

NEWS

LETTER

MAY 2021 | QUARTERLY

TLMOTO

 **TÉCNICO LISBOA**

“CADERNETA”

Gonçalo Jacob or Jacob, as it is sometimes heard at TL Moto meetings, is in his third year of aerospace engineering at Instituto Superior Técnico. He joined the team because of a friend in his first semester of university, without knowing what he was getting into. He was entrusted with many responsibilities from an early stage and today he is the team leader.



HOW DID YOU HEAR ABOUT TLMOTO?

I heard about TLMoto because when I came to IST in the first year, I had a friend in Faro who was the cousin of the project manager and she was the one who spoke to me about it. Then I talked with the project manager and came in just to try it out, to see what it was like, I had no idea what I was getting into, but then I decided to continue.

AND THEN YOU BECAME A TEAM LEADER?

Yes, it eventually happened.

WAS IT DIFFICULT TO CONCILIATE UNIVERSITY AND THE TL MOTO?

It was not easy, eventually what happened was that I worked a little less for the courses. Despite knowing that this is not the ideal balance, I was also realizing what I was gaining from the project. The knowledge I acquired here, even in terms of curriculum, ended up complementing what I was learning in college and made things a lot easier.

WHAT WAS YOUR MOTIVATION TO REMAIN IN THE TEAM?

We started with a presentation phase and I started to do some research and enjoying what I was learning. Then, they gave me responsibility very early on, I was responsible for making the (motorcycle) TLM01's fairings and I think that was also a motivation. When they gave me that task, at the time, there was no one on the team who had already done it, it was a new thing and the fact that I was doing something new from the beginning also made the challenge interesting and then the fact that it was an engineering project.

“CADERNETA”

CAN YOU TELL US ABOUT YOUR JOURNEY INSIDE TLMOTO?

I did the recruitment, after finishing it I joined as the Aerodynamics leader and, therefore, I was responsible for the fairings, the fuel tank, and the seat of (motorcycle) TLM03e, so when I say responsible it was not just me doing them, but I was responsible to lead and coordinate the work; then there were delays and unforeseen circumstances, all because of Covid, and I ended up becoming the team leader while the fairings were not yet finished, everything was delayed. I went from a recruit to Aerodynamics leader and then to team leader when the previous leader had to leave.

WHAT CHARACTERISTICS ARE NEEDED TO BE PART OF THIS TEAM?

Good question! Above all, I think that the will and ability to belong to a team, to want to learn new things, the ability to learn these new things with some autonomy, to want to evolve; ability to be, not innovative, but having initiative, are some examples.

DO YOU THINK THAT'S WHY YOU BECAME THE LEADER, BECAUSE YOU HAD INITIATIVE?

I think it might also have been one of the factors, but I think for that you would have to ask the person who chose me. I was someone who gave a lot to the project right from the start and I think my motivation was one of the factors that influenced this.

YOU WERE JUST SAYING THAT IT WAS DIFFICULT TO JUGGLE EVERYTHING, HOW DO YOU DEAL WITH THE PRESSURE OF BEING A TEAM LEADER?

I don't know how I deal with the pressure. It has a lot to do with the organization.

AND DO YOU CONSIDER YOURSELF AN ORGANIZED PERSON?

I'm working on it. I was poorly organized and felt that it was affecting my ability to reconcile everything. Then, when I became the leader, I started to organize myself better and started to work in that direction because I knew there was going to be more work. At the moment, I feel that I am more comfortable reconciling everything than before when I had less work, because I was more organized.

WHAT PROJECTS CAN WE EXPECT IN THE FUTURE FROM TLMOTO?

Above all, the team is growing, we are going to increase from 20 to around 60 members, so the first project is to consolidate this growth to be a sustainable growth. After this growth, we will invest more and more on innovation, be more present at events and win MotoStudent in 2023.

“CADERNETA”

PERSONALLY, WHAT WAS YOUR BIGGEST SUCCESS AND YOUR BIGGEST FAILURE WITHIN THE TEAM?

My biggest success I think was the construction of the (motorcycle) TLM01's mudguards, having managed to make them. It was a totally new thing, I had no help, and they were very complicated pieces, obviously they didn't come out perfect, but it was a big step forward. My biggest failure was not being able to have the fairings ready in time and having been a little forced to leave this job to the new team.

IN WHAT ASPECTS DO YOU THINK TLMOTO WILL HELP YOU ON YOUR PROFESSIONAL PATH?

Firstly, when I was a leader in Aerodynamics, I gained a lot of technical skills, learned a lot, and gained a much greater sense of what it is like to be working on an engineering project, which is completely different from the classes, which are much more theoretical. This is what I think will make the most difference, because when we start to work it is often not quite what we learnt, and we end up spending some time learning. I think what will help me the most are all the soft skills I have gained in terms of teamwork, communication, knowing how to deal with people, etc.

WHAT DO YOU LIKE TO DO THE MOST WHEN YOU ARE NOT ON TLMOTO?

Those basic answers, I like being with my friends, I like listening to a lot of music, I like to climb and sleep!

GOOD THING YOU TALKED ABOUT MUSIC BECAUSE WE WERE NOW GOING TO ASK YOU FOR MUSIC AND FILM RECOMMENDATIONS.

Film “Shawshank Redemption”; music... it's very difficult, by chance I have Spotify open just now, I recommend “We Almost Lost Detroit”.

FAVORITE MOTOGP RIDER?

Miguel Oliveira.

SOMETHING THAT NO ONE KNOWS ABOUT YOU?

I have written a book.

AND WHAT IS IT CALLED?

That I won't say (laughs).

MOTOSTUDENT DELIVERIES

Last March, we had three separate deliveries to MotoStudent: Prototyping and Testing, Electric Powertrain Test, and the MS Pitch.

MS PITCH

The MS Pitch is a presentation made before a jury on the days of the competition in Aragon, where we simulate that we are facing a group of investors considering whether or not to invest in our “company.” In this presentation, we have to explain the whole process of building and designing our prototype, what types of tests were carried out, and the decisions and requirements we took into account to obtain the best possible prototype. An entire business plan is also presented, where we deliver our whole business strategy planned, from the location of our company’s office, marketing plan, and how long we would have before we see the return on our investment.

Considering the pandemic situation we are going through, the competition decided to do things a little differently this year to ensure the safety of all the teams and their members. In this edition, all the teams had to make this presentation in the form of a video. This change proved to be a new challenge for the team. Still, it was quickly overcome, especially with the help of Tiago Costa, Audiovisual Producer of the Design and Multimedia Center of IST, who provided us with support throughout the process of filming and editing the video, as well as to Vitor

Teixeira, leader of PSEM, for his help in obtaining some of the audiovisual material used.

IN THIS PRESENTATION, WE HAVE TO EXPLAIN THE WHOLE PROCESS OF BUILDING AND DESIGNING OUR PROTOTYPE.

PROTOTYPING AND TESTING AND ELECTRIC POWERTRAIN TEST

Prototyping and Testing consists of a report on the entire manufacturing and testing process of TLM03e, which culminated in the initial tests at the karting track. These tests were only possible after programming some dashboard features that were not fully functional, as some data on the electronic boards were not being read due to board failures. In addition, the motorcycle controller was not programmed for the engine to achieve the projected torque. Another associated problem was the fact that the wiring was not very flexible, which led to some problems in the battery pack. Some adjustments were also made to the suspension level as the height of the bike was too low, which made it difficult to behave at corners. To further improve the performance and to be able to test different suspension springs, and to get the suitable programming to obtain the torque designed for our bike, we will test, during the month of May, our prototype on a bench power.

Finally, the Electric Powertrain Test was also delivered, which consists of sending a video demonstrating the operation of our entire propulsion system.



THE FINAL EVENT IN ARAGON IS GETTING CLOSER AND CLOSER, AND THE TEAM COULDN'T BE MORE EXCITED!

AERODYNAMICS AND COOLING

Last month the molds for the fairings were made, and the fiberglass substitutes finished. Since we couldn't use the CNC machine, interrupting the process of manufacturing MDF molds, the opportunity to manufacture molds in 3D printing arose, which proved to be an excellent solution for its manufacture since the working time decreased considerably. Repairs were also made to the carbon fiber molds to laminate the main carbon fiber fairings and also to the monocoque seat.



However, CFD simulations were made, to understand the lateral force to be applied to the fairings, and then, from FEM simulations of composites, use this value to understand the number of carbon fiber layers and where it is necessary to have a core (material to give rigidity to the composite) so that we can laminate the side fairings.

FINALLY, WE ARE STUDYING WHICH COMPONENTS CAN BE MADE IN COMPOSITES TO OPTIMIZE OUR PROTOTYPE.

DYNAMICS

We let you know the most recent area in the team, the area of Dynamics. It has been responsible for the development of new models to study the dynamic behavior of the motorcycle. Each model focuses on specific components of our next prototype, TLM04e so that in the future it is possible to combine the various results obtained and make decisions that will affect its performance, exchanging synergies with all the other areas.

Currently, this area is working on the TLM03e's suspensions, tweaking parameters such as the preload, and retrieving data for future prototypes.

There has been an adaptation process in the transition of the theory and physics of the bike to the software used. Still, we are getting closer to the correct functioning with a lot of research and several brainstorming among the team members!



ELECTRONICS



IN ADDITION TO THIS, OUR RECRUITS ARE CARRYING OUT EXTENSIVE RESEARCH WORK ON VARIOUS TOPICS SUCH AS TELEMETRY AND ACTIVE BALANCING FOR TLM04E

In the last three months, our electronics members have been responsible for the conclusion of the TLM03e charger, an essential part of electrical prototypes. Like with other electronic devices, it is through this component that the batteries of our prototype are charged. In addition to this, our recruits are carrying out extensive research work on various topics such as Telemetry and Active Balancing for TLM04e. Finally, members are finishing a mobile phone application that presents all Telemetry data obtained through their respective board.

STRUCTURES

In recent months, members of Structures have found themselves in charge of making improvements to our current prototype, the TLM03e. Still, they have also started researching for our next prototype, the TLM04e, to make this bike's performance the best it can be.

Regarding the first, the help of our recruits is palpable, who are already in perfect contact with the current members, carrying out various tasks such as reiterations in the support of the footboards, the controller, and the battery box, so that our prototype has the desired performance. New components are still being designed to improve the bike's ergonomics in the tank area.



NEW COMPONENTS ARE STILL BEING DESIGNED TO IMPROVE THE BIKE'S ERGONOMICS IN THE TANK AREA.

POWERTRAIN

The Powertrain area has been responsible for improving the motorcycle's Powertrain and is also working on the batteries together with the members of Electronics.

These improvements were made in the cabling part in order to optimize its route and ensure that all elements fit within the body of the motorcycle. It was necessary to completely disassemble the batteries due to some errors in the connection of the cells with the remaining pack, having been necessary to solder some of these connections. Adjustments are also being made to the controller programming to improve the prototype's performance, which will soon be tested on a test bench.



TEAM-BUILDINGS

Now that we are in the final stages of the competition, it is crucial to ensure that the team keeps their spirits up and remains motivated for these final steps before we arrive at the Aragon track. On the other hand, the end of one edition indicates the preparation for the next and, with that, the entry of new recruits in the team, being that a large part of their recruitment was done at a distance. Bearing this in mind, the team continues to bet on the most varied Team-Buildings, from Quiz Nights to Escape-Rooms, maintaining the good environment from our home to the workshop!



EVENTS

MECANIST/SEMANA AEROSPACIAL

TLMoto was invited to participate in Aerospace Week and Mecanist, having been present on March 1st and 26th, respectively, virtually, on the Easy Fair Virtual platform. Although this year, they worked differently from the usual ones, due to the pandemic situation that we are going through, these invitations were, as has always been the case, an excellent opportunity to let interested people know more about our project and, in particular, more about our prototype that is almost completed, the TLM03e. We also want to congratulate both organizations for not giving up on their events, ensuring another semester of excellent fairs and opportunities!



RECRUITMENT



Last March, we opened another recruitment phase in the areas of Management, Marketing and Design, and Aerodynamics. The number of people interested in these areas was immense, and everyone has already started working on introductory tasks related to the 1st phase to get to know a little more about our project and to become familiar with the way our team works, with professionalism and seriousness, but always accompanied by a good mood.

Concerning the previous recruitment, this is moving quickly to its final phase, with all areas already in the 3rd phase and carrying out support tasks for the current members. The vast majority have already been able to visit our workshop and finally meet the other team members in person, having already helped directly in the manufacturing process of our TLM03e prototype.

**THERE ARE FEW DAYS THAT
AWAIT THEM UNTIL THEY
BECOME MEMBERS!**



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