

G84 Tapping Canned Cycle (Group 09)

F - Feedrate

S -Spindle speed

* **J** - Retract Multiple (Example: J2 will retract twice as fast as the cutting speed, also see Setting 130)

* **L** - Number of holes if G91 (Incremental Mode) is used

* **R** - Position of the R plane (Position above the part)

* **X** - X-Axis location of hole

* **Y** - Y-Axis location of hole **Z** - Position of the Z Axis at the bottom of hole

* indicates optional

Our tapping Feedrate (F) value is based on our tap RPM (S). These two values, F and S, work together to time the Z-Axis feed movement with the spindle position, creating precise threads.

We use the tap manufacturer's recommended values for our Spindle Speed (S value, RPM).

Our tapping Feedrate (F) is typically in G94 Feed Per Minute. Haas Mills default to G94 when powered-on.

It is possible to tap in G95 Feed Per Revolution Mode as well, but if this is done we must remember to return to G94 before milling.

Tapping Feedrate (F) formulas, and definitions:

Inch Mode, Setting 9 = Inch				Metric Mode, Setting 9 = mm			
Inch Tap		Metric Tap (Pitch in mm)		Inch Tap		Metric Tap (Pitch in mm)	
G94 F:	RPM/TPI	G94 F:	Pitch*RPM/25.4	G94 F:	RPM/TPI*25.4	G94 F:	Pitch*RPM
G95 F:	1/TPI	G95 F:	Pitch/25.4	G95 F:	1/TPI*25.4	G95 F:	Pitch

Pitch is the distance from one thread to the next. On metric taps this value is in millimeters.

Example: M6 x 1. The Pitch is 1.0
M12 x 1.75 tap. The Pitch is 1.75.

TPI is the Threads Per Inch, on Inch (Unified) taps.

Example: ¼-20 tap. The TPI is 20, there are 20 threads per inch.
½-13 tap. The TPI is 13.
1/8-27 NPT tap. The TPI is 27.

RPM is Revolutions Per Minute, our Spindle Speed S value.

There are exactly **25.4** millimeters per inch, so we use this value to convert between inches and millimeters. Inch = mm / 25.4. Millimeters = inch * 25.4.

Program examples:

Inch Mode, Setting 9 = INCH

```
%
O00001 (IN MM TAPPING)
G20 (INCH MODE CHECK)
G94 (INCHES PER MINUTE)

M06 T2 (1/2-13 TAP)
M08
S500
(F = RPM/TPI = 500/13)
G54 G00 G90 X0. Y0.
G43 H02 Z0.1
G84 Z-0.7 R0.1 F38.4615
G80 G00 Z2.

M06 T4 (M12 X 1.75 TAP)
S500
(F = P*RPM/25.4 = 1.75*500/25.4)
G54 G00 G90 X1. Y0.
G43 H04 Z0.1
G84 Z-0.7 R0.1 F34.4488
G80 G00 Z2.

M30
%
```

Metric Mode, Setting 9 = MM

```
%
O00002 (IN MM TAPPING)
G21 (MM MODE CHECK)
G94 (MM PER MINUTE)

M06 T2 (1/2-13 TAP)
M08
S500
(F = RPM/TPI*25.4 = 500/13*25.4)
G54 G00 G90 X0. Y0.
G43 H02 Z3.
G84 Z-20. R3. F976.923
G80 G00 Z50.

M06 T4 (M12 X 1.75 TAP)
S500
(F = P*RPM = 1.75*500)
G54 G00 G90 X25. Y0.
G43 H04 Z3.
G84 Z-20. R3. F875.000
G80 G00 Z50.

M30
%
```

You do not need to command a spindle start (M03 / M04) before G84. The canned cycle starts and stops the spindle as needed.

The RPM, S value, can be commanded on the G84 line, or just prior to it.

G84 Tapping cycles are used for Right-Hand Thread taps. For Left-Hand taps see G74. For Vector Tapping (angled-heads), see G184.

In inch Mode (Setting 9) we round our Feedrates to 4 decimal places, Fxx.xxxx.

In mm Mode (Setting 9) we round our Feedrates to 3 decimal places, Fxx.xxx.

The Rigid Tapping Option (Par. 57:4) must be enabled to tap without a Floating Tap Holder. Contact the manufacture for Feedrate calculations, if using a Floating Tap Holder.

Peck Tapping

Setting 133 REPT RIGID TAP must be turned on in order to tap the same hole more than once, and peck tap.

When Setting 133 is set to ON the spindle will orientate before each tapped hole, which adds a small amount of cycle time to each hole. For this reason it may be best to leave Setting 133 off when not peck-tapping.

The example to the right taps two holes, to a depth of Z-1.75, in .250 inch pecks.

By commanding the same XY location multiple times, with a different Z depth on each line, we are able to peck-tap the hole.

```
%
O00084 (PECK TAP)
  (SETTING 133 = ON)
G20 G94 (INCH PER MIN)

  (PECK TAPS 2 HOLES)
M06 T2 (3/4-10 TAP)
S200
G54 X0 Y0 G00 G90
G43 H02 Z0.25
G84 X0 Y0 Z-0.25 F20. R0.1
X0 Z-0.5
X0 Z-0.75
X0 Z-1.
X0 Z-1.25
X0 Z-1.5
X0 Z-1.75

  (HOLE 2)
X1. Z-.25
X1. Z-0.5
X1. Z-0.75
X1. Z-1.
X1. Z-1.25
X1. Z-1.5
X1. Z-1.75
G80 G00 Z2.

M30
%
```