Overview
The goal of the project was to create a safe snowboard binding to accommodate a bilateral above-knee and unilateral above-elbow amputee. This snowboard would have to balance the needs for control of the snowboard with a damping mechanism, and also be operable with one arm. The ultimate goal was a complete snowboard system, with two bindings designed for Zach Sherman’s prosthetic feet, mounted to a standard snowboard.

Objectives
The Safe Snowboard Binding Team set out to create a mechanical suspension system, mounted in an “alpine snowboarding” orientation.

Approach
- Customer needs were discussed with Zach and Dr. Hills at the first meeting in January
- Concept generation, patent and product searches, meetings with experts (Aaron Wilson of Funtastik Skate and Snowboard) led to a selection of a mechanical shock absorber approach
- Additional customer needs and specifications were developed from Zach and Aaron’s input on binding orientation and placement
- An initial CAD model and material selection were completed
- CAD model was 3D printed in low-fill PLA
- Design was changed and refined from analysis of plastic prototype
- Non-machinable parts (damper and rail-bearings) were ordered
- Aluminium machining was completed in the PSU Learning Factory
- Parts were assembled into two damping bindings
- Final product was presented to sponsors at the Senior Design Showcase on April 27th

Outcomes
- The finished product was not a usable snowboarding system
  - The profile-damper that was ordered was much too stiff
  - The team was unable to design and manufacture a safe foot-clamping mechanism
  - The assembly was heavier than acceptable
- The system created proves that a mechanical suspension system is feasible and could be mounted on a snowboard to accommodate someone with Zach’s unique needs
- Further design could allow Zach to safely snowboard at a competitive level