

# Individual Lab Report 3

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Team G-Bobs the Builders

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## **Individual Progress:**

Since the last checkpoint, I laser-cut acrylic plates used for the tray positioner, I helped with the assembly of the tray positioner, and iterated through different hole sizes for the hopper used to sort the parts.

For the tray positioner, I laser-cut four different acrylic pieces. Two of the pieces were used as spacers so that the timing belt's connection between the motor and the L-bracket would be parallel with the ground. Another plate was used to mount the two L-brackets that the timing belt was connected to. The last plate was used to hold the tray. In putting together the assembly for the tray positioner I screwed in each of the plates, mounted the L-brackets, and connected the timing belt.

Lastly, I iterated through multiple hole sizes for the for the parts in our hopper to fall through by laser-cutting different profiles of acrylic. You can see in Figure 1 the different profiles that I experimented with (with the sequence of design concepts going from left to right). I felt that the last hole was optimized because its dimensions were carefully calculated so that the parts could only go through the hole in one of the four desired orientations. The diagonal (top left corner to bottom right corner) was made slightly smaller than the longest dimension of the part. The height of the hole (top of the semi-circle to the bottom semi-circle) was made just small enough so that the second largest dimension of the piece could not fit through. These parameters helped increase the efficiency of the parts falling through while still ensuring that the parts would only fall through the hole in one of the four desired orientations.

## **Challenges/Issues:**

Efficiently sorting through the parts was an issue that we identified early on in our design process. Despite the progress that we have made in our sorting technique we are still not convinced that the turn-over time will be quick enough to have each part go through our assembly within 15 seconds. We will continue to brainstorm ideas for how to more efficiently sort through pieces and try testing some of our other hopper designs.

One of the issues that occurred when we were assembling the tray positioner was dealing with the bolt heads. The bolt heads at the top of our middle plate in the tray positioner sub-assembly (the plate used for mounting the L-brackets) was longer than we anticipated and we had to add spacers in the four corners of the plate so that we could mount the tray holder plate atop of the middle plate so that the top plate did not come into contact with the bolt heads. Additionally, the bolt heads on the top plate interfere with the tray. We plan to remedy this problem by purchasing countersink bolts.

## **Cross-Referencing:**

This past week I worked with Mike in the machine shop to manufacture the various parts used for our tray positioner subassembly. Mike made the CAD models for the acrylic plates used in the tray positioner design, put holes in the L-brackets that we used as a connection for the timing belt and the plates, and printed the hopper designs used to sort the various parts.

While Mike and I did the majority of the work to assemble the tray positioner subsystem, Guillermo and Eric worked to operate the motor controls using their computers. They were able to create a program that allowed the user to specify the location of the plate based upon their

input into the program. Eric also worked on updating the website. Mainly, creating sequence diagrams of all of our design's subsystems.

**Figures:**



Figure 1: Experimented Hole Sizes

**Future plans:**

For the upcoming week we plan on mounting our part placer subassembly. The part placer will be placed upon one of the pair of rails at the top of our design, be able to translate along the axis of the rails using a motor and timing belt, be able to pick up parts using an electromagnet, and turn the part 180 degrees using a servomotor. We may not be able to install the servomotor by next week but we hope to achieve all of the other tasks. We also hope to install the flux extruder which will be mounted upon the pair of rails parallel to the part placer rail system.

In addition to assisting in assembling these subsystems I will continue to brainstorm ideas for how to better sort through the parts and experiment with various hopper designs.