To Predict ▶ To Design ▶ To Perform

College of Engineering

Department of Mechanical & Industrial Engineering

ME, ECE, BE Capstone Design Program

Tech Baja SAE Mini-Baja

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PROJECT OVERVIEW

Baja SAE Engineering Design Competition

Location: Tennessee Tech University
Cookeville, Tennessee

Date: April 14th-17th

OBJECTIVES

- Design a single-seat, all terrain vehicle that adheres to SAE rules
- Top 20 finish at 2016 Baja SAE Competition
- Score at least 150 points in static events
- Overall weight under 400 pounds

COMPETITION SCORE

STATIC EVENTS [300 Points]	DYNAMIC EVENTS [300 Points]	[400 points]
➢ Cost Report [100]	➢ Acceleration [75]	
➢ Design Report [150]	➢ Maneuverability [75]	
➢ Sales Presentation [50]	➢ Sled Pull [75]	
	➢ Endurance [75]	

SUSPENSION / STEERING

Front Suspension
- Unequal length double A-arms
- 4130 steel tubing
- Fox Float CTD

Rear Suspension
- Custom aluminum trailing arm
- CNC machined billet aluminum bearing carrier
- 4130 steel radial arms (2)
- Fox Float CTD

	Front	Rear
Wheelbase	70 in	
Track Width	52.5 in	49 in
Ground Clearance	12.5 in	
Wheel Travel	8 in	5 in
Spring Rate	80 lbs/in	55 lbs/in
Tires	22x7-10 Maxxis Razr 2	23x8-10 ITP Mudlite
Camber	-3 degrees	0 degrees

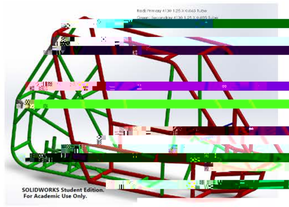
POWERTRAIN

- Continuously Variable Transmission (CVT) - Dayco Engineering GY9
- Custom Gearbox - single speed, dual reduction spur gear train

Gear Ratio	7.56:1
Final Drive Ratio (High/Low)	6.80:1 / 29.48:1
Top Speed	35 mph

FRAME

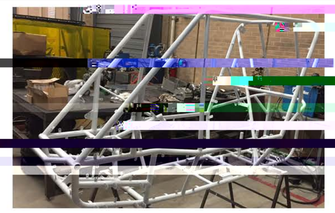
- Primary (red): 1.25" OD, 0.065" wall thick
- Secondary (green): 1.00" OD



- ANSYS Mechanical
- Load = 2.0 x Weight

	Max Stress	Max Deformation	FOS
Top	29.2 ksi	0.13 in	4.2
Front	29.1 ksi	0.07 in	3.4
Side	54.1 ksi	0.024 in	1.8

Number of Members	48
Length of Tubing	95.4 ft
Weight	65 lbs
Length	82 in
Height	47 in
Width	31 in

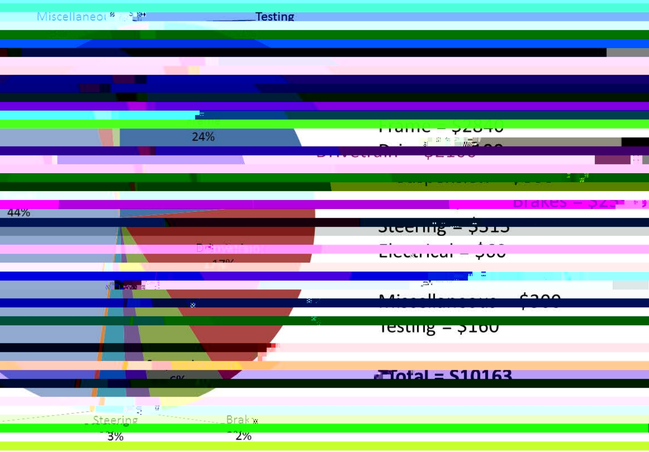


BRAKES / STEERING

- Front caliper - Stock Polaris Outlaw 525
- Rear caliper - Wilwood Dynapro Single
- 14" rack and pinion
- 4130 steel tie rods - 15" long, 0.625" OD

RESULTS

- 20th place / 96 teams
- [illegible] improvement from 2015
- 193.12 points in static events
- Overall weight: 394 pounds
- 23 laps completed in Endurance
- No major failure during race



Sponsors: Mr. Jack Rettig, IPS, CB Gear, LSU Student Government, H&W Machine, Elliot Tool, SST, MH Barrie, The Bandit

Advisors: Dr. Warre