MITSUBISHI MATERIALS

MMT Series

HIGH PRECISION MACHINING OF A WIDE RANGE OF THREADING APPLICATIONS

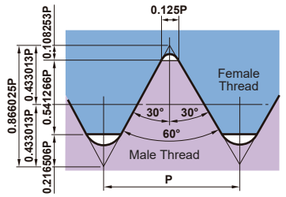
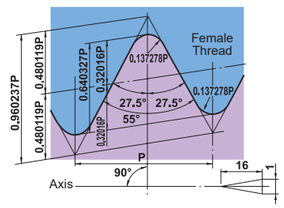
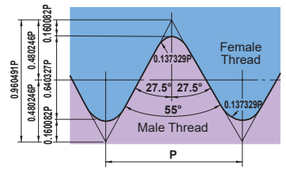
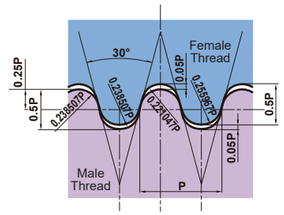
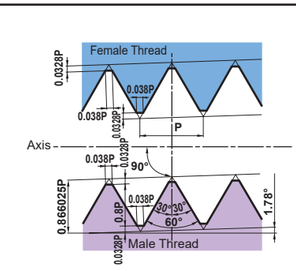
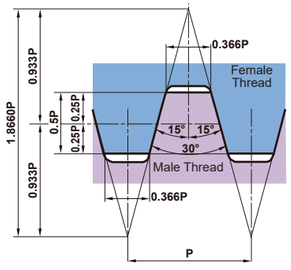
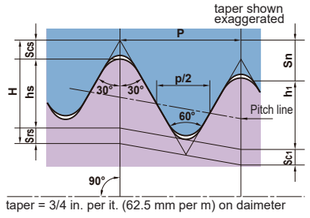
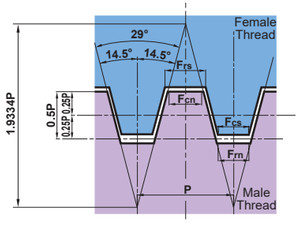
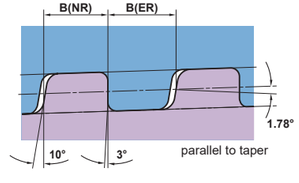
TOOL NEWS **B053A**

CROSS REFERENCE OF THREAD PITCHES

Application		General machining				Pipe fittings and couplings for gas and water			Steam, gas and water line pipes		Pipe couplings for food and fire fighting industries	Motion transmissions		Aircraft and aerospace	Oil and gas	
Type		Partial Profile 60°	Partial Profile 55°	ISO Metric 60°	American UN	Parallel Pipe Thread Whitworth for BSW, BSP	American NPT		Taper Pipe Thread BSPT	American NPTF	Round DIN 405	ISO Trapezoidal 30°	American ACME	UNJ	API Buttress Casing	API Round Casing&Tubing
Symbol		M UNC UNF	W	M	UNC UNF	G(PF) Rp(PS) W	NPT		BSPT R(PT) Rc(PT) Rp	NPTF	Rd	Tr (TM)	ACME (TW)	UNJ	BCSG	CSG LCSG
Holder \ Pitch		mm (thread/inch)	thread/inch	mm	thread/inch	thread/inch	thread/inch		thread/inch	thread/inch	thread/inch	mm	thread/inch	thread/inch	thread/inch	thread/inch
MMT Holder  P.13	Full form	–	–	0.5–5.0	32–5	28–5	27, 18, 14 11.5, 8		28, 19 14, 11	27, 18, 14 11.5, 8	10, 8 6, 4	1.5, 2 3, 4, 5	12, 10 8, 6, 5	32–8	5	10, 8
	Partial form	0.5–5.0 (48–5)	48–5	0.5–5.0	48–5	–	–		–	–	–	–	–	–	–	–
MMT Boring Bars  P.18	Full form	–	–	0.5–5.0	32–5	28–5	27, 18, 14 11.5, 8		19, 14, 11	14, 11.5, 8	10, 8 6, 4	1.5, 2 3, 4, 5	12, 10 8, 6, 5	–	5	10, 8
	Partial form	0.5–5.0 (48–5)	48–5	0.5–5.0	48–5	–	–		–	–	–	–	–	* –	–	–

* When machining an internal UNJ thread, drill an internal hole with the appropriate diameter. Then machine with 60° American UN.
In this case, a full form type insert cannot be used.

STANDARD THREAD AND CORRESPONDING INSERT

Thread Name	Standard Thread Type	Symbol	Thread Name	Standard Thread Type	Symbol
ISO Metric / American UN		M UNC UNF	BSPT		BSPT R(PT) Rc(PT) Rp
Parallel Pipe Thread Whitworth for BSW, BSP		W G (PF) Rp (PS)	Round DIN 405		Rd
American NPT		NPT	ISO Trapezoidal 30°		Tr (TM)
API Round Casing & Tubing		CSG LCSG	American ACME		ACME (TW)
API Buttress Casing		BCSG			

THREADING METHODS

Pipe Threads and Tool Selection

■Parallel Pipe Thread G(PF)

min	Thread	Number of Threads	Standard Internal Diameter
—	G 1/16	28	.258"
1min	G 1/8		.337"
2min	G 1/4	19	.451"
3min	G 3/8		.589"
4min	G 1/2	14	.734"
5min	G 5/8		.811"
6min	G 3/4		.949"
7min	G 7/8		1.098"
8min	G 1	11	1.193"
9min	G 1 1/8		1.376"
10min	G 1 1/4		1.534"

Note 1) Same as PF.

■Taper Pipe Thread R, Rc(PT)

min	Thread	Number of Threads	Standard Internal Diameter
—	R 1/16	28	.258"
1min	R 1/8		.337"
2min	R 1/4	19	.451"
3min	R 3/8		.589"
4min	R 1/2	14	.734"
5min	—	—	—
6min	R 3/4	14	.949"
7min	—	—	—
8min	R 1	11	1.193"
9min	—	—	—
10min	R 1 1/4	11	1.534"

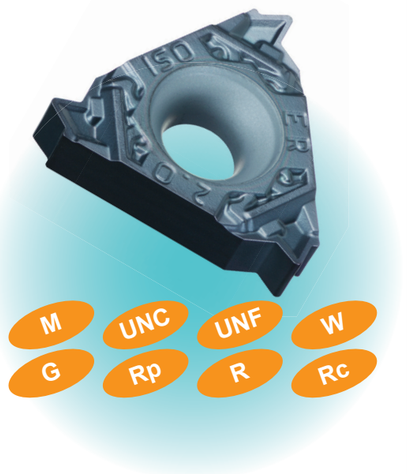
Note 1) Same as Rc, PT.

• The pitch is pre-determined for each nominal diameter. Note the minimum machining diameter especially when internal threading.

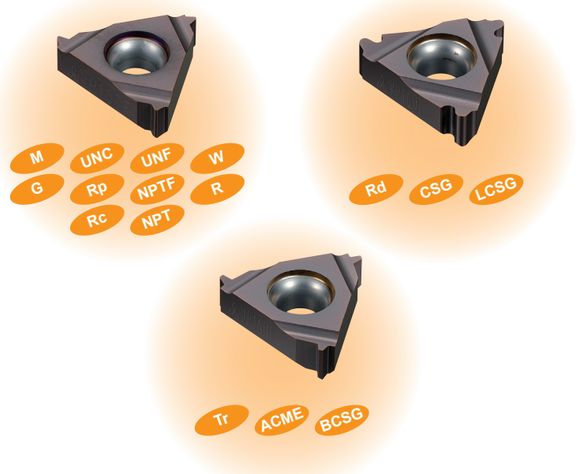
MMT SERIES FEATURES

■A WIDE VARIETY OF PRODUCTS

M-CLASS INSERTS WITH 3-D CHIP BREAKERS



G-CLASS GROUND INSERTS

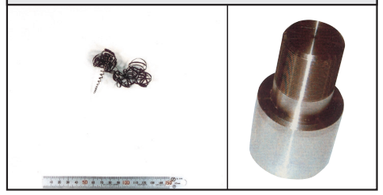


■IDEAL CHIP CONTROL EVEN IN THE LATTER HALF OF PASSES WHEN CONTINUOUS CHIPS ARE USUALLY PRODUCED. (M-CLASS INSERTS WITH 3-D CHIP BREAKERS)

ISO metric external thread pitch 1.5mm　Final pass (6th pass)

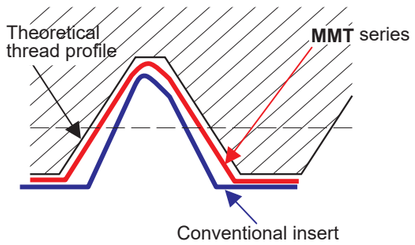
Conventional insert

MMT



<Cutting Conditions>
Workpiece : AISI 4140
Insert : MMT16ER150ISO-S
Grade : VP15TF
Cutting speed : vc=395 SFM
Cutting method : Radial Infeed
Depth of cut : Fixed cut area
Pass : 6 times
Cutting Mode : Wet Cutting

■A HIGHER LEVEL OF PRECISION THAN CONVENTIONAL INSERTS (G-CLASS GROUND INSERTS)



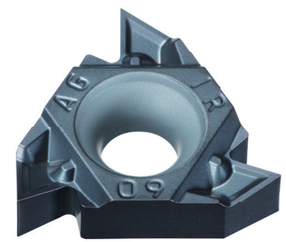
High precision threading can be achieved by using MMT inserts that feature a ground rake face and peripheral cutting edge.

Thread Type	Threading Tolerance
ISO Metric	6g / 6H
American UN	2A / 2B
Whitworth for BSW, BSP	Medium Class A
BSPT	Standard BSPT
Round DIN 405	7h / 7H
ISO Trapezoidal 30°	7e / 7H
American ACME	3G
UNJ	3A
API Buttress Casing	Standard API
API Rounded Casing & Tubing	Standard API RD
American NPT	Standard NPT
American NPTF	Class2

NEW

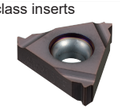
AG type is added to the accurate M-class type 3D chipbreaker

For general purpose 60° and 55° inner/outer diameter threading, the AG type has been added to the precision M-class 3D chip breaker range, which is applicable to 48-8 threads and a pitch of 0.5-3.0mm to meet a wide range of needs.
The M-class precision 3D chip breaker improves chip control and contributes to tool cost reduction.



■CHOOSING M-CLASS INSERTS WITH 3-D CHIP BREAKERS OR G-CLASS INSERTS

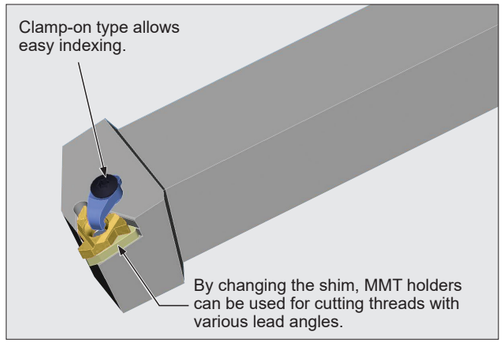
Insert	Chip control	Precision of thread
M-class inserts with 3-D chip breakers 	◎	○

Insert	Chip control	Precision of thread
G-class inserts 	○	◎

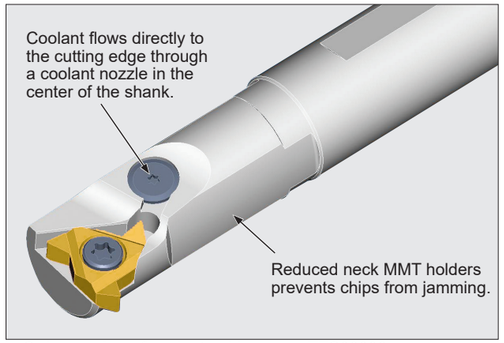
- For ideal chip control and a high cost performance ratio, M-class inserts with 3-D chip breakers are recommended.
- G-class inserts are recommended where higher precision is required.

■HOLDER (Use of special surface treatment)

External

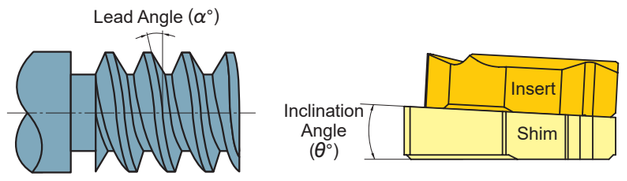


Internal



* Order number of coolant guide screw: TFS03006 (Except MMTIR1316/MMTIR1516)

■SUITABLE FOR THREADS WITH A LARGE LEAD ANGLE



By changing only the shim, MMT holders can be used for turning left hand threads and threads with various lead angles.

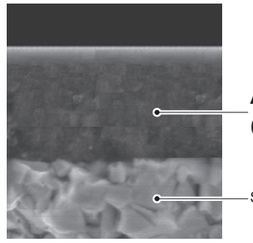
Lead Angle (α°)	Inclination Angle (θ°)
−1.5°	−3°
−0.5°	−2°
0.5°	−1°
1.5°	0°
2.5°	1°
3.5°	2°
4.5°	3°

Standard shim delivered with the holder.

PVD coated carbide grade for stable threading

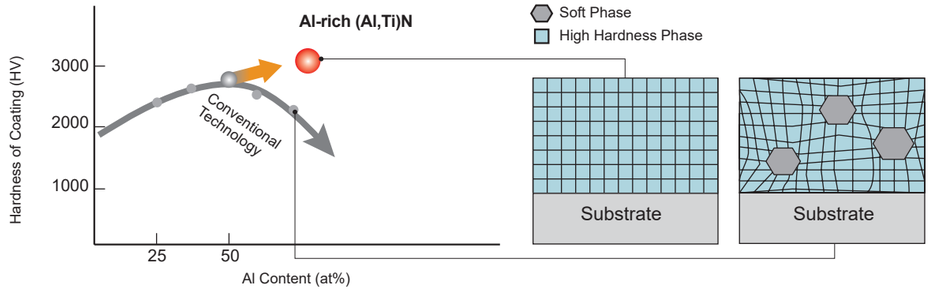
MP9025 Tough grade with an emphasis on cutting edge stability.

Demonstrates excellent fracture resistance when machining at low cutting speeds, internal machining, and even on small corner R sizes.
With excellent adhesion resistance, it is effective in machining heat resistant alloys and precipitation hardening stainless steel.



Al-rich and Conventional Coating Comparison

The Al-rich (Al,Ti)N single layer coating provides stabilization of the high hardness phase and succeeds in dramatically improving wear, crater and welding resistance.



VP10MF

High wear and plastic deformation resistance for threading when maintaining an accurate thread form.
Suitable for continuous high precision machining with extensive tool life.
Effective in combination with G-class inserts for high precision threading.

VP15TF

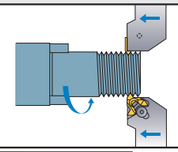
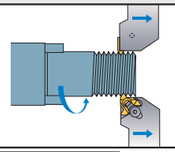
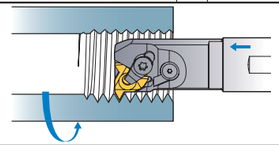
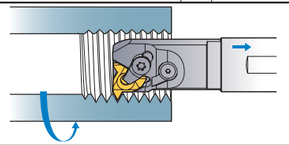
High fracture resistance during low rigidity applications such as bar feed machining. Able to withstand harsh conditions for long periods where conventional inserts would be liable to breakage.
Effective combination of high cost performance M-class inserts with 3-D chip breakers.

VP20RT

Suitable for stainless steel boring and unstable machining where inserts are vulnerable to fracturing.
Effective combination of high cost performance M-class inserts with 3-D chip breakers.

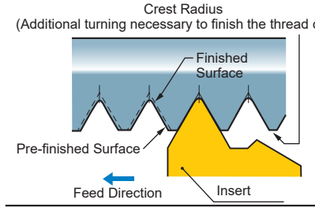
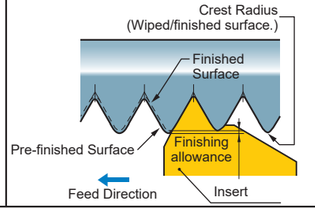
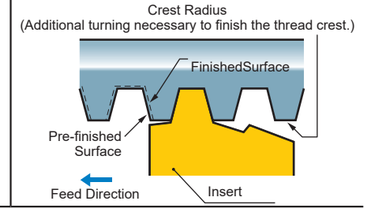
THREADING METHODS

THREADING METHODS

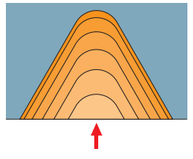
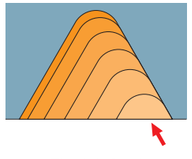
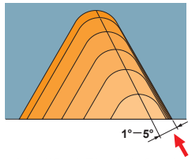
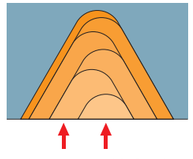
	Right Hand Thread	Left Hand Thread
EXTERNAL	 Holder Reversed	 Holder Reversed
INTERNAL		

- Usually, threads are cut with the feed towards the chuck.
- When machining left hand threads, note that clamping rigidity is lowered due the application of back turning.
- When machining left hand threads, the lead angle is negative. Ensure an appropriate lead angle by changing the shim.

INSERT TYPES

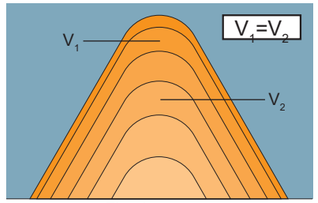
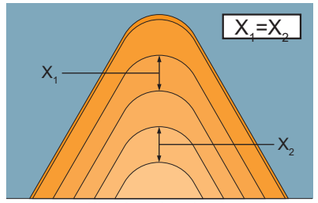
Partial form	Full form	Semi-full form (Trapezoidal threads only)
● The same insert can be used for a range of pitches. ● Shorter tool life because the corner radius of the insert is smaller than that of the full form insert. ● Finishing with another operation is necessary.	● No deburring needed after threading. ● Requires different threading inserts.	● No deburring needed after threading. ● Requires different threading inserts. ● Finishing with another operation is necessary.
 Crest Radius (Additional turning necessary to finish the thread crest.) Finished Surface Pre-finished Surface Feed Direction Insert	 Crest Radius (Wiped/finished surface.) Finished Surface Pre-finished Surface Finishing allowance Feed Direction Insert	 Crest Radius (Additional turning necessary to finish the thread crest.) FinishedSurface Pre-finished Surface Feed Direction Insert

INFEED METHODS

		Radial Infeed	Flank Infeed	Modified Flank Infeed	Incremental Infeed
				 1°–5°	
Features	Advantages	● Easiest to use. (Standard programme for threading) ● Wide application. (Cutting conditions easy to change.) ● Uniform wear of the right and left sides of the cutting edge.	● Relatively easy to use. (Semi-standard programme for threading.) ● Reduced cutting force. ● Suitable for large pitch threads or materials that peel easily. ● Good chip discharge.	● Preventing flank wear on the right side of the cutting edge. ● Reduced cutting force. ● Suitable for large pitch threads or materials that peel easily. ● Good chip discharge.	● Uniform flank wear of the right and left sides of the cutting edge. ● Reduced cutting force. ● Suitable for large pitch threads or materials that peel easily.
	Disadvantages	● Difficult chip control. ● Subject to vibration in the later in stages of cutting. ● Ineffective for large pitch threading. ● Heavy load on the corner radius.	● Large flank wear on the right side of the cutting edge. ● Relatively difficult to change cutting depth. (Re-programming necessary)	● Complex machining programming. ● Difficult to change cutting depth. (Re-programming necessary)	● Complex machining programming. ● Difficult to change cutting depth. (Re-programming necessary) ● Difficult chip control.

THREADING METHODS

THREADING DEPTH

	Features	
	Advantages	Disadvantages
 Fixed cut area	● Easy to use. (Standard programme for threading.) ● Superior resistance to vibration. (Constant cutting force.)	● Long chips generated during the final pass. ● Complex calculation of cutting depth when changing the number of passes.
 Fixed cutting depth	● Reduced load on corner radius during the first half of the passes. ● Easy chip control. (Optional setting of chip thickness) ● Easy to calculate cutting depth when changing the number of passes. ● Good chip control.	● Subject to vibration in the later stages of cutting. (Increased cutting force) ● In some cases, changing the NC programme is necessary.

Note 1) It is recommended to set the depth of cut of the final pass to 0.05mm—0.025mm.
Large cutting depths can cause vibration, leading to a poor surface finish.

■ FORMULAE

● Formulae to calculate infeed for each pass in a reduced series.

$$\triangle ap_n = \frac{ap}{\sqrt{n_{ap}-1}} \times \sqrt{b}$$

$\triangle ap_n$: Depth of cut
n : Actual pass
ap : Total depth of cut
n_{ap} : Number of passes
b : 1st pass 0.3
2nd pass 2—1 = 1
3rd pass 3—1 = 2
•
•
nth pass n—1

(Example)
External threading (ISO Metric)
Pitch : 1.0mm
ap : 0.6mm
n_{ap} : 5 passes

1st Pass $\triangle ap_1 = \frac{0.60}{\sqrt{5-1}} \times \sqrt{0.3} = 0.16 \rightarrow$ **0.16** ($\triangle ap_1$)

2st Pass $\triangle ap_2 = \frac{0.60}{\sqrt{5-1}} \times \sqrt{2-1} = 0.3 \rightarrow$ **0.14** ($\triangle ap_2 - \triangle ap_1$)

3st Pass $\triangle ap_3 = \frac{0.60}{\sqrt{5-1}} \times \sqrt{3-1} = 0.42 \rightarrow$ **0.12** ($\triangle ap_3 - \triangle ap_2$)

4st Pass $\triangle ap_4 = \frac{0.60}{\sqrt{5-1}} \times \sqrt{4-1} = 0.52 \rightarrow$ **0.1** ($\triangle ap_4 - \triangle ap_3$)

5st Pass $\triangle ap_5 = \frac{0.60}{\sqrt{5-1}} \times \sqrt{5-1} = 0.6 \rightarrow$ **0.08** ($\triangle ap_5 - \triangle ap_4$)

■ NC PROGRAMME FOR MODIFIED FLANK INFEED

● Example) M12×1.0 5 passes modified 5°

External Threading	Internal Threading
G00 Z = 5.0 X = 14.0 G92 U—4.34 Z—13.0 F1.0 G00 W—0.07 G92 U—4.64 Z—13.0 F1.0 G00 W—0.06 G92 U—4.88 Z—13.0 F1.0 G00 W—0.05 G92 U—5.08 Z—13.0 F1.0 G00 W—0.03 G92 U—5.20 Z—13.0 F1.0 G00	G00 Z = 5.0 X = 10.0 G92 U4.34 Z—13.0 F1.0 G00 W—0.07 G92 U4.64 Z—13.0 F1.0 G00 W—0.05 G92 U4.84 Z—13.0 F1.0 G00 W—0.04 G92 U5.02 Z—13.0 F1.0 G00 W—0.03 G92 U5.14 Z—13.0 F1.0 G00

SELECTING CUTTING CONDITIONS

		Priority					
		Tool Life	Cutting Force	Surface Finish	Precision of Thread	Chip Discharge	Efficiency (Reduced Passes)
Threading Methods	Radial	○		○	○		○
	Flank	(△ : Modified)	○	(△ : Modified)		○	
Cutting Depth	Fixed Cutting Depth					○	
	Fixed Cut Area	○	○	○	○		○

Note 1) Tool life and surface finish accuracy can be increased by changing the threading method from flank infeed to modified flank infeed.
Chip control can be improved by increasing the cutting depth in the later half of passes.

CUTTING DEPTH AND THE NUMBER OF PASSES

● Selection of the appropriate cutting depth and the right number of passes is vital for threading.

- For most threading, use a "threading cycle programme," which has originally been installed on machines, and specify "total cutting depth" and "cutting depth in the first or final pass."
- Cutting depth and the number of passes are easy to change for the radial infeed method, thus making it easy to determine the appropriate cutting conditions.

How to effectively use MMT series.

- Insert grades with high wear and plastic deformation resistance, specially produced for threading tools, ensure highly efficient cutting by enabling high-speed machining and a reduced number of passes.

Machining Cost Reduction

ADVICE ON IMPROVED THREADING

● Increasing tool life

- To prevent damage to the corner radius - Recommended method - Modified flank infeed
- To have uniform flank wear on both sides of a cutting edge - Recommended method - Radial infeed
- To prevent crater wear - Recommended method - Flank infeed

● Preventing chip problems

- Change to flank or modified infeed.
- During radial infeed cutting, use an inverted holder and change the coolant supply to a downward direction.
- When using the radial infeed method, set the minimum cutting depth at around 0.2mm to make the chips thicker.

● To achieve highly efficient machining

- Increase cutting speed. (Dependant on the maximum revolution and rigidity of the machine.)
- Reduce the number of passes. (Reduce by 30-40%.)
- A reduced number of passes can improve chip discharge because of the thicker chips generated.

● Preventing vibration

- Change to flank or modified infeed.
- When using radial infeed, reduce cutting depth in the later half of passes and lower the cutting speed.

● Increased surface finish accuracy

- A final wiping pass should be performed at the same depth of cut as the last regular pass.
- When using the flank infeed method, change to radial infeed only during the final pass.

MMT SERIES ORDER NUMBER

HOLDERS

EXTERNAL

MMT E R 08 3 – SM

Designation	Application	Hand of Tool	Tool Size (inch) (Height and Width)				Insert Size	Tool Type
	E External	R Right	06 .375	12 .750			3 MMT16	SM Non-offset
			08 .500	16 1.000			4 MMT22	
			10 .625	20 1.250				

INTERNAL

MMT I R 10 2 – 0.50 – 1.5 – C

Designation	Application	Hand of Tool	Shank Diameter (inch)	Insert Size	Min. Cutting Diameter (inch)				Lead Angle	Coolant thru
	I Internal	R Right	10 .625	2 MMT11	0.50 .500		1.15 1.150		1.5 1.5°	C With
			12 .750	3 MMT16	0.60 .600		1.20 1.200		2.5 2.5°	
			16 1.000	4 MMT22	0.75 .750		1.45 1.450			
			20 1.250		0.90 .900		1.50 1.500			
			24 1.500		0.95 .950		1.75 1.750			

INSERTS

M-CLASS

MMT 16 E R 100 ISO – S

S: M-class inserts with 3-D chip breakers

Designation	Diameter of Inscribed Circle (mm)	Application	Hand of Tool	Pitch			Threading Type
	11 6.35	E External	R Right	100 1.0 mm	A	0.5—1.5 mm or 48—16 thread/inch	60 Partial Profile 60°
	16 9.525	I Internal		125 1.25 mm			55 Partial Profile 55°
				150 1.5 mm	G	1.75—3.0 mm or 14—8 thread/inch	ISO ISO Metric
				175 1.75 mm			W Whitworth for BSW, BSP
				200 2.0 mm	AG	0.5—3.0mm or 48—8 thread/inch	BSPT BSPT
				250 2.5 mm			UN American UN
				300 3.0 mm			

G-CLASS

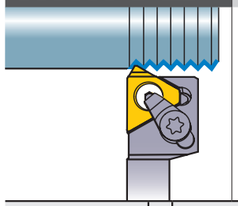
MMT 16 E R 050 ISO

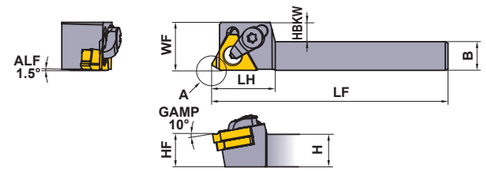
Designation	Diameter of Inscribed Circle (mm)	Application	Hand of Tool	Pitch			Threading Type
	11 6.35	E External	R Right	050 0.5 mm	A	0.5—1.5 mm or 48—16 thread/inch	60 Partial Profile 60°
	16 9.525	I Internal		075 0.75 mm			55 Partial Profile 55°
	22 12.7			100 1.0 mm			ISO ISO Metric
				125 1.25 mm	G	1.75—3.0 mm or 14—8 thread/inch	W Whitworth for BSW, BSP
				150 1.5 mm			BSPT BSPT
				175 1.75 mm			UN American UN
				200 2.0 mm	AG	0.5—3.0 mm or 48—8 thread/inch	RD Round DIN 405
				250 2.5 mm			TR ISO Trapezoidal 30°
				300 3.0 mm			ACME American ACME
				350 3.5 mm			UNJ UNJ
				400 4.0 mm	N	3.5—5.0 mm or 7—5 thread/inch	APBU API Buttress Casing
				450 4.5 mm			APRD API Round Casing&Tubing
				500 5.0 mm			NPT NPT
							NPTF NPTF

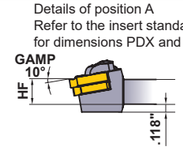
MMTE HOLDER

- Various insert types.
- Precision class insert for precise thread forms.
- Available with a pressed breaker for chip control.
- Able to change lead angle by replacing the shim.

MMTE — External threading







MMTER-063SM
Right hand tool holder only.

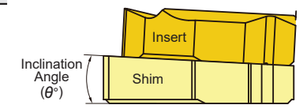
Order Number	Stock	Insert Number	Dimensions (inch)							Clamp Bridge	Clamp Screw *	Stop Ring	Shim Screw *	Shim	Wrench
	R		H	B	LF	LH	HF	WF	HBKW						
MMTER-063SM	●	MMT16ER ○○○○○	.375	.375	4.724	.875	.375	.625	.250	SETK51	SETS51	CR4	HFC03008	CTE32TP15	①TKY15F ②HKY20R
MMTER-083SM	●		.500	.500	4.724	.875	.500	.625	.125	SETK51	SETS51	CR4	HFC03008	CTE32TP15	①TKY15F ②HKY20R
MMTER-083	●		.500	.500	4.000	1.000	.500	.625	–	SETK51	SETS51	CR4	HFC03008	CTE32TP15	①TKY15F ②HKY20R
MMTER-103	●		.625	.625	4.000	1.000	.625	.750	–	SETK51	SETS51	CR4	HFC03008	CTE32TP15	①TKY15F ②HKY20R
MMTER-123	●		.750	.750	5.000	1.000	.750	1.000	–	SETK51	SETS51	CR4	HFC03008	CTE32TP15	①TKY15F ②HKY20R
MMTER-163	●		1.000	1.000	6.000	1.000	1.000	1.250	–	SETK51	SETS51	CR4	HFC03008	CTE32TP15	①TKY15F ②HKY20R
MMTER-124	●	MMT22ER ○○○○○	.750	.750	5.000	1.250	.750	1.000	–	SETK61	SETS61	CR5	HFC04010	CTE43TP15	①TKY20F ②HKY25R
MMTER-164	●		1.000	1.000	6.000	1.250	1.000	1.250	–	SETK61	SETS61	CR5	HFC04010	CTE43TP15	①TKY20F ②HKY25R
MMTER-204	●		1.250	1.250	6.000	1.250	1.250	1.500	–	SETK61	SETS61	CR5	HFC04010	CTE43TP15	①TKY20F ②HKY25R

Note 1) Select and use an alternate shim from list below (sold separately), dependant on the lead angle.
* Clamp Torque (lbf-in) : SETS51=31, SETS61=44, HFC03008=13, HFC04010=19

SHIM

Lead Angle (α°)	Order Number	Stock R	Inclination Angle (θ°)	Applicable Holder
–1.5°	CTE32TN15	●	–3°	MMTER -○○3
–0.5°	CTE32TN05	●	–2°	
0.5°	CTE32TP05	●	–1°	
1.5°	CTE32TP15	●	0°	
2.5°	CTE32TP25	●	1°	
3.5°	CTE32TP35	●	2°	
4.5°	CTE32TP45	●	3°	

Lead Angle (α°)	Order Number	Stock R	Inclination Angle (θ°)	Applicable Holder
–1.5°	CTE43TN15	●	–3°	MMTER -○○4
–0.5°	CTE43TN05	●	–2°	
0.5°	CTE43TP05	●	–1°	
1.5°	CTE43TP15	●	0°	
2.5°	CTE43TP25	●	1°	
3.5°	CTE43TP35	●	2°	
4.5°	CTE43TP45	●	3°	



Standard shim delivered with the holder.

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (SFM)
P	Mild Steel	≤180HB	MP9025	260 (195—330)
			VP10MF	490 (230—755)
			VP15TF	330 (195—460)
			VP20RT	260 (195—330)
	Carbon Steel Alloy Steel	180—280HB	MP9025	260 (195—330)
			VP10MF	460 (260—655)
			VP15TF	330 (195—460)
			VP20RT	260 (195—330)
M	Stainless Steel	≤200HB	MP9025	260 (130—395)
			VP15TF	260 (130—395)
			VP20RT	
K	Gray Cast Iron	Tensile Strength ≤350MPa	VP10MF	460 (260—655)
			VP15TF	295 (195—395)

	Work Material	Hardness	Grade	Cutting Speed (SFM)
S	Heat Resistant Alloy	–	MP9025	100 (65—130)
			VP10MF	150 (50—230)
			VP15TF	100 (65—130)
			VP20RT	
	Titanium Alloy	–	MP9025	150 (80—210)
			VP10MF	195 (130—260)
			VP15TF	150 (80—210)
			VP20RT	
H	Heat-Treated Alloy	45—55HRC	VP10MF	165 (100—230)
			VP15TF	130 (65—195)

● : USA Stock

HOW TO SELECT A SHIM ➤ P.24

MMT M-CLASS INSERTS WITH 3-D CHIP BREAKERS

INSERTS

Type	Order Number	Coated NEW MP9025	Coated VP15TF	Coated VP20RT	Pitch mm	Pitch thread/inch	IC	S	PDY	PDX	RE	Total Cutting Depth (mm)	Geometry
Partial Profile 60°	MMT16ERAG60-S	★	★	★	0.5—3.0	48—8	9.525	3.44	1.2	1.7	0.08	—	Partial form PNA 60°
	MMT16ERA60-S	●	●	●	0.5—1.5	48—16	9.525	3.44	0.8	0.9	0.06	—	
	MMT16ERG60-S	●	●	●	1.75—3.0	14—8	9.525	3.44	1.2	1.7	0.23	—	
Partial Profile 55°	MMT16ERAG55-S	★	★	★		48—8	9.525	3.44	1.2	1.7	0.07	—	Partial form PNA 55°
	MMT16ERA55-S	★	★	★		48—16	9.525	3.44	0.8	0.9	0.07	—	
	MMT16ERG55-S	★	★	★		14—8	9.525	3.44	1.2	1.7	0.23	—	
ISO Metric	MMT16ER100ISO-S	●	●	★	1.0		9.525	3.44	0.7	0.7	0.13	0.61	Full form PNA 60°
	MMT16ER125ISO-S	★	●	★	1.25		9.525	3.44	0.8	0.9	0.16	0.77	
	MMT16ER150ISO-S	●	●	★	1.5		9.525	3.44	0.8	1.0	0.20	0.92	
	MMT16ER175ISO-S	★	●	★	1.75		9.525	3.44	0.9	1.2	0.22	1.07	
	MMT16ER200ISO-S	●	●	★	2.0		9.525	3.44	1.0	1.3	0.26	1.23	
	MMT16ER250ISO-S	★	●	★	2.5		9.525	3.44	1.1	1.5	0.33	1.53	
	MMT16ER300ISO-S	★	●	★	3.0		9.525	3.44	1.2	1.6	0.40	1.84	
American UN	MMT16ER160UN-S	●	●	●		16	9.525	3.44	0.9	1.1	0.23	0.97	Full form PNA 60°
	MMT16ER140UN-S	●	●	●		14	9.525	3.44	1.0	1.2	0.26	1.11	
	MMT16ER120UN-S	●	●	●		12	9.525	3.44	1.1	1.4	0.30	1.30	
Whitworth for BSW, BSP	MMT16ER190W-S	★	★	★		19	9.525	3.44	0.8	1.0	0.18	0.86	Full form PNA 55°
	MMT16ER140W-S	★	★	★		14	9.525	3.44	1.0	1.2	0.25	1.16	
	MMT16ER110W-S	★	★	★		11	9.525	3.44	1.1	1.5	0.32	1.48	
BSPT	MMT16ER190BSPT-S	★	★	★		19	9.525	3.44	0.8	0.9	0.18	0.86	Full form PNA 55°
	MMT16ER140BSPT-S	★	★	★		14	9.525	3.44	1.0	1.2	0.25	1.16	
	MMT16ER110BSPT-S	★	★	★		11	9.525	3.44	1.1	1.5	0.32	1.48	

● = NEW

IDENTIFICATION

MMT 16 E R 100 ISO – S

- MMT — Designation
- 16 — Diameter of Inscribed Circle (mm): 11 = 6.35; 16 = 9.525
- E — Application: E External; I Internal
- R — Hand of Tool: R Right
- 100 — Pitch: 100 1.0mm; 125 1.25mm; 150 1.5mm; 175 1.75mm; 200 2.0mm; 250 2.5mm; 300 3.0mm
  - A: 0.5—1.5mm or 48—16 thread/inch
  - G: 1.75—3.0mm or 14—8 thread/inch
  - AG: 0.5—3.0mm or 48—8 thread/inch
- ISO — Threading Type: 60 Partial Profile 60°; 55 Partial Profile 55°; ISO ISO Metric; W Whitworth for BSW, BSP; BSPT BSPT; UN American UN
- S — M-class inserts with 3-D chip breakers

● : USA Stock ★ : Stocked in Japan
(5 inserts in one case)

MMT G-CLASS GROUND INSERTS

INSERTS

Type	Thread Tolerance	Order Number	Coated VP10MF	Coated VP15TF	Pitch mm	Pitch thread/inch	IC	S	PDY	PDX	RE	Total Cutting Depth (mm)	Geometry
Partial Profile 60°	—	MMT16ERAG60	★		0.5—3.0	48—8	9.525	3.44	1.2	1.7	0.08	—	Partial form PNA 60°
		MMT16ERA60	★	★	0.5—1.5	48—16	9.525	3.44	0.8	0.9	0.05	—	
		MMT16ERG60	★	★	1.75—3.0	14—8	9.525	3.44	1.2	1.7	0.27	—	
		MMT22ERN60	★		3.5—5.0	7—5	12.7	4.64	1.7	2.5	0.53	—	
Partial Profile 55°	—	MMT16ERAG55	★			48—8	9.525	3.44	1.2	1.7	0.07	—	Partial form PNA 55°
		MMT16ERA55	★	★		48—16	9.525	3.44	0.8	0.9	0.05	—	
		MMT16ERG55	★	★		14—8	9.525	3.44	1.2	1.7	0.21	—	
		MMT22ERN55	★			7—5	12.7	4.64	1.7	2.5	0.44	—	
ISO Metric	6g	MMT16ER050ISO	●		0.5		9.525	3.44	0.6	0.4	0.06	0.31	Full form
		MMT16ER075ISO	●		0.75		9.525	3.44	0.6	0.6	0.10	0.46	
		MMT16ER100ISO	●	★	1.0		9.525	3.44	0.7	0.7	0.16	0.61	
		MMT16ER125ISO	●	★	1.25		9.525	3.44	0.8	0.9	0.19	0.77	
		MMT16ER150ISO	●	★	1.5		9.525	3.44	0.8	1.0	0.23	0.92	
		MMT16ER175ISO	●	★	1.75		9.525	3.44	0.9	1.2	0.21	1.07	
		MMT16ER200ISO	●	★	2.0		9.525	3.44	1.0	1.3	0.31	1.23	
		MMT16ER250ISO	●	★	2.5		9.525	3.44	1.1	1.5	0.32	1.53	PNA 60°
		MMT16ER300ISO	●	★	3.0		9.525	3.44	1.2	1.6	0.46	1.84	
		MMT22ER350ISO	★		3.5		12.7	4.64	1.6	2.3	0.45	2.15	
		MMT22ER400ISO	★		4.0		12.7	4.64	1.6	2.3	0.52	2.45	
		MMT22ER450ISO	★		4.5		12.7	4.64	1.7	2.4	0.58	2.76	
		MMT22ER500ISO	★		5.0		12.7	4.64	1.7	2.5	0.63	3.07	

IDENTIFICATION

MMT 16 E R 050 ISO

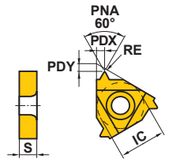
- MMT — Designation
- 16 — Diameter of Inscribed Circle (mm): 11 = 6.35; 16 = 9.525; 22 = 12.7
- E — Application: E External; I Internal
- R — Hand of Tool: R Right
- 050 — Pitch: 050 0.5mm; 075 0.75mm; 100 1.0mm; 125 1.25mm; 150 1.5mm; 175 1.75mm; 200 2.0mm; 250 2.5mm; 300 3.0mm; 350 3.5mm; 400 4.0mm; 450 4.5mm; 500 5.0mm
  - A: 0.5—1.5mm or 48—16 thread/inch
  - G: 1.75—3.0mm or 14—8 thread/inch
  - AG: 0.5—3.0mm or 48—8 thread/inch
  - N: 3.5—5.0mm or 7—5 thread/inch
- ISO — Threading Type: 60 Partial Profile 60°; 55 Partial Profile 55°; ISO ISO Metric; W Whitworth for BSW, BSP; BSPT BSPT; UN American UN; RD Round DIN 405; TR ISO Trapezoidal 30°; ACME American ACME; UNJ UNJ; APBU API Buttress Casing; APRD API Round Casing&Tubing; NPT NPT; NPTF NPTF

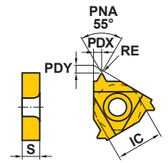
CUTTING DEPTH GUIDE ➤ P.26

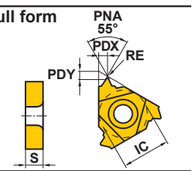
MMT G-CLASS GROUND INSERTS

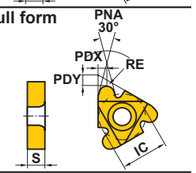
INSERTS

Type	Thread Tolerance	Order Number	Coated VP10MF	Coated VP15TF	Pitch mm	Pitch thread/inch	Dimensions (mm) IC	S	PDY	PDX	RE	Total Cutting Depth (mm)	Geometry
American UN	2A	MMT16ER320UN	●			32	9.525	3.44	0.6	0.6	0.09	0.49	Full form
		MMT16ER280UN	●			28	9.525	3.44	0.6	0.7	0.10	0.56	
		MMT16ER240UN	●			24	9.525	3.44	0.7	0.8	0.16	0.65	
		MMT16ER200UN	●			20	9.525	3.44	0.8	0.9	0.19	0.78	
		MMT16ER180UN	●			18	9.525	3.44	0.8	1.0	0.21	0.87	
		MMT16ER160UN	●	★		16	9.525	3.44	0.9	1.1	0.24	0.97	
		MMT16ER140UN	●	★		14	9.525	3.44	1.0	1.2	0.22	1.11	
		MMT16ER130UN	●			13	9.525	3.44	1.0	1.3	0.24	1.20	
		MMT16ER120UN	●	★		12	9.525	3.44	1.1	1.4	0.32	1.30	
		MMT16ER110UN	●			11	9.525	3.44	1.1	1.5	0.29	1.42	
		MMT16ER100UN	●			10	9.525	3.44	1.1	1.5	0.32	1.56	
		MMT16ER090UN	●			9	9.525	3.44	1.2	1.7	0.35	1.73	
		MMT16ER080UN	●			8	9.525	3.44	1.2	1.6	0.48	1.95	
		MMT22ER070UN	●			7	12.7	4.64	1.6	2.3	0.47	2.22	
		MMT22ER060UN	●			6	12.7	4.64	1.6	2.3	0.53	2.60	
		MMT22ER050UN	●			5	12.7	4.64	1.7	2.5	0.64	3.12	
Whitworth for BSW, BSP	Medium Class A	MMT16ER280W	★			28	9.525	3.44	0.6	0.7	0.09	0.58	Full form
		MMT16ER260W	★			26	9.525	3.44	0.7	0.8	0.10	0.63	
		MMT16ER200W	★			20	9.525	3.44	0.8	0.9	0.18	0.81	
		MMT16ER190W	★	★		19	9.525	3.44	0.8	1.0	0.19	0.86	
		MMT16ER180W	★			18	9.525	3.44	0.8	1.0	0.20	0.90	
		MMT16ER160W	★			16	9.525	3.44	0.9	1.1	0.23	1.02	
		MMT16ER140W	★	★		14	9.525	3.44	1.0	1.2	0.26	1.16	
		MMT16ER120W	★			12	9.525	3.44	1.1	1.4	0.30	1.36	
		MMT16ER110W	★	★		11	9.525	3.44	1.1	1.5	0.33	1.48	
		MMT16ER100W	★			10	9.525	3.44	1.1	1.5	0.37	1.63	
		MMT16ER090W	★			9	9.525	3.44	1.2	1.7	0.34	1.81	
		MMT16ER080W	★			8	9.525	3.44	1.2	1.5	0.39	2.03	
		MMT22ER070W	★			7	12.7	4.64	1.6	2.3	0.46	2.32	
		MMT22ER060W	★			6	12.7	4.64	1.6	2.3	0.53	2.71	
		MMT22ER050W	★			5	12.7	4.64	1.7	2.4	0.66	3.25	
BSPT	Standard BSPT	MMT16ER280BSPT	★			28	9.525	3.44	0.6	0.6	0.09	0.58	Full form
		MMT16ER190BSPT	★	★		19	9.525	3.44	0.8	0.9	0.14	0.86	
		MMT16ER140BSPT	★	★		14	9.525	3.44	1.0	1.2	0.26	1.16	
		MMT16ER110BSPT	★	★		11	9.525	3.44	1.1	1.5	0.33	1.48	
Round DIN 405	7h	MMT16ER100RD	★			10	9.525	3.44	1.1	1.2	0.60	1.27	Full form
		MMT16ER080RD	★			8	9.525	3.44	1.4	1.3	0.75	1.59	
		MMT16ER060RD	★			6	9.525	3.44	1.5	1.7	1.00	2.12	
		MMT22ER040RD	★			4	12.7	4.64	2.2	2.3	1.51	3.18	



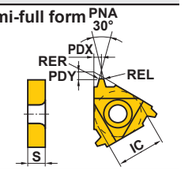


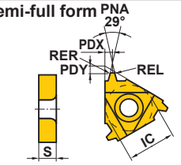


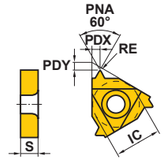


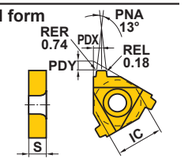
● : USA Stock ★ : Stocked in Japan
(5 inserts in one case)

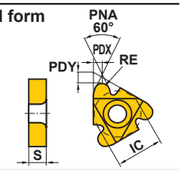
Type	Thread Tolerance	Order Number	Coated VP10MF	Pitch mm	Pitch thread/inch	Dimensions (mm) IC	S	PDY	PDX	RE RER/L	Total Cutting Depth (mm)	Geometry
ISO Trapezoidal 30°	7e	MMT16ER150TR	★	1.5		9.525	3.44	1.0	1.1	0.08	0.90	Semi-full form
		MMT16ER200TR	★	2.0		9.525	3.44	1.1	1.3	0.15	1.25	
		MMT16ER300TR	★	3.0		9.525	3.44	1.3	1.5	0.15	1.75	
		MMT22ER400TR	★	4.0		12.7	4.64	1.7	1.9	0.15	2.25	
		MMT22ER500TR	★	5.0		12.7	4.64	2.1	2.5	0.15	2.75	
American ACME	3G	MMT16ER120ACME	●		12	9.525	3.44	1.1	1.2	0.08	1.19	Semi-full form
		MMT16ER100ACME	●		10	9.525	3.44	1.3	1.4	0.08	1.52	
		MMT16ER080ACME	●		8	9.525	3.44	1.4	1.5	0.10	1.84	
		MMT22ER060ACME	●		6	12.7	4.64	1.8	2.1	0.10	2.37	
		MMT22ER050ACME	●		5	12.7	4.64	2.0	2.3	0.10	2.79	
UNJ	3A	MMT16ER320UNJ	●		32	9.525	3.44	0.6	0.7	0.13	0.46	Full form
		MMT16ER280UNJ	●		28	9.525	3.44	0.7	0.7	0.14	0.52	
		MMT16ER240UNJ	●		24	9.525	3.44	0.7	0.8	0.17	0.61	
		MMT16ER200UNJ	●		20	9.525	3.44	0.8	0.9	0.20	0.73	
		MMT16ER180UNJ	●		18	9.525	3.44	0.8	1.0	0.22	0.81	
		MMT16ER160UNJ	●		16	9.525	3.44	0.9	1.1	0.25	0.92	
		MMT16ER140UNJ	●		14	9.525	3.44	1.0	1.2	0.29	1.05	
		MMT16ER120UNJ	●		12	9.525	3.44	1.1	1.3	0.33	1.22	
		MMT16ER100UNJ	●		10	9.525	3.44	1.2	1.5	0.40	1.47	
		MMT16ER080UNJ	●		8	9.525	3.44	1.2	1.6	0.51	1.83	
API Buttress Casing	Standard API	MMT22ER050APBU	●		5	12.7	4.64	3.1	1.9	0.74/0.18	1.55	Full form
API Round Casing&Tubing	Standard API RD	MMT16ER100APRD	●		10	9.525	3.44	1.2	1.4	0.34	1.41	Full form
		MMT16ER080APRD	●		8	9.525	3.44	1.3	1.5	0.41	1.81	
American NPT	Standard NPT	MMT16ER270NPT	●		27	9.525	3.44	0.7	0.8	0.04	0.66	Full form
		MMT16ER180NPT	●		18	9.525	3.44	0.8	1.0	0.08	1.01	
		MMT16ER140NPT	●		14	9.525	3.44	0.9	1.2	0.09	1.33	
		MMT16ER115NPT	●		11.5	9.525	3.44	1.1	1.5	0.11	1.64	
		MMT16ER080NPT	●		8	9.525	3.44	1.3	1.8	0.14	2.42	
American NPTF	Class 2	MMT16ER270NPTF	★		27	9.525	3.44	0.7	0.8	0.04	0.64	Full form
		MMT16ER180NPTF	★		18	9.525	3.44	0.8	1.0	0.04	1.00	
		MMT16ER140NPTF	★		14	9.525	3.44	0.9	1.2	0.04	1.35	
		MMT16ER115NPTF	★		11.5	9.525	3.44	1.1	1.5	0.04	1.63	
		MMT16ER080NPTF	★		8	9.525	3.44	1.3	1.8	0.04	2.38	

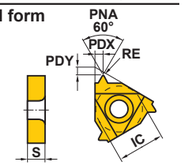


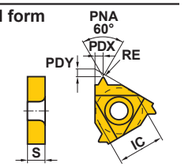










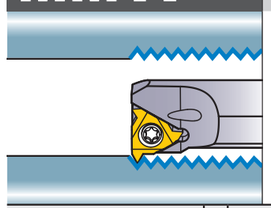


CUTTING DEPTH GUIDE ➢ P.26

MMTI TYPE BORING BARS

- Minimum cutting diameter .500".
- Various insert types.
- Precision class insert for precise thread forms.
- Available with a pressed breaker for chip control.
- Able to change lead angle by replacing the shim.

MMTI



Internal threading

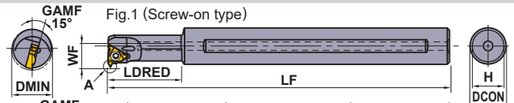


Fig.1 (Screw-on type)

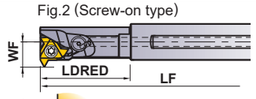


Fig.2 (Screw-on type)

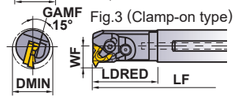


Fig.3 (Clamp-on type)

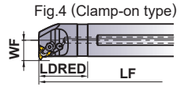
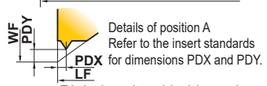


Fig.4 (Clamp-on type)



Details of position A
Refer to the insert standards for dimensions PDX and PDY.

Right hand tool holder only.

Order Number	Stock	Insert Number	Lead Angle	Dimensions (inch)						Clamp Bridge	Clamp Screw *	Stop Ring	Shim Screw *	Shim	Wrench	Fig.
	R			DCON	LF	LDRED	WF	H	DMIN							
MMTIR102-0.50-1.5-C	●	MMT11IR	1.5°	.625	5.000	1.000	.340	.586	**.500**	–	TS25	–	–	–	①TKY08F	1
MMTIR102-0.50-2.5-C	●	○○○○○	2.5°	.625	5.000	1.000	.340	.586	**.500**	–	TS25	–	–	–	①TKY08F	1
MMTIR102-0.60-1.5-C	●		1.5°	.625	6.000	1.250	.380	.586	**.600**	–	TS25	–	–	–	①TKY08F	1
MMTIR102-0.60-2.5-C	●		2.5°	.625	6.000	1.250	.380	.586	**.600**	–	TS25	–	–	–	①TKY08F	1
MMTIR103-0.75-1.5-C	●	MMT16IR	1.5°	.625	6.000	1.500	.480	.586	**.750**	–	CS350860T	–	–	–	①TKY15F	2
MMTIR103-0.75-2.5-C	●	○○○○○	2.5°	.625	6.000	1.500	.480	.586	**.750**	–	CS350860T	–	–	–	①TKY15F	2
MMTIR123-0.90-1.5-C	●		1.5°	.750	7.000	1.500	.510	.711	**.900**	SETK51	SETS51	CR4	HFC03006	CTI32TP15	①TKY15F ②HKY20R	3
MMTIR163-1.15-1.5-C	●		1.5°	1.000	10.000	2.500	.660	.937	**1.150**	SETK51	SETS51	CR4	HFC03006	CTI32TP15	①TKY15F ②HKY20R	3
MMTIR203-1.45-1.5-C	●		1.5°	1.250	10.000	2.000	.810	1.187	**1.450**	SETK51	SETS51	CR4	HFC03006	CTI32TP15	①TKY15F ②HKY20R	4
MMTIR124-0.95-1.5-C	●	MMT22IR	1.5°	.750	7.000	2.000	.610	.711	**.950**	–	TS43	–	–	–	①TKY15F	2
MMTIR124-0.95-2.5-C	●	○○○○○	2.5°	.750	7.000	2.000	.610	.711	**.950**	–	TS43	–	–	–	①TKY15F	2
MMTIR164-1.20-1.5-C	●		1.5°	1.000	8.000	1.500	.700	.937	**1.200**	SETK61	SETS61	CR5	HFC04008	CTI43TP15	①TKY20F ②HKY25R	4
MMTIR204-1.50-1.5-C	●		1.5°	1.250	10.000	2.000	.860	1.187	**1.500**	SETK61	SETS61	CR5	HFC04008	CTI43TP15	①TKY20F ②HKY25R	4
MMTIR244-1.75-1.5-C	●		1.5°	1.500	12.000	2.500	.980	1.437	**1.750**	SETK61	SETS61	CR5	HFC04008	CTI43TP15	①TKY20F ②HKY25R	4

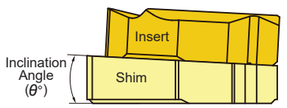
Note 1) Select and use an alternate shim from list below (sold separately), dependant on the lead angle.
- The screw-on type has no shim. The holder has an in-built lead angle. Please select a holder with the appropriate lead angle.
- The minimum cutting diameter (DMIN) indicates the prepared hole diameter, not the nominal thread diameter.

* Clamp Torque (lbf-in) : TS25=8.9, CS350860T=31, SETS51=31, TS43=31, SETS61=44, HFC03006=13, HFC04008=19

SHIM

Lead Angle (α°)	Order Number	Stock R	Inclination Angle (θ°)	Applicable Holder
–1.5°	**CTI32TN15**	●	–3°	MMTIR ○○3-○○○ -○○-C
–0.5°	**CTI32TN05**	●	–2°	
0.5°	**CTI32TP05**	●	–1°	
1.5°	**CTI32TP15**	●	0°	
2.5°	**CTI32TP25**	●	1°	
3.5°	**CTI32TP35**	●	2°	
4.5°	**CTI32TP45**	●	3°	

Lead Angle (α°)	Order Number	Stock R	Inclination Angle (θ°)	Applicable Holder
–1.5°	**CTI43TN15**	●	–3°	MMTIR ○○4-○○○ -○○-C
–0.5°	**CTI43TN05**	●	–2°	
0.5°	**CTI43TP05**	●	–1°	
1.5°	**CTI43TP15**	●	0°	
2.5°	**CTI43TP25**	●	1°	
3.5°	**CTI43TP35**	●	2°	
4.5°	**CTI43TP45**	●	3°	



Standard shim delivered with the holder.

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (SFM)
P	Mild Steel	≤180HB	**MP9025**	260 (195—330)
			VP10MF	490 (230—755)
			VP15TF	330 (195—460)
			VP20RT	260 (195—330)
	Carbon Steel Alloy Steel	180—280HB	**MP9025**	260 (195—330)
			VP10MF	460 (260—655)
			VP15TF	330 (195—460)
			VP20RT	260 (195—330)
M	Stainless Steel	≤200HB	**MP9025**	260 (130—395)
			VP15TF	260 (130—395)
			VP20RT	
K	Gray Cast Iron	Tensile Strength ≤350MPa	**VP10MF**	460 (260—655)
			VP15TF	295 (195—395)

	Work Material	Hardness	Grade	Cutting Speed (SFM)
S	Heat Resistant Alloy	–	**MP9025**	100 (65—130)
			VP10MF	150 (50—230)
			VP15TF	100 (65—130)
			VP20RT	
	Titanium Alloy	–	**MP9025**	150 (80—210)
			VP10MF	195 (130—260)
			VP15TF	150 (80—210)
			VP20RT	
H	Heat-Treated Alloy	45—55HRC	**VP10MF**	165 (100—230)
			VP15TF	130 (65—195)

● : USA Stock
(5 inserts in one case)

HOW TO SELECT A SHIM ➢ P.24

Memo

MMT M-CLASS INSERTS WITH 3-D CHIP BREAKERS

INSERTS

Type	Order Number	Coated: MP9025 (NEW)	Coated: VP15TF	Coated: VP20RT	Pitch: mm	Pitch: thread/inch	Dimensions (mm): IC	S	PDY	PDX	RE	Total Cutting Depth (mm)	Geometry
Partial Profile 60°	MMT11IRA60-S	●	★	●	0.5—1.5	48—16	6.35	3.04	0.8	0.9	0.03	—	Partial form
	MMT16IRAG60-S	★	★	★	0.5—3.0	48—8	9.525	3.44	1.2	1.7	0.05	—	
	MMT16IRA60-S	●	●	●	0.5—1.5	48—16	9.525	3.44	0.8	0.9	0.03	—	
	MMT16IRG60-S	●	●	●	1.75—3.0	14—8	9.525	3.44	1.2	1.7	0.11	—	
Partial Profile 55°	MMT11IRA55-S	★	★	★		48—16	6.35	3.04	0.8	0.9	0.07	—	Partial form
	MMT16IRAG55-S	★	★	★		48—8	9.525	3.44	1.2	1.7	0.07	—	
	MMT16IRA55-S	★	★	★		48—16	9.525	3.44	0.8	0.9	0.07	—	
	MMT16IRG55-S	★	★	★		14—8	9.525	3.44	1.2	1.7	0.21	—	
ISO Metric	MMT11IR100ISO-S	★	★	★	1.0		6.35	3.04	0.6	0.7	0.06	0.58	Full form
	MMT11IR125ISO-S	★	★	★	1.25		6.35	3.04	0.8	0.9	0.08	0.72	
	MMT11IR150ISO-S	★	★	★	1.5		6.35	3.04	0.8	1.0	0.10	0.87	
	MMT16IR100ISO-S	★	●	★	1.0		9.525	3.44	0.6	0.7	0.06	0.58	
	MMT16IR125ISO-S	★	●	★	1.25		9.525	3.44	0.8	0.9	0.08	0.72	
	MMT16IR150ISO-S	●	●	★	1.5		9.525	3.44	0.8	1.0	0.10	0.87	
	MMT16IR175ISO-S	★	●	★	1.75		9.525	3.44	0.9	1.2	0.11	1.01	
	MMT16IR200ISO-S	●	●	★	2.0		9.525	3.44	1.0	1.3	0.13	1.15	
	MMT16IR250ISO-S	★	●	★	2.5		9.525	3.44	1.1	1.5	0.17	1.44	
	MMT16IR300ISO-S	★	●	★	3.0		9.525	3.44	1.1	1.5	0.20	1.73	
American UN	MMT16IR160UN-S	●	●	●		16	9.525	3.44	0.9	1.1	0.11	0.92	Full form
	MMT16IR140UN-S	●	●	●		14	9.525	3.44	0.9	1.2	0.12	1.05	
	MMT16IR120UN-S	●	●	●		12	9.525	3.44	1.1	1.4	0.14	1.22	
Whitworth for BSW, BSP	MMT16IR190W-S	★	★	★		19	9.525	3.44	0.8	1.0	0.18	0.86	Full form
	MMT16IR140W-S	★	★	★		14	9.525	3.44	1.0	1.2	0.25	1.16	
	MMT16IR110W-S	★	★	★		11	9.525	3.44	1.1	1.5	0.32	1.48	
BSPT	MMT16IR190BSPT-S	★	★	★		19	9.525	3.44	0.8	0.9	0.18	0.86	Full form
	MMT16IR140BSPT-S	★	★	★		14	9.525	3.44	1.0	1.2	0.25	1.16	
	MMT16IR110BSPT-S	★	★	★		11	9.525	3.44	1.1	1.5	0.32	1.48	

● = NEW

IDENTIFICATION

MMT 16 I R 100 ISO – S

Designation	
MMT	

Diameter of Inscribed Circle (mm)	
11	6.35
16	9.525

Application	
E	External
I	Internal

Hand of Tool	
R	Right

Pitch			
100	1.0mm	A	0.5—1.5mm or 48—16 thread/inch
125	1.25mm		
150	1.5mm	G	1.75—3.0mm or 14—8 thread/inch
175	1.75mm		
200	2.0mm	AG	0.5—3.0mm or 48—8 thread/inch
250	2.5mm		
300	3.0mm		

Threading Type	
60	Partial Profile 60°
55	Partial Profile 55°
ISO	ISO Metric
W	Whitworth for BSW, BSP
BSPT	BSPT
UN	American UN

S	M-class inserts with 3-D chip breakers

● : USA Stock ★ : Stocked in Japan
(5 inserts in one case)

MMT G-CLASS GROUND INSERTS

INSERTS

Type	Thread Tolerance	Order Number	Coated: VP10MF	Coated: VP15TF	Pitch: mm	Pitch: thread/inch	Dimensions (mm): IC	S	PDY	PDX	RE	Total Cutting Depth (mm)	Geometry
Partial Profile 60°	—	MMT11IRA60	★	★	0.5—1.5	48—16	6.35	3.04	0.8	0.9	0.05	—	Partial form
		MMT16IRAG60	★		0.5—3.0	48—8	9.525	3.44	1.2	1.7	0.05	—	
		MMT16IRA60	★	★	0.5—1.5	48—16	9.525	3.44	0.8	0.9	0.05	—	
		MMT16IRG60	★	★	1.75—3.0	14—8	9.525	3.44	1.2	1.7	0.16	—	
		MMT22IRN60	★		3.5—5.0	7—5	12.7	4.64	1.7	2.5	0.30	—	
Partial Profile 55°	—	MMT11IRA55	★	★		48—16	6.35	3.04	0.8	0.9	0.05	—	Partial form
		MMT16IRAG55	★			48—8	9.525	3.44	1.2	1.7	0.07	—	
		MMT16IRA55	★	★		48—16	9.525	3.44	0.8	0.9	0.05	—	
		MMT16IRG55	★	★		14—8	9.525	3.44	1.2	1.7	0.21	—	
		MMT22IRN55	★			7—5	12.7	4.64	1.7	2.5	0.44	—	
ISO Metric	6H	MMT11IR050ISO	★		0.5		6.35	3.04	0.6	0.4	0.03	0.29	Full form
		MMT11IR075ISO	★		0.75		6.35	3.04	0.6	0.6	0.04	0.43	
		MMT11IR100ISO	★	★	1.0		6.35	3.04	0.6	0.7	0.10	0.58	
		MMT11IR125ISO	★	★	1.25		6.35	3.04	0.8	0.9	0.12	0.72	
		MMT11IR150ISO	★	★	1.5		6.35	3.04	0.8	1.0	0.14	0.87	
		MMT11IR175ISO	★		1.75		6.35	3.04	0.9	1.1	0.10	1.01	
		MMT11IR200ISO	★		2.0		6.35	3.04	0.9	1.1	0.18	1.15	
		MMT16IR050ISO	★		0.5		9.525	3.44	0.6	0.4	0.03	0.29	
		MMT16IR075ISO	★		0.75		9.525	3.44	0.6	0.6	0.04	0.43	
		MMT16IR100ISO	●	★	1.0		9.525	3.44	0.6	0.7	0.10	0.58	
		MMT16IR125ISO	●	★	1.25		9.525	3.44	0.8	0.9	0.12	0.72	
		MMT16IR150ISO	●	★	1.5		9.525	3.44	0.8	1.0	0.14	0.87	
		MMT16IR175ISO	●	★	1.75		9.525	3.44	0.9	1.2	0.10	1.01	
		MMT16IR200ISO	●	★	2.0		9.525	3.44	1.0	1.3	0.18	1.15	
		MMT16IR250ISO	●	★	2.5		9.525	3.44	1.1	1.5	0.15	1.44	
		MMT16IR300ISO	●	★	3.0		9.525	3.44	1.1	1.5	0.26	1.73	
		MMT22IR350ISO	★		3.5		12.7	4.64	1.6	2.3	0.22	2.02	
		MMT22IR400ISO	★		4.0		12.7	4.64	1.6	2.3	0.25	2.31	
		MMT22IR450ISO	★		4.5		12.7	4.64	1.6	2.3	0.28	2.60	
		MMT22IR500ISO	★		5.0		12.7	4.64	1.6	2.3	0.32	2.89	

IDENTIFICATION

MMT 16 I R 050 ISO

Designation	
MMT	

Diameter of Inscribed Circle (mm)	
11	6.35
16	9.525
22	12.7

Application	
E	External
I	Internal

Hand of Tool	
R	Right

Pitch			
050	0.5mm	A	0.5—1.5mm or 48—16 thread/inch
075	0.75mm		
100	1.0mm	G	1.75—3.0mm or 14—8 thread/inch
125	1.25mm		
150	1.5mm	AG	0.5—3.0mm or 48—8 thread/inch
175	1.75mm		
200	2.0mm	N	3.5—5.0mm or 7—5 thread/inch
250	2.5mm		
300	3.0mm		
350	3.5mm		
400	4.0mm		
450	4.5mm		
500	5.0mm		

Threading Type	
60	Partial Profile 60°
55	Partial Profile 55°
ISO	ISO Metric
W	Whitworth for BSW, BSP
BSPT	BSPT
UN	American UN
RD	Round DIN 405
TR	ISO Trapezoidal 30°
ACME	American ACME
UNJ	UNJ
APBU	API Buttress Casing
APRD	API Round Casing&Tubing
NPT	NPT
NPTF	NPTF

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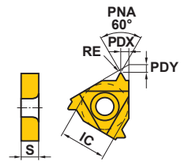
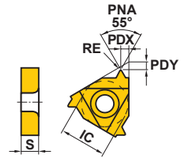
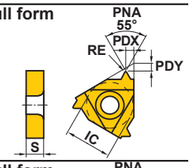
MMT G-CLASS GROUND INSERTS

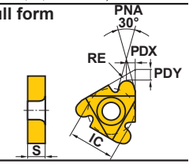
INSERTS

Type	Thread Tolerance	Order Number	Coated VP10MF	Coated VP15TF	Pitch mm	Pitch thread/inch	IC	S	PDY	PDX	RE	Total Cutting Depth (mm)	Geometry
American UN	2B	MMT11IR320UN	●			32	6.35	3.04	0.6	0.6	0.04	0.46	Full form
		MMT11IR280UN	●			28	6.35	3.04	0.6	0.7	0.05	0.52	
		MMT11IR240UN	●			24	6.35	3.04	0.7	0.8	0.09	0.61	
		MMT11IR200UN	●			20	6.35	3.04	0.8	0.9	0.11	0.73	
		MMT11IR180UN	●			18	6.35	3.04	0.8	1.0	0.12	0.81	
		MMT11IR160UN	●			16	6.35	3.04	0.9	1.1	0.14	0.92	
		MMT11IR140UN	●			14	6.35	3.04	0.9	1.1	0.11	1.05	
		MMT16IR320UN	●			32	9.525	3.44	0.6	0.6	0.04	0.46	
		MMT16IR280UN	●			28	9.525	3.44	0.6	0.7	0.05	0.52	
		MMT16IR240UN	●			24	9.525	3.44	0.7	0.8	0.09	0.61	
		MMT16IR200UN	●			20	9.525	3.44	0.8	0.9	0.11	0.73	
		MMT16IR180UN	●			18	9.525	3.44	0.8	1.0	0.12	0.81	
		MMT16IR160UN	●	★		16	9.525	3.44	0.9	1.1	0.14	0.92	
		MMT16IR140UN	●	★		14	9.525	3.44	0.9	1.2	0.11	1.05	
		MMT16IR130UN	●			13	9.525	3.44	1.0	1.3	0.10	1.13	
		MMT16IR120UN	●	★		12	9.525	3.44	1.1	1.4	0.18	1.22	
		MMT16IR110UN	●			11	9.525	3.44	1.1	1.5	0.13	1.33	
		MMT16IR100UN	●			10	9.525	3.44	1.1	1.5	0.15	1.47	
		MMT16IR090UN	●			9	9.525	3.44	1.2	1.7	0.17	1.63	
		MMT16IR080UN	●			8	9.525	3.44	1.1	1.5	0.27	1.83	
		MMT22IR070UN	●			7	12.7	4.64	1.6	2.3	0.23	2.09	
		MMT22IR060UN	●			6	12.7	4.64	1.6	2.3	0.26	2.44	
		MMT22IR050UN	●			5	12.7	4.64	1.6	2.3	0.32	2.93	
Whitworth for BSW, BSP	Medium Class A	MMT11IR190W	★			19	6.35	3.04	0.8	1.0	0.19	0.86	Full form
		MMT11IR140W	★			14	6.35	3.04	0.9	1.1	0.26	1.16	
		MMT16IR280W	★			28	9.525	3.44	0.6	0.7	0.09	0.58	
		MMT16IR260W	★			26	9.525	3.44	0.7	0.8	0.10	0.63	
		MMT16IR200W	★			20	9.525	3.44	0.8	0.9	0.18	0.81	
		MMT16IR190W	★	★		19	9.525	3.44	0.8	1.0	0.19	0.86	
		MMT16IR180W	★			18	9.525	3.44	0.8	1.0	0.20	0.90	
		MMT16IR160W	★			16	9.525	3.44	0.9	1.1	0.23	1.02	
		MMT16IR140W	★	★		14	9.525	3.44	1.0	1.2	0.26	1.16	
		MMT16IR120W	★			12	9.525	3.44	1.1	1.4	0.30	1.36	
		MMT16IR110W	★	★		11	9.525	3.44	1.1	1.5	0.33	1.48	
		MMT16IR100W	★			10	9.525	3.44	1.1	1.5	0.37	1.63	
		MMT16IR090W	★			9	9.525	3.44	1.2	1.7	0.34	1.81	
		MMT16IR080W	★			8	9.525	3.44	1.2	1.5	0.39	2.03	
		MMT22IR070W	★			7	12.7	4.64	1.6	2.3	0.46	2.32	
		MMT22IR060W	★			6	12.7	4.64	1.6	2.3	0.53	2.71	
		MMT22IR050W	★			5	12.7	4.64	1.7	2.4	0.66	3.25	
BSPT	Standard BSPT	MMT11IR190BSPT	★			19	6.35	3.04	0.8	0.9	0.14	0.86	Full form
		MMT11IR140BSPT	★			14	6.35	3.04	0.9	1.0	0.26	1.16	
		MMT16IR190BSPT	★	★		19	9.525	3.44	0.8	0.9	0.14	0.86	
		MMT16IR140BSPT	★	★		14	9.525	3.44	1.0	1.2	0.26	1.16	
		MMT16IR110BSPT	★	★		11	9.525	3.44	1.1	1.5	0.33	1.48	
Round DIN 405	7H	MMT16IR100RD	★			10	9.525	3.44	1.1	1.2	0.55	1.27	Full form
		MMT16IR080RD	★			8	9.525	3.44	1.4	1.4	0.70	1.59	
		MMT16IR060RD	★			6	9.525	3.44	1.4	1.5	0.93	2.12	
		MMT22IR040RD	★			4	12.7	4.64	2.2	2.3	1.40	3.18	



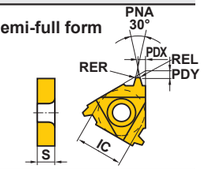


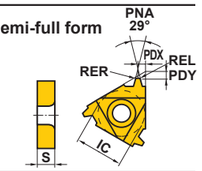


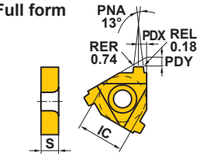


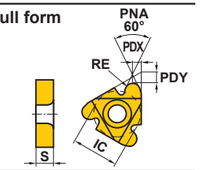
● : USA Stock ★ : Stocked in Japan
(5 inserts in one case)

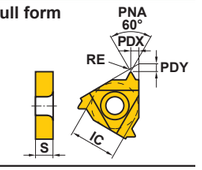
Type	Thread Tolerance	Order Number	Coated VP10MF	Pitch mm	Pitch thread/inch	IC	S	PDY	PDX	RE RER/L	Total Cutting Depth (mm)	Geometry
ISO Trapezoidal 30°	7H	MMT16IR150TR	★	1.5		9.525	3.44	1.0	1.1	0.08	0.90	Semi-full form
		MMT16IR200TR	★	2.0		9.525	3.44	1.1	1.3	0.15	1.25	
		MMT16IR300TR	★	3.0		9.525	3.44	1.3	1.5	0.15	1.75	
		MMT22IR400TR	★	4.0		12.7	4.64	1.7	1.9	0.15	2.25	
		MMT22IR500TR	★	5.0		12.7	4.64	2.1	2.5	0.15	2.75	
American ACME	3G	MMT16IR120ACME	●		12	9.525	3.44	1.2	1.3	0.05	1.19	Semi-full form
		MMT16IR100ACME	●		10	9.525	3.44	1.2	1.3	0.08	1.52	
		MMT16IR080ACME	●		8	9.525	3.44	1.4	1.5	0.10	1.84	
		MMT22IR060ACME	●		6	12.7	4.64	1.8	2.1	0.10	2.37	
		MMT22IR050ACME	●		5	12.7	4.64	2.0	2.3	0.10	2.79	
UNJ		When machining an internal UNJ thread, cut an internal hole with the appropriate diameter. Then machine with American UN 60°. In this case, a full form type insert cannot be used.										
API Buttress Casing	Standard API	MMT22IR050APBU	★		5	12.7	4.64	2.8	1.9	0.74/0.18	1.55	Full form
API Round Casing&Tubing	Standard API RD	MMT16IR100APRD	●		10	9.525	3.44	1.2	1.4	0.34	1.41	Full form
		MMT16IR080APRD	●		8	9.525	3.44	1.3	1.5	0.41	1.81	
American NPT	Standard NPT	MMT16IR270NPT	●		27	9.525	3.44	0.7	0.8	0.04	0.66	Full form
		MMT16IR180NPT	●		18	9.525	3.44	0.8	1.0	0.08	1.01	
		MMT16IR140NPT	●		14	9.525	3.44	0.9	1.2	0.09	1.33	
		MMT16IR115NPT	●		11.5	9.525	3.44	1.1	1.5	0.11	1.64	
		MMT16IR080NPT	●		8	9.525	3.44	1.3	1.8	0.14	2.42	
American NPTF	Class 2	MMT16IR140NPTF	★		14	9.525	3.44	0.9	1.2	0.04	1.35	Full form
		MMT16IR115NPTF	★		11.5	9.525	3.44	1.1	1.5	0.04	1.63	
		MMT16IR080NPTF	★		8	9.525	3.44	1.3	1.8	0.04	2.38	

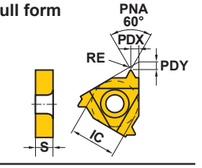












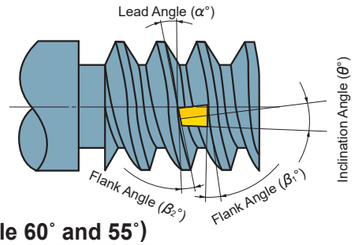
CUTTING DEPTH GUIDE ➤ P.29

CUTTING CONDITIONS OF MMT SERIES

SELECTING A SHIM FOR THE MMT SERIES

■ FLANK ANGLE AND LEAD ANGLE

Lead angle (α) depends on a combination of thread diameter and pitch. Select a shim so that the lead angle of the thread can coincide with the flank angles of the thread and insert (β_1, β_2). No need to change a shim for general threading with an MMT holder. When threading with a small diameter or large pitch, change the shim depending on the lead angle, referring to the table and graph below. When threading left hand threads, change to a shim with a negative inclination angle.



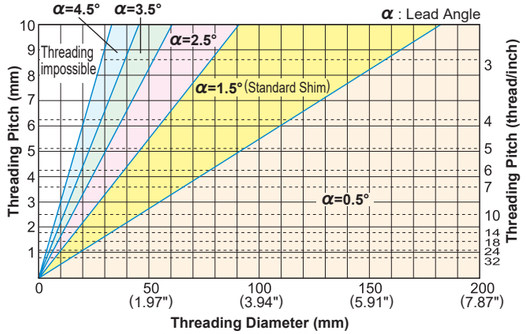
■ SHIM REFERENCE TABLE (THREADING DIAMETER) (Thread angle 60˚ and 55˚)

Pitch (mm) \ Lead Angle	Right Hand Thread (mm)						Left Hand Thread (mm) *		
	Threading impossible	4.5°	3.5°	2.5°	1.5°	0.5°	Threading impossible	−1.5°	−0.5°
0.5	≤ϕ1.7	ϕ1.7 − ϕ2.3	ϕ2.3 − ϕ3.0	ϕ3.0 − ϕ4.6	ϕ4.6 − ϕ9.1	≥ϕ9.1	≤ϕ3.6	ϕ3.6 − ϕ9.1	≥ϕ9.1
0.75	≤ϕ2.5	ϕ2.5 − ϕ3.4	ϕ3.4 − ϕ4.6	ϕ4.6 − ϕ6.8	ϕ6.8 − ϕ13.7	≥ϕ13.7	≤ϕ5.5	ϕ5.5 − ϕ13.7	≥ϕ13.7
1	≤ϕ3.3	ϕ3.3 − ϕ4.6	ϕ4.6 − ϕ6.1	ϕ6.1 − ϕ9.1	ϕ9.1 − ϕ18.2	≥ϕ18.2	≤ϕ7.3	ϕ7.3 − ϕ18.2	≥ϕ18.2
1.25	≤ϕ4.1	ϕ4.1 − ϕ5.7	ϕ5.7 − ϕ7.6	ϕ7.6 − ϕ11.4	ϕ11.4 − ϕ22.8	≥ϕ22.8	≤ϕ9.1	ϕ9.1 − ϕ22.8	≥ϕ22.8
1.5	≤ϕ5.0	ϕ5.0 − ϕ6.8	ϕ6.8 − ϕ9.1	ϕ9.1 − ϕ13.7	ϕ13.7 − ϕ27.4	≥ϕ27.4	≤ϕ10.9	ϕ10.9 − ϕ27.4	≥ϕ27.4
1.75	≤ϕ5.8	ϕ5.8 − ϕ8.0	ϕ8.0 − ϕ10.6	ϕ10.6 − ϕ16.0	ϕ16.0 − ϕ31.9	≥ϕ31.9	≤ϕ12.8	ϕ12.8 − ϕ31.9	≥ϕ31.9
2	≤ϕ6.6	ϕ6.6 − ϕ9.1	ϕ9.1 − ϕ12.1	ϕ12.1 − ϕ18.2	ϕ18.2 − ϕ36.5	≥ϕ36.5	≤ϕ14.6	ϕ14.6 − ϕ36.5	≥ϕ36.5
2.5	≤ϕ8.3	ϕ8.3 − ϕ11.4	ϕ11.4 − ϕ15.2	ϕ15.2 − ϕ22.8	ϕ22.8 − ϕ45.6	≥ϕ45.6	≤ϕ18.2	ϕ18.2 − ϕ45.6	≥ϕ45.6
3	≤ϕ9.9	ϕ9.9 − ϕ13.7	ϕ13.7 − ϕ18.2	ϕ18.2 − ϕ27.3	ϕ27.3 − ϕ54.7	≥ϕ54.7	≤ϕ21.9	ϕ21.9 − ϕ54.7	≥ϕ54.7
3.5	≤ϕ11.6	ϕ11.6 − ϕ15.9	ϕ15.9 − ϕ21.3	ϕ21.3 − ϕ31.9	ϕ31.9 − ϕ63.8	≥ϕ63.8	≤ϕ25.5	ϕ25.5 − ϕ63.8	≥ϕ63.8
4	≤ϕ13.2	ϕ13.2 − ϕ18.2	ϕ18.2 − ϕ24.3	ϕ24.3 − ϕ36.5	ϕ36.5 − ϕ72.9	≥ϕ72.9	≤ϕ29.2	ϕ29.2 − ϕ72.9	≥ϕ72.9
4.5	≤ϕ14.9	ϕ14.9 − ϕ20.5	ϕ20.5 − ϕ27.3	ϕ27.3 − ϕ41.0	ϕ41.0 − ϕ82.1	≥ϕ82.1	≤ϕ32.8	ϕ32.8 − ϕ82.1	≥ϕ82.1
5	≤ϕ16.5	ϕ16.5 − ϕ22.8	ϕ22.8 − ϕ30.4	ϕ30.4 − ϕ45.6	ϕ45.6 − ϕ91.2	≥ϕ91.2	≤ϕ36.5	ϕ36.5 − ϕ91.2	≥ϕ91.2

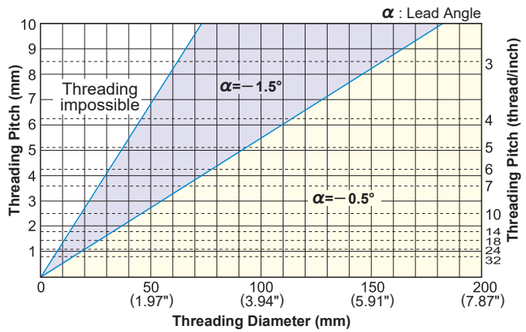
* Back turning in the case of left hand threads.

■ SHIM REFERENCE GRAPH (Thread angle 60˚ and 55˚)

Right Hand Thread



Left Hand Thread



Note 1) When a thread lead angle ≤ the tool flank angle, change the shim to prevent side interference with the insert.
(Refer to the table on page G013 for the calculation of thread lead angle and tool flank angle.)

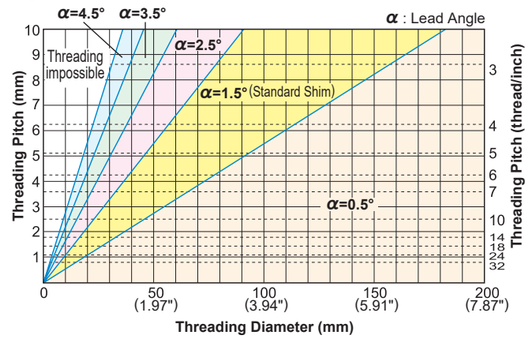
■ SHIM REFERENCE TABLE (THREADING DIAMETER) (Thread angle 30˚ and 29˚)

Pitch (mm) \ Lead Angle	Right Hand Thread (mm)						Left Hand Thread (mm) *		
	Threading impossible	4.5°	3.5°	2.5°	1.5°	0.5°	Threading impossible	−1.5°	−0.5°
0.5	≤ϕ1.8	ϕ1.8 − ϕ2.3	ϕ2.3 − ϕ3.0	ϕ3.0 − ϕ4.6	ϕ4.6 − ϕ9.1	≥ϕ9.1	≤ϕ4.6	ϕ4.6 − ϕ9.1	≥ϕ9.1
0.75	≤ϕ2.7	ϕ2.7 − ϕ3.4	ϕ3.4 − ϕ4.6	ϕ4.6 − ϕ6.8	ϕ6.8 − ϕ13.7	≥ϕ13.7	≤ϕ6.8	ϕ6.8 − ϕ13.7	≥ϕ13.7
1	≤ϕ3.6	ϕ3.6 − ϕ4.6	ϕ4.6 − ϕ6.1	ϕ6.1 − ϕ9.1	ϕ9.1 − ϕ18.2	≥ϕ18.2	≤ϕ9.1	ϕ9.1 − ϕ18.2	≥ϕ18.2
1.25	≤ϕ4.5	ϕ4.5 − ϕ5.7	ϕ5.7 − ϕ7.6	ϕ7.6 − ϕ11.4	ϕ11.4 − ϕ22.8	≥ϕ22.8	≤ϕ11.4	ϕ11.4 − ϕ22.8	≥ϕ22.8
1.5	≤ϕ5.5	ϕ5.5 − ϕ6.8	ϕ6.8 − ϕ9.1	ϕ9.1 − ϕ13.7	ϕ13.7 − ϕ27.4	≥ϕ27.4	≤ϕ13.7	ϕ13.7 − ϕ27.4	≥ϕ27.4
1.75	≤ϕ6.4	ϕ6.4 − ϕ8.0	ϕ8.0 − ϕ10.6	ϕ10.6 − ϕ16.0	ϕ16.0 − ϕ31.9	≥ϕ31.9	≤ϕ16.0	ϕ16.0 − ϕ31.9	≥ϕ31.9
2	≤ϕ7.3	ϕ7.3 − ϕ9.1	ϕ9.1 − ϕ12.1	ϕ12.1 − ϕ18.2	ϕ18.2 − ϕ36.5	≥ϕ36.5	≤ϕ18.2	ϕ18.2 − ϕ36.5	≥ϕ36.5
2.5	≤ϕ9.1	ϕ9.1 − ϕ11.4	ϕ11.4 − ϕ15.2	ϕ15.2 − ϕ22.8	ϕ22.8 − ϕ45.6	≥ϕ45.6	≤ϕ22.8	ϕ22.8 − ϕ45.6	≥ϕ45.6
3	≤ϕ10.9	ϕ10.9 − ϕ13.7	ϕ13.7 − ϕ18.2	ϕ18.2 − ϕ27.3	ϕ27.3 − ϕ54.7	≥ϕ54.7	≤ϕ27.3	ϕ27.3 − ϕ54.7	≥ϕ54.7
3.5	≤ϕ12.7	ϕ12.7 − ϕ15.9	ϕ15.9 − ϕ21.3	ϕ21.3 − ϕ31.9	ϕ31.9 − ϕ63.8	≥ϕ63.8	≤ϕ31.9	ϕ31.9 − ϕ63.8	≥ϕ63.8
4	≤ϕ14.6	ϕ14.6 − ϕ18.2	ϕ18.2 − ϕ24.3	ϕ24.3 − ϕ36.5	ϕ36.5 − ϕ72.9	≥ϕ72.9	≤ϕ36.5	ϕ36.5 − ϕ72.9	≥ϕ72.9
4.5	≤ϕ16.4	ϕ16.4 − ϕ20.5	ϕ20.5 − ϕ27.3	ϕ27.3 − ϕ41.0	ϕ41.0 − ϕ82.1	≥ϕ82.1	≤ϕ41.0	ϕ41.0 − ϕ82.1	≥ϕ82.1
5	≤ϕ18.2	ϕ18.2 − ϕ22.8	ϕ22.8 − ϕ30.4	ϕ30.4 − ϕ45.6	ϕ45.6 − ϕ91.2	≥ϕ91.2	≤ϕ45.6	ϕ45.6 − ϕ91.2	≥ϕ91.2

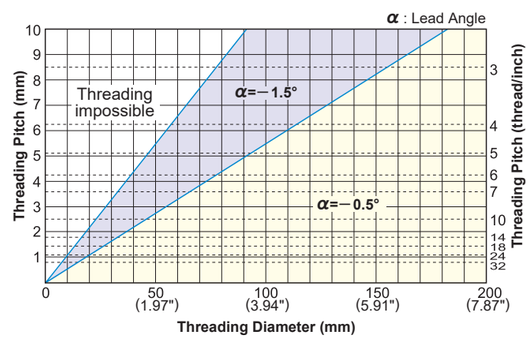
* Back turning in the case of left hand threads.

■ SHIM REFERENCE GRAPH (Thread angle 30˚ and 29˚)

Right Hand Thread



Left Hand Thread



Note 1) When a thread lead angle ≤ the tool flank angle, change the shim to prevent side interference with the insert.
(Refer to the table below for the calculation of thread lead angle and tool flank angle.)

■ Selection table

Lead Angle	Opening angle 60°/55° Right Hand Thread		Opening angle 60°/55° * Left Hand Thread		Opening angle 30°/29° Right Hand Thread		Opening angle 30°/29° * Left Hand Thread	
0	P05	P05	N05	N05	P05	P05	N05	N05
0.5	P05	P05	N05	N05	P05	P05	N05	N05
1	P15	P15	N15	N15	P15	P15	N15	N15
1.5	P15	P15	N15	N15	P15	P15	N15	N15
2	P25	P25	N15	N15	P25	P25	Not Available	Not Available
2.5	P25	P25	Not Available	Not Available	P25	P25	Not Available	Not Available
3	P35	P35	Not Available	Not Available	P35	P35	Not Available	Not Available
3.5	P35	P35	Not Available	Not Available	P35	P35	Not Available	Not Available
4	P45	P45	Not Available	Not Available	P45	P45	Not Available	Not Available
4.5	P45	P45	Not Available	Not Available	P45	P45	Not Available	Not Available
5	P45	P45	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available
5.5	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available

* Back turning in the case of left hand threads.

When replacing a shim, check if the difference between the thread lead angle and shim inclination angle is within:
2.5°—0.5° where thread helix angle is 60° (55°)
2°—1° where thread helix angle is 30° (29°)
∗ Inclination angle of a standard shim is 0°.
∗ The holder has a 1.5° lead angle.

■ CALCULATION OF THREAD LEAD ANGLE

$$\tan\alpha = \frac{l}{\pi d} = \frac{nP}{\pi d}$$

α: Lead angle
l : Lead
n : Number of threads
P : Pitch
d : Effective diameter of thread

■ EXAMPLE OF SELECTING A SHIM

- When the thread lead angle is 2.2°
  ①In the case when the thread helix angle is 60°
  (2.2° lead angle) − (2.5°−0.5°) = -0.3°−1.7° shim inclination angle is appropriate.
  Threading with a standard shim (0° inclination angle) is possible. But, replacing with a shim with a 1° inclination angle is recommended, refer to Standard Shim List on pages G021 and G026.
  ②In the case when the thread helix angle is 30°
  (2.2° lead angle) − (2°−1°) = -0.2°−1.2° shim inclination angle is appropriate.
  Replacing with a shim with a 1° inclination angle is recommended, referring to Standard Shim List on pages G021 and G026.

■ RELIEF ANGLE OF AN INSERT SET ON A HOLDER

Thread Helix Angle	Internal Relief Angle	External Relief Angle
60°	8.8°	5.8°
55°	7.9°	5.2°
30°	4.1°	2.7°
29°	4°	2.6°

- Relief angles (β_2, β_1) of an insert become small when the thread helix angle of a trapezoidal, round, or other thread is small. Take care when selecting a shim.

MMT STANDARD OF DEPTH OF CUT EXTERNAL (RADIAL INFEED)

■ISO Metric

(mm)

Pitch (mm)	Total Cutting Depth	Number of Passes														Insert Type	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	G-class ground inserts	M-class inserts with 3-D chip breakers
0.5	0.31	0.10	0.08	0.07	0.06											MMT16ER050ISO	–
0.75	0.46	0.16	0.14	0.10	0.06											MMT16ER075ISO	–
1.0	0.61	0.18	0.15	0.12	0.10	0.06										MMT16ER100ISO	MMT16ER100ISO-S
1.25	0.77	0.19	0.17	0.14	0.11	0.10	0.06									MMT16ER125ISO	MMT16ER125ISO-S
1.5	0.92	0.22	0.21	0.17	0.14	0.12	0.06									MMT16ER150ISO	MMT16ER150ISO-S
1.75	1.07	0.22	0.21	0.16	0.13	0.11	0.09	0.09	0.06							MMT16ER175ISO	MMT16ER175ISO-S
2.0	1.23	0.24	0.23	0.17	0.16	0.14	0.12	0.11	0.06							MMT16ER200ISO	MMT16ER200ISO-S
2.5	1.53	0.26	0.23	0.19	0.17	0.15	0.13	0.12	0.11	0.11	0.06					MMT16ER250ISO	MMT16ER250ISO-S
3.0	1.84	0.27	0.25	0.20	0.18	0.16	0.14	0.13	0.12	0.12	0.11	0.10	0.06			MMT16ER300ISO	MMT16ER300ISO-S
3.5	2.15	0.33	0.30	0.24	0.21	0.18	0.17	0.15	0.14	0.14	0.12	0.11	0.06			MMT22ER350ISO	–
4.0	2.45	0.34	0.31	0.24	0.22	0.19	0.17	0.16	0.14	0.14	0.13	0.12	0.12	0.11	0.06	MMT22ER400ISO	–
4.5	2.76	0.38	0.34	0.28	0.24	0.22	0.20	0.18	0.16	0.16	0.15	0.14	0.13	0.12	0.06	MMT22ER450ISO	–
5.0	3.07	0.42	0.38	0.32	0.27	0.24	0.22	0.20	0.18	0.18	0.17	0.16	0.15	0.12	0.06	MMT22ER500ISO	–

■American UN

(inch)

Pitch (thread/ inch)	Total Cutting Depth	Number of Passes														Insert Type	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	G-class ground inserts	M-class inserts with 3-D chip breakers
32	.019	.007	.006	.004	.002											MMT16ER320UN	–
28	.022	.007	.006	.004	.003	.002										MMT16ER280UN	–
24	.026	.007	.006	.006	.005	.002										MMT16ER240UN	–
20	.031	.008	.007	.005	.005	.004	.002									MMT16ER200UN	–
18	.034	.009	.008	.006	.005	.004	.002									MMT16ER180UN	–
16	.038	.009	.008	.006	.005	.004	.004	.002								MMT16ER160UN	MMT16ER160UN-S
14	.044	.009	.008	.006	.005	.005	.005	.004	.002							MMT16ER140UN	MMT16ER140UN-S
13	.047	.010	.009	.007	.006	.005	.005	.003	.002							MMT16ER130UN	–
12	.051	.011	.009	.007	.006	.006	.005	.005	.002							MMT16ER120UN	MMT16ER120UN-S
11	.056	.011	.009	.007	.006	.006	.006	.005	.004	.002						MMT16ER110UN	–
10	.061	.011	.009	.007	.006	.006	.006	.005	.005	.004	.002					MMT16ER100UN	–
9	.068	.013	.011	.009	.007	.006	.006	.005	.005	.004	.002					MMT16ER090UN	–
8	.077	.014	.012	.009	.007	.006	.006	.006	.006	.005	.004	.002				MMT16ER080UN	–
7	.087	.015	.013	.011	.009	.008	.007	.006	.006	.005	.005	.002				MMT22ER070UN	–
6	.102	.017	.014	.011	.010	.008	.007	.007	.006	.006	.005	.005	.004	.002		MMT22ER060UN	–
5	.123	.017	.015	.012	.011	.009	.009	.008	.007	.007	.007	.007	.006	.006	.002	MMT22ER050UN	–

■Whitworth for BSW, BSP

(inch)

Pitch (thread/ inch)	Total Cutting Depth	Number of Passes														Insert Type	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	G-class ground inserts	M-class inserts with 3-D chip breakers
28	.023	.007	.006	.004	.004	.002										MMT16ER280W	–
26	.025	.007	.006	.005	.005	.002										MMT16ER260W	–
20	.032	.008	.007	.006	.005	.004	.002									MMT16ER200W	–
19	.034	.008	.007	.006	.006	.005	.002									MMT16ER190W	MMT16ER190W-S
18	.035	.010	.007	.006	.005	.005	.002									MMT16ER180W	–
16	.040	.008	.007	.006	.005	.004	.004	.004	.002							MMT16ER160W	–
14	.046	.009	.008	.007	.006	.005	.005	.004	.002							MMT16ER140W	MMT16ER140W-S
12	.054	.011	.010	.008	.006	.006	.006	.005	.002							MMT16ER120W	–
11	.058	.011	.009	.008	.007	.006	.006	.005	.005	.002						MMT16ER110W	MMT16ER110W-S
10	.064	.011	.010	.008	.007	.006	.006	.005	.005	.004	.002					MMT16ER100W	–
9	.071	.011	.010	.008	.007	.006	.006	.006	.005	.005	.005	.002				MMT16ER090W	–
8	.080	.012	.011	.009	.007	.007	.006	.006	.006	.005	.005	.004	.002			MMT16ER080W	–
7	.091	.013	.013	.010	.009	.008	.007	.007	.006	.006	.006	.004	.002			MMT22ER070W	–
6	.107	.014	.013	.011	.009	.008	.008	.007	.007	.006	.006	.006	.005	.005	.002	MMT22ER060W	–
5	.128	.017	.016	.014	.011	.010	.009	.009	.008	.007	.007	.007	.006	.005	.002	MMT22ER050W	–

Note 1) · Set the finishing allowance on a diameter at approx. .004 inch when using a full form insert.
· Please note the cutting depth and the number of passes when a nose radius of a partial or semi-full form insert or of an internal threading insert is small to prevent damage to the insert nose.
· Please set the cutting depth sufficiently deep enough on materials such as hardened steel or austenitic stainless steel to help prevent premature wear and chipping caused by the outer layer of the material.

■BSPT

(inch)

Pitch (thread/ inch)	Total Cutting Depth	Number of Passes												Insert Type	
		1	2	3	4	5	6	7	8	9				G-class ground inserts	M-class inserts with 3-D chip breakers
28	.023	.007	.006	.004	.004	.002								MMT16ER280BSPT	–
19	.034	.009	.007	.006	.005	.005	.002							MMT16ER190BSPT	MMT16ER190BSPT-S
14	.046	.009	.008	.007	.006	.005	.005	.004	.002					MMT16ER140BSPT	MMT16ER140BSPT-S
11	.058	.010	.009	.008	.007	.006	.006	.005	.005	.002				MMT16ER110BSPT	MMT16ER110BSPT-S

■Round DIN 405

(inch)

Pitch (thread/ inch)	Total Cutting Depth	Number of Passes														Insert Type
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	G-class ground inserts
10	.050	.009	.008	.008	.007	.006	.005	.005	.002							MMT16ER100RD
8	.063	.009	.008	.008	.007	.007	.006	.006	.005	.005	.002					MMT16ER080RD
6	.083	.010	.010	.009	.009	.008	.007	.007	.006	.006	.005	.004	.002			MMT16ER060RD
4	.125	.013	.013	.013	.012	.011	.010	.009	.009	.008	.007	.007	.006	.005	.002	MMT22ER040RD

■ISO Trapezoidal 30°

(mm)

Pitch (mm)	Total Cutting Depth	Number of Passes														Insert Type
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	G-class ground inserts
1.5	0.90	0.23	0.21	0.16	0.13	0.11	0.06									MMT16ER150TR
2.0	1.25	0.29	0.26	0.21	0.17	0.14	0.12	0.06								MMT16ER200TR
3.0	1.75	0.32	0.31	0.24	0.19	0.18	0.17	0.15	0.13	0.06						MMT16ER300TR
4.0	2.25	0.33	0.32	0.24	0.22	0.21	0.17	0.16	0.15	0.14	0.13	0.12	0.06			MMT22ER400TR
5.0	2.75	0.35	0.32	0.26	0.24	0.22	0.21	0.19	0.19	0.17	0.15	0.14	0.13	0.12	0.06	MMT22ER500TR

■American ACME

(inch)

Pitch (thread/ inch)	Total Cutting Depth	Number of Passes														Insert Type
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	G-class ground inserts
12	.047	.011	.009	.008	.007	.006	.004	.002								MMT16ER120ACME
10	.060	.011	.010	.008	.007	.006	.006	.005	.005	.002						MMT16ER100ACME
8	.072	.012	.010	.009	.007	.006	.006	.006	.005	.005	.004	.002				MMT16ER080ACME
6	.093	.013	.012	.011	.009	.008	.007	.006	.006	.005	.005	.004	.005	.002		MMT22ER060ACME
5	.110	.014	.013	.012	.010	.009	.008	.007	.007	.006	.006	.006	.005	.005	.002	MMT22ER050ACME

■UNJ

(inch)

Pitch (thread/ inch)	Total Cutting Depth	Number of Passes														Insert Type
		1	2	3	4	5	6	7	8	9	10	11				G-class ground inserts
32	.018	.006	.006	.004	.002											MMT16ER320UNJ
28	.020	.006	.005	.004	.003	.002										MMT16ER280UNJ
24	.024	.007	.006	.006	.003	.002										MMT16ER240UNJ
20	.029	.007	.006	.005	.005	.004	.002									MMT16ER200UNJ
18	.032	.009	.007	.006	.004	.004	.002									MMT16ER180UNJ
16	.036	.010	.008	.006	.005	.004	.003									MMT16ER160UNJ
14	.041	.010	.009	.007	.005	.004	.004	.002								MMT16ER140UNJ
12	.048	.011	.011	.008	.007	.005	.004	.002								MMT16ER120UNJ
10	.058	.012	.011	.008	.006	.005	.005	.005	.004	.002						MMT16ER100UNJ
8	.072	.012	.012	.009	.007	.006	.006	.005	.005	.004	.004	.002				MMT16ER080UNJ

■API Buttress Casing

(inch)

Pitch (thread/ inch)	Total Cutting Depth	Number of Passes														Insert Type
		1	2	3	4	5	6	7	8	9	10	11				G-class ground inserts
5	.061	.010	.009	.007	.006	.005	.005	.005	.004	.004	.004	.002				MMT22ER050APBU

Note 1) · Set the finishing allowance on a diameter at approx. .004 inch when using a full form insert.
· Please note the cutting depth and the number of passes when a nose radius of a partial or semi-full form insert or of an internal threading insert is small to prevent damage to the insert nose.
· Please set the cutting depth sufficiently deep enough on materials such as hardened steel or austenitic stainless steel to help prevent premature wear and chipping caused by the outer layer of the material.

MMT STANDARD OF DEPTH OF CUT EXTERNAL (RADIAL INFEED)

API Round Casing & Tubing

(inch)

Pitch (thread/inch)	Total Cutting Depth	Number of Passes															Insert Type
		1	2	3	4	5	6	7	8	9	10	11	12				G-class ground inserts
10	.056	.010	.009	.006	.006	.005	.005	.005	.004	.004	.002						MMT16ER100APRD
8	.071	.010	.009	.007	.006	.006	.006	.005	.005	.005	.005	.005	.002				MMT16ER080APRD

American NPT

(inch)

Pitch (thread/inch)	Total Cutting Depth	Number of Passes															Insert Type
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	G-class ground inserts
27	.026	.006	.005	.005	.004	.004	.002										MMT16ER270NPT
18	.040	.008	.006	.006	.005	.005	.004	.004	.002								MMT16ER180NPT
14	.052	.009	.007	.006	.006	.005	.005	.004	.004	.004	.002						MMT16ER140NPT
11.5	.065	.009	.007	.007	.006	.006	.005	.005	.005	.005	.004	.004	.002				MMT16ER115NPT
8	.095	.013	.011	.009	.008	.007	.006	.006	.006	.005	.005	.005	.004	.004	.004	.002	MMT16ER080NPT

American NPTF

(inch)

Pitch (thread/inch)	Total Cutting Depth	Number of Passes															Insert Type
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	G-class ground inserts
27	.025	.006	.006	.004	.004	.003	.002										MMT16ER270NPTF
18	.039	.007	.006	.006	.005	.005	.004	.004	.002								MMT16ER180NPTF
14	.053	.009	.008	.006	.006	.005	.005	.004	.004	.004	.002						MMT16ER140NPTF
11.5	.064	.009	.009	.007	.006	.005	.005	.005	.004	.004	.004	.004	.002				MMT16ER115NPTF
8	.094	.013	.011	.009	.007	.007	.006	.006	.006	.005	.005	.005	.004	.004	.004	.002	MMT16ER080NPTF

Note 1) · Set the finishing allowance on a diameter at approx. .004 inch when using a full form insert.
· Please note the cutting depth and the number of passes when a nose radius of a partial or semi-full form insert or of an internal threading insert is small to prevent damage to the insert nose.
· Please set the cutting depth sufficiently deep enough on materials such as hardened steel or austenitic stainless steel to help prevent premature wear and chipping caused by the outer layer of the material.

MMT STANDARD OF DEPTH OF CUT INTERNAL (RADIAL INFEED)

ISO Metric

(mm)

Pitch (mm)	Total Cutting Depth	Number of Passes														Insert Type			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	G-class ground inserts		M-class inserts with 3-D chip breakers	
0.5	0.29	0.09	0.07	0.07	0.06											MMT11IR050ISO	MMT16IR050ISO	–	–
0.75	0.43	0.15	0.13	0.09	0.06											MMT11IR075ISO	MMT16IR075ISO	–	–
1.0	0.58	0.17	0.15	0.11	0.09	0.06										MMT11IR100ISO	MMT16IR100ISO	MMT11IR100ISO-S	MMT16IR100ISO-S
1.25	0.72	0.18	0.16	0.12	0.11	0.09	0.06									MMT11IR125ISO	MMT16IR125ISO	MMT11IR125ISO-S	MMT16IR125ISO-S
1.5	0.87	0.21	0.20	0.16	0.13	0.11	0.06									MMT11IR150ISO	MMT16IR150ISO	MMT11IR150ISO-S	MMT16IR150ISO-S
1.75	1.01	0.21	0.20	0.15	0.12	0.10	0.09	0.08	0.06							MMT11IR175ISO	MMT16IR175ISO	–	MMT16IR175ISO-S
2.0	1.15	0.24	0.22	0.18	0.14	0.12	0.10	0.09	0.06							MMT11IR200ISO	MMT16IR200ISO	–	MMT16IR200ISO-S
2.5	1.44	0.25	0.24	0.21	0.15	0.13	0.12	0.10	0.09	0.09	0.06					–	MMT16IR250ISO	–	MMT16IR250ISO-S
3.0	1.73	0.26	0.25	0.22	0.17	0.14	0.13	0.12	0.11	0.10	0.09	0.08	0.06			–	MMT16IR300ISO	–	MMT16IR300ISO-S
3.5	2.02	0.32	0.30	0.23	0.19	0.17	0.15	0.14	0.13	0.12	0.11	0.10	0.06			–	MMT22IR350ISO	–	–
4.0	2.31	0.33	0.31	0.24	0.22	0.18	0.15	0.14	0.13	0.12	0.12	0.11	0.10	0.10	0.06	–	MMT22IR400ISO	–	–
4.5	2.60	0.36	0.33	0.28	0.24	0.21	0.19	0.16	0.15	0.14	0.13	0.12	0.12	0.11	0.06	–	MMT22IR450ISO	–	–
5.0	2.89	0.41	0.38	0.32	0.27	0.24	0.21	0.18	0.16	0.15	0.14	0.13	0.12	0.12	0.06	–	MMT22IR500ISO	–	–

American UN

(inch)

Pitch (thread/inch)	Total Cutting Depth	Number of Passes														Insert Type		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	G-class ground inserts		M-class inserts with 3-D chip breakers
32	.018	.006	.006	.004	.002											MMT11IR320UN	MMT16IR320UN	–
28	.020	.006	.005	.004	.003	.002										MMT11IR280UN	MMT16IR280UN	–
24	.024	.007	.006	.005	.004	.002										MMT11IR240UN	MMT16IR240UN	–
20	.029	.007	.006	.005	.005	.004	.002									MMT11IR200UN	MMT16IR200UN	–
18	.032	.008	.007	.006	.005	.004	.002									MMT11IR180UN	MMT16IR180UN	–
16	.036	.008	.007	.006	.005	.004	.004	.002								MMT11IR160UN	MMT16IR160UN	MMT16IR160UN-S
14	.041	.008	.007	.006	.005	.005	.004	.004	.002							MMT11IR140UN	MMT16IR140UN	MMT16IR140UN-S
13	.044	.009	.007	.006	.006	.005	.005	.004	.002							–	MMT16IR130UN	–
12	.048	.009	.009	.007	.006	.005	.005	.005	.002							–	MMT16IR120UN	MMT16IR120UN-S
11	.052	.009	.009	.008	.006	.005	.005	.004	.004	.002						–	MMT16IR110UN	–
10	.058	.010	.009	.008	.006	.005	.005	.005	.004	.004	.002					–	MMT16IR100UN	–
9	.064	.012	.009	.008	.007	.006	.006	.005	.005	.004	.002					–	MMT16IR090UN	–
8	.072	.012	.010	.008	.007	.006	.006	.006	.005	.005	.005	.002				–	MMT16IR080UN	–
7	.082	.014	.012	.009	.008	.007	.007	.006	.006	.006	.005	.002				–	MMT22IR070UN	–
6	.096	.016	.013	.010	.009	.007	.007	.006	.006	.006	.005	.005	.004	.002		–	MMT22IR060UN	–
5	.115	.016	.014	.012	.010	.009	.008	.008	.007	.007	.006	.006	.005	.005	.002	–	MMT22IR050UN	–

Whitworth for BSW, BSP

(inch)

Pitch (thread/inch)	Total Cutting Depth	Number of Passes														Insert Type		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	G-class ground inserts		M-class inserts with 3-D chip breakers
28	.023	.007	.006	.004	.004	.002										–	MMT16IR280W	–
26	.025	.007	.006	.005	.005	.002										–	MMT16IR260W	–
20	.032	.008	.007	.006	.005	.004	.002									–	MMT16IR200W	–
19	.034	.008	.007	.006	.006	.005	.002									MMT11IR190W	MMT16IR190W	MMT16IR190W-S
18	.035	.010	.007	.006	.005	.005	.002									–	MMT16IR180W	–
16	.040	.008	.007	.006	.005	.004	.004	.004	.002							–	MMT16IR160W	–
14	.046	.009	.008	.007	.006	.005	.005	.004	.002							MMT11IR140W	MMT16IR140W	MMT16IR140W-S
12	.054	.011	.010	.008	.006	.006	.006	.005	.002							–	MMT16IR120W	MMT16IR120W-S
11	.058	.011	.009	.008	.007	.006	.006	.005	.004	.002						–	MMT16IR110W	–
10	.064	.011	.010	.008	.007	.006	.006	.005	.005	.004	.002					–	MMT16IR100W	–
9	.071	.011	.010	.008	.007	.006	.006	.006	.005	.005	.005	.002				–	MMT16IR090W	–
8	.080	.012	.011	.009	.007	.007	.006	.006	.006	.005	.005	.004	.002			–	MMT16IR080W	–
7	.091	.013	.013	.010	.009	.008	.007	.007	.006	.006	.006	.004	.002			–	MMT22IR070W	–
6	.107	.014	.013	.011	.009	.008	.008	.007	.007	.006	.006	.006	.005	.005	.002	–	MMT22IR060W	–
5	.128	.017	.016	.014	.011	.010	.009	.009	.008	.007	.007	.007	.006	.005	.002	–	MMT22IR050W	–

Note 1) · Set the finishing allowance on a diameter at approx. .004 inch when using a full form insert.
· Please note the cutting depth and the number of passes when a nose radius of a partial or semi-full form insert or of an internal threading insert is small to prevent damage to the insert nose.
· Please set the cutting depth sufficiently deep enough on materials such as hardened steel or austenitic stainless steel to help prevent premature wear and chipping caused by the outer layer of the material.

MMT STANDARD OF DEPTH OF CUT INTERNAL (RADIAL INFEED)

BSPT

(inch)

Pitch (thread/ inch)	Total Cutting Depth	Number of Passes															Insert Type		
		1	2	3	4	5	6	7	8	9							G-class ground inserts		M-class inserts with 3-D chip breakers
19	.034	.009	.007	.006	.005	.005	.002										MMT11IR190BSPT	MMT16IR190BSPT	MMT16IR190BSPT-S
14	.046	.009	.008	.007	.006	.005	.005	.004	.002								MMT11IR140BSPT	MMT16IR140BSPT	MMT16IR140BSPT-S
11	.058	.010	.009	.008	.007	.006	.006	.005	.005	.002							–	MMT16IR110BSPT	MMT16IR110BSPT-S

Round DIN 405

(inch)

Pitch (thread/ inch)	Total Cutting Depth	Number of Passes															Insert Type
		1	2	3	4	5	6	7	8	9	10	11	12	13	14		G-class ground inserts
10	.050	.009	.008	.008	.007	.006	.005	.005	.002								MMT16IR100RD
8	.063	.009	.008	.008	.007	.007	.006	.006	.005	.005	.002						MMT16IR080RD
6	.083	.010	.010	.009	.009	.008	.007	.007	.006	.006	.005	.004	.002				MMT16IR060RD
4	.125	.013	.013	.013	.012	.011	.010	.009	.009	.008	.007	.007	.006	.005	.002		MMT22IR040RD

ISO Trapezoidal 30°

(mm)

Pitch (mm)	Total Cutting Depth	Number of Passes															Insert Type
		1	2	3	4	5	6	7	8	9	10	11	12	13	14		G-class ground inserts
1.5	0.90	0.23	0.21	0.16	0.13	0.11	0.06										MMT16IR150TR
2	1.25	0.29	0.26	0.21	0.17	0.14	0.12	0.06									MMT16IR200TR
3	1.75	0.32	0.31	0.24	0.19	0.18	0.17	0.15	0.13	0.06							MMT16IR300TR
4	2.25	0.33	0.32	0.24	0.22	0.21	0.17	0.16	0.15	0.14	0.13	0.12	0.06				MMT22IR400TR
5	2.75	0.35	0.32	0.26	0.24	0.22	0.21	0.19	0.19	0.17	0.15	0.14	0.13	0.12	0.06		MMT22IR500TR

American ACME

(inch)

Pitch (thread/ inch)	Total Cutting Depth	Number of Passes															Insert Type
		1	2	3	4	5	6	7	8	9	10	11	12	13	14		G-class ground inserts
12	.047	.011	.009	.008	.007	.006	.004	.002									MMT16IR120ACME
10	.060	.011	.010	.008	.007	.006	.006	.005	.005	.002							MMT16IR100ACME
8	.072	.012	.010	.009	.007	.006	.006	.006	.005	.005	.004	.002					MMT16IR080ACME
6	.093	.013	.012	.011	.009	.008	.007	.006	.006	.005	.005	.005	.004	.002			MMT22IR060ACME
5	.110	.014	.013	.012	.010	.009	.008	.007	.007	.006	.006	.006	.005	.005	.002		MMT22IR050ACME

API Buttress Casing

(inch)

Pitch (thread/ inch)	Total Cutting Depth	Number of Passes															Insert Type
		1	2	3	4	5	6	7	8	9	10	11					G-class ground inserts
5	.061	.010	.009	.007	.006	.005	.005	.005	.004	.004	.004	.002					MMT22IR050APBU

API Round Casing & Tubing

(inch)

Pitch (thread/ inch)	Total Cutting Depth	Number of Passes															Insert Type
		1	2	3	4	5	6	7	8	9	10	11	12				G-class ground inserts
10	.056	.010	.009	.006	.006	.005	.005	.005	.004	.004	.002						MMT16IR100APRD
8	.071	.010	.009	.007	.006	.006	.006	.005	.005	.005	.005	.005	.002				MMT16IR080APRD

Note 1) · Set the finishing allowance on a diameter at approx. .004 inch when using a full form insert.
· Please note the cutting depth and the number of passes when a nose radius of a partial or semi-full form insert or of an internal threading insert is small to prevent damage to the insert nose.
· Please set the cutting depth sufficiently deep enough on materials such as hardened steel or austenitic stainless steel to help prevent premature wear and chipping caused by the outer layer of the material.

American NPT

(inch)

Pitch (thread/ inch)	Total Cutting Depth	Number of Passes															Insert Type
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	G-class ground inserts
27	.026	.006	.005	.005	.004	.004	.002										MMT16IR270NPT
18	.040	.008	.006	.006	.005	.005	.004	.004	.002								MMT16IR180NPT
14	.052	.009	.007	.006	.006	.005	.005	.004	.004	.004	.002						MMT16IR140NPT
11.5	.065	.009	.007	.007	.006	.006	.005	.005	.005	.005	.004	.004	.002				MMT16IR115NPT
8	.095	.013	.011	.009	.008	.007	.006	.006	.006	.005	.005	.005	.004	.004	.004	.002	MMT16IR080NPT

American NPTF

(inch)

Pitch (thread/ inch)	Total Cutting Depth	Number of Passes															Insert Type
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	G-class ground inserts
14	.053	.009	.008	.006	.006	.005	.005	.004	.004	.004	.002						MMT16IR140NPTF
11.5	.064	.009	.009	.007	.006	.005	.005	.005	.004	.004	.004	.004	.002				MMT16IR115NPTF
8	.094	.013	.011	.009	.007	.007	.006	.006	.006	.005	.005	.005	.004	.004	.004	.002	MMT16IR080NPTF

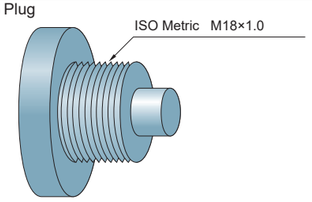
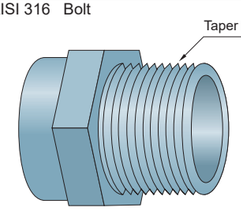
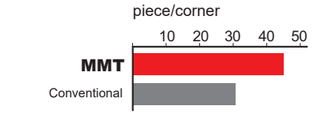
Note 1) · Set the finishing allowance on a diameter at approx. .004 inch when using a full form insert.
· Please note the cutting depth and the number of passes when a nose radius of a partial or semi-full form insert or of an internal threading insert is small to prevent damage to the insert nose.
· Please set the cutting depth sufficiently deep enough on materials such as hardened steel or austenitic stainless steel to help prevent premature wear and chipping caused by the outer layer of the material.

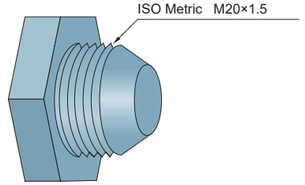
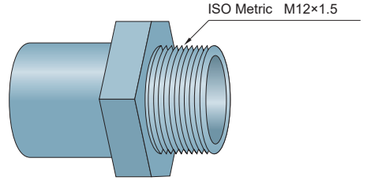
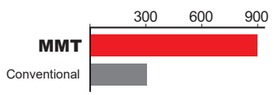
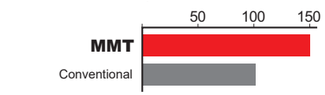
TROUBLE SHOOTING

Problems	Observation	Causes	Solutions
Low thread precision.	Threads do not mesh with each other.	Incorrect tool installation.	Set the insert center height at 0 inch.
			Check holder inclination (Lateral).
	Shallow thread.	Incorrect depth of cut.	Modify the depth of cut.
		Lack of insert wear or plastic deformation resistance.	Refer to "Quickly generated flank wear." and "Large plastic deformation." below.
Poor surface finish.	Surface damage.	Chips wrap around or clog the work pieces.	Change to flank infeed and control the chip discharge direction.
			Change to an M-class insert with a 3-D chip breaker.
		The side of the insert cutting edge interferes with the workpiece.	Check the lead angle and select an appropriate shim.
	Surface tears.	Built-up edge (Welding).	Increase cutting speed.
			Increase coolant pressure and volume.
		Cutting resistance too high.	Decrease depth of cut per pass.
	Surface vibrations.	Cutting speed too high.	Decrease the cutting speed.
		Insufficient work piece or tool clamping.	Re-check work piece and tool clamping. (Chuck pressure, clamping allowance)
		Incorrect tool installation.	Set the insert center height at 0mm.
Short tool life.	Flank wear quickly generated.	Cutting speed too high.	Decrease the cutting speed.
		Too many passes causes abrasive wear.	Reduce the number of passes.
		Small depth of cut for the finishing pass.	Do not re-cut at 0mm depth of cut, larger than 0.05mm depth of cut is recommended.
	Non-uniform wear of the right and left sides of the cutting edge.	The work piece lead angle and the tool lead angle do not match.	Check the work piece lead angle and select an appropriate shim.
	Chipping and fracture.	Cutting speed too low.	Increase cutting speed.
		Cutting resistance too high.	Increase the number of passes and decrease the cutting resistance per pass.
		Unstable clamping.	Check work piece deflection.
			Shorten tool overhang.
			Recheck work piece and tool clamping. (Chuck pressure, clamping allowance)
		Chip packing.	Increase coolant pressure to blow away chips.
			Change the tool pass to control chips. (Lengthen each pass to allow the coolant to clear the chips.
			Change from standard internal cutting to back turning to prevent chip jamming.
		Non-chamfered work pieces causes high resistance at the start of each pass.	Chamfer the workpiece entry and exit faces.
	Large plastic deformation.	High cutting speed and large heat generation.	Decrease the cutting speed.
		Lack of coolant supply.	Check coolant is supply is sufficient.
			Increase coolant pressure and volume.
		Cutting resistance too high.	Increase the number of passes and decrease the cutting resistance per pass.

Memo

Application Examples

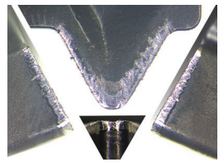
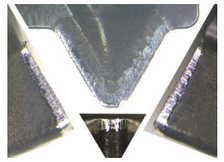
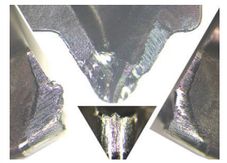
Insert (Grade)		MMT16ER100ISO (VP10MF)	MMT16ER110BSPT (VP15TF)
Workpiece		AISI 4135 Plug 	AISI 316 Bolt 
Cutting Conditions	Cutting Speed **vc** (SFM)	395	330
	Pass	5	20
	Cutting Method	Radial Infeed	Radial Infeed
	Depth of Cut (mm)	Fixed Cut Area	Fixed Cut Area
Cutting Mode		Wet Cutting	Wet Cutting
Results		piece/corner  MMT inserts had less wear than conventional products. Tool life increased 3 fold.	piece/corner  MMT inserts suitable for unstable machining without sudden fracturing. Tool life extended by 1.5 times.

Insert (Grade)		MMT16ER150ISO-S (VP15TF)	MMT16ER150ISO-S (VP15TF)
Workpiece		AISI 1045 Bolt 	AISI 4135 Bolt 
Cutting Conditions	Cutting Speed **vc** (SFM)	460	260
	Pass	6	10
	Cutting Method	Radial Infeed	Radial Infeed
	Depth of Cut (mm)	Fixed Cut Area	Fixed Cut Area
Cutting Mode		Wet Cutting	Wet Cutting
Results		piece/corner  MMT inserts had better chip control and produced smaller burrs on incomplete threads compared to conventional products. 3 times longer tool life was possible.	piece/corner  Better chip control from the MMT inserts prevented chips wrapping around the workpiece. Tool life lengthened x 1.5

Cutting Performance

Inconel 718 Comparison of wear by machining length

When threading heat resistant alloys, it suppresses compound damage such as wear and plastic deformation and achieves excellent wear resistance.

Cutting Length	MP9025	Conventional A	Conventional B	Conventional C
66 feet				
82 feet				Not machinable
115 feet				

<Cutting Conditions> Workpiece Material : Inconel 718
Insert : ISO Metric 60°
Cutting Speed : vc = 100SFM
Pitch : .059 inch
Depth of Cut : Total 12 passes, total depth of cut .036 inch
ap = .004"x3 passes, .003"x4 passes, .002"x5 passes
Cutting Mode : Wet Cutting

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Fax: 248.308.2627

FOR YOUR SAFETY

- Don't handle inserts and chips without gloves.
- Please machine within the recommended application range and exchange expired tools with new ones in advance of breakage.
- Please use safety covers and wear safety glasses.
- When using compounded cutting oils, please take fire precautions.
- When attaching inserts or spare parts, please use only the correct wrench or driver.
- When using rotating tools, please make a trial run to check run-out, vibration and abnormal sounds etc.

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