

Technical Requirements

- Source actuator with 350 lbf peak stall force and movement speeds of at least 2 in/s
- Design/Construct test stand capable of supporting 3000 lbf axial loading
- Design/Build/Test gimbal joint to 3000 lbf axial loading
- Achieve +/- 5 deg of positional accuracy
- Achieve stable 5 Hz oscillation frequencies

Design Selected

- Ultramotion A2 Actuator
- Inverted test stand with realistic engine analog
- Floating gimbal ring with through hole for propellant line
- 90 deg offset dual-actuator control
- Electromechanical Actuators (EMA)



HALE – Thrust Vector Control

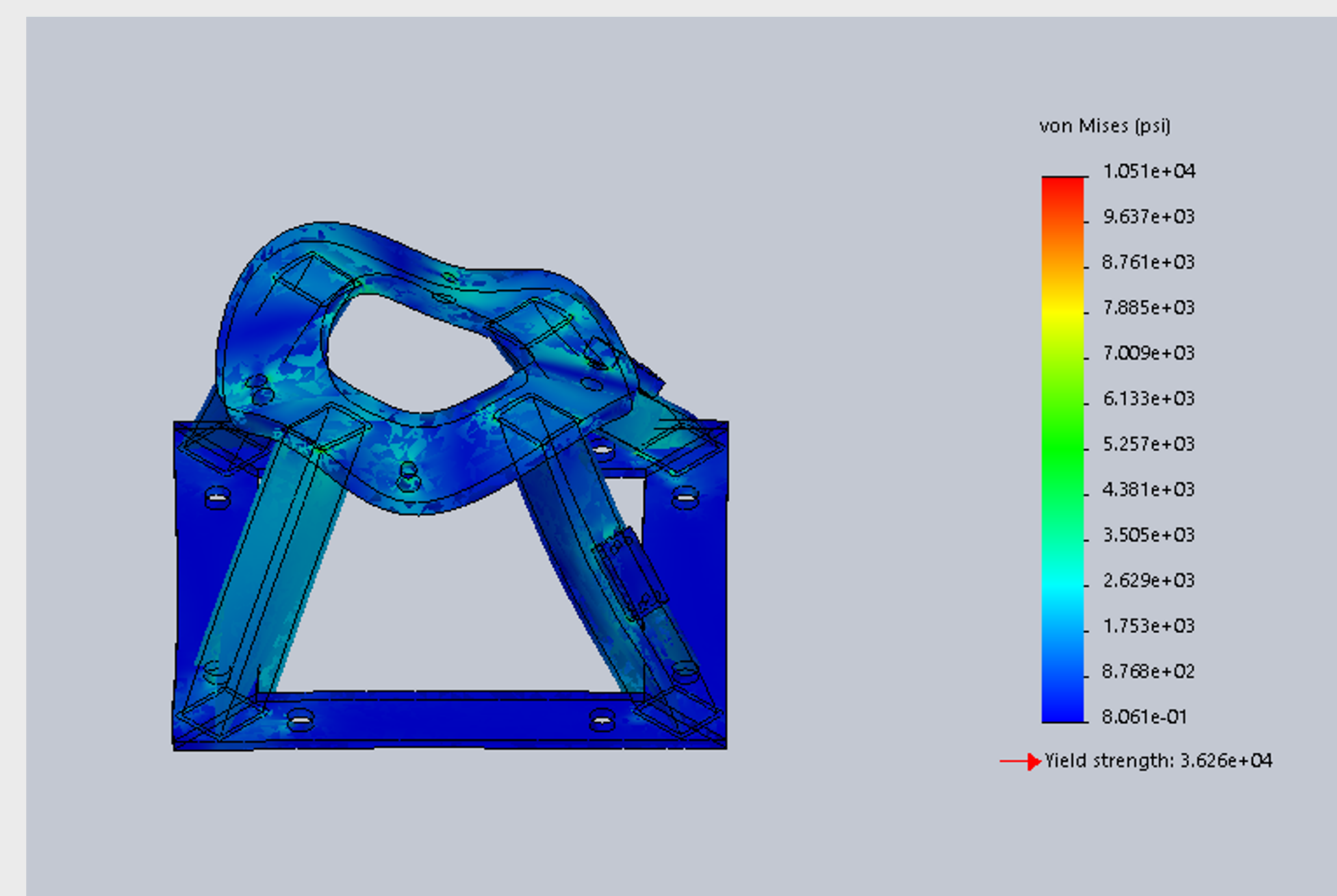
The Oregon State University (OSU) High Altitude Liquid Engine (HALE) rocket team is a student-led, multidisciplinary team comprised of students majoring in business, physics, biochemistry, computer science, and a variety of engineering disciplines. The team's primary focus is on liquid propulsion systems and related launch vehicles. The Thrust Vector Control (TVC) subteam is devoted to developing a closed-loop attitude control system for the HALE rocket. This will allow for active control of the vehicle's orientation and give HALE an advantage over other collegiate launch vehicles. To lay the foundation for future teams, TVC has developed a test stand to validate each component of the system.



Testing Conducted

- Instron static load testing for gimbal joint successful
- FEA for axial loading on test stand successful
- Instron static load testing for Ultramotion A2 actuator unsuccessful
- Actuator frequency response test successful
- Actuator angular deviation test successful

Thrust Stand FEA



TEAM MEMBERS

- Colton Harms
- Gabriel Nourot
- Colson Young
- Jonathon Schwartz
- Kaylin Gopal

TECHNICAL ADVISORS

- Dr. Nancy Squires
- Devon Burson

PROJECT SPONSOR



PROJECT STATUS

- Thrust frame, gimbal, and engine analog manufactured and assembled
- Ultramotion A2 actuator characterized
- PID loop to place engine at a specified vector completed

