Painting Solutions for Limited Mobility  
Week 9: March 23, 2006 to March 29, 2006  
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BME 291

Work Completed

During the 9th week, I focused the majority of my time on the arm support system. The new bracket was made during the 8th week, so the time during the 9th week was used to mount the GCX clamp to the bracket, and mount the clamp bracket unit to the 80/20 components. The new bracket was not completely finished; therefore, the finishing touches were put on the bracket before we could shift forward. First, the holes in the bracket used to mount the bracket to the GCX clamp were not drilled to the correct size. I only drilled pilot holes because I did not want to drill the wrong size hole since the holes were going to be tapped. The tap kit in the lab provides the correct size drill bit to go along with each tap. Since the mounting holes on the GCX clamp are 10-32", I used the corresponding drill bit to drill out the holes of the bracket. Once the holes were drilled, I used the 10-32" tap and tapped the four mounting holes in the bracket (see Figure 1). After the holes were tapped, they were then countersunk to provide a flush mounting surface for the 80/20 components.  

Figure 1: Tapping the mounting holes of the aluminum bracket.

The next step was to size the screws used for mounting the bracket to the GCX clamp. On the GCX website, it states that the mounting holes in the clamp are size 10-32". I purchased four 10-32" screws from Mansfield Supply; however, the screws were two inches long which was much too long for their intended purpose. The depth of the holes in the GCX clamp were measured to be a little under 1/4 of an inch and the thickness of the bracket is 1/4 inch; therefore, the screws needed to be cut to a little under 1/2 inch. To do this, I marked the screws where they were to be cut, and then threaded them into the bracket to hold the screws in place. I used an angle grinder to cut the screws down to size, and then used a grinding disk to grind down the edges so they could be threaded into the holes of the bracket and clamp. Once the screws were cut to size, they were then used to mount the bracket to the GCX clamp (see Figure 2).  

Figure 2: Flush attachment of the bracket to the GCX clamp.

Now that the bracket was attached to the clamp, we were ready to attached the 80/20 to the bracket. In order to do this, we found the centerline of the bracket, and drilled two holes, on the centerline, 1/2 inch in on each side (this can be seen in Figure 2). Next, we measured the same distance in on each side of the 80/20 piece (1/2 inch) and drilled a hole on either side. The two holes lined up, and a 1/4 inch grade 5 bolt was used to attached the 80/20 piece to the bracket on either end (see Figure 3).  

Figure 3: Holes drilled on either side of the 80/20 for mounting to the bracket.

Since we now have the GCX clamp mounted to the bracket and the 80/20 mounted to the bracket, we needed to attach a brake to the linear slide which would slide one line the 80/20 piece. The linear slide we purchased did not come pre-drilled for the brake so we needed to drill the linear slide to incorporate a brake. To find an exact location for the hole used for the brake, I removed a plastic insert from another linear slide which was already drilled for a brake, and used this insert as a template. Once the hole location was marked, I drilled out the hole in the linear slide. Then I drilled the hole in the plastic insert of this linear slide which was not already drilled. To ensure a proper fit, I then cut the edges out of the circular hole in the plastic insert to make the hole square. The hole was cut square to model the plastic insert of the linear slide which was drilled by the factory (see Figure 4).  

Figure 4: Hole drilled in the linear slide and the plastic insert for use of a brake.

The final step was to assemble the whole unit. The GCX clamp was mounted to the bracket, and the 80/20 piece was then mounted to the bracket as well. Next, the linear slide, with the brake, was mounted on the 80/20 piece, and the unit was essentially complete. Figure 5 shows the complete component.  

Figure 5: Complete component consisting of the bracket, clamp, and 80/20 stock.

Future Work

During the 10th 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 weights too much, we plan to remove the unnecessary part to minimize the weight.  

Also during the 10th week, I plan to completely paintbrush/marker wrist attachment device. The bolt will be welded to the holder component and then the whole device 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 10th week.

Project Review

Overall, we are on track with our project. Although we have moved backwards by making changes to both our designs and recreating 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 8: 14.00