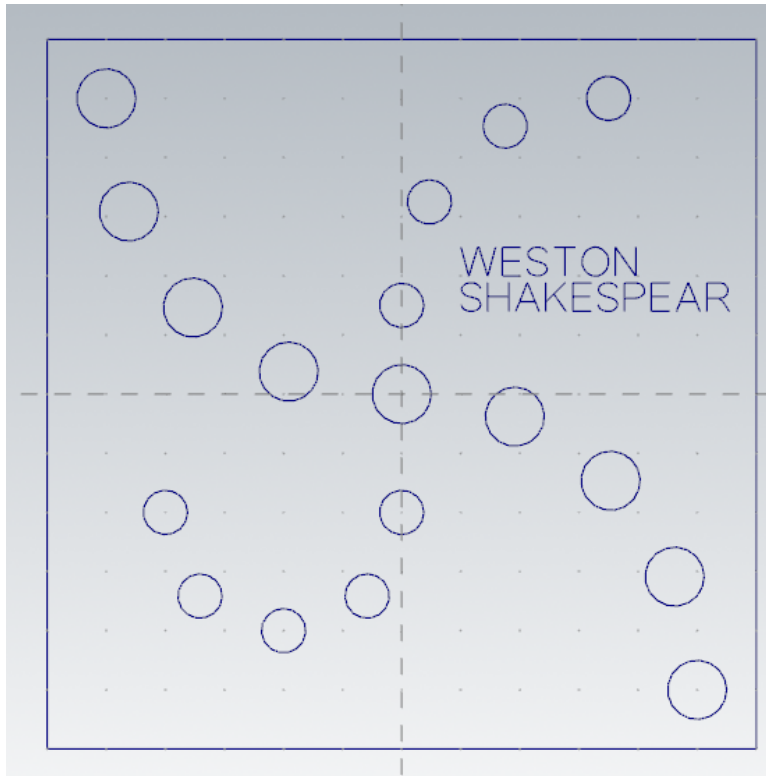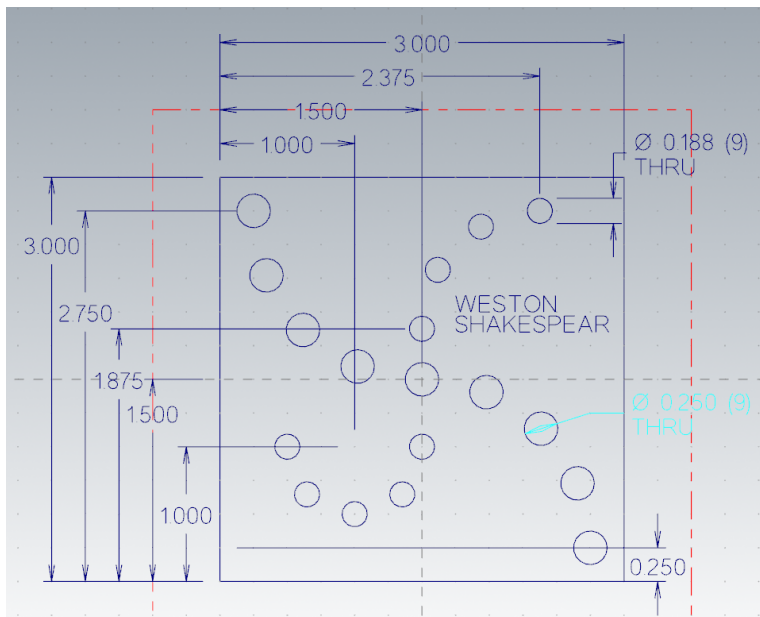# CCET 3680
Mill Lesson 3 Second Exercise
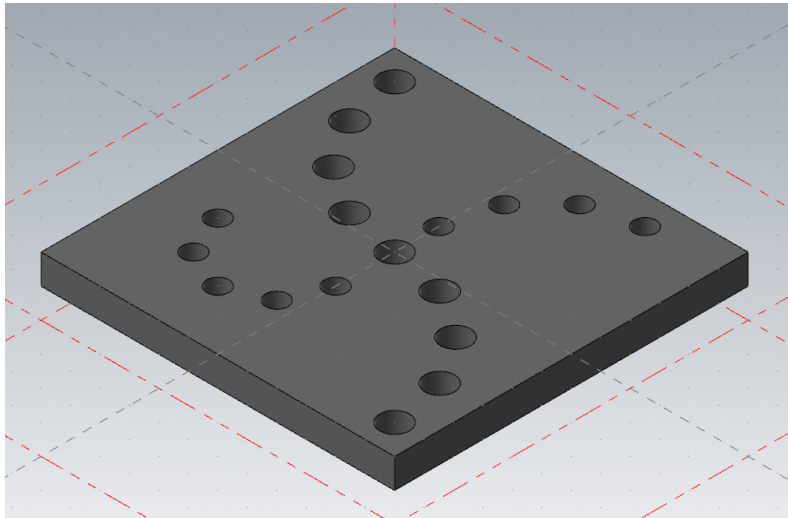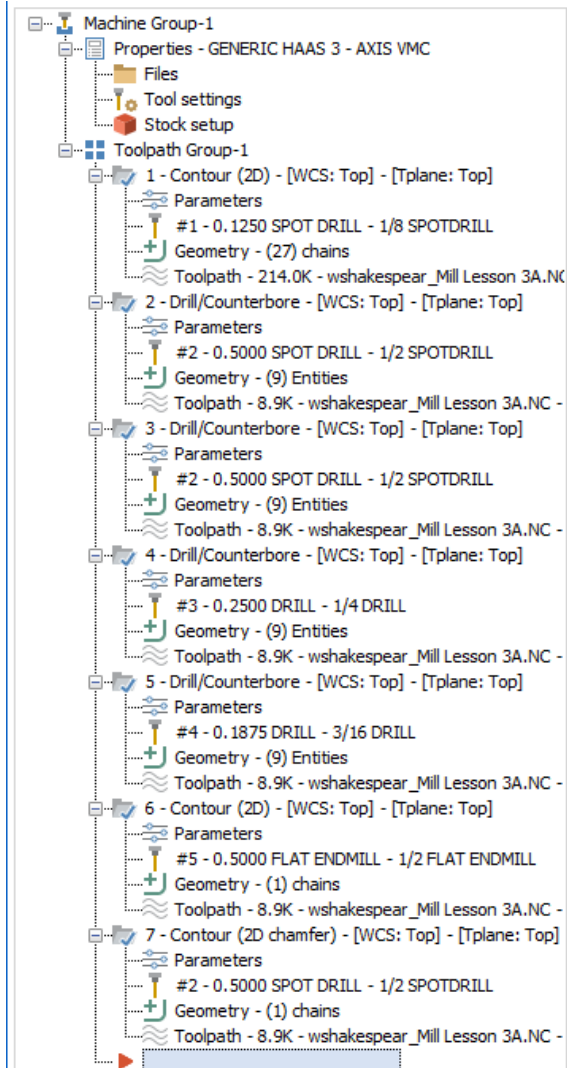
I. Wireframe:

II. Dimensions:
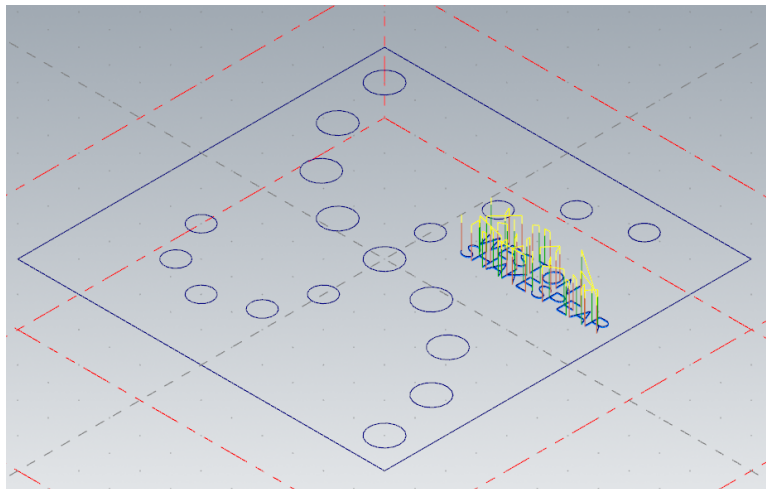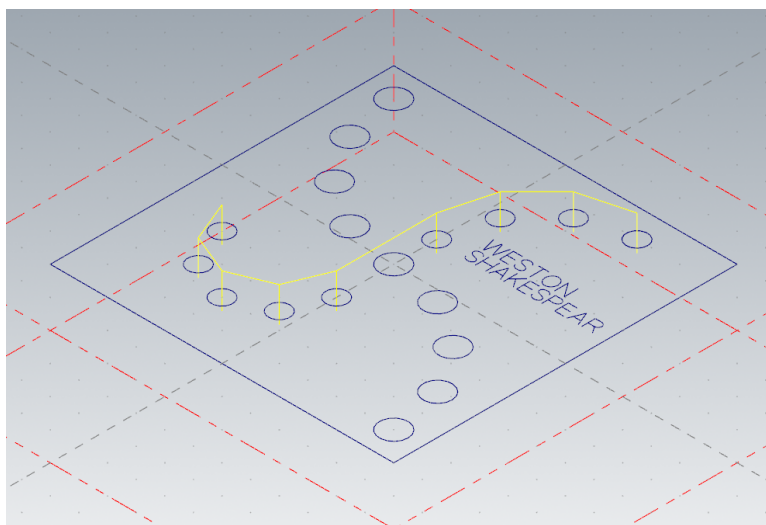
III. Solid:

IV. Toolpaths:

- Machine Group-1
  - Properties - GENERIC HAAS 3 - AXIS VMC
    - Files
    - Tool settings
    - Stock setup
  - Toolpath Group-1
    - 1 - Contour (2D) - [WCS: Top] - [Tplane: Top]
      - Parameters
      - #1 - 0.1250 SPOT DRILL - 1/8 SPOTDRILL
      - Geometry - (27) chains
      - Toolpath - 214.0K - wshakespear_Mill Lesson 3A.NC
    - 2 - Drill/Counterbore - [WCS: Top] - [Tplane: Top]
      - Parameters
      - #2 - 0.5000 SPOT DRILL - 1/2 SPOTDRILL
      - Geometry - (9) Entities
      - Toolpath - 8.9K - wshakespear_Mill Lesson 3A.NC -
    - 3 - Drill/Counterbore - [WCS: Top] - [Tplane: Top]
      - Parameters
      - #2 - 0.5000 SPOT DRILL - 1/2 SPOTDRILL
      - Geometry - (9) Entities
      - Toolpath - 8.9K - wshakespear_Mill Lesson 3A.NC -
    - 4 - Drill/Counterbore - [WCS: Top] - [Tplane: Top]
      - Parameters
      - #3 - 0.2500 DRILL - 1/4 DRILL
      - Geometry - (9) Entities
      - Toolpath - 8.9K - wshakespear_Mill Lesson 3A.NC -
    - 5 - Drill/Counterbore - [WCS: Top] - [Tplane: Top]
      - Parameters
      - #4 - 0.1875 DRILL - 3/16 DRILL
      - Geometry - (9) Entities
      - Toolpath - 8.9K - wshakespear_Mill Lesson 3A.NC -
    - 6 - Contour (2D) - [WCS: Top] - [Tplane: Top]
      - Parameters
      - #5 - 0.5000 FLAT ENDMILL - 1/2 FLAT ENDMILL
      - Geometry - (1) chains
      - Toolpath - 8.9K - wshakespear_Mill Lesson 3A.NC -
    - 7 - Contour (2D chamfer) - [WCS: Top] - [Tplane: Top]
      - Parameters
      - #2 - 0.5000 SPOT DRILL - 1/2 SPOTDRILL
      - Geometry - (1) chains
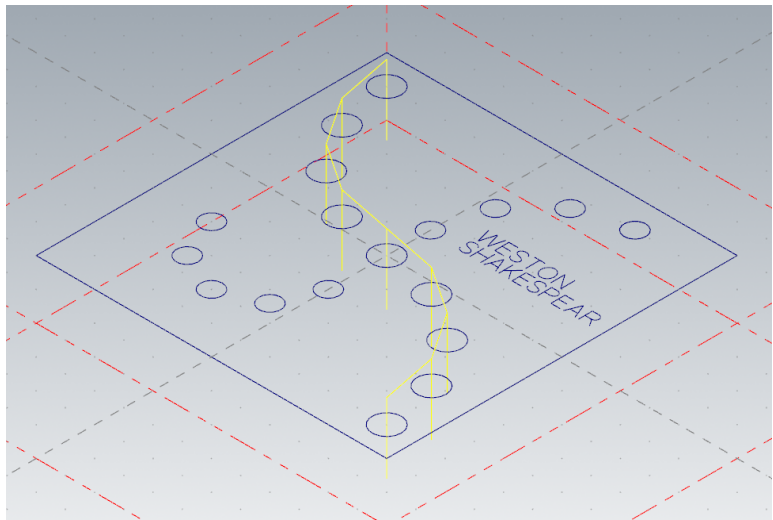   - Toolpath - 8.9K - wshakespear_Mill Lesson 3A.NC -
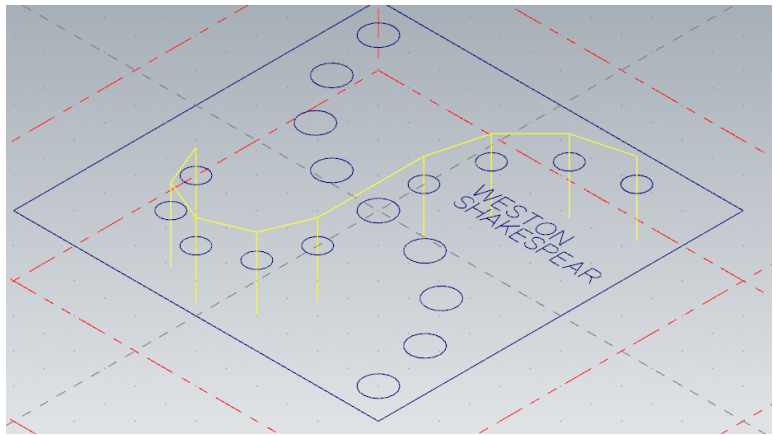
V. Name 2D Contour:
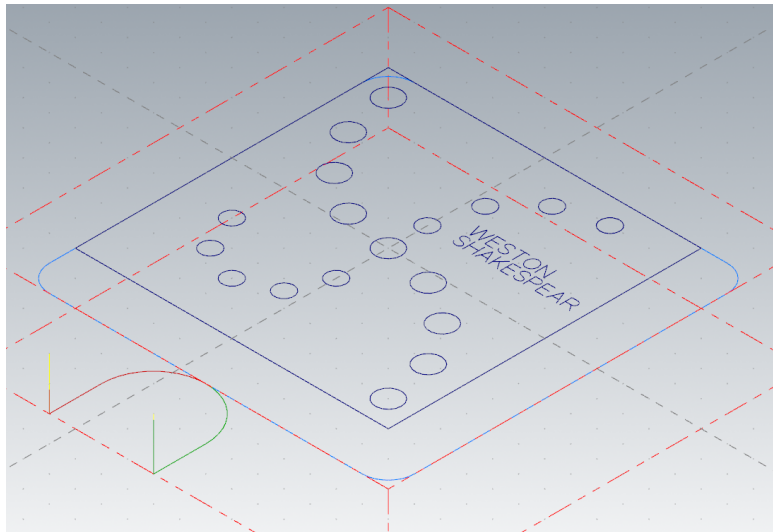

VI. Spot Drill:
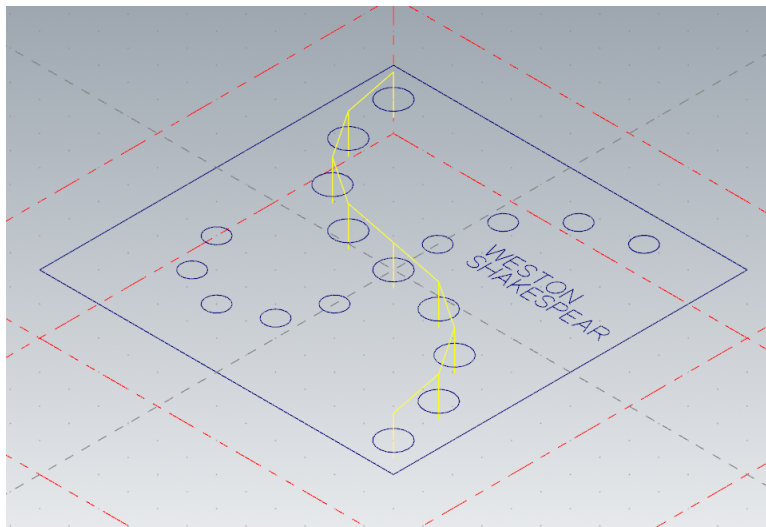
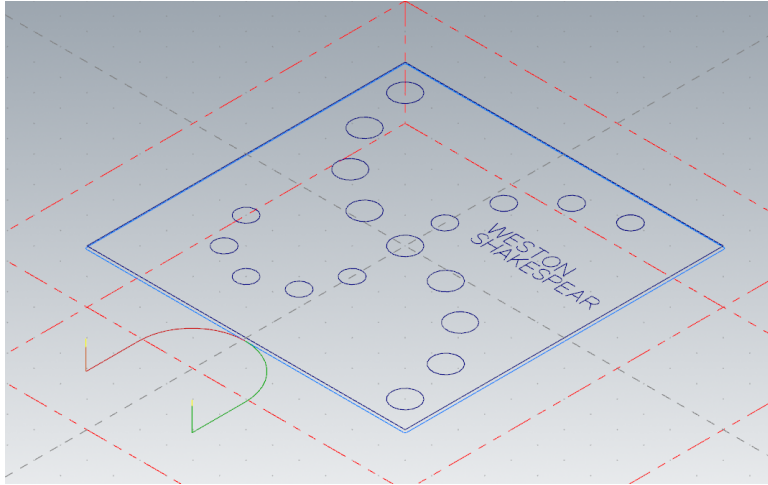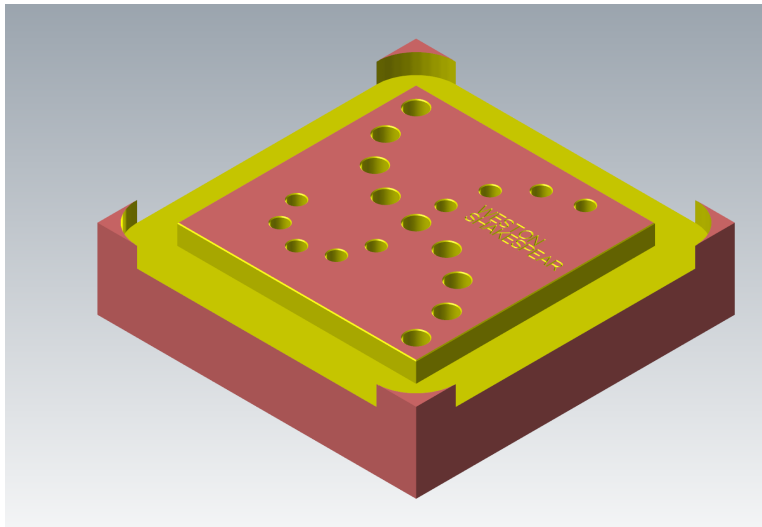## VII. Drill:

VII. Drill:

VIV. 2D Contour:

IX. 2D Chamfer Contour:

X. Final Solid:


XI. Method:

I drew the center rectangle, then used a combination of offsetting, circle, and polar copying to create the needed holes.

XII. GCode Changes:

To modify my gcode to be compatible with the machine I first made sure the HAAS 3 axis post processor was selected when exporting the gcode. Then I removed the long lines at the beginning and edited the last G28 home command to not zero the x axis.

XIII. Finished Part:
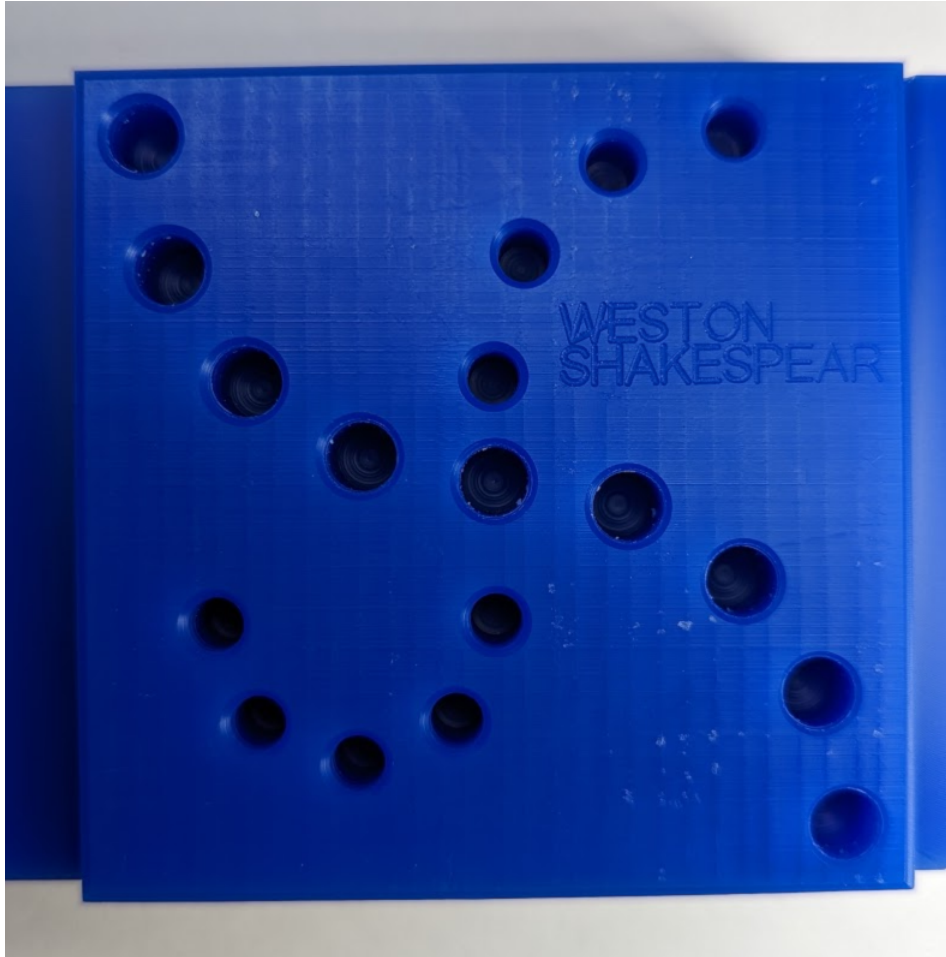
XIV. Gcode:

```
%
O33001
(WSHAKESPEAR_MILL LESSON 3A)
(DATE=DD-MM-YY - 03-02-23 TIME=HH:MM - 11:53)
(MCAM FILE - C:\USERS\WESTONSHAKESPEAR\DOWNLOADS\WSHAKESPEAR_MILL LESSON
3A.EMC)
(NC FILE - C:\USERS\WESTONSHAKESPEAR\DOWNLOADS\GCODE\WSHAKESPEAR_MILL LESSON
3A)
(MATERIAL - ALUMINUM INCH - 6061)
(T7|1/8 SPOTDRILL|H7|D7|TOOL DIA. - .125)
(T3|1/2 SPOTDRILL|H3|D3|TOOL DIA. - .5)
(T5|1/4 DRILL|H5|D5|TOOL DIA. - .25)
(T4|1/2 FLAT ENDMILL|H4|D4|TOOL DIA. - .5)
```

```
N100 G20
N110 G0 G17 G40 G49 G80 G90
N120 T7 M6
N130 G187 P3 E.001
N140 G0 G90 G54 X.2505 Y1.1221 S5000 M3
N150 G43 H7 Z.2
N160 Z.1
N170 G1 Z-.008 F1.1
N180 X.284 Y.9983 F40.
N190 X.3215 Y1.1221
N200 X.3261
N210 X.3636 Y.9983
N220 X.3971 Y1.1221
N230 Z.092 F1.1
N240 G0 Z.192
N250 Z.2
N260 X.4252 Y1.0628
N270 Z.1
N280 G1 Z-.008
N290 X.4996 F40.
N300 Z.092 F1.1
N310 G0 Z.192
N320 Z.2
N330 X.5321 Y1.0293
N340 Z.1
N350 G1 Z-.008
N360 X.5354 Y1.0205 F40.
N370 X.5409 Y1.0123
N380 X.55 Y1.0055
N390 X.5616 Y1.0014
N400 X.5745 Y1.
N410 X.5909 Y1.0022
N420 X.6036 Y1.0088
N430 X.6121 Y1.0185
N440 X.6153 Y1.0294
N450 X.6113 Y1.0421
N460 X.6091 Y1.0448
N470 X.6013 Y1.0512
N480 X.5902 Y1.056
N490 X.5565 Y1.0654
N500 X.5427 Y1.0736
N510 X.539 Y1.0776
```

```
N520 X.5352 Y1.0848
N530 X.5339 Y1.0929
N540 X.5372 Y1.1037
N550 X.546 Y1.1128
N560 X.5588 Y1.1186
N570 X.5745 Y1.1208
N580 X.5877 Y1.1195
N590 X.5994 Y1.1149
N600 X.6085 Y1.1072
N610 X.6142 Y1.0971
N620 Z.092 F1.1
N630 G0 Z.192
N640 Z.2
N650 X.644 Y1.1203
N660 Z.1
N670 G1 Z-.008
N680 X.7352 F40.
N690 Z.092 F1.1
N700 G0 Z.192
N710 Z.2
N720 X.6899
N730 Z.1
N740 G1 Z-.008
N750 Y.9983 F40.
N760 Z.092 F1.1
N770 G0 Z.192
N780 Z.2
N790 X.6918 Y.9721
N800 Z.1
N810 G1 Z-.008
N820 X.61 Y.8901 F40.
N830 Z.092 F1.1
N840 G0 Z.192
N850 Z.2
N860 Y.8483
N870 Z.1
N880 G1 Z-.008
N890 Y.9721 F40.
N900 Z.092 F1.1
N910 G0 Z.192
N920 Z.2
N930 X.6434 Y.9235
```

```
N940 Z.1
N950 G1 Z-.008
N960 X.6959 Y.8483 F40.
N970 Z.092 F1.1
N980 G0 Z.192
N990 Z.2
N1000 X.7236 Y.9128
N1010 Z.1
N1020 G1 Z-.008
N1030 X.798 F40.
N1040 Z.092 F1.1
N1050 G0 Z.192
N1060 Z.2
N1070 X.8305 Y.8793
N1080 Z.1
N1090 G1 Z-.008
N1100 X.8339 Y.8705 F40.
N1110 X.8393 Y.8623
N1120 X.8484 Y.8555
N1130 X.86 Y.8514
N1140 X.8729 Y.85
N1150 X.8893 Y.8522
N1160 X.902 Y.8588
N1170 X.9105 Y.8685
N1180 X.9137 Y.8794
N1190 X.9097 Y.8921
N1200 X.9075 Y.8948
N1210 X.8998 Y.9012
N1220 X.8887 Y.906
N1230 X.855 Y.9154
N1240 X.8411 Y.9236
N1250 X.8374 Y.9276
N1260 X.8336 Y.9348
N1270 X.8323 Y.9429
N1280 X.8356 Y.9537
N1290 X.8445 Y.9628
N1300 X.8572 Y.9686
N1310 X.8729 Y.9708
N1320 X.8861 Y.9695
N1330 X.8978 Y.9649
N1340 X.9069 Y.9572
N1350 X.9126 Y.9471
```

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N1360 Z.092 F1.1
N1370 G0 Z.192
N1380 Z.2
N1390 X.9422 Y.9058
N1400 Z.1
N1410 G1 Z-.008
N1420 X.9898 F40.
N1430 X1.0029 Y.9079
N1440 X1.0152 Y.9143
N1450 X1.0241 Y.9246
N1460 X1.0276 Y.938
N1470 X1.0241 Y.9515
N1480 X1.0152 Y.9619
N1490 X1.0029 Y.9683
N1500 X.9898 Y.9703
N1510 X.9422
N1520 Y.8483
N1530 Z.092 F1.1
N1540 G0 Z.192
N1550 Z.2
N1560 X1.0559 Y.9128
N1570 Z.1
N1580 G1 Z-.008
N1590 X1.1303 F40.
N1600 Z.092 F1.1
N1610 G0 Z.192
N1620 Z.2
N1630 X1.1798 Y.8901
N1640 Z.1
N1650 G1 Z-.008
N1660 X1.2451 F40.
N1670 Z.092 F1.1
N1680 G0 Z.192
N1690 Z.2
N1700 X1.2625 Y.8483
N1710 Z.1
N1720 G1 Z-.008
N1730 X1.2124 Y.9721 F40.
N1740 X1.1624 Y.8483
N1750 Z.092 F1.1
N1760 G0 Z.192
N1770 Z.2
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N1780 X1.1349 Y.85
N1790 Z.1
N1800 G1 Z-.008
N1810 X1.0559 F40.
N1820 Y.9703
N1830 X1.1349
N1840 Z.092 F1.1
N1850 G0 Z.192
N1860 Z.2
N1870 X1.2907 Y.9057
N1880 Z.1
N1890 G1 Z-.008
N1900 X1.346 F40.
N1910 X1.3589 Y.9079
N1920 X1.3698 Y.9144
N1930 X1.3774 Y.9247
N1940 X1.3803 Y.9379
N1950 X1.3774 Y.9512
N1960 X1.3698 Y.9612
N1970 X1.3589 Y.9677
N1980 X1.346 Y.9702
N1990 X1.2907
N2000 Y.8483
N2010 Z.092 F1.1
N2020 G0 Z.192
N2030 Z.2
N2040 X1.3388 Y.9057
N2050 Z.1
N2060 G1 Z-.008
N2070 X1.3522 Y.8982 F40.
N2080 X1.3623 Y.8866
N2090 X1.3869 Y.8483
N2100 Z.092 F1.1
N2110 G0 Z.192
N2120 Z.2
N2130 X.9905 Y1.1221
N2140 Z.1
N2150 G1 Z-.008
N2160 Y.9983 F40.
N2170 X.9034 Y1.1221
N2180 Y.9983
N2190 Z.092 F1.1
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N2200 G0 Z.192
N2210 Z.2
N2220 X.8752 Y1.0599
N2230 Z.1
N2240 G1 Z-.008
N2250 X.8712 Y1.0827 F40.
N2260 X.8708 Y1.0838
N2270 X.8655 Y1.0943
N2280 X.8586 Y1.1033
N2290 X.8408 Y1.1165
N2300 X.8304 Y1.1203
N2310 X.8194 Y1.1215
N2320 X.7995 Y1.1175
N2330 X.7973 Y1.1165
N2340 X.7796 Y1.1033
N2350 X.7674 Y1.0838
N2360 X.764 Y1.0721
N2370 X.7629 Y1.0599
N2380 X.7669 Y1.0374
N2390 X.7674 Y1.0362
N2400 X.7796 Y1.0167
N2410 X.7879 Y1.0091
N2420 X.7973 Y1.0035
N2430 X.8079 Y1.
N2440 X.8194 Y.9988
N2450 X.8392 Y1.0028
N2460 X.8408 Y1.0035
N2470 X.8503 Y1.0091
N2480 X.8586 Y1.0167
N2490 X.8708 Y1.0362
N2500 X.8741 Y1.0476
N2510 X.8752 Y1.0599
N2520 Z.092 F1.1
N2530 G0 Z.192
N2540 Z.2
N2550 X.8026 Y.9703
N2560 Z.1
N2570 G1 Z-.008
N2580 X.7236 F40.
N2590 Y.85
N2600 X.8026
N2610 Z.092 F1.1
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N2620 G0 Z.192
N2630 Z.2
N2640 X.5817 Y.8483
N2650 Z.1
N2660 G1 Z-.008
N2670 X.5317 Y.9721 F40.
N2680 X.4816 Y.8483
N2690 Z.092 F1.1
N2700 G0 Z.192
N2710 Z.2
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N2730 Z.1
N2740 G1 Z-.008
N2750 Y.9721 F40.
N2760 Z.092 F1.1
N2770 G0 Z.192
N2780 Z.2
N2790 X.5042 Y1.
N2800 Z.1
N2810 G1 Z-.008
N2820 X.4252 F40.
N2830 Y1.1203
N2840 X.5042
N2850 Z.092 F1.1
N2860 G0 Z.192
N2870 Z.2
N2880 X.3628 Y.9721
N2890 Z.1
N2900 G1 Z-.008
N2910 Y.8483 F40.
N2920 Z.092 F1.1
N2930 G0 Z.192
N2940 Z.2
N2950 Y.9128
N2960 Z.1
N2970 G1 Z-.008
N2980 X.4535 F40.
N2990 Z.092 F1.1
N3000 G0 Z.192
N3010 Z.2
N3020 X.499 Y.8901
N3030 Z.1
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N3040 G1 Z-.008
N3050 X.5643 F40.
N3060 Z.092 F1.1
N3070 G0 Z.192
N3080 Z.2
N3090 X.3331 Y.9471
N3100 Z.1
N3110 G1 Z-.008
N3120 X.3274 Y.9572 F40.
N3130 X.3183 Y.9649
N3140 X.3066 Y.9695
N3150 X.2934 Y.9708
N3160 X.2777 Y.9686
N3170 X.2649 Y.9628
N3180 X.2561 Y.9537
N3190 X.2528 Y.9429
N3200 X.2568 Y.9291
N3210 X.2579 Y.9276
N3220 X.2699 Y.918
N3230 X.2754 Y.9154
N3240 X.3091 Y.906
N3250 X.3237 Y.8988
N3260 X.328 Y.8948
N3270 X.3336 Y.8843
N3280 X.3342 Y.8794
N3290 X.331 Y.8685
N3300 X.3225 Y.8588
N3310 X.3098 Y.8522
N3320 X.2934 Y.85
N3330 X.2805 Y.8514
N3340 X.2689 Y.8555
N3350 X.2598 Y.8623
N3360 X.2543 Y.8705
N3370 X.251 Y.8793
N3380 Z.092 F1.1
N3390 G0 Z.2
N3400 M5
N3410 G91 G28 Z0.
N3420 M01
N3430 T3 M6
N3440 G187 P3 E.001
N3450 G0 G90 G54 X-1. Y1.125 S5000 M3
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N3460 G43 H3 Z.2
N3470 M8
N3480 G99 G81 Z-.135 R.2 F20.
N3490 X-.5625 Y1.0078
N3500 X-.2422 Y.6875
N3510 X-.125 Y.25
N3520 X-1.
N3530 X.25 Y-.25
N3540 Y-1.125
N3550 X.6875 Y-1.0078
N3560 X1.0078 Y-.6875
N3570 X1.125 Y-.25
N3580 G80
N3590 M5
N3600 G91 G28 Z0. M9
N3610 M01
N3620 T5 M6
N3630 G187 P3 E.001
N3640 G0 G90 G54 X-1. Y1.125 S5000 M3
N3650 G43 H5 Z.2
N3660 M8
N3670 G99 G81 Z-.4 R.2 F20.
N3680 X-.5625 Y1.0078
N3690 X-.2422 Y.6875
N3700 X-.125 Y.25
N3710 X-1.
N3720 X.25 Y-.25
N3730 Y-1.125
N3740 X.6875 Y-1.0078
N3750 X1.0078 Y-.6875
N3760 X1.125 Y-.25
N3770 G80
N3780 M5
N3790 G91 G28 Z0. M9
N3800 M01
N3810 T4 M6
N3820 G187 P3 E.001
N3830 G0 G90 G54 X-2.75 Y-.5 S5000 M3
N3840 G43 H4 Z.25
N3850 M8
N3860 Z.2
N3870 G1 Z-.25 F6.4
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N3880 X-2.25 F40.
N3890 G3 X-1.75 Y0. I0. J.5
N3900 G1 Y1.5
N3910 G2 X-1.5 Y1.75 I.25 J0.
N3920 G1 X1.5
N3930 G2 X1.75 Y1.5 I0. J-.25
N3940 G1 Y-1.5
N3950 G2 X1.5 Y-1.75 I-.25 J0.
N3960 G1 X-1.5
N3970 G2 X-1.75 Y-1.5 I0. J.25
N3980 G1 Y0.
N3990 G3 X-2.25 Y.5 I-.5 J0.
N4000 G1 X-2.75
N4010 Z-.05 F6.4
N4020 G0 Z.25
N4030 M5
N4040 G91 G28 Z0. M9
N4050 M01
N4060 T3 M6
N4070 G187 P3 E.001
N4080 G0 G90 G54 X.5 Y-2.51 S5000 M3
N4090 G43 H3 Z.25
N4100 M8
N4110 Z.2
N4120 G1 Z-.02 F6.4
N4130 Y-2.01 F40.
N4140 G3 X0. Y-1.51 I-.5 J0.
N4150 G1 X-1.5
N4160 G2 X-1.51 Y-1.5 I0. J.01
N4170 G1 Y1.5
N4180 G2 X-1.5 Y1.51 I.01 J0.
N4190 G1 X1.5
N4200 G2 X1.51 Y1.5 I0. J-.01
N4210 G1 Y-1.5
N4220 G2 X1.5 Y-1.51 I-.01 J0.
N4230 G1 X0.
N4240 G3 X-.5 Y-2.01 I0. J-.5
N4250 G1 Y-2.51
N4260 Z.18 F6.4
N4270 G0 Z.25
N4280 M5
N4290 G91 G28 Z0. M9
```

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N4300 G28 X0. Y0.
N4310 M30
%
```