Team 27: SAE Baja

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Objective

To design and manufacture a safe All-Terrain Vehicle (ATV) that coincides with all SAE Baja rules and constraints that will finish all races with an overall score to place the team within the top 20 of the competition.

Design Details

- More Comfortable Driving Position
- Fixed Brake Calipers All Around
- Newly Designed Ackerman Steering Geometry
- Improved Turning Radius

- More Compact & Lightweight Frame
- New Gear Reduction Ratio
- Single Rear Brake Connected to Gearbox
- New H-arm Rear Suspension

Event Scoring

Category	Event	Points	Category Total
Static	Design Evaluation	150	300
	Cost Report	15	
	Prototype Cost	85	
	Sales Presentation	50	
Dynamic	Acceleration	75	700
	Hill Climb/Traction	75	
	Land Maneuverability	75	
	Suspension/Rock Crawl	75	
	Endurance	400	
Total			1000

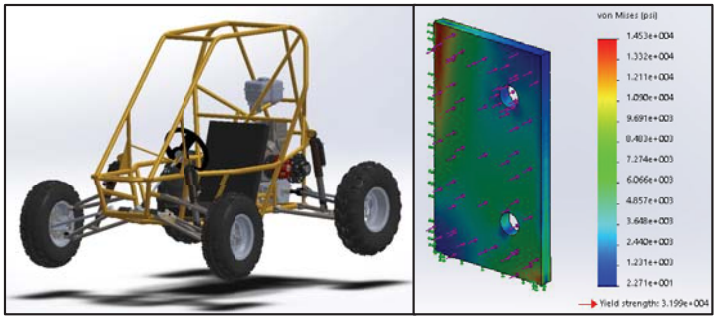
Manufacturing

Frame	-Professionally bent and coped tubes, TIG welded in house -Primary roll cage members: 4130 steel: 1.25" OD , 0.065" thick
Drivetrain	-Purchased Engine -Reused CVT and CV axles -Custom made gearbox built in-house
Suspension	-In-house manufacturing for H-arms, camber links, and uprights -4130 chromoly steel -Purchased rear Fox shocks
Brakes	-In-house manufacturing for rotors and rear brake adapter -Purchased, reused, or had sponsored all other components
Steering	-In-house manufacturing for shaft, linkages, and supports -Purchased rack and pinion
Electrical	-2 kill switches and brake light wired to power supply

Specifications

- Overall Weight: 420 lbs.
- Wheelbase: 60"
- Track Width: 54.5"
- Ride Height: 12"
- Maximum Speed: 31 MPH
- Engine Displacement: 305 cc
- Gear Reduction Ratio: 7:1
- Maximum Torque: 374 ft-lbs
- $10,000 Budget

3D Modeling & Finite Element Analysis



Testing

Weld Strength	Suspension
• A 'Y' joint was sectioned to inspect penetration a 'T' joint was broken to ensure the weld was stronger than the parent material. • Weld efficiency calculated using hardness measurements.	• Vehicle will be dropped from 5 feet off the ground to simulate severe landings • The vehicle will be driven over various obstacles such as large bumps and logs to test the suspension dynamically
Maneuverability	**Acceleration and Braking**
• Driver will attempt to maneuver the vehicle through a cone course without knocking them over. • The turning radius of the vehicle will be measured at different speeds.	• The vehicle will be timed on how long it takes to reach maximum speed. • The brakes will be engaged at full speed and the stopping distance will be measured and ensured that they lock up.

Project Start ↓ | Concept Generation | Analysis | Final Design | Manufacturing / Analysis Refinement | Testing | Competition ↓

September → October → November → December → January → February → March → April → May

Sponsors: Mr. Jack Rettig, Industrial Machine Works, Methanex, Classic Tube, SolidWorks, Stockcar Steel, Wilwood, Coast Machinery, Exxon Mobil

Advisor: Dr. Nikitopoulos