AMZ News

ROLLOUT 2019

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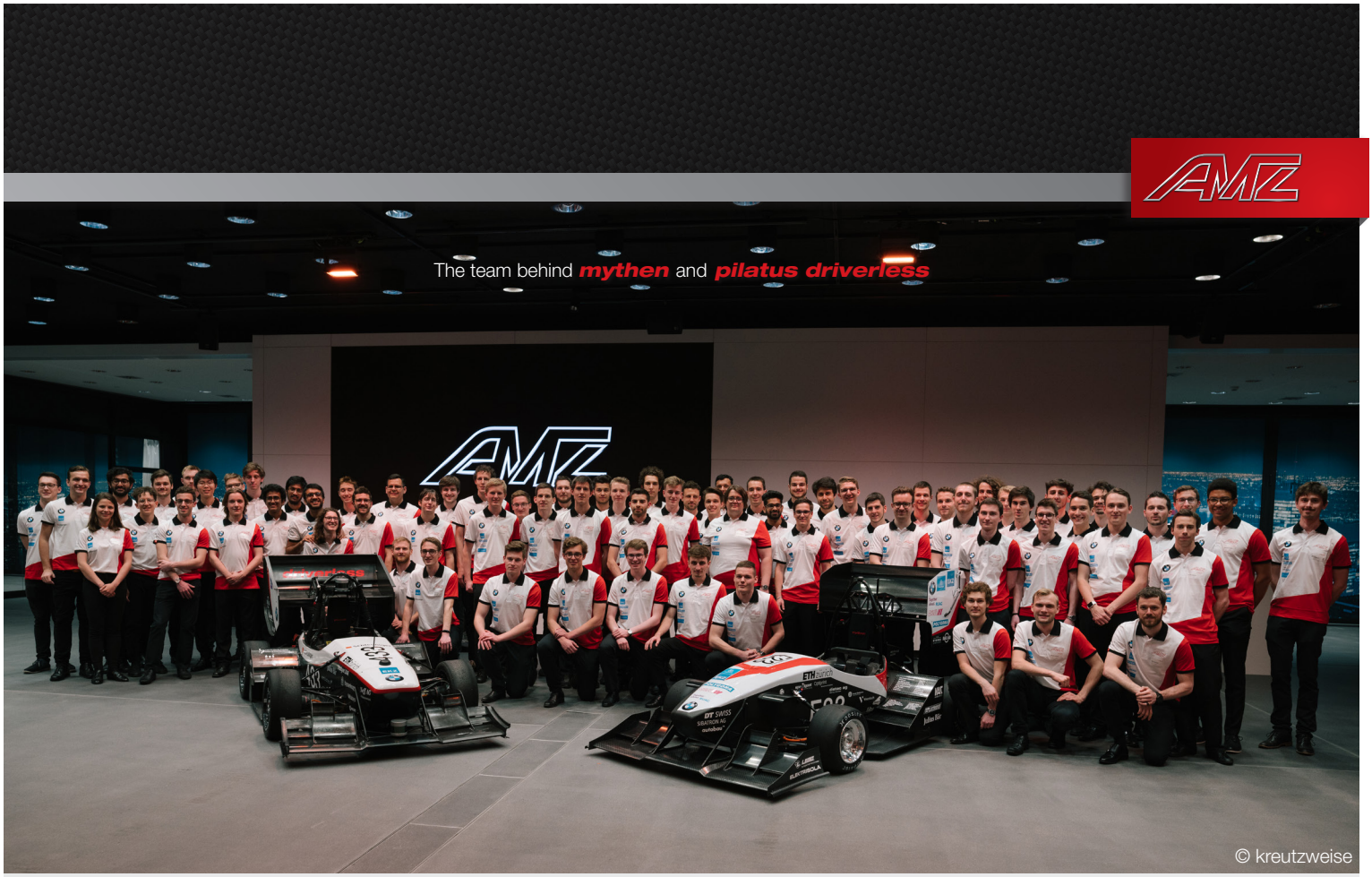


Rollout 2019

Dear Reader – right after about eight months of design work, strenuous labor in the workshop and many sleepless nights during assembly, we are finally proud to present our challenger for the 2019 Formula Student season, mythen, and its driverless sister car, pilatus driverless to you. Our newest prototypes should build on our previous successful seasons and continue to lead the world ranking in Formula Student Electric.

Rollout

On Monday, the 20th of May, the time had finally come. At the BMW Group Brand Experience Center in Dielsdorf, our thirteenth car was presented to the public for the first time – in front of about 350 attending sponsors, friends, families and other members of the Formula Student community.

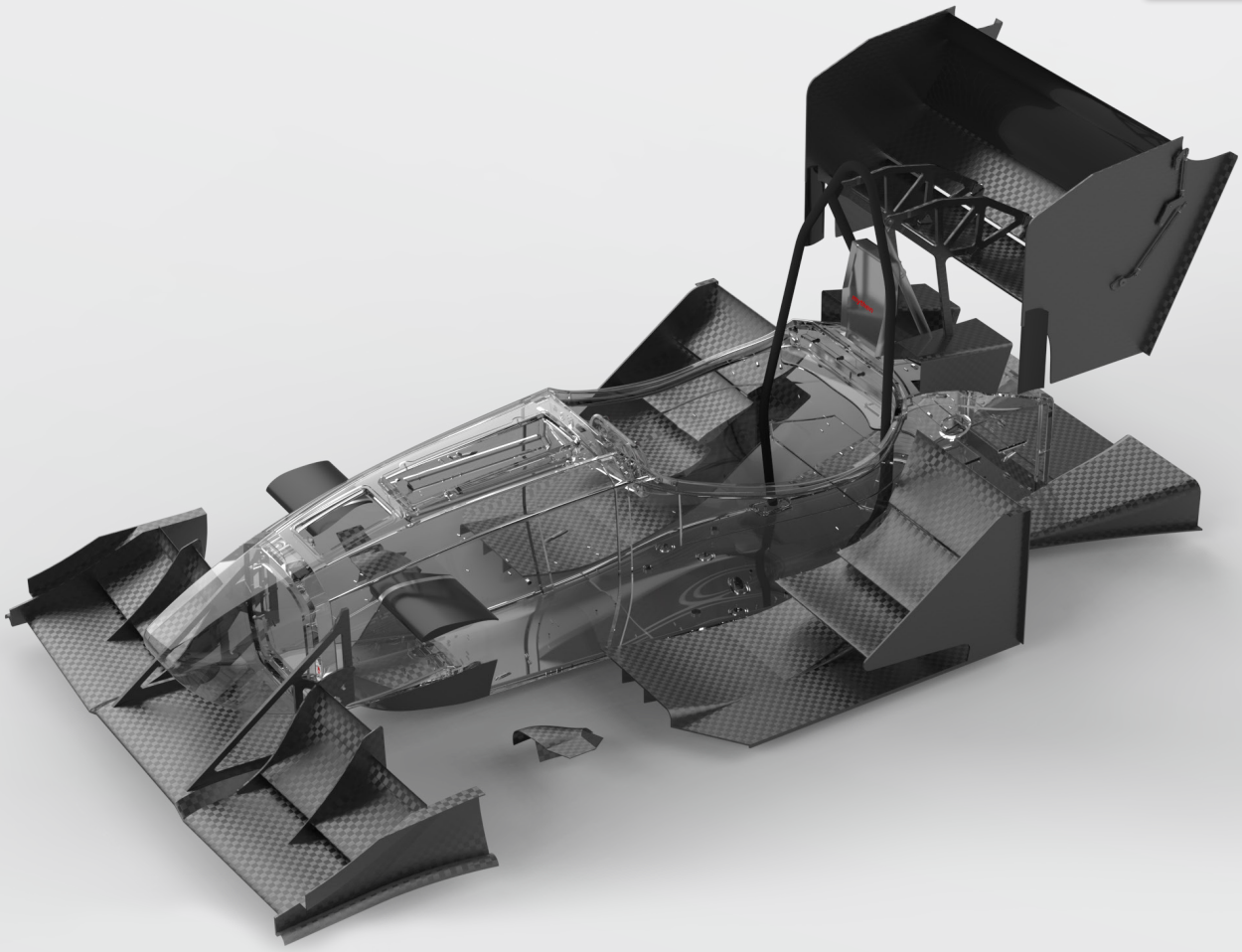
After a short introduction by our hosts BMW and Julius Bär, the technical presentation of both cars followed suit. In there, we presented all of the concepts and innovations behind our newest race cars.

Following the presentations, both cars were unveiled in front of the attending guests.

To end the evening on another high note, the guests, accompanied by a wonderful apéro riche, were able to examine this year's vehicles and all of their predecessors. In a relaxed atmosphere, the proud young engineers talked shop about the new concepts and many interesting discussions were held.

With rollout, the next phase of our project is about to start: testing. In the coming months you will find mythen almost daily at our test sites. It›s not just about making the car faster, but also finding potential vulnerabilities and increasing reliability. After the successful initial startup, all subsystems will gradually be put into operation and mythen will gain in performance with each kilometer driven. In two weeks already, the team will travel to Friedrichshafen in order to gain their first competitive experience at the ZF Racecamp, a pre season trial event.

Only a few days later, mythen's aerodynamic package is extensively tested in the wind tunnel and the last adjustments are taken care of. At the end of June, the pre season will conclude with a testing day at BMW in Maisach and the TKP Racing Day before the first major showdown of the international competition is going to take place on beginning of July at Formula Student Netherlands.



Aerodynamics

mythen

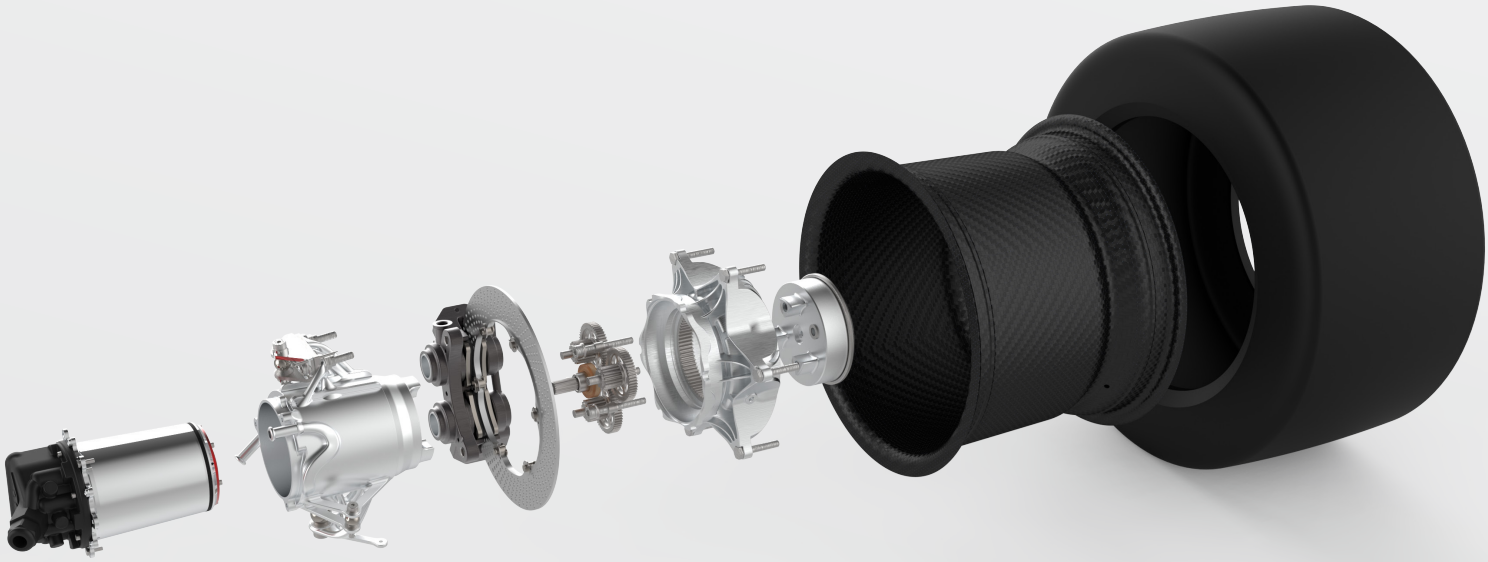
Our thirteenth competitor in Formula Student is a vehicle that meets our high standards through and through. Proven concepts have been further refined, new innovations have been skillfully integrated. You will learn all about the most important innovations in mythen in the following sections.

Packaging

Smaller, lighter, more integrated. These are the keywords that best describe our new packaging. After a consistent comparison of the potential of different concepts, we have succeeded in taking another step forward in the integration of all component groups into our chassis. Except for parts of the drivetrain, all components are completely installed inside the monocoque. Nonetheless, mythen has the narrowest chassis in our association's history, made possible by a complete revision of each component. A one-piece accumulator directly attached to the driver›s seat and geometry-optimized carbon fiber construction brings a 13% lower center of gravity and outstanding conditions for chassis stiffness and aerodynamics.

Aerodynamics

With more than 2000 fluid dynamic simulations performed on the supercomputer of ETH Zurich, mythen once again made an important step forward in the development of aerodynamics. An aerodynamics package particularly designed for fast cornering, consisting of underbody, front and rear wings and a complex system for controlling the tire wake on the sides of the vehicle allows mythen to again achieve higher downforce than its predecessor. To minimize drag on straights, mythen also has a sophisticated drag reduction system that can open and close in under half a second. And although the complete aerodynamics package consists of more than 50 individual carbon fiber components, it weighs just over 10 kg.



Wheelpackaging of *mythen*

Wheelpackaging

The two most important components of a fast race car are the driver and the tires. After intense testing during the concept phase, a 10›› low profile tire was selected as the most powerful solution for mythen. Based on this, a new iteration of our hydraulically decoupled suspension was realized. Due to the significantly smaller space inside the rim compared to the previous year, it was all the more a special challenge to accommodate every component of the wheel packaging inside of it. This challenge could only be mastered through the use of state-of-the-art production technologies. An additively manufactured, topology-optimized upright with integrated cooling channels, an even more compact, completely newly self-developed motor with a weight of just about 2 kg and a planetary gearbox with a gear ratio of almost 16: With all of this, mythen achieves a power density of 1.3 PS/kg and a torque of 400 Nm on every wheel.

Inverter

One third of its predecessor is the weight of the I2, the second generation of the custom inverter developed by AMZ. For each of the two motors, a dual inverter is used, which can drive the motors with a frequency of up to 100 kHz owing to its silicon carbide semiconductors and extremely fast switching gates.

Batteries

Hand in hand with the new inverters come also changes to the battery itself. An increased system voltage of 550 V allows for the use of lighter cabling and an even higher overall efficiency. A slight increase in total energy to 6.35 kWh allows mythen to drive through the 22 km endurance with maximum power.

Controls

But in order to take advantage of all these performance gains, appropriate system control is needed to do so. Thanks to a new vehicle control unit, mythen can control its sensors and actuators even more reliably in any driving situation. Optimized torque distribution, traction control and a rear-wheel steering system are just a few of the advantages that mythen has because of it. A brand new, self-developed data analysis tool helps us to make the testing season even more efficient and bring our cars even closer to their theoretical performance limit.

These and many other components form the basis of mythen. All of them and the entire team behind it are responsible for having taken another leap in the successful history of our association. With all its innovations, improvements and pioneering concepts in one package weighing less than 160 kg, mythen points the way to the future of the Academic Motorsports Association Zurich.

Acknowledgments

At this point, we have little more to say than thank you. Developing and building a race car from the ground up is not easy. And without the support of all our sponsors, partners, families and friends, it would be impossible. A thank you for any way out of a seemingly hopeless situation, for any advice on a complicated problem, for any indulgence on a tight deadline, for any aid or assistance. We appreciate it.

To a successful season!

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