NEW HAMPSHIRE BAJA

SAE INTERNATIONAL

Chassis

Design

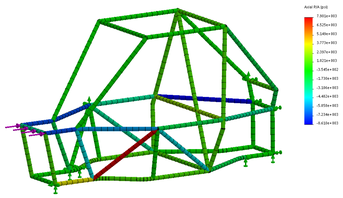
- Utilized 1020 DOM steel for primary and secondary members
- Triangular tube design to increase strength by dissipating forces
- Angled front end to avoid obstacles
- Designed around Collegiate Design Series Baja SAE® 2018 Rules
- Lengthened the rear end of the vehicle to ensure a more uniform weight distribution throughout the vehicle

Ergonomics

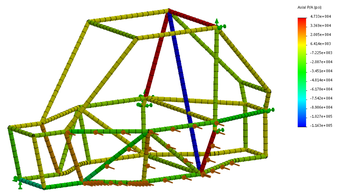
- Cockpit designed to accommodate 95th percentile males and 5th percent females
- Increased width of frame to accommodate leg space

Material

- 36.6% greater bending strength than recommended 1018 steel
- 28.0% greater bending stiffness than recommended 1018 steel



Front Impact Crash at 30 mph



Side Impact Crash at 30 mph

TEAM MEMBERS

Alex Bickford, Nate Bissey, Tony Cafiso, Jim Fey, Pat Glynn, Ryan Joaquin, David Knapp, Ryan Pinard, Connor Rose, Nate Steggall, Belinda Vuto, Colin Williamson

ADVISOR

Barabaros Celikkol

COMPETITION

Baja SAE is a collegiate competition where engineering students design and build a single-seat, all-terrain sporting vehicle. This vehicle serves as a prototype for a recreational production vehicle. Each team is judged in both static and dynamic events. These competition events are listed below.

STATIC	DYNAMIC
Cost Analysis	Acceleration
Design	Hill Climb
Presentation	Maneuverability
	Rock Crawl
	Endurance

Suspension

Front Suspension

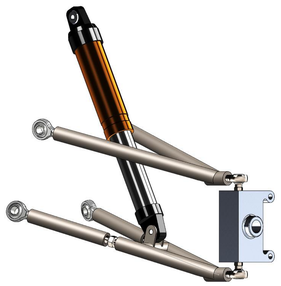
- Reduced ground clearance from last year that contributes to a lower center of gravity
- Included hex bolt for adjustability in bottom arm length
- Designed suspension dynamic systems with Lotus Shark software

Rear Suspension

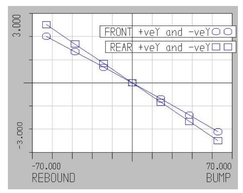
- Semi Trailing Arm Design
- 2.5º of Camber while banking
- Minimal toe in with wheel travel

Shocks

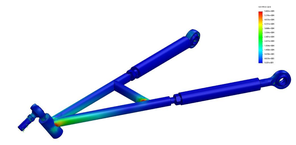
- Fox Float 3 air shocks
- Air adjustable



Semi-Trailing Arm Design



Chamber Angle vs. Wheel Travel



A-arm Analysis
(2000 lbf Maximum Shock Force Applied)

Drivetrain

Engine

- Unmodified four-cycle, air cooled, Briggs & Stratton 10 HP OHV Vanguard Model 19.
- Slotted engine and gearbox mounts for ease of access and adjustability.

Gearbox

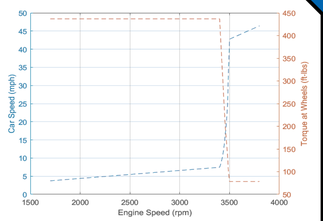
- 8:1 reduction gearing ratio
- Output shaft hex bore reduces stress concentrations compared to keyway design

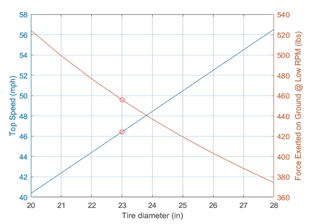
Clutch

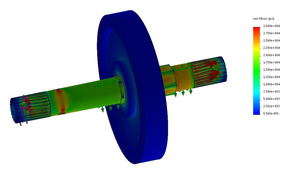
- Gaged GX9 Continuously Variable Transmission
- Low speed ratio 3.9:1, High speed ratio 0.7:1
- Tuned through testing to maximize output

Driveshaft

- Re-engineered shaft to minimize stress around brake mount







392 ft-lb Applied Torque
9,325 lb Force Applied to End of Shaft

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Special thanks to Scott Campbell, Tracey Harvey, Lauren Foxall, Kevan Carpenter, Sheldon Parent.

University of New Hampshire
College of Engineering and Physical Sciences

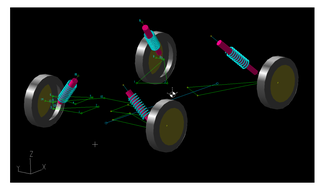
Controls

Steering

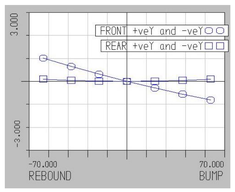
- Decreased angle of steering column to reduce “school bus” driving feel
- Designed steering in conjunction with front suspension with Lotus Shark software
- Incorporated a lightweight, compact steering wheel to improve handling and driver comfort

Brakes

- Top mounted brake and throttle pedals for ease of use and increased foot space
- Included Wilwood reverse pedal assembly and hydraulic cylinders



Lotus Shark Full Suspension Model



Toe Angle vs Wheel Travel

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University of New Hampshire

UNH BAJA