Project Identification

Project Title: Human Integrated Gripping Device
Week 5: February 21, 2006
Lyndon Charles

Work Completed

Last week, Emily and I performed a tension test on the ratchet to determine the maximum load before failure. The setup was according to Figure 1. The testing was done using a Tinius Olsen tension testing machine. The upper jaw was set to move at an increment of 0.005 in/min. From this test, it was found that the ratchet failed at 59.2 lb·ft.

![Setup of Tension Testing for Ratchet](image)

Also, I worked further on the concept for the release mechanism for our device. The are shown in Figure 2, Figure 3, and Figure 4 and will be referred to as Release 1 and Release 2, and Release 3 respectively. In Release 1, between the inner slider and outer guide, there will be a spring. A string is also attached to the far end of the inner slider which is attached to the pawls of each ratchet in series. To release the locked ratchet, the user would simply pull the slider backwards which will pull on the pawl and disconnect them from each ratchet. The latch at the top of the inner slider will then be hooked into the hole in the back of the outer guide (Figure 2a). There will be one on each side so when the first one is locked into place the user would then do the same to the other one which would then open the device completely for release of the hand.
Figure 2. Picture Showing Cardboard Model of Release 1.

Release 2 is shown in Figure 3. In this concept, the string which is attached to the pawls is then attached to the end of the main bar where the little while hole is seen. The hook end is then pushed against the spring and towards the holding post. This will cause a force on the string attached to the other end of the main bar which will pull the pawls and unlock the ratchets. Once the hook is locked around the holding post, the user can do the same for the other one which is located on the other side of the hand.

Figure 3. Illustration of Release 2.
Figure 4 shows the drawing for Release 3. With this concept, a string is attached to the pawls as shown in the cut out section. This will be in a straight line contrary to the visual in the picture where the line appears crooked. This string is attached to a small metal bar which measure .25 inches in length and has two holes on the top. The first rigid segment (the red compartment with the black dots on top) will have two holding posts on the top at positions in conjunction with the holes on the release bar. When the user wants to release the device, the release bar will simply be pulled and locked onto the holding posts. This will release the pawls and allow free movement of the ratchets. One release bar will be found on each side.

Figure 4. Illustration of Release 3.

The first two release systems will be made of stainless steel. I found two industrial strength adhesives that are capable of metal to fabric bonding. They are the E6000 Industrial Strength Craft Adhesive and the Fusion ECRF Cold Bonding Cement. The third system would eliminate the need for metal to fabric adhesion.
Future Work

In the coming week specific parts will be performing tests on the new pieces to determine the force needed to release the ratchets and also the maximum distance which the pawls will be able to move when pulled. I will also be starting any necessary machine shop work.

Project Review

Things are running a little smoother and the project is really beginning to take its real shape and form. I believe this project will be a success if we continue to work the way we have been thus far.

<table>
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<tr>
<th>Task</th>
<th>Hours</th>
<th>Start Date</th>
<th>End Date</th>
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<tbody>
<tr>
<td>Test Parts</td>
<td>1 day</td>
<td>Wed 2/22/06</td>
<td>Wed 2/22/06</td>
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<tr>
<td>calculate total movable distance of pawls</td>
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<tr>
<td>determine required force for release</td>
<td>1 day</td>
<td>Wed 2/22/06</td>
<td>Wed 2/22/06</td>
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<tr>
<td>Machine Shop</td>
<td>1 day</td>
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<td>Assemble and test release</td>
<td>1 day</td>
<td>Fri 1/27/06</td>
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Hours Worked: 11