Small diameter endmills able to handle various machining modes

Hybrid TAC Mill Series

Next generation TAC endmills allow one tool for various types of machining

Tungaloy America, Inc.

Hybrid TAC Mills provide comparable results to solid carbide endmills in high productivity, machining accuracy, and multi-functional machining capability!

EPH High Accuracy

Allows low cutting forces, high productivity, and highly accurate machining that is comparable to solid carbide endmills! Inserts are available in various corner radius sizes.

- *Long Cutting Edge Length*
- *Shoulder Milling*
- *High Accuracy*

EVH Multi-functional

The toolholder has a center cutting edge which allows shoulder milling, slotting, drilling, and other kinds of machining with only one tool.

- *Center Cutting Edge*
- *Shoulder Milling*

EXH High Feed

Super high feed machining capability improves productivity in roughing. Center cutting design allows it to be used in a variety of machining.

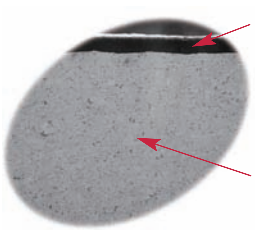
Center Cutting Edge

High Productivity

PVD coated grade for steels, stainless steels, and cast irons.

AH730

P Steels | M Stainless steel | K Cast irons



Improved wear resistance

"Flash-coat" which excels in wear resistance and coating adhesion allows longer tool life and high machining reliability.

High toughness fine grained carbide

Improved chipping resistance and impact resistance.

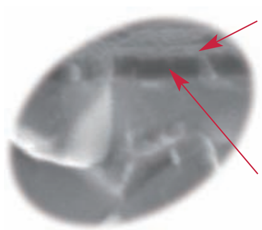
Maintains sharp cutting edge.

DLC coated grade for aluminum alloy.

DS1200

N Nonferrous metals

DLC=Diamond Like Carbon



Improved welding resistance

Provides good lubricity between insert surface and work surface, reducing built up edge during machining.

Improved adhesion strength of DLC coat and substrate

High welding resistance.

Maintains high quality machining surface.

EPH High Accuracy

Allows low cutting forces, high productivity, and highly accurate machining that is comparable to solid carbide endmills! Inserts are available in various corner radius sizes.

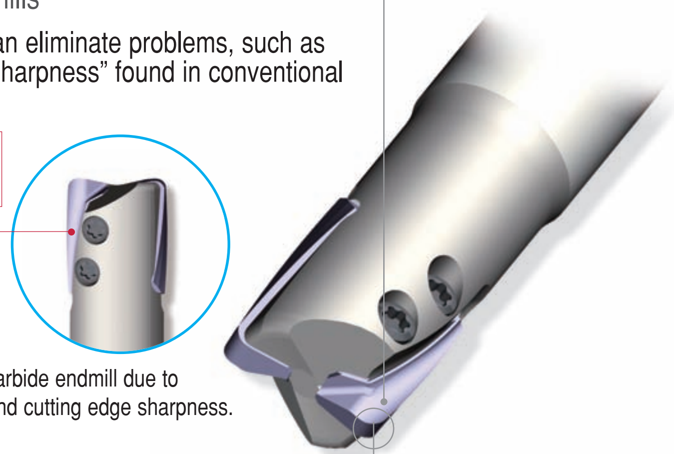
■ Long cutting edge length and high rake geometry

→ Covers wide machining area comparable to those of solid endmills

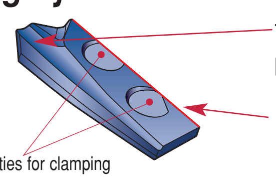
- Hybrid TAC Mill, combining TAC endmill and solid carbide endmill, can eliminate problems, such as "small insert and short edge length", "single tooth", "and insufficient sharpness" found in conventional indexable insert endmills.

Tool diameters are available in ø0.500", ø0.625" (two teeth) and ø0.750" and ø1.00" (three or four teeth).

Edge length equivalent to cutter diameter. 15° helix angle.



■ Highly accurate insert geometry



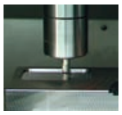
The cutting edge geometry is comparable to a solid carbide endmill due to precision grinding. This provides the high accuracy and cutting edge sharpness.

Excellent positioning accuracy is due to the axial base.

■ Available in a variety of corner radius

→ Covers the machining area from square endmills to radius endmills

P Steels	Corner radii are available in .008", .020", .040", .060", .080"
N Nonferrous metals	Corner radii are available in .008", .020", .040", .060", .080"



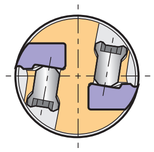
Allows highly productive pocketing

■ Highly functional body design

- Special surface treatment improves resistance to corrosion and rubbing.
- The new clamping mechanism, **"DD-Fit"**, directly fixes the insert to the upper surface with two clamping screws. It allows improved rigidity to the insert and body. Moreover, the insert can be loosened and removed without removing the screws from the body, preventing the loss of the small screws.

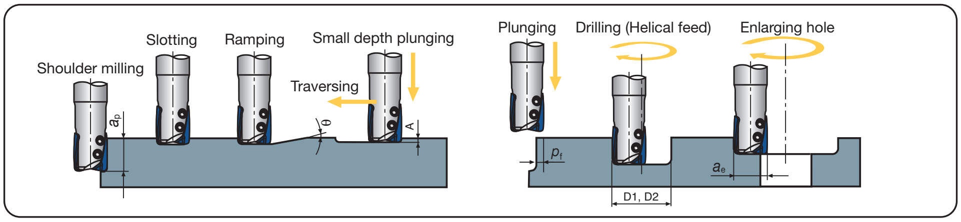
DD-FiT Double Direct Fixation Technology

This logo stands for Tungaloy's original new clamping mechanism for small diameter indexable insert cutting tools.



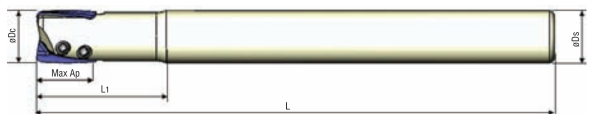
Clamping mechanism (Two-insert EPH type)

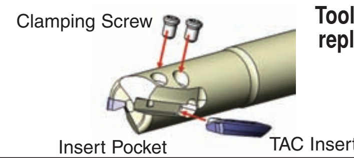
■ Machining Modes



Cat No.	Tool Dia. (in.)	Max. Depth of Cut (ap) (in.)	Max. Ramping Angle (θ°)	Max. Plunging Depth (A) (in.)	Max. Peck Feed in Plunging (Pf)	Min. Machinable Hole Dia. (D1)	Max. Machinable Hole Dia. (D2)*	Max. Cutting Width in Enlarging Hole (ae)*
EPH13R050U0050-2	0.500	0.47	2.5	0.012	0.11	0.67	0.93	0.48
EPH18R063U0063-2	0.625	0.63	2.0	0.012	0.15	0.83	1.23	0.61
EPH18R075U0075-3	0.750	0.63	2.0	0.012	0.15	1.26	1.47	0.73
EPH18R100U0100-4	1.000	0.63	1.5	0.012	0.15	1.58	1.98	0.98

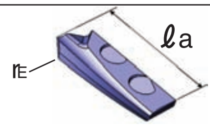
■ EPH (Body)





Catalog Number	Stock	# of Teeth	Dimensions (inch) øDc	øDs	Max. a_p	L	L1	Clamping Screw (Std. fastening Torque)	Wrench	Applicable Insert
EPH13R050U0050-2	●	2	0.500	0.500	0.450	3.500	1.000	CSPB-2.2SH (9.7 in.-lb.)	IP-7D	XHGR13020□□□R-□□
EPH18R063U0063-2	●	2	0.625	0.625	0.600	4.000	1.250	CSPB-2.5SH (9.7 in.-lb.)	IP-7D	XHGR18T20□□□R-□□
EPH18R075U0075-3	●	3	0.750	0.750	0.600	4.000	1.500	CSPB-2.5SH (9.7 in.-lb.)	IP-7D	XHGR18T20□□□R-□□
EPH18R100U0100-4	●	4	1.000	1.000	0.600	4.000	2.000	CSPB-2.5SH (9.7 in.-lb.)	IP-7D	XHGR18T20□□□R-□□

■ Inserts



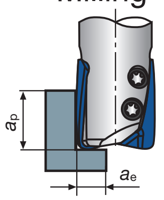
Insert Cat. No.	Grade AH730	Dimensions (in) ℓa	Corner R rE	Application	Applicable Cutter
XHGR130202ER-MJ	●	0.512	0.01	P Steels	EPH13R050U0050-2
XHGR130205ER-MJ	●		0.02		
XHGR130210ER-MJ	●		0.04		
XHGR130215ER-MJ	●		0.06		
XHGR130220ER-MJ	●		0.08	M Stainless steel	
XHGR18T202ER-MJ	●	0.700	0.01		EPH18R063U0063-2 EPH18R075U0075-3 EPH18R100U0100-4
XHGR18T205ER-MJ	●		0.02		
XHGR18T210ER-MJ	●		0.04	K Cast irons	
XHGR18T215ER-MJ	●		0.06		
XHGR18T220ER-MJ	●		0.08		

Insert Cat. No.	Grade DS1200	Dimensions (in) ℓa	Corner R rE	Application	Applicable Cutter
XHGR130200FR-AJ	●	0.512	0.00		EPH13R050U0050-2
XHGR130205FR-AJ	●		0.02		
XHGR130210FR-AJ	●		0.04		
XHGR130215FR-AJ	●		0.06		
XHGR130220FR-AJ	●		0.08	N Nonferrous metals	
XHGR18T200FR-AJ	●	0.700	0.00		EPH18R063U0063-2 EPH18R075U0075-3 EPH18R100U0100-4
XHGR18T205FR-AJ	●		0.02		
XHGR18T210FR-AJ	●		0.04		
XHGR18T215FR-AJ	●		0.06		
XHGR18T220FR-AJ	●		0.08		

● : Stocked Standard

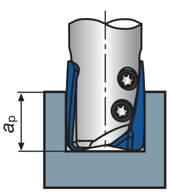
■ General Cutting Conditions

Shoulder Milling



Work Material		Carbon Steels and Aloy Steels		Alloy Steels and Prehardened Steels		Stainless Steels		Cast Irons		Aluminum Alloys (Si<12%)		Aluminum Alloys (Si>13%)	
Hardness		<30HRC		30~40HRC		<250HB		-		-		-	
Cutting Speed		vc=200~600 SFM		vc=160~500 SFM		vc=160~500 SFM		vc=260~650 SFM		vc=300~1,000 SFM		vc=260~600 SFM	
Conditions		RPM	Feed (ipm)	RPM	Feed (ipm)	RPM	Feed (ipm)	RPM	Feed (ipm)	RPM	Feed (ipm)	RPM	Feed (ipm)
Tool dia. (in)	ø0.500	3050	20	2520	11	2520	8	3470	23	4960	29	3280	16
	ø0.625	2400	15	2010	8	2010	6	2780	18	3970	22	2360	12
	ø0.750	2000	19	1680	10	1680	8	2320	23	3310	33	2200	17
	ø1.000	1500	19	1260	10	1260	8	1730	23	2480	33	1640	17
Depth of cut (in)		ap<0.08D		ap<0.06D		ap<0.5D		ap<1.0D		ap<1.0D		ap<1.0D	
		ae<0.15D		ae<0.15D		ae<0.15D		ae<0.2D		ae<0.2D		ae<0.2D	

Slotting



Work Material		Carbon Steels and Aloy Steels		Alloy Steels and Prehardened Steels		Stainless Steels		Cast Irons		Aluminum Alloys (Si<12%)		Aluminum Alloys (Si>13%)	
Hardness		<30HRC		30~40HRC		<250HB		-		-		-	
Cutting Speed		vc=160~500 SFM		vc=100~360 SFM		vc=100~360 SFM		vc=200~600 SFM		vc=260~720 SFM		vc=200~530 SFM	
Conditions		RPM	Feed (ipm)	RPM	Feed (ipm)	RPM	Feed (ipm)	RPM	Feed (ipm)	RPM	Feed (ipm)	RPM	Feed (ipm)
Tool dia. (in)	ø0.500	2520	13	1760	7	1760	6	3050	18	3740	22	2790	14
	ø0.625	2010	9	1400	6	1400	4	2440	13	3000	17	2230	10
	ø0.750	1680	13	1170	7	1170	6	2040	18	2500	23	1860	14
	ø1.000	1260	13	880	7	880	6	1530	18	1870	23	1390	14
Depth of cut (in)		ap<0.2D		ap<0.15D		ap<0.15D		ap<0.4D		ap<0.4D		ap<0.4D	

■ Notes

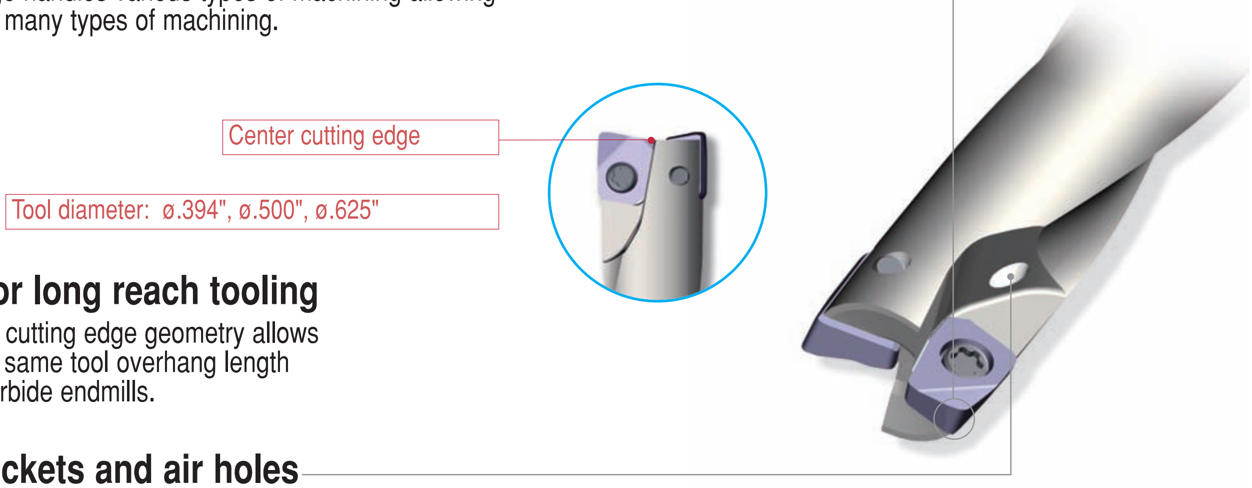
- ●When slotting, use a rigid machine.
- ●In slotting or pocketing where chips tend to stay in the cutting zone, use an air blast to remove chips to prevent chip recutting.
- ●When chips tend to weld excessively on the cutting edge such as when machining aluminum alloys, use a water soluble cutting fluid.
- ●In the case of cutting a casting skin or a heavily interrupted work surface, decrease the feed per tooth and the maximum depth of cut to 1/2 to 2/3 times the values shown in the table.
- ●Tool overhang length must be as short as possible to avoid chatter. When the tool overhang length is long, decrease the number of revolutions and feed.
- ●Cutting conditions are generally limited by the rigidity and power of the machine and the rigidity of the workpiece. When setting the conditions, start from half of the values of the general cutting conditions and then increase the value gradually while making sure the machine is normally running.

EVH Multi-functional

The toolholder has a center cutting edge which allows shoulder milling, slotting, drilling, and other kinds of machining with only one tool.

■ Center cutting edge design for square shoulder milling

- Center cutting edge handles various types of machining allowing only *one tool* for many types of machining.



■ Most suitable for long reach tooling

- The low resistance cutting edge geometry allows machining with the same tool overhang length (L/D=4) as solid carbide endmills.

■ Long helical pockets and air holes

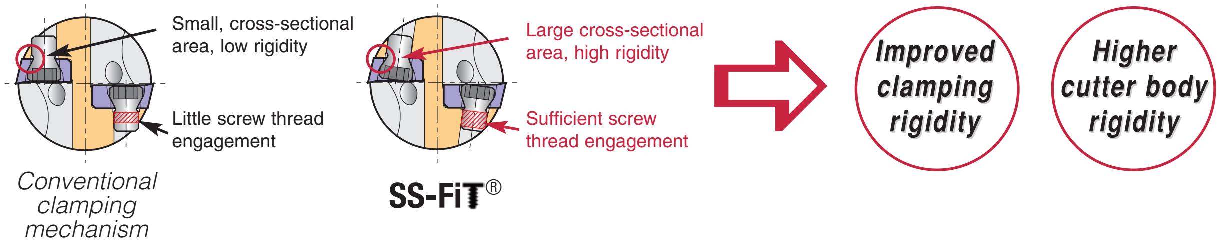
- Allows trouble free chip evacuation even in deep pocketing.

■ The new clamping mechanism

- The new clamping mechanism, **"SS-Fit"** (PAT.P), improves rigidity and allows a smaller tool diameter.

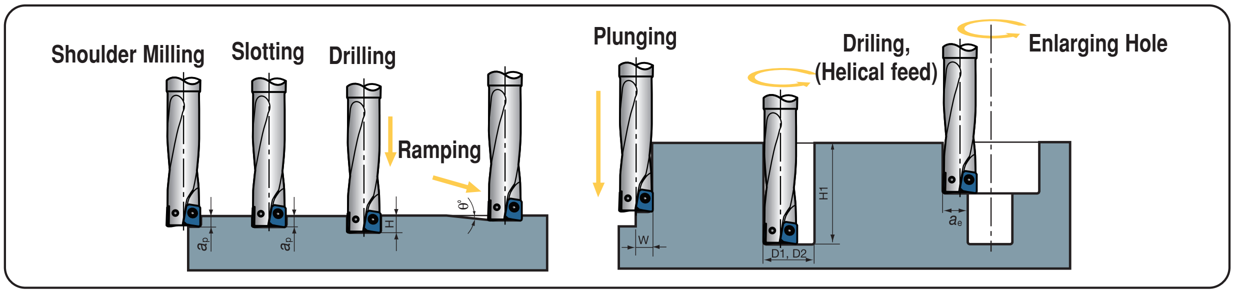
SS-FiT Slant Screw Fixation Technology

This logo stands for Tungaloy's original new clamping mechanism for small diameter indexable insert cutting tools.



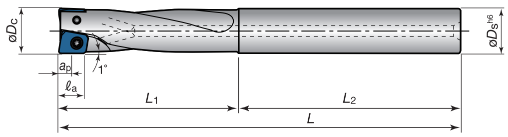
■ Machining Modes

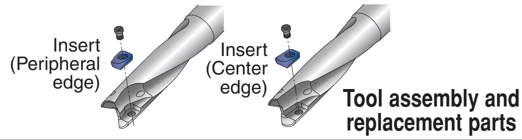
Unit: inch



Cat No.	Tool Dia. (in.)	Effective Edge Length (ap)	Max. Depth of Drill (H)	Max. Cutting Width in Plunging (W)	Max. Ramping Angle (θ°)	Min. Machinable Hole Dia. (D1)	Max. Machinable Hole Dia. (D2)	Max. Cutting Width in Enlarging Hole (ae)
EVH06R039U0050-02	0.394	0.1	0.2	0.2	5	0.5	0.7	0.4
EVH07R050U0050-02	0.500	0.1	0.2	0.2	5	0.6	0.9	0.4
EVH09R063U0063-02	0.625	0.2	0.3	0.3	5	0.7	1.0	0.6

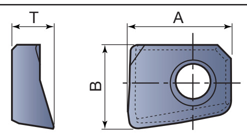
■ EVH (Body)



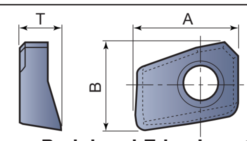


Catalog Number	Stock	# of Teeth	Dimensions (inch)						Clamping Screw (Std. fastening Torque)	Wrench	Applicable Central Insert	Applicable Peripheral Insert
			øDc	øDs	Max. a_p	L	L1	L2				
EVH06R039U0050-02	●	2	0.394	0.50	0.12	3.57	1.57	2.00	CSPD-1.8S (6.2 in.-lb.)	IP-6F	XVGT06H205□C-□	XVGT06H205□P-□
EVH07R050U0050-02	●	2	0.500	0.50	0.14	4.00	2.00	2.00	CSPB-2H (6.2 in.-lb.)	IP-6F	XVGT08X305□C-□	XVGT07X305□P-□
EVH09R063U0063-02	●	2	0.625	0.63	0.18	4.50	2.50	2.00	CSPB-2.5S (11.5 in.-lb.)	IP-8D	XVGT09X408□C-□	XVGT09X408□P-□

■ Inserts



Center Edge Insert



Peripheral Edge Insert

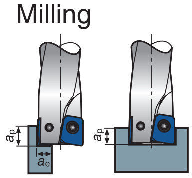
	Insert Cat. No.	Grade AH730	Dimensions (in.) A	B	T	Application	Applicable Cutter
Center Edge	XVGT06H205EC-MJ	●	0.244	0.193	0.098	P Steels / M Stainless steel / K Cast irons	EVH06R039U0050-02
Center Edge	XVGT08X305EC-MJ	●	0.280	0.248	0.118		EVH07R050U0050-02
Center Edge	XVGT09X408EC-MJ	●	0.350	0.311	0.157		EVH09R063U0063-02
Peripheral Edge	XVGT06H205EP-MJ	●	0.244	0.201	0.098		EVH06R039U0050-02
Peripheral Edge	XVGT07X305EP-MJ	●	0.280	0.252	0.118		EVH07R050U0050-02
Peripheral Edge	XVGT09X408EP-MJ	●	0.350	0.315	0.157		EVH09R063U0063-02

	Insert Cat. No.	Grade DS1200	Dimensions (in.) A	B	T	Application	Applicable Cutter
Center Edge	XVGT06H205FC-AJ	●	0.244	0.193	0.098	N Nonferrous metals	EVH06R039U0050-02
Center Edge	XVGT08X305FC-AJ	●	0.280	0.248	0.118		EVH07R050U0050-02
Center Edge	XVGT09X408FC-AJ	●	0.350	0.311	0.157		EVH09R063U0063-02
Peripheral Edge	XVGT06H205FP-AJ	●	0.244	0.201	0.098		EVH06R039U0050-02
Peripheral Edge	XVGT07X305FP-AJ	●	0.280	0.252	0.118		EVH07R050U0050-02
Peripheral Edge	XVGT09X408FP-AJ	●	0.350	0.315	0.157		EVH09R063U0063-02

● : Stocked Standard

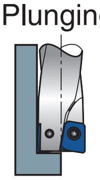
■ General Cutting Conditions

Shoulder Milling Slotting



ap: Axial depth of cut
ae: Radial depth of cut

Plunging



Work Material		Carbon Steels and Aloy Steels		Alloy Steels and Prehardened Steels		Stainless Steels		Cast Irons		Aluminum Alloys (Si<12%)		Aluminum Alloys (Si>13%)	
Hardness		<30HRC		30~40HRC		<250HB		-		-		-	
Cutting Speed		vc=160~330 SFM		vc=100~330 SFM		vc=160~400 SFM		vc=200~460 SFM		vc=330~1,000 SFM		vc=330~660 SFM	
Conditions		RPM	Feed (ipm)	RPM	Feed (ipm)	RPM	Feed (ipm)	RPM	Feed (ipm)	RPM	Feed (ipm)	RPM	Feed (ipm)
Tool dia. (in)	ø0.394	2550	15	1910	7	2550	15	3180	20	6370	40	4770	26
	ø0.500	2120	13	1590	6	2120	13	2650	17	5300	33	3980	22
	ø0.625	2980	9	1190	5	1590	9	1990	13	3980	25	2980	17
Machining Mode	Shoulder Milling	ap<0.25D		ap<0.25D		ap<0.25D		ap<0.25D		ap<0.25D		ap<0.25D	
		ae<0.2D		ae<0.2D		ae<0.2D		ae<0.3D		ae<0.3D		ae<0.3D	
	Slotting	ap<0.1D		ap<0.1D		ap<0.1D		ap<0.15D		ap<0.2D		ap<0.2D	

Work Material		Carbon Steels and Aloy Steels		Alloy Steels and Prehardened Steels		Stainless Steels		Cast Irons		Aluminum Alloys (Si<12%)		Aluminum Alloys (Si>13%)	
Hardness		<30HRC		30~40HRC		<250HB		-		-		-	
Cutting Speed		vc=330~1,000 SFM		vc=330~820 SFM		vc=100~330 SFM		vc=330~1,000 SFM		vc=330~1,650 SFM		vc=330~1,000 SFM	
Conditions		RPM	Feed (ipm)	RPM	Feed (ipm)	RPM	Feed (ipm)	RPM	Feed (ipm)	RPM	Feed (ipm)	RPM	Feed (ipm)
Tool dia. (in)	ø0.394	2550	5	1910	3	2550	5	3180	7	6370	18	4770	11
	ø0.500	2120	4	1590	3	2120	4	2650	6	5300	15	3980	9
	ø0.625	2980	3	1190	2	1590	3	1990	5	3980	11	2980	7

ap: Axial depth of cut ae: Radial depth of cut

■ Notes

- In slotting or pocketing where chips tend to stay in the cutting zone, use an air blast to remove chips to prevent chip recutting.
- When chips tend to weld excessively on the cutting edge such as when machining aluminum alloys, use a water soluble cutting fluid.
- In the case of cutting a casting skin or a heavily interrupted work surface, decrease the feed per tooth and the maximum depth of cut to 1/2 to 2/3 times the values shown in the table.
- Tool overhang length must be as short as possible to avoid chatter. When the tool overhang length is long, decrease the number of revolutions and feed.
- Cutting conditions are generally limited by the rigidity and power of the machine and the rigidity of the workpiece. When setting the conditions, start from half of the values of the general cutting conditions and then increase the values gradually while making sure the machine is running normally.

EXH High Feed

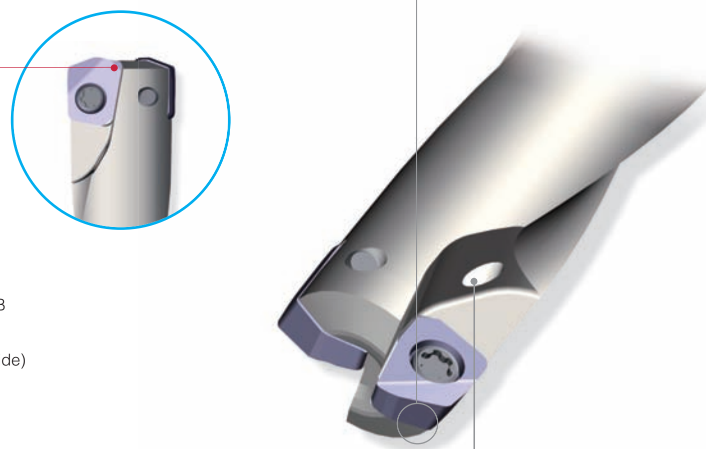
Super high feed machining capability improves productivity in roughing. Center cutting design allows it to be used in a variety of machining.

Cutting edge geometry for higher productivity

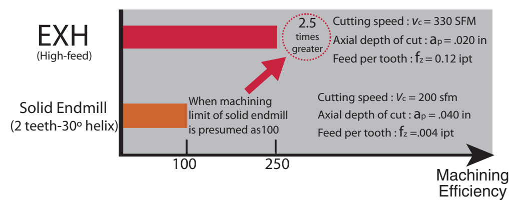
- EXH improves productivity in roughing

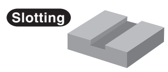
Center cutting edge

Tool diameter: ø.394", ø.500", ø.625"



Efficiency of machining





Machine : Small M/C (BT30)
Work material : Carbon steels (JIS S55C), 200HB
Neck length : 1.57"
Tool diameter : ø0.394"
GL : 4.3" (Length from a gauge side)

Most suitable for long reach tooling

- Cutting edge of low resistance allows machining with the same tool overhang length (L/D=4) as for solid carbide endmills.

Long helical pockets and air holes

- Allows smooth chip evacuation even in deep pocketing.

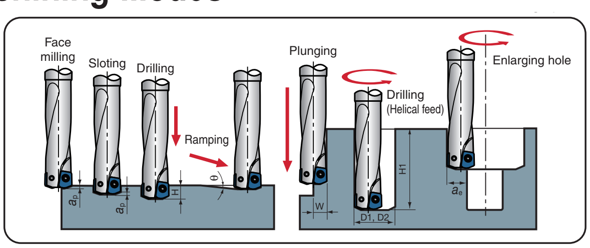
The new clamping mechanism

- The new clamping mechanism, "*SS-Fit*" (PAT.P), improves rigidity and reduces tool diameter.

SS-FiT Slant Screw Fixation Technology

This logo stands for Tungaloy's original new clamping mechanism for small diameter indexable insert cutting tools.

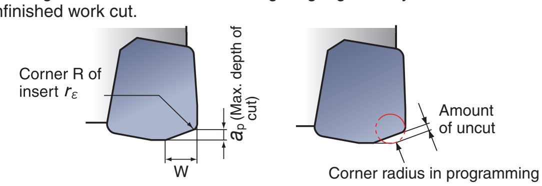
Machining Modes



Cat No.	Tool Dia. (in.)	Effective Edge Length (ap)	Max. Depth of Drill (H)	Max. Cutting Width in Plunging (W)	Max. Ramping Angle	Min. Machinable Hole Dia. (D1)	Max. Machinable Hole Dia. (D2)*	Max. Cutting Width in Enlarging Hole (ae)
EXH06R039U0050-02	0.394	0.024	0.197	0.197	0.197	0.472	0.748	0.276
EXH07R050U0050-02	0.500	0.024	0.236	0.236	0.197	0.551	0.906	0.354
EXH09R063U0063-02	0.625	0.031	0.315	0.315	0.197	0.709	1.220	0.492

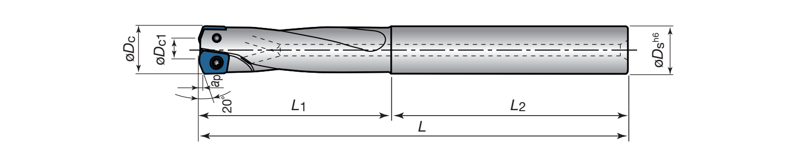
Notes for Programming

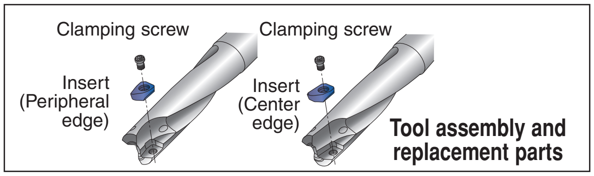
When using CAD/CAM, please program it for a radius cutter. The following table shows actual cutting edge geometry and amount of unfinished work cut.



Cat No.	Tool Dia. (in.)	Max. Depth of Cut (ap)	Corner R of Insert (re)	(W)	Amount of Uncut (t)	Corner Radius in Programming
EXH06R039U0050-02	0.394	0.024	0.020	0.098	0.0276	R0.02
					0.0236	R0.04
EXH07R050U0050-02	0.500	0.024	0.020	0.098	0.0276	R0.02
					0.0236	R0.04
EXH09R063U0063-02	0.625	0.031	0.031	0.118	0.0315	R0.02
					0.0276	R0.04
					0.0236	R0.06

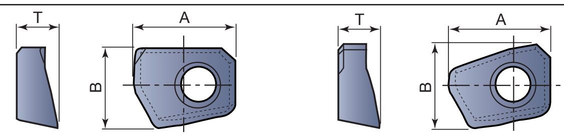
EXH (Body)





Catalog Number	Stock	# of Teeth	Dimensions (inch)						Clamping Screw (Std. fastening Torque)	Wrench	Applicable Central Insert	Applicable Peripheral Insert
			øDc	øDs	Max. a_p	L	L1	L2				
EXH06R039U0050-02	●	2	0.394	0.50	0.02	3.57	1.57	2.00	CSPD-1.8S (6.2 in.-lb.)	IP-6F	XXGT06H205□C-□	XXGT06H205□P-□
EXH07R050U0050-02	●	2	0.500	0.50	0.02	4.00	2.00	2.00	CSPB-2H (6.2 in.-lb.)	IP-6F	XXGT08X305□C-□	XXGT07X305□P-□
EXH09R063U0063-02	●	2	0.625	0.63	0.03	4.50	2.50	2.00	CSPB-2.5S (11.5 in.-lb.)	IP-8D	XXGT09X408□C-□	XXGT09X408□P-□

Inserts



Center Edge Insert   Peripheral Edge Insert

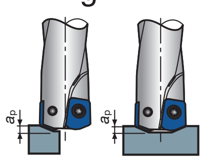
	Insert Cat. No.	Grade	Dimensions (in.)			Application	Applicable Cutter
		AH730	A	B	T		
Center Edge	XXGT06H205EC-MJ	●	0.244	0.193	0.098	P Steels	EXH06R039U0050-02
Center Edge	XXGT08X305EC-MJ	●	0.276	0.244	0.118	P Steels	EXH07R050U0050-02
Center Edge	XXGT09X408EC-MJ	●	0.350	0.311	0.157	M Stainless steel	EXH09R063U0063-02
Peripheral Edge	XXGT06H205EP-MJ	●	0.244	0.201	0.098	M Stainless steel	EXH06R039U0050-02
Peripheral Edge	XXGT07X305EP-MJ	●	0.276	0.248	0.118	K Cast irons	EXH07R050U0050-02
Peripheral Edge	XXGT09X408EP-MJ	●	0.350	0.315	0.157	K Cast irons	EXH09R063U0063-02

	Insert Cat. No.	Grade	Dimensions (in.)			Application	Applicable Cutter
		DS1200	A	B	T		
Center Edge	XXGT06H205FC-AJ	●	0.244	0.193	0.098	N Nonferrous metals	EXH06R039U0050-02
Center Edge	XXGT08X305FC-AJ	●	0.276	0.244	0.118	N Nonferrous metals	EXH07R050U0050-02
Center Edge	XXGT09X408FC-AJ	●	0.350	0.311	0.157	N Nonferrous metals	EXH09R063U0063-02
Peripheral Edge	XXGT06H205FP-AJ	●	0.244	0.201	0.098	N Nonferrous metals	EXH06R039U0050-02
Peripheral Edge	XXGT07X305FP-AJ	●	0.276	0.248	0.118	N Nonferrous metals	EXH07R050U0050-02
Peripheral Edge	XXGT09X408FP-AJ	●	0.350	0.315	0.157	N Nonferrous metals	EXH09R063U0063-02

● : Stocked Standard

General Cutting Conditions

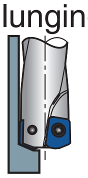
Face Milling   Slotting



ap: Axial depth of cut

Work Material		Carbon Steels and Aloy Steels		Alloy Steels and Prehardened Steels		Stainless Steels		Cast Irons		Aluminum Alloys (Si<12%)		Aluminum Alloys (Si>13%)	
Hardness		<30HRC		30~40HRC		<250HB		-		-		-	
Cutting Speed		vc=330~1,000 SFM		vc=330~820 SFM		vc=330~1,000 SFM		vc=330~1,000 SFM		vc=330~1,650 SFM		vc=330~1,000 SFM	
Conditions		RPM	Feed (ipm)	RPM	Feed (ipm)	RPM	Feed (ipm)	RPM	Feed (ipm)	RPM	Feed (ipm)	RPM	Feed (ipm)
Tool dia. (in)	ø0.394	4770	56	3820	30	4770	56	6360	100	9550	226	6360	125
	ø0.500	3980	47	3180	25	3980	47	5300	83	7950	188	5300	104
	ø0.625	2980	35	2380	19	2980	35	3970	62	5960	141	3970	78
Depth of cut (in)	ø0.394	ap<0.024		ap<0.020		ap<0.024		ap<0.024		ap<0.024		ap<0.024	
	ø0.500	ap<0.024		ap<0.020		ap<0.024		ap<0.024		ap<0.024		ap<0.024	
	ø0.625	ap<0.031		ap<0.024		ap<0.031		ap<0.031		ap<0.031		ap<0.031	

Plunging



Work Material		Carbon Steels and Aloy Steels		Alloy Steels and Prehardened Steels		Stainless Steels		Cast Irons		Aluminum Alloys (Si<12%)		Aluminum Alloys (Si>13%)	
Hardness		<30HRC		30~40HRC		<250HB		-		-		-	
Cutting Speed		vc=330~1,000 SFM		vc=330~820 SFM		vc=330~1,000 SFM		vc=330~1,000 SFM		vc=330~1,650 SFM		vc=330~1,000 SFM	
Conditions		RPM	Feed (ipm)	RPM	Feed (ipm)	RPM	Feed (ipm)	RPM	Feed (ipm)	RPM	Feed (ipm)	RPM	Feed (ipm)
Tool dia. (in)	ø0.394	4770	9	3820	6	4770	9	6360	17	9550	30	6360	17
	ø0.500	3980	8	3180	5	3980	8	5300	15	7950	25	5300	15
	ø0.625	2980	6	2380	4	2980	6	3970	11	5960	19	3970	11

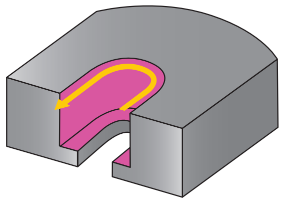
■ Notes
- ●In slotting or pocketing where chips tend to stay in the cutting zone, use an air blast to remove chips to prevent chip recutting.
- ●When chips tend to weld excessively on the cutting edge such as when machining aluminum alloys, use a water soluble cutting fluid.
- ●In the case of cutting a casting skin or a heavily interrupted work surface, decrease the feed per tooth and the maximum depth of cut to 1/2 to 2/3 times the values shown in the table.
- ●Tool overhang length must be as short as possible to avoid chatter. When the tool overhang length is long, decrease the number of revolutions and feed.
- ●Cutting conditions are generally limited by the rigidity and power of the machine and the rigidity of the workpiece. When setting the conditions, start from half of the values of the general cutting conditions and then increase the values gradually while making sure the machine is running normally.

Machining Examples

Improvement from single flute indexable cutter

Tool: **EPH18R016M16.0-2 (ø16mm, two flutes)**
Inserts: **XHGR18T210ER-MJ AH730 (Corner R: 1.0mm)**

Work material:	Carbon steel (JIS S45C)
Cutting speed:	V_c =330 SFM for roughing/finishing
Axial depth of cut:	a_p =.080" for roughing, a_p =.512" for finishing
Radial depth of cut:	a_e =.020" for finishing
Feed per tooth:	f_z = .003" ipt for roughing, f_z .002" ipt for finishing
Table feed:	V_f = 920 SFM for roughing, V_f = 650 SFM for finishing
Machine:	NC milling machine (BT40)
Cutting fluid:	Dry cutting



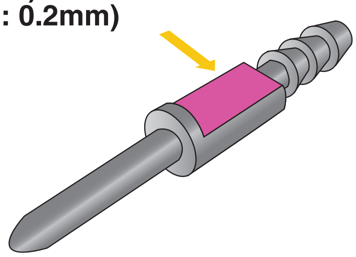
■ Existing tool
Tool: Coated solid radius endmill (ø16mm, two flutes)

Results: Feed marks were not noticable. The surface quality and accuracy were good. Compared with existing solid radius endmills, Hybrid TAC MILL reduced tool costs and simplified tool management.

Increased machining productivity on automatic lathe

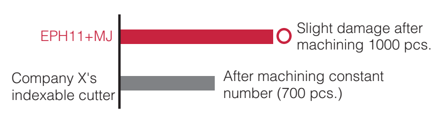
Tool: **EPH11R010M10.0-2 (ø10mm, two flutes)**
Inserts: **XHGR110202ER-MJ AH730 (Corner R: 0.2mm)**

Work material:	Low carbon steel (JIS S15C)
Cutting speed:	V_c = 130 SFM
Axial depth of cut:	a_p = .047"
Radial depth of cut:	a_e= .051"
Feed per tooth:	f_z = .002 ipt
Machine:	NC automatic lathe
Coolant Fluid:	Water soluble type



■ Existing tool
Tool: Other company's indexable cutter (ø10mm, two flutes)
Inserts: PVD Coated

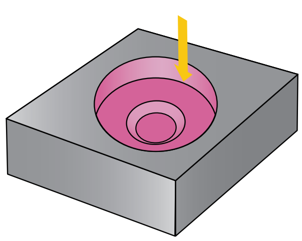
Results: Compared to the existing tool, Hybrid TAC MILL, which features lower cutting forces, could reduce machining noise. The surface quality and machining accuracy were also improved.
The tool life was 1.4 times more than the existing tool.



Improvement from two-flute, round-insert cutter

Tool: **EXH07R012M12.0-02 (ø12mm, two flutes)**
Inserts: **XXGT07X305EC/P-MJ AH730**

Work material:	Carbon steel, JIS S50C, 200 HB
Cutting speed:	V_c = 525 SFM
Axial depth of cut:	a_p = .020"
Radial depth of cut:	a_e = .236"
Feed per tooth:	f_z = .012 ipt
Table feed:	V_f = 8 SFM
Machine:	Vertical machining center (BT40)
Cutting fluid:	Dry cutting (Air blast)



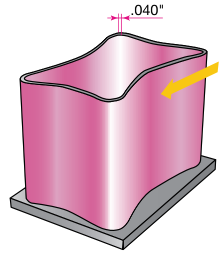
■ Current Tool: Other company's indexable-round insert cutter (ø12mm, two flute)
Inserts: PVD Coated

Results: In contour cutting, EXH was able to reduce cutting force and machining noise. With existing tooling, it was necessary to change tool after only 60 min of cutting time. The EXH was able to double the tool life 120 min.

Deep pocket milling of thin-walled workpiece

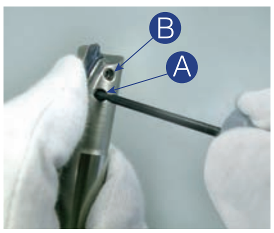
Tool:	**EVH09R016M16.0-02 (ø16mm, two flutes)**
Inserts:	**XVGT09X405FC/P-AJ DS1200 (Corner R: 0.5 mm)**

Work material:	Aluminum alloy (JIS A7075)
Cutting speed:	Vc = 1200 SFM
Axial depth of cut:	a_p =.060"
Radial depth of cut:	a_e =.630"
Feed per tooth:	f_z = .004" ipt
Feed:	V_f = 5 SFM
Machine:	Vertical machining center (BT30)
Cutting fluid:	Dry cutting
Net machining time:	23 min



● Results: In pocketing of 1mm thin-walled work, EVH was able to machine with no chattering.
Chip evacuation was satisfactory due to the effect of the through the spindle airblast.

● Insert mounting procedure



① After loosening the clamping screws, place the insert in the pocket of the body while pushing it with your finger.
② Lightly fasten the clamping screws in order of Ⓐ then Ⓑ.
③ Securely tighten the clamping screws in order of Ⓐ then Ⓑ.
(Refer to the standard tightening torque values.)
④ Check the condition of insert seating clearance between the insert and insert pocket, the tool diameter, and the peripheral edge runout.

■ Maximum Allowable RPM

- The clamping screw should be torqued to the value specified for each cutter size.
- The face mill arbor and collet chuck should be well balanced. Ensure safe operation at the allowable revolutions is certified.
- The inserts should be of the same type and grade.
- The inserts and parts should be used in the specified number. Any modifications should not be applied to the inserts, parts, and cutter body.

The maximum RPM shown above is determined only for keeping the balance of the rotating body with centrifugal force. Please refer to the general cutting conditions for the work material and insert grade.

Table below shows the maximum allowable number of revolutions of cutters. Avoid using the cutter at revolutions in excess of the allowable number because it can cause breakage of the machine and tool. Broken tool parts can be propelled at the operator.

Body Cat.No.	Tool Dia. mm (inch)	Max allowable (rpm)
EPH	ø10-12-16 (.500",.625",.750",1.00")	15,000
EVH/EXH	ø10-12 (.394",.500")	50,000
	ø16 (.625")	40,000

■ Notes
●Be sure to use the specified inserts listed in Tungaloy's catalogs or the instruction manual. Use of other inserts may results in undesirable machining or cutter body breakage.
●Before changing or indexing the insert, remove chips and other foreign matter from the inserts and insert pockets using an air blast or a wiping cloth.
●Clamping screws should be fastened with the specified wrench contained in the package.
●Make sure to replace clamping screws and wrench before they are excessively worn or deformed due to long term use.

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