Bioflax Motorcycle Parts

The joined challenge of HAN and Ten Kate Racing: How can motorsport become more sustainable for our future?

Students at HAN University of Applied Sciences and Ten Kate Racing B.V. join the MotoNext project to improve the sustainability of motorsport racing. But who are these brave innovators?



The innovators

We are Artem Koriachko, Jelte Woestenenk, IJsbrand Oosten, Juan Hulleman, Kacper Ostrowski, Simon Witteveen and Bart Rots from the Academy of Engineering and Automotive. We had the fantastic opportunity to meddle with the Yamaha YZF-R6 rear subframe in our Semester 6 project. No pressure, right?

The project goal

Let's give you more background! The rear subframe is a structural part of the motorcycle, which, connected to the main frame, supports the weight of the driver and hosts several electronic devices. In addition, the subframe may contact the asphalt or the guardrail in an accident during racing. Therefore, our main challenge is redesigning the rear subframe while ensuring enough strength, lightness and a reduced carbon footprint. The current subframe is made of magnesium, but here is the twist: we are challenged with bioflax composites. Not steel, aluminium, or carbon fibre, but flax. Yes, flax, the plant. The kind of ingredient you'd expect in a healthy smoothie, not bolted to a 120horsepower track monster.

Why bother? We bother because motorsport is fast and loud, and sustainable is not an adjective that resonates with it. We wanted to prove that natural fibres could survive and thrive in that high-stress environment. Of course, the budget was... tight. Let's say it made "low-cost" look luxurious. So, we had to get creative and very persuasive.

The journey

First, we scanned the original subframe, modelled it and tested it for rigidity and strength. Second, we designed the new bio-flax composite subframe and the mould for production. Third, we produced and tested the subframe to validate the simulation work. Every gram mattered. Every euro and kg of CO2, even more so.

But not everything went as smoothly as it looks! We had a "cheap" plan to use MDF (medium-density fibreboard) on the CNC router to manufacture the mould. However, it turns out that MDF dust during CNC milling is frowned upon. Our only suggested alternative? PUR foam, which costs three times more. We needed to choose for safety!

But guess what? Networking saved us! We could source usable wood to fabricate the mould for free via our senior engineer. We had a celebration and renewed faith in teamwork with a happier client on board!

Lessons learned

This project wasn't just about CAD models, breaking up samples and swearing at software. It taught us how to strive for creativity, how to arrange our resources, and how to feel a team sharing the same challenges and rising together through many ups and downs. We learned that a good contact list is worth more than titanium fasteners and that when things go wrong, you keep calm, re-plan, and give feedback more constructively.

The subframe prototype

What did we actually make? A prototype of the rear subframe for a Yamaha R6, made from bioflax. It's not stronger than carbon or magnesium and probably won't change MotoGP overnight. But that's not the point. The point is that it works for what it is designed, it is cheaper, and motorsport becomes more sustainable. Did you know we can save up to 40% of CO2 emissions by substituting magnesium with a bioflax subframe? We proved that bioflax composites can survive where they were never meant to be. That's bold and, if we're honest, mind-blowing!

Who cares?

Ten Kate Racing B.V. and its competitors in motorsport. If we can save weight and cost without compromising performance, they can implement more sustainable materials in structural components. And beyond motorsport, any industry in transportation and energy could benefit from these advantages. We're not trying to save the world with a sub-frame, but maybe we're nudging it in the right direction.

Pride and dreams

We're proud to have fabricated the Yamaha YZF-R6 rear subframe prototype, driven by our passion for motorsport and a lot of grit. At the symposium, we'll show off our prototype and the test results that prove bio flax can take a beating. It's not flawless, but for a team of students juggling ambition, spreadsheets, duct tape, and WD-40, it's a damn good start!



Concept 1 BioFlax sub-frame Yamaha YZF-R6