

1

Tests comprehension of motion types

Name: _____

Date: _____

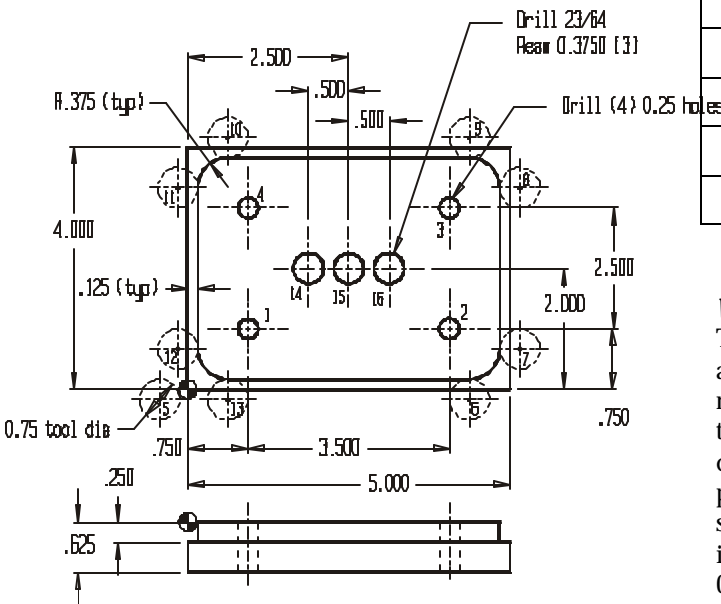
Score (126 possible): _____

Instructions: This is the first complete program you will be working on. Though it will not require that you actually write the entire program on your own, it will show you much of what is involved in doing so.

First use the print to come up with the coordinates going into the program by filling in the coordinate sheet. For the Z coordinate of the hole machining operations, you may wish to give two values, one for the approach position and the other for the hole bottom position, so you'll have these values available when you work on the program. For the 0.25 holes, for example, you could specify Z as 0.100/-0.730. For the 0.75 end mill, position it 0.100 away from the workpiece in X in point number 5.

Second, study the process to confirm that you understand what the program will be doing. *Third*, fill in the blanks in the program with the appropriate G codes, feedrates, spindle speeds, and axis positions.

Print:



Coordinate sheet:

#	X	Y	Z
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			

Warning about the drawing: The drawing is not to scale. The end mill is drawn smaller than its actual size. While it appears that the end mill is tangent to the center of hole number one (and 2, and 3, and 4), in reality it is not. Notice the 0.125 step around the workpiece. This must be used to calculate the positions for the end mill's path. For the X position of point 13, for example, you must add the 0.125 step to the 0.375 workpiece radius, the result for point 13's X is 0.5, **not 0.375** as it would be if you (incorrectly) subtract 0.375 (tool radius) from the 0.75 X position of point one.

Process:

Seq.	Operation description	Tool	Station	Speed	Feedrate
1	Center drill all holes	# 3 center drill	1	2000 rpm	5.0 ipm
2	Drill (4) 0.25 holes	1/4 drill	2	1200 rpm	4.8 ipm
3	Drill (3) 23/64 holes	23/64 drill	3	800 rpm	.0 ipm
4	Ream (3) 0.375 holes	0.375 reamer	4	600 rpm	7.0 ipm
5	Mill contour	0.750 end mill	5	400 rpm	4.5 ipm

Program: (One point for each correctly filled in blank)

O0001 (Program number)

(Center Drill)

N005 T01 M06

N010 G54 G90 S_____ M03 T02

N015 G___ X_____ Y_____ (pt 1)

N020 G43 H01 Z_____ M08

N025 G01 Z-0.200 F5.0

N030 G00 Z_____

N035 _____ (pt 2)

N040 _____

N045 _____

N050 _____ (pt 3)

N055 _____

N060 _____

N075 _____ (pt 4)

N080 _____

N085 _____

N090 _____ (pt 14)

N095 _____

N100 _____

N105 _____ (pt 15)

N110 _____

N115 _____

N120 _____ (pt 16)

N125 _____

N130 _____ M09

N135 G91 G28 Z0 M19

N140 M01

(1/4 drill)

N145 T02 M06

N150 G54 G90 S_____ M03 T03

N155 G___ X_____ Y_____ (pt 1)

N160 G43 H02 Z_____ M08

N165 G01 Z-0.730 F_____

N170 _____

N175 _____ (pt 2)

N180 _____

N185 _____

N190 _____ (pt 3)

N195 _____

N200 _____

N205 _____ (pt 4)

N210 _____

N215 _____ M09

N220 G91 G28 Z0 M19

N225 M01

(23/64 drill)

N230 T03 M06

N235 G54 G90 S_____ M03 T04

N240 G___ X_____ Y_____ (pt 14)

N245 G43 H03 Z_____ M08

N250 G01 Z_____ F_____

N255 _____

N260 _____ (pt 15)

N265 _____

N270 _____

N275 _____ (pt 16)

N280 _____

N285 _____ M09

N290 G91 G28 Z0 M19

N295 M01

(0.3750 reamer)

N300 T04 M06

N305 G54 G90 S_____ M03 T05

N310 G___ X_____ Y_____ (pt 14)

N315 G43 H04 Z_____ M08

N320 G01 Z_____

N325 _____

N330 _____ (pt 15)

N335 _____

N340 _____

N345 _____ (pt 16)

N350 _____

N355 _____ M09

N360 G91 G28 Z0 M19

N365 M01

(0.750 end mill)

N370 T05 M06

N375 G54 G90 S_____ M03 T01

N380 G___ X_____ Y_____ (pt 5)

N385 G43 H05 Z0.1 M08

N390 G01 Z-0.25 F50.

N395 _____ F _____ (pt 6)

N400 _____
(pt7)

N405 _____ (pt 8)

N410 _____
(9)

N415 _____ (pt 10)

N420 _____ (11)

N425 _____ (pt 12)

N430 _____ (13)

N435 G00 Z0.1 M09

N440 G91 G28 Z0 M19

N445 M30