Gandhinagar Institute of Technology

Affiliated to Gujarat Technological University

TEAM GREENITIOUS V4.0

(Vehicle number : 7)

Eco Green Vehicle Challenge 2019

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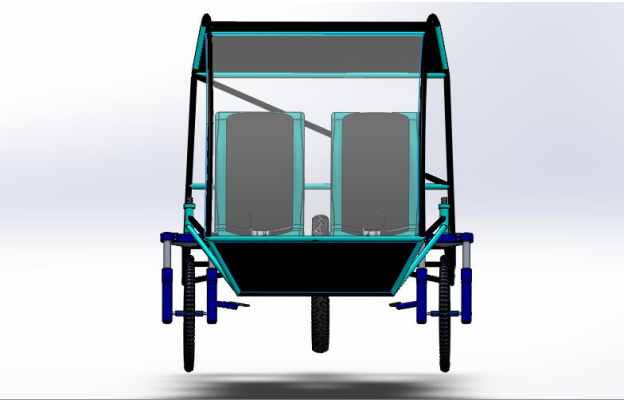
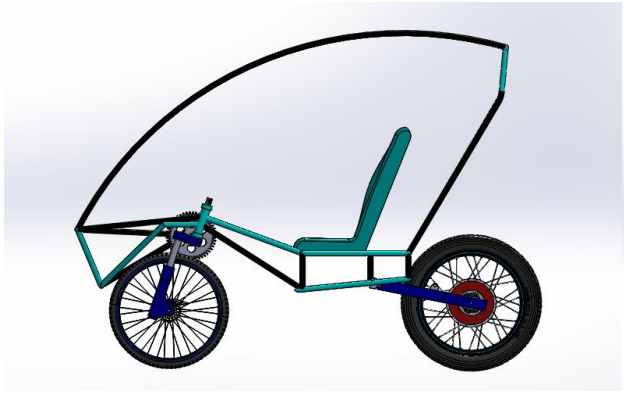
- Viren Panchal (vc)

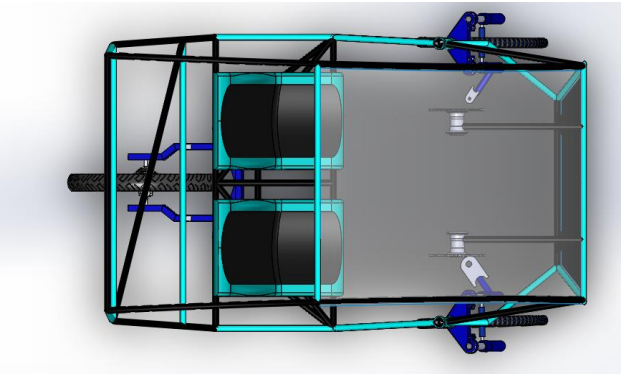
Host By : L.D College of Engineering

Technical Specification & 2D/3D Views:

- Ergonomics
- Wheel base: 144.36cm (56.83in)
- Track Width: 117.17cm (46.13in)
- Ground Clearance from seat: 57.54cm (22.65in)
- Aesthetic View of Vehicle
- Good Stability







Frame:

Design Methodology:

Lesson Learnt

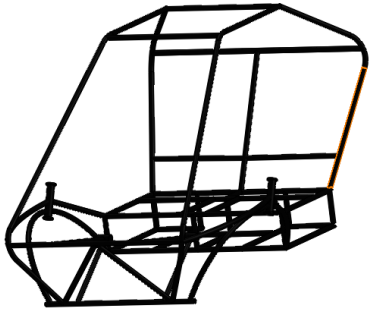
- **In 2018**

  - More human effort due to drag.
  - Centre of Gravity was varying.
  - Number of members are more.

- **In 2019 (1st Attempt)**

  - Drag has been reduced.
  - Centre of Gravity has been improved.
  - Reduction in seating members.

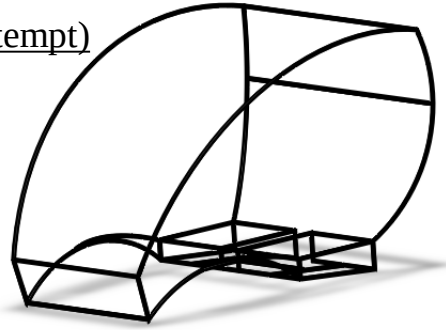
In 2018



- Material which we had compared were **Aluminum, Chromoly, AISI 1017** but out of these, we procured **AISI 1017** on the basis of it's yield strength, economically as well as performance.

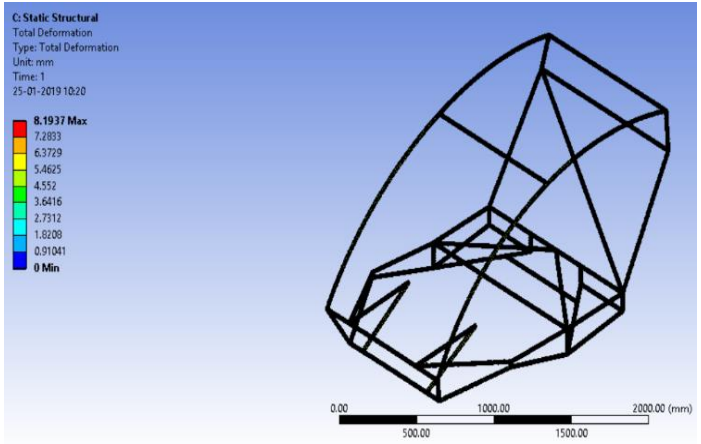
Mechanical Properties - AISI 1017	Value
Tensile Strength, Ultimate	405 Mpa
Yield Strength	340 Mpa
Bulk Modulus	160 Gpa
Elongation at Break	18%

In 2019
First Attempt)

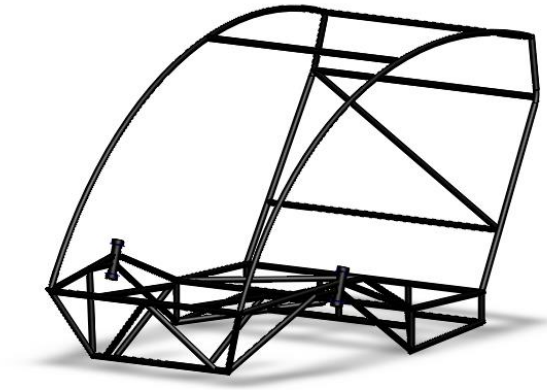


Frame:

- **Ergonomically design:** The vehicle is design to be spacious, countenancing easy entry and exit of driver.
- Stability and lower center of gravity.
- Simplicity in design.
- Aero-dynamic.
- Vehicle strength must be required.
- Aesthetic view of vehicle.



Dimension of Vehicle	
Length	208 cm (81.89 in)
Width	124.46 cm (49 in)
Height	121.94 cm



Steering and Suspension:

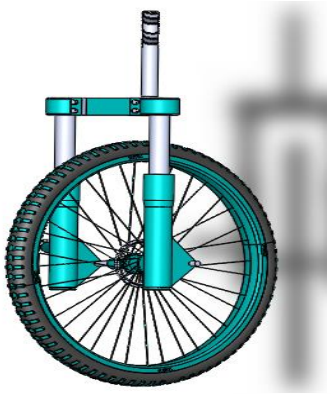
Design Consideration

- Tadpole in structure.
- Tractive effort available from share of weight.
- Batter grip available for both steering and braking.
- Comfort.
- Excellent handling as CG is lower.

Steering Details:

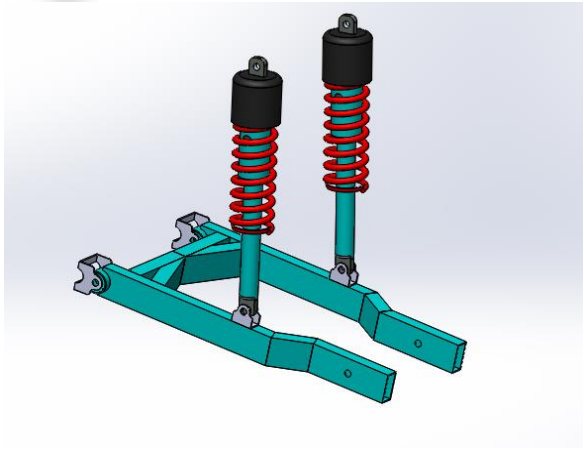
- Bell crank steering mechanism (with tie rod and steering lever)
- Steering rod of 98 cm length provided with helm joint for 3 plane motion.
- Turning radius: 420 cm
- Fork Length: 90 cm
- Material: Aluminium and AISI 1017 material.

Steering and Suspension:

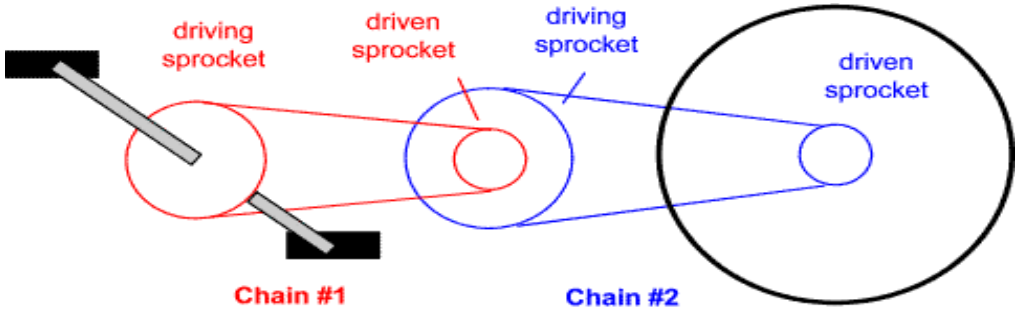


- Front:
  Telescopic Suspension

- Rear suspension:
  - Swing Arm or Trailing Arm
  - Closed coil helical spring suspension
  - Spring travel: 1.18 in
  - Spring rate: 135 N/mm
  - Free Length: 33.5 cm
  - Motion Ratio: 0.82



Drive Train:



Formulas :-

1. Angle=360/No. of Teeth
2. Pitch :- practically measured
3. PCD=Pitch*Cosec(180/T)
4. RPM(N1)=N2*T2/T1 where, N2=60(assumed),T2=48(measured),T1=derailleur teeth
5. Torque=F*R where, F=sprocket force, R=PCD/2
6. Force=Torque/R where, R= Radius of wheel =25/2 inches=0.3175 m

Drive Train:

Calculation:

Value Table

Sr. no	Teeth	Angle (θº)	Pitch (m)	PCD (m)	RPM	Torque (Nm)	Force(Wheel)(N)
1	34	10.58823529	0.024	0.288	84.70	79.57	250.6
2	24	15	0.024	0.204	120	56.36	177.5
3	22	16.36363636	0.024	0.187	130.9090909	52.67	162.7
4	20	18	0.024	0.170	147	47.01	148.06
5	18	20	0.024	0.153	160	42.375	133.4
6	16	22.5	0.024	0.136	180	37.66	118.61
7	14	25.71428571	0.024	0.119	205.7142857	33.02	104

Brakes:

Rear: Drum Brake

Front: Disc Brakes

Braking force & Dynamic Axle load
Breaking Force: 5866 N Dynamic axle load: 84.72 N

Stopping Distance
Assuming speed: 18 km/hr
Stopping Distance: 2m

➢ Ergonomics:

- The vehicle is design to be spacious, countenancing easy entry and exit of driver.
- Seat angle (26 degree from vertical) and Seat height (58.5 cm above ground).
- Easily operated steering handle with comfort.
- To increase performance use of Disc brakes and lowering positioning of driver.
- Rollcage is designed in order to enhance overall safety in case of front or rollover impact.

➢ Safety:

- Providing OEM conversion 3-point seatbelts, Helmets, Safety goggles, knee and elbow guards

Innovations :

- **Transmission:**
  - We have used seven speed sprocket along with drum brake of rear wheel after making innovative coupling.
- **Steering:**
  - Bell Crank Mechanism with Tie Rod and Steering lever.
- **Suspension:**
  - Telescopic suspension is used on front wheels and mounted on 18 degree castor angle.
- **Brake:**
  - Combination of Hydraulic disc brakes and drum brake.