

Chassis & Suspension

Proposed Design

Vehicle Specifications

Dimensions	Front	Rear
Overall Length, Width, Height	1593mm long, 1208.9mm wide	
Wheelbase	1593mm	
Track Width	1209mm	1153 mm
Mass with 68kg driver seated	121 kg	138 kg

Chassis Specifications

Frame Construction	Complete Tubular Space Frame
Material	4130 Steel Round Tubing
Joining method and material	Fusion welding ER70-S2 filler
Targets (Torsional Stiffness or other)	1460 N-m/deg
Torsional stiffness and validation method	1460.50 N-m/deg CAE beam model
Bare frame mass with brackets and paint	33 kg
Crush zone material	Dow Impax 700 Foam
Crush zone length	254mm
Crush zone energy capacity	Standard FSAE IA is being used

Suspension Specifications

Suspension Parameters	Front	Rear
Suspension Type	Double unequal length A-Arm. Push rod actuated 45 deg oriented spring and damper	Double unequal length A-Arm. Push rod actuated horizontally oriented spring and damper
Tire Size, Compound and Make	6/18-10 LCO 7 Wide	6/18-10 LCO 7 Wide
Wheels (width, construction)	7 in, 1 pc al rim, 4-3 offset	7 in, 1 pc al rim, 4-3 offset
Center of Gravity Design Height	214.63 mm	
Suspension design travel	38.1 mm Jounce/12.7 mm rebound	44.45 mm Jounce/19.05 mm rebound
Wheel rate (chassis to wheel center)	44.92 N/mm	63.01 N/mm
Roll rate (chassis to wheel center)	.23 deg/g	
Sprung mass natural frequency	3.76 Hz	2.73 Hz
Jounce Damping	N/A	N/A
Rebound Damping	N/A	N/A
Motion ratio / type	.5 progressive	.5 progressive
Rate of Camber Change- Ride Camber (deg / m)	7.48 deg/m	24.8 deg/m
Roll Camber (deg / deg)	.32 deg/deg	1 deg/deg
Static Toe	.2 toe out	.3 toe in
Static camber and adjustment method	neg 1.5 adj. via shims on arms	neg .2 adj. via shim on arms
Front Caster and Kinematic Trail	4 deg non adjustable	
Front Kingpin Axis Inclination and Offset	4 deg non adjustable	
Static Ackermann and adjustment method	100% non adjustable	
Anti dive / Anti Squat	N/A	
Roll center position static	35.05 mm	35.05 mm
Roll center position at 1 g lateral acc		
Steer location, Gear ratio, Steer Arm	rear steer, 6.4:1 gear ratio, 57.15 mm steer arm	

Motivation:

To design and manufacture a light weight and cost effective chassis and suspension for the 2015 Formula SAE competition.

Design Goals

- Reduce Weight of Chassis & Suspension
- Increase Chassis Torsional Rigidity
- Improve Overall Vehicle Packaging
- Improve Vehicle Handling Characteristics
- Simplify Design for Ease of Manufacturing
- Improve Suspension Tuning Ability
- Reduce Overall Vehicle Envelope
- Reduce Vehicle Cost

Responsibilities

Responsibilities	Suspension Design	Chassis Design	Manufacturing	Analysis
Christian Ramos				
Oswaldo Fernandez				
Alex Diaz				
Ricardo Gonzalez				

Project Timeline



Team Members



Christian Ramos Oswaldo Fernandez Alejandro Diaz Ricardo Gonzalez

Faculty Advisor: Andres Tremante