Traumatic Brain Injury Reducing Army Combat Helmet

Team 6
Week 5
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Work Completed:

The second outer shell was cut and hardened this week. The method used is the pinwheel design where one entire piece of Kevlar is used for an entire layer rather than the triangle method used last week. Figure 1 shows the way each layer was cut. Since each layer has different dimensions, the Kevlar was taped down to the helmet mold then cut. The cut layer would then be fully taped around so that another piece of uncut Kevlar could go on top. In total eight layers were used for the second shell.

Figure 1: Pinwheel Layers

Figure 2 shows the layers removed from the shell before painted with epoxy and hardened on the mold.
This method turned out to be much faster in terms of epoxy application compared to the triangle design. Overall it took approximately 3 hours to apply all layers, not including the time to cut the fabric. The cutting process was as time consuming if not more time consuming than the triangle method because each layer was a different shape. Figure 3 shows the hardened helmet shell. Note that a few inches were left draped down and will be cut to the proper length with a small jigsaw.
Paint was also researched this week. The paint used by the military is known as CARC: Chemical Agent Resistant Coating. These paints are expensive and carcinogenic. Therefore, using them is not practical since chemical resistance has no bearing on the project. If the helmet will be painted at all, then non-CARC epoxy-based paint will be used along with an epoxy primer on the surface. A spray gun would make the job look professional but buying one would cost approximately $60. The paint could be applied by brush, but it is not recommended. If one could be obtained cheaper or possibly be donated it would help in this situation. The paint itself including the primer would cost anywhere between $75 -$100.

Some work was put in towards using expanded polystyrene under the assumption that we would have to apply it ourselves. After researching this there are no good solutions to this. For example, if we were to spray and expand the polystyrene ourselves it would require temperatures of 100 degrees C as well as buying a blowgun and termination chemicals. If we were to purchase a block of EPS to mold, there are no real practical ways of cutting it without the help of machinery. Therefore, it seems like the only probably course of action is to send the helmet out.

**Future Work:**

One more helmet could be made but the reasoning for making a third helmet isn’t very strong. The two built helmets must be trimmed to spec and holes must be drilled based on the holes for the original helmet. Molds for the neck guard and chin guard must also be made.
**Hours Worked:**

6 hours were spent creating the second shell and 5 hours were spent on finding information on paint and EPS for a total of 11 hours.