

Bulldog Racing - 2018 SAE Baja

Mechanical Engineering

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Abstract

Bulldog Racing is a nonprofit organization and the Fresno Collegiate Chapter of the Society of Automotive Engineers (SAE). The team designs, fabricates, tests, and competes with a prototype off road vehicle against dozens of other schools from across the world. Vehicles are then judged based on overall design, cost and dynamic performance. Students that are involved deal with real world challenges of funding and fabricating a vehicle while putting their classroom design knowledge to the test. While the club mainly consists of engineers seeking practical applications for their studies, we welcome anyone who shares our interests in promoting and racing a successful competition vehicle.

Chassis

The chassis is a tubular space frame made of 4130 Chromoly Steel. This material is used frequently by teams due to its' high strength to weight ratio. Changes from last year's design include an extended rear end to accommodate the drivetrain and suspension designs, and a more spacious cockpit to improve driver ergonomics.



Fabrication

Students learn a wide variety of fabrication techniques which give them hands on experience in an industry-like setting.



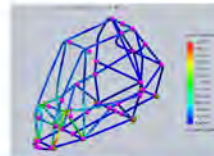
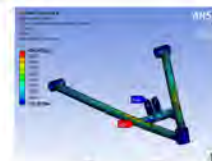
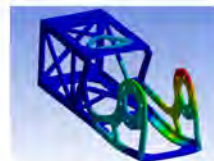
Drivetrain

SAE requires all competing teams to utilize the same engine, the Briggs & Stratton Model 19, which was specifically designed for Baja SAE events. With an even playing field, it is up to teams to design and optimize the off-road performance characteristics of the vehicle.



- Theoretical 150 ft Accel. – 4.25 s
- Theoretical Top Speed – 32 MPH
- Max Gradeability – 53.6 degrees
- Briggs & Stratton 10hp M19 Engine
- CVTech 0.43:3.0 Ratio CVT
- Dana/Schafer 13.25 LSD Transaxle
- 6061-T6 Anodized Aluminum Drivetrain Mount

Analysis



Suspension

The front suspension design utilizes unequal length, non-parallel A-arm. The rear design is a 3-link which is made up of the main trailing arm and two camber links. The two camber links allow adjustability so that the suspension can be tuned during testing. AFCO monotube shocks and springs are being trialed for the first time this year.



Final Car Design

The car is nearing completion and the team will be taking it to Portland Oregon for competition on May 30th – June 2nd where it will compete with 100 other teams from around the world.



Brakes & Steering

Custom pedals have been fabricated this year to gain more design points at competition and to reduce cost. At competition, the car must be capable of locking all four wheels to pass the technical inspection. Our system has been designed with a max hydraulic pressure of 792 psi to achieve this requirement.

The steering system utilizes a 14 in. steering rack and optimizes pro-ackerman. This helps with sliding around corners with loose dirt and gravel on the track.



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