OMG Edge Systems Saddle Process Improvement

Western Carolina University
School of Engineering + Technology

Original Objectives

- Develop and calibrate an FEA model using test data to analyze saddles and determine whether or not the original saddle is over-engineered according to company standards.
  - Develop alternative designs that will allow for company savings.

Requirements

- No degradation of wind performance of accompanying coping system and accommodate current clip design. [✓]
- Manufacturable at equal or less cost compared to current design. [✓]
- The saddle must account for a minimum of 6 inches overhang from the wall or parapet. [✓]
- Must accommodate overhang in front, back or both of the parapet wall. [✓]

Concepts

- Original Concepts
  - One bend saddle (Final Design)
  - Flat saddle
    -With strengthening bends
- Used FEA model to determine which of the concepts were most promising and verified them with destructive testing.
  - See Alternate Design Model/ FEA/Test in Final Design/Results

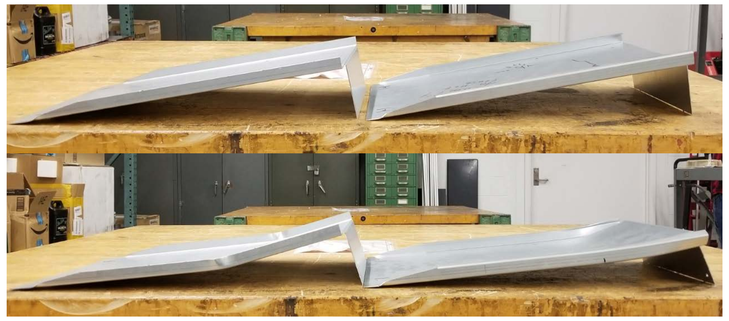
Problem Statement

We were to work with OMG Edge Systems to determine whether or not their coping saddle was over-engineered and find alternate designs to accommodate our findings.

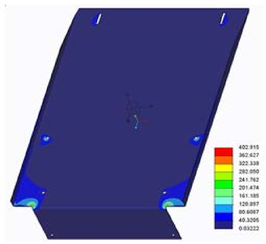
Final Design/Results

We tested their saddle using their on site tension rig to destroy a saddle and use their measured data to develop an FEA model as a basis for alternate designs. The model was developed iteratively as it was a statically indeterminate system. One alternate design we proposed was to remove two bends from their design, saving them a dollar per part. Upon testing the part, we discovered that there was a second failure mode via displacement leading to the part experiencing higher stresses in the test leading to failure of the saddle. While our alternate design wasn't capable of withstanding the same loading conditions as their original saddle design, it was determined to withstand wind zones in which OMG Edge Systems sold half of their saddles in the last fiscal year. This resulted in both an approximate savings of $4200 yearly for the company with this design and confirmed their current design for higher speed wind zones.

Before and after destructive testing on our saddle design (left) and OMG's original design (right).



Alternate Design Model/FEA/Test



* On March 16, 2020 classes and labs were closed to students due to the COVID-19 Pandemic. Without access to fabrication and testing equipment, Objectives and Deliverables were modified accordingly.

Modified Objectives

- What had to be modified due to COVID-19?
  - Our team was unable to continue calibrating the FEA model to satisfaction.
- How did the team operate in the new environment?
  - Our team operated effectively and used Zoom to meet with our Faculty mentor and coordinate to complete the project.
- What was the impact on the overall project?
  - We were still able to complete the project and OMG Edge Systems was satisfied with our contributions.

Summary

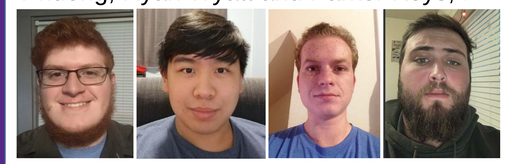
- We were able to discover another failure mode in their testing rig, verify their current design and create another design which can perform in wind zones encompassing half of OMG's sales, saving them approximately $4200 annually.

Team & Acknowledgements

Team

- Duncan Stiles (BSE Conc. Mechanical)
- Dyllon Phuong (Engineering Technology - Applied Systems Technology)
- Ryan Wyatt (BSE Conc. Mechanical)
- Parker Keys (Engineering Technology - Applied Systems Technology)

Pictured left to right: Duncan Stiles, Dyllon Phuong, Ryan Wyatt and Parker Keys, .



Sponsor and Faculty

- Paul Linton
- Dr. Wes Stone