DESIGN DEVELOPMENT

Nose Cone

- Designed to tolerate excessive heat due to supersonic speeds
- Impact resistant for recovery conditions
- Smooth surface finish reduces drag dur to skin friction

Airframe

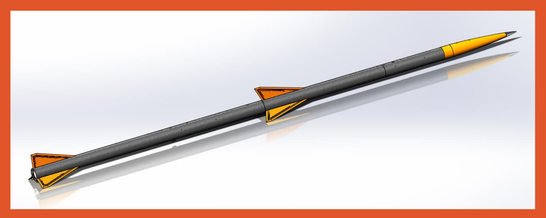
- Designed to be light and extremely strong
- Radio-transparent for telemetry data transmission

Retainer

- Bonded with high shear strength epoxy
- Provides large contact surface for effective force transmission

Fins

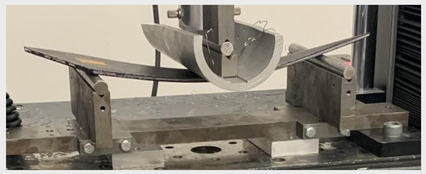
- Fiberglass frame for rigidity
- Aluminum honeycomb core for excess shear strength
- Multiple materials for increased flutter velocity
- Tip-to-tip carbon fiber layer to provide excess rigidity throughout flight
- Impact resistant



Oregon State University

HIGH ALTITUDE ROCKET TEAM: STRUCTURES AND INTEGRATION

OSU High Altitude Rocket Team, HART, is responsible for designing a two-stage demonstration rocket capable of setting an OSU altitude record. The **Structures and Integration (S&I)** sub-team is responsible for designing and validating the structural components of the rocket. The 2019-2020 S&I team members have made significant strides towards optimizing the rocket's performance and integration time.



DESIGN VALIDATION

Finite Element Analysis (FEA):

Computer aided design software has proven useful in validating designs. FEA with simulated aerodynamic loads are paramount to the design process as they give estimates for structural performance without spending time and money building and testing designs.

Structural Testing:

Designs are then subject to structural testing. Structural testing is the final step in deciding whether a specific design is viable for full scale flight. Subjecting a component to the physical loading scenario is the only way to determine if a design is structurally sound.

DESIGN INNOVATION

The 2019-2020 High Altitude Rocket Team has introduced unique design changes with hopes to optimize the rocket. **Eliminating the inter-stage coupler (ISC)** will both reduce weight and eliminate a manufacturing challenge. While prior years utilized an ISC to join airframes of unequal diameter, the airframes this year allow for elimination of this part. Additionally, the **motor retainer** will serve to transfer force from the rocket's solid motor into the airframe. Years prior used a radial bolt hole pattern to transfer motor force. The retainer is housed entirely within the airframe, reducing excess drag, stress concentrations on the airframes, and integration time.

TEAM MEMBERS
Brent Barzler
Erich Trickel
Nicholas Nopwaskey
Tyler Peltier

TECHNICAL ADVISOR
Dr. Nancy Squires

PROJECT SPONSOR
OSU AIAA

Project Status

- Finalized designs
- Manufacturing Complete
- Physical testing validated design
- Rocket has been test integrated and is ready for full scale flight.