

Crash Helmet Design

A Safety Product PBL for AEC Physics

In this authentic project, students will design, prototype and test a crash helmet with a purpose of protecting a population of people from traumatic head (brain) injury. Students will employ the design thinking process, start-to-finish, and use an egg to simulate a human head.



Make simple mock-ups, iterate quickly, fail fast

Task: View the Prototype video to learn methods for producing quick prototypes to test out your best ideas generated during ideation. Then use a 3D design program (Tinkercad, Fusion 360, etc.) to design an egg crash helmet which meets your design specifications in your problem statement. 3D print the hard shell of the helmet using PLA filament, then add padding (and additional drag features, if desired) to complete your prototype. Also be sure to:

- Size the helmet for a median egg (height and width), as well as eggs which are slightly larger and slightly smaller than the median size
- Ensure the egg can “see out” and maintain “reasonable mobility,” not feeling weighed down by an overly large or clunky helmet
- Add a chin strap or other means of securing the egg head in the helmet
- Ensure the egg can get in and out of the helmet in a reasonable time frame as identified in your problem statement

Work Product: Work individually or as a team to *build a working prototype* of an egg crash helmet. Submit your engineering designs of your prototype (label the perspective and orthogonal views) as a PDF, as well as a photo of your egg in its prototype helmet.

Scoring: Your prototype submission should consist of:

- Title and team member names (5 pts)
- A PDF file showing engineering design views of your prototype, screen captured from Tinkercad/Fusion 360:
 - Perspective view (10 pts)
 - Orthogonal views: front view (10 pts), side view (10 pts), top view(10 pts), bottom view (10 pts)
 - Helmet dimensions: height and width, exterior and interior (10 pts total)
- Photograph (JPG or PNG) of egg in its completed prototype helmet (35 pts)

Submit: Create and share your files with your instructor via Google Drive and send the shared links via Edsby.