Studying the Effects of Print Angle on the Impact Resistance of 3D Printed Pieces

Geppert, Jared (School: Blaine High School)

Something that has always interested me is 3D printing, so I decided to conduct an experiment testing 3D printed pieces. The goal was to determine at which angles the test pieces should be printed at to maximize impact resistance. The process included designing the pieces using CAD software, and printing them on a Prusa Mk.III fused-deposition modeling printer. Then a swinging pendulum fixture was constructed with a clamping vise to hold the pieces while they get hit by the hammer. The 3D printed piece was clamped at the bottom and the hammer was dropped from 90 degrees above the piece, and how far through the piece the hammer traveled on was measured and recorded. In the end, it was found that the closer to 0 degrees the pieces were printed at, the more energy the pieces absorbed from the hammer. My hypothesis was partially correct in that the 90 degree print was the weakest. The testing of the pieces was rather tedious, but the design process and engineering was fun and I learned a lot. In the future I'd like to do more layer angle testing and gather more data points. I'd also like to test other shaped pieces besides rectangular prisms and see how their impact resistance stacks up.

Awards Won: