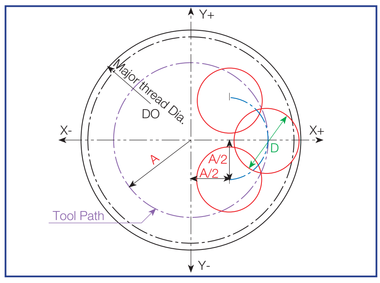
CNC Program for Internal Threading

Right-hand threading (climb milling) from bottom up.
Program is based on tool center.
This method of programming needs no tool radius compensation value, other than an offset for wear.

$$A = \frac{Do - D}{2}$$

A = Radius of tool path
Do = Major thread diameter
D = Cutting diameter

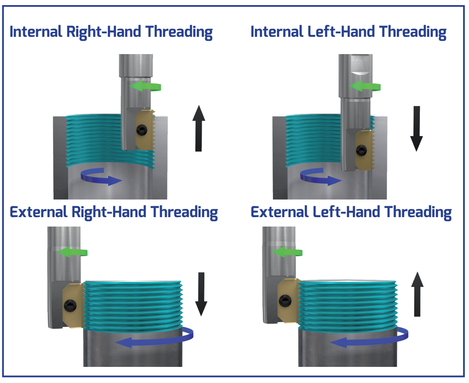


General Program

G90 G00 G54 G43 H1X0 Y0 Z10 S...
G00 Z-(to thread depth)
G01 G91 G41 D1 X(A/2) Y-(A/2) Z0 F...
G03 X(A/2) Y(A/2) R(A/2) Z(1/8 pitch)
G03 X0 Y0 I-(A) J0 Z(pitch)
G03 X-(A/2) Y(A/2) R(A/2) Z(1/8 pitch)
G01 G40 X-(A/2) Y-(A/2) Z0
G90 X0 Y0 Z0

Internal Threading

Example: M 48x2.0 IN-RH Thread depth 25 mm)
Toolholder: MTE D29-1-W25-30
(Cutting dia. 29 mm)
Insert: MT LNHU 3005 I2.00ISO
A=(Do-D)/2=(48-29)/2=9.5
A/2=4.75
(Tool compensation of radius=0)
G90 G0 G54 G43 G17 H1X0 Y0 Z10 S1320
G0 Z-25
G01 G91 G41 D1X 4.75 Y-4.75 Z0 F41
G03 X4.75 Y4.75 R4.75 Z0.25
G03 X0 Y0 I-9.5 J0 Z2.0
G03 X-4.75 Y4.75 R4.75 Z0.25
G01 G40 X-4.75 Y-4.75 Z0
G90 G0 X0 Y0 Z0
M30
%



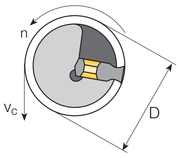
Calculating RPM

Metric Example:
v_c=120 m/min
D=30 mm

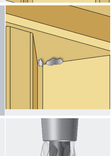
$$n = \frac{v_c \times 1000}{\pi x D} = \frac{120 \times 1000}{3.14 x 30} = 1274 \text{ RPM}$$

Inch Example:
v_c= 410 SFM
D=1.5 inch

$$n = \frac{v_c \times 12}{\pi x D} = \frac{410 \times 12}{3.14 x 1.5} = 1045 \text{ RPM}$$



TROUBLESHOOTING THREAD MILLING

Problems		Possible Cause	Reduce cutting speed	Increase feed rate and reduce radial passes	Check coolant preasure/flow direction	Check stability	Reduce feed rate	Add radial passes	Increase cutting speed	Reduce overhang	Use zero compensation	Check CNC program	Adjust cutting conditions	Add sufficient coolant	Reduce cutting conditions	Clamp tool to the minimum overhang length	Adjust feed/speed	Check tool and workpiece clamping
			Solutions															
Flank Wear		High cutting speed	●															
		Chip too thin		●														
		Insufficient coolant			●													
Fracture/ Chipping		Vibrations				●												
		High load on cutting edge					●	●										
Build Up Edge		Cutting speed too low							●									
		Insufficient coolant			●													
Thread Surface Chatter Marks /Vibrations		Feed rate too high					●											
		Large profile						●										
		Thread length too long						●		●								
Thread Accuracy (GO/NO GO Gauge)		Tool deflection					●	●			●							
		CNC program error										●						
Insert/Tool Breakage		High load on the cutting edge						●										
		Improper cutting conditions															●	
		Chip evacuation												●				
		CNC program error										●						
Tapered Thread		Tool cutting load						●							●			
		Tool overhang														●		
Short Tool Life		Unsuitable cutting conditions															●	
		Vibrations														●		●