Project Recap

Gentex’s current method of edge beading application onto military helmets has created a bottleneck in production. A high level of dexterity and skill required to apply the edge beading, lengthy adhesive drying time, and workstation variability make the edge beading application a process step that results in a high amount of rework and repetitive motion strain to workers. Team HEAD proposed to decrease the adhesive drying time, create tools to assist the workers in adhesive and edge beading application, and to create a standardized workstation layout.

The first objective was to decrease the curing time of the adhesive through research of the adhesive properties. The team was unable to meet this objective. Previous attempts at using heat to decrease drying time were ineffective. It was found that pressure applied to the adhesive during the 8 to 12 minutes after application would assist in creating a stronger bond. The team has used this information to help with the creation of tooling. Research was extended to include alternative adhesives, but did not form any conclusive results. With research completed, the team recommends the continued use of the Scotch-Weld 1300L adhesive in the current process.

The team’s second objective was to complete designs and prototype tooling fixtures to aid the operators in the edge beading application process. The team designed and created two tooling fixtures. The first tooling fixture is a pressure application tool, which will be used to put pressure on the edge beading in the areas where a majority of the quality defects occur. Using the knowledge gained from adhesive research, the team decided that this tool could be instrumental in decreasing defects if used during the 8 to 12 minute key drying time of the adhesive. The second tooling fixture is an edge fitting tool, which will be used as a guide for applying the adhesive around the helmet and applying the edge beading to the helmet. In addition, the team also looked at the safety and ergonomics of the operators, and this tool will reduce the risk of CTD’s and other safety issues related to the application of the edge beading. Prototypes of both tools were created.

The third objective in this project was to design a standardized workstation layout. The team wanted to focus on reducing the walking and large turning motions that the operators had previously been performing during their tasks. With this workstation layout, the operator’s main tasks will now be performed at the worktable, since the use of the edge fitted tool removes the need for the large helmet holder. The placement of the remaining tools keeps the adhesive and toluene in a center area for use with either the beading roller or edge fitted tool. The layout can be manipulated in order to adapt to both the left or right air vent.

All objectives were completed and deliverables handed over to Gentex. The team fell under budget for this project, having spent approximately $691 of our budget of $860.