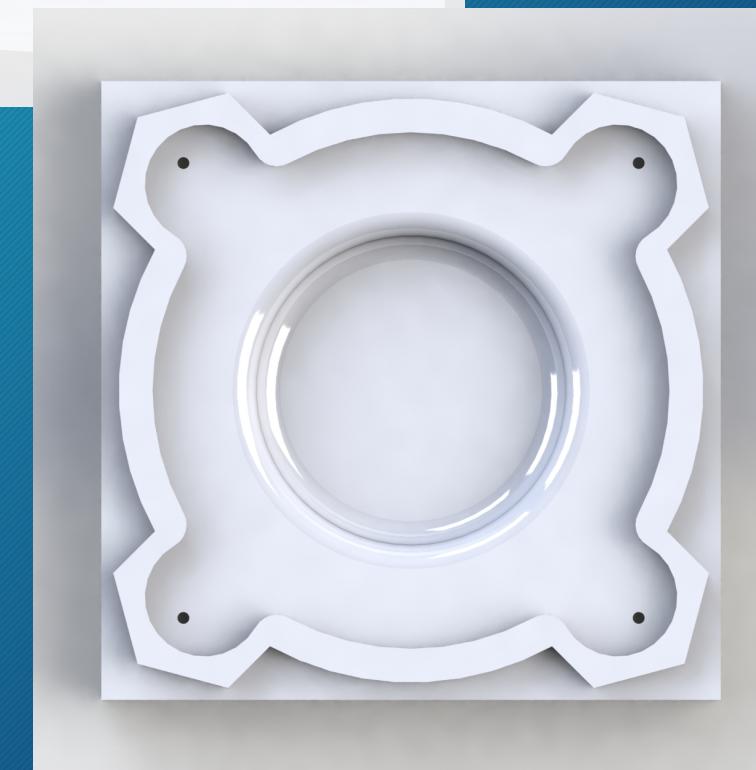
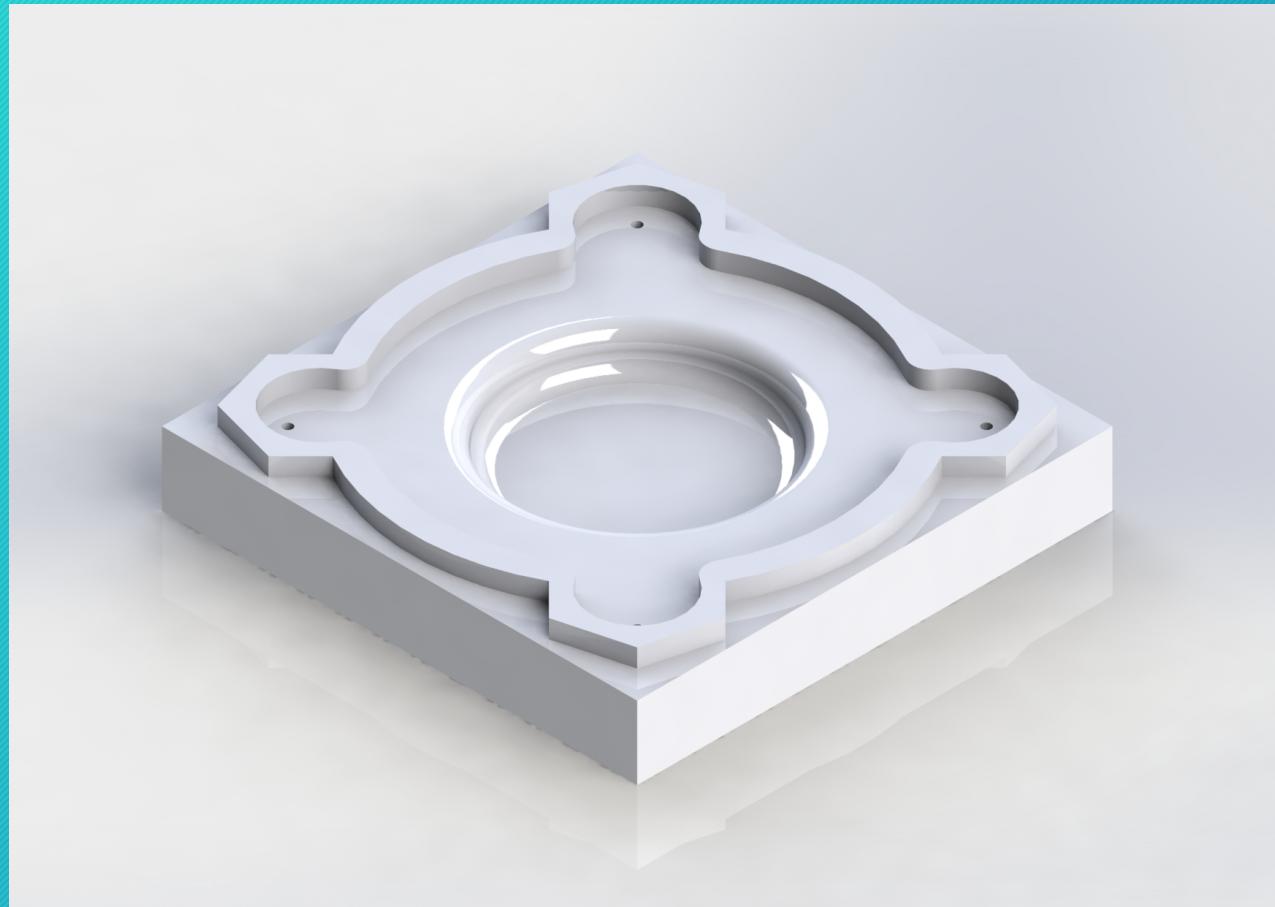


Arena CAD/CAM

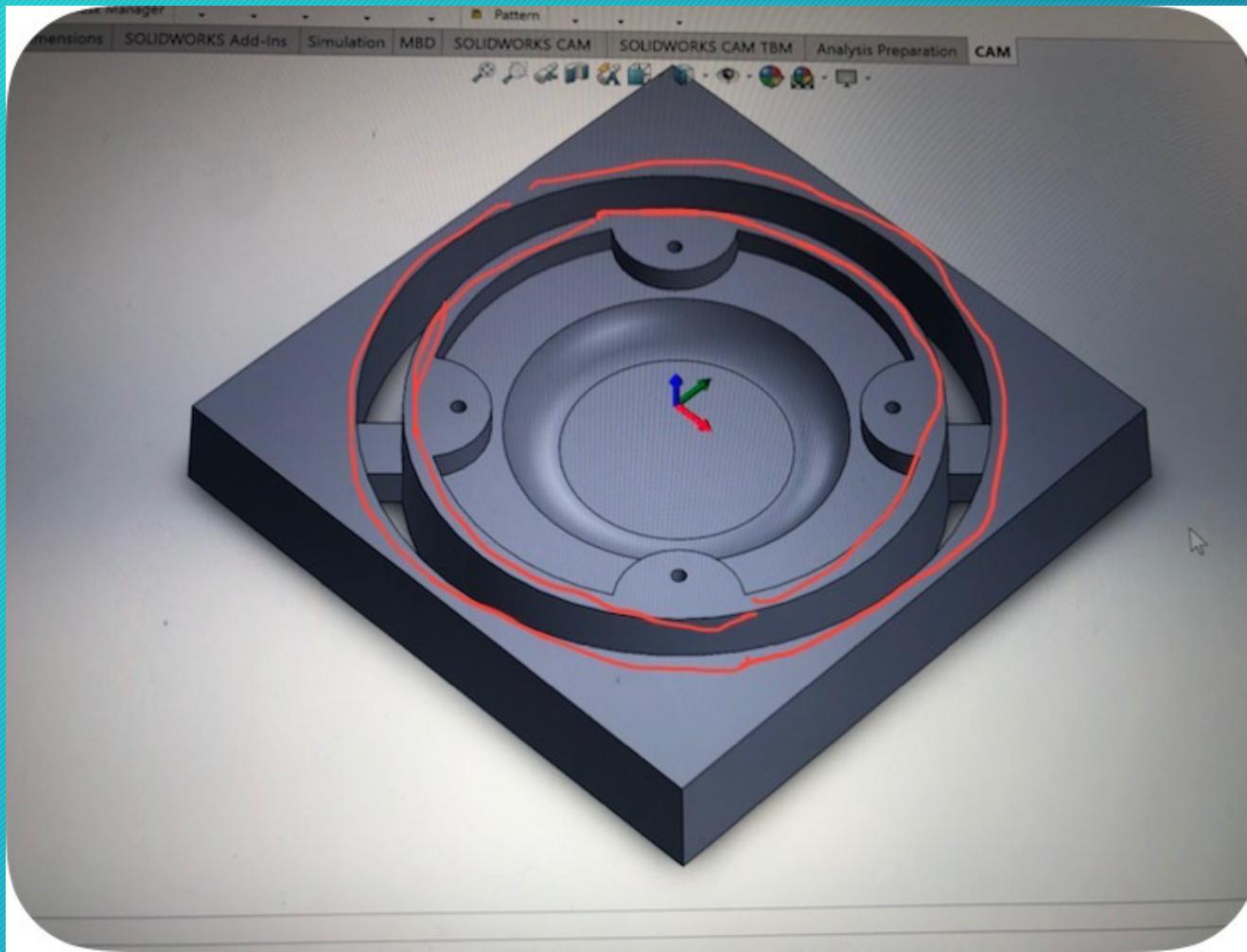
Omar Elsewify
October 27th, 2020



Final Design



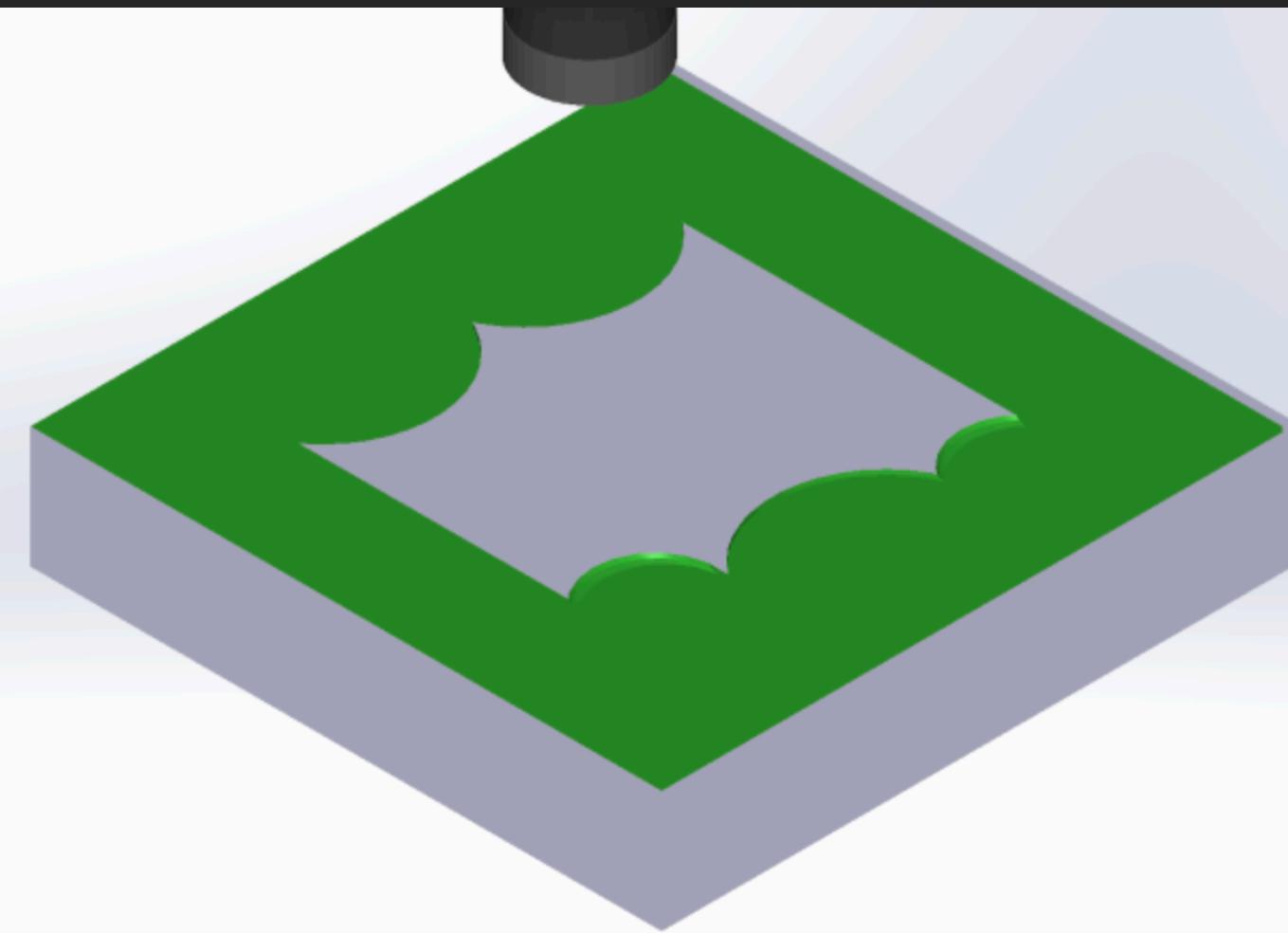
Design Decisions



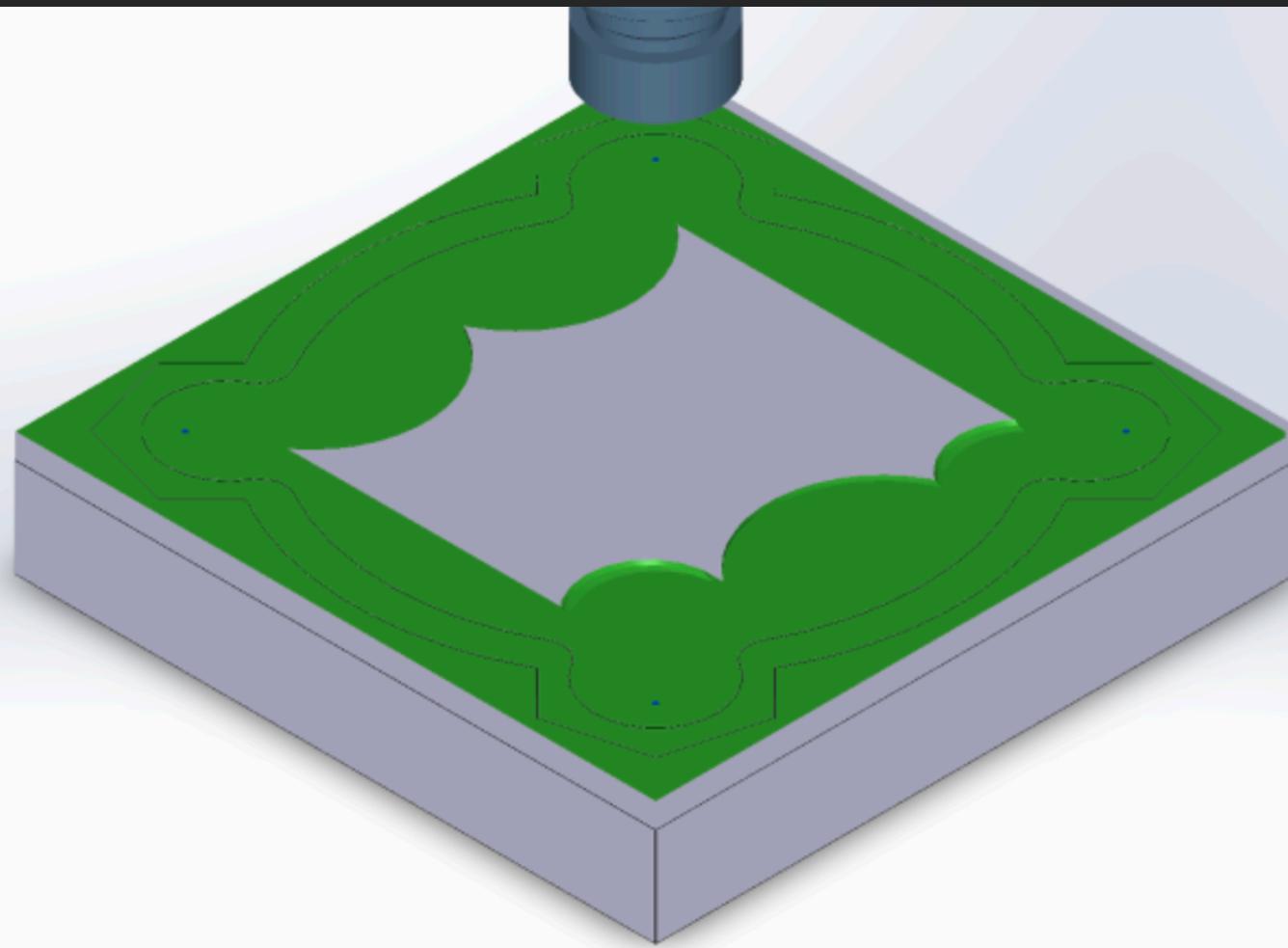
- Too time consuming
- Tools would collide with stock
- Waste of material

I also considered making a stepped cut to make sure the tool won't collide, but it was just too time consuming

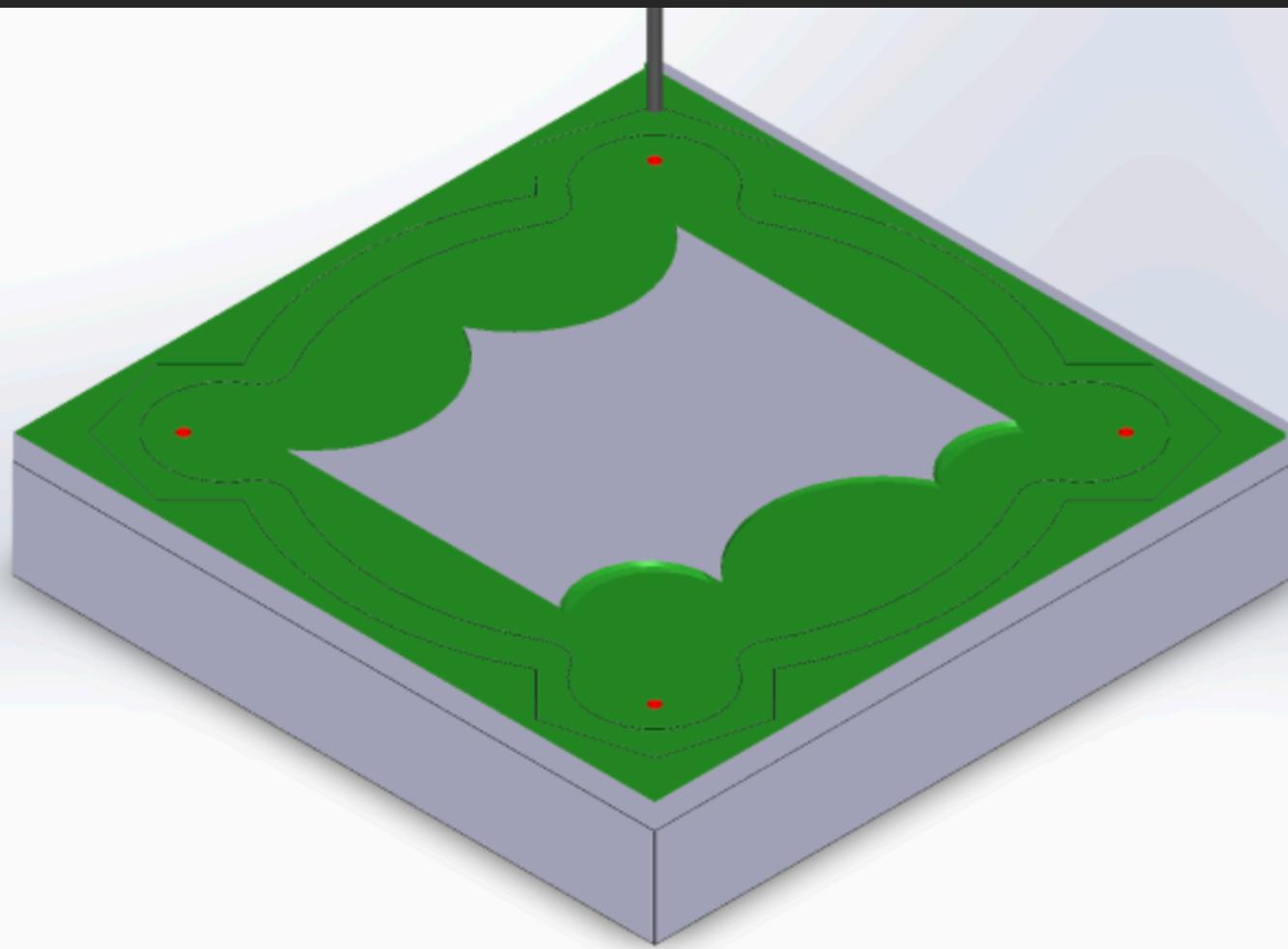
FACE operation



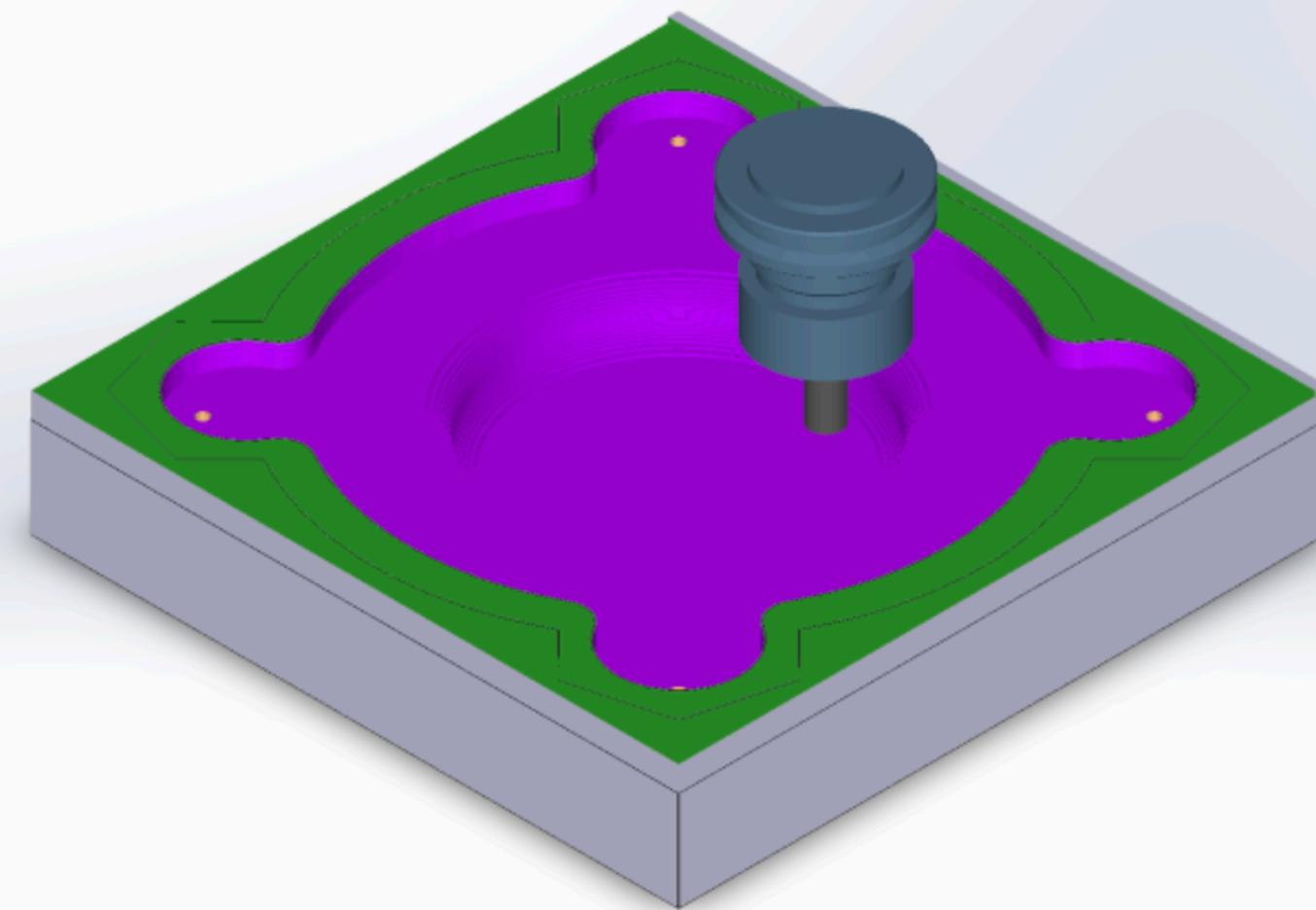
Center Drill operation



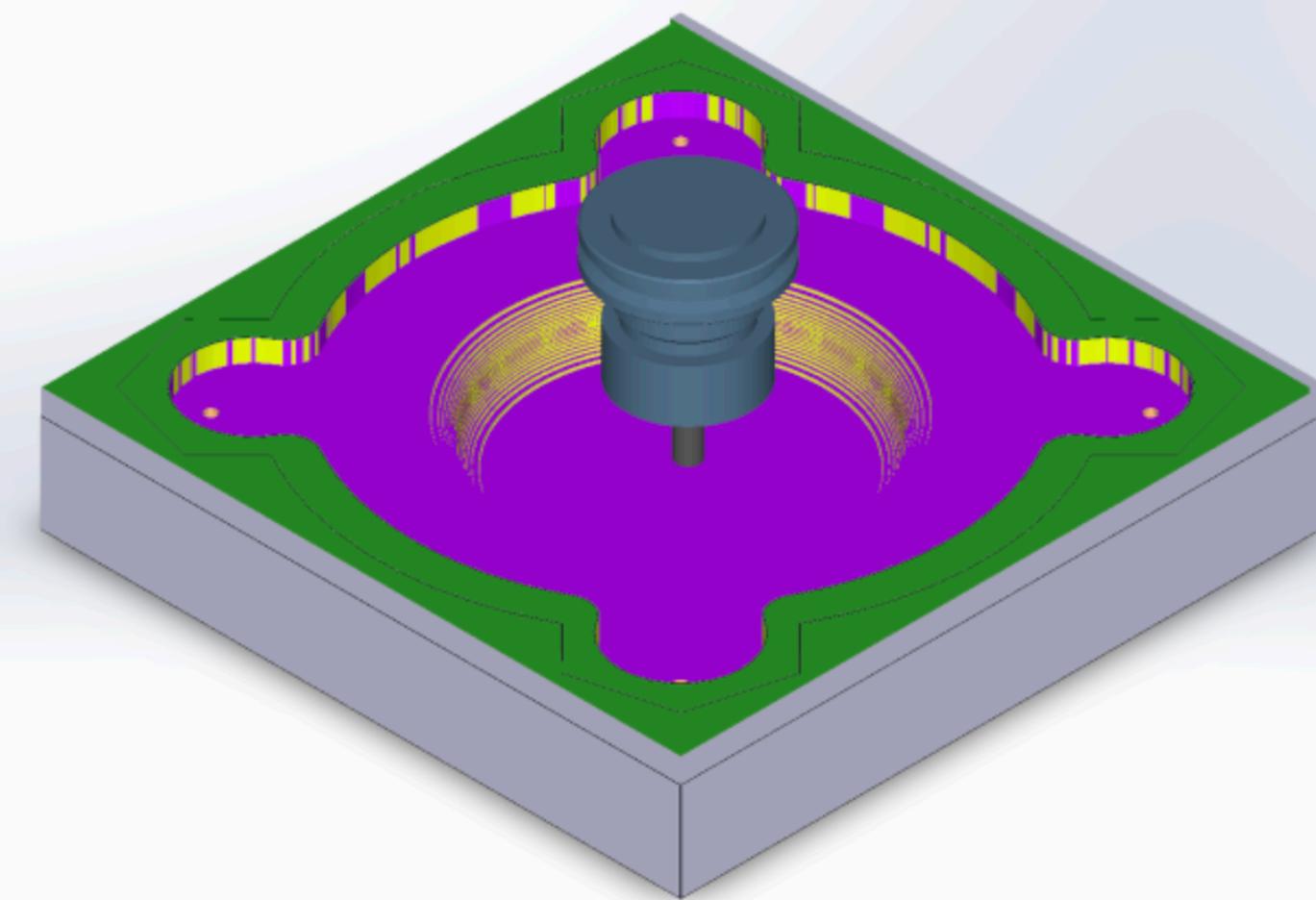
Spot Drill Operation



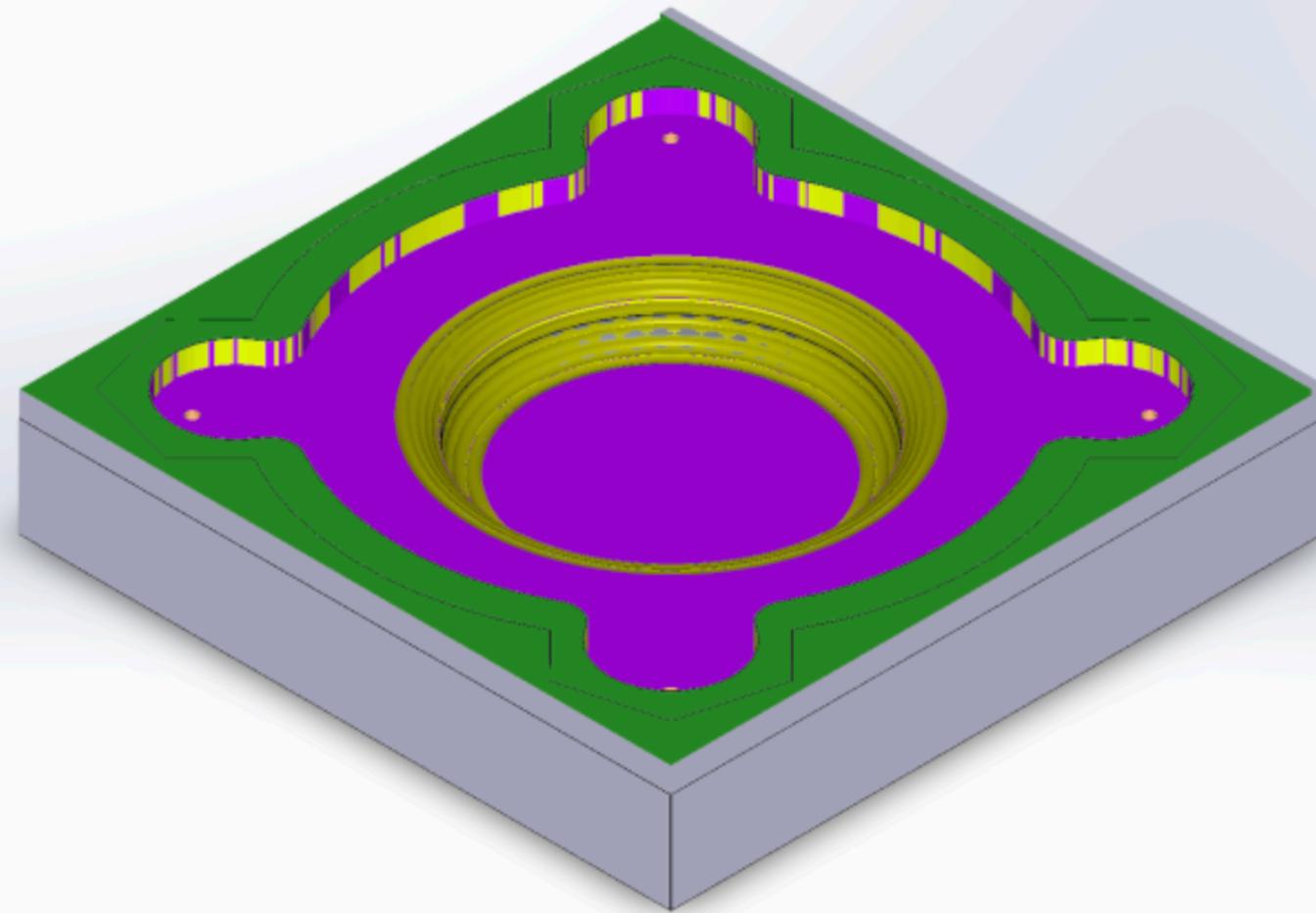
Adaptive Clearing #1 - Flat End Mill



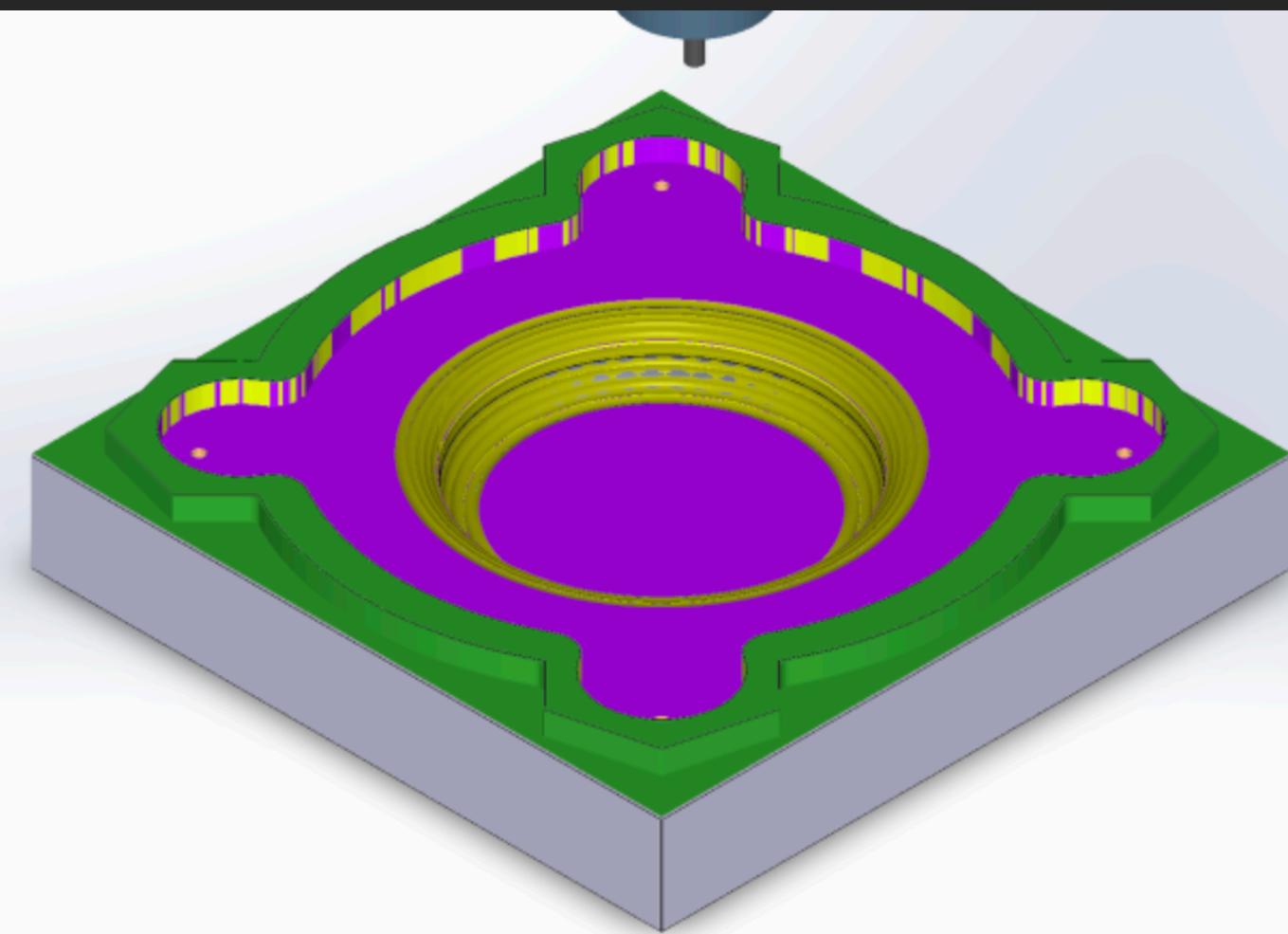
Adaptive Clearing #2 - Bullnose



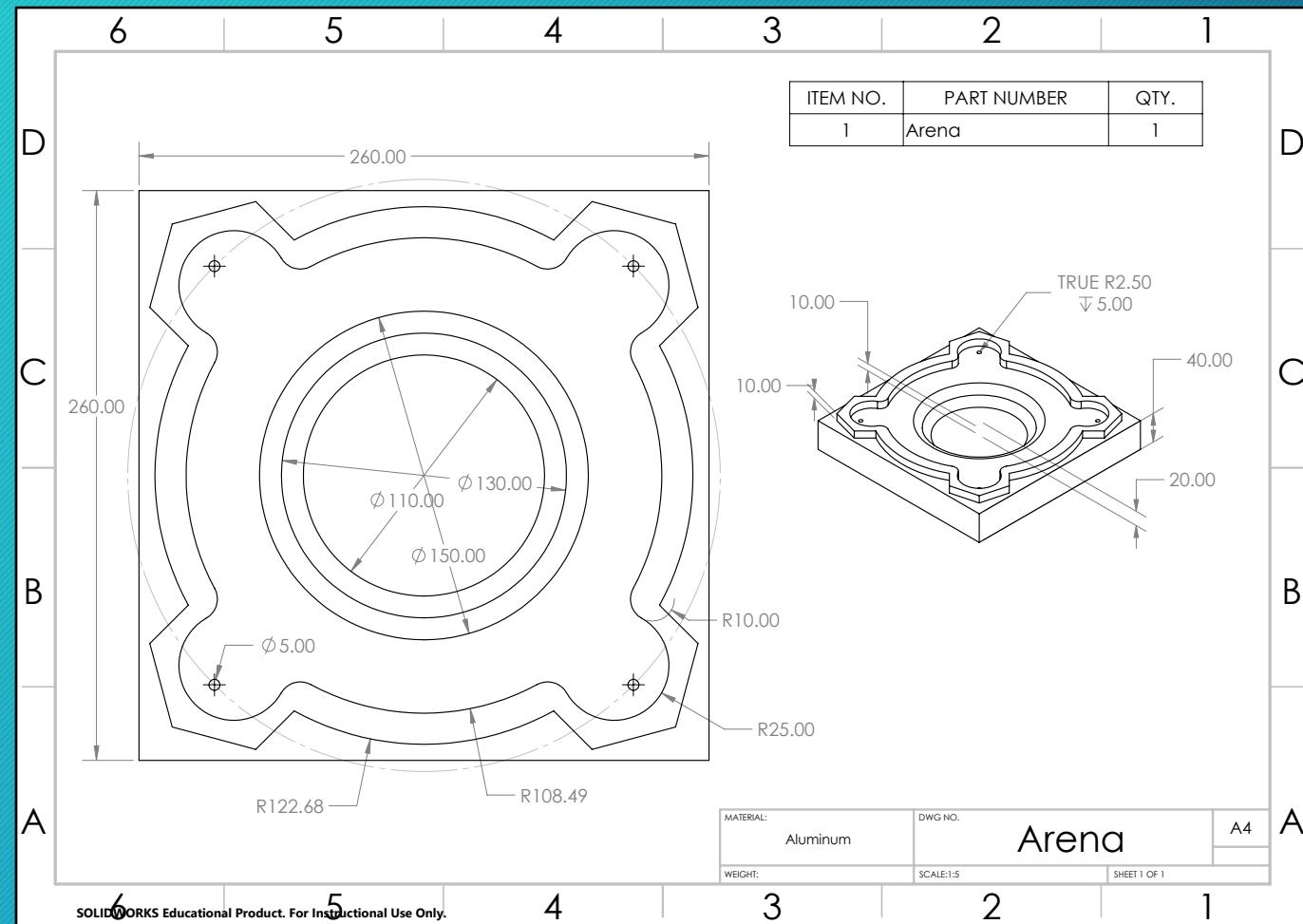
Scallop - Ball End Mill



Adaptive Clearing #3 - Flat End Mill



SolidWorks DRAWING



Stock Setup

WCS: #0

STOCK:

DX: 260mm
DY: 260mm
DZ: 52mm

PART:

DX: 260mm
DY: 260mm
DZ: 50mm

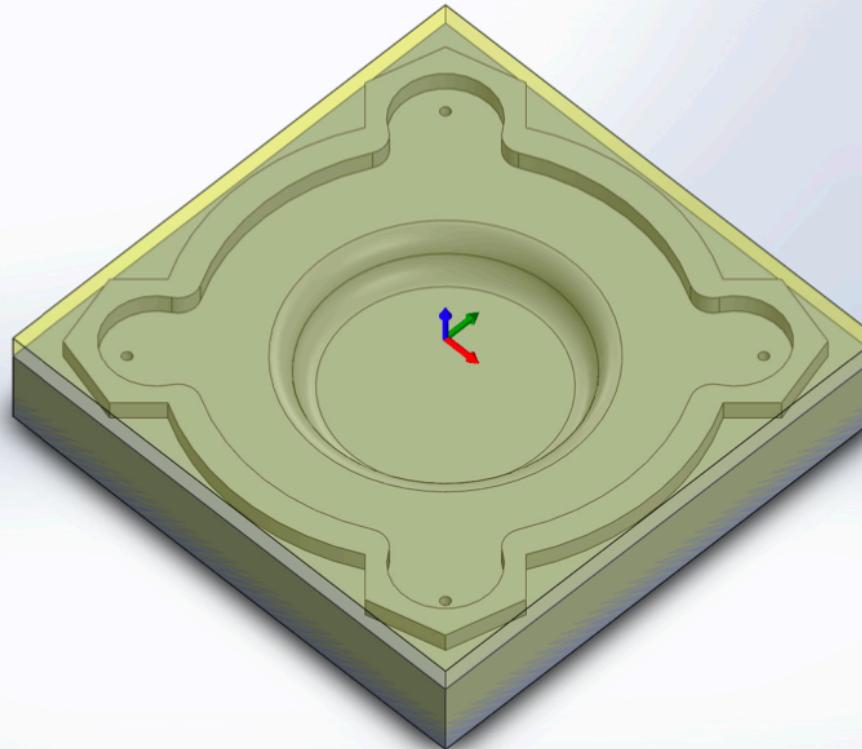
STOCK LOWER IN WCS #0:

X: -130mm
Y: -130mm
Z: -52mm

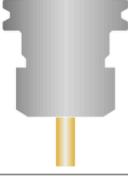
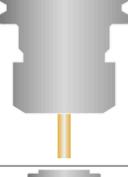
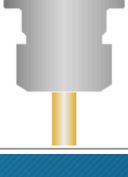
STOCK UPPER IN WCS #0:

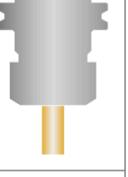
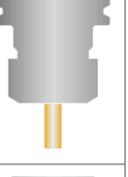
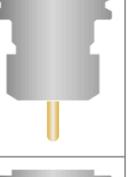
X: 130mm
Y: 130mm
Z: 0mm

Setup



Tool List and Operations

| Tools | | | |
|---|---|---|---|
| T1 D1 L1 Type: face mill Diameter: 50.8mm Length: 39.7mm Flutes: 5 Description: 2" Face Mill Vendor: Maritool Product: MSAP16-D050A05R-25.4 | Minimum Z: -2mm Maximum Feed: 1651mm/min Maximum Spindle Speed: 6500rpm Cutting Distance: 1319.78mm Rapid Distance: 331.49mm Estimated Cycle Time: 52s (2.8%) | Holder: Maritool CAT40-FMA1.0-1.5M Comment: Maritool CAT40-FMA1.0-1.5M Vendor: Maritool Product: CAT40-FMA1.0-1.5M |  |
| T3 D3 L3 Type: bullnose end mill Diameter: 9.52mm Corner Radius: 0.38mm Length: 24.76mm Flutes: 3 Description: 3/8" Bullnose Endmill | Minimum Z: -31mm Maximum Feed: 2286mm/min Maximum Spindle Speed: 3056rpm Cutting Distance: 8483.41mm Rapid Distance: 2718.15mm Estimated Cycle Time: 4m:15s (13.6%) | Holder: Maritool CAT40-ER32-2.35 Comment: Maritool CAT40-ER32-2.35 Vendor: Maritool Product: CAT40-ER32-2.35 |  |
| T4 D4 L4 Type: center drill Diameter: 4.76mm Tip Angle: 118° Length: 9.47mm Flutes: 2 Description: #2 Center Drill | Minimum Z: -4mm Maximum Feed: 736.6mm/min Maximum Spindle Speed: 6110rpm Cutting Distance: 28mm Rapid Distance: 637.32mm Estimated Cycle Time: 10s (0.5%) | Holder: Maritool CAT40-ER32-2.35 Comment: Maritool CAT40-ER32-2.35 Vendor: Maritool Product: CAT40-ER32-2.35 |  |
| T5 D5 L5 Type: ball end mill Diameter: 6.35mm Length: 21.59mm Flutes: 3 Description: 1/4" Ball Endmill | Minimum Z: -31.98mm Maximum Feed: 1524mm/min Maximum Spindle Speed: 4584rpm Cutting Distance: 4160.65mm Rapid Distance: 71.34mm Estimated Cycle Time: 2m:45s (8.8%) | Holder: Maritool CAT40-ER32-2.35 Comment: Maritool CAT40-ER32-2.35 Vendor: Maritool Product: CAT40-ER32-2.35 |  |
| T8 D8 L8 Type: flat end mill Diameter: 6.35mm Length: 21.59mm Flutes: 3 Description: 1/4" Flat Endmill | Minimum Z: -11mm Maximum Feed: 1524mm/min Maximum Spindle Speed: 4584rpm Cutting Distance: 14575.72mm Rapid Distance: 7180.33mm Estimated Cycle Time: 11m:0s (35.1%) | Holder: Maritool CAT40-ER32-2.35 Comment: Maritool CAT40-ER32-2.35 Vendor: Maritool Product: CAT40-ER32-2.35 |  |
| T9 D9 L9 Type: drill Diameter: 4.76mm Tip Angle: 118° Length: 50.16mm Flutes: 1 Description: 3/16 | Minimum Z: -22mm Maximum Feed: 736.6mm/min Maximum Spindle Speed: 6110rpm Cutting Distance: 60mm Rapid Distance: 749.32mm Estimated Cycle Time: 14s (0.7%) | Holder: Maritool CAT40-APU13 Drill Chuck Comment: Maritool CAT40-APU13 Vendor: Maritool Product: CAT40-APU13 |  |
| T10 D10 L10 Type: flat end mill Diameter: 12.7mm Length: 27.94mm Flutes: 3 Description: 1/2" Flat Endmill | Minimum Z: -31mm Maximum Feed: 2336.8mm/min Maximum Spindle Speed: 2292rpm Cutting Distance: 22538.8mm Rapid Distance: 3348.72mm Estimated Cycle Time: 10m:19s (32.9%) | Holder: Maritool CAT40-ER32-2.35 Comment: Maritool CAT40-ER32-2.35 Vendor: Maritool Product: CAT40-ER32-2.35 |  |

| Operations | | | |
|---|---|---|--|
| Operation 1/7 Description: Face2 Strategy: Facing WCS: #0 Tolerance: 0.01mm Maximum Stepover: 48.26mm Maximum Z: 15mm Minimum Z: -2mm Maximum Spindle Speed: 6500rpm Maximum Feedrate: 1651mm/min Cutting Distance: 1319.78mm Rapid Distance: 331.49mm Estimated Cycle Time: 52s (2.8%) Coolant: Flood | T1 D1 L1 Type: face mill Diameter: 50.8mm Length: 39.7mm Flutes: 5 Description: 2" Face Mill Vendor: Maritool Product: MSAP16-D050A05R-25.4 |  | |
| Operation 2/7 Description: Drill1 Strategy: Drilling WCS: #0 Tolerance: 0.01mm Maximum Z: 15mm Minimum Z: -4mm Maximum Spindle Speed: 6110rpm Maximum Feedrate: 736.6mm/min Cutting Distance: 28mm Rapid Distance: 637.32mm Estimated Cycle Time: 10s (0.5%) Coolant: Flood | T4 D4 L4 Type: center drill Diameter: 4.76mm Tip Angle: 118° Length: 9.47mm Flutes: 2 Description: #2 Center Drill |  | |
| Operation 3/7 Description: Drill2 Strategy: Drilling WCS: #0 Tolerance: 0.01mm Maximum Z: 15mm Minimum Z: -22mm Maximum Spindle Speed: 6110rpm Maximum Feedrate: 736.6mm/min Cutting Distance: 60mm Rapid Distance: 749.32mm Estimated Cycle Time: 14s (0.7%) Coolant: Flood | T9 D9 L9 Type: drill Diameter: 4.76mm Tip Angle: 118° Length: 50.16mm Flutes: 1 Description: 3/16 |  | |
| Operation 4/7 Description: Adaptive2 Strategy: Adaptive WCS: #0 Tolerance: 0.1mm Stock to Leave: 0.5mm Maximum Stepdown: 10mm Optimal Load: 5.08mm Load Deviation: 0.51mm Maximum Z: 15mm Minimum Z: -31mm Maximum Spindle Speed: 2292rpm Maximum Feedrate: 2336.8mm/min Cutting Distance: 22538.8mm Rapid Distance: 3348.72mm Estimated Cycle Time: 10m:19s (32.9%) Coolant: Flood | T10 D10 L10 Type: flat end mill Diameter: 12.7mm Length: 27.94mm Flutes: 3 Description: 1/2" Flat Endmill |  | |
| Operation 5/7 Description: Adaptive3 Strategy: Adaptive WCS: #0 Tolerance: 0.1mm Stock to Leave: 0.5mm Maximum Stepdown: 10mm Optimal Load: 3.81mm Load Deviation: 0.38mm Maximum Z: 15mm Minimum Z: -31mm Maximum Spindle Speed: 3056rpm Maximum Feedrate: 2286mm/min Cutting Distance: 8483.41mm Rapid Distance: 2718.15mm Estimated Cycle Time: 4m:15s (13.6%) Coolant: Flood | T3 D3 L3 Type: bullnose end mill Diameter: 9.52mm Corner Radius: 0.38mm Length: 24.76mm Flutes: 3 Description: 3/8" Bullnose Endmill |  | |
| Operation 6/7 Description: Scallop1 Strategy: Scallop WCS: #0 Tolerance: 0.01mm Stock to Leave: 0mm Maximum Stepover: 3.17mm Maximum Z: 15mm Minimum Z: -31.98mm Maximum Spindle Speed: 4584rpm Maximum Feedrate: 1524mm/min Cutting Distance: 4160.65mm Rapid Distance: 71.34mm Estimated Cycle Time: 2m:45s (8.8%) Coolant: Flood | T5 D5 L5 Type: ball end mill Diameter: 6.35mm Length: 21.59mm Flutes: 3 Description: 1/4" Ball Endmill |  | |
| Operation 7/7 Description: Adaptive7 Strategy: Adaptive WCS: #0 Tolerance: 0.1mm Stock to Leave: 0.5mm Maximum Stepdown: 10mm Optimal Load: 2.54mm Load Deviation: 0.25mm Maximum Z: 15mm Minimum Z: -11mm Maximum Spindle Speed: 4584rpm Maximum Feedrate: 1524mm/min Cutting Distance: 14575.72mm Rapid Distance: 7180.33mm Estimated Cycle Time: 11m:0s (35.1%) Coolant: Flood | T8 D8 L8 Type: flat end mill Diameter: 6.35mm Length: 21.59mm Flutes: 3 Description: 1/4" Flat Endmill |  | |

G-Code

```
1 |: (PGM, NAME="1")
2 ; T1 D=50.8 CR=0 - ZMIN=-2 - FACE MILL
3 ; T3 D=9.525 CR=0.381 - ZMIN=-31 - BULLNOSE END MILL
4 ; T4 D=4.762 CR=0 TAPER=118DEG - ZMIN=-4 - CENTER DRILL
5 ; T5 D=6.35 CR=0 - ZMIN=-31.977 - BALL END MILL
6 ; T8 D=6.35 CR=0 - ZMIN=-11 - FLAT END MILL
7 ; T9 D=4.762 CR=0 TAPER=118DEG - ZMIN=-22 - DRILL
8 ; T10 D=12.7 CR=0 - ZMIN=-31 - FLAT END MILL
9 : G90 G40 G94
10 G17
11 G71
12 M26
13 ; FACE2
14 M26
15 :T1 M6
16 M26
17 :T4
18 S6500 M3
19 H0
20 M8
21 G0 X150.569 Y-108.2
22 Z15
23 Z5
24 G1 Z3.08 F1651
25 G18 G3 X145.489 Z-2 I145.489 K3.08
26 G1 X123.369
27 X-123.369
28 X-125
29 G17 G2 Y-66.482 I-125 J-87.341
30 G1 X-94.199
31 G3 Y-24.765 I-94.199 J-45.624
```