

Pat. No. 5601464



Carbide Threading tool

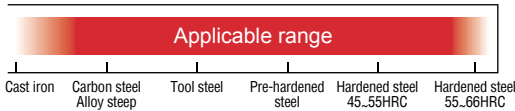
***ET-PN***  
***EDT-TH***  
***EDT-(N)PT-ATH***

Carbide Thread Mill series

Mitsubishi Hitachi Tool Engineering, Ltd.

New Product News | No.1305E-3 | 2017-6

# Features



Applications

Mold making

Parts processing

ET-PN  
EDT-TH, EDT-(N)PT-ATH

φ1.4~φ15.4 [ 124 Items ]

## Features of Epoch Thread Mill

- Tough and strong edge design provides threading of hardened steels.
- Tip shape that reduces cutting resistance suppresses tool bending.
- Drastically reduces tool breakage, a particular problem

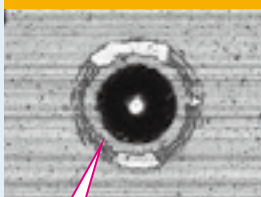
**Reduces risk of breaking off inside!**



## New coating with excellent adhesion and wear resistance

### Adhesion of PN coating

#### Conventional coating



Coating is peeling.

Substrate: Carbide alloy

#### PN coating



No peeling  
↓  
Superior adhesion

### Cross-sectional structure and characteristics of PN coating layer.

Membrane surface with improved lubrication characteristics



Improved adhesion increases stability!

Microstructure increases heat resistance!

## Features of Epoch D Thread Mill

- This single tool can perform both drilling and threading simultaneously.
- High-strength edge shape design suppresses edge tip breakage in severe machining environments including hardened steels.

**No pilot hole needed**



**ATH coating further improves the hardness and oxidation resistance of the previous TH coating.**

### New PVD Nano Technology

Epoch Super Coating **ATH**

Pat.No.3934136

- Hardness and oxidation resistance of TH coatings is further improved. Enables longer life and higher efficiency when cutting high-hardness materials.  
Hardness: 3800HV; Oxidation temperature: 1200°C (Si nano composite coating with finer crystal particles)
- Exhibits performance in ultra high-efficient cutting.

## Reduces the risk of breaking off inside

By using a tool with a diameter smaller than the inside diameter of the thread, cutting chips are smaller and chip evacuation is improved.  
The risk of the tool breaking off inside the hole is reduced as a result.

## One tool - various types of thread milling

Right hand, left-hand and fine thread milling can be performed by just changing the NC program.  
The nominal diameters of the coarse threads and fine threads that can be processed with the same tool are different.  
(Example: For ET-1.25-16-PN, coarse thread is M8 × P1.25 and fine thread is M10 × P1.25)

## Cutting conditions can be freely set

Unlike when using taps, synchronizing the rotation and feed rates is not necessary, so these tools can be used in the same manner as end mills and cutting conditions can be set according to the processing environment.

## Usable on a variety of machines

Since the load is smaller than when using taps, these tools can be used even on machines having low-powered spindle.  
In addition, special tooling such as tapping holders are not necessary.

## Provides good finished surfaces

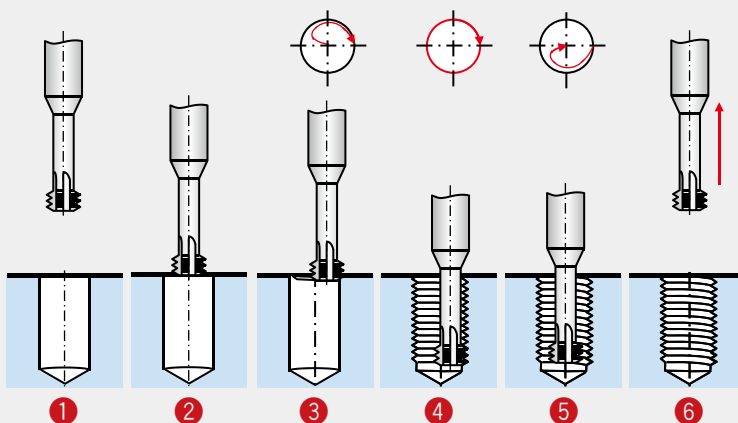
Interrupted cutting suppresses tearing to provide good finished surfaces.

## Minimal incomplete threads enable thread milling to be performed to the bottom of the hole

Epoch Thread Mills are designed with no incomplete thread and Epoch D Thread Mills have only one incomplete thread, making them ideal for when you want to perform thread milling to the bottom of shallow holes.



## Machining process with Epoch Thread Mill



- 1 Startup
- 2 Positioning for starting point of machining
- 3 Entry (gradually cutting in)
- 4 Threading
- 5 Release (gradually detaching from cutting)
- 6 Ending

※ Epoch D Thread Mill can perform boring simultaneously.

NC programs can be easily created!

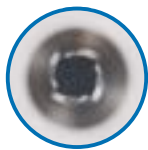
You can create NC programs on our website!

<http://www.mmc-hitachitool.co.jp/technical/nc-et/>

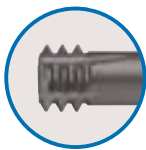
Left-hand cutting tool - Reverse spindle rotation should be used.

# Line Up

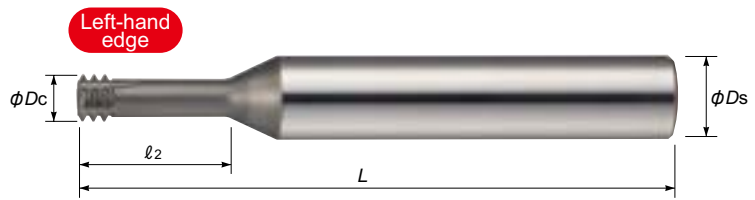
## Epoch Thread Mill



4 flutes



No incomplete thread



### ET-(U)○○.○○-○○.○-PN

Unit : mm

Item Code	Stock	Nominal dia. $D_1$	Pitch $P$	Tool Dia. $D_c$	Under Neck Length $\ell_2$	Overall Length $L$	Shank Dia. $D_s$	Oil Hole	
<b>For Metric threads</b>									
Thread depth: $2 \times D_1$									
ET-0.4-4-PN	<input type="checkbox"/>	M2	0.4	1.4	4	50	6	-	
ET-0.45-4.4-PN	<input type="checkbox"/>	M2.2	0.45	1.6	4.4	50	6	-	
ET-0.45-5-PN	<input type="checkbox"/>	M2.5	0.45	1.8	5	50	6	-	
ET-0.5-6-PN	<input checked="" type="checkbox"/>	M3	0.5	2.4	6	50	6	-	
ET-0.7-8-PN	<input checked="" type="checkbox"/>	M4	0.7	3.1	8	50	6	-	
ET-0.8-10-PN	<input checked="" type="checkbox"/>	M5	0.8	3.8	10	50	6	-	
ET-1.0-12-PN	<input checked="" type="checkbox"/>	M6	1	4.6	12	50	6	-	
ET-1.25-16-PN	<input checked="" type="checkbox"/>	M8	1.25	6.2	16	70	10	-	
ET-1.5-20-PN	<input checked="" type="checkbox"/>	M10	1.5	7.5	20	70	10	-	
ET-1.75-24-PN	<input checked="" type="checkbox"/>	M12	1.75	9	24	80	10	-	
ET-2-32-PN	<input type="checkbox"/>	M16	2	11.5	32	100	12	-	
ET-2.5-36-PN	<input type="checkbox"/>	M18	2.5	14	36	135	16	○	
ET-2.5-40-PN	<input type="checkbox"/>	M20	2.5	15	40	135	16	○	
<b>For Metric threads</b>									
Thread depth: $2.5 \times D_1$									
ET-0.4-5-PN	<input type="checkbox"/>	M2	0.4	1.4	5	50	6	-	
ET-0.45-5.5-PN	<input type="checkbox"/>	M2.2	0.45	1.6	5.5	50	6	-	
ET-0.45-6.25-PN	<input type="checkbox"/>	M2.5	0.45	1.8	6.25	50	6	-	
ET-0.5-7.5-PN	<input checked="" type="checkbox"/>	M3	0.5	2.4	7.5	50	6	-	
ET-0.7-10-PN	<input checked="" type="checkbox"/>	M4	0.7	3.1	10	50	6	-	
ET-0.8-12.5-PN	<input checked="" type="checkbox"/>	M5	0.8	3.8	12.5	50	6	-	
ET-1.0-15-PN	<input checked="" type="checkbox"/>	M6	1	4.6	15	50	6	-	
ET-1.25-20-PN	<input checked="" type="checkbox"/>	M8	1.25	6.2	20	70	10	-	
ET-1.5-25-PN	<input checked="" type="checkbox"/>	M10	1.5	7.5	25	70	10	-	
ET-1.75-30-PN	<input checked="" type="checkbox"/>	M12	1.75	9	30	80	10	-	
ET-2-40-PN	<input type="checkbox"/>	M16	2	11.5	40	100	12	-	
ET-2.5-45-PN	<input type="checkbox"/>	M18	2.5	14	45	135	16	○	
ET-2.5-50-PN	<input type="checkbox"/>	M20	2.5	15	50	135	16	○	
<b>For Unified threads</b>									
Thread depth: $2 \times D_1$									
ET-U64-3.7-PN	<input type="checkbox"/>	No.1-64UNC	1.854	0.397	1.4	3.7	50	6	-
ET-U56-4.4-PN	<input type="checkbox"/>	No.2-56UNC	2.184	0.454	1.65	4.4	50	6	-
ET-U48-5-PN	<input type="checkbox"/>	No.3-48UNC	2.515	0.529	1.9	5	50	6	-
ET-U40-5.7-PN	<input type="checkbox"/>	No.4-40UNC	2.845	0.635	2.1	5.7	50	6	-
ET-U32-7-PN	<input type="checkbox"/>	No.6-32UNC	3.505	0.794	2.55	7	50	6	-
ET-U36-8.3-PN	<input type="checkbox"/>	No.8-36UNF	4.166	0.706	3.3	8.3	50	6	-
ET-U24-9.7-PN	<input type="checkbox"/>	No.10-24UNC	4.826	1.058	3.5	9.7	70	6	-
ET-U20-12.7-PN	<input type="checkbox"/>	1/4-20UNC	6.35	1.27	4.75	12.7	70	6	-
ET-U18-12.7-PN	<input type="checkbox"/>	1/4-28UNF	6.35	0.907	5	12.7	70	6	-
ET-U18-15.9-PN	<input type="checkbox"/>	5/16-18UNC	7.938	1.411	6	15.9	80	10	-
ET-U16-19.1-PN	<input type="checkbox"/>	3/8-16UNC	9.525	1.588	6.7	19.1	80	10	-
ET-U14-22.2-PN	<input type="checkbox"/>	7/16-14UNC	11.112	1.814	7.7	22.2	80	10	-
ET-U13-25.4-PN	<input type="checkbox"/>	1/2-13UNC	12.7	1.954	9.2	25.4	80	10	-
ET-U12-28.6-PN	<input type="checkbox"/>	9/16-12UNC	14.288	2.117	10.5	28.6	100	12	-
ET-U11-31.8-PN	<input type="checkbox"/>	5/8-11UNC	15.875	2.309	11.4	31.8	100	12	-
<b>For Unified threads</b>									
Thread depth: $2.5 \times D_1$									
ET-U64-4.6-PN	<input type="checkbox"/>	No.1-64UNC	1.854	0.397	1.4	4.6	50	6	-
ET-U56-5.5-PN	<input type="checkbox"/>	No.2-56UNC	2.184	0.454	1.65	5.5	50	6	-
ET-U48-6.3-PN	<input type="checkbox"/>	No.3-48UNC	2.515	0.529	1.9	6.3	50	6	-
ET-U40-7.1-PN	<input type="checkbox"/>	No.4-40UNC	2.845	0.635	2.1	7.1	50	6	-
ET-U32-8.8-PN	<input type="checkbox"/>	No.6-32UNC	3.505	0.794	2.55	8.8	50	6	-
ET-U36-10.4-PN	<input type="checkbox"/>	No.8-36UNF	4.166	0.706	3.3	10.4	50	6	-
ET-U24-12.1-PN	<input type="checkbox"/>	No.10-24UNC	4.826	1.058	3.5	12.1	70	6	-
ET-U20-15.9-PN	<input type="checkbox"/>	1/4-20UNC	6.35	1.27	4.75	15.9	70	6	-
ET-U28-15.9-PN	<input type="checkbox"/>	1/4-28UNF	6.35	0.907	5	15.9	70	6	-
ET-U18-19.8-PN	<input type="checkbox"/>	5/16-18UNC	7.938	1.411	6	19.8	80	10	-
ET-U16-23.8-PN	<input type="checkbox"/>	3/8-16UNC	9.525	1.588	6.7	23.8	80	10	-
ET-U14-27.8-PN	<input type="checkbox"/>	7/16-14UNC	11.112	1.814	7.7	27.8	80	10	-
ET-U13-31.8-PN	<input type="checkbox"/>	1/2-13UNC	12.7	1.954	9.2	31.8	80	10	-
ET-U12-35.7-PN	<input type="checkbox"/>	9/16-12UNC	14.288	2.117	10.5	35.7	100	12	-
ET-U11-39.7-PN	<input type="checkbox"/>	5/8-11UNC	15.875	2.309	11.4	39.7	100	12	-

● : Stocked Items. □ : Stocked by specified distributor. Contact with our sales department.

※For information about tool diameter correction, refer to the item in "Cautions on use" on p. 15.

# Recommended Cutting Conditions

## Epoch Thread Mill

Work material		Cast Iron, Carbon steels 150~200HB FC250,S50C			Stainless steels SUS304			Tool steels 25~35HRC SCM440, HPM7			Pre-hardened steels 35~45HRC HPM-MAGIC,NAK80		
Cutting speed $v_c$ (m/min)		80 ~ 85 ~ 90			70 ~ 75 ~ 80			60 ~ 65 ~ 70					
Nominal dia. $D_1$	Tool dia. $D_c$ (mm)	Revolution $n$ ( $\text{min}^{-1}$ )	Feed rate $v_f$ (mm/min)	Feed per tooth $f_z$ (mm/t)	Revolution $n$ ( $\text{min}^{-1}$ )	Feed rate $v_f$ (mm/min)	Feed per tooth $f_z$ (mm/t)	Revolution $n$ ( $\text{min}^{-1}$ )	Feed rate $v_f$ (mm/min)	Feed per tooth $f_z$ (mm/t)			
M2	1.4	19,300	208	0.009	17,100	164	0.008	14,800	142	0.008			
M2.2	1.6	16,900	203	0.011	14,900	163	0.01	12,900	141	0.01			
M2.5	1.8	15,000	202	0.012	13,300	164	0.011	11,500	142	0.011			
M3	2.4	11,300	154	0.017	9,900	127	0.016	8,600	103	0.015			
M4	3.1	8,700	188	0.024	7,700	152	0.022	6,700	127	0.021			
M5	3.8	7,100	198	0.029	6,300	163	0.027	5,400	130	0.025			
M6	4.6	5,900	204	0.037	5,200	170	0.035	4,500	134	0.032			
M8	6.2	4,400	198	0.05	3,900	165	0.047	3,300	128	0.043			
M10	7.5	3,600	216	0.06	3,200	179	0.056	2,800	148	0.053			
M12	9	3,000	216	0.072	2,700	184	0.068	2,300	145	0.063			
M16	11.5	2,400	235	0.087	2,100	194	0.082	1,800	154	0.076			
M18	14	1,900	171	0.101	1,700	144	0.095	1,500	117	0.088			
M20	15	1,800	184	0.102	1,600	154	0.096	1,400	125	0.089			
No.1-64UNC	1.4	19,300	170	0.009	17,100	134	0.008	14,800	116	0.008			
No.2-56UNC	1.65	16,400	176	0.011	14,500	156	0.011	12,500	122	0.01			
No.3-48UNC	1.9	14,200	181	0.013	12,600	148	0.012	10,900	117	0.011			
No.4-40UNC	2.1	12,900	203	0.015	11,400	167	0.014	9,900	135	0.013			
No.6-32UNC	2.55	10,600	208	0.018	9,400	174	0.017	8,100	141	0.016			
No.8-36UNF	3.3	8,200	170	0.025	7,200	144	0.024	6,300	115	0.022			
No.10-24UNC	3.5	7,700	228	0.027	6,800	187	0.025	5,900	149	0.023			
1/4-20UNC	4.75	5,700	218	0.038	5,000	181	0.036	4,400	146	0.033			
1/4-28UNF	5	5,400	184	0.04	4,800	155	0.038	4,100	122	0.035			
5/16-18UNC	6	4,500	211	0.048	4,000	176	0.045	3,400	139	0.042			
3/8-16UNC	6.7	4,000	256	0.054	3,600	214	0.05	3,100	173	0.047			
7/16-14UNC	7.7	3,500	267	0.062	3,100	221	0.058	2,700	179	0.054			
1/2-13UNC	9.2	2,900	237	0.074	2,600	198	0.069	2,200	155	0.064			
9/16-12UNC	10.5	2,600	221	0.08	2,300	183	0.075	2,000	148	0.07			
5/8-11UNC	11.4	2,400	235	0.087	2,100	192	0.081	1,800	154	0.076			

Work material		Hardened steels 45~55HRC SKD61,HPM38,STAVAX			Hardened steels 55~62HRC SKD11,YXR3			Hardened steels 62~66HRC SKH51,HAP40		
Cutting speed $v_c$ (m/min)		50 ~ 55 ~ 60			40 ~ 45 ~ 50			30 ~ 35 ~ 40		
Nominal dia. $D_1$	Tool dia. $D_c$ (mm)	Revolution $n$ ( $\text{min}^{-1}$ )	Feed rate $v_f$ (mm/min)	Feed per tooth $f_z$ (mm/t)	Revolution $n$ ( $\text{min}^{-1}$ )	Feed rate $v_f$ (mm/min)	Feed per tooth $f_z$ (mm/t)	Revolution $n$ ( $\text{min}^{-1}$ )	Feed rate $v_f$ (mm/min)	Feed per tooth $f_z$ (mm/t)
M2	1.4	12,500	105	0.007	10,200	73	0.006	8,000	58	0.006
M2.2	1.6	10,900	107	0.009	9,000	69	0.007	7,000	53	0.007
M2.5	1.8	9,700	109	0.01	8,000	72	0.008	6,200	56	0.008
M3	2.4	7,300	82	0.014	6,000	53	0.011	4,600	40	0.011
M4	3.1	5,600	96	0.019	4,600	62	0.015	3,600	49	0.015
M5	3.8	4,600	102	0.023	3,800	66	0.018	2,900	50	0.018
M6	4.6	3,800	106	0.03	3,100	67	0.023	2,400	52	0.023
M8	6.2	2,800	101	0.04	2,300	64	0.031	1,800	50	0.031
M10	7.5	2,300	113	0.049	1,900	72	0.038	1,500	57	0.038
M12	9	1,900	112	0.059	1,600	72	0.045	1,200	54	0.045
M16	11.5	1,500	120	0.071	1,200	74	0.055	1,000	62	0.055
M18	14	1,300	95	0.082	1,000	56	0.063	800	45	0.063
M20	15	1,200	100	0.083	1,000	64	0.064	700	45	0.064
No.1-64UNC	1.4	12,500	86	0.007	10,200	60	0.006	8,000	47	0.006
No.2-56UNC	1.65	10,600	93	0.009	8,700	60	0.007	6,800	47	0.007
No.3-48UNC	1.9	9,200	90	0.01	7,500	59	0.008	5,900	46	0.008
No.4-40UNC	2.1	8,300	104	0.012	6,800	64	0.009	5,300	50	0.009
No.6-32UNC	2.55	6,900	113	0.015	5,600	67	0.011	4,400	53	0.011
No.8-36UNF	3.3	5,300	88	0.02	4,300	57	0.016	3,400	45	0.016
No.10-24UNC	3.5	5,000	121	0.022	4,100	77	0.017	3,200	60	0.017
1/4-20UNC	4.75	3,700	116	0.031	3,000	73	0.024	2,300	56	0.024
1/4-28UNF	5	3,500	98	0.033	2,900	62	0.025	2,200	47	0.025
5/16-18UNC	6	2,900	110	0.039	2,400	70	0.03	1,900	56	0.03
3/8-16UNC	6.7	2,600	136	0.044	2,100	85	0.034	1,700	69	0.034
7/16-14UNC	7.7	2,300	141	0.05	1,900	91	0.039	1,400	67	0.039
1/2-13UNC	9.2	1,900	126	0.06	1,600	81	0.046	1,200	61	0.046
9/16-12UNC	10.5	1,700	117	0.065	1,400	74	0.05	1,100	58	0.05
5/8-11UNC	11.4	1,500	118	0.07	1,300	79	0.054	1,000	61	0.054

For other materials, please ask our local sales office or call the toll-free Technical Support line at 0120-134159.

- [Note]**
- ① Epoch Thread Mill is an only for threading the inside of holes.
  - ② The above cutting conditions are for the nominal diameters stated in the table. Cutting conditions for other nominal diameters should be calculated taking into consideration the cautions on use (p.15).
  - ③ The machinery should be a machining center equipped with NC (numerical control) equipment having a helical interpolation function.
  - ④ The feed rate stated in the above conditions table is the feed rate at the tool center during threading. In addition, the per-tooth feed rate is the numerical value at the cutting point.
  - ⑤ Since there is a risk of cutting chips getting inside the machine, when using tools equipped with oil holes, be sure to perform processing using the oil holes.
  - ⑥ Use the appropriate coolant for the work material and machining shape.
  - ⑦ These conditions are for general guidance; in actual machining conditions adjust the parameters according to your actual machine conditions.

# Line Up

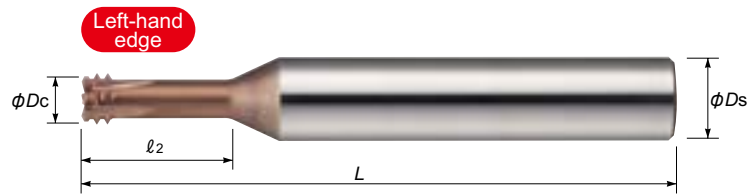
## Epoch D Thread Mill



4 flutes



1 incomplete thread and  
2 complete threads



## EDT-(U) . . . - . . . -TH

Unit : mm



Item Code	Stock	Nominal dia. $D_1$	Pitch $P$	Tool Dia. $D_c$	Under Neck Length $l_2$	Overall Length $L$	Shank Dia. $D_s$	Oil Hole	
<b>For Metric threads</b>									
Thread depth: $2 \times D_1$									
EDT-0.4-4-TH	<input type="checkbox"/>	M2	0.4	1.4	4	50	6	-	
EDT-0.45-4.4-TH	<input type="checkbox"/>	M2.2	0.45	1.6	4.4	50	6	-	
EDT-0.45-5-TH	<input type="checkbox"/>	M2.5	0.45	1.8	5	50	6	-	
EDT-0.5-6-TH	<input checked="" type="checkbox"/>	M3	0.5	2.4	6	50	6	-	
EDT-0.7-8-TH	<input checked="" type="checkbox"/>	M4	0.7	3.1	8	50	6	-	
EDT-0.8-10-TH	<input checked="" type="checkbox"/>	M5	0.8	3.8	10	50	6	-	
EDT-1.0-12-TH	<input checked="" type="checkbox"/>	M6	1	4.6	12	50	6	-	
EDT-1.25-16-TH	<input checked="" type="checkbox"/>	M8	1.25	6.2	16	70	10	-	
EDT-1.5-20-TH	<input checked="" type="checkbox"/>	M10	1.5	7.5	20	70	10	○	
EDT-1.75-24-TH	<input checked="" type="checkbox"/>	M12	1.75	9	24	80	10	○	
EDT-2-32-TH	<input type="checkbox"/>	M16	2	11.5	32	100	12	○	
EDT-2.5-36-TH	<input type="checkbox"/>	M18	2.5	14	36	135	16	○	
EDT-2.5-40-TH	<input type="checkbox"/>	M20	2.5	15	40	135	16	○	
<b>For Metric threads</b>									
Thread depth: $2.5 \times D_1$									
EDT-0.4-5-TH	<input type="checkbox"/>	M2	0.4	1.4	5	50	6	-	
EDT-0.45-5.5-TH	<input type="checkbox"/>	M2.2	0.45	1.6	5.5	50	6	-	
EDT-0.45-6.25-TH	<input type="checkbox"/>	M2.5	0.45	1.8	6.25	50	6	-	
EDT-0.5-7.5-TH	<input checked="" type="checkbox"/>	M3	0.5	2.4	7.5	50	6	-	
EDT-0.7-10-TH	<input checked="" type="checkbox"/>	M4	0.7	3.1	10	50	6	-	
EDT-0.8-12.5-TH	<input checked="" type="checkbox"/>	M5	0.8	3.8	12.5	50	6	-	
EDT-1.0-15-TH	<input checked="" type="checkbox"/>	M6	1	4.6	15	50	6	-	
EDT-1.25-20-TH	<input checked="" type="checkbox"/>	M8	1.25	6.2	20	70	10	-	
EDT-1.5-25-TH	<input checked="" type="checkbox"/>	M10	1.5	7.5	25	70	10	○	
EDT-1.75-30-TH	<input checked="" type="checkbox"/>	M12	1.75	9	30	80	10	○	
EDT-2-40-TH	<input type="checkbox"/>	M16	2	11.5	40	100	12	○	
EDT-2.5-45-TH	<input type="checkbox"/>	M18	2.5	14	45	135	16	○	
EDT-2.5-50-TH	<input type="checkbox"/>	M20	2.5	15	50	135	16	○	
<b>For Unified threads</b>									
Thread depth: $2 \times D_1$									
EDT-U64-3.7-TH	<input type="checkbox"/>	No.1-64UNC	1.854	0.397	1.4	3.7	50	6	-
EDT-U56-4.4-TH	<input type="checkbox"/>	No.2-56UNC	2.184	0.454	1.65	4.4	50	6	-
EDT-U48-5-TH	<input type="checkbox"/>	No.3-48UNC	2.515	0.529	1.9	5	50	6	-
EDT-U40-5.7-TH	<input type="checkbox"/>	No.4-40UNC	2.845	0.635	2.1	5.7	50	6	-
EDT-U32-7-TH	<input type="checkbox"/>	No.6-32UNC	3.505	0.794	2.55	7	50	6	-
EDT-U36-8.3-TH	<input type="checkbox"/>	No.8-36UNF	4.166	0.706	3.3	8.3	50	6	-
EDT-U24-9.7-TH	<input type="checkbox"/>	No.10-24UNC	4.826	1.058	3.5	9.7	70	6	-
EDT-U20-12.7-TH	<input type="checkbox"/>	1/4-20UNC	6.35	1.27	4.75	12.7	70	6	-
EDT-U28-12.7-TH	<input type="checkbox"/>	1/4-28UNF	6.35	0.907	5	12.7	70	6	-
EDT-U18-15.9-TH	<input type="checkbox"/>	5/16-18UNC	7.938	1.411	6	15.9	80	10	-
EDT-U16-19.1-TH	<input type="checkbox"/>	3/8-16UNC	9.525	1.588	6.7	19.1	80	10	-
EDT-U14-22.2-TH	<input type="checkbox"/>	7/16-14UNC	11.112	1.814	7.7	22.2	80	10	○
EDT-U13-25.4-TH	<input type="checkbox"/>	1/2-13UNC	12.7	1.954	9.2	25.4	80	10	○
EDT-U12-28.6-TH	<input type="checkbox"/>	9/16-12UNC	14.288	2.117	10.5	28.6	100	12	○
EDT-U11-31.8-TH	<input type="checkbox"/>	5/8-11UNC	15.875	2.309	11.4	31.8	100	12	○
<b>For Unified threads</b>									
Thread depth: $2.5 \times D_1$									
EDT-U64-4.6-TH	<input type="checkbox"/>	No.1-64UNC	1.854	0.397	1.4	4.6	50	6	-
EDT-U56-5.5-TH	<input type="checkbox"/>	No.2-56UNC	2.184	0.454	1.65	5.5	50	6	-
EDT-U48-6.3-TH	<input type="checkbox"/>	No.3-48UNC	2.515	0.529	1.9	6.3	50	6	-
EDT-U40-7.1-TH	<input type="checkbox"/>	No.4-40UNC	2.845	0.635	2.1	7.1	50	6	-
EDT-U32-8.8-TH	<input type="checkbox"/>	No.6-32UNC	3.505	0.794	2.55	8.8	50	6	-
EDT-U36-10.4-TH	<input type="checkbox"/>	No.8-36UNF	4.166	0.706	3.3	10.4	50	6	-
EDT-U24-12.1-TH	<input type="checkbox"/>	No.10-24UNC	4.826	1.058	3.5	12.1	70	6	-
EDT-U20-15.9-TH	<input type="checkbox"/>	1/4-20UNC	6.35	1.27	4.75	15.9	70	6	-
EDT-U28-15.9-TH	<input type="checkbox"/>	1/4-28UNF	6.35	0.907	5	15.9	70	6	-
EDT-U18-19.8-TH	<input type="checkbox"/>	5/16-18UNC	7.938	1.411	6	19.8	80	10	-
EDT-U16-23.8-TH	<input type="checkbox"/>	3/8-16UNC	9.525	1.588	6.7	23.8	80	10	-
EDT-U14-27.8-TH	<input type="checkbox"/>	7/16-14UNC	11.112	1.814	7.7	27.8	80	10	○
EDT-U13-31.8-TH	<input type="checkbox"/>	1/2-13UNC	12.7	1.954	9.2	31.8	80	10	○
EDT-U12-35.7-TH	<input type="checkbox"/>	9/16-12UNC	14.288	2.117	10.5	35.7	100	12	○
EDT-U11-39.7-TH	<input type="checkbox"/>	5/8-11UNC	15.875	2.309	11.4	39.7	100	12	○

● : Stocked Items.

□ : Stocked by specified distributor. Contact with our sales department.

※For information about tool diameter correction, refer to the item in "Cautions on use" on p. 15.

# Recommended Cutting Conditions

## Epoch D Thread Mill

Work material		Cast Iron, Carbon steels 150 ~ 200HB FC250,S50C			Tool steels 25 ~ 35HRC SCM440,HPM7			Pre-hardened steels 35 ~ 45HRC HPM-MAGIC,NAK80		
Cutting speed $v_c$ (m/min)		80 ~ 85 ~ 90			70 ~ 75 ~ 80			60 ~ 65 ~ 70		
Nominal dia. $D_1$	Tool dia. $D_c$ (mm)	Revolution $n$ (min <sup>-1</sup> )	Feed rate $v_f$ (mm/min)	Feed per tooth $f_z$ (mm/t)	Revolution $n$ (min <sup>-1</sup> )	Feed rate $v_f$ (mm/min)	Feed per tooth $f_z$ (mm/t)	Revolution $n$ (min <sup>-1</sup> )	Feed rate $v_f$ (mm/min)	Feed per tooth $f_z$ (mm/t)
M2	1.4	19,300	139	0.006	17,100	123	0.006	14,800	107	0.006
M2.2	1.6	16,900	129	0.007	14,900	114	0.007	12,900	99	0.007
M2.5	1.8	15,000	134	0.008	13,300	119	0.008	11,500	103	0.008
M3	2.4	11,300	99	0.011	9,900	87	0.011	8,600	76	0.011
M4	3.1	8,700	117	0.015	7,700	104	0.015	6,700	90	0.015
M5	3.8	7,100	123	0.018	6,300	109	0.018	5,400	93	0.018
M6	4.6	5,900	127	0.023	5,200	112	0.023	4,500	97	0.023
M8	6.2	4,400	123	0.031	3,900	109	0.031	3,300	92	0.031
M10	7.5	3,600	137	0.038	3,200	122	0.038	2,800	106	0.038
M12	9	3,000	135	0.045	2,700	122	0.045	2,300	104	0.045
M16	11.5	2,400	149	0.055	2,100	130	0.055	1,800	111	0.055
M18	14	1,900	106	0.063	1,700	95	0.063	1,500	84	0.063
M20	15	1,800	115	0.064	1,600	102	0.064	1,400	90	0.064
No.1-64UNC	1.4	19,300	113	0.006	17,100	100	0.006	14,800	87	0.006
No.2-56UNC	1.65	16,400	112	0.007	14,500	99	0.007	12,500	86	0.007
No.3-48UNC	1.9	14,200	111	0.008	12,600	99	0.008	10,900	85	0.008
No.4-40UNC	2.1	12,900	122	0.009	11,400	107	0.009	9,900	93	0.009
No.6-32UNC	2.55	10,600	127	0.011	9,400	113	0.011	8,100	97	0.011
No.8-36UNF	3.3	8,200	109	0.016	7,200	96	0.016	6,300	84	0.016
No.10-24UNC	3.5	7,700	144	0.017	6,800	127	0.017	5,900	110	0.017
1/4-20UNC	4.75	5,700	138	0.024	5,000	121	0.024	4,400	106	0.024
1/4-28UNF	5	5,400	115	0.025	4,800	102	0.025	4,100	87	0.025
5/16-18UNC	6	4,500	132	0.03	4,000	117	0.03	3,400	100	0.03
3/8-16UNC	6.7	4,000	161	0.034	3,600	145	0.034	3,100	125	0.034
7/16-14UNC	7.7	3,500	168	0.039	3,100	148	0.039	2,700	129	0.039
1/2-13UNC	9.2	2,900	147	0.046	2,600	132	0.046	2,200	112	0.046
9/16-12UNC	10.5	2,600	138	0.05	2,300	122	0.05	2,000	106	0.05
5/8-11UNC	11.4	2,400	146	0.054	2,100	128	0.054	1,800	110	0.054

Work material		Hardened steels 45 ~ 55HRC SKD61,HPM38,STAVAX			Hardened steels 55 ~ 62HRC SKD11,YXR3			Hardened steels 62 ~ 66HRC SKH51,HAP40		Stainless steels SUS304
Cutting speed $v_c$ (m/min)		50 ~ 55 ~ 60			40 ~ 45 ~ 50			30 ~ 35 ~ 40		
Nominal dia. $D_1$	Tool dia. $D_c$ (mm)	Revolution $n$ (min <sup>-1</sup> )	Feed rate $v_f$ (mm/min)	Feed per tooth $f_z$ (mm/t)	Revolution $n$ (min <sup>-1</sup> )	Feed rate $v_f$ (mm/min)	Feed per tooth $f_z$ (mm/t)	Revolution $n$ (min <sup>-1</sup> )	Feed rate $v_f$ (mm/min)	Feed per tooth $f_z$ (mm/t)
M2	1.4	12,500	90	0.006	10,200	73	0.006	8,000	58	0.006
M2.2	1.6	10,900	83	0.007	9,000	69	0.007	7,000	53	0.007
M2.5	1.8	9,700	87	0.008	8,000	72	0.008	6,200	56	0.008
M3	2.4	7,300	64	0.011	6,000	53	0.011	4,600	40	0.011
M4	3.1	5,600	76	0.015	4,600	62	0.015	3,600	49	0.015
M5	3.8	4,600	79	0.018	3,800	66	0.018	2,900	50	0.018
M6	4.6	3,800	82	0.023	3,100	67	0.023	2,400	52	0.023
M8	6.2	2,800	78	0.031	2,300	64	0.031	1,800	50	0.031
M10	7.5	2,300	87	0.038	1,900	72	0.038	1,500	57	0.038
M12	9	1,900	86	0.045	1,600	72	0.045	1,200	54	0.045
M16	11.5	1,500	93	0.055	1,200	74	0.055	1,000	62	0.055
M18	14	1,300	73	0.063	1,000	56	0.063	800	45	0.063
M20	15	1,200	77	0.064	1,000	64	0.064	700	45	0.064
No.1-64UNC	1.4	12,500	73	0.006	10,200	60	0.006	8,000	47	0.006
No.2-56UNC	1.65	10,600	73	0.007	8,700	60	0.007	6,800	47	0.007
No.3-48UNC	1.9	9,200	72	0.008	7,500	59	0.008	5,900	46	0.008
No.4-40UNC	2.1	8,300	78	0.009	6,800	64	0.009	5,300	50	0.009
No.6-32UNC	2.55	6,900	83	0.011	5,600	67	0.011	4,400	53	0.011
No.8-36UNF	3.3	5,300	71	0.016	4,300	57	0.016	3,400	45	0.016
No.10-24UNC	3.5	5,000	93	0.017	4,100	77	0.017	3,200	60	0.017
1/4-20UNC	4.75	3,700	89	0.024	3,000	73	0.024	2,300	56	0.024
1/4-28UNF	5	3,500	74	0.025	2,900	62	0.025	2,200	47	0.025
5/16-18UNC	6	2,900	85	0.03	2,400	70	0.03	1,900	56	0.03
3/8-16UNC	6.7	2,600	105	0.034	2,100	85	0.034	1,700	69	0.034
7/16-14UNC	7.7	2,300	110	0.039	1,900	91	0.039	1,400	67	0.039
1/2-13UNC	9.2	1,900	96	0.046	1,600	81	0.046	1,200	61	0.046
9/16-12UNC	10.5	1,700	90	0.05	1,400	74	0.05	1,100	58	0.05
5/8-11UNC	11.4	1,500	91	0.054	1,300	79	0.054	1,000	61	0.054

For other materials, please ask our local sales office or call the toll-free Technical Support line at 0120-134159.

- [Note]**
- ① Epoch D Thread Mill is capable of simultaneous boring and threading.
  - ② The above cutting conditions are for the nominal diameters stated in the table. Cutting conditions for other nominal diameters should be calculated taking into consideration the cautions on use (p. 15).
  - ③ The machinery should be a machining center equipped with NC (numerical control) equipment having a helical interpolation function.
  - ④ The feed rate stated in the above conditions table is the feed rate at the tool center during thread milling. In addition, the per-tooth feed rate is the numerical value at the cutting point.
  - ⑤ Since there is a risk of cutting chips getting inside the machine, when using tools equipped with oil holes, be sure to perform processing using the oil holes.
  - ⑥ Use the appropriate coolant for the work material and machining shape.
  - ⑦ These conditions are for general guidance; in actual machining conditions adjust the parameters according to your actual machine conditions.

# Line Up

## Epoch D Thread Mill

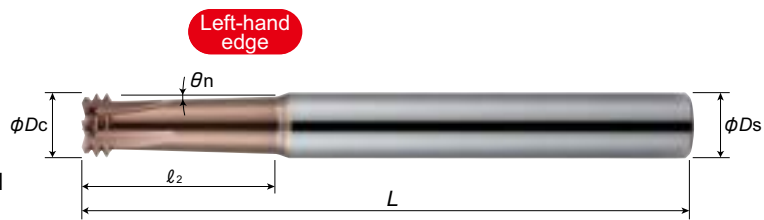
for PT, NPT  
Threads



4 flutes



1 incomplete thread and  
2 complete threads



Neck angle  $\theta_n$ : 1.7°

※The neck angle ( $\theta_n$ ) of EDT-PT1(NPT1)-45-ATH is 0° (straight neck).

## EDT-PT $\odot\odot\odot$ - $\odot\odot$ -ATH

Unit : mm



for PT(Rc) threads		Nominal diameter $D_1$		Pitch $P$	Reference tool dia. $D_c$	Under neck length $l_2$	Overall length $L$	Shank dia. $D_s$	Oil Hole	Nominal diameter correction amount $D_2$
Item code	Stock	Pilot hole not required	Pilot hole required (pilot hole diameter)							
EDT-PT1/16-18-ATH	●	PT $\frac{1}{16}$ -28 7.723	PT $\frac{1}{8}$ -28 ( $\phi 4$ 以上) 9.728	0.9071	4.8	18	70	6	—	0.029
EDT-PT1/8-19-ATH	●	PT $\frac{1}{8}$ -28 9.728	—	0.9071	5.7	19	70	6	—	0.029
EDT-PT1/4-28-ATH	●	PT $\frac{1}{4}$ -19 13.157	PT $\frac{3}{8}$ -19 ( $\phi 6$ 以上) 16.662	1.3368	7.9	28	80	10	—	0.043
EDT-PT3/8-28-ATH	●	PT $\frac{3}{8}$ -19 16.662	—	1.3368	9.6	28	80	10	—	0.043
EDT-PT1/2-35-ATH	●	PT $\frac{1}{2}$ -14 20.955	PT $\frac{3}{4}$ -14 ( $\phi 8$ 以上) 26.441	1.8143	11.5	35	110	12	—	0.058
EDT-PT1-45-ATH	●	—	PT1-11 ( $\phi 10$ 以上) 33.249	2.3091	15.4	45	135	16	—	0.074

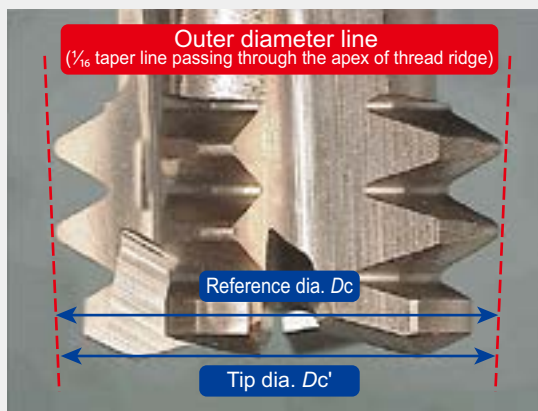
## EDT-NPT $\odot\odot\odot$ - $\odot\odot$ -ATH

for NPT threads		Nominal diameter $D_1$		Pitch $P$	Reference tool dia. $D_c$	Under neck length $l_2$	Overall length $L$	Shank dia. $D_s$	Oil Hole	Nominal diameter correction amount $D_2$
Item code	Stock	Pilot hole not required	Pilot hole required (pilot hole diameter)							
EDT-NPT1/16-18-ATH	●	NPT $\frac{1}{16}$ -27 7.895	NPT $\frac{1}{8}$ -27 ( $\phi 4$ 以上) 10.242	0.9407	4.8	18	70	6	—	0.03
EDT-NPT1/8-19-ATH	●	NPT $\frac{1}{8}$ -27 10.242	—	0.9407	5.7	19	70	6	—	0.03
EDT-NPT1/4-28-ATH	●	NPT $\frac{1}{4}$ -18 13.616	NPT $\frac{3}{8}$ -18 ( $\phi 6$ 以上) 17.055	1.4111	7.9	28	80	10	—	0.045
EDT-NPT3/8-28-ATH	●	NPT $\frac{3}{8}$ -18 17.055	—	1.4111	9.6	28	80	10	—	0.045
EDT-NPT1/2-35-ATH	●	NPT $\frac{1}{2}$ -14 21.224	NPT $\frac{3}{4}$ -14 ( $\phi 8$ 以上) 26.569	1.8143	11.5	35	110	12	—	0.058
EDT-NPT1-45-ATH	●	—	NPT1-11.5 ( $\phi 10$ 以上) 33.228	2.2087	15.4	45	135	16	—	0.071

● : Stocked Items.

Nominal diameter which requires pilot hole can not be used without larger pilot hole than the values shown in the table.

## ○ Cautions when using Epoch D Thread Mill for PT, NPT threads



Reference dia.  $D_c$ :  
diameter at the virtual crest position of the first thread  
Tip dia.  $D_c'$ :  
diameter at the tool tip position

Since the reference tool diameter  $D_c$  and the tool tip diameter  $D_c'$  are different, it is necessary to correct the nominal diameter  $D_1$  and program. The nominal diameter  $D_1$  corresponds to the reference diameter of the groove of the internal thread (reference diameter of the tap).

### Example

#### Thread milling PT $\frac{1}{4}$ with EDT-PT1/4-28-ATH

Nominal diameter  $D_1$  + nominal diameter correction amount  $D_2$   
= setup nominal diameter 13.157 + 0.043 = 13.2

When adjusting the reference diameter position of the internal thread by tool diameter correction, the correction value is calculated using the following formula.

\*In the case of radius indication in the NC program based on the tool center

(Reference tool dia.  $D_c \pm$  adjustment length  $\times \frac{1}{16}$ ) + 2 (Convert to radius)  
(7.9 -  $2 \times \frac{1}{16}$ ) + 2 = 3.8875

Calculate with plus for shallowing and minus for deepening. Therefore in this case, it becomes 2 mm deeper.



# Recommended Cutting Conditions

## Epoch D Thread Mill for PT,NPT Threads

Work material		Cast Iron, Carbon steels 150 ~ 200HB FC250,S50C			Tool steels 25 ~ 35HRC SCM440,HPM7			Pre-hardened steels 35 ~ 45HRC HPM-MAGIC,NAK80		
Cutting speed $v_c$ (m/min)		80 ~ 85 ~ 90			70 ~ 75 ~ 80			60 ~ 65 ~ 70		
Nominal dia. $D_1$	Reference tool dia. $D_C$ (mm)	Revolution $n$ (min <sup>-1</sup> )	Feed rate $v_f$ (mm/min)	Feed per tooth $f_z$ (mm/t)	Revolution $n$ (min <sup>-1</sup> )	Feed rate $v_f$ (mm/min)	Feed per tooth $f_z$ (mm/t)	Revolution $n$ (min <sup>-1</sup> )	Feed rate $v_f$ (mm/min)	Feed per tooth $f_z$ (mm/t)
PT $\frac{1}{16}$ -28	4.8	5,600	146	0.024	5,000	131	0.024	4,300	112	0.024
PT $\frac{1}{8}$ -28	5.7	4,700	181	0.029	4,200	162	0.029	3,600	139	0.029
PT $\frac{1}{4}$ -19	7.9	3,400	167	0.04	3,000	148	0.04	2,600	128	0.04
PT $\frac{3}{8}$ -19	9.6	2,800	192	0.048	2,500	171	0.048	2,200	150	0.048
PT $\frac{1}{2}$ -14	11.5	2,400	204	0.055	2,100	179	0.055	1,800	153	0.055
PT $\frac{3}{4}$ -14	11.5	2,400	278	0.055	2,100	243	0.055	1,800	208	0.055
PT1-11	15.4	1,800	231	0.065	1,600	206	0.065	1,300	167	0.065
NPT $\frac{1}{16}$ -27	4.8	5,600	156	0.024	5,000	140	0.024	4,300	120	0.024
NPT $\frac{1}{8}$ -27	5.7	4,700	202	0.029	4,200	180	0.029	3,600	155	0.029
NPT $\frac{1}{4}$ -18	7.9	3,400	182	0.04	3,000	160	0.04	2,600	139	0.04
NPT $\frac{3}{8}$ -18	9.6	2,800	200	0.048	2,500	179	0.048	2,200	157	0.048
NPT $\frac{1}{2}$ -14	11.5	2,400	209	0.055	2,100	183	0.055	1,800	157	0.055
NPT $\frac{3}{4}$ -14	11.5	2,400	279	0.055	2,100	244	0.055	1,800	209	0.055
NPT1-11.5	15.4	1,800	231	0.065	1,600	205	0.065	1,300	167	0.065

Work material		Hardened steels 45 ~ 55HRC SKD61,HPM38,STAVAX			Hardened steels 55 ~ 62HRC SKD11,YXR3			Hardened steels 62~66HRC SKH51,HAP40		Stainless steels SUS304
Cutting speed $v_c$ (m/min)		50 ~ 55 ~ 60			40 ~ 45 ~ 50			30 ~ 35 ~ 40		
Nominal dia. $D_1$	Reference tool dia. $D_C$ (mm)	Revolution $n$ (min <sup>-1</sup> )	Feed rate $v_f$ (mm/min)	Feed per tooth $f_z$ (mm/t)	Revolution $n$ (min <sup>-1</sup> )	Feed rate $v_f$ (mm/min)	Feed per tooth $f_z$ (mm/t)	Revolution $n$ (min <sup>-1</sup> )	Feed rate $v_f$ (mm/min)	Feed per tooth $f_z$ (mm/t)
PT $\frac{1}{16}$ -28	4.8	3,600	94	0.024	3,000	78	0.024	2,300	60	0.024
PT $\frac{1}{8}$ -28	5.7	3,100	120	0.029	2,500	96	0.029	2,000	77	0.029
PT $\frac{1}{4}$ -19	7.9	2,200	108	0.04	1,800	89	0.04	1,400	69	0.04
PT $\frac{3}{8}$ -19	9.6	1,800	123	0.048	1,500	103	0.048	1,200	82	0.048
PT $\frac{1}{2}$ -14	11.5	1,500	128	0.055	1,200	102	0.055	1,000	85	0.055
PT $\frac{3}{4}$ -14	11.5	1,500	174	0.055	1,200	139	0.055	1,000	116	0.055
PT1-11	15.4	1,100	141	0.065	900	116	0.065	700	90	0.065
NPT $\frac{1}{16}$ -27	4.8	3,600	101	0.024	3,000	84	0.024	2,300	64	0.024
NPT $\frac{1}{8}$ -27	5.7	3,100	133	0.029	2,500	107	0.029	2,000	86	0.029
NPT $\frac{1}{4}$ -18	7.9	2,200	118	0.04	1,800	96	0.04	1,400	75	0.04
NPT $\frac{3}{8}$ -18	9.6	1,800	129	0.048	1,500	107	0.048	1,200	86	0.048
NPT $\frac{1}{2}$ -14	11.5	1,500	131	0.055	1,200	105	0.055	1,000	87	0.055
NPT $\frac{3}{4}$ -14	11.5	1,500	174	0.055	1,200	139	0.055	1,000	116	0.055
NPT1-11.5	15.4	1,100	141	0.065	900	116	0.065	700	90	0.065

For other materials, please ask our local sales office or call the toll-free Technical Support line at 0120-134159.

- [Note]**
- ① Epoch D Thread Mill is capable of simultaneous boring and threading.
  - ② The above cutting conditions are for the nominal diameters stated in the table. Cutting conditions for other nominal diameters should be calculated taking into consideration the cautions on use (p.15).
  - ③ The machinery should be a machining center equipped with NC (numerical control) equipment having a helical interpolation function.
  - ④ The feed rate stated in the above conditions table is the feed rate at the tool center during tapping. In addition, the per-tooth feed rate is the numerical value at the cutting point.
  - ⑤ Since there is a risk of cutting chips getting inside the machine, when using tools equipped with oil holes, be sure to perform processing using the oil holes.
  - ⑥ Use the appropriate coolant for the work material and machining shape.
  - ⑦ These conditions are for general guidance; in actual machining conditions adjust the parameters according to your actual machine conditions.

### Advantages of using Epoch D Thread Mill in pipe threading

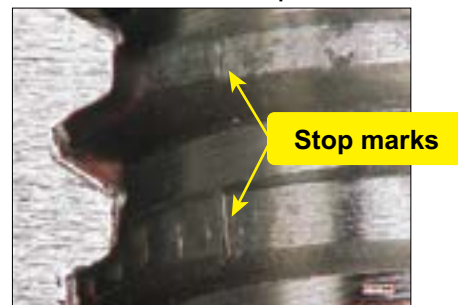
#### Epoch D Thread Mill



No stop marks

Good finished surface without tear

#### General tap



Stop marks

Tears easily and stop marks occurred

**Effective for countermeasures against liquid leakage that is often caused by tapping**

# Technical data



## Field data of Epoch Thread Mill

### 01 Threading of hardened steels (M4×P0.7)

#### Cutting conditions

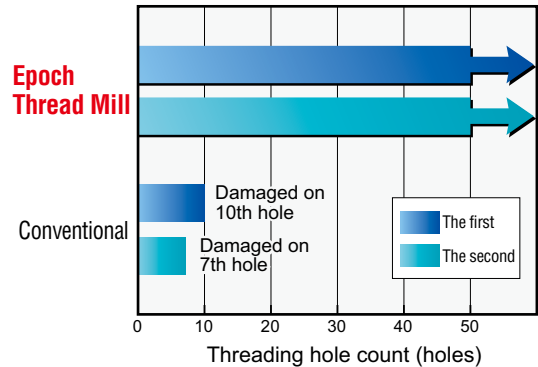
**Work material : SKD11(60HRC)** Tool : ET-0.7-8-PN  
 $n=4,620\text{min}^{-1}$  ( $v_c=45\text{m/min}$ )  $v_f=62\text{mm/min}$  ( $f_z=0.015\text{mm/t}$ )  
 Threading depth : 8mm Blind hole  
 Pilot hole dia.×Pilot hole depth :  $\phi 3.4 \times 12\text{mm}$  Coolant : Air-blow



Epoch Thread Mill  
after threading 50 holes



Conventional  
after threading 10 holes.

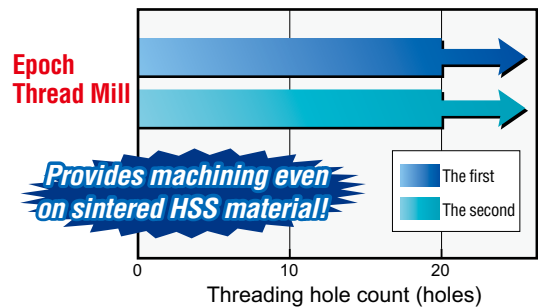


**Machining up to 50 holes. NOT reached tool life.**

### 02 Threading of sintered HSS material (M4×P0.7)

#### Cutting conditions

**Work material : HAP40(64HRC)** Tool : ET-0.7-8-PN  
 $n=4,620\text{min}^{-1}$  ( $v_c=45\text{m/min}$ )  $v_f=47\text{mm/min}$  ( $f_z=0.025\text{mm/t}$ )  
 Threading depth : 7mm Through hole  
 Pilot hole dia.×Pilot hole depth :  $\phi 3.4 \times 7\text{mm}$  Coolant : Water-base



**Provides machining even on sintered HSS material!**

**Machining up to 20 holes. NOT reached tool life.**

### 03 Threading of pre-hardened steel (M12×P1.75)

#### Cutting conditions

**Work material : CENA1(40HRC)** Tool : ET-1.75-24-PN  
 $n=3,537\text{min}^{-1}$  ( $v_c=100\text{m/min}$ )  $v_f=311\text{mm/min}$  ( $f_z=0.088\text{mm/t}$ )  
 Threading depth : 22mm Blind hole  
 Pilot hole dia.×Pilot hole depth :  $\phi 10.5 \times 28\text{mm}$  Coolant : Water-base



Epoch Thread Mill after threading 300 holes.

**Machining up to 300 holes, NOT reached tool life.**

### 04 Threading of stainless steel (M8×P1.25)

#### Cutting conditions

**Work material : SUS304** Tool : ET-1.25-20-PN  
 $n=5,130\text{min}^{-1}$  ( $v_c=100\text{m/min}$ )  $v_f=277\text{mm/min}$  ( $f_z=0.06\text{mm/t}$ )  
 Threading depth : 20mm Blind hole  
 Pilot hole dia.×Pilot hole depth :  $\phi 6.9 \times 22\text{mm}$  Coolant : Water-base



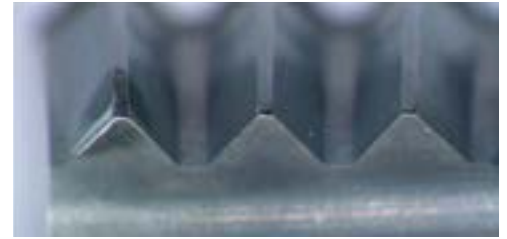
Epoch Thread Mill after threading 300 holes.

**Machining up to 300 holes, NOT reached tool life.**

## 05 Threading of superalloy (M6×P1)

### Cutting conditions

**Work material : Inconel 718(40HRC)** Tool : ET-1.0-12-PN  
 $n=2,420\text{min}^{-1}$ ( $v_c=35\text{m/min}$ )  $v_f=56\text{mm/min}$  ( $f_z=0.025\text{mm/t}$ )  
 Threading depth : 12mm Blind hole  
 Pilot hole dia.×Pilot hole depth :  $\phi 5.1 \times 15\text{mm}$  Coolant : Water-base



Epoch Thread Mill after threading 25 holes.

**It is possible to thread superalloy which is difficult to tapping.**

## 06 Threading of non-ferrous (Aluminium alloy A7075, Acrylic resin) (M6×P1)

### Cutting conditions

**Work material : Aluminium alloy A7075, Acrylic resin**

Tool : ET-1.0-12-PN  $n=14,500\text{min}^{-1}$ ( $v_c=210\text{m/min}$ )  $v_f=540\text{mm/min}$  ( $f_z=0.04\text{mm/t}$ )  
 Threading depth : 12mm Blind hole Pilot hole dia.×Pilot hole depth :  $\phi 5 \times 15\text{mm}$

Work material	Aluminium alloy A7075		Acrylic resin	
	Coolant	Water-base	Air-blow	Water-base
Surface				

**High efficiency threading is possible even in dry condition**

- ※By using water-soluble cutting fluid, it is possible to obtain a glossy high-quality machined surface.
- ※By using water-soluble cutting fluid, Epoch D Thread Mill can be used with same cutting parameters.

## About pilot hole dia.

### Metric threads

Item code	Nominal dia. $D_1$	Pitch $P$ (mm)	Recommended pilot hole dia. (mm)
ET-0.4-4-PN	M2	0.4	1.6
ET-0.45-4.4-PN	M2.2	0.45	1.75
ET-0.45-5-PN	M2.5	0.45	2.05
ET-0.5-6-PN	M3	0.5	2.5
ET-0.7-8-PN	M4	0.7	3.3
ET-0.8-10-PN	M5	0.8	4.2
ET-1.0-12-PN	M6	1	5
ET-1.25-16-PN	M8	1.25	6.75
ET-1.5-20-PN	M10	1.5	8.5
ET-1.75-24-PN	M12	1.75	10.25
ET-2-32-PN	M16	2	14
ET-2.5-36-PN	M18	2.5	15.5
ET-2.5-40-PN	M20	2.5	17.5

### Unified threads

Item code	Nominal dia. $D_1$	Pitch $P$ (mm)	Recommended pilot hole dia. (mm)
ET-U64-3.7-PN	No.1-64UNC	1.854	0.397
ET-U56-4.4-PN	No.2-56UNC	2.184	0.454
ET-U48-5-PN	No.3-48UNC	2.515	0.529
ET-U40-5.7-PN	No.4-40UNC	2.845	0.635
ET-U32-7-PN	No.6-32UNC	3.505	0.794
ET-U36-8.3-PN	No.8-36UNF	4.166	0.706
ET-U24-9.7-PN	No.10-24UNC	4.826	1.058
ET-U20-12.7-PN	1/4-20UNC	6.35	1.27
ET-U28-12.7-PN	1/4-28UNF	6.35	0.907
ET-U18-15.9-PN	5/16-18UNC	7.938	1.411
ET-U16-19.1-PN	3/8-16UNC	9.525	1.588
ET-U14-22.2-PN	7/16-14UNC	11.112	1.814
ET-U13-25.4-PN	1/2-13UNC	12.7	1.954
ET-U12-28.6-PN	9/16-12UNC	14.288	2.117
ET-U11-31.8-PN	5/8-11UNC	15.875	2.309

※Recommended pilot hole diameters are for internal threads regulated by former JIS class 2.

Please use these tools for pilot hole machining.

(For details, please refer to Mitsubishi Hitachi Tool's New Product News or Cutting Tools Products Catalogue.)

Product Name	Item code	News No.
• Carbide Non Step Borer series	<b>WHNSB-TH</b> <b>WNSB-TH</b>	<b>No.1005</b>
• Carbide Oil Hole Non Step Borer H for High Hardness Material	<b>NSBH-ATH</b>	<b>No.1304</b>
• Miniature Drill WHMB	<b>WHMB-TH</b>	<b>No.1603</b>



## Field data of Epoch D Thread Mill

### 01 Simultaneous threading and drilling on hardened steels (M8×P1.25)

#### Cutting conditions

**Work material : SKD11(Improved)(62HRC)**

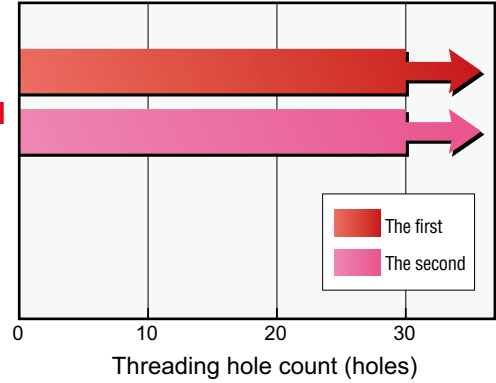
Tool : EDT-1.25-16-TH

$n=2,060\text{min}^{-1}$  ( $v_c=40\text{m/min}$ )  $v_f=47\text{mm/min}$  ( $f_z=0.025\text{mm/t}$ )

Threading depth : 15mm Blind hole

Coolant : Air-blow

Epoch D  
Thread Mill



Tool condition of Epoch D Thread Mill after machining 30 holes

**Wear condition is good with no chipping or damage!**

### 02 Simultaneous threading and drilling on hardened steels (M8×P1.25)

#### Cutting conditions

**Work material : SKD61(45HRC)**

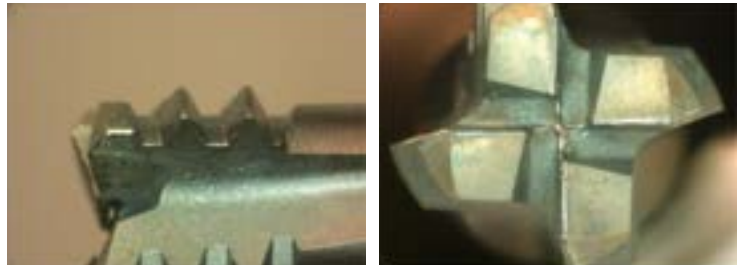
Tool : EDT-1.25-16-TH

$n=2,820\text{min}^{-1}$  ( $v_c=55\text{m/min}$ )

$v_f=75\text{mm/min}$  ( $f_z=0.03\text{mm/t}$ )

Threading depth : 16mm Blind hole

Coolant : Air-blow



Epoch D Thread Mill after threading 150 holes.

**Machining up to 150 holes, NOT reached tool life.**

### 03 Simultaneous threading and drilling on pre-hardened steels (M4×P0.7)

#### Cutting conditions

**Work material : NAK80(40HRC)**

Tool : EDT-0.7-10-TH

$n=5,650\text{min}^{-1}$  ( $v_c=55\text{m/min}$ )

$v_f=75\text{mm/min}$  ( $f_z=0.015\text{mm/t}$ )

Threading depth : 10mm Blind hole

Coolant : Air-blow



Epoch D Thread Mill after threading 400 holes.

**Machining up to 400 holes, NOT reached tool life.**

## 04 Simultaneous threading and drilling on stainless steels (M4×P0.7)

### Cutting conditions

**Work material : SUS304**

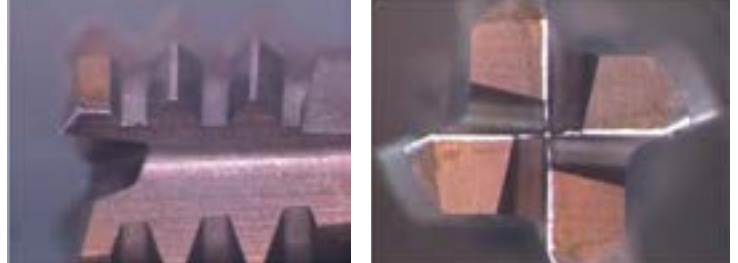
Tool : EDT-0.7-10-TH

$n=3,600\text{min}^{-1}$  ( $v_c=35\text{m/min}$ )

$v_f=49\text{mm/min}$  ( $f_z=0.015\text{mm/t}$ )

Threading depth : 10mm Blind hole

Coolant : Water-base



Epoch D Thread Mill after threading 600 holes.

**Machining up to 600 holes, NOT reached tool life.**

## 05 Simultaneous threading and drilling on titanium alloys (M4×P0.7)

### Cutting conditions

**Work material : Ti-6Al-4V**

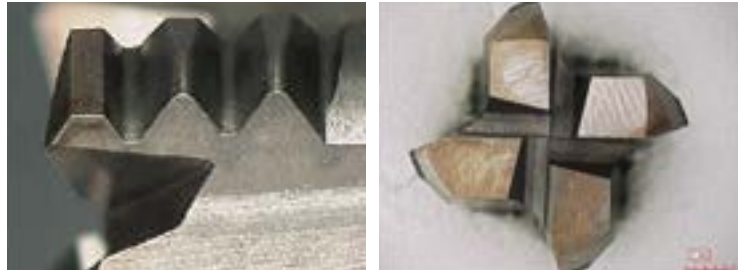
Tool : EDT-0.7-10-TH

$n=3,600\text{min}^{-1}$  ( $v_c=35\text{m/min}$ )

$v_f=49\text{mm/min}$  ( $f_z=0.015\text{mm/t}$ )

Threading depth : 10mm Blind hole

Coolant : Water-base



Epoch D Thread Mill after threading 64 holes.

**Threading titanium alloy which is difficult to tapping is possible without pilot hole.**

## 06 Simultaneous threading and drilling on hardened steel (PT<sup>1/16</sup>-28)

for PT, NPT  
Threads

### Cutting conditions

**Work material : STAVAX(52HRC)**

Tool : EDT-PT1/16-18-ATH

$n=3,600\text{min}^{-1}$  ( $v_c=55\text{m/min}$ )

$v_f=94\text{mm/min}$  ( $f_z=0.024\text{mm/t}$ )

Threading depth : 16mm

Coolant : Air-blow



Epoch D Thread Mill after threading 50 holes.

**Machining up to 50 holes, NOT reached tool life.**

# Trouble shooting

## Regarding thread diameter expansion/contraction

Suitable tool diameter correction should be performed according to the work material and tool wear condition. Also, please be careful not to forget to input the tool diameter correction value into the machine.

## Dimensional accuracy worsens when moving toward the bottom of the hole (deflection)

A characteristic of the thread milling method is that tool deflection increases as the tool progresses toward the bottom of the hole. It may be necessary to perform zero cutting in order to perform high-accuracy thread milling with low deflection.

## Regarding tool breakage

As a countermeasure against tool breakage, performing processing with a reduced feed rate is effective. In addition, when processing with tool extended or when large rough cutting chips are produced, breakage due to chip clogging should be considered. In such cases, if processing is performed with a higher cutting speed, the cutting chips will be broken into smaller bits which may improve conditions.

Changes in cutting chip conditions due to different cutting speeds;  
Simultaneous boring and thread milling (M8 × P 1.25) of carbon steel



Low



Cutting Speed



High

## The NC program created using Mitsubishi Hitachi Tool's NC program creation software doesn't work properly.

There are differences in the programming code for the machine being used. Please contact the machine manufacturer for details.

## Regarding machinable nominal diameters

Please note that since the Epoch D Thread Mill performs boring simultaneously, it cannot perform thread milling for diameters of more than 1.68 times the tool diameter  $D_c$ . There are no particular similar limitations on using the Epoch Thread Mill. Also, please be aware that if screws of a size smaller than the nominal diameter described in the line-up table are processed, there is a possibility of malfunctioning the screw shape. Example) Threading M14×P2 with ET-2-40-PN (designed for M16×P2)

# Cautions on use

## About tool feed rate

When performing thread milling by helical interpolation, the cutting point feed rate should be multiplied by a coefficient to determine the tool center feed rate.

The equation for calculating the tool center feed rate is shown at right.

The standard cutting conditions for PT and NPT threads are calculated based on the nominal diameter  $D_1$ ' at the machinable maximum depth (neck length).

Example) Thread milling PT $\frac{1}{8}$  with EDT-PT1/8-19-ATH

$D_1 = 9.728 (D_1) - 19 (\text{under neck length}) \times \frac{1}{6} (\text{thread taper angle}) = 8.5405$

$$v_f = f_z \times z \times n \times \frac{D_1 - D_c}{D_1}$$

$v_f$ : Feed rate	(mm/min)
$f_z$ : Feed per tooth	(mm/t)
$z$ : No. of flutes	
$n$ : Rotation	(min <sup>-1</sup> )
$D_1$ : Nominal diameter	(mm)
$D_c$ : Tool diameter	(mm)

## About tool diameter correction

When performing thread milling by helical interpolation, it may be necessary to compensate for increased cutting resistance due to differences in work materials or tool wear condition.

In the NC programs created using Mitsubishi Hitachi Tool's NC program creation software, tool diameter correction is in radius designation format.

### Correction example Threading of hardened material (60HRC) (M8×P1.25)

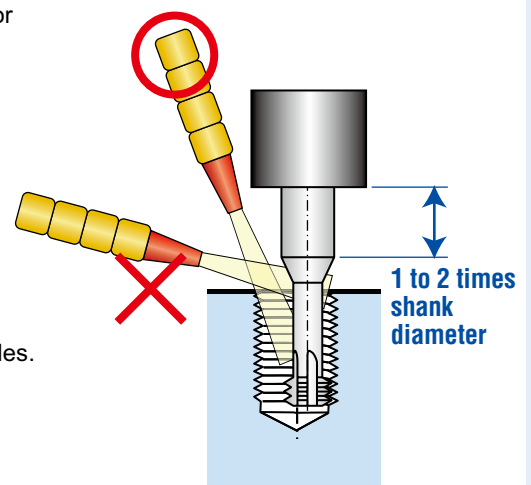
Work material : SKD11(60HRC) Tool : ET-1.25-20-PN(Tool dia.  $\phi 6.2$ ) Pilot hole dia.×Pilot hole depth :  $\phi 6.8 \times 25$ mm  
 $n = 2,060 \text{ min}^{-1}$  ( $v_c = 40 \text{ m/min}$ )  $v_f = 56 \text{ mm/min}$   $f_z = 0.03 \text{ mm/t}$  Threading depth : 20mm Blind hole

Threading hole count (holes)	10	20	30	40
Tool dia. correction value (mm)	3.09	3.08	3.06	3.04

**NOT reached tool life.**

## About coolant

- The first recommended coolant shown in the table tends to have the superior tool life. When priority is given to finished surface quality, water-soluble cutting fluids are effective. Oil-based cutting fluids are not suitable because they degrade chip removal characteristics.
- The holder should grip the tool shank so that the holder does not block the hole and the shank projection amount is 1 to 2 times the shank diameter. The coolant nozzle should then be positioned so that the coolant will reach the bottom of the hole. In addition, coolant pressure should be adjusted so that it removes cutting chips. If the setting is bad, cutting chip clogging may lead to flute tip damage or tool breakage.
- Since there is a risk of cutting chips getting inside the machine, when using tools equipped with oil holes, be sure to perform processing using the oil holes.



Work material	ET		EDT	
	Air-blow	Water-base	Air-blow	Water-base
Hardened steel, Pre-hardened steel Tool steel, Cast iron, Carbon steel	◎	○	◎	△
Stainless steel	×	◎	×	◎
Super heat resistant alloy, Titanium alloy	×	◎	×	◎
Aluminium alloy, Copper alloy, Resin	○	◎	×	◎

- ◎ : First recommended
- : Second recommended
- △ : Tendency to decrease tool life
- × : Not recommended



The diagrams and table data are examples of test results, and are not guaranteed values.

"Epoch", "*Hi-Pre<sup>2</sup>*" and "MOLDINO" are registered trademarks of Mitsubishi Hitachi Tool Engineering, Ltd. in Japan.

## **Attentions on Safety**

### 1. Cautions regarding handling

- (1) When removing the tool from its case (packaging), be careful that the tool does not pop out or is dropped. Be particularly careful regarding contact with the tool flutes.
- (2) When handling tools with sharp cutting flutes, be careful not to touch the cutting flutes directly with your bare hands.

### 2. Cautions regarding mounting

- (1) Before use, check the outside appearance of the tool for scratches, cracks, etc. and that it is firmly mounted in the collet chuck, etc.
- (2) If abnormal chattering, etc. occurs during use, stop the machine immediately and remove the cause of the chattering.

### 3. Cautions during use

- (1) Before use, confirm the dimensions and direction of rotation of the tool and milling work material.
- (2) The numerical values in the standard cutting conditions table should be used as criteria when starting new work. The cutting conditions should be adjusted as appropriate when the cutting depth is large, the rigidity of the machine being used is low, or according to the conditions of the work material.
- (3) Cutting tools are made of a hard material. During use, they may break and fly off. In addition, cutting chips may also fly off. Since there is a danger of injury to workers, fire, or eye damage from such flying pieces, a safety cover should be attached when work is performed and safety equipment such as safety goggles should be worn to create a safe environment for work.
- (4) There is a risk of fire or inflammation due to sparks, heat due to breakage, and cutting chips. Do not use where there is a risk of fire or explosion. **Please caution of fire while using oil base coolant, fire prevention is necessary.**
- (5) Do not use the tool for any purpose other than that for which it is intended.

### 4. Cautions regarding regrinding

- (1) If regrinding is not performed at the proper time, there is a risk of the tool breaking. Replace the tool with one in good condition, or perform regrinding.
- (2) Grinding dust will be created when regrinding a tool. When regrinding, be sure to attach a safety cover over the work area and wear safety clothes such as safety goggles, etc.
- (3) This product contains the specified chemical substance cobalt and its inorganic compounds. When performing regrinding or similar processing, be sure to handle the processing in accordance with the local laws and regulations regarding prevention of hazards due to specified chemical substances.

## Mitsubishi Hitachi Tool Engineering, Ltd.


Head Office  
Hulic Ryogoku Bldg, 8F, 4-31-11, Ryogoku, Sumida-ku, Tokyo, Japan 130-0026  
International Sales Dept. : TEL +81-3-6890-5103 FAX +81-3-6890-5128

Official Web Site

<http://www.mmc-hitachitool.co.jp/e/>

Database for selection Cutting Tool Products **[TOOL SEARCH]**

TOOLSEARCH

Search Web 

#### Europe **MMC Hitachi Tool Engineering Europe GmbH**

Itterpark 12, 40724 Hilden, Germany.  
Tel +49-(0)2103-24820 Fax +49-(0)2103-248230

#### America **MITSUBISHI MATERIALS U.S.A. CORPORATION**

**DETROIT OFFICE Customer service**  
41700 Gardenbrook Road, Suite 120, Novi, MI 48375-1320 U.S.A.  
Tel +1(248) 308-2620 Fax +1(248) 308-2627

**CHICAGO OFFICE**  
1314B North Plum Grove Road, Schaumburg, IL 60173 U.S.A.  
Tel +1(847) 252-6371 Fax +1(248) 308-2627

#### China **MMC Hitachi Tool Engineering(Shanghai),Ltd.**

11F, Chuang Xing Financial Center, 288 Nanjing RD (West) Shanghai, China 200003  
Tel +86-(0)21-3366-3058 Fax +86-(0)21-3366-3050

#### Thailand **MMC Hardmetal(Thailand)Co.,Ltd. HT-Division**

399 Interchange 21 Building, 20th Floor, Unit no. 2015, Sukhumvit 21 Asoke Road, Klongtoey Nua, Wattana, Bangkok 10110, Thailand  
Tel +66-(0)2-611-2520 Fax +66-(0)2-611-2521

#### India **Hitachi Metals (India) Pvt. Ltd.**

Plot No 94 & 95 Sector 8, IMT Manesar, Gurgaon-122050, Haryana, India  
Tel +91-124-4812315 Fax +91-124-2290015

DISTRIBUTED BY: