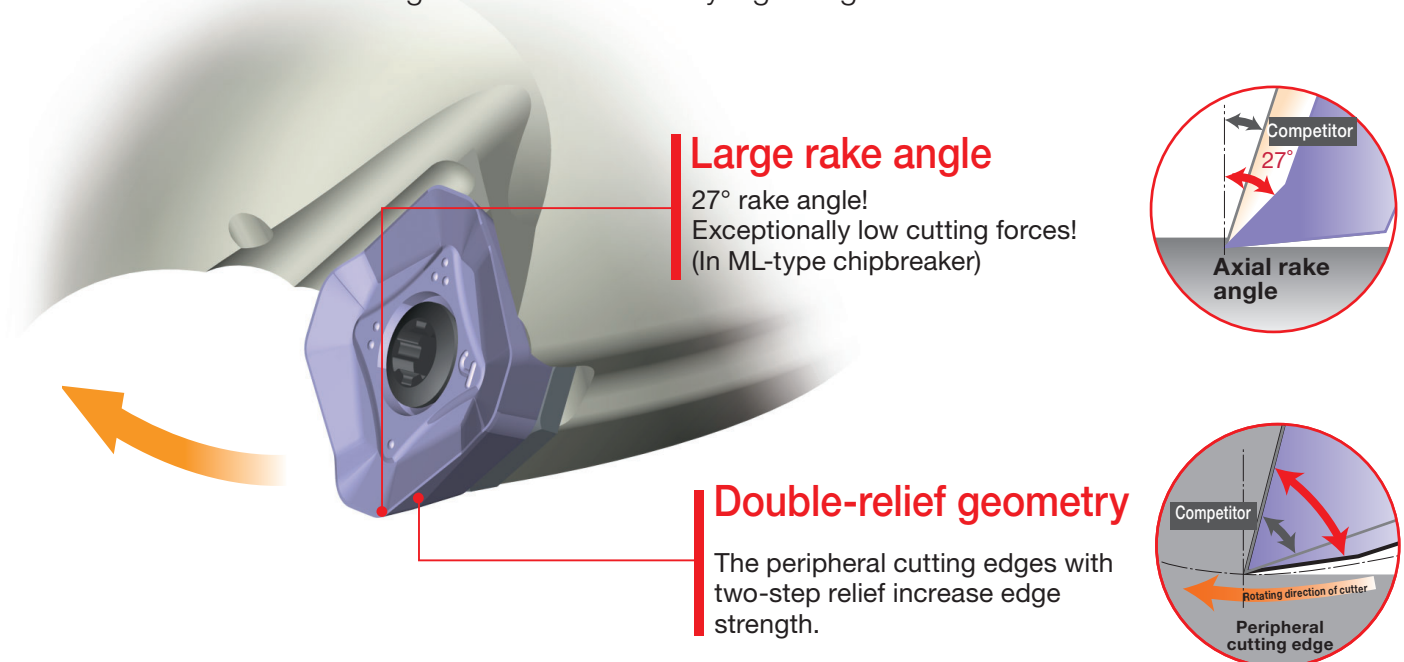
■ Analysis of the load transmission route



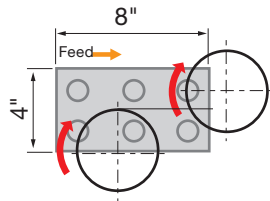
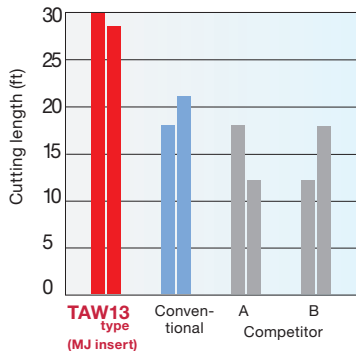
20 to 30% lighter than competitors cutters.
Lighter than conventional mills by 5 to 10%.

■ Low cutting forces and reliability for impact resistance

Contributes to free cutting action with extremely high toughness levels.

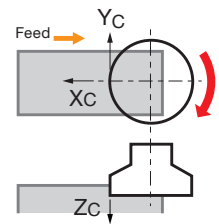
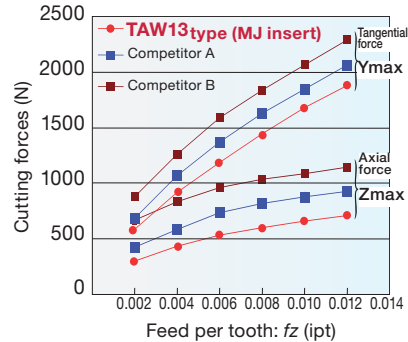


Comparison of impact resistance



Work material : Carbon steel (1050), 280HRC
 Cutting speed : $V_c = 500$ sfm
 Feed per tooth : $f_z = 0.012$ ipt
 Depth of cut : $a_p = 0.080$ "
 Cutting width : $a_e = 2.000$ "
 Machine : BT50

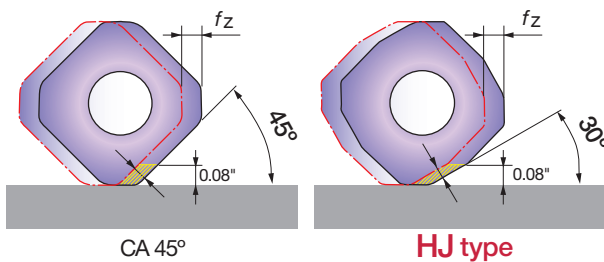
Comparison of cutting forces



Work material : Carbon steel (1050), 280HB
 Cutting speed : $V_c = 500$ sfm
 Feed per tooth : $f_z = 0.002 \sim 0.012$ ipt
 Depth of cut : $a_p = 0.120$ "
 Cutting width : $a_e = 3.150$ "
 Machine : BT50

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.



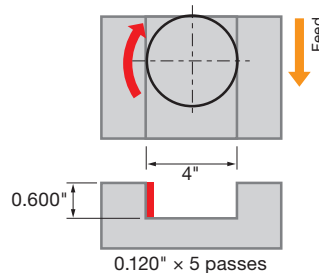
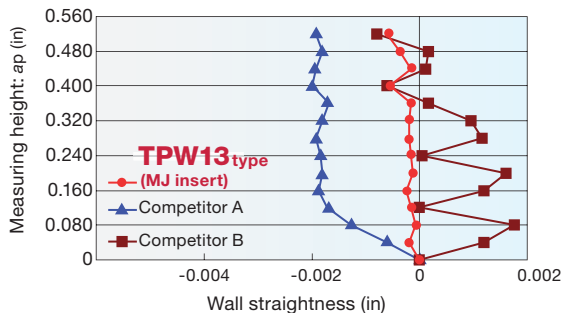
Productivity improved X 2 times!

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 (1055), 210HB
 Cutting speed : $V_c = 330$ sfm
 Feed per tooth : $f_z = 0.004$ ipt
 Depth of cut : $a_p = 0.120$ " $\times$ 5 passes
 Width of cut : $a_e = 4$ "
 Machine : BT50 (slotting)

Highly functional body design

Air-holes applicable for through-the-spindle coolant system. (For cutters smaller than $\phi 5.000$ ")
 Special surface treatment improves resistance to corrosion and rubbing.

Chipbreaker

MJ type **First choice**

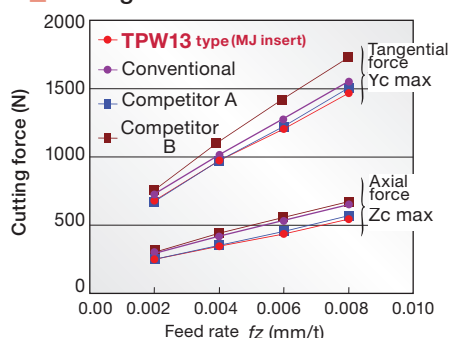
For general purpose well balanced impact resistance and low cutting forces.

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

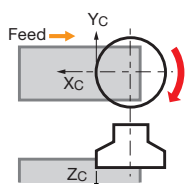
M **AH130** Stainless
K **T1115** Cast iron

PREMIUMTEC

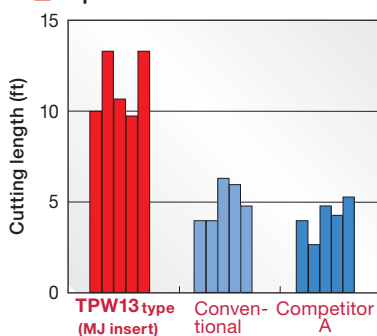
Cutting forces



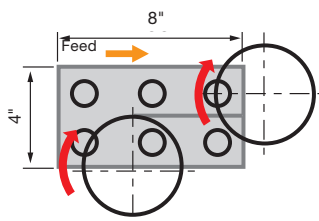
Work material : Carbon steel (1055)
Cutting speed : $V_c = 500$ sfm
Feed per tooth : $f_z = 0.002 \sim 0.008$ ipt
Depth of cut : $a_p = 0.120$ "
Cutting width : $a_e = 3.150$ "
Machine : BT50



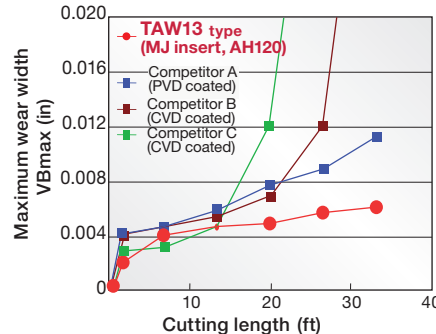
Impact resistance



Work material : Die steel (PX5)
Cutting speed : $V_c = 500$ sfm
Feed per tooth : $f_z = 0.008$ ipt
Depth of cut : $a_p = 0.120$ "
Cutting width : $a_e = 2.000$ "
Machine : BT50



Wear resistance



Work material : Chromium molybdenum steel equivalent to (4140), 280HB
Cutting speed : $V_c = 500$ sfm
Feed per tooth : $f_z = 0.010$ ipt
Depth of cut : $a_p = 0.080$ "
Cutting width : $a_e = 2.500$ "
Machine : BT40
(Dry cutting)

AJ type **For machining aluminium alloys**

The DLC coated grades offer excellent welding resistance.

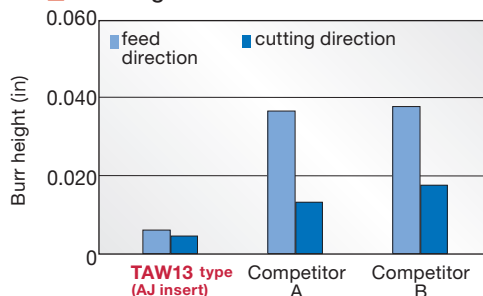
Excellent sharpness
with the **AJ** chipbreaker

+
Excellent welding resistance
DLC coated grade **DS1100**

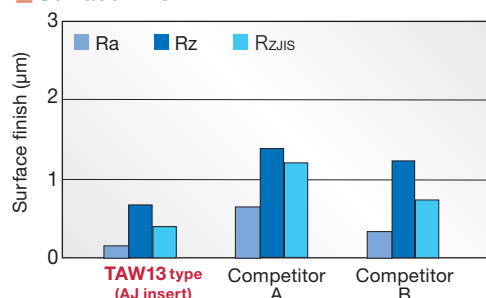
**Longer tool life,
Better surface finish &
fewer burrs!!**

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

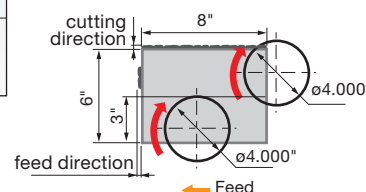
Burr height



Surface finish



Work material : Aluminium alloy (JIS A5052)
Machine : BT40
Cutting speed : $V_c = 2000$ sfm
Feed per tooth : $f_z = 0.006$ ipt
Depth of cut : $a_p = 0.040$ "
Cutting width : $a_e = 3$ "



HJ type For high productivity

Allows 1.5 to 2 times higher feeds than conventional inserts. (Max. depth of cut: $a_p = 0.080''$)
Excellent impact resistance and low cutting forces even under high cutting load in high feed milling.

P AH120 : for general purpose.
T3130 : for high speed milling.
Steel

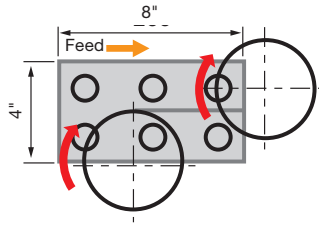
M AH130
Stainless

K T1115
Cast iron

PREMIUMTEC
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Comparison of productivity

	Feed per tooth: fz (ipt)				
	0.012	0.016	0.020	0.024	0.026
TAW13 (HJ insert)	➡➡➡➡➡				
Competitor A	➡				
Competitor B	➡				



Work material : Chromium molybdenum steel (4140), 30HRC

Machine : BT50

Cutting speed : $V_c = 650$ sfm

Feed per tooth : $fz = 0.012 \sim 0.026$ ipt

Depth of cut : $a_p = 0.080''$

Cutting width : $a_e = 2.000''$

MJ type (G-class)

For finishing and precision machining

Ground insert with high accuracy.
For high surface finish.

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

Wiper insert

For finishing

When combined with regular inserts it allows excellent surface finish.

P NS740
Steel

M
Stainless

K GH110
Cast iron

N KS05F : for general purpose.
DX140 : for high quality surface finish.
DS1100 : for high quality surface finish.
Non-ferrous

ML type

For low cutting forces and less rigid workpieces

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

P AH120
Steel

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

K T1115
Cast iron

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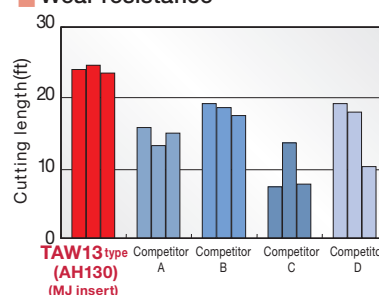
MS type

For machining stainless steels

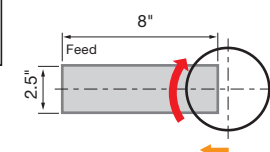
Suitable for machining stainless steel.
Sharp cutting edge and large rake angle eliminate burrs.
Suitable for machining stainless steel.
Sharp cutting edge and large rake angle eliminate burrs.

M AH130 **PREMIUMTEC**
Stainless

Wear resistance



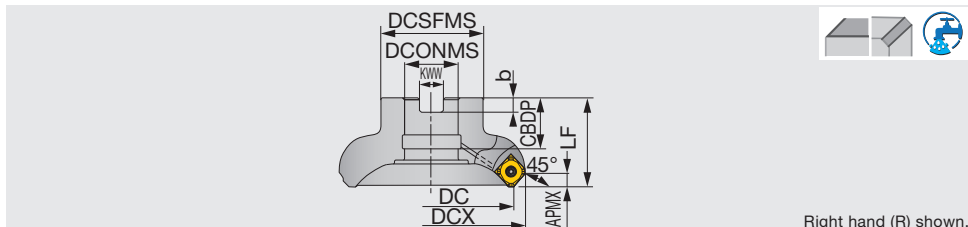
Work material : Stainless steel (340)
Cutting speed : $V_c = 500$ sfm
Feed per tooth : $fz = 0.008$ ipt
Depth of cut : $a_p = 0.080''$
Cutting width : $a_e = 2.500''$
Machine : BT50



TAW13

30° - 45° face mill, with screw clamp system, for SWMT/SWGT13 inserts

GAMP=+17°~+20°, GAMF=-16°~-11°

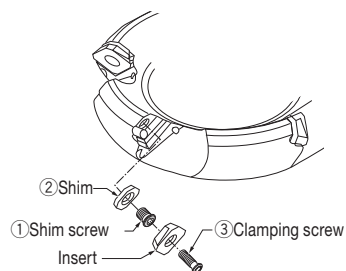


Inch	DC	DCX	CICT	DCSFMS	LF	DCONMS	CBDP	KWW	b	WT (lb)	Air hole	Insert	Arbor type
TAW13R200U0075A03	2.000	3	2.510	1.693	1.575	0.750	0.750	0.315	0.197	0.880	With	SW*T13...	A
TAW13R200U0075A04	2.000	4	2.510	1.693	1.575	0.750	0.750	0.315	0.197	0.880	With	SW*T13...	A
TAW13R200U0075A05	2.000	5	2.510	1.693	1.575	0.750	0.750	0.315	0.197	0.880	With	SW*T13...	A
TAW13R300U0100A04	3.000	4	3.510	1.969	1.969	1.000	1.020	0.374	0.236	1.980	With	SW*T13...	A
TAW13R300U0100A06	3.000	6	3.510	1.969	1.969	1.000	1.020	0.374	0.236	1.980	With	SW*T13...	A
TAW13R300U0100A08	3.000	8	3.510	1.969	1.969	1.000	1.020	0.374	0.236	1.980	With	SW*T13...	A
TAW13R400U0150A05	4.000	5	4.520	3.150	1.969	1.500	1.378	0.626	0.394	3.750	With	SW*T13...	B
TAW13R400U0150A07	4.000	7	4.520	3.150	1.969	1.500	1.378	0.626	0.394	3.530	With	SW*T13...	B
TAW13R400U0150A10	4.000	10	4.520	3.150	1.969	1.500	1.378	0.626	0.394	3.750	With	SW*T13...	B
TAW13R500U0150A06	5.000	6	5.510	3.150	2.480	1.500	1.457	0.626	0.394	6.170	With	SW*T13...	B
TAW13R500U0150A08	5.000	8	5.510	3.150	2.480	1.500	1.457	0.626	0.394	5.950	With	SW*T13...	B
TAW13R500U0150A12	5.000	12	5.510	3.150	2.480	1.500	1.457	0.626	0.394	6.170	With	SW*T13...	B
TAW13R600U0200A07	6.000	7	6.510	3.937	2.480	2.000	1.500	0.748	0.433	9.040	Without	SW*T13...	B
TAW13R600U0200A10	6.000	10	6.510	3.937	2.480	2.000	1.500	0.748	0.433	8.600	Without	SW*T13...	B
TAW13R600U0200A16	6.000	16	6.510	3.937	2.480	2.000	1.500	0.748	0.433	9.040	Without	SW*T13...	B

*Recommended clamping torque : CSPB-3.5 = 2.58 lbs·ft

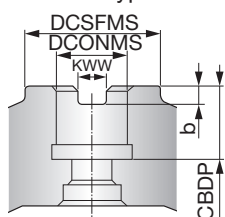
SPARE PARTS

Designation	③Clamping screw	Lubricant	①Shim screw	Shell locking bolt	②Shim	Wrench	Wrench 1
TAW13R200...	CSPB-3.5	M-1000	DTS5-3.5SS	0.375X1.125H	FSSA1102	IP-15D	P-3.5
TAW13R300...	CSPB-3.5	M-1000	DTS5-3.5SS	C0.500X1.375H	FSSA1102	IP-15D	P-3.5
TAW13R400..., 500...	CSPB-3.5	M-1000	DTS5-3.5SS	TMBA-0.750H	FSSA1102	IP-15D	P-3.5
TAW13R600...	CSPB-3.5	M-1000	DTS5-3.5SS	-	FSSA1102	IP-15D	P-3.5

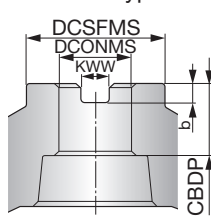


Arbor type

Arbor type A



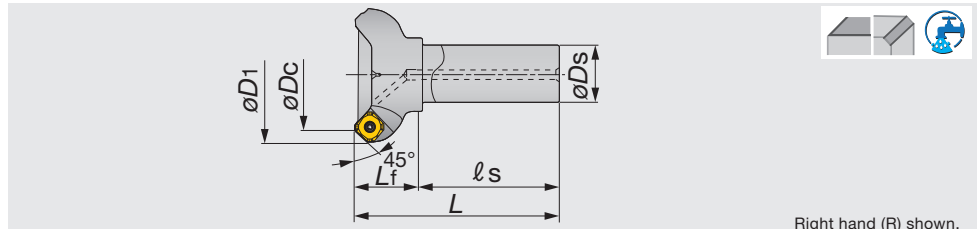
Arbor type B



EAW13

30° - 45° face endmill, shank type with screw clamp system, for SWMT/SWGT13 inserts

A.R.=+17°~+20°,R.R.= -16°~-11°



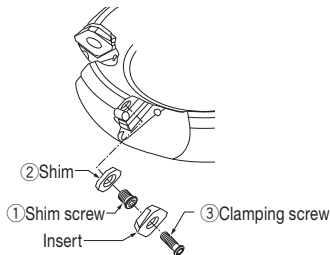
Right hand (R) shown.

Metric	ϕD_c	z	ϕD_1	ϕD_s	ℓ_s	L_f	L	Kg	Air hole	Insert
EAW13R025M25.0-02	25	39	2	25	80	35	115	0.4	With	SW*T13...
EAW13R032M32.0-02	32	46	2	32	80	35	115	0.7	With	SW*T13...
EAW13R040M32.0-03	40	54	3	32	80	35	115	0.8	With	SW*T13...
EAW13R050M32.0-03	50	63	3	32	80	40	120	1	With	SW*T13...
EAW13R050M32.0-04	50	63	4	32	80	40	120	0.9	With	SW*T13...
EAW13R063M32.0-04	63	76	4	32	80	40	120	1.1	With	SW*T13...
EAW13R063M32.0-05	63	76	5	32	80	40	120	1.1	With	SW*T13...
EAW13R080M32.0-04	80	94	4	32	80	40	120	1.5	With	SW*T13...
EAW13R080M32.0-06	80	94	6	32	80	40	120	1.4	With	SW*T13...

SPARE PARTS

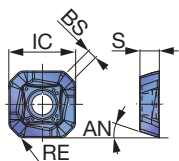
Designation	③Clamping screw	Lubricant	①Shim screw	②Shim	Wrench	Wrench 1
EAW13R025**-040**	CSPB-3.5	M-1000	-	-	IP-15D	-
EAW13R050**-080**	CSPB-3.5	M-1000	DTS5-3.5SS	FSSA1102	IP-15D	P-3.5

*Recommended clamping torque (N·m): CSPB-3.5=3.5

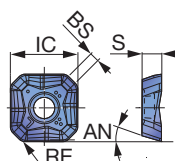


INSERT

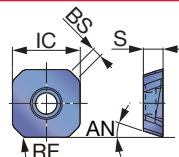
SWMT13T3-MJ



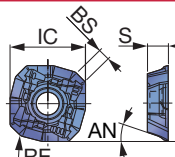
SWMT13T3-ML



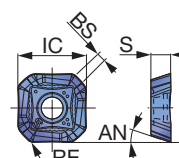
SWMW13T3 (Flat)



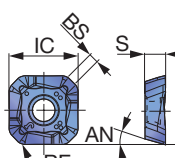
SWMT13T3-HJ



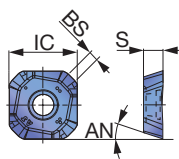
SWMT13T3-MS



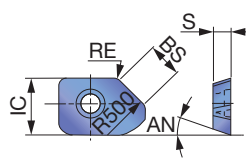
SWGT13T3-MJ



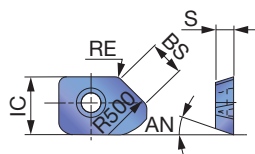
SWGT13T3-AJ



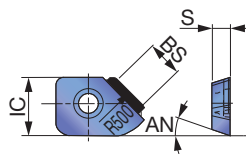
WWCW13T3AFER-WS



WWCW13T3AFFR-WS



WWCW13T3AFFR-WD



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

★ : First choice
☆ : Second choice

Designation	RE	APMX	Coated										Cermet	Uncoated		PCD	IC	S	AN	BS
			AH120	AH130	AH140	AH3135	GH110	T1115	T1215	T3130	T3225	DS1100	NS740	KS05F	DX140					
SWMT13T3AFPR-MJ	0.059	0.157	●	●	●	●		●	●	●	●		●				0.547	0.157	18.5°	0.079
SWMT13T3AFER-ML	0.059	0.098	●			●											0.547	0.157	18.5°	0.079
SWMW13T3AFTR	0.059	0.197	●			●		●	●	●	●		●				0.547	0.157	18.5°	0.079
SWMT13T3AFPR-HJ	0.059	0.079	●	●	●	●		●	●	●	●						0.579	0.157	18.5°	0.091
SWMT13T3AFPR-MS	0.039	0.157		●	●	●											0.555	0.157	18.5°	0.079
SWGT13T3AFPR-MJ	0.059	0.157	●			●							●				0.547	0.157	18.5°	0.079
SWGT13T3AFFR-AJ	-	0.157												●			0.555	0.157	18.5°	0.079
WWCW13T3AFER-WS	0.059	-					●						●				0.504	0.157	18.5°	0.307
WWCW13T3AFFR-WS	0.059	-										●		●			0.504	0.157	18.5°	0.307
WWCW13T3AFFR-WD	-	-													●		0.504	0.157	18.5°	0.307

● : Line up

DX140 : Packing Quantity = 1 pc.

STANDARD CUTTING CONDITIONS

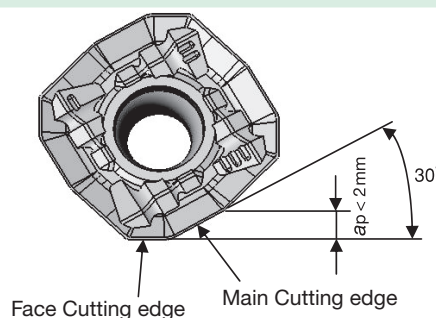
ISO	Workpiece materials	Priority	Grade	Cutting speed v_c (sfm)	Roughing (Depth of cut: > 0.039")					
					Feed per tooth: f_z (ipt)					
					MJ	ML	HJ	MS	Flat	AJ
P	Mild and low carbon steels 1010, 1015, etc. < 180 HB	First choice	AH3135	330 - 890	0.002 - 0.012	0.002 - 0.010	0.008 - 0.024	0.004 - 0.010	0.002 - 0.012	-
		Wear resistance	T3225	490 - 300	0.002 - 0.012	-	0.008 - 0.024	-	0.002 - 0.012	-
		Surface quality	NS740	330 - 980	0.002 - 0.009	-	-	-	0.002 - 0.009	-
	Carbon and alloy steels 1045, 4140, etc. < 300 HB	First choice	AH3135	330 - 760	0.002 - 0.010	0.002 - 0.008	0.008 - 0.020	-	0.002 - 0.010	-
		Wear resistance	T3225	490 - 910	0.002 - 0.010	-	0.008 - 0.020	-	0.002 - 0.010	-
		Surface quality	NS740	330 - 760	0.002 - 0.008	-	-	-	0.002 - 0.008	-
	Die steels H13, D2, etc. < 30 HRC	First choice	AH3135	330 - 590	0.002 - 0.008	0.002 - 0.008	0.008 - 0.016	-	0.002 - 0.008	-
		Wear resistance	T3225	330 - 590	0.002 - 0.008	-	0.008 - 0.016	-	0.002 - 0.008	-
	Stainless steels S30400, S31600, etc. < 250 HB	First choice	AH3135	260 - 660	0.004 - 0.010	-	0.008 - 0.020	0.004 - 0.008	-	-
		Wear resistance	T3225	490 - 820	0.004 - 0.010	0.004 - 0.008	0.008 - 0.020	-	0.004 - 0.010	-
K	Gray cast irons No.250B, No.300B, etc.	First choice	T1215	590 - 980	0.002 - 0.010	-	0.008 - 0.024	-	0.002 - 0.010	-
		Fracture resistance	AH120	490 - 820	0.002 - 0.010	0.002 - 0.008	0.008 - 0.024	-	0.002 - 0.010	-
	Ductile cast irons 60-40-18, 80-55-06, etc.	First choice	T1215	390 - 660	0.002 - 0.010	-	0.008 - 0.024	-	0.002 - 0.010	-
		Fracture resistance	AH120	330 - 590	0.002 - 0.010	0.002 - 0.008	0.008 - 0.024	-	0.002 - 0.010	-
S	Titanium alloys Ti-6Al-4V, etc.	First choice	AH130	98 - 197	-	-	-	0.004 - 0.008	-	-
	Heat-resistant alloys Inconel 718, etc.	First choice	AH120	33 - 131	0.002 - 0.006	-	-	-	-	-
N	Aluminum alloys Si < 13 %	-	DS1100 KS05F	300 - 3281	-	-	-	-	-	0.002 - 0.008
	Aluminum alloys Si $\geq$ 13%	-	DS1100 KS05F	260 - 980	-	-	-	-	-	0.002 - 0.008
	Copper alloys	-	DS1100 KS05F	660 - 1640	-	-	-	-	-	0.002 - 0.008

Notes for use of HJ-type inserts

HJ-type inserts can be used for high feed machining.

When using the insert, care should be taken with the following:

- The maximum depth of cut is $a_p = 0.079"$. Select feeds within the above value.
- Do not use the HJ-type inserts with other types (such as MJ- and MS-types) in the same body.
- The outer shape of the HJ-type insert is different from those of other types (such as MJ- and MS-types), but the insert can be held in the same insert pocket.



Notes on use of wiper insert

- When requiring good surface finishes, use of a wiper insert (WWCW13T3AF_R-W_) is recommended. In general, installing one wiper insert delivers superior surface finishes.
- When using the wiper insert, install the insert as shown in Fig. A. If the insert is installed as shown in Fig. B, breakage of the insert is inevitable and normal surface finish can not be obtained.

Fig. A

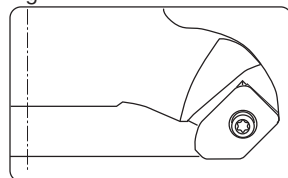
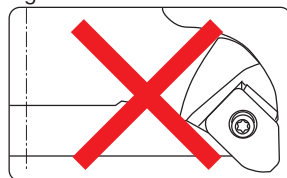


Fig. B



- The wiper insert must not be used together with HJ-type inserts
- 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 feed per tooth (f_z mm/t) of the normal insert following the wiper insert is double that of other inserts.
- When using the wiper insert, depth of cut (a_p) less than 0.039" is recommended.

STANDARD CUTTING CONDITIONS

ISO	Workpiece materials	Priority	Grade	Cutting speed vc (sfm)	Light cutting to finishing (Depth of cut: ≤ 0.039")					
					Feed per tooth: fz (ipt)					
					MJ	ML	HJ	MS	Flat	AJ
P	Mild and low carbon steels 1010, 1015, etc. < 180 HB	First choice	AH3135	330 - 890	0.002 - 0.010	0.002 - 0.008	0.008 - 0.024	0.004 - 0.008	0.002 - 0.010	-
		Wear resistance	T3225	490 - 980	0.002 - 0.010	-	0.008 - 0.024	-	0.002 - 0.010	-
		Surface quality	NS740	330 - 980	0.002 - 0.008	-	-	-	0.002 - 0.008	-
	Carbon and alloy steels 1045, 4140, etc. < 300 HB	First choice	AH3135	330 - 760	0.002 - 0.008	0.002 - 0.006	0.008 - 0.020	-	0.002 - 0.008	-
		Wear resistance	T3225	490 - 920	0.002 - 0.008	-	0.008 - 0.020	-	0.002 - 0.008	-
		Surface quality	NS740	330 - 760	0.002 - 0.007	-	-	-	0.002 - 0.007	-
M	Stainless steels S30400, S31600, etc. < 250 HB	First choice	AH3135	260 - 660	0.004 - 0.008	-	0.008 - 0.020	0.004 - 0.007	-	-
		Wear resistance	T3225	590 - 820	0.004 - 0.008	0.004 - 0.007	0.008 - 0.020	-	0.004 - 0.008	-
K	Gray cast irons No.250B, No.300B, etc.	First choice	T1215	590 - 980	0.004 - 0.008	-	0.008 - 0.024	-	0.004 - 0.008	-
		Fracture resistance	AH120	490 - 820	0.004 - 0.008	0.002 - 0.007	0.008 - 0.024	-	0.004 - 0.008	-
	Ductile cast irons 60-40-18, 80-55-06, etc.	First choice	T1215	390 - 660	0.004 - 0.008	-	0.008 - 0.024	-	0.004 - 0.008	-
		Fracture resistance	AH120	330 - 590	0.004 - 0.008	0.002 - 0.007	0.008 - 0.024	-	0.004 - 0.008	-
S	Titanium alloys Ti-6Al-4V, etc.	-	AH130	98 - 197	-	-	-	0.004 - 0.008	-	-
	Heat-resistant alloys Inconel 718, etc.	-	AH120	33 - 131	0.002 - 0.006	-	-	-	-	-
N	Aluminum alloys Si < 13 %	-	DS1100 KS05F	990 - 3281	-	-	-	-	-	0.002 - 0.008
	Aluminum alloys Si ≥ 13%	-	DS1100 KS05F	260 - 980	-	-	-	-	-	0.002 - 0.008
	Copper alloys	-	DS1100 KS05F	660 - 1640	-	-	-	-	-	0.002 - 0.008

Notes:

- When cutting at a large depth of cut or a large cutting width, the cutting speed (vc) and feed (fz) should be set to the lower side of the values shown in the above table.
- Dry cutting (or air-blowing) is generally recommended. However, when chips tend to excessively adhere to the cutting edges when machining

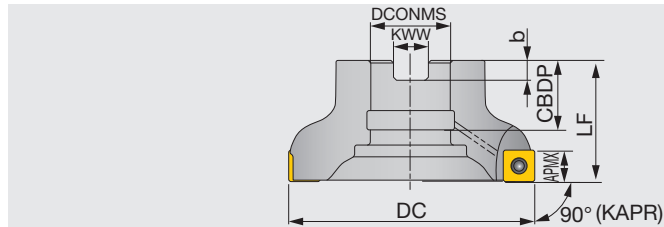
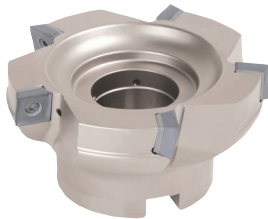
stainless steel, use a water soluble cutting fluid. In this case, use the AH130 grade at speeds lower than vc = 330 sfm.

- When wet machining mild steels, carbon steels and alloy steels, use T3130 at lower cutting conditions.
- TAW13 type TAC mills cannot be used for axial-feed cutting such as ramping, plunging and drilling.

TPW13

Square shoulder mill, with screw clamp system, for SWMT/SWGT13 inserts

GAMP = +11.5°, GAMF = -13° ~ -10.5°



Right hand (R) shown.

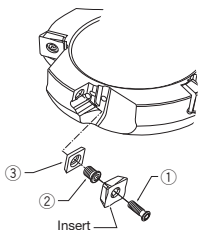
Inch	APMX	DC	CICT	LF	DCONMS	CBDP	KWW	b	WT(lb)	Air hole	Insert	Arbor type
TPW13R200U0075A03	0.394	2.000	3	1.575	0.750	0.750	0.315	0.197	0.660	With	SW*T1304...	A
TPW13R200U0075A04	0.394	2.000	4	1.575	0.750	0.750	0.315	0.197	0.660	With	SW*T1304...	A
TPW13R200U0075A05	0.394	2.000	5	1.575	0.750	0.750	0.315	0.197	0.660	With	SW*T1304...	A
TPW13R300U0100A04	0.394	3.000	4	1.969	1.000	1.024	0.374	0.236	1.760	With	SW*T1304...	A
TPW13R300U0100A06	0.394	3.000	6	1.969	1.000	1.024	0.374	0.236	1.540	With	SW*T1304...	A
TPW13R300U0100A08	0.394	3.000	8	1.969	1.000	1.024	0.374	0.236	1.760	With	SW*T1304...	A
TPW13R400U0150A05	0.394	4.000	5	1.969	1.500	1.378	0.626	0.394	3.530	With	SW*T1304...	B
TPW13R400U0150A07	0.394	4.000	7	1.969	1.500	1.378	0.626	0.394	3.310	With	SW*T1304...	B
TPW13R400U0150A10	0.394	4.000	10	1.969	1.500	1.378	0.626	0.394	3.310	With	SW*T1304...	B
TPW13R500U0150A06	0.394	5.000	6	2.480	1.500	1.457	0.626	0.394	5.510	With	SW*T1304...	B
TPW13R500U0150A08	0.394	5.000	8	2.480	1.500	1.457	0.626	0.394	5.290	With	SW*T1304...	B
TPW13R500U0150A12	0.394	5.000	12	2.480	1.500	1.457	0.626	0.394	5.510	With	SW*T1304...	B
TPW13R600U0200A08	0.394	6.000	8	2.480	2.000	1.496	0.748	0.433	7.940	With	SW*T1304...	B
TPW13R600U0200A12	0.394	6.000	12	2.480	2.000	1.496	0.748	0.433	8.160	With	SW*T1304...	B
TPW13R600U0200A15	0.394	6.000	15	2.480	2.000	1.496	0.748	0.433	8.160	Without	SW*T1304...	B

SPARE PARTS



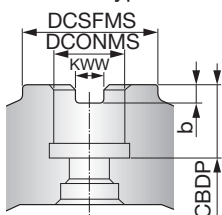
Designation	① Clamping screw	Lubricant	② Shim screw	Shell locking bolt	③ Shim	Wrench for ①	Wrench for ②
TPW13R200...	CSPB-3.5	M-1000	DTS5-3.5SS	C0.375X1.125H	FSSP1102	IP-15D	P-3.5
TPW13R300...	CSPB-3.5	M-1000	DTS5-3.5SS	C0.500X1.375H	FSSP1102	IP-15D	P-3.5
TPW13R400..., 500...	CSPB-3.5	M-1000	DTS5-3.5SS	TMBA-0.750H	FSSP1102	IP-15D	P-3.5
TPW13R600...	CSPB-3.5	M-1000	DTS5-3.5SS	-	FSSP1102	IP-15D	P-3.5

*Recommended clamping torque : CSPB-3.5 = 2.58 lbs·ft

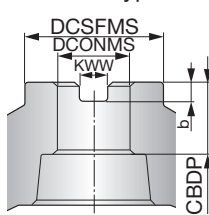


Arbor type

Arbor type A



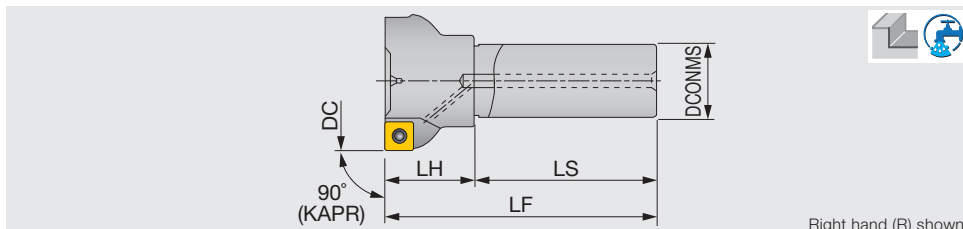
Arbor type B



EPW13

Square shoulder endmill, shank type with screw clamp system, for SWMT/SWGT13 inserts

GAMP = +11.5°, GAMF = -13° ~ -10.5°

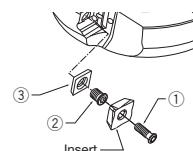


Metric	APMX	DC	CICT	DCONMS	LS	LH	LF	WT(kg)	Air hole	Insert
EPW13R032M32.0-02	10	32	2	32	80	35	115	0.6	With	SW*T1304...
EPW13R040M32.0-03	10	40	3	32	80	35	115	0.7	With	SW*T1304...
EPW13R050M32.0-03	10	50	3	32	80	40	120	0.9	With	SW*T1304...
EPW13R050M32.0-04	10	50	4	32	80	40	120	0.9	With	SW*T1304...
EPW13R063M32.0-04	10	63	4	32	80	40	120	1	With	SW*T1304...
EPW13R063M32.0-05	10	63	5	32	80	40	120	1	With	SW*T1304...
EPW13R080M32.0-04	10	80	4	32	80	40	120	1.3	With	SW*T1304...
EPW13R080M32.0-06	10	80	6	32	80	40	120	0.8	With	SW*T1304...

SPARE PARTS

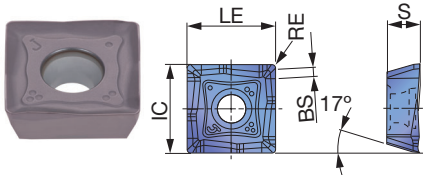
Designation	① Clamping screw	Lubricant	② Shim screw	③ Shim	Wrench for ①	Wrench for ②
EPW13R032, 040...	CSPB-3.5	M-1000	-	-	IP-15D	-
EPW13R050 - 080...	CSPB-3.5	M-1000	DTS5-3.5SS	FSSP1102	IP-15D	P-3.5

*Recommended clamping torque (N·m) : CSPB-3.5=3.5

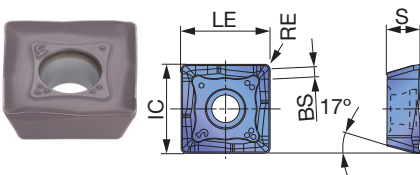


INSERT

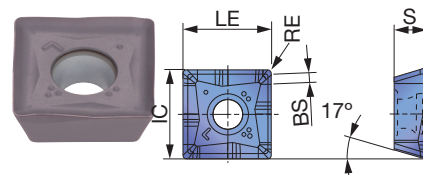
SWGT1304-MJ



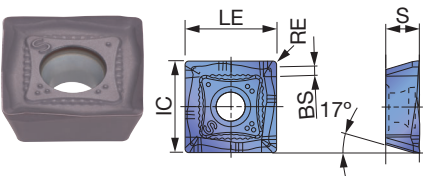
SWMT1304-MJ



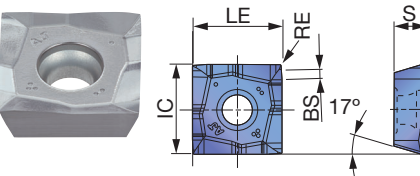
SWMT1304-ML



SWMT1304-MS



SWGT1304-AJ



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

★ : First choice
☆ : Second choice

Designation	RE	APMX	Coated								Cermet	Uncoated						
			AH120	AH130	AH140	AH3135	T1115	T1215	T3130	T3225	DS1100	NS740	KS05F					
SWGT1304PDPR-MJ	0.031	0.394	●								●				0.535	0.535	0.197	0.055
SWMT1304PDPR-MJ	0.031	0.394	●	●	●	●	●	●	●		●				0.535	0.535	0.197	0.055
SWMT1304PDER-ML	0.031	0.394	●			●									0.535	0.535	0.197	0.055
SWMT1304PDPR-MS	0.031	0.394		●	●										0.535	0.535	0.197	0.055
SWGT1304PDFR-AJ	-	0.394								●		●			0.535	0.535	0.197	0.063

●: Line up

STANDARD CUTTING CONDITIONS TPW / EPW13 type

ISO	Workpiece material	Grade	Cutting speed V_c (sfm)	Roughing (Depth of cut: $APMX \geq 0.040"$)				Light cutting to finishing (Depth of cut: $APMX \geq 0.040"$)			
				Feed per tooth: f_z (ip)				Feed per tooth: f_z (ip)			
				MJ	ML	MS	AJ	MJ	ML	MS	AJ
P	Mild steels Low carbon steels < 180HB	AH3135 (First choice)	330 - 890	0.002 - 0.010	0.002 - 0.008	-	-	0.002 - 0.008	0.002 - 0.007	-	-
		T3225 (Wear resistance)	500 - 980	0.002 - 0.010	-	-	-	0.002 - 0.008	-	-	-
		AH130 (Fracture resistance)	260 - 590	0.002 - 0.010	-	0.002 - 0.008	-	0.002 - 0.008	-	0.002 - 0.007	-
		NS740 (Surface finish)	330 - 980	0.002 - 0.006	-	-	-	0.002 - 0.005	-	-	-
	Carbon steels Alloy steels < 300HB	AH3135 (First choice)	330 - 760	0.002 - 0.008	0.002 - 0.006	-	-	0.002 - 0.007	0.002 - 0.005	-	-
		T3225 (Wear resistance)	490 - 920	0.002 - 0.008	-	-	-	0.002 - 0.007	-	-	-
		AH130 (Fracture resistance)	260 - 490	0.002 - 0.008	-	-	-	0.002 - 0.007	-	-	-
		NS740 (Surface finish)	330 - 760	0.002 - 0.006	-	-	-	0.002 - 0.005	-	-	-
	Die steels < 30HRC	AH3135 (First choice)	330 - 590	0.002 - 0.006	0.002 - 0.005	-	-	0.002 - 0.005	0.002 - 0.004	-	-
		T3225 (Wear resistance)	330 - 590	0.002 - 0.006	-	-	-	0.002 - 0.005	-	-	-
M	Stainless steels < 50HB	AH130 / AH3135 (First choice)	260 - 650	0.002 - 0.008	-	0.002 - 0.007	-	0.002 - 0.007	-	0.002 - 0.006	-
		AH120 (Wear resistance)	490 - 820	0.002 - 0.008	0.002 - 0.006	-	-	0.002 - 0.007	0.002 - 0.005	-	-
K	Gray cast irons Ductile cast irons	T1215 (First choice)	330 - 820	0.002 - 0.008	-	-	-	0.002 - 0.007	-	-	-
		AH120 (Fracture resistance)	330 - 820	0.002 - 0.008	0.002 - 0.006	-	-	0.002 - 0.007	0.002 - 0.005	-	-
N	Aluminum alloys Si < 13 %	DS1100 / KS05F (First choice)	980 - 3300	-	-	-	0.002 - 0.008	-	-	-	0.002 - 0.008
	Aluminum alloys Si $\geq$ 13 %	DS1100 / KS05F (First choice)	260 - 980	-	-	-	0.002 - 0.008	-	-	-	0.002 - 0.008
	Copper alloys	DS1100 / KS05F (First choice)	660 - 1650	-	-	-	0.002 - 0.008	-	-	-	0.002 - 0.008

- When machining at large depth of cut or large cutting width, V_c and f_z 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 $V_c \leq 328$ sfm.

- When machining mild steel, carbon steel or alloy steel in wet conditions the T3130 is recommended. In this case, V_c and f_z should be reduced.
 - TPW13 type can not be used for ramping, plunging and drilling.

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 catalog 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.

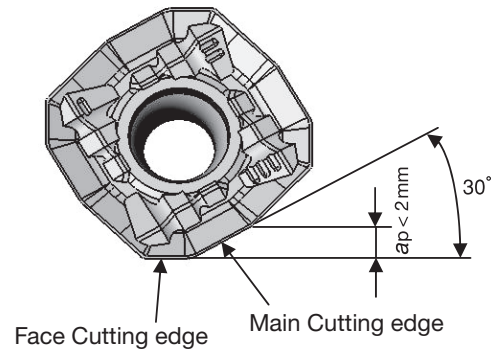
- The inserts should be clamped by using the wrench supplied with the TAC Mill.
- After a long periods of use, the clamping screws and wrench may become deformed or damaged. These elements must be replaced as soon as possible.

■ Notes for use of HJ-type inserts

HJ-type inserts can be used for high feed machining.

When using the insert, care should be taken with the following:

- The maximum depth of cut is $a_p = 0.080''$. Select feeds within the above value.
- Do not use the HJ-type inserts with other types (such as MJ- and MS-types) in the same body.
- The outer shape of the HJ-type insert is different from those of other types (such as MJ- and MS-types), but the insert can be held in the same insert pocket.



■ Notes on use of wiper insert

- When requiring good surface finishes, use of a wiper insert (WWCW13T3AF_ R-W_) is recommended. In general, installing one wiper insert delivers superior surface finishes.
- When using the wiper insert, install the insert as shown in Fig. 1. If the insert is installed as shown in Fig. 2, breakage of the insert is inevitable and normal surface finish can not be obtained.
- The wiper insert must not be used together with HJ-type inserts
- 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 feed per tooth (f_z mm/t) of the normal insert following the wiper insert is double that of other inserts.
- When using the wiper insert, depth of cut (a_p) less than $0.040''$ is recommended.

Fig.1

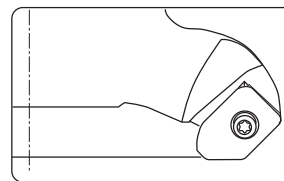
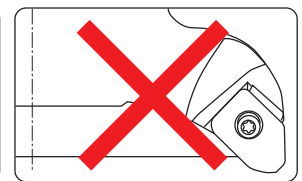
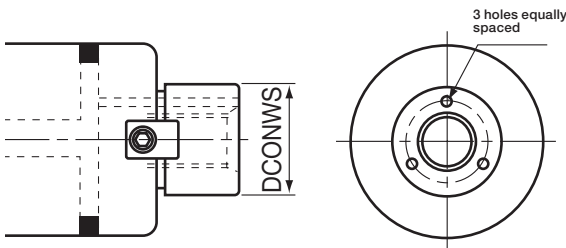


Fig.2



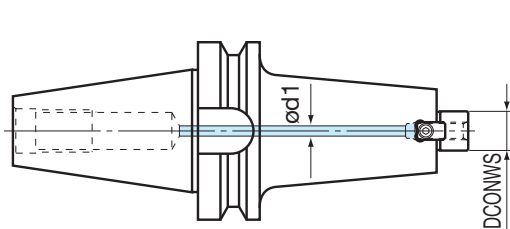
Face mill arbors with center through-coolant hole



Cutter diameter DC (in)	2.000	3.000	4.000 5.000	6.000
Nominal diameter DCONWS (in)	0.750	1.000	1.500	2.000

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

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



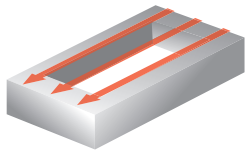
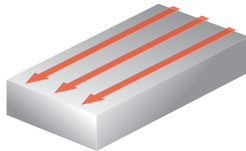
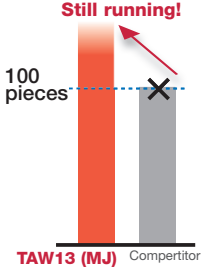
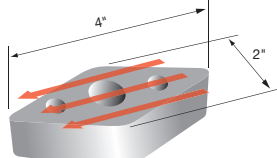
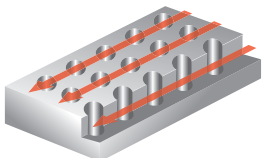
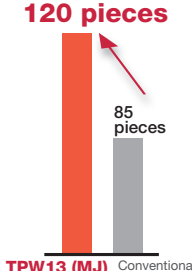
Nominal diameter DCONWS (in)	0.750	1.000	1.500	2.000
Applicable arbor types	FMC SM1	FMA FMC	FMA	FMA
Through hole diameter ød1 (in)	0.20 ~ 0.30	0.25 ~ 0.35	0.40 ~ 0.60	0.40 ~ 0.60

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

Workpiece type		Machine component (structural part)	Plate for die
Cutter		TAW13R300U0100A06 ($\phi 3.000"$, $z = 6$)	TAW13R400U0150A07 ($\phi 4.000"$, $z = 7$)
Insert		SWMT13T3AFPR-MJ	SWMT13T3AFPR-HJ
Grade		AH120	AH3135
Workpiece material		Chromium molybdenum steel	Carbon steel (S55C / C55)
		 P	 P
Cutting conditions	Cutting speed : V_c (sfm)	600	790
	Feed per tooth: f_z (ipt)	0.006	0.024
	Feed speed : V_f (ipm)	26	126
	Depth of cut : ap (in)	0.08	0.08
	Width of cut : ae (in)	-	~ 3
	Machining	Face milling	Face milling
	Coolant	Dry	Water soluble
	Machine	Vertical machining center BT50	Vertical machining center BT50
Results		 Tool life 180% Smooth cutting without chattering makes tool life stable.	 Tool life 270% Feed speed: $V_f = 47 \Rightarrow 126$ ipm. Even in high feed machining, the cutting is very smooth and silent.
Workpiece type		Hydraulic part	Machine component
Cutter		TPW13R300U0100A04 ($\phi 3.000"$, $z = 4$)	TPW13R300U0100A06 ($\phi 3.000"$, $z = 6$)
Insert		SWMT1304PDPR-MS	SWMT1304PDPR-MJ
Grade		AH140	AH140
Workpiece material		Chromium molybdenum steel	316
		 P	 M
Cutting conditions	Cutting speed : V_c (sfm)	400	330
	Feed per tooth: f_z (ipt)	0.007	0.004
	Feed speed : V_f (ipm)	14	10
	Depth of cut : ap (in)	1.2	0.110 x 5 Passes
	Width of cut : ae (in)	~ 2	3.150
	Machining	Face milling	Face milling and shouldering
	Coolant	Dry	Water soluble
	Machine	-	Vertical machining center
Results		 Productivity 140% Cutting with TPW13 proved very silent with drastically improved surface finish.	 Productivity 150% In high impact, heavy machining the TPW13 demonstrates stable tool life and reduced chipping.

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