

*Lightweight*

NEXT-GENERATION WHEEL

MEILENSTEIN <sup>ART</sup> WHITE PAPER

*Lightweight*

*Lightweight*

THE EVOLUTION  
OF PERFORMANCE



*Lightweight*

INTRODUCTION

# A NEW ERA OF ENGINEERING

After nearly four years of focused development, Lightweight introduces a new era in carbon wheel engineering.

Every part of the process has been rethought, rebuilt, and refined. At the heart of the new wheel is a completely re-engineered rim architecture, using Alpha Rib Technology, our patented internal rib structure. This breakthrough unlocks a wider, more aerodynamic profile while increasing stiffness and reducing weight. A combination once out of reach, now made a reality.

The result is Lightweight's most advanced wheelset to date, a perfect intersection of aerodynamics, construction, and control. It is built for riders who expect the highest level of performance.





TECHNICAL DESIGN

# PERFORMANCE ENGINEERING PRECISION DESIGN

The visual identity of this wheel is defined by its unique technical design, shaped by aerodynamic drag reduction principles and a radically reimagined hub architecture.

The Penta-Fly hub system is engineered for maximum performance using:

- Spokes bonded directly to a precision-machined aluminum hub, eliminating the need for traditional spoke interfaces and creating a clean, uninterrupted structural connection.
- Oversized flanges that boost lateral and torsional stiffness, delivering optimal power transfer and precise control, even through intense acceleration or braking.
- A minimized central hub diameter that reduces aerodynamic drag and improves overall efficiency.
- An exposed spoke-to-hub interface that highlights the wheel's technical aesthetic, with no covers or visual distractions.

The rim's raw UD carbon finish is the result of an advanced manufacturing method that eliminates traditional woven prepregs. What remains is the pure, unfiltered structure of the material, a clear expression of the wheel's high-performance purpose.

This is not just a wheel. It is a reflection of everything Lightweight stands for in engineering.



TECHNICAL DESIGN

# DRS – DRAG REDUCTION SHAPE AERODYNAMICS REDEFINED

The new MEILENSTEIN <sup>ART</sup> road wheelset features a 23 mm inner width, optimized for wider tires and various wind conditions. Its aerodynamic shape cuts through headwinds and maintains stability in crosswinds for a ride that’s both fast and controlled.

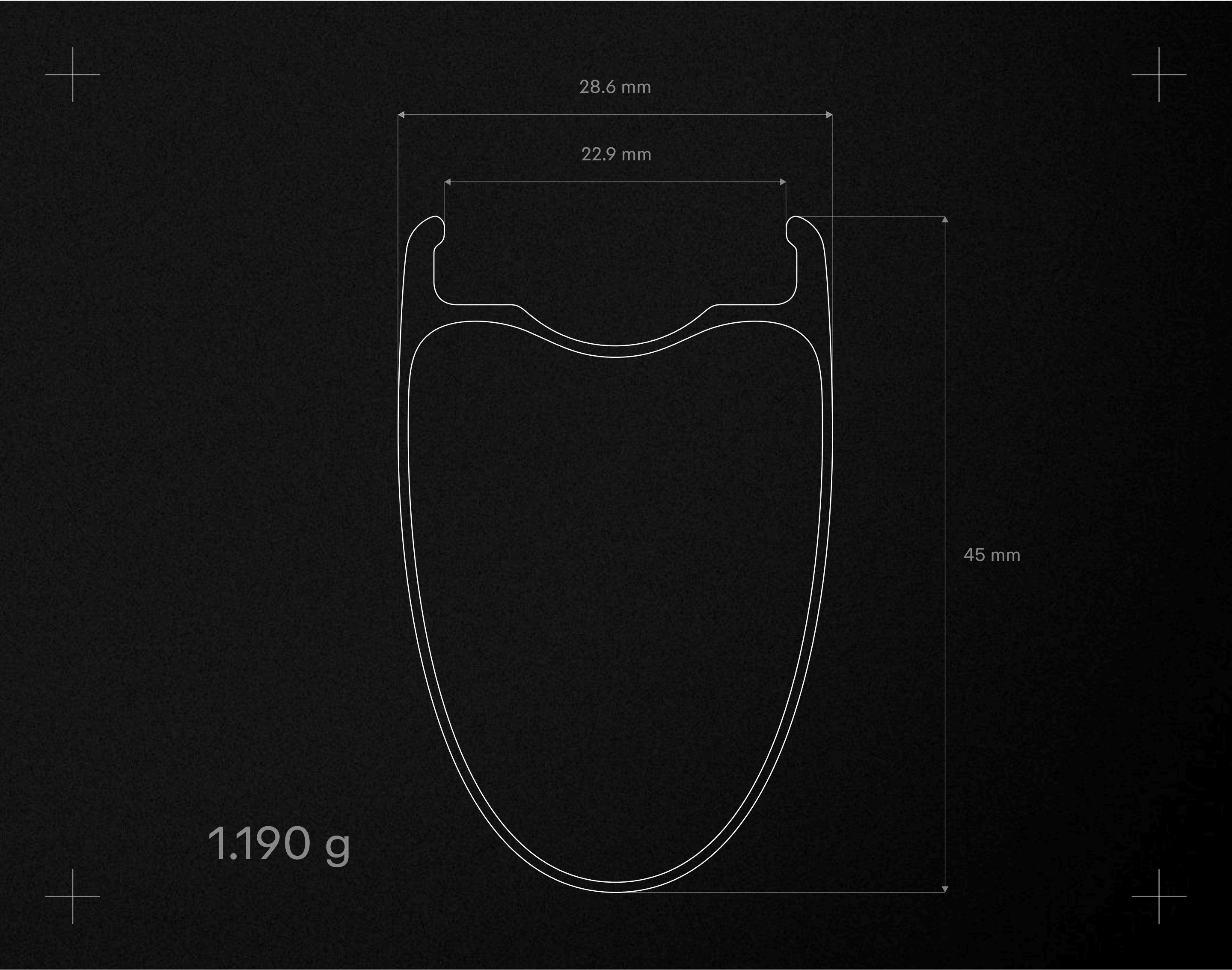
TECHNICAL DESIGN

# WIDER IS BETTER

## MASTERING MODERN ROAD CYCLING

In today’s world of high-performance road cycling, “Wider is Better” is more than just a trend. It’s a rethinking of what speed should feel like. As riders demand both comfort and aerodynamic efficiency, the challenge is no longer choosing between them but mastering both.

The new MEILENSTEIN <sup>ART</sup> rim was created to meet that challenge head-on. Specifically engineered for tires 28 mm and wider, shaped with a 45 mm rim depth, and weighing 1.190 g, it brings together the best of both worlds with reduced drag and remarkable control. From chasing KOMs to fast-moving pelotons, it is built to respond, built to inspire, and built to perform.



TECHNOLOGY

# REVOLUTIONARY RIM TECHNOLOGY

## ENGINEERED FOR THE FUTURE

This wheel introduces an entirely new construction method that marks a paradigm shift in composite rim design. Multiple patents are pending.

Abandoning the traditional foam-core structure, the rim features a predominantly hollow architecture reinforced by Alpha Rib Technology (ART). This achieves superior stiffness and lower weight without compromising structural integrity.

A key element of this approach is a removable core material used during manufacturing. Unlike conventional permanent cores, it is extracted and reused after curing, promoting sustainable production and improving process efficiency.

Production combines automation and handcraft, placing material only where it is needed. The result is precision, consistency, and performance you can trust.

More than innovation, this represents a true revolution in high-performance wheel engineering.





TECHNOLOGY

# ART – ALPHA RIB TECHNOLOGY

## STRUCTURAL INNOVATION FROM THE INSIDE OUT

The MEILENSTEIN <sup>ART</sup> rim is built on Alpha Rib Technology (ART), a breakthrough that redefines how internal reinforcement can enhance performance.

Instead of a traditional hollow structure, ART introduces a network of integrated ribs inside the rim cavity. These structural elements dramatically increase lateral stiffness by reinforcing the cross-section against side loads, essential for precision handling and efficient power transfer.

ART also transforms the spoke interface. Carbon fiber spokes are directly bonded into the internal rib structure, eliminating bends or directional changes and preserving the natural load path of the fibers. This maximizes tensile strength, reduces material fatigue, and creates a more direct connection between rider and road.

What emerges is a rim that is lighter, stiffer, and more structurally efficient. It is a defining step in composite wheel technology.

TECHNOLOGY

# PRECISION IN EVERY FIBER

## THE MANUFACTURING PROCESS

Each wheel begins with a rigorously engineered process, using approximately 500 meters of carbon fiber and around 70 precision-cut plies, including proprietary fabrics developed exclusively for Lightweight.

Every fiber is selected with purpose. Ultra-high modulus carbon and other fiber types are strategically positioned to maximize performance exactly where it's needed. This tailored layup achieves the ideal balance of stiffness, strength, and weight throughout the wheel. The spokes are permanently bonded to both the rim and hub using high-performance structural adhesives. This delivers long-term stability, eliminates the need for re-truing, and prevents any loss of stiffness over time.

Built with precision and designed to endure, each wheel reflects Lightweight's pursuit of uncompromising performance and reliability, ride after ride, year after year.



PERFORMANCE

# AERO-MASS INDEX

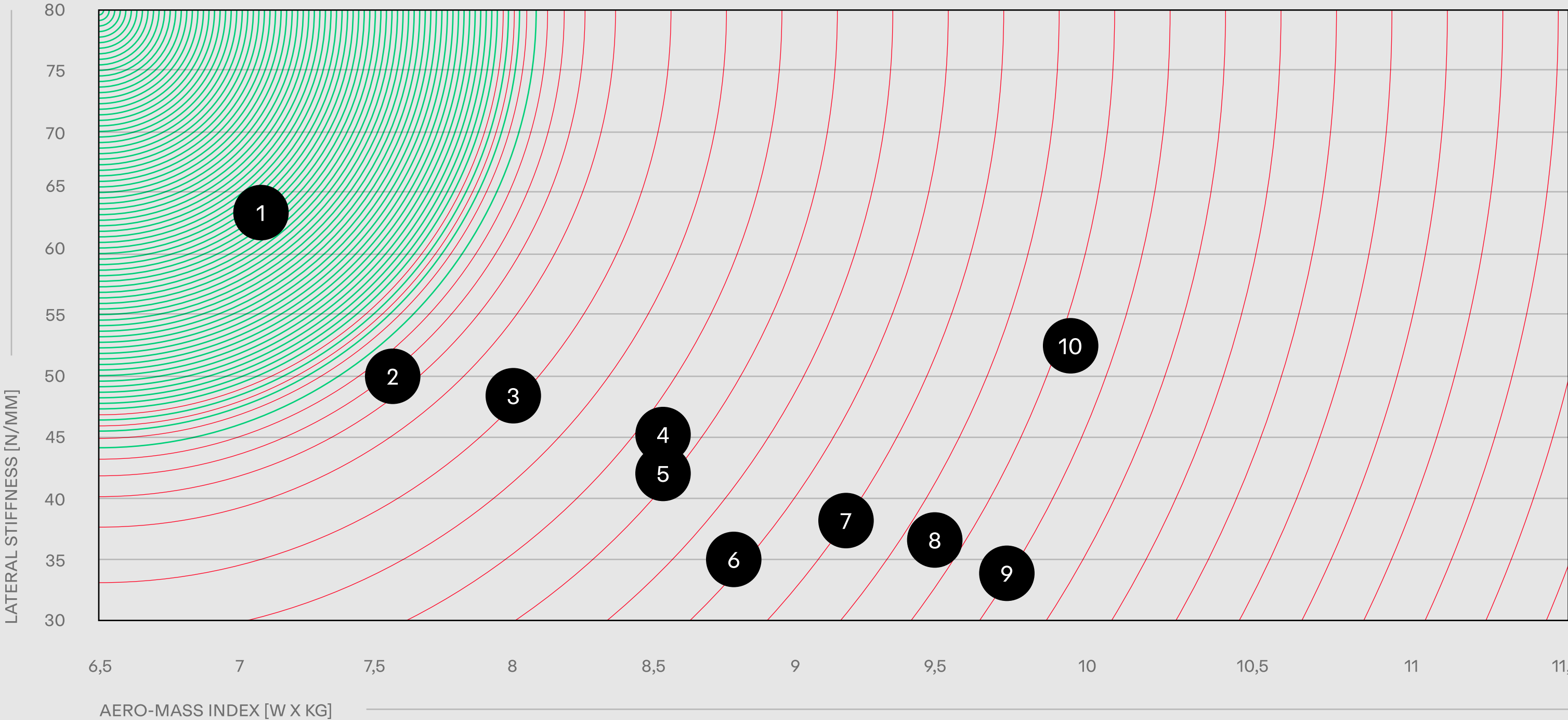
MEILENSTEIN <sup>ART</sup> was developed with a singular ambition to perform across every scenario, from steep climbs and flat sprints to fast descents and sharp turns. The goal was simple: to deliver the best possible balance of aerodynamics, low weight, and stiffness.

With a 23 mm internal rim width, the wheelset is optimized for wider tires, improving grip, comfort, and control, even in sharp turns and crosswinds. To measure this performance in real terms, Lightweight created the Aero-Mass Index, a new metric that evaluates wheels based on aerodynamic drag and weight combined. The lower the index, the better the balance between speed and overall performance.

MEILENSTEIN <sup>ART</sup> achieves over 20% greater aerodynamic efficiency than its predecessor. More than 70 prototypes were built, tested, and refined. Each version was analyzed for stiffness, weight, and spoke tension under real riding loads, ensuring a final design that responds with speed, stability, and control.

The outcome is a wheelset that feels fast and focused in every situation, whether accelerating, cornering, braking, or pushing into headwinds.

THE AERO-MASS INDEX IS CALCULATED AS:  
WATT × KG = DRAG AT 45 KM/H × WEIGHT



- 1 LIGHTWEIGHT MEILENSTEIN <sup>ART</sup>
- 2 PARTINGTON MK2 R39
- 3 MAVIC COSMIC ULTIMATE
- 4 RESERVE 52
- 5 DT SWISS ARC 1100 DB50
- 6 DT SWISS CRC 1400 SPLINE 45
- 7 ZIPP 454 NSW
- 8 ZIPP 303 FIRECREST
- 9 NEWMEN ADVANCED SL R.50
- 10 CADEX



TESTING

# TESTED BEYOND STANDARDS

## PROVEN RELIABILITY

Like every Lightweight wheel, this model has undergone a rigorous testing program that goes beyond the standards set by ISO 4210.

To confirm long-term durability and rider safety, we simulated a wide range of real-world scenarios, measuring stresses across the rim, spokes, and hub. These insights shaped custom test protocols that mirror the demands of actual riding, from intense sprints and braking to prolonged load cycles.

The wheel was also subjected to corrosion and climate testing to simulate years of environmental exposure and assess performance over time.

The result is a wheel built for exceptional safety, reliability, and longevity, even after years of demanding use.

TESTING

# PROVEN BY PROFESSIONALS REAL-WORLD TESTING

Beyond extensive lab trials, this wheel was ridden by dedicated amateur and professional cyclists in real-world conditions. The feedback was unanimous.

Even seasoned riders with deep experience and high expectations described a ride unlike anything they had known. On high-speed descents, sharp corners, and in unpredictable winds, the wheel delivered exceptional control, quick responsiveness, and power transfer that left a lasting impression.

*“EVEN ON LONG DESCENTS AND IN UNPREDICTABLE CROSSWINDS, I FELT COMPLETELY IN CONTROL. CORNERING FELT LIKE RIDING ON HIGH-SPEED TRACKS. IT’S THE KIND OF CONFIDENCE YOU CAN’T PUT A PRICE ON.”*

*“I’VE TESTED COUNTLESS HIGH-END WHEELS, BUT THIS ONE WAS ON A DIFFERENT LEVEL. THE CONTROL IN CORNERS AND CROSSWINDS WAS UNREAL . IT FELT LIKE THE BIKE WAS READING MY MIND.”*

# UNIQUE SELLING POINTS

A NEW STANDARD IN RIM ARCHITECTURE

## ART ALPHA RIB TECHNOLOGY

Alpha Rib Technology is Lightweight’s latest innovation, a new internal architecture built around a hollow rim reinforced with carbon ribs. Introduced in the MEILENSTEIN <sup>ART</sup>, it is engineered to increase lateral stiffness without adding weight, improving power transfer while supporting a wider, more aerodynamic rim profile.

As forces build through corners or under load, Alpha Rib Technology channels them through the rim directly to the spoke interface. This stabilizes the cross-section, prevents deformation, and maintains stiffness where it’s needed most.

Each carbon spoke is bonded in a straight, unbent line into the ribs, preserving the full strength of the fibers while minimizing material use. The result is a lighter, stronger build that delivers a more responsive and controlled ride.

INTEGRATED DESIGN FOR MAXIMUM EFFICIENCY

## R2R DESIGN RIM-TO-RIM DESIGN

R2R, or Rim to Rim, is Lightweight’s proprietary spoke design featured in the MEILENSTEIN <sup>ART</sup> wheelset. Each carbon spoke runs in a continuous line from one side of the rim, through the hub, to the other side without bends, breaks, or mechanical connectors.

This uninterrupted structure removes the need for weight-adding components like nipples and threads, which can loosen or wear over time. By keeping the carbon fibers straight and under consistent tension, the spokes retain full tensile strength, maximizing stiffness, durability, and load-bearing performance.

Each spoke is permanently bonded to the hub using high-performance adhesive. There is no material fatigue and loss of spoke tension, just consistent performance with every ride.

OPTIMIZED FOR SPEED AND CONTROL

## DRS DRAG REDUCTION SHAPE

At the core of our aerodynamic concept is Drag Reduction Shape, a design philosophy focused on achieving the ideal balance between low drag and crosswind stability.

Using advanced Computational Fluid Dynamics and a detailed Design of Experiments process, we evaluated a wide range of rim profiles. Parameters such as width, curvature, and radius transitions were precisely tuned to find the most efficient geometry.

Final profiles were validated in wind tunnel testing with various tire types and wind speeds to ensure consistent performance. The spoke profiles were also refined to minimize turbulence across the entire system.

The result is a wheel that delivers aerodynamic efficiency with confident handling, even in the most demanding conditions.

# UNIQUE SELLING POINTS

HIGH PERFORMANCE, LOW WASTE

## RCT RECYCLABLE CORE TECHNOLOGY

To create the hollow rim and its integrated carbon rib structure, we use a removable core technology. A specially designed core is wrapped in carbon fibers and infused with resin, forming the precise internal geometry needed for maximum stiffness and strength.

Once the resin has fully cured, the core is carefully extracted, leaving behind a lightweight hollow structure reinforced by internal ribs. The core material is then recycled and reused in future production, minimizing waste while maintaining technical precision.

This process makes it possible to build structurally complex rims with absolute consistency, combining performance engineering with a commitment to sustainable manufacturing.

ENGINEERED FOR PERFORMANCE

## LCC LIGHTWEIGHT CUSTOM COMPOSITE

Lightweight Custom Composite is a proprietary material technology made from tailor-made composites engineered for minimal weight and maximum performance. By fine-tuning the composition, it achieves an optimal balance of strength, responsiveness, and durability.

The result is a high-performance material that enhances efficiency, improves ride dynamics, and meets the highest demands of cycling.

GERMAN CRAFT, GLOBAL STANDARD

## PIONEER WORK MADE IN GERMANY

Handcrafted Precision reflects the care and craftsmanship behind each Lightweight wheel. Key processes are performed by hand to ensure exceptional consistency and attention to detail. This hands-on approach upholds the highest standards of quality and delivers performance you can trust.

Made in Germany Innovation represents the foundation of Lightweight's engineering excellence. Developed and produced in Friedrichshafen, every wheel draws on decades of expertise, combining advanced technology with rigorous standards to meet the demands of serious cyclists around the world.

Lightweight



CONCLUSION

# THE ALL NEW MEILENSTEIN <sup>ART</sup>

## A NEW BENCHMARK IN PERFORMANCE ENGINEERING

The MEILENSTEIN <sup>ART</sup> wheelset represents a new standard of innovation, precision, and performance in modern cycling. Developed over nearly four years, it reflects a complete re-engineering, from materials and manufacturing to aerodynamics and structural design.

At its core is Alpha Rib Technology (ART), a system of internal ribs that boosts lateral stiffness while maintaining a lightweight, hollow rim. Paired with direct spoke bonding and a patented system of internal ribs, it delivers unmatched power transfer, responsiveness, and control.

Aerodynamics were refined using CFD simulations, DoE, and wind tunnel testing. The rim profile reduces drag, while remaining stable in crosswinds. Guided by the Aero-Mass Index, the design strikes a rare balance of speed, stiffness, and weight, providing measurable gains across all riding scenarios.

Each wheel uses over 500 meters of carbon fiber and 70 precision-cut plies. A hybrid of automated and manual processes ensures material is placed only where needed, improving consistency and reducing waste. Tested beyond industry standards, including climate, corrosion, and ride simulations, MEILENSTEIN <sup>ART</sup> has earned praise from both professionals and amateurs for its agility, comfort, and control.

Every detail is engineered for speed, confidence, and reliability. MEILENSTEIN <sup>ART</sup> is more than a wheelset, it’s a new benchmark for performance.



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