

GUJARAT TECHNOLOGICAL UNIVERSITY

AUTOMOBILE RESEARCH GROUP



1. Background of event:

Gujarat Technological University initiated GT Motorsports – A Formula Student Team under Automobile research group to represent GTU in National Level Competitions with an aim to provide practical knowledge to the students from every college Affiliated to GTU in 2014. This event helps shape future engineers through competitive spirit and encompasses all elements of a vehicle building for aesthetics in design, to the choice of parts, through structure design and modelling, to fabrication and testing. This event sets the stage to assess the capability for teamwork, entrepreneurship, and leadership and management skills of the students

2. Event declaration link (if any, if its GTU internal event)

<http://files.gtu.ac.in/circulars/16Mar/17032016.pdf>

http://files.gtu.ac.in/circulars/16Mar/31032016_02.pdf

3. **Date:** 23/01/2016 - 28/01/2016

Time: 10:00 AM Onwards.

Title of Event: Formula Student INDIA 2016

Venue: Buddh International Circuit, Greater Noida, Uttar Pradesh

Position: 9th Rank (50 teams participated)

4. Brief proceeding of the event from where new readers can get some idea:

Date: 23rd January, 2016 (Day-0)



The team visited the event site as per the schedule, registered themselves and collected the Kit (T-shirts, Bands & Caps) provided by the event organisers. After the registration, GT Motorsports team was allotted a pit, where in the team was supposed to set up their car and the required tools. 29 team members of GTMS had reported on the event site. The feeling of each member standing in the India's only Formula Race Track "Buddh International Circuit" was immense and was the fruitful result of their hard work.

Everyone on site was busy helping their respective team to set up their car as well as taking the tour of the circuit. Around 1000 students from across the country representing their Institute were all excited and well prepared for the upcoming challenges in the form of various events of the competition. The day ended with an Inauguration function initiated by the organisers welcoming all the 48 teams, which were to compete amongst one another in the coming 5 days.

Pat Clarke an official from Delta Advisory Board conducted a seminar after the Inauguration addressing some basic problems each team face in designing Formula Student Car as well as some useful tips to build a well-engineered Formula Race car.

Date: 24th January, 2016 (Day-1)

During the 1st day of the event, the Technical Inspection which is the first test every team has to pass through, were open for all the teams. GT Motorsports made some final preparations in the car and moved for the Technical Inspection Bay to get their car inspected. Few minor changes were advised in the car as per the technical inspector inspecting the car.



Scrutiny at Technical Inspection Bay



Team working on Car in Pit

Date: 25th January, 2016 (Day-2)

The team worked on correcting the errors which were pointed by the tech inspectors and later during the day, appeared again for the technical inspection. The result this time was improvised, but there were still some minor changes which the team had to work upon before finally clearing the technical inspection.

Problems Faced by GTMS during Second Technical Inspection Attempt:

- Play in Pedal box
- Metal Lock nuts instead of Nylon lock nuts in areas which are likely to be affected by Heat easily
- Safety wiring of Bolts

Solutions of the problems:

- Plate was removed and Pedal box was directly mounted on the chassis
- Safety wirings were made better and use of taps were made where Nylon nuts were used so as to reduce the impact of heat.

The team was asked to appear in the **Business Case** presentation during the 2nd Day of the event @ 5:30pm. Here in, few team members are to present in front of Judges a proposal as in to

lure the investors to invest in them in order to start the production of their car on large scale. Three members of GTMS had appeared in front of the panel of judges and presented their Business case.

At the end of day-2, a seminar was arranged by **Mr. Christoph Hhan**, an engineer from **Mathworks**, also a Design Judge of the event, regarding the simulations of the vehicle as well as tips and guidelines for improving the performance and tuning of the ECU (Electronic Control Unit) of the engine. This seminar proved to be very useful for the present participants as ECU is a component of the car where in tuning proves to be very difficult for the students and thus his guidance was much needed for all.



Car heading for Tech Inspection

Date: 26th January, 2016 (Day-3)

The team was supposed to appear in the **Design event and Cost event** starting from 9:00 am. The team reported to the Cost Event Bay on the scheduled time along with the Car and the Driver. In the cost event, the team has to present in front of the judges the detail costing of the car and have to answer the questions of the judges accurately.

Cost Event:

Team GTMS presented their cost to the judges of the event along with the unique features of their car like Pneumatic Shifter and customised Radiator which helped them in reducing the cost of the car along with optimizing the features as per their requirements. Further after the presentation of the cost by the students it was now the turn of the judges to check if the participants have considered all the minute cost details of the car. Details as precise as cost of Bolts used in Steering Wheel to the Adhesives used to glue 3D printed steering mountings were asked for in the cost event.

In addition to the cost presentation, each team is given a task of presenting a Real Case Scenario of some particular situation provided to each team in advance. Team GTMS was given a situation where in they were tasked with mass production of Steering Wheels. The team in this case were supposed to propose a Business plan where they need to specify following details:

1. Cost of Steering Wheel
2. Return on Investment
3. Consideration of production and Manufacturing facilities.

After the Cost event, the team was supposed to go through the Design evaluation of their car. In the design event, the motive is to check the knowledge of the students about the design of their car. In the design event, the evaluation of the designing knowledge of members of the team was evaluated and later the feedback was provided to the team, where they need to focus for further improvement of the car.

Design Event:

During the design event, entire team members of GTMS were called on the Design Event Bay so that each members can participate in this event and gain knowledge designing.

Following were the Judges present during the Designing event of GTMS:

1. Pat Clarke : Delta Advisory Board
2. Christoph Hhan : Mathworks
3. Arun Vinayak : Ather Energy
4. Rupali Kaur : Ford



Teams at Design Judging Bay

The design of GTM16 impressed every judge and gathered many words of Praise. After the brief analysis of the design of GTM16 the judges then discussed among themselves and gave following feedback to the team members:

1. Include junior team members so that the legacy continues.
2. Use of simulation so as to analysis the design virtually to generate more precise design.
3. Make vehicle more compact and ergonomically well designed.

Date: 27th January, 2016 (Day-4)

During the 4th Day of the event, the team appeared again for the Technical inspections and finally cleared the test. All the technical aspects of the Rulebook were cleared by the car. After clearing the Technical Inspection, the team further moved towards other tests that were in line to clear before participating in any event.

The Car first got fuelled and weighing of the car was done. GTM16 weighed 232kg. It further moved for the Tilt Test, where the car in made to tilt at 45deg and 60deg from the horizontal and leaks are checked. During performing the Tilt Test, GTM16 was mounted on the tilt table and the harness was tightened around the Main Roll hoop of the car so as to prevent car in case of roll over. **Steve Fox** an official from Power train Tech checked for the harness and found some issue with the clip used to ensure belt being rigidly bound with the tilt table. After about 30mins new clips were brought and the judge was satisfied with the safety of the car. Along with this, Steve Fox described all the present judges of Tilt test about how to ensure proper working of the harness and safety of the car.

Finally after all the Chaos created by the defective harness was solved, tilt test was resumed and GTM16 performed the tilt test. GTM16 was detected of no Leaks and successfully cleared the Tilt test in the very first attempt.



A Car on Tilt Test Table

Further the team moved for the Noise test, where in, the engine is fired and noise level of the car @7500rpm is measured. The noise in any scenario should not exceed 110dbc. GTM16 in its first attempt measured about 117dbc noise level and was not able to clear the noise test in its first attempt. The team later, worked upon reducing the noise level of the car and thus used the Glass wool in the Exhaust system for the same.

During the team's attempt to reduce the noise level, day-4 came to end and the team was left with their final attempt on the Final Day of the event.

Date: 28th January, 2016 (Day-5)

During the Final Day of the event, GTM16 was supposed to clear the remaining 2 tests and participate in the Dynamic event. As the team was working for clearing the Noise Test, the team was left in utter shock and complex situation as there was noted a Breakdown in the car where in Air Intake of the car was badly affected and was broken. The team went in a state where clearing the tests seemed difficult, but members of GTMS didn't lost hope and kept working towards repairing the breakdown of the car. It was only the result of the hard work and dedication of the students that GTM16 got repaired well under time and was ready for the tests.



All Cleared and ready for Track Events

Finally, the team was all set to appear for the noise test and the team finally cleared the Noise test successfully. Thereafter, the team rushed with the car towards clearing the final test which was The Brake Test, where in, the car is supposed to get all its 4 wheels locked simultaneously. GTM16 became the first car in the event to have cleared the Brake Test in their first attempt. Finally, all the mandatory tests were cleared by the team and were ready to participate in the Dynamic events of the competition.



And we finally made it to the RACE Track.

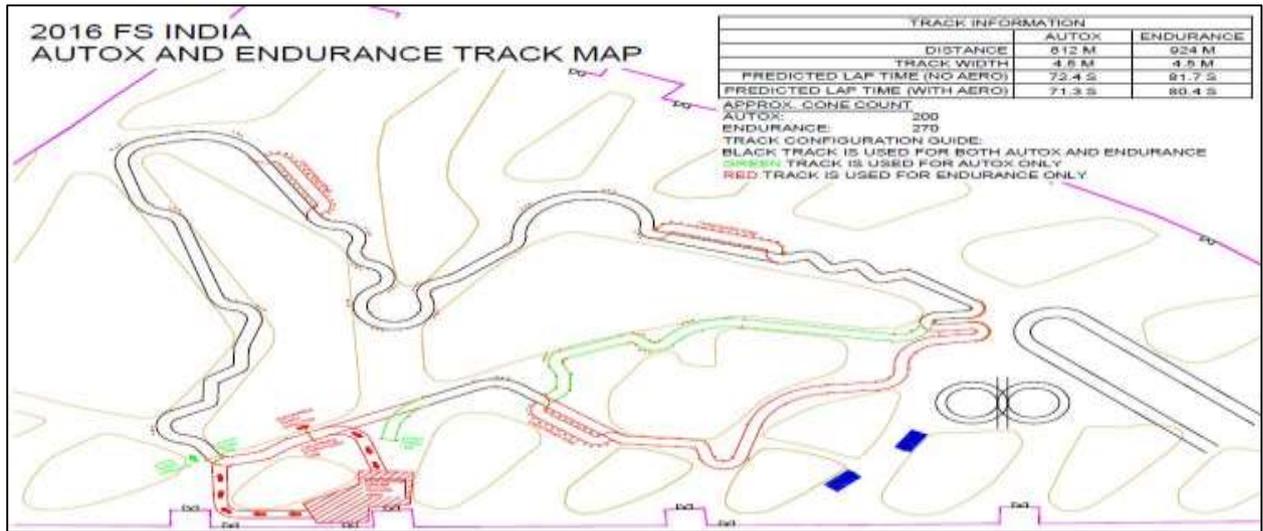
Without wasting much time, the team moved in to participate in the Skidpad event and recorded 14.86 secs to complete the track in the first attempt.



GTM16 on Skid pad Track

After the Skidpad event, the team was all set and ready with the car to participate in the Endurance Race, which was scheduled to start @ 2:30pm. GTM16 was among the 9 teams which were eligible for the endurance race out of 48 teams registered in the event.

The Endurance Race:



Track Map

GTM16 was lined up on the 4th place during the start of the Endurance event. The Endurance race comprises of a 22km race among different cars with the track being restricted to some 6ft and to check the driver's capabilities various hurdles in form of Zig-Zag pattern were designed in the race. Each team is supposed to complete 22km run on the track in order to successfully complete the Endurance Race. Along with that, teams are supposed to get their driver changed after the completion of 11km.



Endurance Driver 1



Endurance Driver Change



Endurance Driver 2

GTM16 made a great start to the race and were going smooth and clean during the entire race. With some great driving skills of the drivers of GTM16, the team managed to complete the Endurance race with No Breakdown and further emerged as the First Car to complete the Endurance Race in Formula Student India 2016 competition. This in itself was a great achievement for all the members of GTM16. The team was filled with joy of having completed the Endurance race at their best in the First attempt itself.



At the Chequered Flag

TEAM GTMOTORSPORTS		
FINAL RESULTS (FSI 2016)		
EVENT	SCORE	RANK
DESIGN EVENT	50	18
COST EVENT	20	28
BUSINESS EVENT	33	26
SKIDPAD	2.5	6
ENDURANCE	22	4
FUEL EFFICIENCY	76.5	4
OVERALL RESULTS	203.5	9

Report submitted by:

Prof. Jignasha. N. Acharya, GT Motorsports Team Students.