**Project Identity**

Assistive Robotic Arm  
Week 2  
February 8, 2007-February 14, 2007  
Megan Madariaga

**Work Completed:**

On Wednesday Danielle and I went to the machine shop to cut out the gripper pieces. The gripper pieces were made out of thin aluminum sheet and it was cut with a shear. First we measured half an inch across all the way down the sheet. We scratched the line with a sharp tool and a straight edge. Next we measured one and a half inch long and cut that with a shear. This was repeated three more times. The next length was two and a half inches long and was cut to that length with the shear eight times in all. The final length was three and a half inch long and was cut to that length with the shear eight times in all. Danielle and I deburred the edges using a file. While working with this material we noticed that it was a bit flimsy so we made two of every part. We thought that we could reinforce the parts it that was necessary when assembling the grippers. Below are the pieces in Figure 1 and 2.

![Figure 1: Aluminum gripper pieces](image1)

![Figure 2: Danielle deburring the pieces](image2)

On Friday Danielle and I returned to the machine shop to finish deburring all of the pieces of metal with a file. Also using the file and a table clamp, we rounded the edges so that was the grippers would be less dangerous for the client to use. This can be seen in Figure 3.
After that was complete, we returned to the senior design lab to use the drill press to drill holes in the aluminum pieces in order to put together the grippers. When I drilled the pilot hole that worked out fine, but when I used the desired drill bit it bent the aluminum piece down the center. This caused us to rethink the material that we were using. Bill suggested that we use a thicker plastic that is one fourth of an inch thick.

When thinking about the grippers more, Danielle and I came to the conclusion that we should increase the size of the gripper pieces so all will be one inch wide and then vary in length from 2 inches to 3 inches and finally 4 inches. The only downfall of this new material is that I worry that it may be too heavy. The original material (aluminum sheet) was .032 inches thick and the new material is .25 inches thick, so it is a huge difference. Also when considering the grippers we decided to change the length of the gripper hands from two by two inches to the new area of two by four inches. Since the material is shiny and smooth, we are planning to cover it with rubber of some kind in order to add resistance to the surface. This will make it easier to grip things.

Also this week spoons and bowls were researched. For the client to eat independently a right handed handicap spoon will be attached to the grippers. Also we want to include a bowl with a lip to allow the client to scrape the spoon on the top when taking food out of the bowl. The desired products were found on caregiverproducts.com. When looking at spoons it was decided to go with the metal soup spoon bent at a thirty degree angle. Though it was not made out of plastic which would be safer for the client, it had a good handle which would easily connect to the arm, bigger surface area on the spoon and we are not wasting money on a set of silverware when we will only attach the spoon. A picture of the two products can be seen below in Figures 4 and 5.
On Monday the purchase order was passed in for the right handed soup spoon and the suction bowl with lip. Before heading to the machine shop I measured out the lengths of the gripper pieces on the PVC board as seen in Figure 6.

Next Danielle and I traveled to the machine shop to cut out the gripper pieces with the band saw. After all the pieces were cut out, a PVC peeler tool was used to debur the edges. Since the corners were sharp, we decided to use the belt sander and round the edges. The completed pieces can be seen in Figure 7.
Future Work:
The main goal for the next week will be assembling the grippers and the joints of the robotic arm. We want to get this finished as soon as possible in order to order the motors, which were delayed this week due to the change of gripper material. By next week the total torque will be calculated and used to assess what motors will be effective.

Project Review:
This week many alterations were made to the original design. First the material of the gripper was changed from aluminum to PVC sheet. This sheet was .25 inches thick compared to the original .032 inches. With the increase in thickness we changed the sizes of the gripper pieces and also of the hand parts. The hand parts will be used to pick up things so we decided to double the original surface area. Instead of using the plastic spoon, we have opted to order the soup spoon made out of metal, but has a larger surface area and better handle for attachment.

Hours Worked:
12 hours