Traumatic Brain Injury Reducing Army Combat Helmet

Team 6
Week 6 and 7
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Work Completed

My sixth and seventh weeks of BME 4910 were used to make the third helmet mold, scrub the second helmet, and do some more research for the team. My first task of the week was to make the mold for our second Kevlar shell. I started this by scrubbing the previous mold with a brush to remove any remaining flakes and loose pieces.

The mold for the third shell was made on top of the mold for the first and second shells. It was made in the same manner as the last molds were made. Mold Polish Step 1 was applied then removed. Mold Polish Step 2 was applied then removed. Four layers of parting wax were applied, allowing 45 minutes drying time in between each. The mold was left overnight between after the last coat of parting wax was applied. The next day, four layers of PVA release film were applied on the helmet, with 15 minutes of drying time in between each one.

Due to the problems I ran into last week with trying to make a mold for the neck guard, I spent some time scrubbing the remnants of the old mold out of the second shell after Jim had cut it. I wasn’t able to remove as much mold as I had hoped for, but there is a significant difference that can be seen, as shown in Figures 1 and 2.

Figure 1. Second shell before scrubbing.

Figure 2. Second shell after scrubbing.
Figures 1 and 2 also show the cuts that Jim made on the helmet. Lines were drawn on the inside of the shell in order to determine the shape of our prototype, as shown in Figure 3. The lines show the shape of the ACH that was used as a mold and the projected size of our shell.

![Figure 3. Lines used to determine how to cut shape of shell.](image)

Several expanded polystyrene foam blocks were ordered to make the EPS layer. We had trouble determining how to cut and shape the blocks to fit our prototype, as the foam supplier did not sell foam cutting tools. I found a company online called Hot Wire Foam Factory that sells a variety of foam cutting tools. We decided that a freehand router tool would be the best tool for our project, as the foam needs to be cut to have convex and concave surfaces. The freehand router tool is shown in Figure 4.

![Figure 4. Freehand router from www.hotwirefoamfactory.com.](image)
I also spent some time researching and contacting companies these past two weeks. I looked into purchasing the suspension system and pads that are used on the current ACH from Gentex Corporation. I have not heard back from them, but I will follow up shortly. I also contacted the Snell Memorial Foundation to look into the possibility of having them test our prototype, as it looks like the RIH Foundation may not be able to help us.

**Future Work**

In the coming weeks we need to construct our third and final shell. We also need to complete the molds for the neck and chin guards for each shell. Once we receive the foam and foam cutter, we should be able to make the EPS layers and prepare the shells for the suspension system and internal padding.

**Hours Worked**

I worked a total of 11 hours on the project. About 6 hours were spent making the mold. The second shell took about an hour to clean out. I also spent about 4 hours researching and contacting companies.