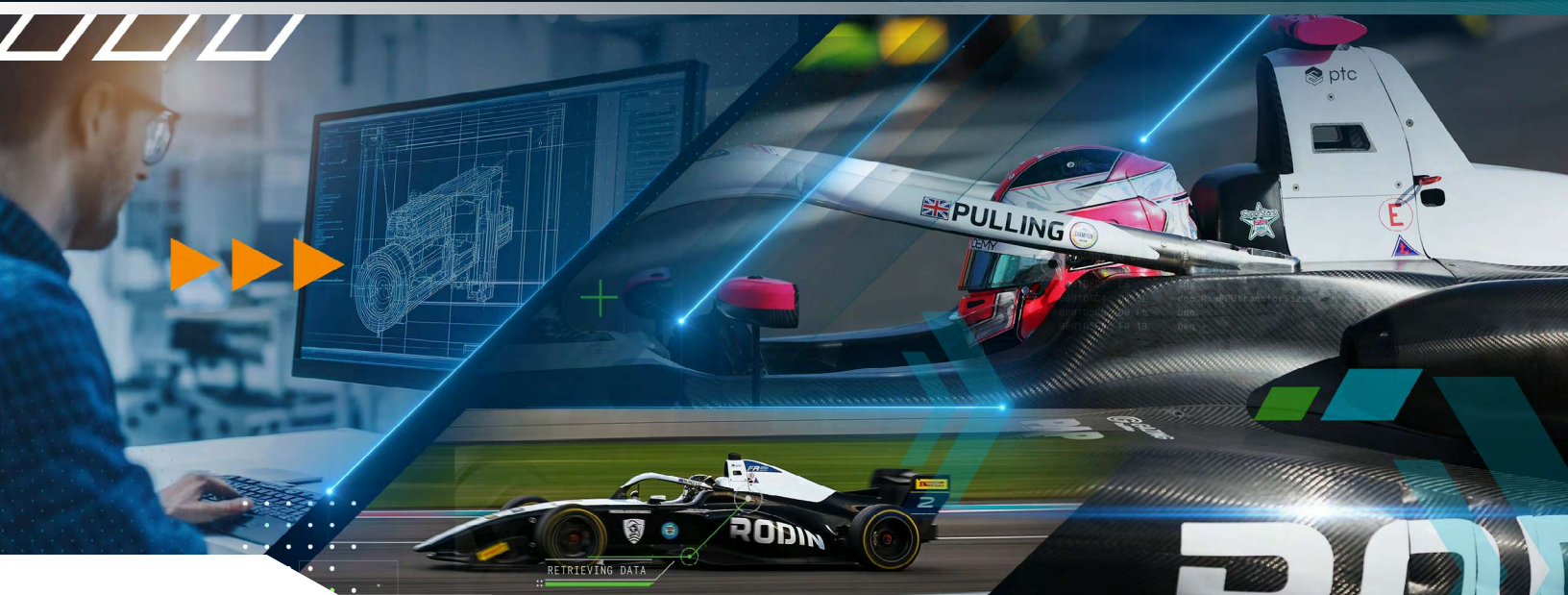


The Science Behind the Speed: Creo-Enabled Aero Insights at Rodin Motorsport

How Rodin Motorsport Optimized FIA F3 Performance at Macau with Integrated CAD and CFD in Creo.



Rodin Motorsport is one of the most successful development teams in modern single seater racing. The organization operates seven racing teams and has helped launch the careers of many stars who passed through its garage as young teenagers on their way to Formula 1, including George Russell, Carlos Sainz, Sebastian Vettel, Daniel Ricardo and Lando Norris.

"We're privileged to see drivers arrive as teenagers and grow into champions," said David Brown, Technical Director at Rodin Motorsport. "Running seven racing programs across multiple championships gives us an unusually broad set of cars, regulations and engineering challenges."

Formerly known as Carlin, the team rebranded as Rodin Motorsport in 2024. Building on Carlin's legacy of nearly 450 race wins, Rodin Motorsport has captured major titles across the junior formula ladder, including back to back GB3 teams' championships in 2024 and 2025, British F4 titles, and the women only FI Academy drivers championship in 2024, winning races in every series they competed in last season.

Across two decades of engineering work, the team has leveraged advanced 3D design and analysis to accelerate innovation on hundreds of components and development projects, from suspension concepts to test car integrations.

The Challenge: Tight Regulations, Minimal Adjustments, Maximum Impact

Macau's Guia Circuit is a street circuit located on the southeastern edge of the Macau Peninsula in China, winding through the city's tight roads and waterfront. The circuit presents a unique problem for an FIA F3 car. Tight, technical sections demand downforce, but the 1.2 km main straight rewards low drag. Because the category is tightly regulated, Rodin Motorsport wasn't allowed to make new rear wing parts, so they could only adjust the existing pieces within small, legally permitted limits and natural variations that occur as those parts wear over time.

"Design is ultimately about finding lap time - improving performance, increasing driver confidence and extracting every advantage regulations allow," said Benn Huntingford, Sporting Director at Rodin Motorsport. "We will always go above and beyond to push the boundaries of great design within these regulations and help our drivers get the edge."

The team needed to understand how the car behaved both when the rear wing flap was closed and when it was opened using the Drag Reduction System (DRS), then figure out how those differences in airflow and speed would affect overall lap time on a track like Macau that has both tight corners and a very long straight.

"In motorsport, speed, accuracy and reliability all matter, but timelines for any iterations are always tight," Brown noted. "The challenge was finding the right compromise between downforce for the twisty sections and drag reduction for the straight, within the strict FIA limits."

The Solution: Creo as the Foundation for High Fidelity Aero Modelling

Rodin Motorsport has relied on Creo for nearly two decades, first adopting the software in 2007–2008 when the team was still known as Carlin. It has become the foundation of their design and development work, supporting everything from suspension redesigns and gearbox improvements to wind tunnel models and complex test car integrations.

For the challenges of the Macau circuit, Rodin Motorsport first created a detailed 3D model of the rear wing in Creo, then used Creo Flow Analysis to capture pressure distributions across the mainplane and flap, and Creo Simulate to translate those pressures into downforce and drag values for both DRS states. This allowed the team to understand how air would flow around the wing and how that airflow would affect overall balance, grip and straight line speed.

With Creo Flow Analysis, Rodin Motorsport engineers run high-fidelity Computational Fluid Dynamics (CFD) directly inside their CAD models, spotting any aerodynamic and issues early. Creo Simulate





then adds built-in finite element analysis to test structural performance at the same stage. This combination gives engineers a single environment to optimize aerodynamics and strength simultaneously, accelerating development and improving on-track correlation. The result is faster decisions, fewer redesigns and components that behave exactly as the data predicts when the car hits the circuit.

Once the main model was ready, the team tested ten wing flap angle variations in half degree increments. Because everything was set up inside a single integrated environment, each scenario only took around 15 minutes to generate, enabling rapid comparison across the full range of options.

"Without Creo, this would have required building physical parts, booking wind tunnel time and re running the test for every minor adjustment," Brown added. "Instead of ten iterations in an afternoon, we'd be facing days or weeks. Creo allowed us to analyze every half degree change with both open and closed DRS."

The team then fed drag and downforce outputs into a lap time simulation tool to determine whether gains on the straight would outweigh the loss in cornering performance.

"Creo handled the modelling, pressure distribution and load calculations. Then we tied the results directly into our lap time model," said Brown. "The goal was simple: make a fully data driven setup decision. Creo made that possible."

This project extends Rodin Motorsport's broader application of Creo, which has supported multiple programs across the company's teams, such as the redesign of the IndyCar IR 12 rear anti roll bar, real time stiffness modelling, system level mass optimization and fueling improvements.

The Benefits: Data Driven Decisions and Faster Learning Curves

Using Creo gave Rodin Motorsport a clear, quantifiable understanding of how very small adjustments to the rear wing flap would affect the car's behavior. Their analysis showed that increasing the flap angle by just half a degree slightly reduced grip but also reduced drag, helping the car travel faster on Macau's long straight. When they combined this information with lap time simulations, it became clear that the extra straight line speed could more than make up for the small loss of cornering performance.

"Everything comes back to improving lap time," said Huntingford. "Our lap simulation indicated a potential improvement of up to 0.25 seconds, which is significant when every fraction of a second counts. Working with PTC has helped us give drivers a more responsive, more tunable car, and that builds confidence and performance, which wins races."





"Creo's combination of 3D modelling and built in simulation has transformed the speed at which we engineer solutions," Brown added. "Because the analysis lives alongside the model, we move faster and make better decisions between races."

"The data let us pick exactly the right aero compromise for Macau," Brown said. "Creo's computational fluid dynamics capabilities expose marginal gains quickly, and they correlate with what we see on the track. Add those marginal gains together and you move the car forward. A simulation can whisper all the right answers, but if the car doesn't echo them in the real world, it's meaningless. The win isn't in the spreadsheet. It's in seeing the model's predictions show up in lap time, grip, and confidence."

The workflow is also enabling Rodin Motorsport's younger engineers to develop rapidly. Reusable templates and consistent processes make advanced simulation accessible across all seven teams within the business.

Looking Ahead: Integrating Additive Manufacturing Into Trackside Engineering

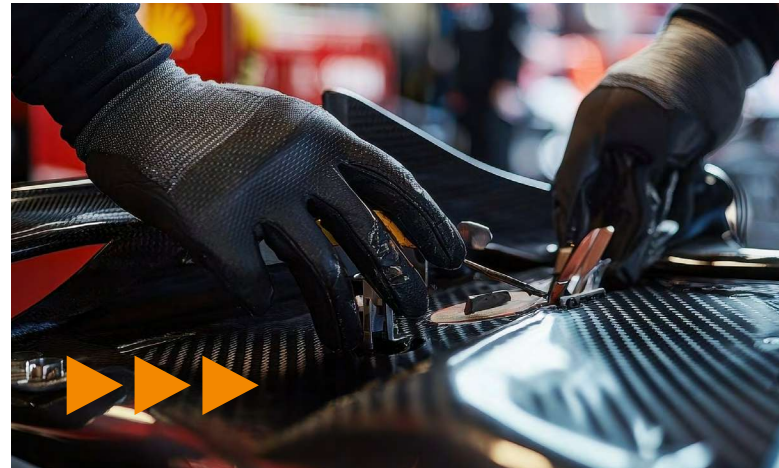
Rodin Motorsport is expanding into new categories while continuing to scale its integrated design and simulation approach. The team has added the Formula Regional European Championship to its 2026 racing schedule and will also enter GT racing. It is extending Creo access to a wider group of engineers, connecting designs directly with in house additive manufacturing for pit equipment and fixtures.

"We're opening up more licences for younger engineers and standardizing a common approach across every program," Brown said. "Additive manufacturing is already central to our parent company, and that's helping us deepen our use of the technology."



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Benn Huntingford, Sporting Director, Rodin Motorsport





Its parent company, Rodin Cars, has built its entire development model around advanced metal 3D printing, using it to produce critical components such as titanium suspension parts and the industry-first fully 3D-printed eight-speed gearbox for the Rodin FZERO. By drawing on this capability, Rodin Motorsport gains access to a culture of rapid iteration, in-house precision manufacturing, and design freedom that exceeds the limits of traditional production methods. The result is a unified technical ecosystem where young engineers can work with cutting-edge tools and a shared methodology that strengthens every programme across the organisation.

Rodin Motorsport will continue using Creo to iterate rapidly, run targeted simulations inside CAD and make evidence based setup decisions within strict FIA regulations.

"We've used Creo for everything from wind tunnel models to suspension and gearbox internals. It lets us think bigger because we're not afraid to try new ideas," Brown said.

Although AI isn't part of the current workflow, the team sees potential in the future.

"AI could help us sift through large volumes of performance data," Brown concluded. "As long as engineers define the priorities, it could become another useful tool to help us move faster."

Benefits

- **Clear insight into small setup changes** - Creo allows Rodin Motorsport to understand exactly how tiny adjustments for marginal gains, such as half degree changes to a rear wing flap, affect speed and grip, helping them choose the best setup for each circuit.
- **Faster testing and quicker decisions** - Once the main model is built, Rodin Motorsport can test each new variation in just 15 minutes, letting them explore multiple options rapidly instead of spending days preparing each change.
- **Less reliance on special equipment and expensive testing** - By running simulations directly in Creo, the team avoids building custom parts or booking costly wind tunnel time for small performance gains.
- **Reusable models and shared workflows for the next generation** - Rodin Motorsport's younger engineers can easily work with reusable templates and shared models, creating a consistent approach across all seven racing teams.

Customer Overview | Rodin Motorsport

Industry	Automotive
Employees	60+
Turnover	£11.32m (\$15.25m)
Headquarters	Farnham, Surrey, England
PTC Products	Creo, Creo Flow Analysis, Creo Simulate