

# E-BAJA REPORT

2022 - 2023



SUBMITTED TO THE PRINCIPAL

24/04/2023

SVCE

Respected Sir,

**Sub: Submission of final report on E-BAJA SAEINDIA 2023, Team Traxion Offroading–Reg.**

We are delighted to inform that our college team, our team TRAXION OFFRAOD RACING members comprising of 13 Automobile, 10 Mechanical and 3 Electrical and Electronics Engineering students participated in the **EBAJA SAEINDIA 2023** held at Chitkara University, Baddi, Himachal Pradesh from 05.04.2023 to 10.04.2023. Our college team **secured the 15<sup>th</sup> position out of 27 teams** that cleared technical inspections and participated in the Final Endurance Race. Additionally, the team was awarded the **2<sup>nd</sup> runner-up position** in the **'Technology Innovation Event** for using **“Portal Axle system”**. Overall, the team achieved **60<sup>th</sup> position out of 75 teams** in the **main event**. The competition involves designing and fabrication of an All-terrain Electric Vehicle from scratch by the students and competing its performance with several other teams from all over the nation. Previously our college team have participated in M-Baja events. This the first time the team have represented our college in E-Baja event.



TEAM TRAXION OFFROADING

The E-BAJA event has three phases: Preliminary Round, Virtual Round, and the final physical round. The preliminary round focuses on virtual presentation of the vehicle design, specification of the components to be used and the CAE analysis.

The second phase, In Virtual Round the team has to present their ATV's analysis, Design validations, Ergonomic factors, Calculations for components and the simulation results.

The final phase, In physical round the teams which have cleared the virtual round are allowed to participate. In physical round the ATV fabricated by the teams will be evaluated under the electrical and mechanical inspection, After clearing the inspection the team will allowed to participate

dynamic events (Sledge pull, Acceleration test, Maneuverability, Suspension test) and finally the ATV will be tested for its endurance in a specially curated offroad track.

A total of 81 teams have participated in the virtual round, held online from 13.12.2022 to 19.12.2022. Out of 81 teams, 75 teams were selected for the final physical round held at Chitkara University from 05.04.2023 to 10.04.2023. The participation in the event had given an excellent opportunity for each student in the team to gain practical knowledge, while specializing in their areas of interest and strengthening their knowledge gained by curriculum. The final physical round is covered and broadcasted by BAJA SAE India in their official YouTube channel and in their official webpage. This year, Mr. R. SAKTHIVEL, M.E, Assistant Professor, accompanied the student team for the final physical round.

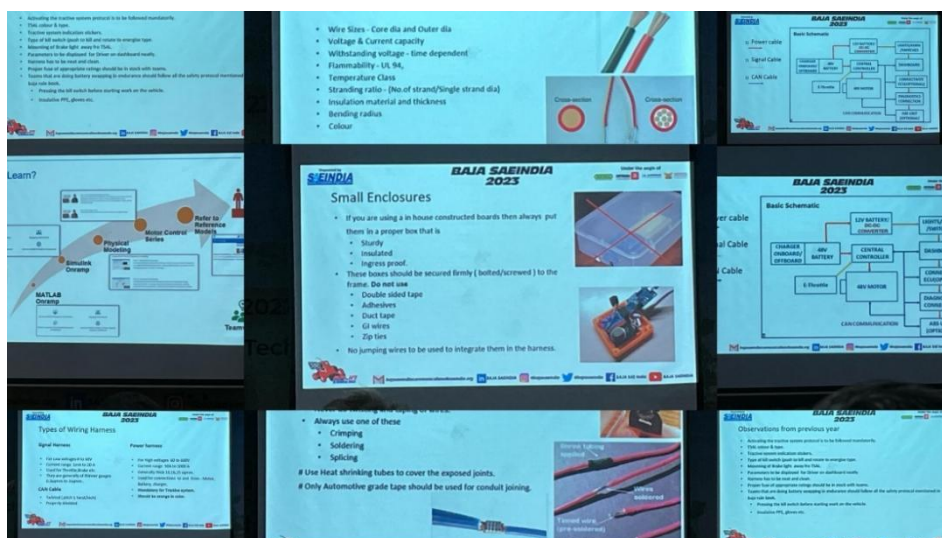
The team was mentored by the following members: Dr.V. Ganesh ASP/AUT, Mr.R. Sakhivel AP/AUT, Dr. S G Bharathidasan ASP/EEE, Dr. M. Sankar AP /EEE and Mr. J. Sivaramapandian AP/MEC.

### PRELIMINARY EVENT

The Preliminary event is a two-day event, including a virtual inauguration and presentation from each team showcasing their design for the ATV. The preliminary event held between 16.09.2022 and 17.09.2022, On 16<sup>th</sup> September, 2022 the virtual inauguration is held and on the next day the slot for the presentation is allotted. The students from our college team had presented their design of the ATV and the specification of the components that were going to be used in the vehicle.

### PHYSICAL WORKSHOP

After the preliminary event the BAJA SAE India have organized an two day physical workshop at Acropolis Institute of technology and research on 12<sup>th</sup> and 13<sup>th</sup> November 2023. A total of 5 students have participated in that workshop, In the 2-day workshop the important aspects in designing and fabrication of the ATV is covered and it helped the students while participating in the virtual event and helped them in fabrication of ATV for the final physical round.



PRESENTATION AT THE PHYSICAL WORKSHOP

### VIRTUAL EVENT



The virtual event held between 13.12.2022 to 19.12.2022. The second leg will incorporate virtual dynamic events with the help of automotive simulation software combined with virtual static events. This will include the virtual static events evaluation such as Design, cost and sales presentation, The team have presented the design and analysis of the vehicle on 17.12.2023, on allotted time slot. On 18.12.2022 the team have done their presentation for cost event and sales event. The presentation will be evaluated by the judges and points will be provided accordingly. Based on the points secured by the team, The teams will be selected for the final phase-Physical round.

## PHYSICAL ROUND

The final phase is conducted physically from 05.04.2023 to 08.04.2023. In this phase the ATVs fabricated by the participating team will be physically evaluated, and the teams which have passed the physical evaluation will be allowed to participate in the dynamic event such as acceleration event, Maneuverability event, Suspension & Traction Event and Final Endurance event.

### PHYSICAL ROUND Day 1 - 05/04/2023

#### REGISTRATION AND INAUGURATION

The registrations were on 5<sup>th</sup> April 2023. The team along with the faculty advisor reported to the event site at 8:00 A.M at Chitkara University for the registration. The first few hours of the day were utilized in registering our team for the main event. At the registration desk, ID Cards and other supporting documents including the pass for the vehicle was collected. After the registration the ATV is transported to the event site from the shipping area. The vehicle is taken to the allocated PIT, The students carried out some minor works in the vehicle to make it ready for the Technical Inspection, so after the registrations and other formalities, 5 team members along with the Faculty advisor attended the inauguration function that went on for an hour. The captain from the team have collected the vehicle inspection coupons from the event management office. Each team will be given two chances to clear the technical inspection. Only after clearing the technical inspection the teams will be allowed to participate in dynamic event.



INAGURATION FUNCTION

**Day 2 - 06/04/2023**

## **TECHNICAL EVALUATION**

All BAJA SAEINDIA vehicles must pass technical evaluation in order to participate in physical dynamic event. The inspection will determine whether the ATVs fabricated by the team adhere to the rules and requirements provided by BAJA SAE India. The teams are allowed to carry out works in their allotted pit to make their vehicle comply for technical inspection. There will be two attempts to clear the technical inspection. If the vehicle does not get passed in first attempt, The team will be given an second attempt, If the vehicle failed in second attempt, The team will not be allowed to participate in any dynamic events. Even if the vehicle passed the technical inspection, The vehicle may be re-inspected at any time during the entire course of the event and correction of any non-compliance will be advised if any. The technical inspection is carried as two stages: electrical and mechanical inspection.

The mechanical technical inspection is a four-stage process.

**STAGE 1:** This stage involves the verification of various documents related to the material used, Invoice copy of the safety equipment used by the driver, Components used in the vehicle and their certifications if there any.

**STAGE 2:** This stage involves the scrutinizing of the roll cage (frame) of the vehicle with respect to the rules of the event and also towards the safety of the driver.

**STAGE 3:** This stage involves checking of all the subsystems of the vehicle i.e., Powertrain, Suspension, Drivetrain, steering system, Braking system etc

**STAGE 4:** This stage involves checking of the safety equipment of the driver such as the driver seat mount, seat belt mount, arm restrains, fire extinguishers in the vehicle.

The electrical technical inspection is two stage process

In electrical technical inspection the vehicles electrical and electronic components will be examined the components include the motor, motor controller, wire harnessing, controller and starting circuit. And the second stage is examination of the supporting documents such as IP certification, C- Certification for the traction motor, Battery pack and battery charger.

**Inspection Stickers:** A multi-part inspection sticker will be issued after completing each technical inspection. The panel members of technical evaluation will paste the inspection sticker on the right side of the firewall in the vehicle. The inspection sticker must remain on the vehicle throughout the competition. Vehicles which cleared mechanical and electrical inspection and brake test will be allowed to operate under power.

## **ATTEMPT 1**

The team have lined up the vehicle for electrical inspection, In the electrical inspection the vehicle was heavily scrutinized. Unfortunately, the vehicle starting circuit and siren didn't work as expected. The judges also suggested to tighten some loose electrical connections and insulate some parts of terminal. Due to the above reasons the team could not able to clear the Electrical technical inspection in first attempt, And the team has been asked to rectify the above mentioned things in second attempt.

After attempting the electrical inspection, The team lined up the vehicle for mechanical inspection. The team have submitted the invoice of the components and test reports of the components used in the vehicle and cleared the stage 1, After that the roll cage of the ATV is inspected since the roll cage is fabricated according to the guidelines the second stage is cleared. Since the vehicle didn't start the third stage of mechanical inspection couldn't be cleared in the first attempt itself, The evaluators also some minor works such as buffing up of sharp edges in the vehicle, covering panel gaps. The evaluator also suggested to change the fasteners used in body panel to standardized one and to change the helmet since the helmet is manufactured in the year 2017 which will be considered is expired one.

After the technical inspection few team members attended the validation event, In the validation event the vehicles virtual model tested in computer generated environment. The team have cleared the validation check.

After that the team members worked hard to clear the technical inspection in second attempt.



VEHICLE AT THE TECHNICAL EVALUATION BAY

**Day 3 - 07/04/2023**

### **TECHNICAL EVALUATION (ATTEMPT II)**

The team was pumped up for clearing the necessary tests as soon as possible to move on to the most important dynamic events. After taking necessary correction that were suggested by the panel members during the first attempt of the technical inspection. the team lined up the vehicle for the second attempt of Technical Evaluation.

In electrical inspection the vehicle is verified again by the panel. During the second attempt the vehicle starting circuit worked properly and since the previously suggested work had be done the team cleared the electrical inspection.

In mechanical inspection all the documents and invoice has been again verified and vehicle is again verified. As the previously suggested correction had been done the team had successfully cleared the mechanical inspection.



TEAM AT SECOND ATTEMPT OF ELECTRICAL INSPECTION



TEAM AFTER CLEARING THE MECHANICAL INSPECTION

Both the Electrical and mechanical technical inspection had cleared successfully in second attempt. The team received the technical inspection clear stickers

## WEIGHT CHECK



After clearing the Technical inspection, the vehicle was taken to weight check bay and the vehicle weight recorded. The total weight of the vehicle is recorded as 384.95 kg.



VEHICLE AT WEIGHT CHECK BAY

The optimistic and energized team geared up to clear the brake test event. The vehicles will be allowed to participate in the dynamic event only after clearing the brake test.



AFTER THE TEAM CLEARED THE TECHNICAL EVALUATIONS

### **BRAKE TEST - 07/04/2023**

In an excited attitude, the team took the vehicle for brake test with good energy .In this test, the vehicle will have to accelerate to a minimum speed of 35 kmph and panic braking will be applied. Under this condition all the four wheels must lock and the vehicle should be stopped within a minimum distance of 1.5 meters.

Attempt-1



The first trial run happened, but unfortunately the vehicle could not reach the minimum speed and the first attempt was declared as fail, but as positive thing all four wheel have locked while brakes are applied. Some changes were made to the vehicle by working on transmission system. The team again lined up for the brake test. The optimistic team have cleared the brake test successfully in the second attempt and the vehicle reached a speed of 40 kmph which is higher than minimum speed requirement .As the team cleared the brake in second attempt and got “OK” .The team geared up to participate in dynamic events.



VEHICLE AT BRAKE TEST SITE

### **ACCELERATION EVENT - 07/04/2023**

With the same spirit after the completion of brake test the team lined up for the acceleration event. At first attempt our vehicle was able to accelerate within given time. The team again attempted for better results and in the second attempt our vehicle have reached a speed of 40 kmph in 6.5 seconds. The team had cleared the acceleration event and got “OK” and stickers for acceleration attempt. The Dynamic events are closed for the day due to time concerns.



VEHICLE DURING THE ACCELERATION EVENT

### **INNOVATION EVENT**

Mr. Gowtham S from Department of Automobile Engineering and Mr. Ravi Krishnan S, Department of Mechanical Engineering along with the Mr. R. Sakthivel, Faculty advisor represented the team in the Innovation event. This time the team was shortlisted for the innovation event for introducing **PORTAL AXLE** in the vehicle. The panel of judges were impressed with the optimized and more efficient design of the portal axle system. The portal axle system had given advantages such as extra ground clearance, with four-wheel drive and they interacted with our college team members. Based on the team members response, the team won the **SECOND RUNNER-UP** award for technology innovation.

**Day 4 - 08/04/2022**

### **ENDURANCE EVENT**

Endurance race is an event where our vehicle's full potential is checked. The endurance race is a four-hour event the team will be given points according to how many laps they have covered. Out of **75 team only 27 teams were selected for participating in the final endurance race**. After the completion of the dynamic events our team is ready for the final Endurance race. The driver briefing is done by the officials. The vehicle then lined up for the flag off. At 10:00 AM the race was started with flag off.



**VEHICLE LINED UP FOR THE ENDURANCE RACE**



VEHICLE IN ENDURANCE RACE

The ATV of our team progressed in a paced manner. The ATV have completed five laps successfully. Unfortunately during the 6<sup>th</sup> lap the vehicle's Heim joint got loosen which is highly required for manuverability of the vehicle. The team members rushed over there and fixed the fault within 15 minutes and the vehicle was back to track. Our vehicle completed 8 laps and returned for charging the battery at 12.00 PM. Since we doesn't have an extra battery for swapping; the battery is kept for charging. About 1:00 PM the vehicle was ready to continue the race but unfortunately it has been announced that the endurance test has been over due to temperature concern. The vehicle has again undergone technical inspection and the endurance event is completed and the vehicle is taken back to the allotted pit. We have given a lap bonus and our team have achieved **15<sup>th</sup> place in the final endurance race** by completing a total of 9 laps (8 laps + 1 bonus).



VEHICLE IN ENDURANCE RACE





VEHICLE LINED UP FOR FINAL INSPECTION AFTER ENDURANCE TEST

### VALEDICTORY FUNCTION

The valedictory function was started at 3.00 PM. All the guests who were present at the dais delivered their views and thoughts about the BAJA event. The Prize distribution was started with the static event followed up by dynamic events. **TEAM TRAXION OFFROADING secured SECOND RUNNER-UP place in the TECHNOLOGICAL INNOVATION EVENT.** Around 5.30 Pm the event was finished with the National Anthem.





THE TEAM MEMBERS WHILE RECEIVING THE 2<sup>nd</sup> RUNNER-UP IN TECHNOLOGICAL INNOVATION EVENT



2<sup>nd</sup> RUNNER UP AWARD IN TECHNOLOGICAL INNOVATION EVENT

### **DAY 5 & 6 - 11/04/2022 & 12/11/2022**

As the part of the event many companies will take part in the recruitment process after the event. The final year student was allowed to take part in the recruitment process. The students will have to take the BAJA Aptitude Test-(BAT) as a preliminary round before H.R round. The students those have cleared the BAT will be allowed to take part in final recruitment process.

### **HR INTERVIEW**

Nine students from our college cleared the BAJA aptitude test and got selected for the HR interview. Based the company requirement only four students were allowed to attend the recruitment process.

Mr. B. Guruviknesh, Mr. Kavin B, Mr. Kalaranjan N and Mr. Yuvaraj R from Department of Automobile Engineering, Ms. M. Anshuhl, Mr. Mohamed Mansoor Ibrahim OMS, Mr. S. Gowrishankar from Department of Electrical and Electronics Engineering have attended the recruitment process of ARAI, Anand Groups, Altair, Renault Nissan Technology and Business Centre India, General Motors, ATS. and they are waiting for their result.

## LESSONS LEARNT

Participation in the event gave us an immense experience and practical knowledge. We have learnt many things and some of the things we made should be corrected in future event, first Weight reduction should be considered as a key point while designing and manufacturing. Secondly the technical evaluation should be completed as early as possible in order to participate in other dynamic events.

## ACKNOWLEDGEMENT

We sincerely thank our college management for continuously supporting the team for the participation in the event. We also thank the HODs of Department of Automobile Engineering, Department of Mechanical Engineering and Department Electrical & Electronics Engineering for their continuous support. We also thank all the faculty advisors and alumni members for their valuable inputs during course of the event, and all faculties and supporting staff members of our college for accompanying the team during work, after college hours and on holidays.



CREW - TEAM TRAXION OFFROADING

**Dr. V. Ganesh**

ASP/AUT

Faculty Advisor - BAJA SAEINDIA 2023

**Mr. R. Sakthivel**

AP/AUT

Faculty Advisor - BAJA SAEINDIA 2023

**Dr. J. Venkatesan**

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Patron, SAE Collegiate Club of SVCE