

## Contents:

## Page:

## Contents:

## Page:

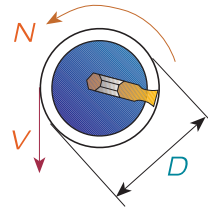
Conversion of Cutting Speed to Rotational Speed	2
Tool Selection	3
CPT Mill-Thread catalog and CNC programming	
Software	4
Example of Thread Milling CNC Program for Internal Threading	4
Mill-Thread Inserts Speed and Feed Selection	5
Cutting Data Slim MT Type	6
Spiral Mill-Thread Inserts Speed and Feed Selection	7
Spiral Finish Speed Selection	7
Cutting Data D-Thread type	8
Cutting Data CMT type	9-11

<b>Mill-Thread Solid Carbide Grades, Speed and Feed Selection</b>	
MT, MTB, MTZ, EMT types	12
Cutting Data MTQ type	13
FMT - Fast MT type	14
Cutting Data FMT type	15
Cutting Data AMT type	16
Cutting Data Mini Mill-Thread MTS, MTI & FMTI types	17-18
Cutting Data MTSB type	18
Cutting Data DMT type	19
Cutting Data DMTH type	19
Cutting Data MT Drill - MTD type	20
MT drill working cycle	20
Cutting Data Mini Mill-Thread MTSH and FSH type	21
Cutting Data MTH type	22

## Conversion of Cutting Speed to Rotational Speed

Conversion of selected cutting speed to rotational speed is calculated by the following formula:

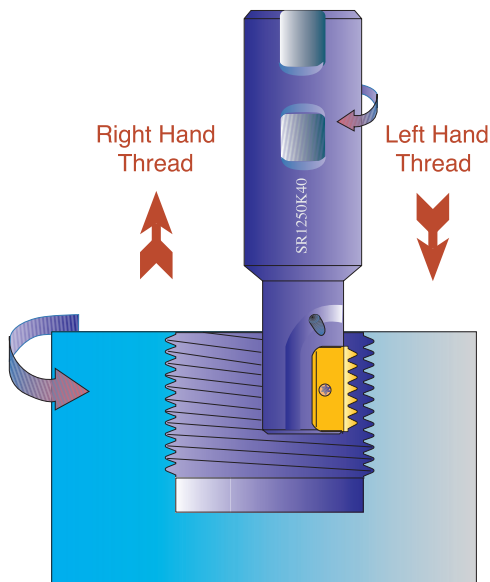
$$N = \frac{V \times 1000}{\pi \times D} = \frac{120 \times 1000}{3.14 \times 30} = 1274 \text{ RPM}$$



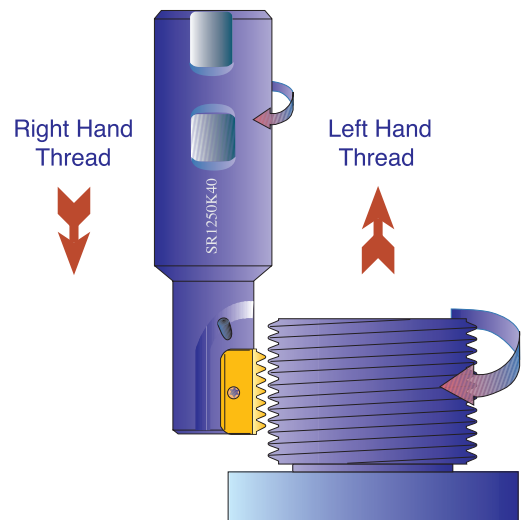
**Example:**  $V=120 \text{ m/min}$   
 $D=30 \text{ mm}$

D=Cutting diameter

### Internal Thread



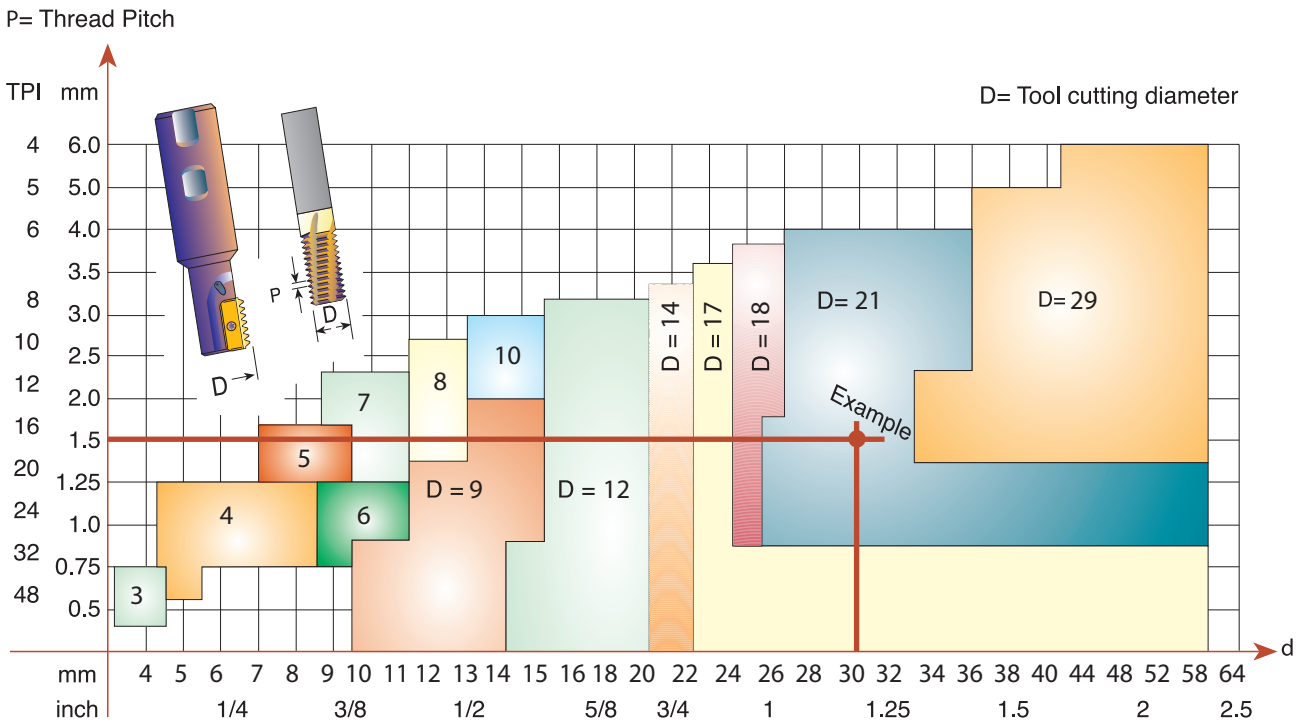
### External Thread



## Tool Selection

For indexable and solid carbide Mill Threads

The following chart provides a fairly accurate visual selection tool for Internal Threading. The chart is suitable for the following thread forms: ISO, UN, WHIT, NPT, NPTF, BSPT and PG.



Any tool with a small cutting diameter can produce larger diameter threads.

**Example:** Internal thread M30 x 1.5:

Find a Milling Tool to produce d=30 Internal

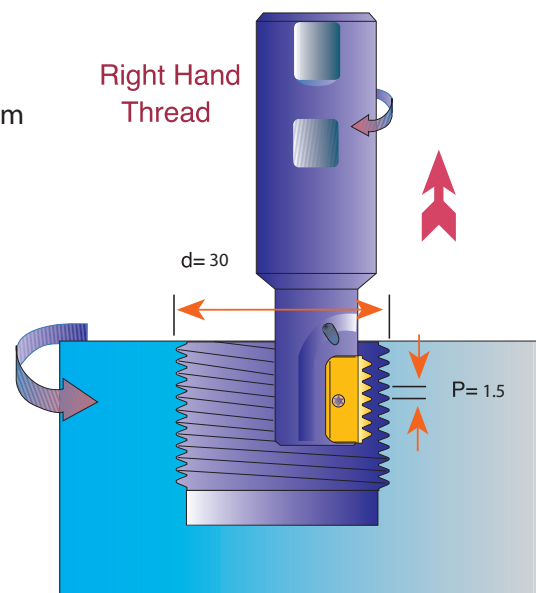
right hand ISO thread with a thread pitch P=1.5 mm.

As can be seen from the chart above, the two red lines

intersect at a selected tool with a cutting diameter of D=21 mm

Chosen toolholder: SR0021 H21

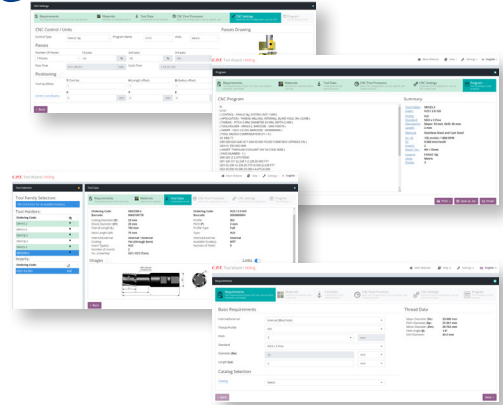
Insert: 21 I 1.5 ISO MT7



If you need assistance, please call your local distributor and ask for help in selecting the appropriate tool as well as for a CNC program to suit your CNC milling machine.

## CPT Mill-Thread catalog and CNC programming Software

This software is provided by CPT to assist you, the thread milling user, to select and apply the correct tool to machine threads on CNC machining centers. The program will find tools and inserts which are suitable for your application, calculate cutting data and generate a CNC program for a variety of controls.



The software is available at our website:

[www.cpt-gewindewerkzeuge.de/home](http://www.cpt-gewindewerkzeuge.de/home)

## Example of Thread Milling CNC Program for Internal Threading

Right hand thread (climb milling) from bottom up.

Program is based on tool center.

This method of programming needs no tool radius compensation value other than an offset for wear.

$A = \frac{D_0 - D}{2}$	<p>A = Radius of tool path                  D<sub>0</sub> = Major thread dia.                  D = Cutting dia.</p>
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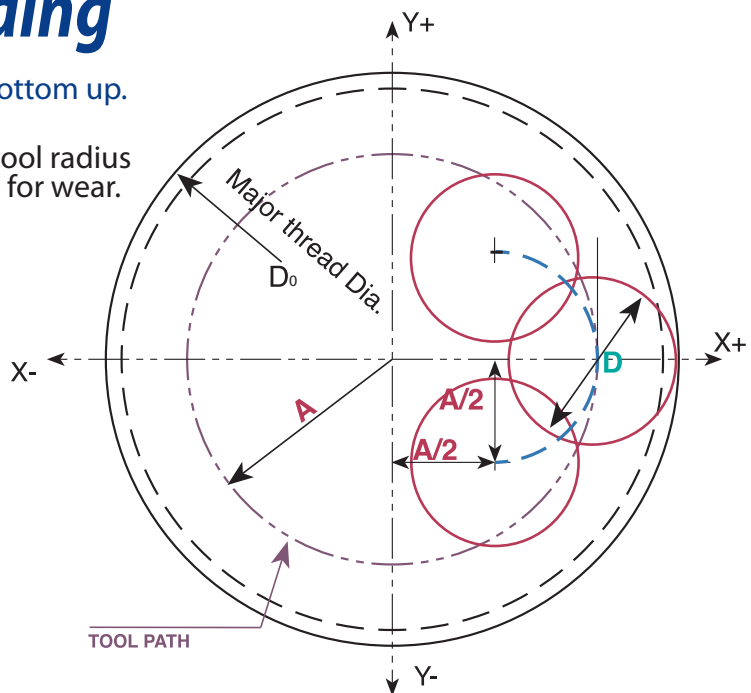
### General Program

```
G90 G00 G54 G40 G17 G94 X0 Y0 S---M03
G43 H1 Z50.000 M08
G90 G01 Z- (TO THREAD DEPTH) F5000
G91 G41 D1 X(A/2) Y-(A/2) Z0 F---
G03 X(A/2) Y(A/2) Z(1/8 PITCH) I0 J(A/2) F---
G03 X0 Y0 Z(PITCH) I-(A) J0
G03 X-(A/2) Y(A/2) Z(1/8 PITCH) I-(A/2) J0
G01 G40 X-(A/2) Y-(A/2) Z0 F5000
G90 G00 Z50.000
```

### Internal Thread

EXAMPLE: M 32 X 2.0 (Thread depth 18 mm)  
 TOOLHOLDER: SR0021 H20 (Cutting dia. 21 mm)  
 INSERT: 21 I 2.0 ISO  
 $A = (32 - 21) / 2 = 5.5$

```
G90 G00 G54 G40 G17 G94 X0.000 Y0.000 S2986 M03
G43 H1 Z50.000 M08
G90 G01 Z-18.250 F5000
G91 G41 D1 X2.750 Y-2.750 Z0.000 F215
G03 X2.750 Y2.750 Z0.250 I0.000 J2.750 F74
G03 X0.000 Y0.000 Z2.000 I-5.500 J0.000
G03 X-2.750 Y2.750 Z0.250 I-2.750 J0.000
G01 G40 X-2.750 Y-2.750 Z0.000 F5000
G90 G00 Z50.000
```



## Mill-Thread Inserts Speed and Feed Selection

**MT7** Sub-Micron Grade with Titanium Aluminum Nitride multi-layer coating (ISO K10 - K20). This is a general purpose grade, which can be used with all materials; it should be run at medium to high cutting speeds.

ISO	Materials	Cutting Speed m/min MT7
<b>P</b>	Low and Medium Carbon Steels	115 - 280
	High Carbon Steels	130 - 200
	Alloy Steels, Treated Steels	105 - 180
<b>M</b>	Stainless Steels	130 - 190
	Cast Steels	150 - 190
<b>K</b>	Cast Iron	80 - 70
<b>N</b>	Non-Ferrous & Aluminum	180 - 340
	Synthetics, Duroplastics, Thermoplastics	115 - 460
<b>S</b>	Nickel Alloys, Titanium Alloys	25 - 90

**Recommended FEED RATE: 0.05 - 0.15 mm**

## Cutting Data

### Slim MT type

**MT17** Advanced New Sub-Micron carbide grade with multi-layer PVD coating, provides high performance in all machining conditions. The new grade ensures high abrasive wear resistance, machining wide range of materials including steels, tough and difficult materials and high alloyed steels.

ISO	Material	Conditions	Cutting Conditions	
			Cutting Speed (m/min)	Feed Rate (mm/tooth)
P	Non-Alloy Steel and Cast Steel, Free Cutting Steel	Annealed < 0.25% C	110-220	( 0.055 * D ) / 22
		Annealed ≥ 0.25% C	100-210	
		Annealed ≥ 0.55% C	90-150	
	Low Alloy Steel and Cast Steel (less than 5% alloying elements)	Annealed	60-110	( 0.055 * D ) / 22
		Quenched & Tempered	60-90	
	High Alloy Steel, Cast Steel, and Tool Steel	Annealed	55-90	
		Quenched & Tempered	45-80	
M	Stainless Steel and Cast Steel	Ferritic	90-200	( 0.055 * D ) / 22
		Martensitic	80-160	
		Austenitic	60-110	( 0.045 * D ) / 22
		High alloy Austenitic & Duplex	40-70	
K	Cast Iron Nodular (GGG)	Ferritic	90-125	( 0.055 * D ) / 22
		Pearlitic	90-110	
	Grey Cast Iron (GG)	Ferritic	110-145	
		Pearlitic	80-125	
	Malleable Cast Iron	Ferritic	110-125	
		Pearlitic	80-120	
N	Aluminum-Wrought Alloy	Not Cureable	135-350	( 0.05 * D ) / 22
		Cured	100-270	
	Aluminum-Cast, Alloyed	Not Cureable ≤ 12% Si	90-270	
		Cured	90-225	
		High Temperature > 12% Si	90-180	
	Copper Alloys	Free Cutting > 1% Pb	70-225	
Brass		70-180		
	Electrolytic Copper	70-270		
Non Metallic	Duroplastics, Fiber Plastics	Hard Rubber	70-270	
			70-270	
S	High Temperature/Super Alloys (Fe based)	Annealed	30-50	( 0.038 * D ) / 22
		Cured		
	High Temperature/Super Alloys (Ni or Co based)	Annealed	25-45	
Cured				
	Cast			
	Titanium Alloys	Alpha + Beta Alloys Cured	30-40	

D= Toolholder cutting diameter.

## Spiral Mill-Thread Inserts Speed and Feed Selection

**MT7** Sub-Micron Grade with Titanium Aluminum Nitride multi-layer coating (ISO K10 - K20). This is a general purpose grade, which can be used with all materials; it should be run at medium to high cutting speeds.

ISO	Materials	Cutting Speed m/min MT7
<b>P</b>	Low and Medium Carbon Steels	145 - 360
	High Carbon Steels	165 - 255
	Alloy Steels, Treated Steels	135 - 230
<b>M</b>	Stainless Steels	165 - 245
	Cast Steels	190 - 245
<b>K</b>	Cast Iron	100 - 220
<b>N</b>	Non-Ferrous & Aluminum	230 - 440
	Synthetics, Duroplastics, Thermoplastics	145 - 590
<b>S</b>	Nickel Alloys, Titanium Alloys	30 - 115

**Recommended FEED RATE: 0.05 - 0.15 mm**

As you may note, cutting speed is shown in range terms. In most standard cases choosing a speed in the middle of the range would be a good choice for a start.

For hard metals reduce cutting speed.

## Spiral Finish Speed Selection

**MT7** Sub-Micron Grade with Titanium Aluminum Nitride multi-layer coating (ISO K10 - K20). This is a general purpose grade, which can be used with all materials; it should be run at medium to high cutting speeds.

ISO	Materials	Cutting Speed (m/min) MT7
<b>P</b>	Low and Medium Carbon Steels	200 - 330
	High Carbon Steels	170 - 235
	Alloy Steels, Treated Steels	100 - 195
<b>M</b>	Stainless Steels	180 - 230
	Cast Steels	180 - 230
<b>K</b>	Cast Iron	200 - 350
<b>N</b>	Non-Ferrous and Aluminum	500 - 1100
	Synthetics, Duroplastics, Thermoplastics	400 - 1500
<b>S</b>	Nickel Alloys, Titanium Alloys	30 - 55

## Cutting Data

### D-Thread type

**MT7** Sub-Micron Grade with Titanium Aluminum Nitride multi-layer coating (ISO K10 - K20). This is a general purpose grade, which can be used with all materials; it should be run at medium to high cutting speeds.

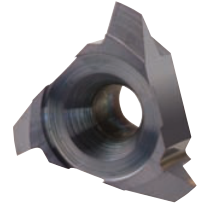
ISO	Materials	Cutting Speed (m/min)
<b>P</b>	Low and Medium Carbon Steels <0.55%C	100 - 205
	High Carbon Steels ≥0.55%C	100 - 180
	Alloy Steels, Treated Steels	100 - 140
<b>M</b>	Stainless Steels - Free Cutting	85 - 125
	Stainless Steels - Austenitic	80 - 115
	Cast Steels	115 - 155
<b>K</b>	Cast Iron	75 - 145
<b>N</b>	Aluminum ≤12%Si, Copper	150 - 300
	Aluminum >12% Si	150 - 300
	Synthetics, Duroplastics, Thermoplastics	100 - 350
<b>S</b>	Nickel Alloys, Titanium Alloys	45 - 95

**Recommended FEED RATE: 0.07 - 0.15 mm**



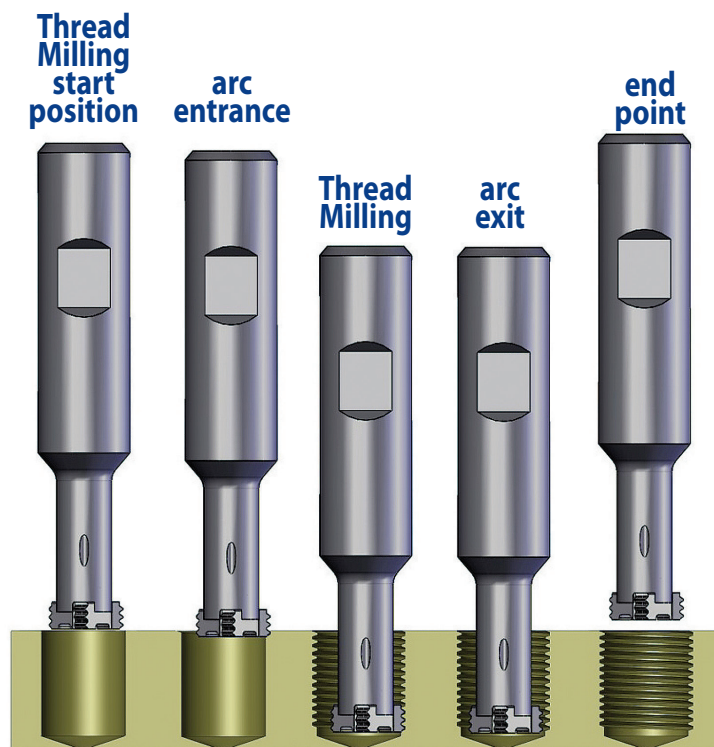
## Cutting Data

### CMT type



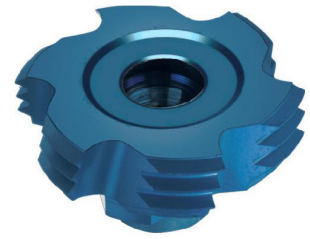
**MT7** Sub-Micron Grade with Titanium Aluminum Nitride multi-layer coating (ISO K10 - K20). This is a general purpose grade, which can be used with all materials; it should be run at medium to high cutting speeds.

ISO	Materials	Cutting Speed m/min	Feed mm/tooth Cutting Diameter=D			
			Ø10	Ø12	Ø18	Ø25
<b>P</b>	Low and Medium Carbon Steels <0.55%C	60 - 120	0.16	0.17	0.20	0.22
	High Carbon Steels ≥0.55%C	60 - 90	0.14	0.16	0.20	0.22
	Alloy Steels, Treated Steels	50 - 80	0.10	0.12	0.16	0.18
<b>M</b>	Stainless Steels - Free Cutting	70 - 100	0.10	0.11	0.15	0.17
	Stainless Steels - Austenitic	60 - 90	0.10	0.11	0.15	0.17
	Cast Steels	70 - 90	0.10	0.12	0.16	0.18
<b>K</b>	Cast Iron	40 - 80	0.16	0.17	0.20	0.22
<b>N</b>	Aluminum ≤12%Si, Copper	100 - 200	0.16	0.17	0.20	0.22
	Aluminum >12% Si	60 - 140	0.10	0.11	0.16	0.18
	Synthetics, Duroplastics, Thermoplastics	50 - 200	0.19	0.19	0.22	0.24
<b>S</b>	Nickel Alloys, Titanium Alloys	20 - 40	0.07	0.07	0.10	0.12
<b>H</b>	Hardened Steel 45 - 50HRc	60 - 70	0.09	0.09	0.13	0.15
	Hardened Steel 50 - 55HRc	50 - 60	0.08	0.08	0.12	0.14



## Cutting Data

### CMT Spiral Multi Flute Inserts



#### Carbide grade - MT8:

Sub-Micron Grade with Aluminum Titanium Nitride (AlTiN) multi-layer coating (ISO K10-K20). Extremely high heat resistant and smooth cutting operation, for high performance, and normal machining conditions. General purpose for all materials.

ISO Standard	Material	Cutting Speed m/min	Feed mm/tooth Cutting Diameter = D
			Ø16-Ø35
<b>P</b>	Low and Medium Carbon Steels <0.55%C	60 - 120	0.14 - 0.24
	High Carbon Steels ≥0.55%C	60 - 90	0.12 - 0.24
	Alloy Steels, Treated Steels	50 - 80	0.08 - 0.20
<b>M</b>	Stainless Steel-Free Cutting	70 - 100	0.08 - 0.19
	Stainless Steel-Austenitic	60 - 90	0.08 - 0.19
	Cast Steels	70 - 90	0.08 - 0.20
<b>K</b>	Cast Iron	40 - 80	0.14 - 0.24
<b>N</b>	Aluminum ≤12%Si, Copper	100 - 200	0.14 - 0.26
	Aluminum >12%Si	60 - 140	0.08 - 0.22
	Synthetics, Duroplastics, Thermoplastics	50 - 200	0.17 - 0.28
<b>S</b>	Nickel Alloys, Titanium Alloys.	20 - 40	0.05 - 0.14
<b>H</b>	Hardened Steel, 45-50HRc	60 - 70	0.07 - 0.17
	Hardened Steel, 51-55HRc	50 - 60	0.06 - 0.16

## Cutting Data

### CMT Milling cutter



**MT7** Sub-Micron Grade with Titanium Aluminum Nitride multi-layer coating (ISO K10 - K20). This is a general purpose grade, which can be used with all materials; it should be run at medium to high cutting speeds.

ISO Standard	Material	Cutting Speed m/min	Feed mm/tooth
<b>P</b>	Low and Medium Carbon Steels <0.55%C	60 - 120	0.05 - 0.15
	High Carbon Steels $\geq 0.55\%C$	60 - 90	0.05 - 0.10
	Alloy Steels, Treated Steels	50 - 80	0.05 - 0.10
<b>M</b>	Stainless Steel-Free Cutting	70 - 100	0.04 - 0.13
	Stainless Steel-Austenitic	60 - 90	0.04 - 0.10
	Cast Steels	70 - 90	0.04 - 0.13
<b>K</b>	Cast Iron	40 - 80	0.05 - 0.15
<b>N</b>	Aluminum $\leq 12\%Si$ , Copper	100 - 200	0.05 - 0.25
	Aluminum $> 12\%Si$	60 - 140	0.03 - 0.10
	Synthetics, Duroplastics, Thermoplastics	50 - 200	0.05 - 0.25
<b>S</b>	Nickel alloys, Titanium Alloys.	20 - 40	0.03 - 0.10
<b>H</b>	Hardened Steel, $\leq 45 HRC$	60 - 70	0.03 - 0.10

## Mill-Thread Solid Carbide Grades, Speed and Feed Selection

### MT type

**MT7** Sub-Micron Grade with Titanium Aluminum Nitride multi-layer coating (ISO K10 - K20). This is a general purpose grade, which can be used with all materials; it should be run at medium to high cutting speeds.

ISO	Materials	Cutting Speed m/min	Feed mm/tooth Cutting Diameter=D										
			Ø2	Ø3	Ø4	Ø6	Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25
P	Low and Medium Carbon Steels <0.55%C	90 - 200	0.03	0.04	0.04	0.06	0.07	0.08	0.09	0.11	0.12	0.15	0.18
	High Carbon Steels ≥0.55%C Alloy Steels, Treated Steels	100 - 145	0.02	0.03	0.03	0.05	0.06	0.07	0.08	0.09	0.10	0.12	0.15
M	Stainless Steels - Free Cutting	55 - 130	0.02	0.03	0.03	0.04	0.05	0.06	0.06	0.07	0.08	0.09	0.11
	Stainless Steels - Austenitic	55 - 100	0.02	0.02	0.03	0.03	0.04	0.05	0.05	0.06	0.07	0.08	0.10
	Cast Steels	120 - 135	0.02	0.02	0.03	0.03	0.04	0.05	0.05	0.06	0.07	0.08	0.10
K	Cast Iron	65 - 120	0.03	0.04	0.04	0.06	0.07	0.08	0.09	0.11	0.12	0.15	0.18
N	Aluminum ≤12%Si, Copper	135 - 280	0.03	0.04	0.04	0.06	0.07	0.08	0.09	0.11	0.12	0.15	0.18
	Aluminum >12% Si	90 - 200	0.02	0.02	0.03	0.03	0.04	0.05	0.05	0.06	0.07	0.08	0.10
	Synthetics, Duroplastics, Thermoplastics	90 - 320	0.05	0.06	0.07	0.08	0.10	0.11	0.12	0.14	0.15	0.18	0.22
S	Nickel Alloys, Titanium Alloys	20 - 70	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.05

For cutters with long cutting length reduce feed rate by 40%

### MTB, MTZ, EMT types

ISO	Materials	Cutting Speed m/min	Feed mm/tooth Cutting Diameter=D										
			Ø2	Ø3	Ø4	Ø6	Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25
P	Low and Medium Carbon Steels <0.55%C	100 - 250	0.03	0.04	0.04	0.06	0.07	0.08	0.09	0.11	0.12	0.15	0.18
	High Carbon Steels ≥0.55%C	110 - 180	0.02	0.03	0.03	0.05	0.06	0.07	0.08	0.09	0.10	0.12	0.15
	Alloy Steels, Treated Steels	90 - 160	0.02	0.02	0.03	0.03	0.04	0.05	0.05	0.06	0.07	0.08	0.10
M	Stainless Steels - Free Cutting	60 - 160	0.02	0.03	0.03	0.04	0.05	0.06	0.06	0.07	0.08	0.09	0.11
	Stainless Steels - Austenitic	60 - 120	0.02	0.02	0.03	0.03	0.04	0.05	0.05	0.06	0.07	0.08	0.10
	Cast Steels	130 - 170	0.02	0.02	0.03	0.03	0.04	0.05	0.05	0.06	0.07	0.08	0.10
K	Cast Iron	70 - 150	0.03	0.04	0.04	0.06	0.07	0.08	0.09	0.11	0.12	0.15	0.18
N	Aluminum ≤12%Si, Copper	150 - 350	0.03	0.04	0.04	0.06	0.07	0.08	0.09	0.11	0.12	0.15	0.18
	Aluminum >12% Si	100 - 250	0.02	0.02	0.03	0.03	0.04	0.05	0.05	0.06	0.07	0.08	0.10
	Synthetics, Duroplastics, Thermoplastics	100 - 400	0.05	0.06	0.07	0.08	0.10	0.11	0.12	0.13	0.15	0.18	0.22
S	Nickel Alloys, Titanium Alloys	20 - 80	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.05

For cutters with long cutting length reduce feed rate by 40%

## MTQ type

Thread mills with relieved neck and internal coolant for milling medium and large threads on relatively deep work pieces.

- To produce medium and large threads on relatively deep work pieces.
- To use overhang according to the application.
- To perform deep threads at the bottom of the application.

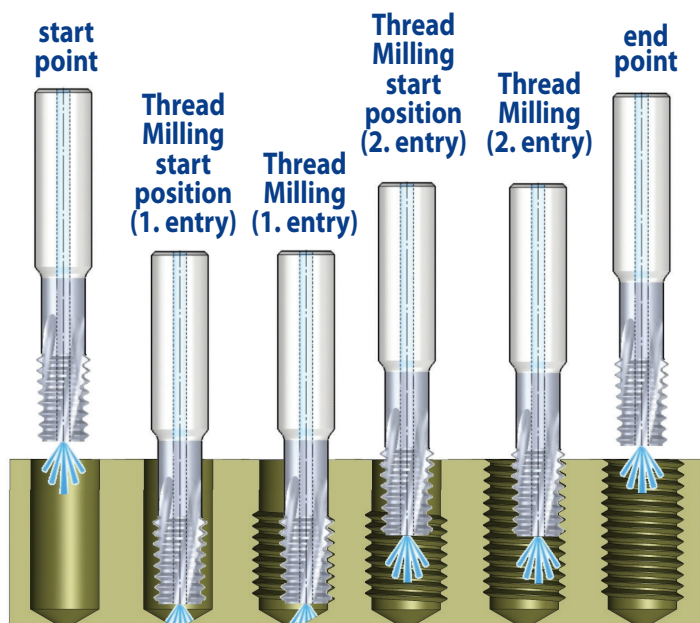
### Advantages

- Provides high rigidity and stability (anti-vibration).
- Accomplishes deep threads in one pass.
- Relatively low cutting forces due to short cutting length.
- Threads length up to 3D.

## Cutting Data

**MT7** Sub-Micron Grade with Titanium Aluminum Nitride multi-layer coating (ISO K10 - K20). This is a general purpose grade, which can be used with all materials; it should be run at medium to high cutting speeds.

ISO	Materials	Cutting Speed m/min	Feed mm/tooth Cutting Diameter=D					
			Ø10	Ø12	Ø14	Ø16	Ø20	Ø25
<b>P</b>	Low and Medium Carbon Steels < 0.55%C	100 - 250	0.06	0.07	0.07	0.08	0.10	0.12
	High Carbon Steels ≥ 0.55%C	110 - 180	0.05	0.05	0.06	0.07	0.09	0.10
	Alloy Steels, Treated Steels	90 - 160	0.03	0.04	0.04	0.05	0.06	0.07
<b>M</b>	Stainless Steels - Free Cutting	60 - 160	0.04	0.04	0.05	0.06	0.06	0.08
	Stainless Steels - Austenitic	60 - 120	0.04	0.04	0.04	0.05	0.06	0.07
	Cast Steels	130 - 170	0.03	0.04	0.04	0.05	0.06	0.07
<b>K</b>	Cast Iron	70 - 150	0.06	0.07	0.07	0.08	0.10	0.12
<b>N</b>	Aluminum ≤ 12%Si, Copper	150 - 350	0.06	0.07	0.07	0.08	0.10	0.12
	Aluminum > 12% Si	100 - 250	0.03	0.04	0.04	0.05	0.06	0.07
	Synthetics, Duroplastics, Thermoplastics	100 - 400	0.08	0.09	0.10	0.11	0.13	0.15
<b>S</b>	Nickel Alloys, Titanium Alloys	20 - 80	0.02	0.02	0.02	0.03	0.03	0.03



## FMT - Fast MT type

- CPT has designed a unique line of solid carbide thread milling tools FMT for increased productivity and high performance.
- Large number of flutes enables to achieve significant shorter machining time.

## FMT vs. Taps

Features	FMT	Taps
Thread up to bottom at blind hole	Possible	Not possible
Machining load	Very low	High
Thread surface quality	High	Medium
Process reliability	Very reliable, especially for expensive work pieces	Medium
Thread geometry	Very accurate	Medium
Cycle time	Same or faster than tap	Fast

## Case Study

### Application

Internal right hand thread: M6x1.0  
 Thread length: 10 mm, Blind hole  
 Bore size: Ø 5 mm  
 Chamfer: 0.9 mm

### Work piece material

Steel SAE 4340

### Cutter description

FMT08048F10 1.0 ISO - with internal coolant  
 Shank diameter: Ø8 mm  
 Cutting diameter: Ø4.8 mm  
 Number of flutes: 6  
 Cutting length: 10.5 mm  
 Total length: 64 mm

### Cutting conditions

Cutting speed: 130 m/min Feed: 0.016 mm/tooth

### Machine

Mori Seiki NV5000 Coolant: emulsion 5%

### Results

Tool life : 2,170 threads  
 Cycle time: 1.5 sec

## Cutting Data

### FMT - Fast MT type

**MT8** Sub Micron grade with advanced PVD triple coating (ISO K10-K20).  
Extremely high heat resistant and smooth cutting operation, for high performance and normal machining conditions. General purpose for all materials.

ISO Standard	Materials	Cutting Speed m/min	Feed mm/tooth Cutting Diameter = D				
			Ø5	Ø6	Ø8	Ø10	Ø12
<b>P</b>	Low and Medium Carbon Steels < 0.55%C	100 - 250	0.03	0.06	0.07	0.08	0.09
	High Carbon Steels ≥ 0.55%C	110 - 180	0.03	0.05	0.06	0.07	0.08
	Alloy Steels, Treated Steels	90 - 60	0.02	0.03	0.04	0.05	0.05
<b>M</b>	Stainless Steel - Free Cutting	60 - 160	0.03	0.04	0.05	0.06	0.06
	Stainless Steel - Austenitic	60 - 120	0.01	0.03	0.04	0.05	0.05
	Cast Steels	130 - 170	0.02	0.03	0.04	0.05	0.05
<b>K</b>	Cast Iron	70 - 150	0.04	0.06	0.07	0.08	0.09
<b>N</b>	Aluminum ≤ 12%Si, Copper	150 - 350	0.04	0.06	0.07	0.08	0.09
	Aluminum > 12%Si	100 - 250	0.03	0.03	0.04	0.05	0.05
	Synthetics, Duroplastics, Thermoplastics	100 - 400	0.06	0.08	0.10	0.11	0.12
<b>S</b>	Nickel Alloys, Titanium Alloys.	20 - 80	0.02	0.03	0.03	0.03	0.03
<b>H</b>	Hardened Steel, 45-50HRc	60 - 70	0.02	0.03	0.03	0.03	0.03

## AMT Solid Carbide Thread Mills for Aluminum Machining

Solid carbide thread mills for High-speed Aluminum machining. High-speed aluminum machining requires tools that minimize the tendency of Aluminum to stick to the tool cutting edges, provides high surface finish, ensuring efficient chip evacuation and sufficient strength of the cutting edge to absorb the cutting forces.

### Features

- Optimized carbide grade for Aluminum, cast iron and stainless steels
- Cylindrical shank (Weldon shank - upon request)
- With internal coolant bore
- Uncoated, smooth cutting edge
- High thread surface quality
- Same tool for right hand or left hand internal threads
- Additional items with cutting chamfer

## Cutting Data

### AMT

**K20** Uncoated Sub- Micron carbide grade for Aluminum and non-ferrous materials, Stainless Steels and Titanium.

ISO Standard	Materials	Cutting Speed m/min	Feed mm/tooth Cutting Diameter = D		
			D ≤ 4	4 < D < 9	D ≥ 9
<b>P</b>	Low & Medium Carbon Steels < 0.55%C	50-140	0.005-0.03	0.01-0.05	0.02-0.10
	High Carbon Steels ≥ 0.55%C	60-130	0.005-0.02	0.01-0.04	0.02-0.09
	Alloy Steels, Treated Steels				
<b>M</b>	Stainless Steel-Free Cutting	40-120	0.005-0.02	0.01-0.04	0.02-0.09
	Stainless Steel-Austenitic				
	Cast Steels	70-120	0.005-0.03	0.01-0.05	0.02-0.10
<b>K</b>	Cast Iron	50-120	0.005-0.03	0.01-0.05	0.02-0.10
<b>N</b>	Aluminum ≤ 12%Si, Copper	130-250	0.005-0.04	0.01-0.06	0.02-0.13
	Aluminum > 12%Si	80-180	0.005-0.04	0.01-0.06	0.02-0.13
	Synthetics, Duroplastics, Thermoplastics	80-180	0.005-0.04	0.01-0.06	0.02-0.13
<b>S</b>	Nickel alloys, Titanium alloys	20- 80	0.005-0.02	0.01-0.04	0.02-0.09

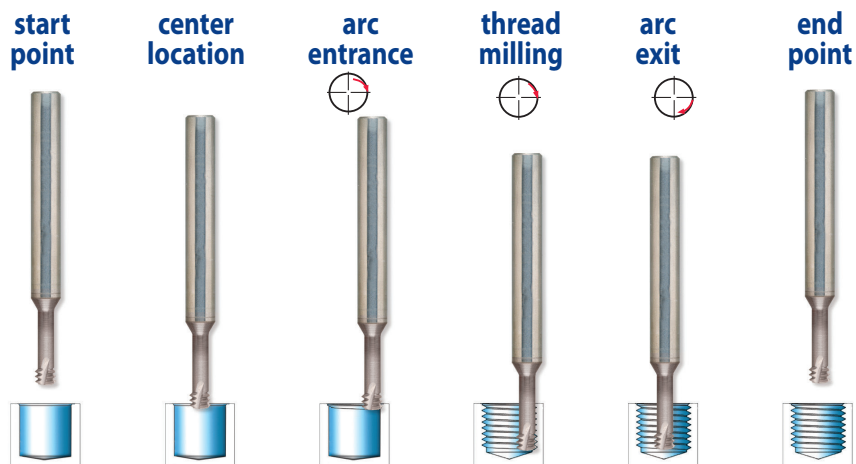


## Cutting Data

### Mini Mill-Thread MTS, MTI and FMTI types

- MT6** Ultra-Fine carbide grade with high hardness and toughness provides an excellent solution for machining steels, stainless steels, and super alloys Ni or Ti base. With a universal PVD multi-layer coating, provides high heat and wear resistance.
- MT7** Sub-Micron Grade with Titanium Aluminum Nitride multi-layer coating (ISO K10 - K20). This is a general purpose grade, which can be used with all materials; it should be run at medium to high cutting speeds.
- MT8** Sub-Micron Grade with Aluminum Titanium Nitride (AlTiN) multi-layer coating (ISO K10-K20). Extremely high heat resistant and smooth cutting operation, for high performance, and normal machining conditions. General purpose for all materials.
- MT11** Ultra-fine Sub-Micron grade with advanced PVD triple coating.

ISO Standard	Materials	Cutting Speed m/min	Feed mm/tooth													
			Cutting Diameter = D													
			Ø1	Ø1.5	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8	Ø9	Ø10	Ø12	Ø14	Ø16
<b>P</b>	Low and Medium Carbon Steels < 0.55%C	60-120	0.04	0.05	0.05	0.07	0.09	0.11	0.13	0.14	0.15	0.16	0.16	0.17	0.18	0.18
	High Carbon Steels ≥ 0.55%C	60- 90	0.03	0.04	0.05	0.06	0.08	0.09	0.10	0.12	0.13	0.14	0.14	0.16	0.17	0.18
	Alloy Steels, Treated Steels	50- 80	0.03	0.04	0.04	0.05	0.05	0.06	0.07	0.07	0.08	0.09	0.10	0.12	0.13	0.14
<b>M</b>	Stainless Steels - Free Cutting	70-100	0.02	0.03	0.03	0.04	0.05	0.06	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.13
	Stainless Steels - Austenitic	60- 90	0.02	0.03	0.03	0.04	0.05	0.06	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.13
	Cast Steels	70- 90	0.03	0.04	0.04	0.05	0.05	0.06	0.07	0.07	0.08	0.09	0.10	0.12	0.13	0.14
<b>K</b>	Cast Iron	40- 80	0.04	0.05	0.05	0.07	0.09	0.11	0.13	0.14	0.15	0.16	0.16	0.17	0.18	0.18
<b>N</b>	Aluminum ≤12%Si, Copper	100-200	0.04	0.05	0.05	0.07	0.09	0.11	0.13	0.14	0.15	0.16	0.16	0.17	0.18	0.18
	Aluminum >12% Si	60-140	0.03	0.03	0.03	0.04	0.05	0.06	0.06	0.07	0.08	0.09	0.10	0.11	0.13	0.14
	Synthetics, Duroplastics, Thermoplastics	50-200	0.09	0.10	0.11	0.12	0.14	0.16	0.18	0.19	0.19	0.19	0.19	0.20	0.20	0.20
<b>S</b>	Nickel Alloys and Titanium Alloys	20- 40	0.03	0.03	0.03	0.04	0.04	0.05	0.06	0.06	0.06	0.07	0.07	0.07	0.08	0.08



## Mini Mill-Thread vs. Taps

Features	Mini Mill-Thread	Taps
Thread surface quality	High	Medium
Thread geometry	Very accurate	Medium
Thread tolerances	4H, 5H, 6H with std cutter	6H with standard tap, 4H with specific tap
Machining time	Same as tap or shorter	Short
Tool breakage	Almost not possible	Could happen often
Machining load	Very low	High
Range of thread diameters	Wide range of diameters	Specific tap for each diameter
Right/Left hand threading	Same cutter	Specific tap for each
Geometric shape	Full profile	Partial profile

## Cutting Data

### MTSB

ISO Standard	Materials	Cutting speed Vc [m/min]	Feed Fz [mm/tooth]					
			Cutting Diameter=D					
			Ø1	Ø1.5	Ø2	Ø3	Ø4	Ø5
<b>P</b>	Low and Medium Carbon Steels < 0.55%C	60-120	0.04	0.05	0.05	0.07	0.09	0.11
	High Carbon Steels ≥ 0.55%C	60- 90	0.03	0.04	0.05	0.06	0.08	0.09
	Alloy Steels, Treated Steels	50- 80	0.03	0.04	0.04	0.05	0.05	0.06
<b>M</b>	Stainless Steel - Free Cutting	70-100	0.02	0.03	0.03	0.04	0.05	0.06
	Stainless Steel - Austenitic	60- 90	0.02	0.03	0.03	0.04	0.05	0.06
	Cast Steels	70- 90	0.03	0.04	0.04	0.05	0.05	0.06
<b>K</b>	Cast Iron	40- 80	0.04	0.05	0.05	0.07	0.09	0.11
<b>N</b>	Aluminum ≤ 12%Si, Copper	100-200	0.04	0.05	0.05	0.07	0.09	0.11
	Aluminum > 12%Si	60-140	0.03	0.03	0.03	0.04	0.05	0.06
	Synthetics, Duroplastics, Thermoplastics	50-200	0.09	0.10	0.11	0.12	0.14	0.16
<b>S</b>	Nickel Alloys, Titanium Alloys.	20- 40	0.03	0.03	0.03	0.04	0.04	0.05
<b>H</b>	Hardened Steel, 45-50HRc	60- 70	0.03	0.04	0.04	0.05	0.05	0.06

## Cutting Data

### DMT type

**MT7** Sub-Micron Grade with Titanium Aluminum Nitride multi-layer coating (ISO K10 - K20). This is a general purpose grade, which can be used with all materials; it should be run at medium to high cutting speeds.

ISO	Materials	Cutting Speed m/min	Feed mm/tooth							
			Ø3	Ø4	Ø5	Ø6	Ø8	Ø9	Ø10	Ø12
<b>P</b>	Low and Medium Carbon Steels < 0.55%C	60 - 120	0.02	0.03	0.03	0.04	0.05	0.05	0.05	0.05
	High Carbon Steels ≥ 0.55%C	60 - 90	0.015	0.02	0.03	0.03	0.04	0.04	0.04	0.05
	Alloy Steels, Treated Steels	50 - 80	0.015	0.02	0.02	0.02	0.02	0.03	0.03	0.04
<b>M</b>	Stainless Steels - Free Cutting	70 - 100	0.015	0.02	0.02	0.02	0.02	0.03	0.03	0.03
	Stainless Steels - Austenitic	60 - 90	0.015	0.02	0.02	0.02	0.02	0.03	0.03	0.03
	Cast Steels	70 - 90	0.015	0.02	0.02	0.02	0.02	0.03	0.03	0.04
<b>K</b>	Cast Iron	40 - 80	0.02	0.03	0.03	0.04	0.05	0.05	0.05	0.05
<b>N</b>	Aluminum ≤12%Si, Copper	100 - 200	0.02	0.03	0.03	0.04	0.05	0.05	0.05	0.05
	Aluminum >12% Si	60 - 140	0.015	0.02	0.02	0.02	0.02	0.03	0.03	0.03
	Synthetics, Duroplastics, Thermoplastics	50 - 200	0.03	0.04	0.05	0.05	0.06	0.06	0.06	0.06

### DMTH type

**MT11** Ultra-fine Sub-Micron grade with advanced PVD triple Blue coating.

ISO	Materials	Cutting Speed m/min	Feed mm/tooth								
			Ø2	Ø3	Ø4	Ø5	Ø6	Ø8	Ø9	Ø10	Ø12
<b>P</b>	Low and Medium Carbon Steels < 0.55%C	60 - 120	0.02	0.02	0.03	0.03	0.04	0.05	0.05	0.05	0.05
	High Carbon Steels ≥ 0.55%C	60 - 90	0.02	0.02	0.02	0.03	0.03	0.04	0.04	0.04	0.05
	Alloy Steels, Treated Steels	50 - 80	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.04
<b>M</b>	Stainless Steels - Free Cutting	70 - 100	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03
	Stainless Steels - Austenitic	60 - 90	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03
	Cast Steels	70 - 90	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.04
<b>K</b>	Cast Iron	40 - 80	0.03	0.03	0.03	0.03	0.04	0.05	0.05	0.05	0.05
<b>N</b>	Aluminum ≤10%Si, Copper	100 - 200	0.03	0.03	0.03	0.03	0.04	0.05	0.05	0.05	0.05
	Aluminum >10% Si	60 - 140	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03
	Synthetics, Duroplastics, Thermoplastics	50 - 200	0.04	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06
<b>S</b>	Nickel Alloys, Titanium Alloys and High Temp. Alloys	20 - 40	0.02	0.03	0.03	0.04	0.05	0.05	0.06	0.06	0.06
<b>H</b>	Hardened Steels 45-50 HRc	60 - 70	0.02	0.02	0.02	0.03	0.04	0.04	0.05	0.05	0.05
	Hardened Steels 50-55 HRc	50 - 60	0.01	0.01	0.01	0.02	0.03	0.03	0.04	0.04	0.04

## Cutting Data

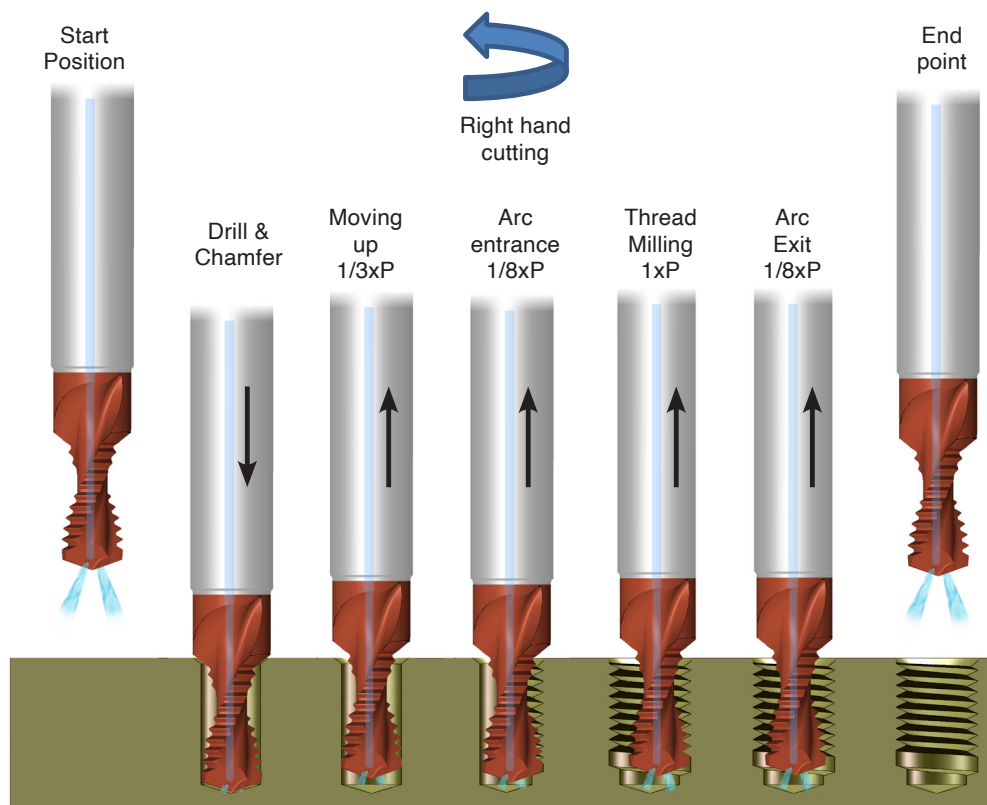
### MT Drill - MTD

**Carbide grade K20:** Uncoated Sub-Micron carbide grade dedicated for machining Aluminum and Cast Iron.

**MT7:** Sub-Micron carbide grade combines high hardness and toughness, with PVD triple coating for smooth cutting and high performance.

Material Group	Materials	Cutting Speed m/min		Feed mm/r Cutting Diameter = D			Feed mm/tooth Cutting Diameter = D		
				Drilling			Mill Thread		
		K20	MT7	D≤4	4<D<6	D≥6	D≤4	4<D<6	D≥6
<b>K</b>	Cast Iron	50- 80	80-120	0.10-0.15	0.15-0.20	0.15-0.30	0.005-0.03	0.01-0.05	0.02-0.10
<b>N</b>	Aluminum ≤12%Si, Copper	100-250	100-350	0.06-0.10	0.10-0.20	0.20-0.30	0.005-0.04	0.01-0.06	0.02-0.13
	Aluminum >12%Si	---	80-180	0.05-0.07	0.10-0.15	0.15-0.25	0.005-0.04	0.01-0.06	0.02-0.13
	Synthetics, Duroplastics, Thermoplastics	60-100	80-180	0.10-0.20	0.20-0.30	0.20-0.30	0.005-0.04	0.01-0.06	0.02-0.13

## MT Drill working cycle



## Cutting Data

### Mini Mill-Thread MTSH and FSH

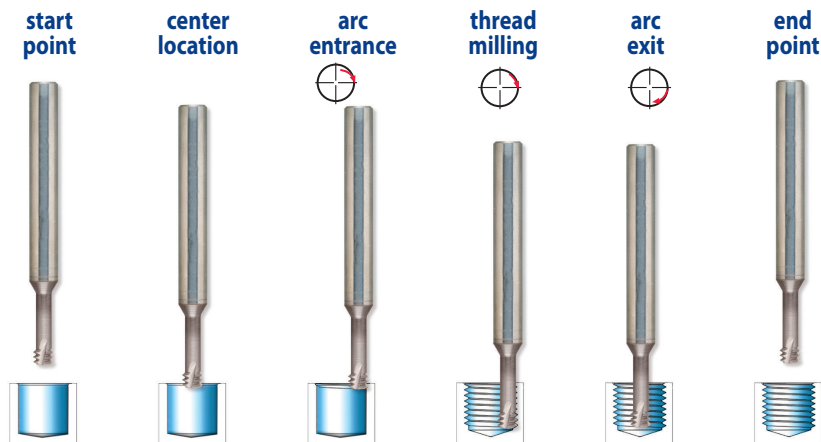
**MT9** Sub-Micron Grade with advanced PVD triple coating.

**MT6** Ultra-Fine carbide grade with high hardness and toughness provides an excellent solution for machining steels, stainless steels, and super alloys Ni or Ti base. With a universal PVD multi-layer coating, provides high heat and wear resistance.

**MT3** Ultra-Fine carbide grade with PVD multi-layer coating for machining Super Alloys and Hard materials up to 65 HRc. Provides supreme edge stability with high heat and wear resistance. For increased productivity and high performance.

#### Left hand cutting for CNC code use M04

ISO	Materials	Hardness HRc	Cutting Speed m/min	Feed mm/tooth													
				Cutting Diameter = D													
				Ø1	Ø1.5	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8	Ø9	Ø10	Ø12	Ø14	Ø16
<b>S</b>	Nickel Alloys, Titanium Alloys and High Temp. Alloys		20-40	0.03	0.03	0.03	0.04	0.04	0.05	0.06	0.06	0.06	0.07	0.07	0.07	0.08	0.08
<b>H</b>	Hardened Steels	45 - 50	60 - 70	0.03	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.07	0.08	0.08	0.09	0.10	0.11
		51 - 55	50 - 60	0.02	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.07	0.08	0.09	0.10
		56 - 62	40 - 50	0.01	0.02	0.02	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.08	0.09



#### Case Study

Application	Internal Thread M4 X 0.7
Thread Depth	8.0 mm
Workpiece Material	Tool Steel: D2
Hardness	60-62 (HRc)
Cutter Description	MTSH06031C9 0.7 ISO
Machining Conditions	Cutting Speed: 44 m / min Feed: 0.03 mm / tooth
Machine	Mori Seiki VN5000
Control	Fanuc
Cooling Lubricant	Emulsion
Tool Life (No. of Threads)	84

## Cutting Data

### MTH type

**MT11** Sub-Micron Grade with advanced PVD triple coating.

ISO	Materials	Hardness HRc	Cutting Speed m/min	Feed mm/tooth								
				Cutting Diameter = D								
				Ø2.5	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8	Ø9	Ø10
<b>S</b>	Nickel Alloys, Titanium Alloys and High Temp. Alloys		20-50	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.04
<b>H</b>	Hardened Steels Cast Iron	45 - 50	70 - 80	0.02	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.07
		51 - 55	60 - 70	0.01	0.02	0.02	0.03	0.03	0.04	0.04	0.05	0.06
		56 - 62	40 - 50	0.005	0.01	0.01	0.02	0.02	0.03	0.03	0.04	0.05

For cutters with long cutting length reduce feed rate by 40%

Positioning

Thread Milling

Chamfering

