Designing a System of Prefabricated Parts for ADA-compliant Residential Wheelchair Ramps

Overview
The current wheelchair ramp market offers no solution good solution to provide a ramp system that can compliment different home styles at a reasonable price point. Existing modular ramp systems are either very industrial looking or require extensive contractor labor to construct.

Objectives
Our team’s objective for this semester focused on improving upon an existing prototype to create a modular wheelchair ramp system that was capable of aesthetically accommodating various architecture styles.

Approach
- Reviewed existing prototype to determine what features needed to be redesigned.
- Discussed potential aesthetic improvements to the old design with the project sponsor.
- Generated concepts that would allow ramp sections to connect together on a single post.
- Developed CAD models of best scoring connector design from concept scoring phase.
- Created 3D printed and aluminum casted prototypes of the male and female connectors.
- Developed CAD model of new deck frame which incorporated bolted connections rather than welds.
- Performed Finite Element Analysis to all the structural components of our design to ensure an adequate Factor of Safety was met for expected loading.
- Manufactured deck frame by cutting, drilling, and bolting stock aluminum components.
- Purchased, modified, and installed a commercially available railing system to complete the full scale prototype.

Outcomes
- The sponsor can apply for a provisional patent for the deck section connectors.
- The project will reduce the contractor labor cost for future wheelchair ramp builds.
- If a patent is granted for connection components, sponsor can begin to reach out to decking companies (i.e. TREX) to try and sell the idea for further development.