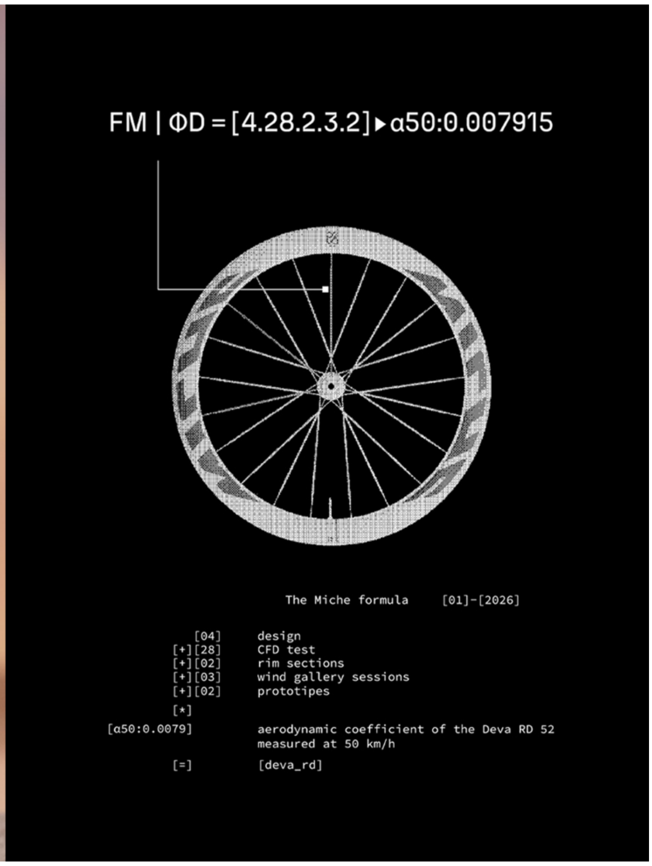
DEVA RD

WHITEPAPER



DESIGN BRIEF

The Deva RD was developed based on an in-depth analysis of the state-of-the-art of Miche's high-end wheels. The starting point was immediately clear: to make full use of the tools, engineering experience and know-how accumulated in more than 30 years of specialised production to create a wheel that exceeds the highest standards of performance, efficiency and reliability today.

The goal was not simply evolutionary, but ambitiously revolutionary: to create Miche's highest performing wheel yet.

The name "Deva" — an ancient Sanskrit word meaning "shining one" — was chosen precisely to represent the search for balance that guided the project: essential forms, advanced materials, and a system that responds naturally to every pedal stroke. This concept is not just a decorative element — it reflects our philosophy of harmonising structure, aerodynamics and cycling experience.

THE MICHE FORMULA

Throughout the development process, we followed our internal methodology, which we apply systematically to every project. This is based on conducting a set of strict measurements, simulations and repeated checks to analyse and evaluate a large quantity of data, including aerodynamic data obtained through CFD models and wind tunnel testing, and integrating them progressively until the most effective solution is reached.

In the case of the Deva RD, this method brought the focus onto aerodynamics and material behaviour. The goal was to reduce drag and improve aerodynamic efficiency, smoothness, stiffness-to-weight ratio, and overall product reliability.

THE DEVELOPMENT PROCESS

The project centres around carbon spokes, a solution used for the first time on a product designed for professional use. Developing the ideal solution required meticulous work on fibres, spoke-hub integration, and behaviour under load.

During this phase, the contribution of the Groupama FDJ – Cycling Team was decisive: initial prototype testing quickly revealed areas for improvement, instantly steering the project in the right direction.

The rim posed the main aerodynamic challenge. The goal was to create a profile capable of minimising drag while integrating seamlessly with the tyre. The various sections developed were compared through simulations and experimental testing, ultimately defining a balanced geometry in terms of efficiency and stability. The entire development process took over a year and a half, from modelling and prototyping to testing on the road and in the laboratory.

THE FIRST PROJECT PHASES

We launched the project with a structured series of wind tunnel tests, comparing the industry's main competitors with our Kleos RD 50. The goal was to establish an aerodynamic benchmark for a wheel with a 50 mm profile — a standard height for professionals and amateurs alike — making it the natural reference point for a new high-performance wheelset.

During this preliminary phase, we also analysed the first two carbon spoke sections, studying their aerodynamic efficiency and stiffness. Wind tunnel testing provided precise data on the behaviour of various wheel–tyre systems across varying airflow angles, allowing us to evaluate the differences between the profiles.

These initial results were crucial: they defined the technical boundaries for developing the new wheel and guided subsequent design decisions — both for the rim shape and the spoke configuration — thereby laying the foundation for the iterations that followed.

THE SPOKES IN DETAIL

To optimise every component of the wheel, various spokes were tested individually during the first wind tunnel session, guaranteeing peak performance in the final product.

Two types of spokes with different cross-sections were considered, both of which provided the same stiffness once the complete wheel was assembled.

To accurately isolate the results and ensure the aerodynamic contribution came exclusively from the spokes, two identical wheels were fitted, using the same rims and hubs. This helped to pinpoint which of the two spoke models would perform best during wind tunnel testing. Moreover, to enhance overall aerodynamics, the nipples were integrated directly into the rim, reducing turbulence at the profile's leading edge.

Finally, to achieve the best possible balance in terms of handling, the total spoke count was reduced from 24+24 to 21+21 compared to the Kleos RD, thus achieving the ideal compromise between rigidity, responsiveness and stability. The result is a top-of-the-line wheel accessible to all.

THE HUB

The hub of the DEVA RD is entirely designed and manufactured in Italy, at the Miche plant in San Vendemiano, using high-precision machining processes.

The shape configuration of the flanges was defined from the geometric radius specifications: the hub body was modelled to ensure optimal integration with the cross-section and profile of the spokes used, maximising mechanical strength and aerodynamic consistency.

The hub body is in Ergal 7075 T6.
On the front wheel, the camber angle has been increased to improve overall lateral stiffness, with direct benefits on responsiveness and directional accuracy.

In the rear hub, a structural combination of Ergal aluminium with titanium pawl carriers has been adopted to optimise the weight-to-stiffness ratio. For Shimano compatible versions, a specific lightweight freewheel body has been developed to further improve system efficiency.

The Miche Aeroblade integrated into the rear hub is 3D-printed in carbon-filled resin. In this evolution, in addition to protecting against contaminants, this element ensures the spokes are duly positioned and contained, contributing to the overall geometric stability.

The hubs and freewheel body are fitted with six CeramicSpeed bearings in total, selected for maximum smoothness, reduced rolling resistance, and increased operational reliability.

The rear hub features micrometric adjustment, which allows precise preload tuning of the bearings on each wheel and achieves optimal smoothness in all conditions of use.

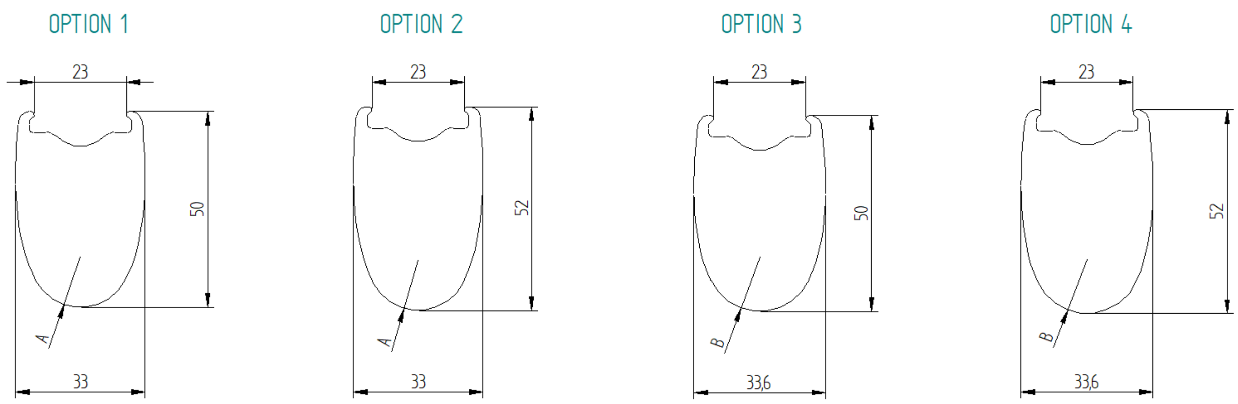
DEVELOPMENT OF THE RIM

We carried out a three-dimensional scan of a 28 mm tyre mounted on a rim with a 23 mm internal width — defined as the reference width for this project — and featuring a hook as an essential element of Miche's conception of rims for road-use. The goal was to accurately analyse the actual shape taken on by the tyre once fully seated on the rim and inflated to the project's reference operating pressure, depending on the internal rim width. This information was key to designing a rim that would integrate optimally with the tyre, creating an interface capable of minimising air-induced resistance.

Based on the data collected, we developed four preliminary rim geometries, each derived from NACA aerodynamic profiles adapted to the specific requirements of a modern road wheel. Each section was modelled taking into account rim–tyre interaction, airflow behaviour at different yaw angles, and the need to maintain the highest possible level of airflow attachment along the tyre–rim system profile.

Based on these four initial concepts, our aim was to investigate the influence of:

- Different NACA profiles
- Profile depth
- Profile width
- Leading-edge curvature
- Position of the maximum width point



The four variants formed the initial core of the study to identify the profile with the greatest potential in terms of aerodynamic efficiency, stability, and airflow continuity between tyre and rim.

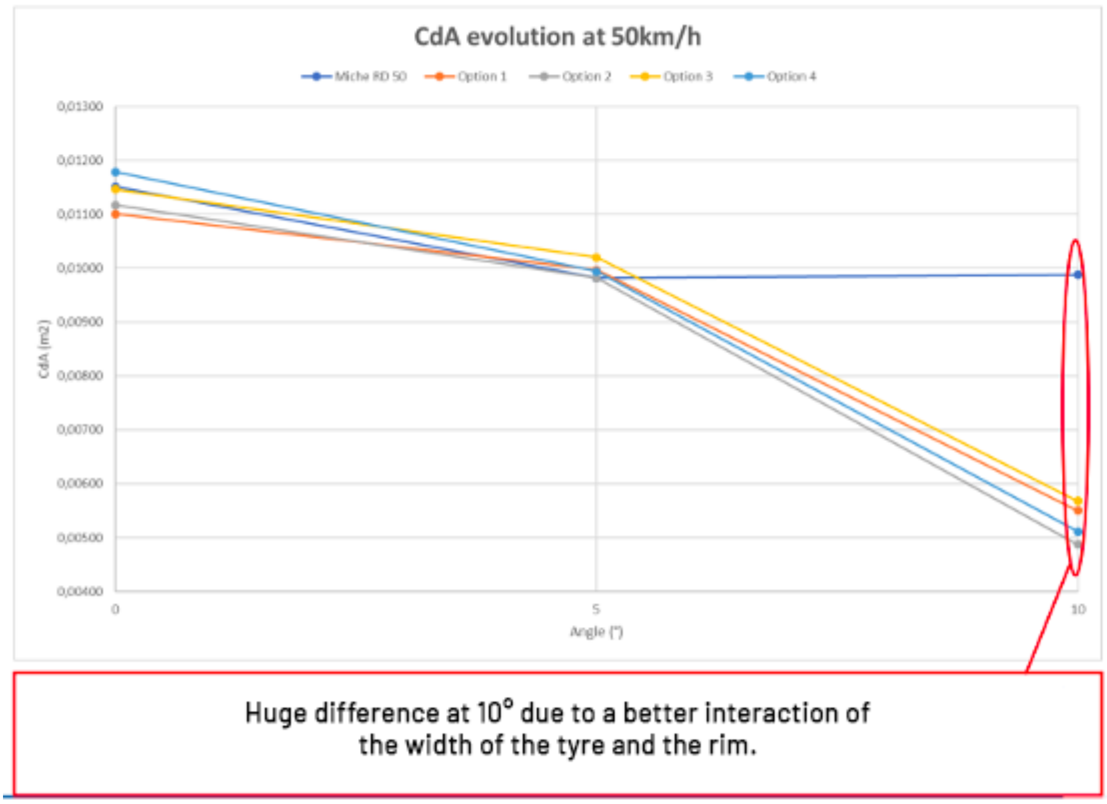
CFD TESTING, CROSS-AERODYNAMIC ANALYSIS

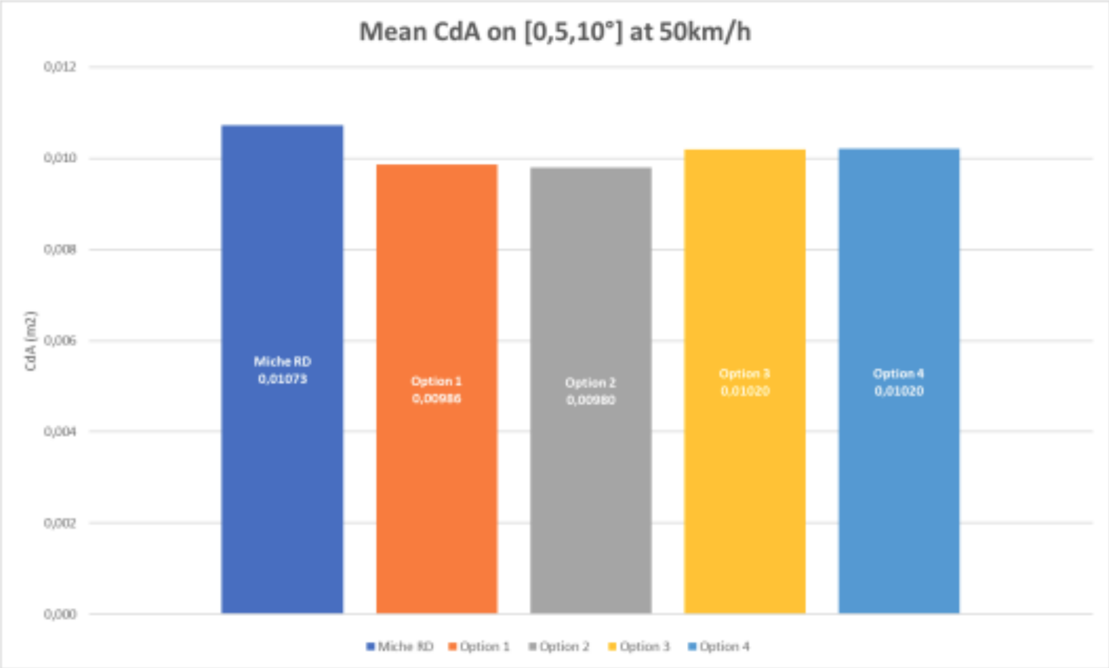
At this stage, the joint contribution of Miche and the Groupama–FDJ Cycling Team became pivotal, marking the start of a collaboration launched in early 2025. Through a continuous exchange of expertise, the Team's Tech Centre and engineers collaborated with Miche to perform CFD simulations on the complete wheel model, applying World Tour-level analytical procedures and tools adapted to the project's requirements.

The simulations were validated against data collected during the project's first phase at the GST-Windkanal wind tunnel, a benchmark facility in the cycling industry and a technical reference for numerous World Tour teams and athletes. This correlation between CFD and real-world measurements allowed us to check the consistency of the numerical models used by the Groupama – FDJ Cycling Team, identify any deviations, and further refine the design hypotheses.

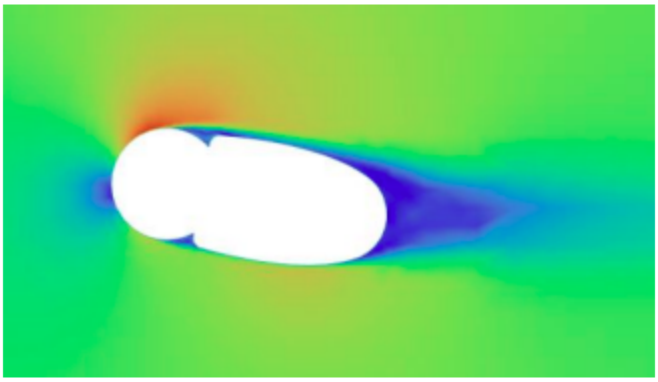
In parallel, joint analysis of the results made it possible to objectively select the two best performing rim profiles from the four developed in the previous phase. Sections revealing the best balance of aerodynamic efficiency, crosswind stability and flow continuity were carried forward into subsequent iterations, while less effective solutions were discarded.

This phase consolidated the project's technical foundation, ensuring alignment between simulations, physical testing and real-world feedback, and allowing subsequent development stages to proceed more efficiently and effectively.





Preliminary results from the CFD analysis indicate that all designs improved over the Kleos RD 50 rim, with option 2 having the lowest Cd·A, for which an improvement of 8.6% at 50 km/h is expected.



This result was made possible by improved integration between the tire and the rim, which, combined with the rim's NACA profile, ensures better airflow attachment even at high flow incidence angles, thereby leading to an overall reduction in drag.

MATERIALS

To reduce weight in every detail, the choice of materials used in the assembly of the final product was guided by the goal of maximising the specific performance of each individual wheel component.

The carbon fibre spokes were paired with metal parts — the spoke head and thread — made from titanium. Compared to the more common steel components, this solution delivers a weight saving of 0.5 g per spoke, amounting to 21 g per wheelset, which features a 21+21 spoke configuration for front and rear.

The rim is manufactured using a mixed carbon fibre layup composed of T700 / T800 / T1000 fibres, selected to achieve the optimal balance between mechanical strength, stiffness, lightness, and impact absorption capability. This advanced layup improves the rim's structural performance and enhances its reliability in real-world use.

FROM MODEL TO PROTOTYPE: WIND TUNNEL TESTING

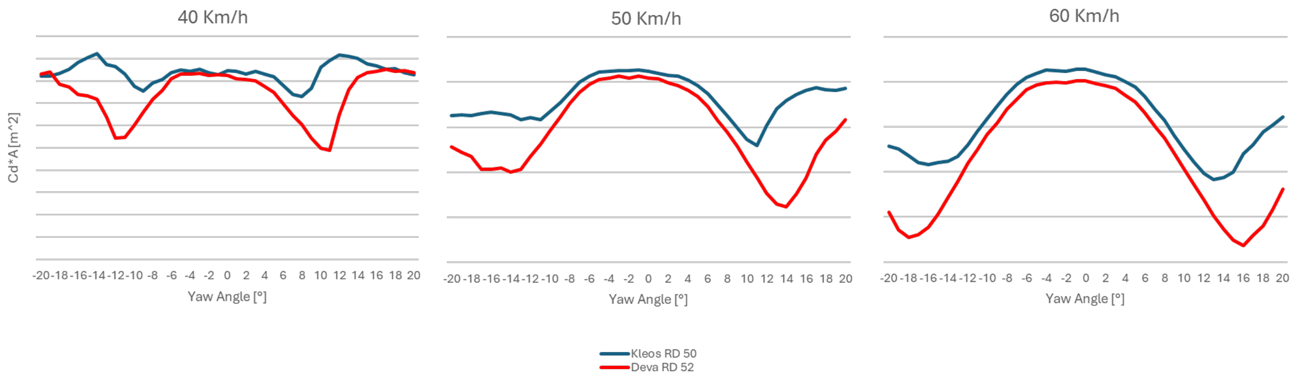
Based on the profiles identified as most promising through CFD testing, we produced a rim prototype CNC-machined from a single block of aluminium. This approach allowed us to develop an extremely accurate model, suitable for being pressurized, with the tyre at real-world inflation pressure (5 bar). The goal was to directly verify rim–tyre integration, comparing the resulting geometry with what had been defined during the design and modelling phases.

The two prototypes thus produced were then assembled with hubs and spokes to create a complete, fully functional wheelset for real-world wind tunnel testing. This phase was essential to jointly validate the work carried out, directly comparing the CFD simulation results developed collaboratively by Miche's engineers and the Tech Centre of the Groupama – FDJ Cycling Team with physical measurements taken under controlled conditions.

TESTING OF THE FINAL PROTOTYPE

We returned to the wind tunnel with the final carbon profile, complete with the production hub and spokes, to validate the behaviour of the finished product under conditions fully representative of real-world use. During this session, comparative tests were also carried out on the new Filante SLR ID2, allowing for a more accurate analysis of the aerodynamic behaviour of the wheel–bike system and also generating data relevant for professional racing applications.

Direct comparison with the setup previously used by the Groupama–FDJ Cycling Team enabled us to precisely quantify the performance gains achieved with the introduction of the new Deva RD wheelset. Measurements, repeated under varying crosswind conditions, showed that the selected profile delivers a consistent reduction in aerodynamic drag across all yaw angles from –20° to +20°, along with improved flow stability compared to previous solutions.



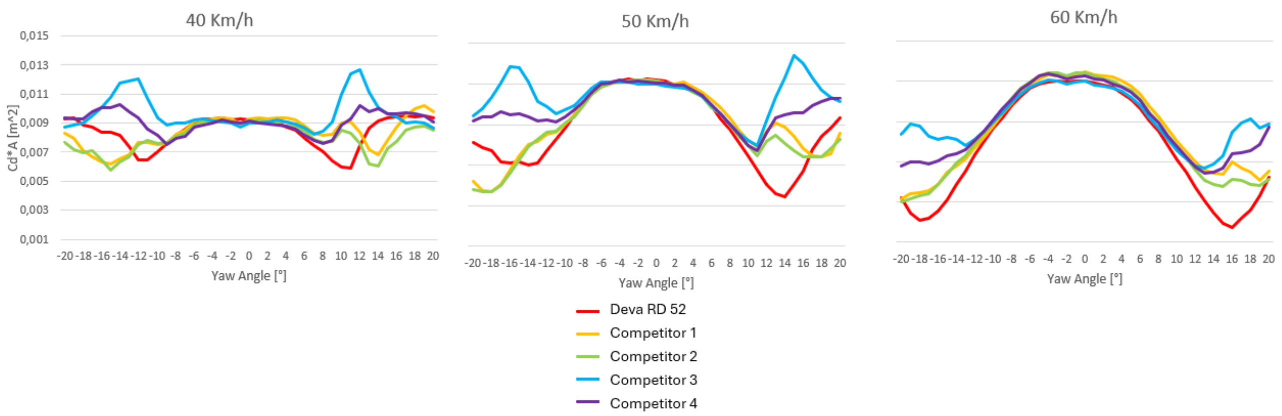
The percentage reductions in Cd·A compared to the Kleos RD 50, weighted across all measured wind incidence angles to give greater importance to smaller angles (more commonly encountered in real-world conditions) and less weight to larger ones, are as follows:

At 40 km/h: –8.6%
At 50 km/h: –9.3% (consistent with the 8.6% predicted by CFD analysis)
At 60 km/h: –10.9%

When converted into watts, considering only the front wheel and the tire tested individually, these values correspond to:

At 40 km/h: –0.7 W
At 50 km/h: –1.2 W
At 60 km/h: –2.2 W

When comparing these results with the main competitors in the WorldTour circuit, for rim depths comparable to 50 mm, it can be observed that across all tested speed ranges, the Deva RD 52 ranks among the highest-performing wheels.



This testing phase completed the validation process, providing a clear correlation between CFD simulation results, intermediate prototypes, and physical wind tunnel measurements. In this way, we were able to confirm the effectiveness of the final design and coherently conclude the development cycle.

Building on these results and on the proven development and validation process used for the 52 mm front rim, the same design approach was applied to the 52 mm rear rim and to the entire 62 mm rim series. For the 52 mm rear rim, the external profile width was reduced to 31 mm compared to the 33 mm of the front rim, with the primary goal of lowering the overall wheelset weight. This design choice does not compromise the wheels' overall aerodynamic performance when mounted on the bike, as the rear wheel has a significantly lower aerodynamic impact than the front wheel, due to the turbulence generated by the front of the bike and the rider.

The same approach was applied to the profiles of the 62 mm series, featuring a 31 mm width at the front and a 30 mm width at the rear.

STIFFNESS-TO-WEIGHT

One of the key objectives in the development of DEVA RD was to improve stiffness relative to weight, as well as dynamic responsiveness, using the excellent results already achieved with the Kleos RD as a benchmark. The goal was not simply to match those performance levels, but to surpass them in a way that is both measurable and clearly perceptible to the rider.

Along this development path, the adoption of carbon fibre spokes proved to be a decisive factor. Due to their superior mechanical properties — high elastic modulus, excellent tensile strength, and extremely low weight — they allowed us to increase the overall stiffness of the wheel without introducing any compromises in terms of weight or dynamic behaviour. On the contrary, the use of carbon fibre enabled a significant reduction in rotating mass, lowering the total wheelset weight from 1450 g to 1305 g.

This combination of increased stiffness and reduced structural mass resulted in a substantial improvement in the stiffness-to-weight ratio, a key parameter for achieving a more responsive, precise and high-performing wheel during accelerations and changes of pace. The result of these engineering choices redefines DEVA RD at a level of performance of absolute excellence.

LA FORMULA MICHE

DEVA RD represents the most advanced expression of the Miche Formula — a development method combining engineering, data analysis, and cycling expertise. The project was developed through a structured process comprising 4 preliminary designs, 2 NACA profiles tested on the 52 mm front wheel, 28 CFD simulations carried out in collaboration with the Tech Centre of the Groupama–FDJ Cycling Team, 24 hours of wind tunnel testing across 3 dedicated sessions, 2 different optimised spoke cross-sections, and 2 full-aluminium prototypes to verify rim–tyre integration under real-world conditions.

The result is an entirely new wheelset, consisting of 4 rims (52 mm and 62 mm, front and rear with dedicated widths), a 23 mm internal width, and 21 spokes (14+7) designed to optimise stiffness, aerodynamics, and ride quality.

It is precisely the combination of these figures, tests, measurements and technical decisions that determine what we call the Miche Formula: a rigorous development process that transforms data and experience into real-world performance — and which finds its highest expression in DEVA RD.