The Hexagonal Weave: Using Hexagonal Engineering to Create a Better Body Armor

Lynn, Lucas (School: Wetumpka High School)

The purpose of this research is to create a better body armor by testing different woven patterns and creating a loom for the textile. Body armor plays a huge factor in the vitality rate of the military. As weapons become more advanced, armor must advance too. The largest issue with armor is providing protection without adding weight. This research focuses on armor's woven textiles. Two weaves, the hexagonal and grid weave, were tested in explosives tests. The weaves were made of Kevlar. Additionally, no manufacturing process for the hexagonal weave exists. The hexagonal loom was built to create the hexagonal fabric and was successful. It is divided into two sections, the front heddles for the tabby weave and the horizontal heddle for the diagonal weft insertion. The tabby weave is woven loose so that the diagonal weft can be implemented easily. A reed is used to tighten at the end. In the explosives tests, the hexagonal and grid weaves were placed around a 0.23 kg explosive that was detonated. Additionally, a clay control sample was placed with the woven samples. The hexagon samples showed no damage. The grid and clay control samples were all displaced and had visible damage. In conclusion, my research in the explosives testing supports the hypothesis that the hexagon weave is stronger. The dual assembly process in the Hexagon Loom was ideal and supports the concept of hexagonal engineering and production.

Awards Won:

Third Award of $1,000

Patent and Trademark Office Society: Second Award of $500