

NEWSLETTER

TLMOTO
TÉCNICO LISBOA



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Hugo Ramos

Hugo Ramos is the current technical director of TLMoto. He is in the 4th year of his Master's Degree in Mechanical Engineering, specifically in Systems. He is one of the oldest members of the current team and promises some improvements on the new moto!

What do you think it made you become technical director?

I think it was a combination of two factors: first, it was one of the most dedicated people on the team. They trusted me easily because I was always on top of things and met deadlines. Secondly, it was also slightly due to a lack of options. People are always coming and going, and my time at TL is above average, so I was one of the people with the most experience because I've been there the longest. That was also a factor, along with my good performance and commitment to the TLM04e competition.

How did you learn about TL, and why did you join?

I heard about TL during Aerospace week, when I was in my first year in 2019. I've always liked motorcycles, so seeing a motorcycle on that stand caught my attention. Then, a colleague of mine joined TL, so I decided to join as well. Also, the covid came, and I thought that I would have a lot of free time being at home, so I decided to join this project.

How was your TL journey after joining?

First, I did the recruiting, then I was a member of Powertrain for about four months. When I joined, the TLM03e was being made, so I participated in its manufacture. As the leader of Propulsion was going to leave in July, after the competition, around February or March of that year, I started to accompany him and be a leader with him so that the transition would be smoother. However, I would also do some work. Then I became the leader at the end of the competition when he left. After about a year, the old technical director was going to leave, so he made me an offer to be the new technical director. Again, there was a period when we were both in that position, but I got more and more responsibility, and by June, I was on my own.

What are your biggest challenges in this position?

I think my biggest challenge, which has come since I was a powertrain leader, was being a leader. Certain attitudes and specific actions of a leader make a lot of difference, and that doesn't come as naturally to me as it does to other people. Technically, I'm very methodical, organized, and I'm comfortable in most areas. Still, the most significant difficulty I've had so far has been being a leader who inspires people, and who knows how to say things in the right place, at the right time, and in the right way. Until I became a leader, I thought that being technically good would automatically make me a good leader, but that's not the case at all. I feel some progress, but I know I still have a long way to go to be an exceptional leader.

What's the biggest motivation for you to stay on the team?

It's enjoying this! Seeing the prototype on the track gives me a lot of pleasure. Since I joined the team, I've always wanted to follow the project from the beginning to the end, that is, from scratch until the moto is racing on a track, which is what is happening now with the TLM04e. Accompanying this entire journey has been my goal since I joined the team. When I joined, I had no idea what the project's status was, and it was only after a year or a year and a half that a new project started. And now I continue because I want to see the moto until the end.

If you had to choose another area when you entered, what would it have been?

When I joined, if I hadn't gone to Powertrain, I would have gone to Aerodynamics. But if it were today, I wouldn't have gone to that area but to Structures. I thought aerodynamics was really cool and interesting, but as my course progressed, and after trying new things, I realized that what's behind it doesn't really appeal to me, contrary to parts design or electronics.



What were the biggest skills you gained with TL?

Time management, leadership... I learned a lot about electronics and discovered a great passion for this area in TL and not in the course. I learned, and I am still learning a lot about project management, as I was following a project from start to finish, and a few people don't finish college with this experience.

Do you feel that TL influenced your idea of what you would like to do when you finish your course?

Before joining the course, I thought of working in the aeronautical industry, and TL changed my view a little. Despite continuing to like working in aeronautics one day, I also really enjoyed working in the automotive industry, but with prototypes, that is competition. Whether MotoGP or Formula 1, I think that aspect influenced my opinion.

What advice would you give someone that wants to join the team?

Don't be afraid to take risks. This is a new experience, there will always be sacrifices. If you like racing prototypes and doing real projects, not just theory, it's worth taking a chance and seeing what it's like. As it changed me, it can also change the course of what they want to do, and they can discover their vocation.

How will the TLM04e be better than the TLM03e with you as technical director?

It will be more reliable in terms of Powertrain. Since I was in that department, I learned a lot about what can go wrong and what can be improved in that area. One of the problems we had with the TLM03e was not having a solid base to test and validate models due to the unreliability of the electronics and the powertrain. And now, having all this experience, not only mine but also from people in the Powertrain department, we already know where it can fail and how to solve it. Having a moto with a safe powertrain, the following teams can optimize the structure, the aerodynamics, and they have a solid moto to test, and that doesn't need to be stopped in the officine with problems all the time.



Do you think it was challenging to combine studying with TL?

Honestly, I didn't find it that difficult. It's hard work, no doubt, but I didn't feel much difficulty since it was something I liked. Sometimes I had to sacrifice some things I liked to do or hours of sleep. But I've always managed my time well, and with TL, I've learned to manage it more efficiently, but I've always managed to reconcile the two things, and so far, I've never failed a course.

Who is your favorite MotoGP pilot?

Oh, that's easy. The pilot is Miguel Oliveira and the team is Ducati.



So do you think it was an advantage to have followed the problems of the TLM03e to build the TLM04e now?

Yes, if the team had all renewed between the motos, it would have been worse. Passing on knowledge is not the same thing. Having recently competed in Italy was also an asset because it gave the current team experience on the track and experience working on the bike, which is better than transferring knowledge, writing documents, or holding meetings...

TLM03e VS TLM04e

STRUCTURES

One of the changes in the main structures of the TLM04e was in the frame, which went from a Twin Spar to an all-aluminium Monocoque so that it would be possible to integrate the battery pack in it, something that has never been done before in the TLM03e. The arm has also changed: instead of raw aluminum, it will be made of sheet metal to reduce weight. The battery box modeling design will also change from parallelepipeds to hexagons, allowing for greater modularity and ease of battery pack removal. A more in-depth analysis has also been made of the connecting pieces to remove as much material as possible and reduce weight. Finally, a new sub-area was made: Production - which focuses, as the name implies, on the production of the entire motorcycle, as well as in logistics and moulds.



ELECTRONICS

The Electronics area introduced new components on the TLM04e dashboard, optimizing the screen, which guaranteed better control and interaction with the motorcycle. Regarding the BMS, the board was changed to maximize the control over the battery and all its surrounding components. Finally, this area added new sensors to the telemetry board to capture more parameters than the TLM03e.

POWERTRAIN

In Powertrain, more intensive tests were carried out to choose the cells that would be used in the battery pack, and optimizations were made to reduce weight (about 80% less compared to the TLM03e). The motorcycle's security system has also been improved.

AERODYNAMICS AND COOLING

The 04 brought to this area a massive change in its concepts. The competition in Italy allowed the confidence to switch from air to water cooling system, which means that the latest bike will be fully liquid-cooled. In terms of Aerodynamic Design, there will not be any changes.

DYNAMICS

This area did not exist when the TLM03e was built. However, it is possible to identify differences between one moto and another. The TLM04e underwent an optimization of the geometric parameters (something that didn't happen in the TLM03e, or, if it was, very little), and a linkage system was introduced to the rear suspension. When optimizing the parameters, the team identified the need to decrease the wheelbase and increase the swingarm angle.

Participation in Events

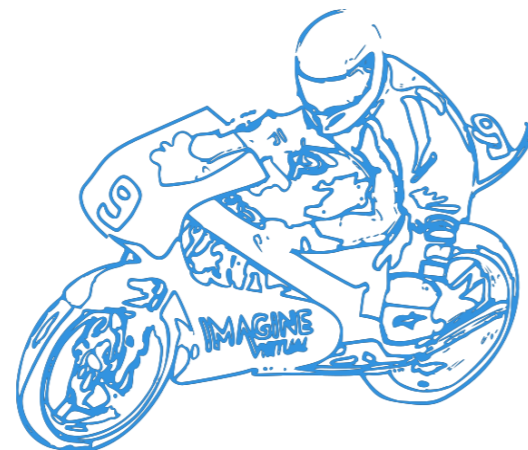
At the end of February, several events happened at the Alameda campus of the Instituto Superior Técnico, in which the team participated. Between February 22nd and 24th, took place the 12th edition of MecanIST, a fair organized by Forum Mecânica. The team had the opportunity to be present on February 24th, making the project known and ensuring the sharing of ideas with some of the participating companies. In addition, on February 28th, SINFO took place, carried out by the computer science students, an event that will last until March 3rd. At the previously mentioned event, TLMoto, once again, had the opportunity to expose the project and clarify all doubts of the student community.

RECRUITMENT

Last November, the team started its first recruitment phase for the 2022/23 academic year, where positions were available for the departments of Electronics, Structures, Logistics, Marketing and Design, Powertrain, Human Resources, and Sponsors. After collecting applications and doing a session to present the team to those interested, the candidate selection phase began, where a brief interview was held with each candidate, and a case study was conducted to evaluate their motivation and soft skills.



After this stage, the candidates were chosen and allocated to their respective areas of interest, where they performed tasks that allowed them to understand the commitment and talent of each. Finally, the recruits were selected according to the team's needs and became part of the project in February. It is essential to highlight the role of the Human Resources department throughout this process, from its planning and execution to the monitoring of each candidate.



FROM COMBUSTION TO SMARTENERGY



SMARTENERGY

The latest edition of 2022 started this section. With it came the opportunity to understand in more detail the changes that the transition from a combustion engine to an electric motor entailed.

The hardships felt were not few. However, the biggest challenge that the team faced came from the batteries: To have viable autonomy, a large number of batteries is needed, which in turn are characteristically dense, adding a lot of weight to the bike, which is why there is an urgent need for much more robust structures on the motorcycle for the equivalent of the same combustion power. On the other hand, when stepping into the field of electric motors, the team faced the reality of a little-explored and developed market. Not only are there fewer companies and commercial solutions (for example, there are not as many options for inverters/controllers for electric motors, which ends up limiting the surveyed depth in the motorcycle), but this gap also resulted in the lack of standards in the industry - that is, each manufacturer produces as it suits it, unlikely to what we can see in the combustion motorcycles offer.

In conclusion, the main setback of this transition was, and still is, the lack of literacy and research on electric vehicles, which implied an increased effort for the team, who had to learn from scratch as much as possible about the powertrain, since everything changed.



POWERTRAIN

In the last quarter, the Powertrain area completed some work that had been started previously, such as the design of the cell modules and battery box and the final version of the schematics of the motorcycle's electrical system. Developed a configuration of the cells/modules to optimize the mass of the busbars and defined the charging system. The area tested the motor and the entire motorcycle's electrical system, the methods and types of soldering of the cells, and the fuses for them. Currently, Powertrain it's focused on improving the manufacturing techniques of the modules, prototyping and testing a battery module, and manufacturing the battery box.



AERODYNAMICS AND COOLING

Over the past few months, the Aerodynamics and Cooling area has been busy developing the cooling system, more specifically, choosing which radiators to use and perfecting the cooling of all necessary components. A pilot's position was also studied to adjust the pegs, the bench, the depot, and the fairing. In addition, the aerodynamics & cooling area teamed up with the Propulsion and Structures areas to prevent system interference with the rest of the motorcycle components. The Design sub-area finished and simulated the TLM04e fairing.



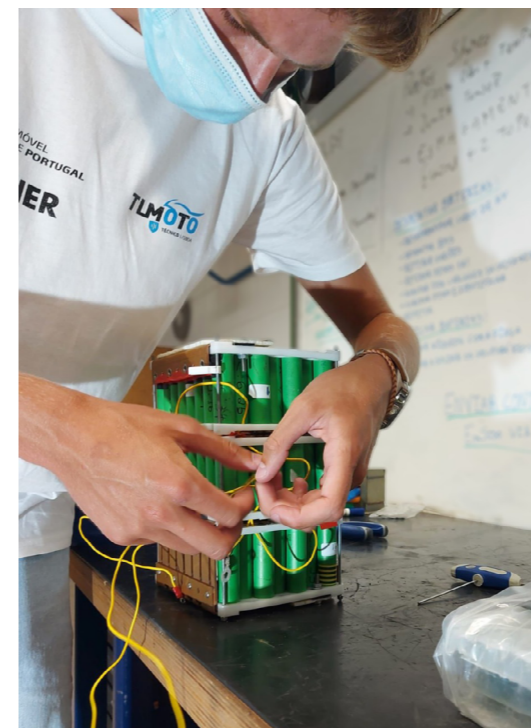
DYNAMICS

In the last quarter, the Dynamics area actively worked on delivering "Chapter B: Product Design" for MotoStudent. The subarea of Testing and Dynamic Components modelled and optimized the structural components that make up the linkage of the TLM04e. They also analysed the forces on brake components (pads, callipers, and brake support) and studied the heat generated during braking.

STRUCTURES

The Structures area completed the prototype design and developed a report on the structural analyses for the competition delivery. Currently, the area is in the manufacturing phase, starting the material preparation and processes for the physical construction of the motorcycle. It is also imperative to highlight all the work behind reviewing the components to evaluate its safe

The Modeling and Simulation subarea developed the force bank, representing a document with all the forces applied to the motorcycle's structural components, both in a static position and in dynamic events. In addition, the advances in the Motus and Laptime programs continued.



ELETRONICS

The electronics members focused on soldering and starting tests on the new prototype boards. After identifying errors, the second iteration started, incorporating the necessary improvements. It is also worth mentioning all the work done for delivery to MotoStudent. Simultaneously, the new dashboard design was defined to make more information available.

LOGISTICS

During the last few months, the Logistics members developed several tasks: the inventory of the team's materials, updating and drafting guides needed for the proper functioning of the area. They were also responsible for planning and attending events, such as Mecanist and SINFO, and organizing the TLMoto's barbecue!



HUMAN RESOURCES

In the last months, the Human Resources department actively monitored the recruitment process that began in November, handling the planning and organization of general meetings. They carried out a performance evaluation of the team's management, prepared essential documents, reformulated old ones, and prepared a training on leadership for all leaders and sub-leaders of all the departments. Noteworthy is the planning of the subsequent recruitment, which will be announced soon! Besides this, they focused on usual work, such as following up on departments, updating team data, and electing the member of the month.



MARKETING & DESIGN

Last quarter, the Marketing and Design department wrote an article for our partner Motojornal, developed some applications for funding contests, and made some improvements and updates to the team website. They were also responsible for all of its promotional material. In addition, they did all their regular work, such as planning and developing posts for social media, analyzing the team's engagement, and collecting continuously photographic and video material.



SPONSORS

In the last quarter, the Sponsors department underwent a substantial restructuring, forcing it to reorganize the platforms used to register meetings and partners to organize all the work done by its members. In addition, the department was in charge of finding partners to finance the team and companies willing to make some of their machinery and materials available. Regarding current partners, this area was responsible for providing all the information about the project they requested. Finally, it is relevant to mention the application's development for the Technov funding contest.





PARTNERS



THANK YOU

Do you want to know more? Follow us on social media and learn more about our history!

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