



WHITEPAPER

PROJECT BRIEF

The development of **Graff RD** stems from the evolution of modern gravel racing and the analysis of the demands that have emerged from international competitions in recent years. Higher average speeds, wider tires, and more technically demanding courses have introduced new design constraints: greater structural stiffness, optimized impact management, and stable aerodynamic behavior in crosswinds across a wide range of yaw angles.

The aim of the project was not simply to evolve the existing platform, but to create a wheel designed from the outset for competitive gravel racing, capable of combining aerodynamic efficiency, impact resistance, low weight and handling precision within a single, coherent system.

Graff RD is the result of a development process combining simulation, structural design, laboratory validation and field testing, carried out in collaboration with The Grip Elite Gravel team and Mattia De Marchi.

Every component—from the rim and carbon spokes to the hub—was developed as an integral part of a system designed to meet the demands of modern gravel racing, where performance, reliability, and control must coexist even in the most extreme conditions.

THE MICHE FORMULA

Throughout the development process, we followed our internal methodology, which we systematically apply to every project. It is based on meticulous measurements, simulations, and repeated testing, through which we analyze and assess extensive datasets—including aerodynamic data obtained from CFD models and wind tunnel validation—progressively integrating the results until we achieve the most effective solution.

For **Graff RD**, this methodology led us to focus particularly on aerodynamic profiles and material response. The goal was to reduce drag while improving aerodynamic efficiency, rolling efficiency, stiffness-to-weight ratio, and the product's overall reliability under the most extreme conditions.

CARBON SPOKES AND A NEW STRUCTURAL PLATFORM

Graff RD marks Miche's first application of VONOA Carbon Spokes technology to a wheel designed specifically for competitive gravel racing.

The carbon-fiber spokes feature a **4 × 1 mm cross-section**, derived directly from the experience gained during the development of Deva RD and subsequently adapted to the specific demands of off-road riding.

In gravel riding, the wheel is subjected to significantly greater lateral loads, radial impacts, and vibrations than in road use. For this reason, development focused not only on stiffness, but above all on impact response and the long-term durability of the structure.

The **12+12 spoke configuration** was retained to achieve the best balance between:

- lateral stiffness
- immediate power transfer
- handling precision
- stability over rough terrain

The stiffness-to-weight ratio was once again one of the project's key development parameters.

RIM AND INTERNAL WIDTH: DESIGNED FOR MODERN GRAVEL

The evolution of gravel tires demanded a complete rethink of the rim geometry.

Graff RD features a **30 mm hookless internal rim width**, designed for bigger section tires and lower operating pressures, improving tire carcass support and contact patch stability.

Increasing the internal width inevitably also affects the wheel's aerodynamic behavior. For this reason, the profile was completely redesigned, building on the experience gained from developing Miche's RD road wheels.

The new NACA airfoil was optimized to maintain efficient airflow even with tires wider than **47 mm**, seeking the best balance between drag, weight, and stability across the entire yaw-angle range analyzed by Miche (-20° to $+20^{\circ}$).

At the same time, the rim shoulder section was redesigned to improve its ability to absorb impacts from obstacles typically encountered in gravel riding, while preserving the wheel's structural integrity.

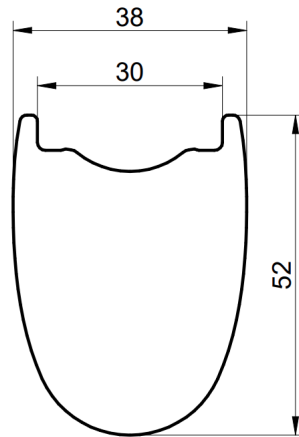
THE HEART OF THE PROJECT: AERODYNAMIC DATA

Aerodynamic development began with the already proven performance of Graff Aero 48. However, its profile was completely redesigned to meet the discipline's evolving demands and the increasingly high speeds that now define gravel racing at every level of competition.



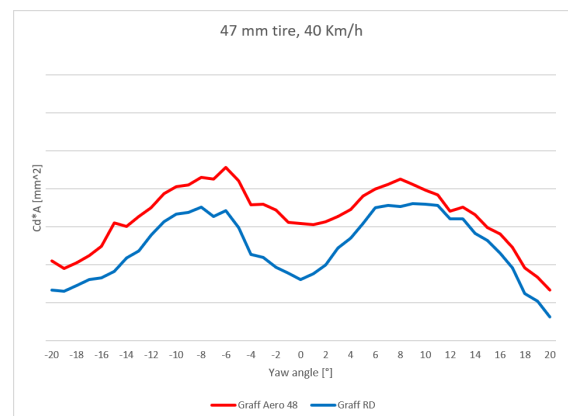
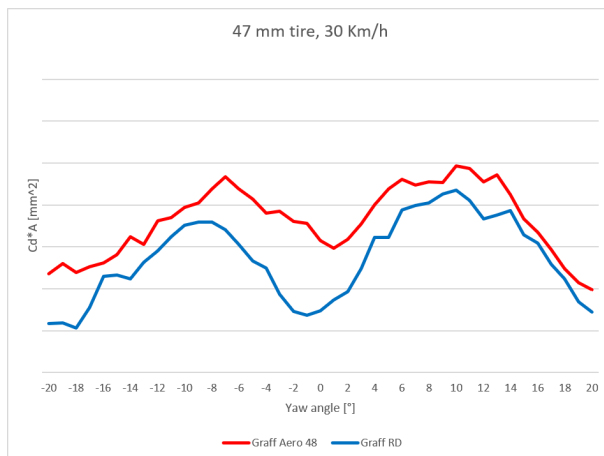
The increased internal rim width required for bigger section tires resulted in a corresponding increase in the rim's external width.

Redesigned using a NACA aerodynamic profile and validated to maintain aerodynamic efficiency even with tire widths greater than 47 mm, the new profile stabilizes airflow around the rim-tire interface, reduces turbulence, and optimizes the aerodynamic efficiency of the wheel-tire system.



Testing was conducted at two speeds, 30 and 40 km/h, using 47 and 50 mm tires. The results are shown below:

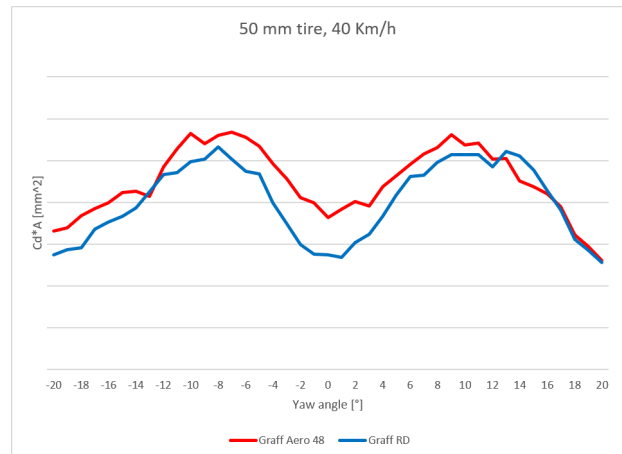
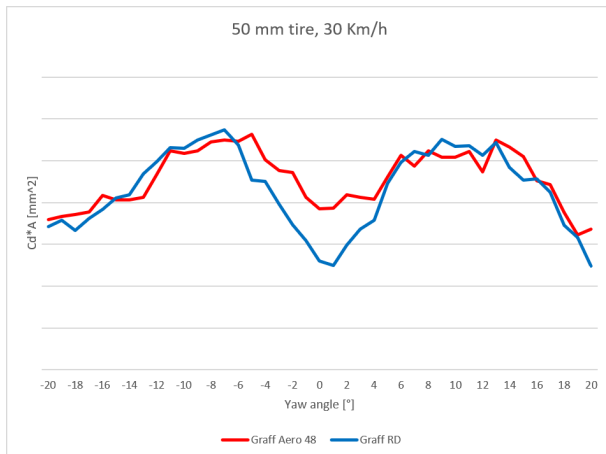
47 MM TIRE



Among the tested configurations, using 47 mm tires allows Graff RD to deliver its best aerodynamic performance. The improvement in weighted-average CdA compared to Graff Aero 48, calculated across all tested yaw angles from -20° to +20° in 1° increments, is as follows:

- At 30 km/h: **-6.92%**
- At 40 km/h: **-5.94%**

50 MM TIRE



The improvement in weighted-average CdA compared to Graff Aero 48, calculated across all tested yaw angles from -20° to $+20^{\circ}$ in 1° increments, is as follows:

- At 30 km/h: **-2.73%**
- At 40 km/h: **-3.92%**

Graff RD therefore delivers improved aerodynamic performance across every tested combination of reference speed and tire width, representing a significant step forward compared to Graff Aero 48.



HUB AND ROLLING EFFICIENCY

The hub was completely redesigned to integrate the new carbon spokes.

The flange geometry was developed directly around the cross-section of the **VONOA spokes**, ensuring an optimal hub-spoke interface while maximizing mechanical strength, stiffness, and aerodynamic consistency.

The front and rear hub bodies are machined from Ergal 7075 T6, while the rear hub features a titanium pawl carrier to optimize the weight-to-stiffness ratio.

Micrometric bearing preload adjustment ensures optimal bearing setup in all riding conditions.

The hub system is designed and manufactured at Miche's facility in San Vendemiano, Italy.

To maximize rolling efficiency, Graff RD also features the new **CeramicSpeed ALPHA** bearings, assembled by hand in Denmark.

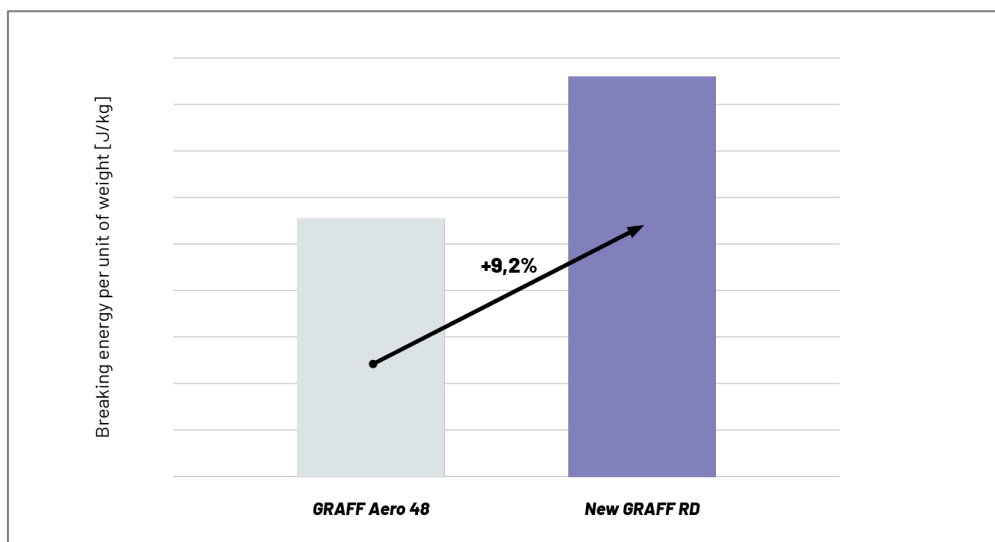
The Class 1 silicon nitride balls, paired with hardened stainless-steel raceways and low-friction seals, reduce rolling resistance while maintaining high reliability even in the harshest environmental conditions.

THE IMPACT FORMULA

In gravel racing, performance depends on more than weight and aerodynamics. The wheel's ability to withstand repeated impacts is an equally critical design parameter.

For this reason, Miche developed The Impact Formula, a validation protocol specifically designed for every wheel. Each test sample is subjected to a sequence of impacts at every spoke hole, with progressively increasing energy until the first sign of structural damage appears.

The total energy absorbed during the test cycle directly measures the structure's ability to dissipate impacts while maintaining its integrity.



It is not simply about passing a single test, but a development methodology that systematically evaluates wheel performance under the conditions typically encountered in competitive gravel racing.

Compared to Graff Aero 48, **impact energy to failure per unit weight has increased by 9.2%**. The result is a lighter wheel that also improves the impact resistance of the already robust and proven Graff Aero 48.

VALIDATED WHERE IT MATTERS MOST

The development of Graff RD did not end in the laboratory.

The team tested every design solution in international competitions with **The Grip** team and **Mattia De Marchi**, using racing as the final stage of the development process.

Stiffness, impact response, dynamic behavior, and handling precision were validated at the speeds and under the loads typical of the most demanding gravel competitions.

Only the solutions that demonstrated both performance and reliability under real-world conditions made it into the product's final configuration.

Graff RD brings the engineering approach of our RD division to the gravel world, reinterpreting it for a discipline in which speed must coexist with impact resistance, control and reliability.

Every component was developed as part of a single integrated system: carbon spokes, the new hookless rim, dedicated hubs, and **The Impact Formula** protocol work together to deliver a no-compromise wheel designed for modern gravel racing.