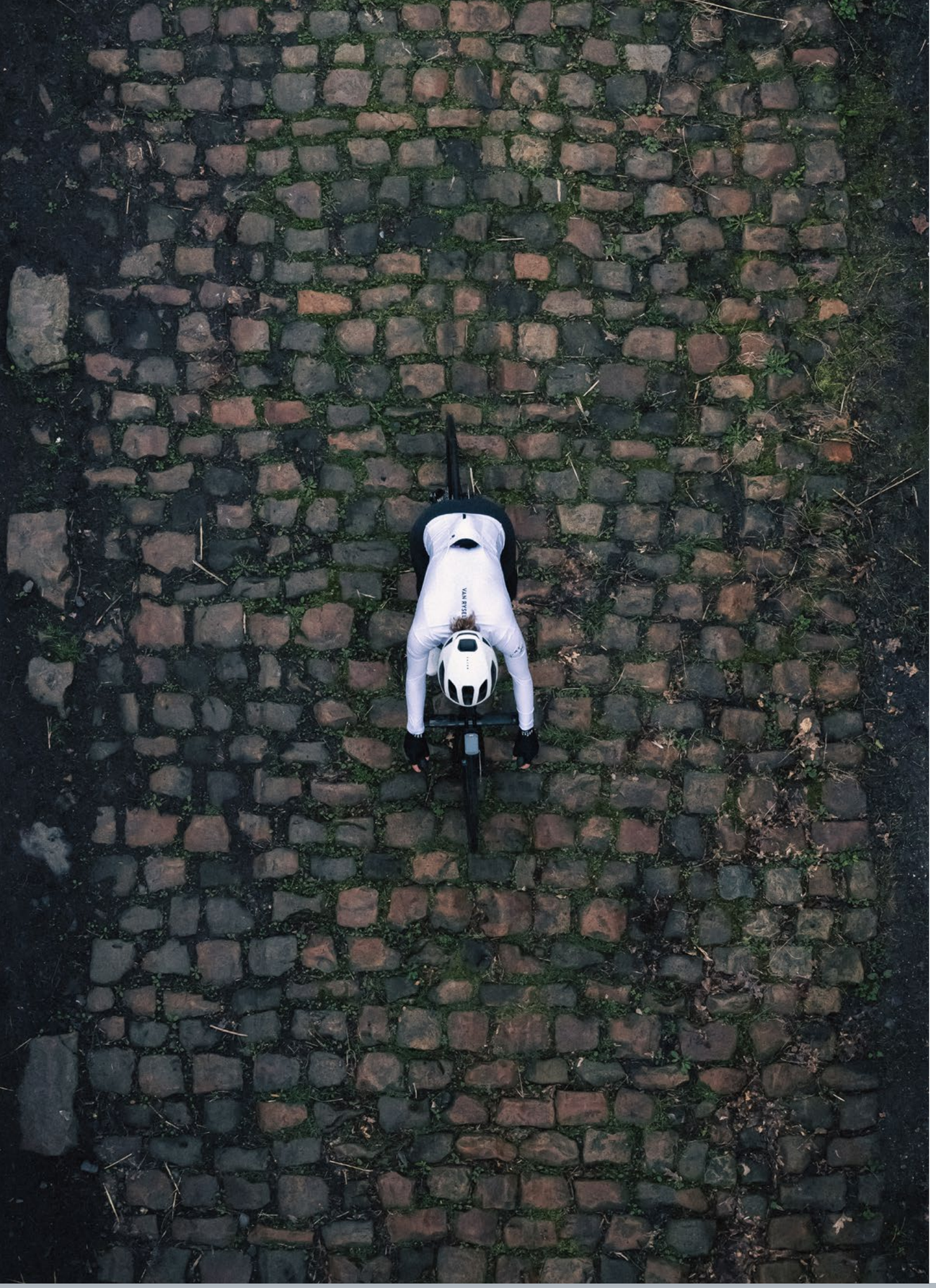
RCR - F

WHITE PAPER

VAN RYSEL



THE VAN RYSEL STORY BEGINS

in the capital of French Flanders, just a few kilometres from the iconic cobbled sectors that are synonymous with the world's most legendary one day race.

A land of cycling excellence, where every hill and cobbled sector tells stories of epic races and legendary cyclists.

Founded in 2019, V|R is designed for every cyclist in the world, whatever their level, goal or vision of cycling.

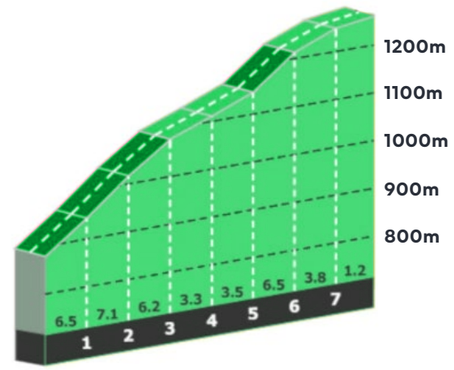
100% passionate, the VAN RYSEL team embodies and expresses a spirit of conquest and tenacity on a daily basis. Its approach is guided by high performance, capable of rising to the greatest challenges.

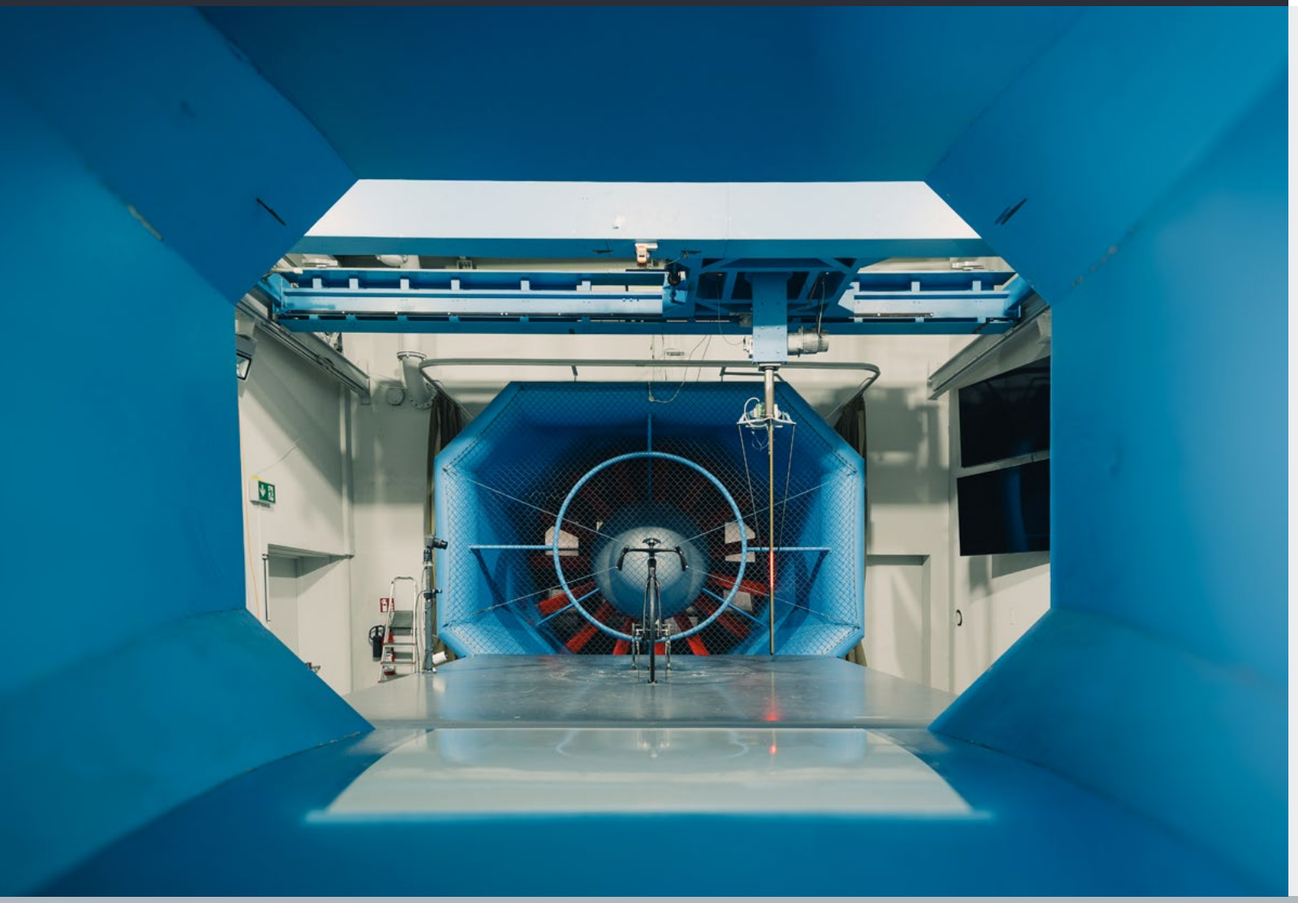
WHY RCR-F ?

The goal of VAN RYSEL's engineers is to enable cyclists to perform at the highest level, regardless of the race type. Whether it's a mountain stage or a Flemish classic, each race has its own unique characteristics.

To address this, the engineers simulated different race profiles based on several criteria: elevation gain, wind speed, race speed, the rider's role within the team (domestique or leader), rider weight, and power output.

Following this analysis, they concluded that excelling across all race types required the development of a bike that complements the RCR – one that pushes the limits of aerodynamics and stiffness for high speed, low elevation races: the RCR-F.





THE RCR-F'S IDEAL TERRAIN

By simulating key WorldTour race courses, engineers identified the ideal performance targets for this bike, making it the perfect complement to the RCR.

Here are the three race characteristics where the RCR-F outperforms the RCR:

- Less than 1,500 metres of elevation gain per 100 km.
- A minimum average speed of 35 km/h: the higher the speed, the greater the RCR-F's advantage.
- Average gradients of up to 5%.

Based on these characteristics, the RCR-F is ideal for several race types:

- One day classics with minimal elevation gain.
- Flat or rolling stages with a sprint finish.
- Medium mountain stages with steady climbs not exceeding 5%.

The RCR-F is also a powerful platform for relatively new triathletes looking for a fast, aerodynamic bike without stepping up to a full TT rig. An Aerobar Kit, specifically designed for the RCR-F combo, is available to add extensions and optimize positioning.

SUMMARY

1

AERODYNAMICS

The main development focus of the RCR-F is aerodynamics.
This key factor makes it even faster and helps save valuable watts.

STEP 1
SETTING THE OBJECTIVES

Our engineers retested the RCR in the wind tunnel, confirming its position among the best on the market. The RCR now serves as a benchmark for development. By analyzing the performance of the latest innovations in professional cycling, a clear objective was established: to design the fastest aero bike in the peloton, pushing aerodynamic performance even further than the RCR.

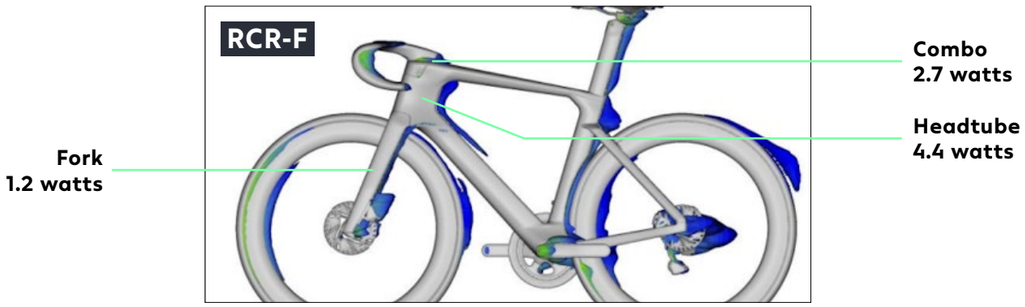
STEP 2
CFD

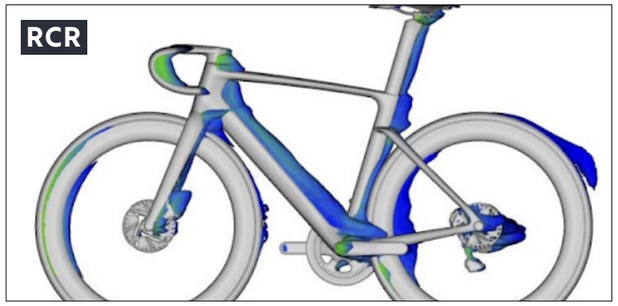
A study of Computational Fluid Dynamics (CFD) is a crucial phase in determining aero dynamic choices.

CFD is a digital simulation method that analyses, visualises, and optimises airflow around an object to reduce drag and improve aerodynamics. Dozens of concepts were simulated to define the structural choices for each part of the prototype.

Major aero dynamic gains in CFD compared to the RCR at 45 km/h (without bottles or bottle cages):

· 1.2 watts at the fork
· 4.4 watts at the head tube
· 1.7 watts at the down tube
· 2.7 watts at the cockpit



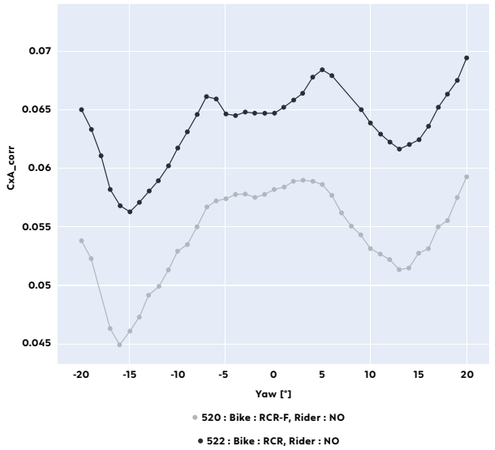


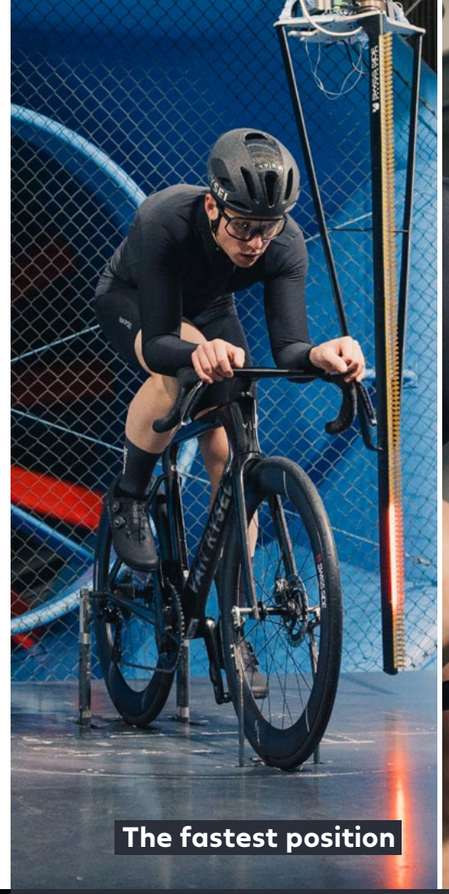
STEP 3
WIND TUNNEL TESTING

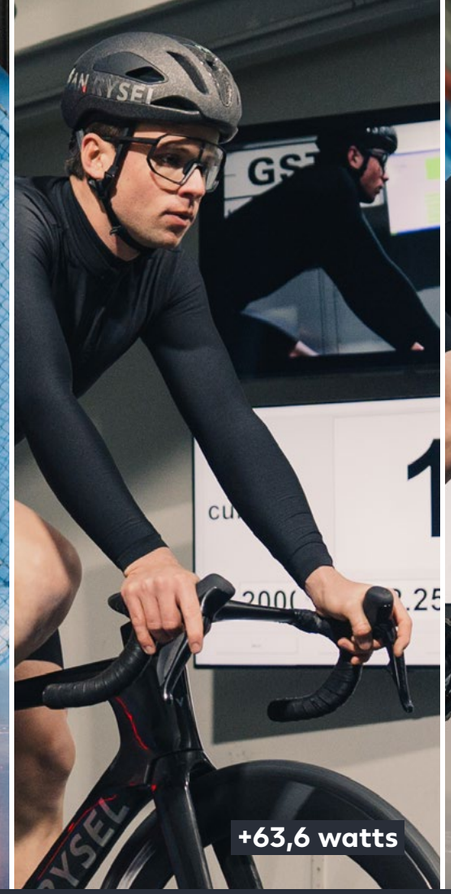
To confirm the watt savings observed in CFD, VAN RYSEL engineers tested the best iterations in the wind tunnel. Thanks to 3D printing, the exact frame shape can be reproduced. In total, more than six bike concepts were tested to select the most efficient one.

Aerodynamic gains after wind tunnel testing compared to the RCR:

- **13.6 watts** saved at 45 km/h (without bottles or bottle cages)
- **20.1 watts** saved at 55 km/h (with bottles and bottle cages, race conditions)







STEP 4
WIND TUNNEL TESTING WITH RIDERS

It was crucial to test the RCR-F with a rider on it. A rider's movements create turbulence in the airflow that cannot be otherwise reproduced or guessed at. These tests helped determine the aerodynamic impact of different positions, allowing athletes to optimise their posture for maximum aero gains.

Aerodynamic gains based on the fastest position, with elbows at 90°, hands on shifters, and pedaling:

- 63.6 watts saved compared to a position with hands on the shifters and arms extended.
- 27.1 watts saved compared to a position in the drops.

STEP 5
REAL WORLD TESTING

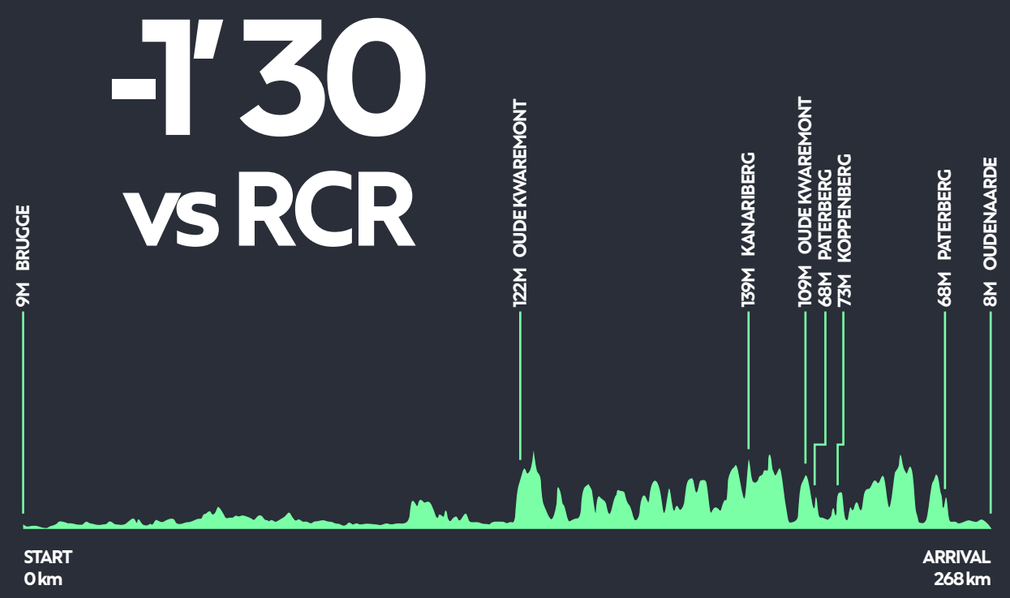
The primary goal of the bike is to perform in WorldTour races. With the help of Decathlon - AG2R - La Mondiale riders, VAN RYSEL engineers analysed the RCR-F's performance compared to the RCR on different terrains.

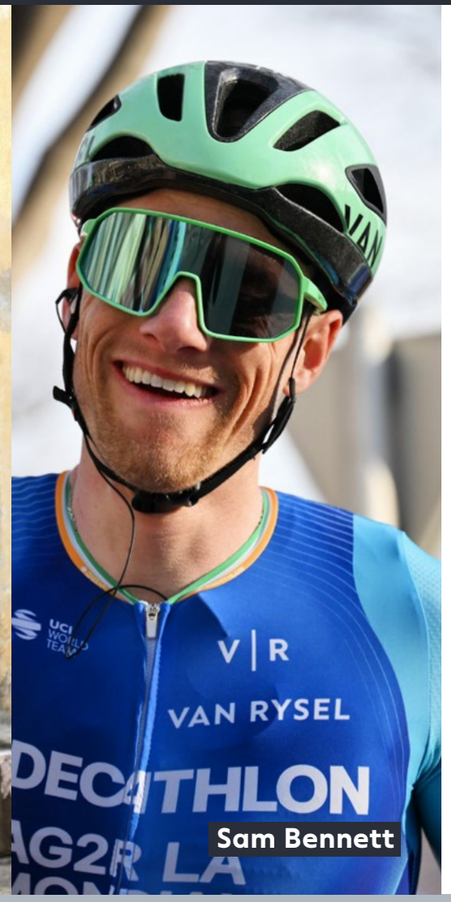
"IMPRESSIVE, 36-38 KM/H AT UNDER 200 WATTS!"

Pierre Gautherat

"I HAVEN'T EVEN REACHED ITS LIMITS YET. EVEN AT 68 KM/H IT HAD MORE TO GIVE."

Sam Bennett





STEP 6
FINAL VERSION

After a development process of more than two years, the final aerodynamic version of the RCR-F has been approved. A long but essential process to achieve such a high level of performance. The objective has been met.

On a standard 268 km course with 2,250 m of elevation gain and an average speed of 41.6 km/h, the RCR-F saves over 1 minute 30 seconds compared to the RCR, with the same power output.

SURROUNDING OURSELVES WITH THE BEST

Founded by former Formula 1 engineers, SWISS SIDE has established itself as the benchmark for aerodynamics in the cycling world. With expertise in CFD and wind tunnel testing, they apply cutting edge technologies from motorsports to optimise every watt spent on the bike.

VAN RYSEL collaborated with SWISS SIDE engineers to create the RCR-F, the most aerodynamic bike ever to come out of their wind tunnel.

2

THE COCKPIT: THE SHOWPIECE

The cockpit is a central element for several reasons. VAN RYSEL engineers focused particularly on developing a cockpit that meets the criteria of aerodynamics and ergonomics, all in the pursuit of performance, and in collaboration with Deda.

AN AERODYNAMIC GEM

In aerodynamics, the most crucial areas to optimise are the bike's front sections. The cockpit is a central component that requires specific development to meet the overall demands of the RCR-F.

VAN RYSEL engineers designed more than 10 different combinations, using CFD simulations and wind tunnel tests to arrive at the final version. Thanks to its curved shape, the RCR-F's cockpit saves up to 2.7 watts compared to the RCR's (wind tunnel test at 45 km/h), offering significantly improved aerodynamic performance.

2.7 WATTS SAVED

ERGODROPS

Why a round shape?

That's the question the RCR-F design team asked themselves. Since the launch of the RCR and a new design approach, we've been committed to offering athletes the best sensory experience with their bikes.

For the RCR, we focused on the position most adopted by climbers (hands on the top of the bars). On the RCR-F, the focus was placed on riding with hands in the drops of the handlebars.

We believe that, on a purely aero bike, two positions should be prioritised. The grip of the drops caught our attention in particular.

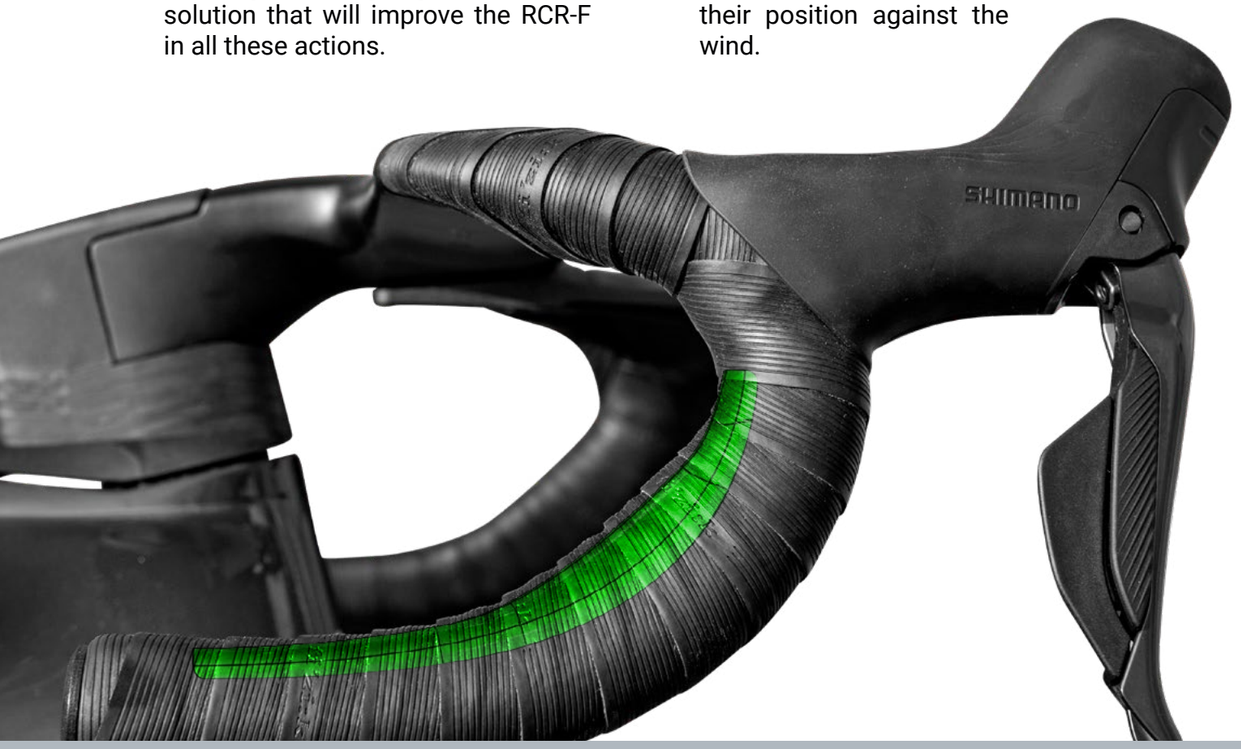
Turning, sprinting, accelerating, braking, steering, positioning: these are all actions we perform with our hands in the drops. We took the challenge of designing an innovative solution that will improve the RCR-F in all these actions.

During sprints, sprinters become one with their bike. At high speed, it's crucial to be able to grasp the drops perfectly to be as fast as possible while maintaining total control of the bike.

The engineers therefore developed Ergodrops, an insert shaped to perfectly fit the hollow of the hand. This design increases the contact surface between the hand and the inserts, making bike handling easier and allowing the cyclist to focus their maximum effort on their legs.

Beyond maximising grip, the Ergodrops allow riders to no longer worry about the position of their hands; they will always be in the right place, ensuring the ideal position to turn, brake, accelerate, and sprint.

To top it all off, the Ergodrops orient the wrists to minimise the cyclist's frontal surface and perfect their position against the wind.



ECCELLENZA ITALIANA

Founded in 2013 by a group of cycling enthusiasts, Deda quickly distinguished itself with its unique expertise, combining high end craftsmanship and cutting edge technologies. For VAN RYSEL, it was clear that Deda would be entrusted with the manufacturing of the RCR-F cockpit, ensuring exceptional quality at every production stage. Thanks to their expertise and meticulous manufacturing processes, the RCR-F's cockpit offers the perfect balance of lightness and comfort, ensuring optimal performance without compromise.

Deda ELEMENTI

3

MAN MACHINE

Creating the most aerodynamic bike isn’t just about optimising the frame; it also involves precise work on the cyclist’s posture. Over 75% of aerodynamic drag comes from the rider’s position on the bike. That’s why the engineers designed the RCR-F to naturally promote an optimal posture, combining aerodynamics and comfort during effort.

WHAT IS THE IDEAL POSITION?

The engineers at VAN RYSEL studied various types of races to determine the ideal posture for optimising performance.

When a rider is in the front positions of the peloton at a constant speed of 45 km/h, an optimised aerodynamic position can save up to 70 watts during a steady effort.

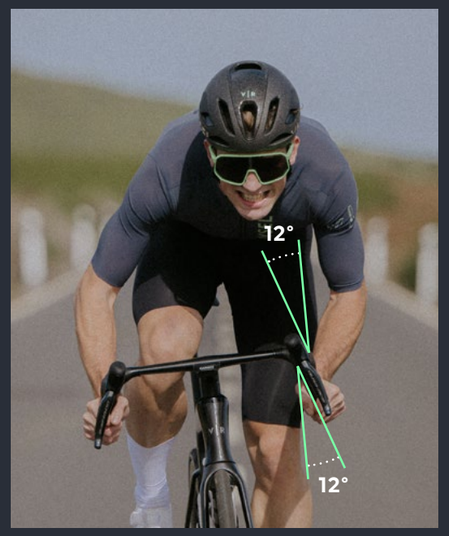
The recommended posture involves placing the hands on the brake levers, with the forearms resting on the top of the cockpit. The elbow angle should be about 90 degrees, while the shoulders are slightly drawn inward to reduce drag and maximise aerodynamics.

COMPONENTS SERVING THE POSITION

Thanks to a 12 degree flare – compared to 7 degrees on the RCR – the cockpit on the RCR-F offers a more pronounced drop angle, optimising both sprint stability and aerodynamics in the low position.

This design naturally directs the gear controls inward, making it easier to tilt the wrists and adopt an efficient and comfortable position.

An ergonomic improvement that, of course, complies with UCI regulations.



TAILORED FOR EVERY SIZE

In collaboration with biomechanists, VAN RYSEL engineers have adjusted each size of the RCR-F frame with an optimised cockpit, ensuring an ideal aerodynamic position.

Length	70	80	90	100	110	120
Width	400	400	420	420	440	440
Frame size	XXS	XS	S	M	L	XL

4

AERODYNAMICS WITHOUT COMPROMISING WEIGHT

The performance of a bike relies on a balance between weight, aerodynamics, and efficiency. VAN RYSEL engineers have managed to minimise weight while maintaining optimal aerodynamic performance.

EVERY GRAM COUNTS

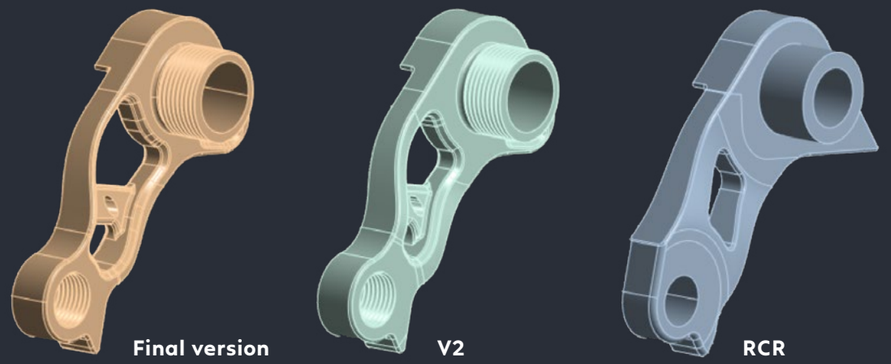
All components, with aerodynamics as the priority, have been lightened to the maximum. Each component has been tested in our laboratories to ensure reliability and durability.

For example, the seat post clamp has been lightened by 20 grams without compromising its rigidity.

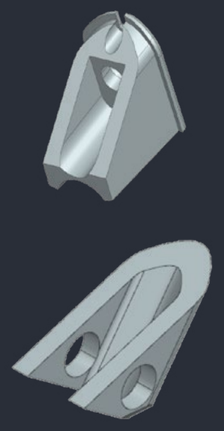
· The rear derailleur hanger has also been optimised, reducing the weight by 9 grams.

· The choice of titanium bolts for certain frame components saved an additional 8 grams.

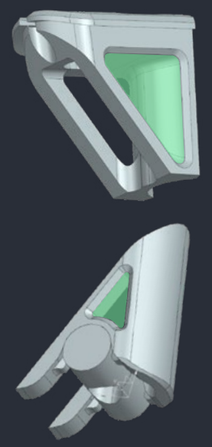
In total, these optimisations have resulted in a weight reduction of 37 grams, or a 3.5% reduction in the total frame weight (size M).



Final version V2 RCR



RCR seat post clamp



RCR-F seat post clamp

CARBON FIBRE SELECTION

To ensure a lightweight frame while maintaining optimal rigidity, the RCR-F is built using a blend of different carbon fibres.

The most essential are Super High Mod Carbon and High Mod Carbon, which reduce the amount of material needed, making the frame lighter while preserving the stiffness of thicker fibres.

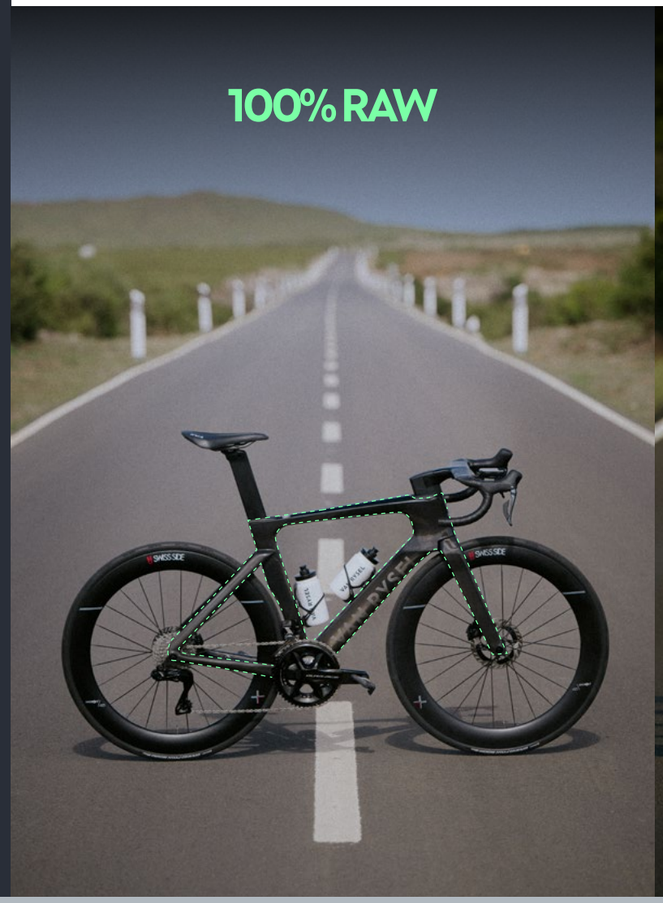
Our most premium fibre, Super High Mod Carbon in 60T, plays a key role in achieving an exceptionally low weight without compromising the bike's overall rigidity.

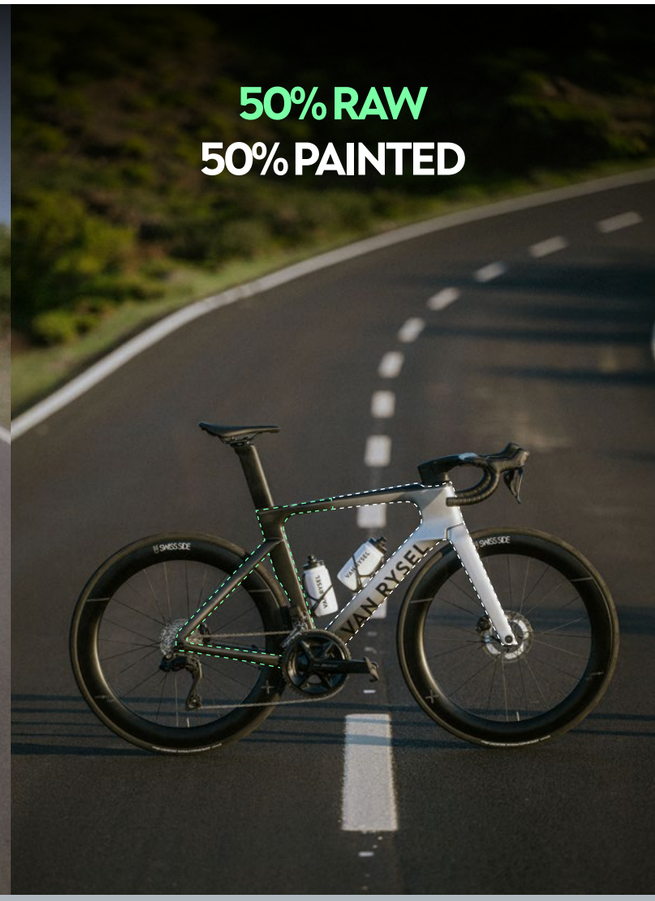
HIGH PERFORMANCE AESTHETIC

A bike's design goes beyond aesthetics—it embodies an identity. At VAN RYSEL, performance is our signature style.

To maintain lightness without compromising visual impact, paint is applied only to the front of the frame, allowing the raw carbon to take prominence at the rear. This design choice highlights the bike's technical sophistication while optimising weight.

For an even lighter setup, a fully raw carbon version takes this philosophy further, shaving off 30 to 60 grams depending on size and paint color.





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STIFFNESS

The RCR-F is designed for fast paced races with frequent accelerations, often culminating in a sprint finish. Maximum stiffness is essential to ensure optimal power transfer during intense efforts, allowing every watt to be fully exploited.

WHAT IS A LAYUP?

A carbon frame's layup refers to the way the different carbon fibre layers are stacked to shape the frame. This process is critical, as it directly impacts key performance factors:

· **Stiffness:** The frame's ability to resist deformation under load, ensuring optimal power transfer.

· **Strength:** Resistance to forces and impacts, guaranteeing durability and rider safety.

· **Weight:** A lighter frame enhances acceleration and climbing performance at equal rider power output.

By strategically orienting the fibres, engineers can reinforce specific areas of the frame for maximum stiffness and strength. Additionally, the choice of carbon types plays a crucial role, as each material offers unique properties that influence overall performance.

FRAME FIBRES

Each area of the frame utilises different carbon fibres depending on specific performance needs. Some sections prioritise lightweight construction at the expense of stiffness, while others focus on maximising rigidity.

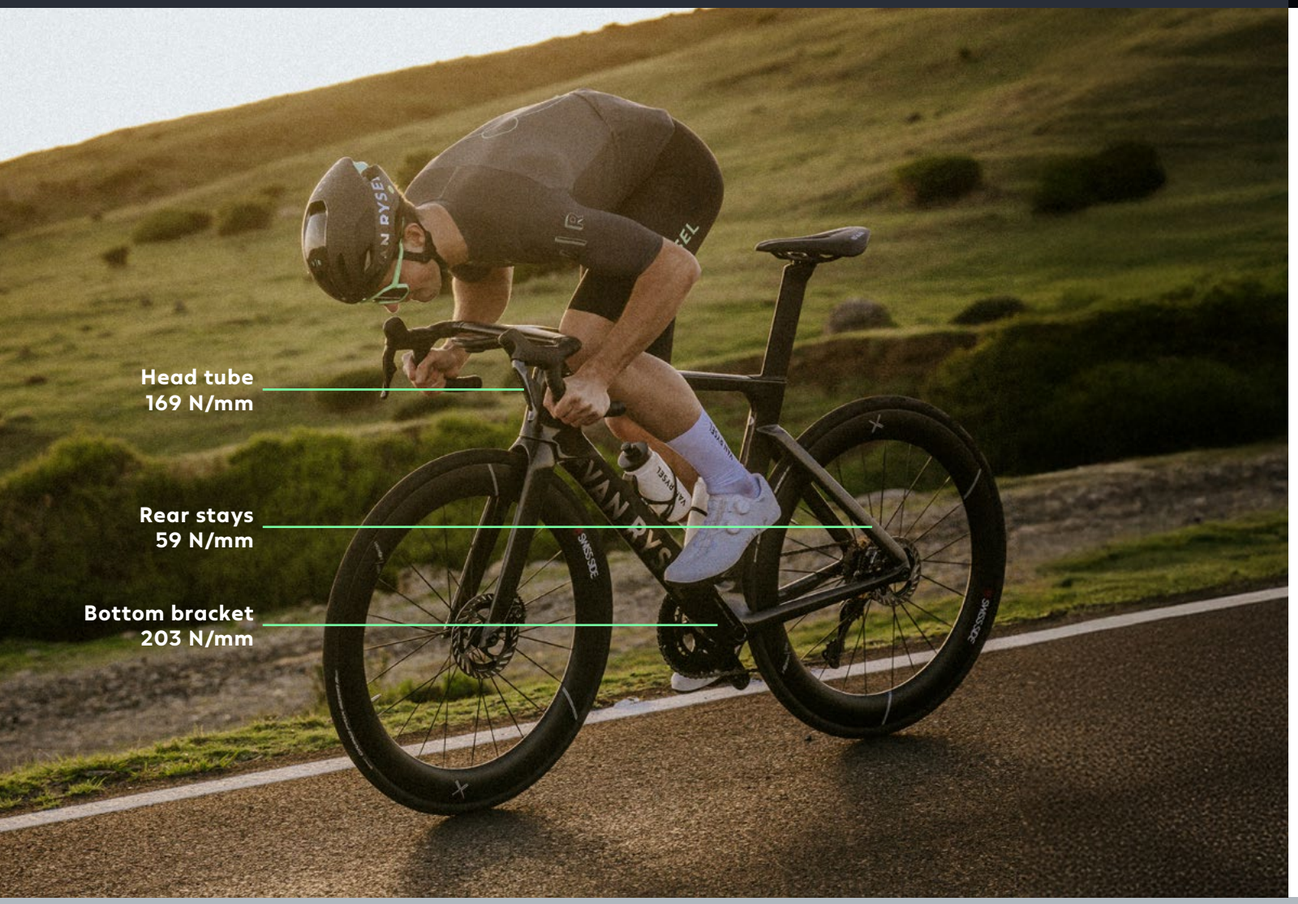
To achieve the highest level of stiffness, two types of carbon fibre were selected: 40T and 60T. The 60T fibre provides exceptional stiffness and must be used with precision. Strategic 60T patches have been placed in key areas to ensure maximum power transfer, eliminating any loss of energy through the frame.

READY FOR THE SPRINT

The stiffness values of the RCR-F frame, expressed in Newtons per millimetre, reflect a technical approach to performance:

· **Head tube:** 169 N/mm
· **Bottom bracket:** 203 N/mm
· **Rear stays:** 59 N/mm

Compared to the RCR, the RCR-F is 7% stiffer in the front section of the frame. Feedback from professionals on the Decathlon - AG2R - La Mondiale team helped VAN RYSEL engineers pinpoint this area as the most stressed during sprints, allowing for the gain of those crucial extra watts.



CARBON FRAME CRAFTSMANSHIP

The process of manufacturing a carbon frame involves several key steps. First, carbon fibre sheets are cut to the required dimensions. These layers are then carefully laid in a mould according to a predefined pattern. Once positioned, epoxy resin is applied to bind the fibres together. Finally, the mould undergoes a curing process to eliminate air and ensure maximum strength.

A total of **517** pieces are assembled by hand in the mould. VAN RYSEL demands this level of craftsmanship to guarantee the highest quality for its bikes.

THE RCR-F, ALREADY VICTORIOUS IN RACES

VAN RYSEL