To Predict ▶ To Design ▶ To Perform

College of Engineering
Department of Mechanical & Industrial Engineering

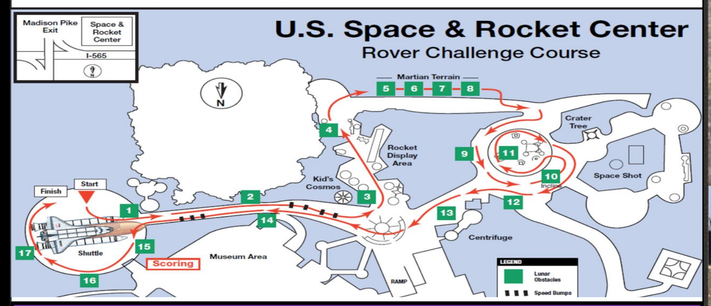
ME, ECE, IE Capstone Design Programs

Team 24:"Chandler's" NASA Human Exploration Rover Challenge

Andrew Bui, Glynn Cooper, Madison Davis, Cameron Fahrig, Melissa Gisevius, Summer Matherne

Background

- March 30, 2017 at the US Space and Rocket Center in Huntsville, Alabama
- Competition course consisting of 17 obstacles.
- LSU Teams:
  - Tannin' Tigers (2015-2016): 32:53 — 20th of 34
  - Mike II (2016-2017): 19:06 — 15th of 38



Objective Statement

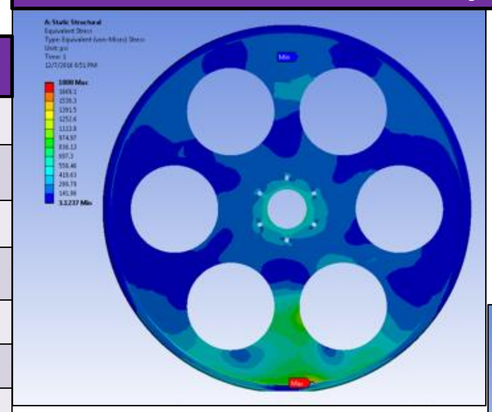
To design, manufacture, and test the human powered rover based on the constraints set by NASA in the competition rules to complete the obstacle course with minimal penalties

Engineering Specifications

Specifications	Target	Actual
Average Speed	5.5mph	2.55mph
Turn Radius	≤15ft	≤11ft
Vehicle Weight	225lbs	277lbs
Braking Distance	4-8ft	7.5ft
Width	≤60in	54in
Fender Area	≥120in^2	145in^2
Collapsed Size	60x60x60in^3	54x58x43.5in^3
Vehicle Clearance	≥15in	15.5in
Assembly Time	<18s	10.42s

Mike II

Main Component Analysis

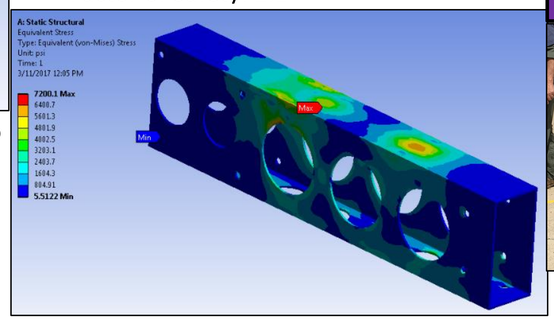


FEA on frame after cutting out holes to cut weight

- Max Stress: 7200 psi
- Factor of Safety: 6.4
- Weight cut per half frame: 2.8lbs

Finite Element Analysis (FEA) on wheel

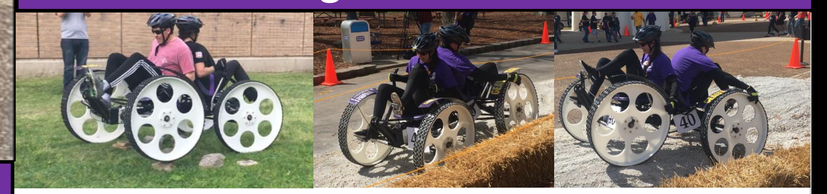
- Loads Applied:
  - 250lb bearing load
  - 75ft-lb moment
  - 50lb axial load
  - fixed at bottom surface
- Max Stress: 1808 psi
- Yield Strength of HDPE: 3800 psi
- Factor of Safety: 2.1



Wheel Manufacturing

Discs were cut and CNC'd out of HDPE. Channels were milled through the center of the rims and they were put through the roller to bend them into semicircles. A heat gun was used to plastic weld the rims to the disks. Bar mat was secured to HDPE rims with screws and washers

Testing and Validation



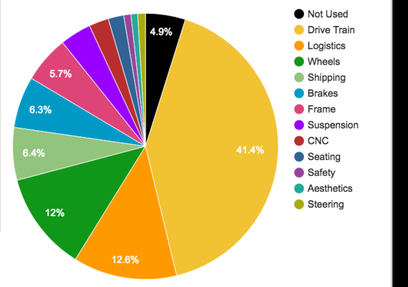
Rock Outcropping Testing | Crevice Obstacle at Competition | Gravel Pit at Competition

Assembly Time Testing | Carry Test at Competition | Size Test at Competition

Safety

Drivers at the starting line after having passed the safety inspection by the NASA officials. Drivers must wear proper PPE and vehicle must be deemed safe for course

Budget: $7000



Sponsors: Jack Rettig represented by Dr. Dimitris Nikitopoulos

Advisor: Dr. Manas Gartia

Alumni Advisor: Mr. Blake David