Anteater Electric Racing

Ergonomics Subsystem | Cockpit Prototype

Department of Mechanical and Aerospace Engineering at the University of California, Irvine

MISSION STATEMENT

The *Cockpit Prototype* aims to enhance the driver's control and safety in Anteater Electric Racing's 2024-2025 season vehicle, Kilozott. The subsystem design strives to improve lateral support, optimize reach, and ensure adherence to FSAE guidelines. The subsystem prototype will first be integrated into EVO, the previous generation car, for testing and driver training to inform the final adjustments of the system

ERGONOMICS TEAM

Advisor
Professor John Michael McCarthy

Senior Ergonomics Engineer
Athena Wong

Ergonomics Engineers
Tyler Enright
Ethan Yoon

MAE93 Interns
Katie Schmitz
Meera Sambhwani

TARGET PERFORMANCE

Technical Inspection & Event Expectations

- Acceleration (75m): 4.3s
- Skid Pad: 5.05s
- Endurance (22 km): Event Completion
- Autocross: 53.8s

Power & Energy Consumption

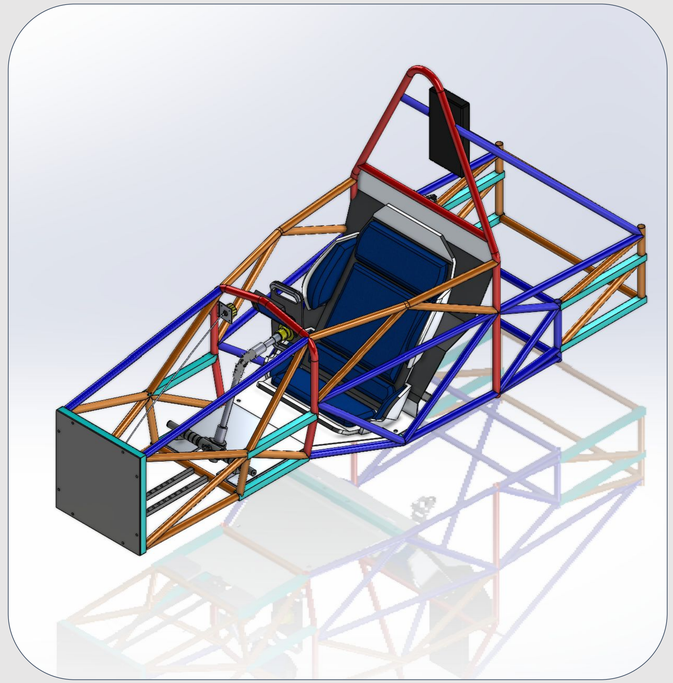
- Output: 62 kW continuous | 112 kW peak
- Power Demand Averages:
  - Acceleration: 0.162 kWh
  - Skid Pad: 0.15 kWh
  - Endurance: 8 kWh
  - Autocross: 0.8 kWh

Performance estimates are based on previous competition data and manufacturer specifications. Drivers expected to meet or surpass targets.

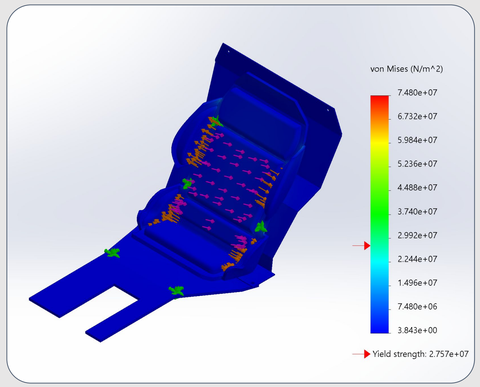
- Expected outcome is a full physical prototype, validated through static and dynamic testing with performance metrics from acceleration, skid pad, endurance, and autocross events

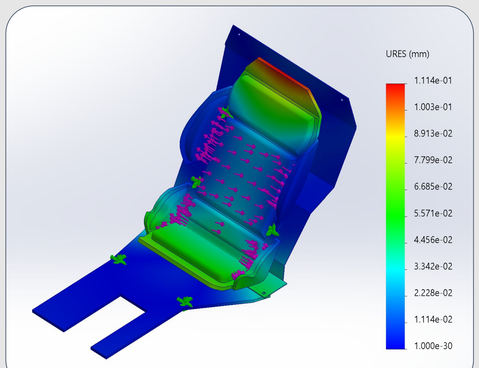
COCKPIT PROTOTYPE

COMPONENTS INTEGRATED



FINITE ELEMENT ANALYSIS





Timeline

- Original designs done outside of MAE151A by Ergonomics subteam
- Subteam of Anteater Electric Racing
- Focus on prototyping, manufacturing, and testing

Societal Impacts and Safety Concerns

- Advances EV technology for future transportation
- Promotes sustainable innovation in motorsports
- Emergency shutdown & fault detection systems

Future Improvements

- Accelerated timeline to allow for extended prototyping.
- Receive and retain more sponsorships to lower costs.

SPECIAL THANKS
Professor David Copp
Professor Mark Walter
Professor John Michael McCarthy

KEY FEATURES

Components redesigned based on performance of previous vehicle and in accordance with most recent FSAE technical inspection sheet.

Floor Closeout

- Sealed with non-perforated, rigid material (aluminum) to prevent debris entry (T.1.7).
- No gaps larger than 6 mm in driver-exposed areas.

Firewall

- Constructed from rigid, non flammable material (aluminum) for driver separation from powertrain (T.1.8).
- All pass-throughs sealed to prevent fluid leaks.

Dashboard

- Simplified for quick access to essential controls while ensuring 100° field of view (V.2.2).
- Emergency kill switch positioned for immediate access (IC.9.4).

Steering

- Achieved near-zero bump steer by raising tie rod upright and shifting rack outward.
- Optimized for ergonomics, reducing wrist strain while maintaining <7° free play (V.3.2).
- Equipped with quick-release steering wheel for rapid driver egress (IN.5.2).

Headrest

- Energy-absorbing padding to reduce impact forces (T.2.8).
- Maximum 25 mm gap to the helmet for safety.
- Offset to allow driver's head to remain horizontal *as per driver feedback*

Seat

- Extended bolsters for lateral support *as per driver feedback*
- Adjusted padding for improved driver stability in high-G turns (T.1.5, T.1.6).

FSAE Technical Inspection Form | 2024