Impulse Technology: Reducing the Bending Moment in Structures

Overview
Impulse Technology is a small start-up company from State College working on a passive, self-aligning below-the-knee prosthetic leg design. Existing passive legs are stiff, generating excessive bending moment on the amputee’s residual limb. A new design will mimic the natural leg by minimizing the bending moment. The new prosthetic design will be compared to existing designs via a constructed testing apparatus.

Objectives
- Create a CAD model of an existing prosthetic leg design
- Design and fabricate an apparatus to compare bending moments in current and new prosthetic designs
- Build a prototype for experimental demonstration of the functionality of the new design

Approach
- Gather customer needs from sponsor
- Research background information and existing products
- Perform concept generation and selection
- Model and simulate proposed apparatus designs in SolidWorks
- Combine and select the final apparatus design from proposed concepts
- Fabricate the final design based off of results from SolidWorks simulation
- Perform multiple tests using existing prosthetic design
- Analyze force and angle results to create benchmark comparison

Outcomes
A bending moment measurement platform with adjustable measurement ranges was developed and demonstrated. The results of the first test showed an angle of deflection of 29° when a 50 lb force was applied. The results of the second test showed an angle of deflection of 39° when a 55 lb force was applied. Impulse Technology will use this testing apparatus to compare the angle of deformation and forces applied to the prosthetic foot to determine the success of new prosthetic designs.