Painting Solutions for Limited Mobility
Week 10: March 20, 2006 to April 5, 2006
Team Report
Team #1
BME 291

Work Completed

During the 9th week, we began to assemble the final prototypes of our two designs. First, I spent some time working on the paintbrush/marker wrist attachment device. This device centers around an impact wrist guard (for snowboarding). Attached to this, there is a PVC base unit which provides the attachment for the holder unit. This week, I constructed a new PVC base unit. I cut hollow round PVC to around 3/4 of an inch. On the bottom, the hole was drilled out to make room for the spring. This can be seen in Figure 1. On the top of the PVC base, the template constructed week ago was used to mark for the holes needed to allow rotation of the holder unit. The holes were then drilled out using the drill press (see Figure 3). Once the PVC base unit was finished, the rest of the device was constructed. A long carriage bolt with a spring attached to it was inserted through the bottom of the PVC. Washers were placed on the carriage bolt on either side of the spring. This spring would provide the locking mechanism of the holder unit.

Figure 1: Drilling out the bottom hole of the PVC base.
The holder unit was then constructed. This was made out of a round hollow piece of metal. The hollow tube was cut to the same length as the diameter of the PVC base. Two holes were threaded on top of the hollow tube to allow the wing nuts to thread into the tube. The wing nuts will provide the mechanism to lock the paintbrush or marker into place. Next, a hole was drilled and tapped on the bottom of the hollow tube to the same size as the carriage bolt which was inserted into the PVC base. Two other holes were drilled into the bottom of the holder unit, 1/8 inch in diameter. Bolts, 1/8 inches in diameter were placed in these holes and were locked securely in place. These 1/8 inch bolts serve as the way to lock the holder unit in place by dropping into the holes drilled into the PVC base. The carriage bolt was then threaded into the hole in the holder unit. The holder unit was tack-welded to the bolt so that it would not come off during use. The only step is to attach the whole PVC base/holder unit assembly to the wrist guard.

During the week of March 29th to April 5th, several advancements were made on the positioning system as well. Dan cut and milled the aluminum attachment clamp bracket so that it would be of minimal size and decrease unnecessary weight of the device. This likely will not significantly affect the strength of the material (see Figure 4). Another task performed while enduring the wait for the arrival of the joint parts, was machining the articulating arms. Each arm was milled at the end to produce a completely flat surface, consistent with .005”. This will allow the joint to be secured with an interfacing of maximal surface area and eliminate any loosening or instability that may occur after cyclical loadings.

Also, on Monday of week 10, supplies were purchased and put to use. Melissa bought Velcro, stretchy wide elastic, and light metal rings. All of these are intended to keep our clients arm comfortably secured to the arm rest (see Figure 5). The seams needed to be let out in order to integrate the straps on one side and the rings opposing. Two straps were sewn in that loop through the rings and then back to secure with Velcro.
The upper seams were too tight along the curved edge. So next I removed these seamed and widened them.

**Figure 4:** Milled bracket to save weight without sacrificing strength.

**Figure 5:** Velcro straps added to the arm support.

**Future Work**

During the 11th week, the arm support system will be completely assembled with all the newly ordered parts and it will also be tested. The complete arm support system will be mounted to the wheelchair in the lab and all the positions will be tested. Our one
concern is the weight of the complete unit; therefore, if the completely unit weighs too much, we plan to remove the unnecessary part to minimize the weight.

Also during the 11th week, I plan to complete the paintbrush/marker wrist attachment device. The PVC/holder component will be attached to the wrist guard. Once this is done, it will be tested and any necessary changes will be made. We hope to have the whole project complete in the 11th week.

**Project Review**

Overall, we are on track with our project. Although we have moved backwards by making changes to both our designs and reconstructing components to our designs, we allotted two weeks for making new orders and changes to our designs. Once these changes are made to our project, they will be ready for the final testing phase, which will ultimately prove whether the product functions properly or not. As of now, and with the testing that has already been completed, we are on track with time and with creating a successful product.

**Hours Worked**

Hours spent on the project for Week 10: 14.00