Polar Center at Penn State Iceberg

Overview
Our team was tasked with creating an artificial scale model of an iceberg to be used during the Polar Center’s annual outreach event, Polar Day. The iceberg will be used as part of an educational exhibition during which an underwater remotely operated vehicle (ROV) will be used to explore it and complete a scavenger hunt. Our team needed to design, build, test and refine a large prototype to be handed over to the sponsor at the end of the semester.

Objectives
Our objectives included fabricating a prototype that was easily portable, storable, durable and resembled the aesthetics of an actual iceberg. It needed to float in the Penn State Natatorium’s dive well and consist of 90% submerged volume and 10% unsubmerged volume.

Approach
- We gathered requirements and customer needs through talking to our contact and sponsor.
- Four concepts were initially generated before settling on a tabular iceberg design.
- Solidworks models were used to visualize different designs and their strengths and weaknesses.
- Material selection was one of our main challenges in designing the final prototype.
- Most of our testing was performed on different types of polystyrene foam to be used in the top half.
- The final design underwent many changes during construction and testing.
- Insulation foam was used in the top half of the iceberg while Plexiglas was used underwater.
- Hot wire cutters and paint were used to make our final prototype resemble a real iceberg.
- Modular design principles were used to insure that the final prototype is portable and storable.
- Full-scale testing was crucial in determining which design aspects to focus on improving.

Outcomes
- Our sponsor will use the final prototype in their exhibit on Polar Day.
- The final prototype fulfils all of the original design criteria: it is easily storable, portable, durable and resembles an actual iceberg.
- The final prototype can be adjusted in size and configuration to meet the sponsor’s individual needs.
- At its full height, the foam sits about 4’ off of the ground and is 8’ in length while the Plexiglas sheets extend over 8’ underwater.
- Our team was able to successfully communicate our ideas with our sponsor and with one another, resulting in a cohesive and synergetic team.