

L8 CODING EXERCISE

In other lessons you coded and created programs which provided for basic linear moves for the XYZA axes, indexing, and learned about rastering. Not much coding was involved.

If you had to do individual lines of code for numerous repetitive moves one can just write a subroutine (M98 command) to avoid a lot of coding. Below is definition of M98 and M99 commands from the manual.

10.8.7 Call subroutine -M98 (page 10-30, 10.8.7 in the manual.)

This has two formats:

(a) To call a subroutine program within the current part program file code `M98 P~ L~` or `M98 ~P ~Q`. The program must contain an O line with the number given by the P word of the Call . This O line is a sort of "label" which indicates the start of the subroutine. The O line may not have a line number (N word) on it. It, and the following code, will normally be written with other subroutines and follow either an M2, M30 or M99 so it is not reached directly by the flow of the program.

(b) To call a subroutine which is in a separate file code `M98 (filename) L~`
for example `M98 (test.tap)`

For both formats:

The L word (or optionally the Q word) gives the number of times that the subroutine is to be called before continuing with the line following the M98. If the L (Q) word is omitted then its value defaults to 1.

By using parameters values or incremental moves a repeated subroutine can make several roughing cuts around a complex path or cut several identical objects from one piece of material.

Subroutine calls may be nested. That is to say a subroutine may contain a M98 call to another subroutine. As no conditional branching is permitted it is not meaningful for subroutines to call themselves recursively.

10.8.8 Return from subroutine

To return from a subroutine program M99 Execution will continue after the M98 which called the subroutine.

If M99 is written in the main program, i.e. not in a subroutine, then the program will start execution from the first line again. See also M47 to achieve the same effect.

The L8 coding lesson is to create a program for the paths shown in Figure 1 below and use a subroutine. The program will provide pathing for rastering moves in the Y direction using an endmill. There are some things that you must consider before you even start coding. There is an enlarger pic of the figure at the end of this writing.

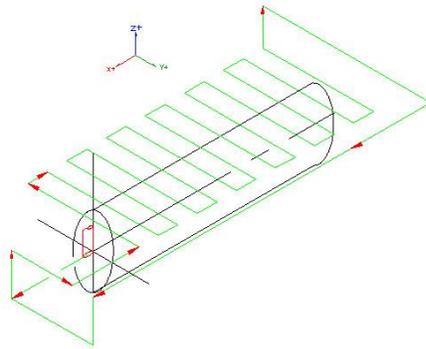


FIGURE 1

Now look at FIGURE 2 which is looking in the Y+ direction and what is shown is the cutter coming across the Y- (red color) and going back Y+ (blue color)

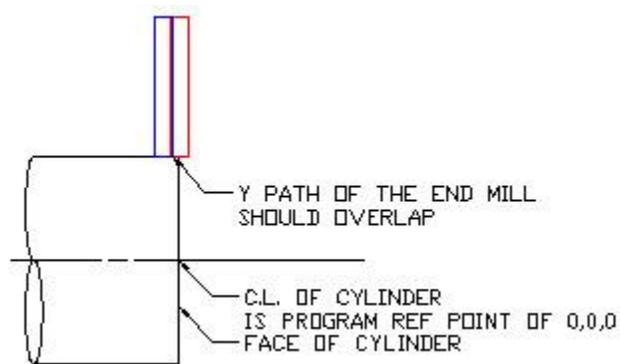


FIGURE 2

How will you touch off the tool to the work?

What is total depth of cut?

What size diameter cutter will be used?

How much of an overlap of the paths should be used?

What should the feedrate be for the material to be machined?

Now look at FIGURE 3 which is looking in the X- direction. It shows the cutter (red) directly at the center of the Y- path for the complete horizontal path (green).

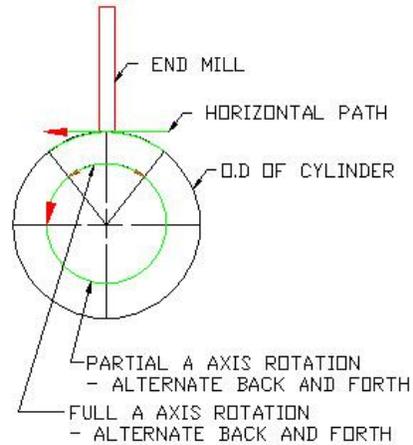


FIGURE 3

How long should the horizontal path be?

How do you want the A axis to rotate as the cutter moves across the cylinder?

How can one minimize the motions and run at a coordinated speed for A and Y axis?

SO

You need to know the above and apply what you learned thus far to code the horizontal paths which are repeated numerous times. The subroutine will have the code to do what is shown in FIGURE 4.

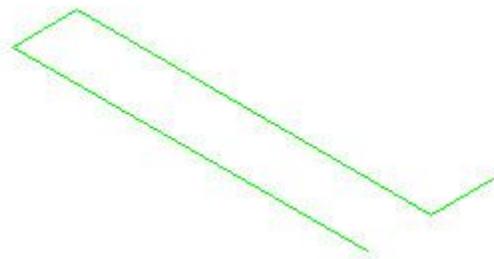


FIGURE 4

Here is a sample subroutine to show how a subroutine works. Line comments are in red.

N05 (SUBROUTINE EXAMPLE)

N10 G20 G91

N20 G0 Y.5 F10

N30 G0 X-.875

N40 M98 P1234 L2 **RUN SUBROUTINE 2 TIMES**

N50 G90

N60 G53 G0 X0

N70 G53 G0 Y0

N80 M30

O1234 **SUBROUTINE & NOTE "O" IS A LETTER NOT A NUMBER**

N100 G1 Y-1 A360 F1800 **N100 to N103 IS PATHS FOR FIGURE 4**

N101 G1 X-.25 F10

N102 G1 Y1 A-360 F1800

N103 G1 X-.25 F10

N104 M99 **RETURN TO PROGRAM LINE 50 AFTER SUB RUNS 2 TIMES**

8E1

Create a program for the paths shown in Figure 1 and also use a subroutine.

The cylinder shown in Figure 1 is as follows:

- 3.0" inches in diameter and 12" long
- Assume you will be using 1/4" diameter end mill
- Program reference is the center line and face of the cylinder
- End mill touches off to the face of the cylinder at the centerline
- Code for G91 mode
- Linear moves are at F10
- The rastering should be as shown (centered above the cylinder). The tool should move across at the top of the cylinder. The total Y path distance should be 2". For now just use an F1800 in the code lines of G1 Y+ _ A+ _ F1800. **Note that Lesson 9 will address Feedrate #3 as it has not been discussed.**

8E2

Create a program for the paths so you can scribe / cut markings around a cylinder as shown in Figure 5. Don't duplicate, only cut / scribe a line once. The marking lengths along the cylinder should vary for 10 deg, 5deg and 1 deg marks. Use a subroutine to do it.

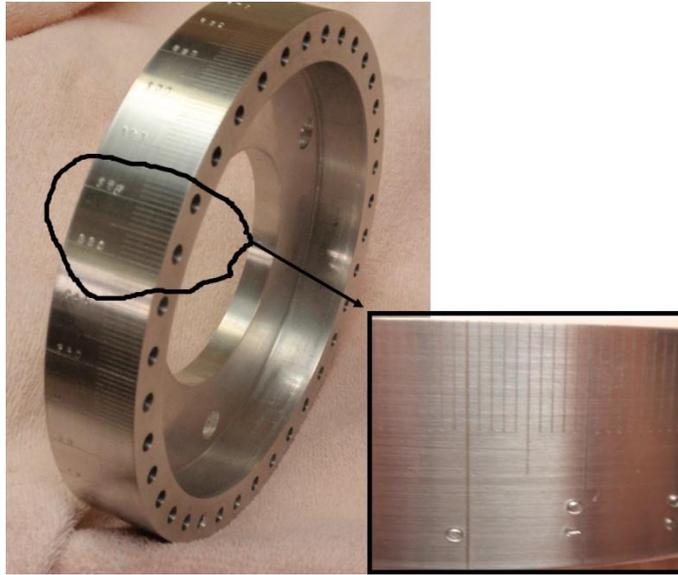
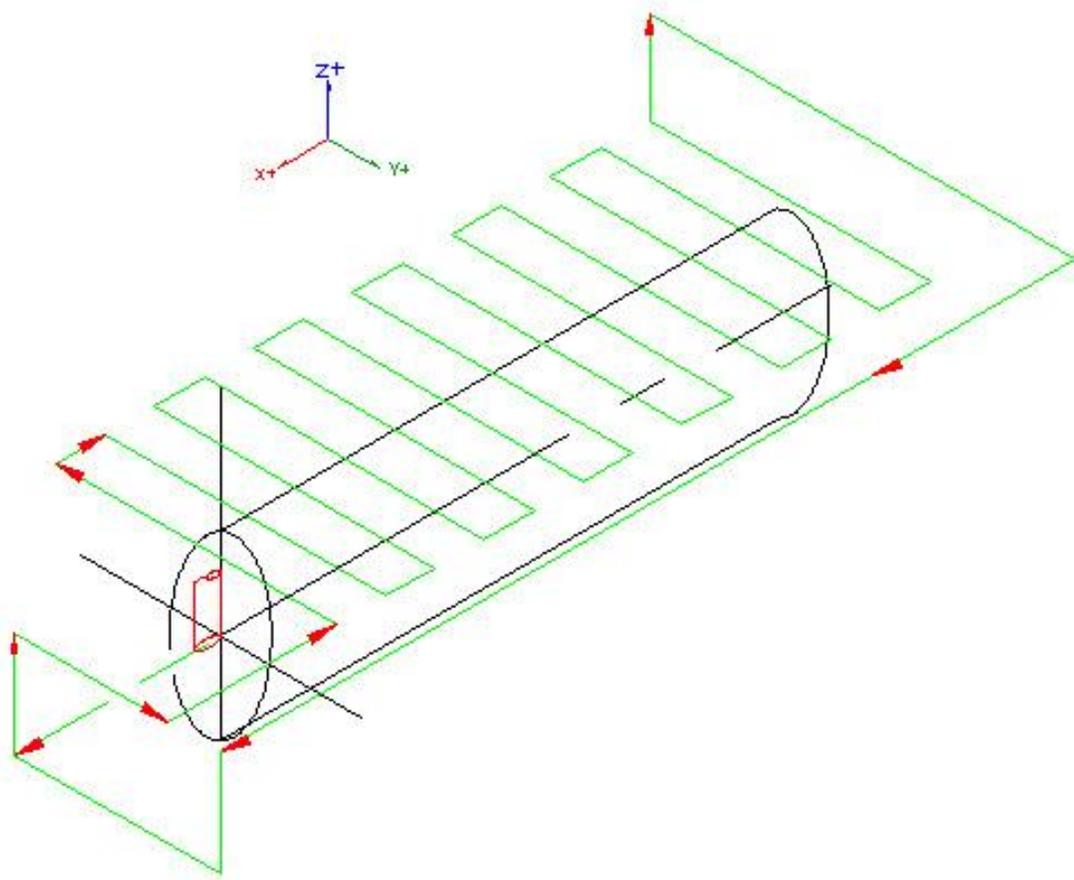


FIGURE 5



To be continued,

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