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NATIONAL INSTITUTE OF
TECHNOLOGY
CALICUT

TEAM UNWIRED

EVENT REPORT

SUPRA SAE 2019

BUDDH INTERNATIONAL CIRCUIT, GREATER NOIDA



**There aren't too many things in life that remind you
to breathe. Racing is one among them.**

-Vaughn Gittin Jr

(Self taught professional drifting champion)

A Message for future teams

The journey will be tough, there will come times at which it would seem better to give up. But the spirit of the team will keep you going through the tough days and nights. You will achieve more than what you expect, You will overcome everything that you thought impossible. In the end what you experience will be something which you were already told, that is to keep moving forward no matter how much life drags you down.

We Dream For a Reason

Team Members - Supra SAE 2019

1. Aswanth V - Captain
2. Kiran KT - Vice Captain
3. Subin Raj T Sunil - Treasurer
4. Mithun Manog - Powertrain
5. Vanamadi Ganesh - Suspension and Steering
6. Harris Mubeen - Brakes and Safety
7. Revanth Reddy - Powertrain
8. Manu CL - Chassis
9. Aravind S Krishnan - Powertrain
10. Muhammed Yaseen P - Brakes and Safety
11. Sourav UK - Powertrain
12. Mahes Babu - Suspension and Steering
13. Ajay K - Chassis
14. Ajay AS - Chassis
15. Rishi Diwedi - Suspension and Steering
16. Mohammed Jaseel KT - Suspension and Steering
17. Vishnu Dathan - Suspension and Steering
18. Faris Y - Brakes and Safety
19. Abhinav Suresh Babu - Powertrain
20. Abhinav Singh - Powetrain
21. Fazil Kamar - Chassis
22. Vishnu Santosh - Chassis
23. Shobith Tomar - Suspension and Steering



TEAM UNWIRED - 2019 SUPRA TEAM AT BUDDH INTERNATIONAL CIRCUIT

What is SUPRA SAE ?

SUPRA (Super Racing) SAEINDIA is a national-level engineering student competition where teams design and fabricate a Formula- style vehicle as per the design standards of SAE International. The goal is to develop and provide a platform for student engineers to experience, build, and learn. It offers a unique way to test students' theoretical knowledge in a practical context. Students gain and develop skills such as engineering, project management and teamwork. Points are earned in a series of off track, "Static" events, and on track, "Dynamic" events. The team with the most points at the end of the competition wins. The growing popularity of the competition is proven by the rapidly rising number of participants and the establishment of new events.

The SUPRA SAEINDIA events consists of a total of 1000 points distributed evenly in the different static and dynamic events.

Guided by a standard rule book, the Formula Supra requires teams to build a single-seat race vehicle, using an engine having a maximum capacity of 610cc. With numerous other guidelines over the construction, dynamics and safety of the vehicle, students attempt their hands at designing the car by utilizing various computer aided tools like CATIA, Solidworks, ANSYS, etc. The event will be judged by a panel comprising 100 eminent experts from the automotive industry and Motorsports Fraternity including three international experts from Germany.

Supra SAE promotes careers and excellence in engineering as it encompasses all aspects of the automotive industry including research, design, manufacturing, testing, developing, marketing, management and finances. Formula SAE takes students out of the classroom and allows them to apply textbook theories to real work experiences. As a student, taking part in Formula Student gives them the theychance to demonstrate their technical, engineering design, and manufacturing skills. They will also learn important lessons on team worki, time management, project management, budgeting and presentation: all things that any prospective employer will be looking for. Formula Student graduates also find that the professionalism they gain as practicing engineers means they are well equipped for their future engineering careers.

The eventful journey of Team Unwired to the grounds of glory at the Buddh International circuit begins, the realization that failures and will power runs a team was our lantern during the dark.

At SUPRA SAE 2019 - Buddh International Circuit, Greater Noida

DAY 1 - 15 JULY 2019

The first day was full of anticipation and excitement, It was the first time the team was participating in the event. At the event site the team was waiting at the gate for their chance for registration and pit allotment, at the same time some of the team members were at the main gate of the venue to unload the car from the truck. After the registration process was over, the attendance for the entire team members were taken and ID cards and meal coupons for 5 days were issued.

On Getting the ID cards and completion of registration processes, the team was issued the pit and then began the tedious task of setting up the tools and the car. All the parts of the car that had become loose during transportation and that had been bought as parts had been fixed on the car. By the time the team had done preparing the car it was noon, and the team went up to the grand stand to take lunch. After having lunch, the team did final inspection on the car and prepared it for the safety scrutiny happening the next day.

By afternoon, the team members along with seniors went to visit pits of other teams and tried to learn more about their design and to make meaningful relationships that might prove invaluable during and after the race.

At 18.30 the organizers announced the participants to leave their pits and move out of the event site. The team then called in the bus and retired to the hotel, at the hotel a team meeting was called to discuss about the duties and responsibilities each person would be undertaking the next day.



The car being taken to the pit



The pit after all the preparatory works had been done

DAY 2 - 16 JULY 2019

The bus was called in early, the team reached the pit at 8 and the car was allotted number 13 in the queue and Inspection bay 5. In total there were 8 inspection bays. At about 14:20, the inspection of the car began. 4 members of the team was present at the technical inspection bay to answer any queries or doubts which the Judges had. Around 6 judges inspected the car at the time and came up with a few issues that had to be rectified and the car had to be presented in front of them again for re-inspection.

The points mentioned were -

1. Flooring not rigidly bolted to the frame
2. Threaded clips to be changed
3. Front axle boot not sealed properly
4. Kill switch sticker not proper
5. Safety wires not properly installed
6. Breather pipes to be installed
7. Air intake not rigidly mounted
8. Axle movement not okay
9. Firewall extension for radiator to be given
10. Electrical wires to be covered with insulation tape
11. Positive pedal stoppers required for pedals
12. Kill switch key chain absent

After the first technical inspection, the team went on to work on the car so as to rectify the above mentioned issues, while another 3 members of the team went to get the required parts. By this time it was also decided that 4 members will go to Delhi to get the air intake cut and re-welded so as to make it rule compliant. By the end of the day, some of the above mentioned issues were corrected. The issues corrected on this day were the following.

Issue Rectification

1. New bolts added to the frame and flooring
2. Threaded clips replaced with zip tie
3. New Kill switch sticker was pasted
4. Safety wire was installed again
5. Front axle boot was secured using zip tie
6. Axle movement was fixed using washers
7. Firewall extension for radiator was given
8. Electrical wires were all covered using insulation tape
9. Pedal stoppers for clutch and accelerator pedals were installed
10. Kill switch key chain was installed

By the time 10 issues were rectified, it was 18.30 and the organizers asked all the Participants to leave the event area as the event concluded for the day.

The Team then returned to the hotel, and after having dinner a meeting was called to discuss about the work division for the next day and the current status of the car was also discussed. After assigning four members to go to Delhi the next morning to cut and re-weld the intake, the captain gave a briefing of the works that had to be done to clear the safety scrutiny.



The car being prepared for technical inspection at Technical inspection bay 5

DAY 3 - 17 JULY 2019

It was not a comfortable day for the team, because the team had not completed technical inspection and the absence of teammates due to medical issues created a desperate and stressful ambience throughout the day. The team started the day rushing to complete the remaining works. A team of four people went to *Delhi* to cut and re-weld the existing intake manifold system as it protruded out of the lateral plane from the outside edge of the tires. In the meantime, other members of the team were in the pit busy re-checking the car. After the car was checked the team took the car to the hot pit to do bits of welding on the stopper pedals.

Some of the team members went to the pit of other teams to learn from their design. Being a first year team it is important to learn from the other teams who were more experienced with the competition. This provided a lot of exposure to several efficient engineering practices, which the team noted down to take into design consideration while designing the car for the next competition.

The team members who went to modify the intake returned only by evening, by then technical inspection for the day had closed and the day was cut short, but the team wasted no time and installed the new intake on the car and attached all the parts that were removed. New breather pipes were brought in from Delhi and they were also installed on the car with a metal joint pipe for compliance. The rest of the day was spent planning on what to do next since the following day was the last day of technical inspection and it was important that the team reach the inspection bay as early as possible since there would be a lot of teams waiting for their last attempts.

All the hopes were now rested on the technical inspection as it was the first barrier towards creating a benchmark and it brings closer to the final event.

As the day was called off, the team returned to the hotel. It was necessary that the team sleep early but the anticipation of what the next day held made the team restless.

DAY 4 - 18 JULY 2019

Today was the final day of technical inspection, and the last attempt for the team to clear technical inspection. Four members of the team arrived at the pit early in the morning so as to get the car into the first technical inspection slot of the day. At around 9 AM, the technical inspection judges arrived and started the inspection of the car, after the preliminary checks the judge asked the team to change the angle of the fuel filler neck.

The car was quickly taken to the hot pit to cut the existing fuel filler neck, after cutting half of the filler neck with cutting tool the team then switched to cutting with a saw blade as the cutting tool was unable to reach the nooks of the filler neck. After around 20 minutes of cutting with the saw blade the team was able to completely cut off the existing fuel filler neck and reattach the new filler neck at an angle less than 90 degrees to the vertical.

After verification of all the works and checking for errors again, the team presented the car for technical inspection again, this time the team was clear of all mistakes and the judge gave the green signal, The team was then asked to put the body panel back on the car so as to stick the first sticker. This was a remarkable achievement for the team because it was the first time Team Unwired was clearing the technical inspection. After getting the first sticker the team was relieved and happy at the same time because all the hard work had paid off.



Car loaded on the weighing scale



The driver being prepared for egress test

By the time the technical inspection was over and the first sticker was given to the team, and it was already noon. The car was then taken to weighing area to check the weight, after two rounds of measurement the weight of the car was found to be 240 kilograms. From the weight check area, the car was moved to the driver egress test area, in egress test both drivers of the car, fully equipped and seatbelts strapped have to get out of the car in under 5 seconds. The test was performed shortly and both the drivers

were able to exit in under 5 seconds. From there team was cleared for fueling the vehicle, the team then spared no time and went to the fueling bay, after filling fuel till the brim of the fuel filler neck. The car was then checked for any leaks and spills by the team, and then the team checked the vital fluids of the car and adjusted the levels of oils and fluids so as to prepare for the Tilt Test.

After being in queue for 15 minutes, it was the teams chance to undergo the tilt test. After loading the car into the tilt table, the car was first tilted to 45 degrees and checked for fluid leaks, then the angle was increased to 60 and the outer tyres of the car was checked for ground contact. Upon raising the angle to 60, the judge then asked the tem to cut the excess nuts, in under 30 minutes the team had cut the excess nuts and then was presented for re-inspection, this time the team cleared the tilt test also.



At the fueling bay, final checks being done on the car.

The time was 16.15 as the tilt test was cleared, in 15 minutes the team had static events. The static events included Business presentation, Cost presentation and Design evaluation. The first static event for the day was business presentation, after giving the presentation, the judges were impressed with the teams way of presentation and they gave several suggestions, like making the presentation more colorful and changing currency format to INR.

The next event was design evaluation, during design evaluation the team was tested on each and every aspect of the car, and the technical knowledge as well, even the micron size of the air filter used and the boundary conditions for intake design was asked. After the presentation the judges gave several suggestions on weight loss strategy and design optimization.

The last event for the day was cost presentation, during the cost presentation even the cost of smallest parts was evaluated, the team was questioned on the cost of wires used in engine management to the clips used to hold the wires. All the information was then cross checked with the bill of materials submitted. The judges were very impressed with the cost presentation and the team was overall satisfied with their presentation.

The team had only one objective left for the day, it was to fire up the engine and check its integrity with the air intake attached. The team moved the car to the engine check area and cranked the engine, but the engine refused to fire, the team then got on working on the engine management system and wiring harness to isolate the fault.

But no faults were to be seen and then as a last resort the team removed the air intake and replaced it with 48 mm throttle body for testing.



The car tilted to 60 degree angle to check for outer wheel contact and fluid leaks.

Still the engine was not firing, after an hour of troubleshooting and checking wiring the team was still unable to fire the engine. In the end the team changed the engine management system and re pressurised the fuel line and recalibrated the throttle, at the last go the team tested the fuel delivery system and verified it to be working. With the fuel pressure and ignition timings and fuses checked the team then proceed to fire the engine, after 3 seconds of cranking, the engine started with a misfire and breathed into full cycle. At this moment the entire team was full of adrenaline as the engine fired and worked like a charm. By this time it was time to wind up for the day, and the objectives for the next day was to fire the engine with the air intake attached and appear for noise and brake test so as to complete all technical inspections. With high spirits and hopes the team returned to the hotel.

DAY 5 - 19 JULY 2019

Team started the day very early with fully charged batteries and fully charged minds. The team rushed to the Buddh International Circuit before the break of dawn. It was a day of great importance since the team had to complete noise and brake tests before noon. The first task was to get the engine started with the intake mounted. It was a difficult task and after many attempts the engine team managed to get the engine running. After some trial attempts the car was taken to the noise test area. The maximum noise was reported as 109.1dB which was permissible as the limit was 110dB. Then the kill switches and intake had to be checked. The intake turned out to be fine but after killing the engine with master kill switch the battery was drained so the team was asked to re-attempt the test. The team took the second attempt with the spare battery and that too drained after several crankings. By the end the team was short of extra charged batteries and had to get the aid of our fellow teams to get a charged battery. The team completed the noise test in the third attempt and the time was 10:30. After successful completion of the test the team was awarded with the next sticker.

The next task was to complete the break test. The objective was to drive the vehicle at 40kmph and to stop the vehicle within 5 meters with all four wheels locked at the same time without getting out of track. The team had only one attempt since there were too many teams in the waiting list and the deadline was 1 pm. It was a critical event since this was the last test to be completed to qualify for dynamic events. The sun had no mercy and the temperature was 40 degrees. After 15 minutes in the queue, the first and only attempt was taken. The car didn't fail us and the team completed the brake test in the first attempt and the third and final sticker was awarded.



The final three stickers on the body panel.

Now the car was deemed safe and could move on for the dynamic events. The team was enthralled and some final checks and proceeded to the acceleration event. In acceleration event, the time for completing a 75m track is noted. The best acceleration time at SUPRA 2019 was 5.4 seconds and average time was 6.5 seconds. The team had to attempt the event twice and the best time would decide the final result. In the first attempt the car completed the run in 5.8 seconds. Before the second attempt, the car needed a new battery. While changing the battery one of the judges noticed a broken weld on the drive shaft. The car was temporarily held up for re-inspection. After crucial discussions, the judging panel asked the team to fix the broken driveshaft, which the team had to manage in a limited time, because the dynamic events were due that day.

After fixing the drive shaft, the team appeared for the autocross event, which is taking the car through sharp corners and tight zigzag paths, and successfully completed it in 106 seconds. The skidpad event was closed by the time so an attempt was not possible.



The car tackling the corners at autocross.

The team returned to pit with a satisfied heart because they knew that they have achieved something that cannot be achieved without being extraordinary. The next day was going to be the real challenge, the endurance day, because it has a great influence in the overall ranking than any other event. Moreover, racing their car in an International Circuit is the dream of any Formula Team.

DAY 6 - 20 JULY 2019

It was the last and the most awaited day of competition, The Endurance Day. Being the final and defining event which tests the reliability and the overall performance of the car, the endurance race pushes the machine to its absolute limits. The car is expected to complete 8 laps, each of length 3.2 km, in the minimum time possible. There is a compulsory pit stop after the completion of 4 laps, and the driver has to be changed and inspections on the fitness of the vehicle is assessed to further continue the race.

The team reached early at the track. After refueling, along with one team member and two drivers the car is taken into final safety inspection before taking into Buddh international main circuit. Judges upon inspection then instructed to tighten the safety wire which was only adjustment required to participate in endurance. After clearing it, the car was taken into the main track and had a photo session along with the other 30 cars which made it to the final endurance.



All 30 cars assembled in for the photo session at the main circuit

To keep the spirits of the teams high there was a car stunt show by Maruti Suzuki, the conclusion of which marked the start of endurance. After aligning the 30 cars in a line there was another quick technical inspection by the German judges. After final inspection the first set of 15 cars were flagged off for race.

The first set completed the race in under 40 minutes. Car 95 took off along with the second set, but the battery posed problems still as it was drained out pretty soon and

the car was having cranking difficulties, but in the end the engine fired and the marshal gave the green flag for the car.

For the first half of the lap the car was making really good progress, but towards the end of the first lap the engine developed a fault in crankshaft bearing, this resulted in slowing down and extreme engine vibrations and instability.

There were times during which car 95 gained good speed but the broken bearing was interfering with the smooth piston motion which made its performance very much unpredictable.



Team Unwired Car 95, during endurance at the main circuit.

But even with the broken bearing the vehicle was moving, and completed the first half of the race, but the broken bearing had caused crankcase blow by and this caused the engine to leak oil. During driver change this issue was noted by the judge and the team got DNF for the last event.

The journey ended there for team unwired, but the destination was reached. The team learned a lot and experienced a lot during the competition days. The team members became more attached to the car as well as each other. It was a feat that was previously not achieved by any other generation of team unwired. The team created a benchmark for themselves. With limited resources and unlimited spirit which is varied as is the team, Team Unwired had glorified the name and brought in the pride of running

in an international race track, where the professionals had battled it out for everything. The event concluded by teaching that engineering is more than classroom learning. The team learned that engineering is an art, and engineers are artists who create reality which was previously thought impossible. After everything, ***without engineering science is just a philosophy.***

LESSONS LEARNED FOR TOMORROW

It might seem impossible in the beginning, but it depends on how you see it. We looked for the light at the end of the tunnel, and we found it. Team is your ultimate strength and team spirit is the ultimate fuel, with your team by your side nothing is impossible.

