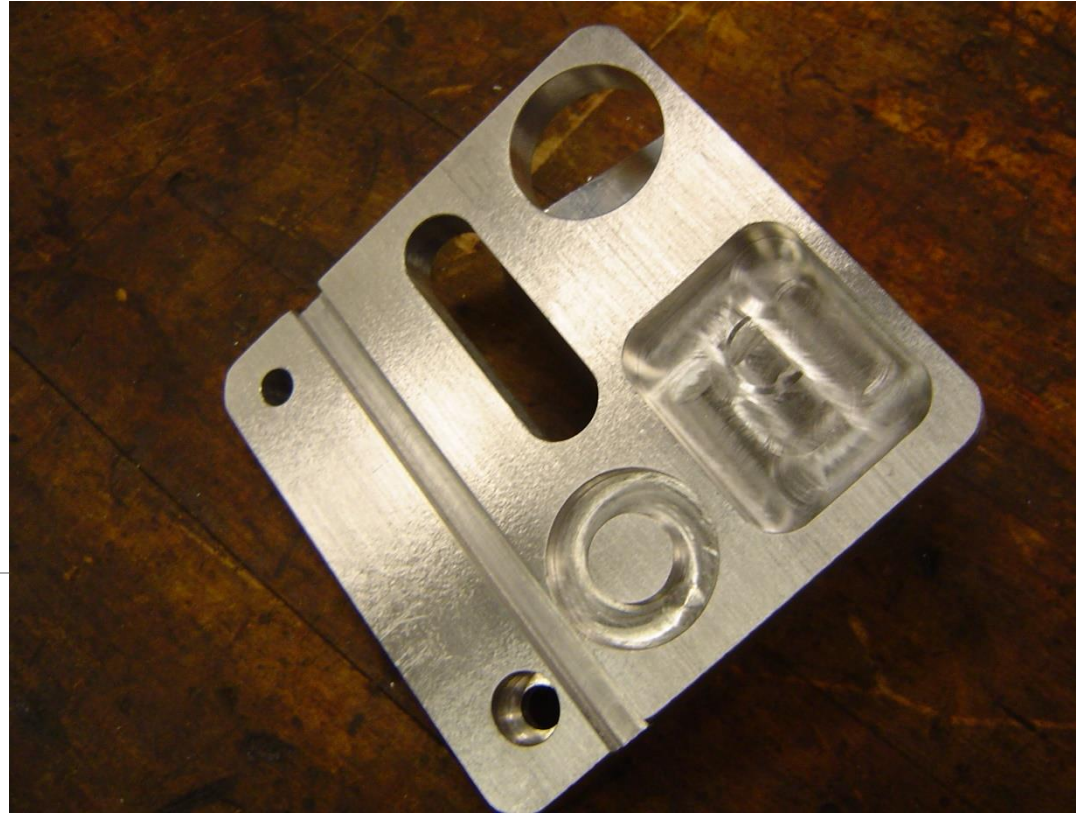


MEEG 301 Shop Project



MR. NELSON

MR. RICKETTS

Requirements to work in the shop

- You MUST have completed the 3 online training modules, and watched the **five videos** on the shop website.
- You MUST have passed the online Machine Shop and Hand and Power Tools quiz on or after September 1st 2018.
- If you haven't done both of these, The ProWatch card swipe system on the door will NOT let you into the shop.
- If you are not sure if you have completed both of these, you can check your FOM account, or contact Mr. Nelson or Mr. Ricketts in the shop.

Additional Information

- Be on time for your appointment! If you are more than 5 minutes late, you will be marked as late. If you are more than 15 minutes late, you will have to reschedule.
- Bring 2 copies of your signed drawings with you. One is for you to work from, and one goes in our file. You will also need a screenshot of your online Prototrak program.
- Before your appointment, review the Shop Procedures and Milling Machine operation. Also look at the 5 CNC Basics training videos. This is all available on our webpage.
- <http://sites.udel.edu/studentshop/>

Features you can choose from.

Circle Pocket

The .500 cutter will start in the middle and remove all the material inside the circle. The hole will be through.

Slot

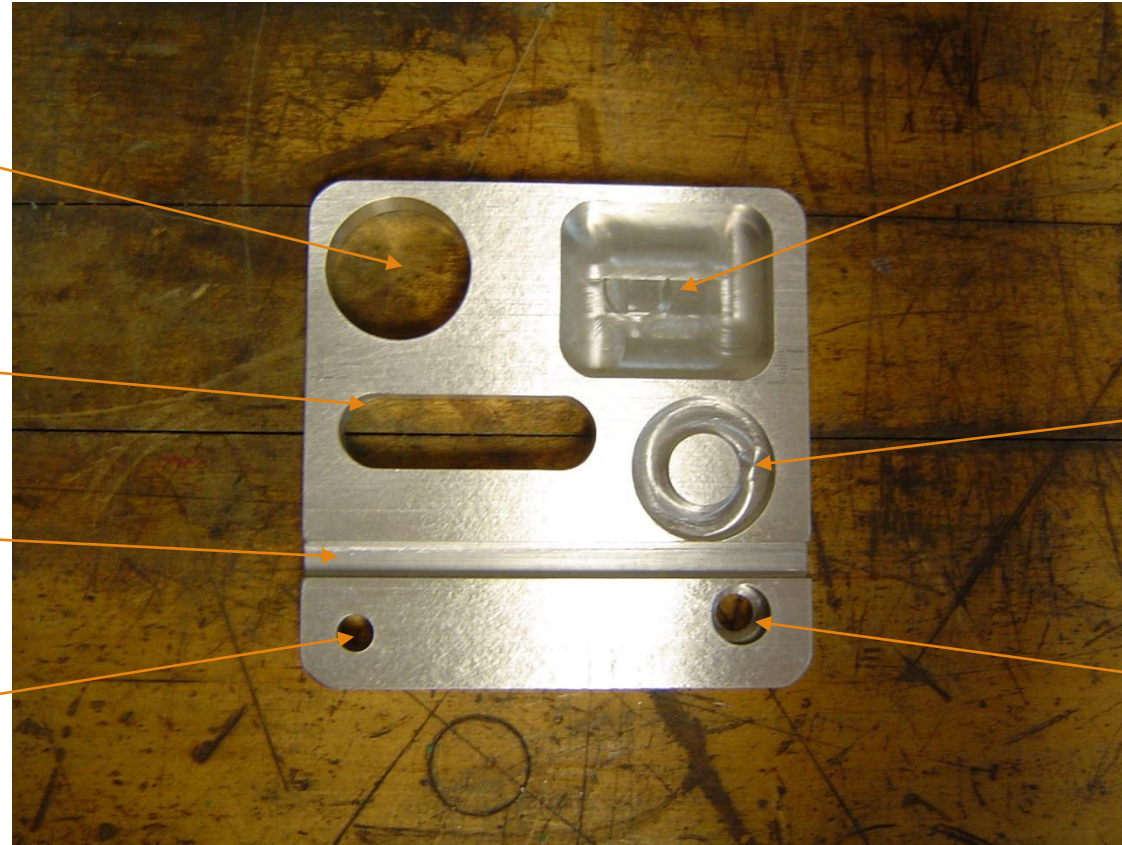
The .500 cutter will cut a slot. The ends must be radiused slightly larger than the cutter radius. The slot will be through.

Straight cut

The .250 cutter will cut a straight line across the part. The depth should be .125.

Drilled and Reamed hole

The hole will be drilled through undersize, and reamed to a precise .2490 diameter for a .001 interference fit with a .250 part.



Rectangular Pocket

The .500 cutter will start in the middle and remove all the material inside the rectangle. The depth should be .25.

Circle Frame or Profile

The .250 cutter will cut a circle, leaving material in the center. The depth should be .125.

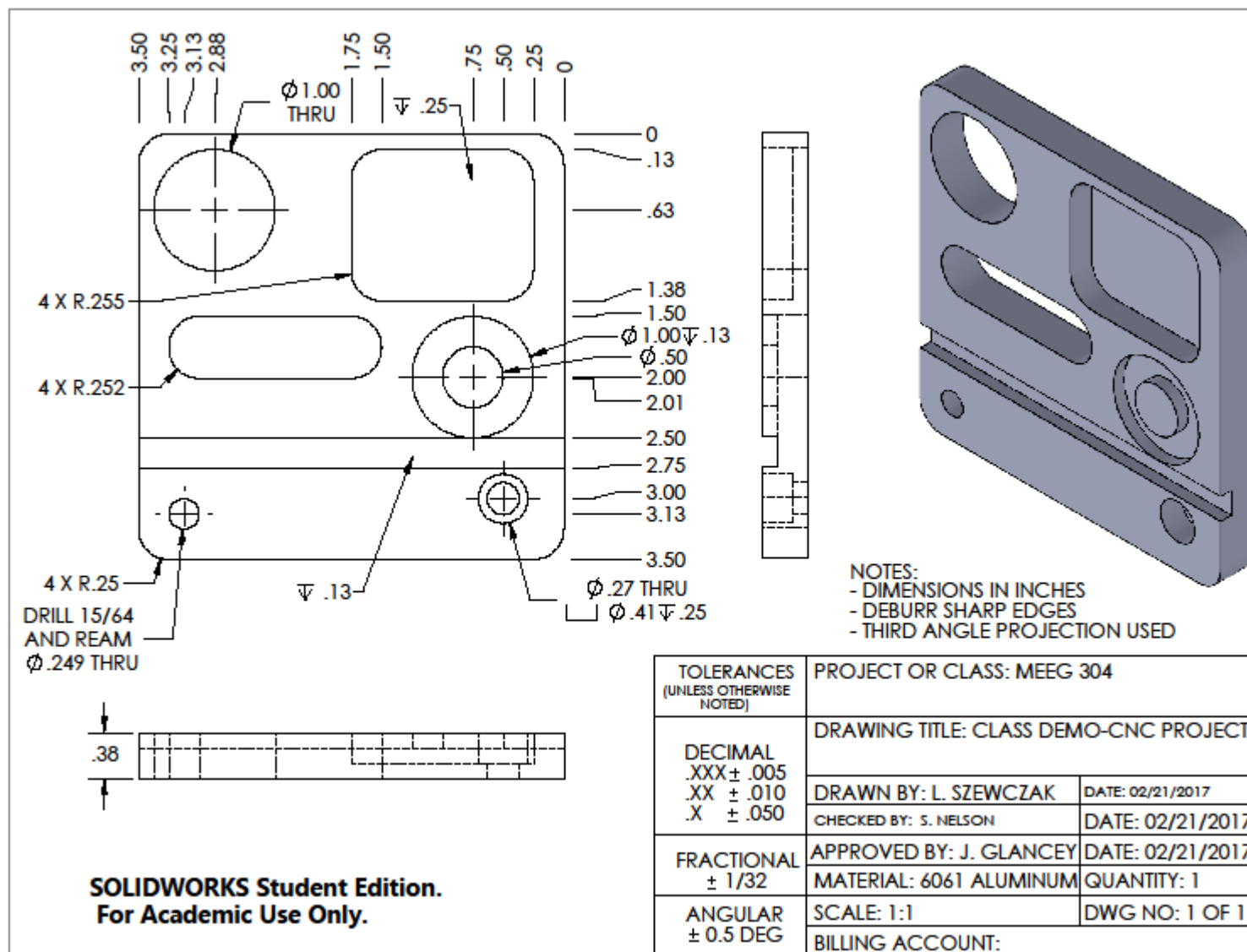
Drilled Hole with a Counterbore

The .266 hole will be drilled through the part and counterbored for a 1/4 - 20 socket head cap screw.

Choose 4 features from the 7 provided

- You can choose 4 features for your part. They MUST be the same depths as specified, and use the specified cutter size. The features can be whatever size you want (except the drilled holes) as long as they fit within the confines of the part.
- The outside of the part will be 3 ½" square X .375 thick, with .25" radii on all 4 corners.
- Make sure you have at least 1/8" clearance between features, and the outside of the part.
- The feed rate on both cutters will be 4 inches per minute.
- We have 2 hours to complete your part and clean up. If you run out of time, you will have to complete it on your own time.

Sample Part Drawing – There are other samples available on Sakai

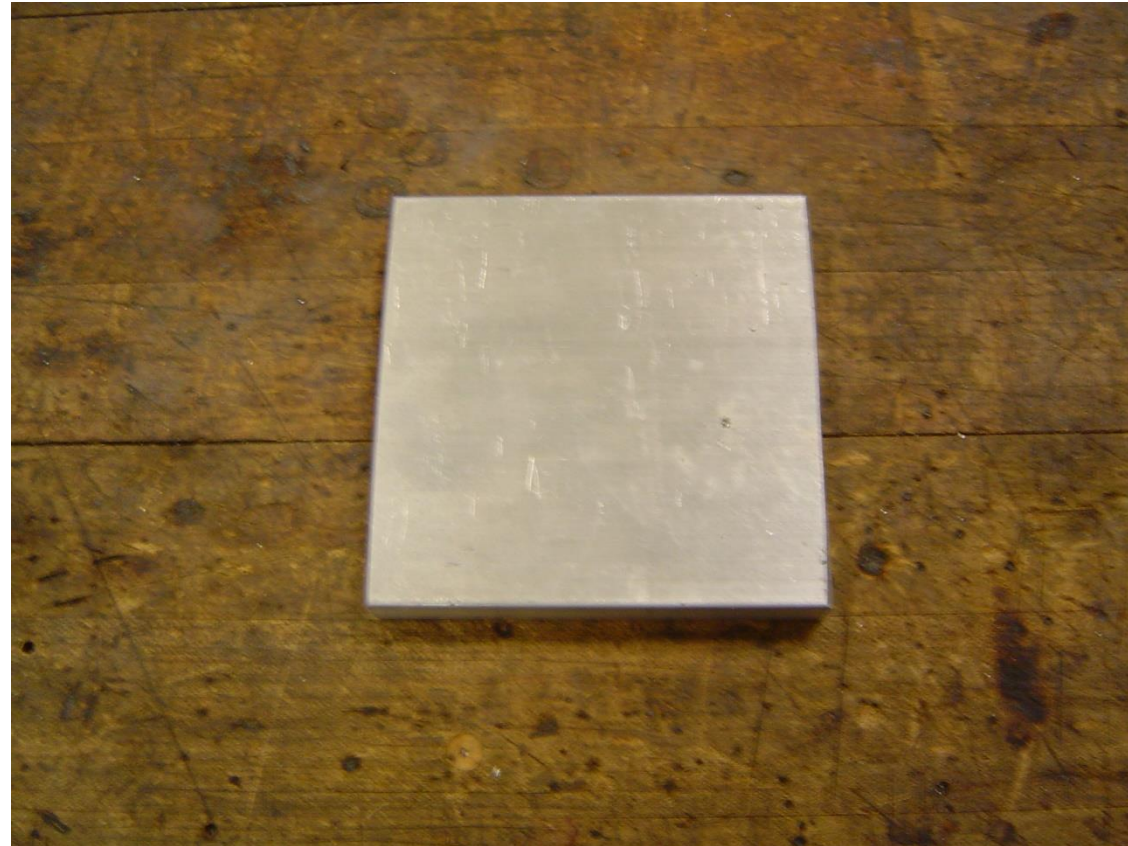


CNC Overview

1. Obtain Materials.
2. Mark the corner of the blank that is “0” in X and Y on your drawing, $\frac{1}{4}$ ” (.25) in from the edge in both your X and Y dimensions. Secure it in the vise and set the zero point.
3. Program the outer profile and machine.
4. Program your first feature and machine.
5. Program your second feature and machine.
6. Program your third and fourth features and machine.
7. Turn the part over and mill off the excess to meet the .375 thickness.
8. Clean up the machine, surrounding area, and tool cart. Put tools away.
9. Deburr your part (if there is time left, or come back and do it on your own time). Clean up the workbench when you are done.

Provided Material

Roughly 4"x 4"x 0.5"
aluminum stock Obtain
Materials.



Process: Vise securement



Process: Alignment/Zeroing



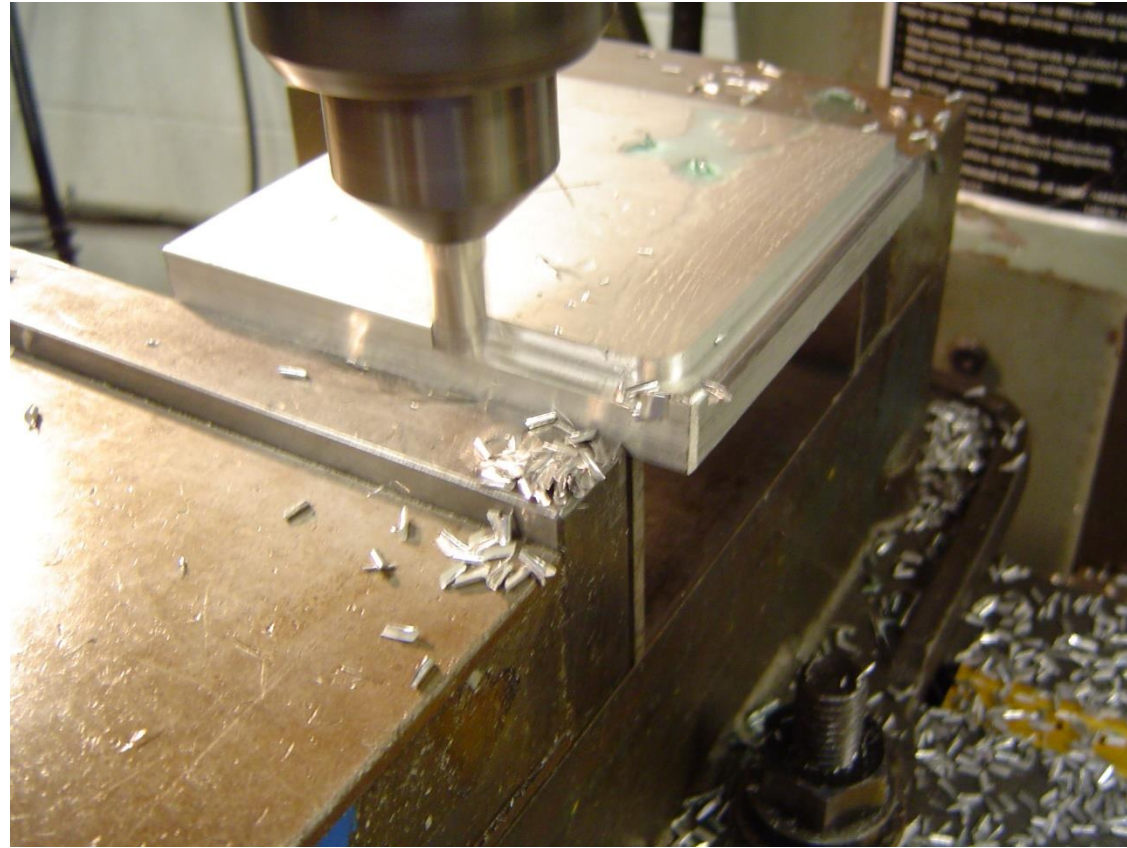
Process: Program the cut



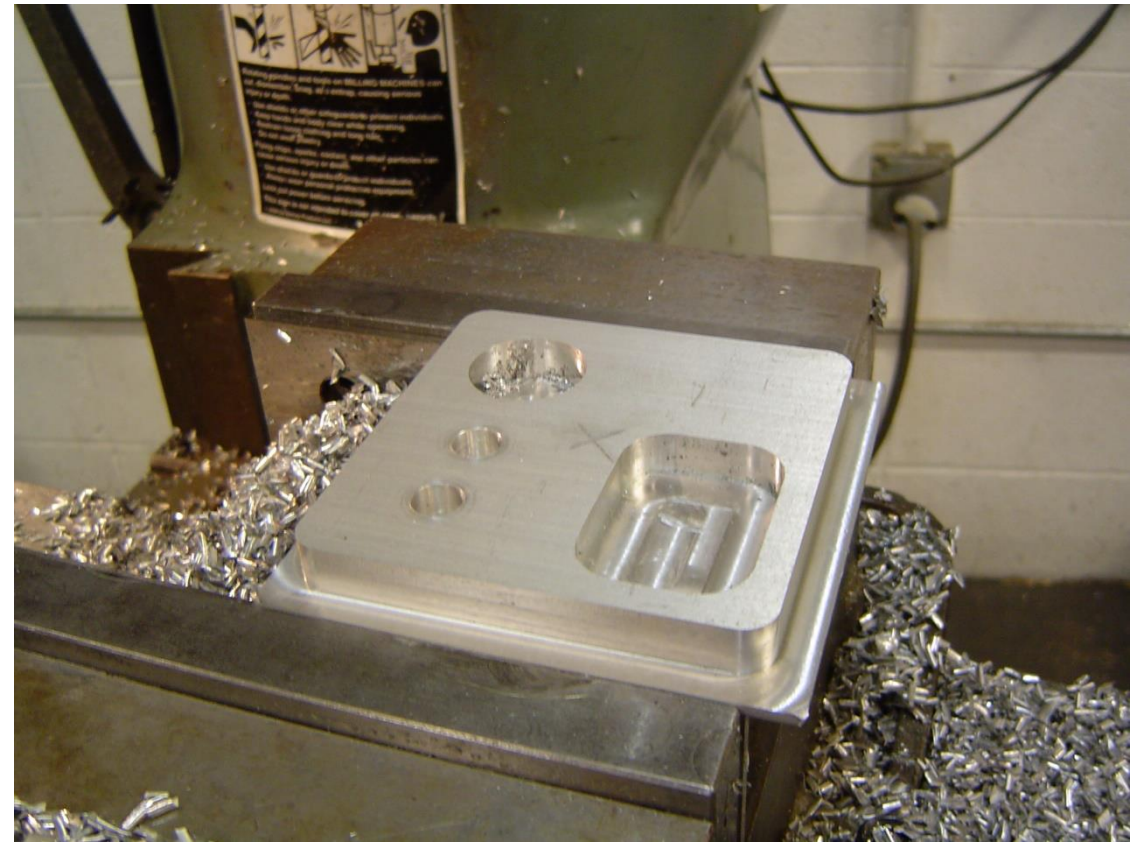
Basic 2 axis Prototrak Programming

1. Clear any existing programs by pressing MODE – PROGRAM IN/OUT – ERASE PROGRAM
2. Press MODE – PROGRAM for a new program. Give the program a number (usually 1) and press ABS SET to enter it. Set your origin on the part using a pointer or edge finder (X-ABS SET, Y ABS SET)
3. Press the button for which feature you want to program first (we will start with the outside frame or profile). This will be a rectangular frame or profile. It will need 2 diagonal corner x and y dimensions (X1,Y1 and X3,Y3) You will use the ABS SET button to enter the data. For CONRAD (corner radius) you will enter .25 . This will put the radius on all 4 corners of the part. For the direction enter clockwise (1) this way the cutter will climb mill the outside of the part. The tool offset will be LEFT (2), the finish cut (FIN CUT) will be 0, the feedrate will be 3.0 (inches per minute), the tool number will be 1, and the tool diameter will be .500.
4. Once you complete the program event-push the LOOK button to see a graphic of what you just programmed. Make sure it looks like what is on your drawing!
5. For the next events-push the appropriate button for what you want to program.
(POCKET-FRAME- circle or rectangle) (MILL-straight line) (POSITION DRILL – X,Y position for a drilled hole)
(ARC for a curved line)
6. Always check your program by running it with the tool NOT touching the part to confirm that the program is correct! Once the program is confirmed, then you can set your depth of cut and start machining your part.
7. To run your program, press MODE, RUN, START. Check that your tool diameter is correct, Make sure the X and Y handles are folded in, and that your tool is above the part. Press GO, and it will move to the start position. Now you can lower your cutter to the proper depth and turn the machine on. Press GO again and it will start machining your part.

Process: Mill the outside edge



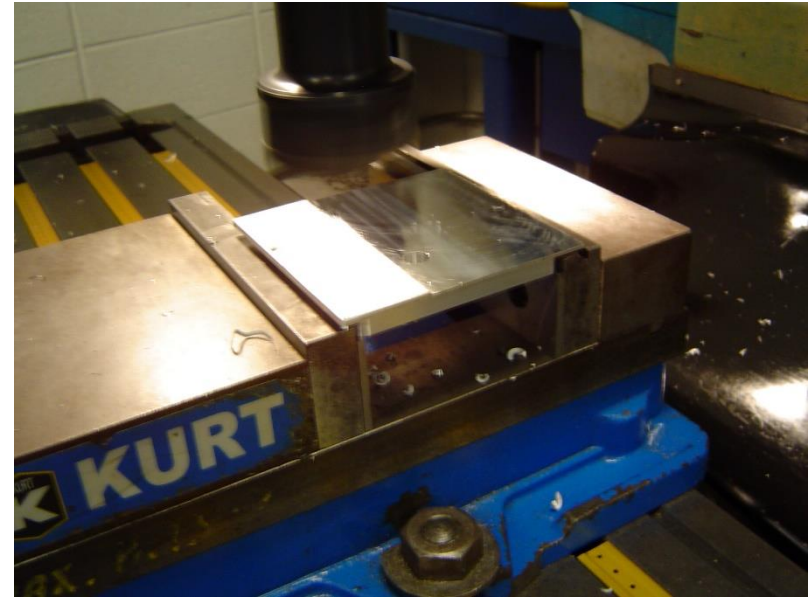
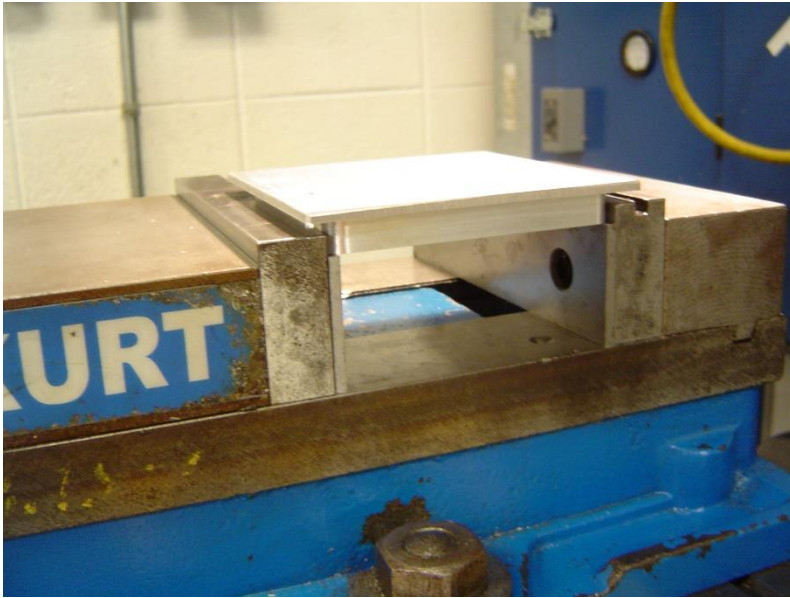
Process: Mill inner features



Process: Drill holes



Process: Remove excess / Face bottom



Clean up the machine and surrounding area.

Milling this part makes a lot of chips.

Please make sure the machine, tool cart, and floor are completely free of chips and debris.

Make sure the area is clean, the machine has been wiped down, and all tools have been put away.



Process: Deburr and remove sharp edges



Questions?
