Kern-Liebers 2 – Auto Window Mechanism with Strip Springs

Overview
Kern-Liebers tasked the team with designing a spring-operated house window mechanism to be sold in the United States market and to be manufactured utilizing a Kern-Liebers constant force strip spring. The window must close automatically, using the energy stored in the strip spring.

Objectives
The team designed a strip spring operated window mechanism, to allow for automatic closure of household windows. The mechanism needed to utilize one of Kern-Liebers strip springs, be adaptable to many window sizes, and be sold at a low cost.

Approach
- Began with simple background, patent, and existing products research
- Gathered customer needs, by creating and distributing an online survey
- Generated 10 different concepts, and sketched each of them
- Used concept screening and scoring to narrow down all concepts to one final design
- Talked with sponsor and faculty advisors to gather input and make necessary changes to the final design
- Used an extensive Gantt chart to keep the team on schedule
- Used an Excel spreadsheet to document all purchases and keep the team from going over budget
- Created Solidworks models of the final design
- With drawings from the solid model, a CNC waterjet cutter was used for precise cutting of the mechanism housing
- The final prototype was built based on the final SolidWorks model
- The prototype was tested, and necessary modifications were made

Outcomes
- A strip spring has been combined with a household window to create an automatic closing window, which no existing product does
- The mechanism is built using a Kern-Liebers spring, which is easily manufactured in-house
- The mechanism can be easily adapted to many different size windows