

*Lightweight*

NEXT-GENERATION COCKPIT

# Lightweight HPC White Paper





# Lightweight

## INTRODUCTION

The **Lightweight HPC (High Performance Cockpit)** is crafted for those who demand nothing short of perfection, no matter the cost or effort. After more than **three years of development**, this cockpit represents the pinnacle of what is possible in aero cockpit design, offering a significant upgrade for any dream bike. For the first time, your **Lightweight wheel upgrade** can be perfectly matched with a cockpit that embodies the same level of precision and performance.

At the heart of its innovation is the **specially engineered internal structure** that enhances the bar's strength while maintaining its aerodynamic profile. This integration of advanced materials and construction techniques gives the HPC its remarkable stiffness and durability, without adding unnecessary weight.

The result is the **best aero cockpit in the world**, optimized across key performance factors—**aerodynamics, weight, stiffness, and comfort**. Not only will this cockpit shave off precious seconds to make you the fastest rider, but it will also help create the **lightest aero bike** possible. Whether you're chasing personal bests or simply seeking the ultimate cycling experience, the HPC will take your performance to new heights.





# Lightweight

## TECHNOLOGY BREAKDOWN

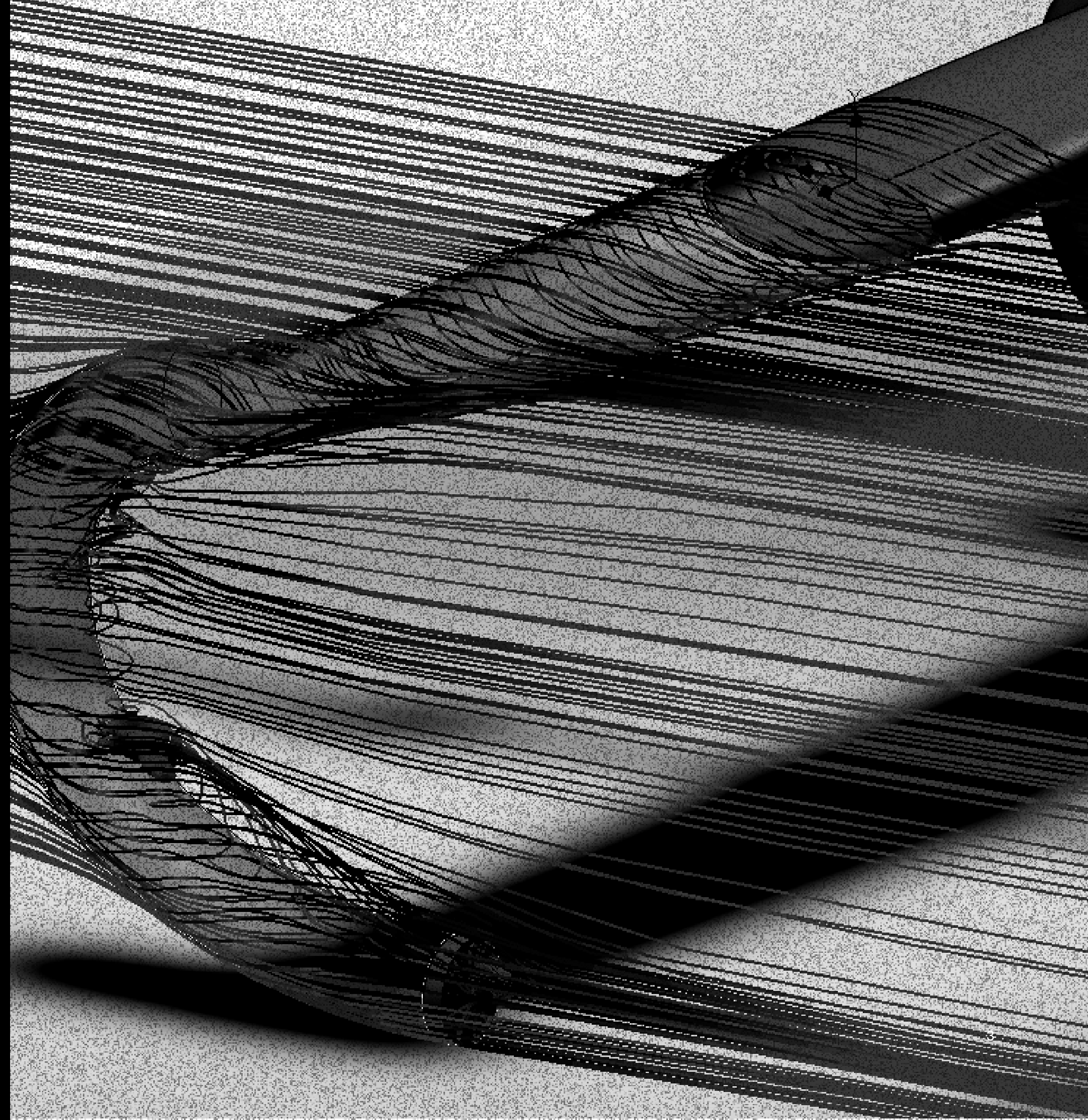
### 1. THE TECHNICAL DESIGN

The technical design was based on finding the right aero profile for every part of the cockpit to allow for a minimum air resistance while providing maximum strength and stiffness. The profiles are based on the different airfoils out of the NACA database (formerly National Advisory Committee for Aeronautics which is now part of NASA). These aerospace profiles were adjusted and optimised for technical properties but also rider comfort, to be used on a road bike cockpit.

The different aero profiles were then worked into the geometry for the cockpit, completing the technical design, which was tested on multiple iterations in the wind tunnel.

#### ASD - AERO STREAMLINE DESIGN

*“The ASD seamlessly combines elegant design with outstanding aerodynamics and reduced weight. Every element of the cockpit has been carefully crafted to minimize air resistance and maximize speed. Experience the perfect symbiosis of aesthetic design, optimal aerodynamics, and light weight.”*





# Lightweight

## TECHNOLOGY BREAKDOWN

### 2. THE GEOMETRY

“Narrow is aero” becomes more and more important in today's road bike world, but riding aerodynamic positions is only possible as long as you are comfortable enough. So a big focus was on finding the best ergonomics for each hand position. For that purpose we used a lot of 3D-printed handlebar pieces and lots of hands on feedback (literally) for many different hand sizes and rider geometries.

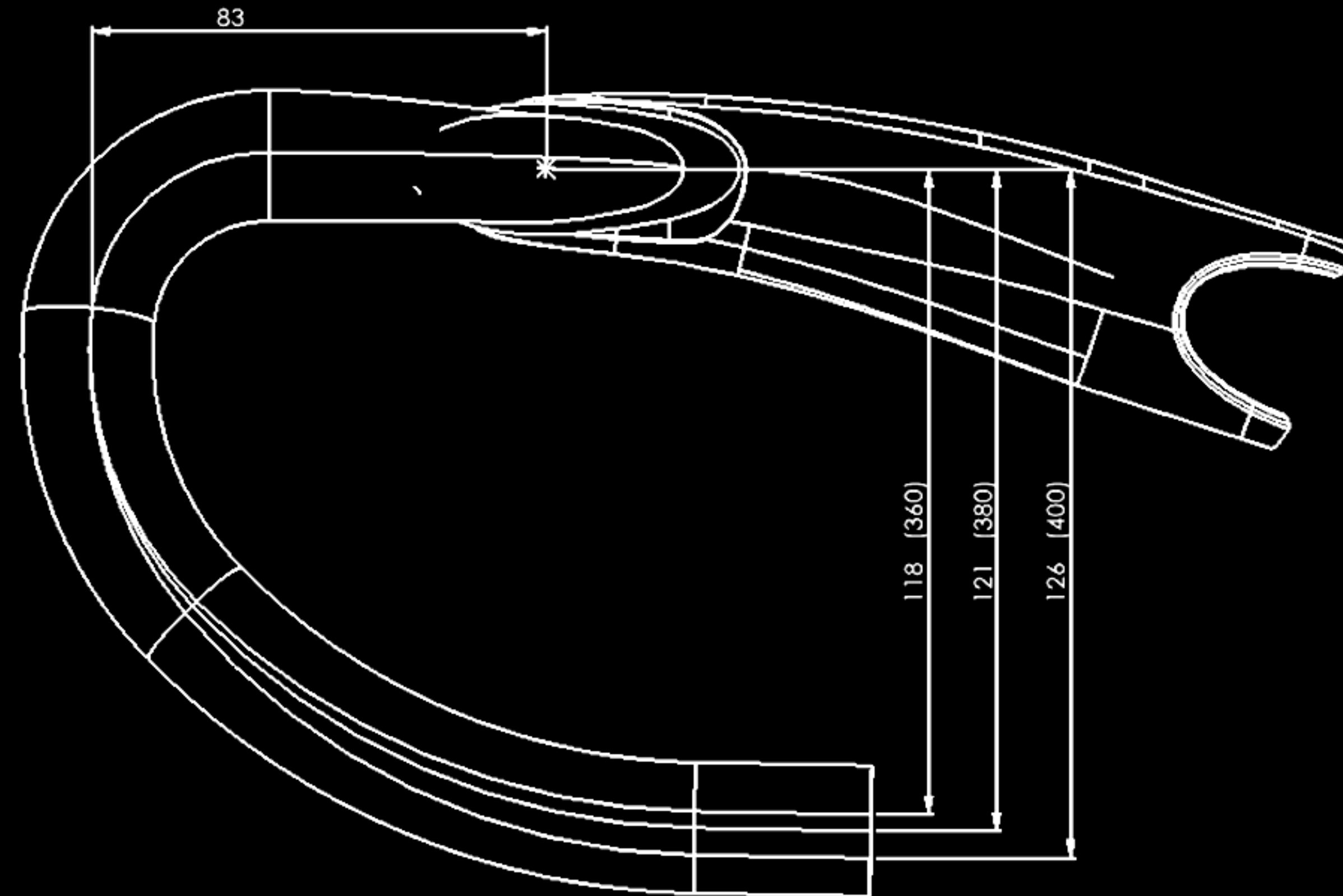
One of the key features is the incline coming from the tops into hoods, which is giving the wrist bones a fitting place to rest while in the hoods.

Another ergonomic feature is the adaptive size adjustment (ASA) giving each handlebar width a drop geometry custom-fit for each body size, without limiting you to your specific fit should you have other preferences.

#### ASA - ADAPTIVE SIZE ADJUSTMENT

*“The ASA - Adaptive Size Adjustment offers you a custom-tailored reach for each size. This precise adjustment allows for a personalised fit, ensuring optimal comfort and control. It delivers perfect ergonomics that precisely support your riding position.”*

WIDTH (MM)	360	380	400
FLARE (MM)	400	420	440
ANGLE	-6°	-6°	-6°
DROP (MM)	118	121	126
REACH (MM)	83	83	83
LENGTHS (MM)	90 - 130MM		





# Lightweight

TECHNOLOGY BREAKDOWN

## 3. THE FINAL DESIGN

To elevate the technical foundation, we collaborated with a range of external designers to enhance the aesthetic dimensions by refining and reshaping the existing curves, edges, and features defined by the original geometry. Through multiple design iterations, we achieved a seamless fusion of elegant form and technical precision, resulting in an optimized balance of visual appeal and performance.



STAGE 01



STAGE 02



STAGE 03



FINAL



# Lightweight

TECHNOLOGY BREAKDOWN

## 4. THE TECHNOLOGY

Very early in the engineering development it became apparent that the optimised aero profile alone, using existing technology, wouldn't allow us to reach our eager weight and stiffness goals. So we had to invent a new technology based on classical technologies in aerospace engineering combined with recent technologies in the carbon composite field, to offer the extreme lightness this cockpit deserves.

This technology enables inner structures in completely hollow carbon parts which aren't limited by using foams or other core materials. This allows us to build the first carbon composite part in the world, with entirely free placement and shape of inner reinforcement structures exactly where we need it, without the major disadvantages of similar technologies used in aerospace or motorsports.

Those inner structures while used to reinforce the cockpit and thus making it lighter, are also used to guide the internal brake cables.

Of course we weren't Lightweight, if we were already happy with this accomplishment alone, able to rival any similar part in Formula 1 or aerospace. On top of that we optimised and perfected our carbon layup plan over the time of the prototyping process.





# *Lightweight*

TECHNOLOGY BREAKDOWN

## 5. THE PROCESS

After 51 Prototype iterations for the handlebar and stem, we defined a total of 142 precision cut carbon patches that make up the intricate layup of the cockpit. Those are divided into 39 patches in the tops, 72 in the drops and 31 in the stem area. Making it the most complex cockpit on the market.

The carbon fibre materials used are varying depending on the position in the cockpit as well as the different mechanical load and failure cases of driving in the hoods or drops. We are using two different high strength fibres including T800 Toray as well as two different high stiffness modulus fibres including M40J, to give us the ideal balance between strength and stiffness.

Given the complexity of this carbon composite part you may call us crazy, but we only offer the very best for our customers.



# Lightweight

TECHNOLOGY BREAKDOWN

## 6. THE PERFORMANCE

Setting our performance goal was the easy part, we want to have the best aerodynamics and weight with high stiffness for precise handling. Archiving the goal was the harder part.

For a long time you had to decide for an Aero-bike or Ultralight-bike. With recent trends light and aerodynamic bikes shifted more into the focus of development.

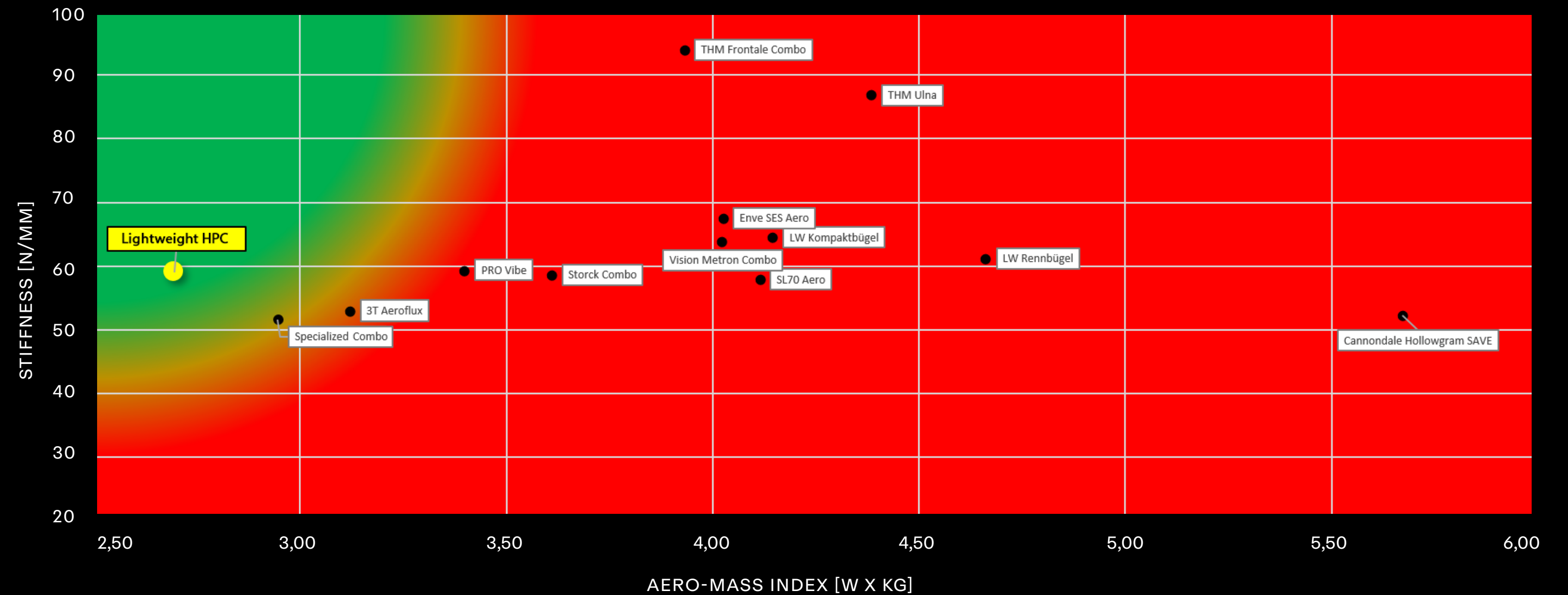
The gold standard for light components is the stiffness-to-weight ratio. Air resistance in Watt is used to compare aero components. For Ultralight-Aero-components there isn't a method yet to rate them. This is why we invented the Aero-Mass-Index.

**The Aero-Mass-Index is the tool to compare all bike components based on their weight and air resistance. Weight and aerodynamics are given the same impact on the Index.**

The Aero-Mass-Index [Watt x kg] is the product of air resistance at 45 km/h [Watt] and weight [kg].

Having the lowest possible Aero-Mass-Index shows the best balance between low weight and good aerodynamics.

## AERO-MASS INDEX





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TECHNOLOGY BREAKDOWN

## 6. THE PERFORMANCE

WEIGHT: 270GR.





# Lightweight

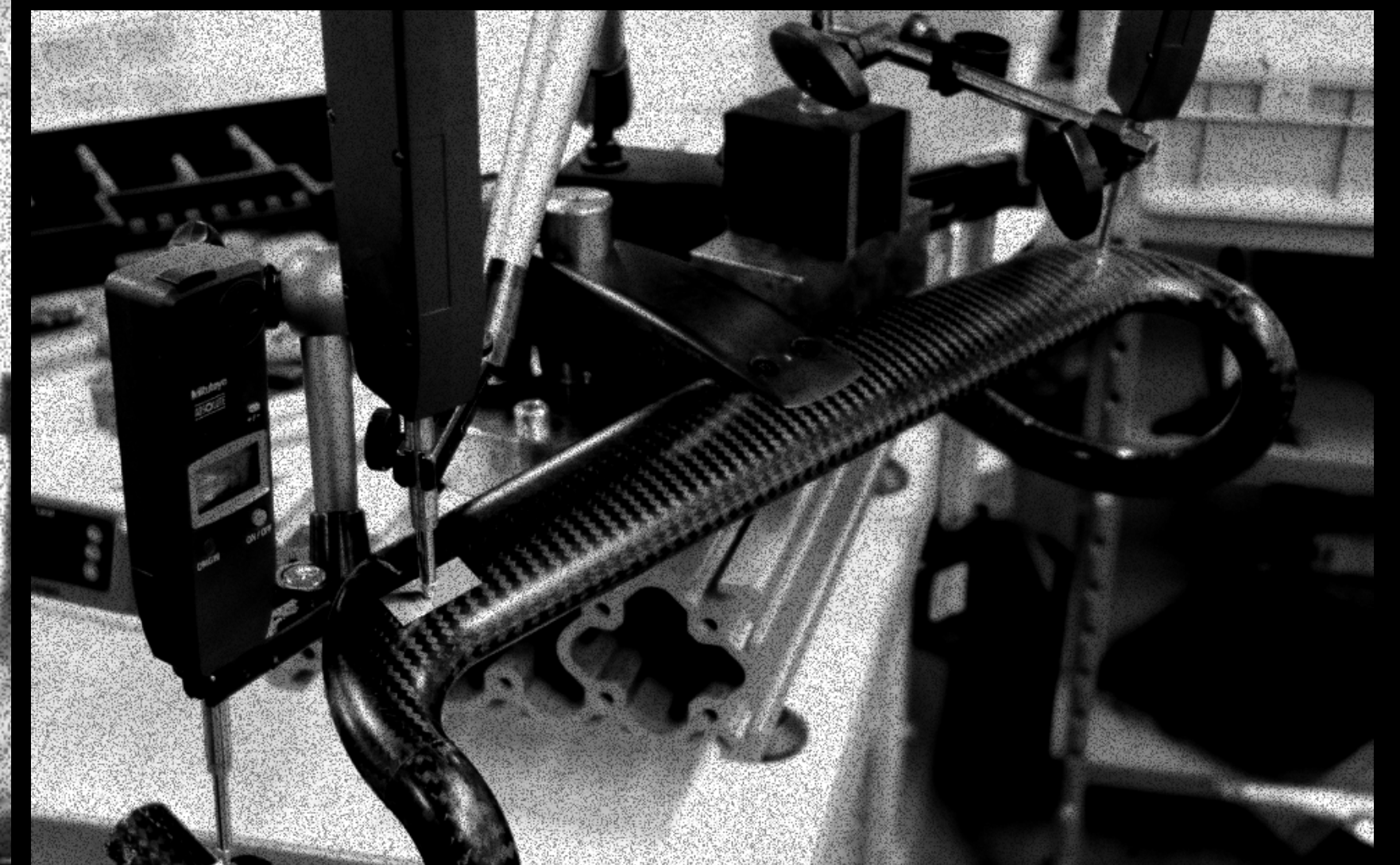
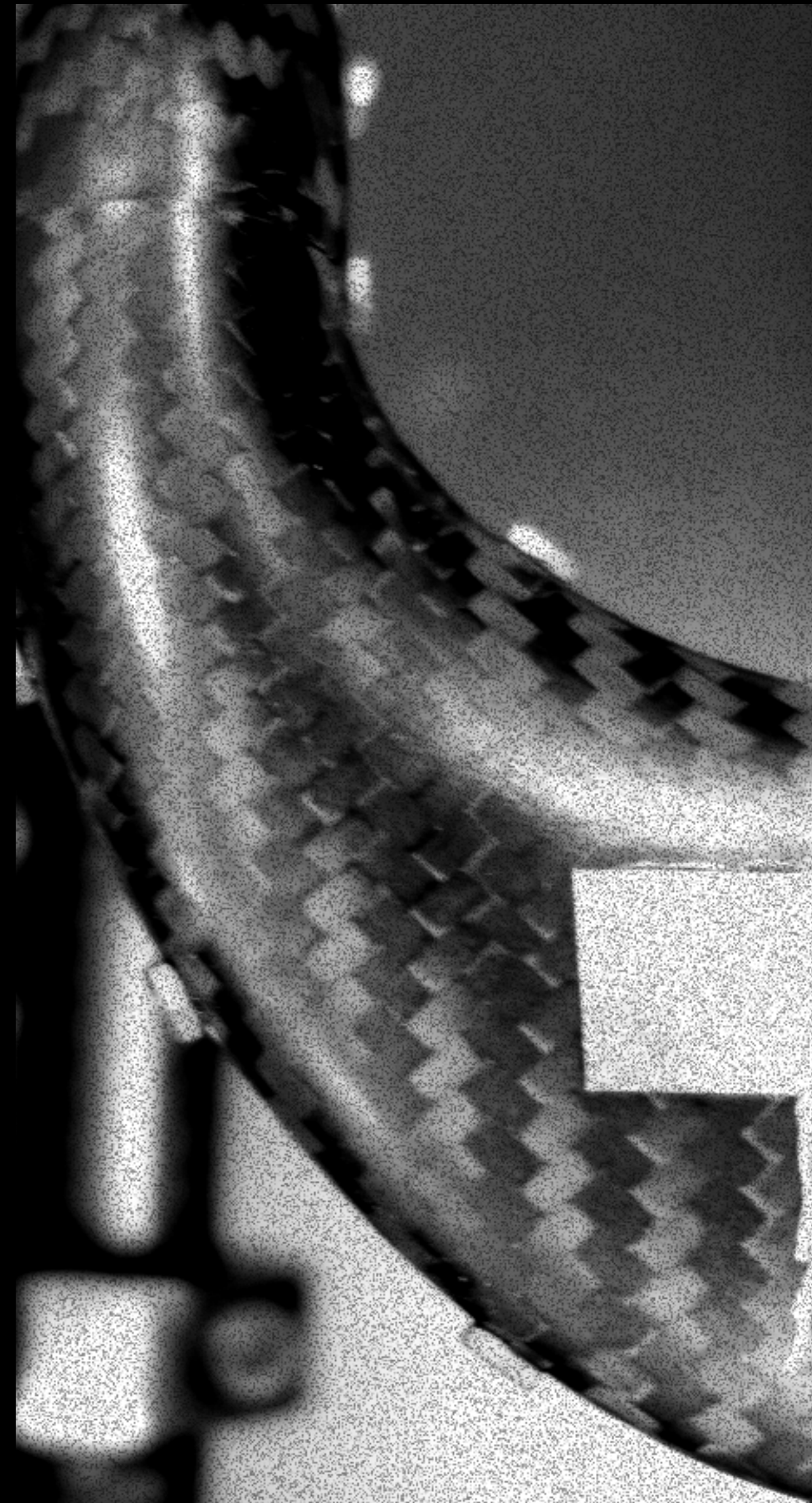
## TECHNOLOGY BREAKDOWN

### 7. THE TESTING

For our testing during the development and our production we are using the ISO 4210-5 standard tests as well as other tests for real life usage and failure criteria which are not yet included in the standard. All our inhouse lightweight tests have even higher requirements then the ISO 4210 standard demands, giving our costumers the safety and reassurance they deserve.

A huge benefit of our careful handcrafted process here in Germany is, that we have our engineering, quality department and production right here. Working hand in hand on everyday basis we can monitor and ensure a high standard of quality.

One of the many non-standard tests was to assess the areas where we lose stiffness in order to improve stiffness-to-weight-ratio. In order to do that we prepared multiple measurement points on the handlebar and used the robotic precision measuring arm "Faro" to test how each of the points moved in space. Giving us a clearer understanding of material movement than a standard 1-axis test can provide. These results influenced our 1-axis tests to include other measurement points as well.





# Lightweight

UNIQUE SELLING POINTS (USPs)

## ASD - AERO STREAMLINE DESIGN

*“The ASD - Aero Streamline Design seamlessly combines elegant design with outstanding aerodynamics and reduced weight. Every element of the cockpit has been carefully crafted to minimise air resistance and maximize speed. Experience the perfect symbiosis of aesthetic design, optimal aerodynamics, and light weight.”*

## ASA - ADAPTIVE SIZE ADJUSTMENT

*“The ASA - Adaptive Size Adjustment offers you a custom-tailored reach and drop for each size. This precise adjustment allows for a personalised fit, ensuring optimal comfort and control. It delivers perfect ergonomics that precisely support your riding position.”*

## ISC - INTERNAL STRUCTURAL CONSTRUCTION

*The ISC (Internal Structural Construction) is a key innovation within our carbon design. These specialized internal structures enhance the cockpit’s strength and stiffness while maintaining low weight, making them essential to the high-performance capabilities of the HPC Cockpit. To achieve the best stiffness-to-weight ratio, the cockpit is built from 142 individual carbon patches, each meticulously designed for optimal performance. This segmented construction allows us to fine-tune the stiffness and weight distribution across the entire cockpit, ensuring a level of precision and balance that delivers the ultimate riding experience—one that no other brand can match. This engineering approach guarantees a robust yet lightweight construction, providing the perfect blend of strength and agility for demanding riders.*





## Lightweight

UNIQUE SELLING POINTS (USPs)

### ICM - INTEGRATED COMPUTER MOUNT

*“The ICM - Integrated Computer Mount offers seamless integration for your computer, ensuring a clean and functional cockpit setup. The precise mounting provides stability and a secure hold during your ride. This system keeps your performance data always in view.”*

### MADE IN GERMANY INNOVATION

*“Made in Germany Innovation stands for the highest quality and advanced technology, developed and produced in Germany. Every detail is crafted with excellent engineering and precision. This innovation ensures reliable performance and outstanding standards.”*

### HANDCRAFTED PRECISION

*“Handcrafted Precision combines masterful craftsmanship with exact attention to detail to ensure the highest quality. Every step of the production process is carefully performed by hand to guarantee exceptional precision and reliability. This artisanal excellence delivers unmatched performance and perfection.”*





# Lightweight

UNIQUE SELLING POINTS (USPs)

## LCC - LIGHTWEIGHT CUSTOM COMPOSITE

*“LCC - Lightweight Custom Composite combines tailor-made composite materials with minimal weight to deliver exceptional performance and durability. By customising the material composition, we achieve optimal strength and lightness. This bespoke composite technology sets new standards for efficiency and ride dynamics.”*

## ADVANCED RTM PRECISION (STEM)

*“Advanced RTM Precision utilises cutting-edge Resin Transfer Molding technology for highly precise shaping. This process ensures exact fit and consistently high quality. The precise manufacturing enhances the performance and durability of your components.”*

## PREMIUM PREPREG CONSTRUCTION (HANDLEBAR)

*“Premium Prepreg Construction uses top-quality prepreg materials to deliver exceptional strength and low weight. This advanced construction method ensures maximum performance and durability. Precise manufacturing elevates each component to a new level of quality.”*





# Lightweight

## PERFORMANCE METRICS

Achieving **high stiffness while maintaining low weight** is crucial for any high-performance cockpit, and the **Lightweight HPC** excels in all areas. It sets a new benchmark for **aero cockpits**, combining strength, precision, and minimal weight to deliver unmatched performance.

### STIFFNESS TESTING ACROSS KEY AREAS

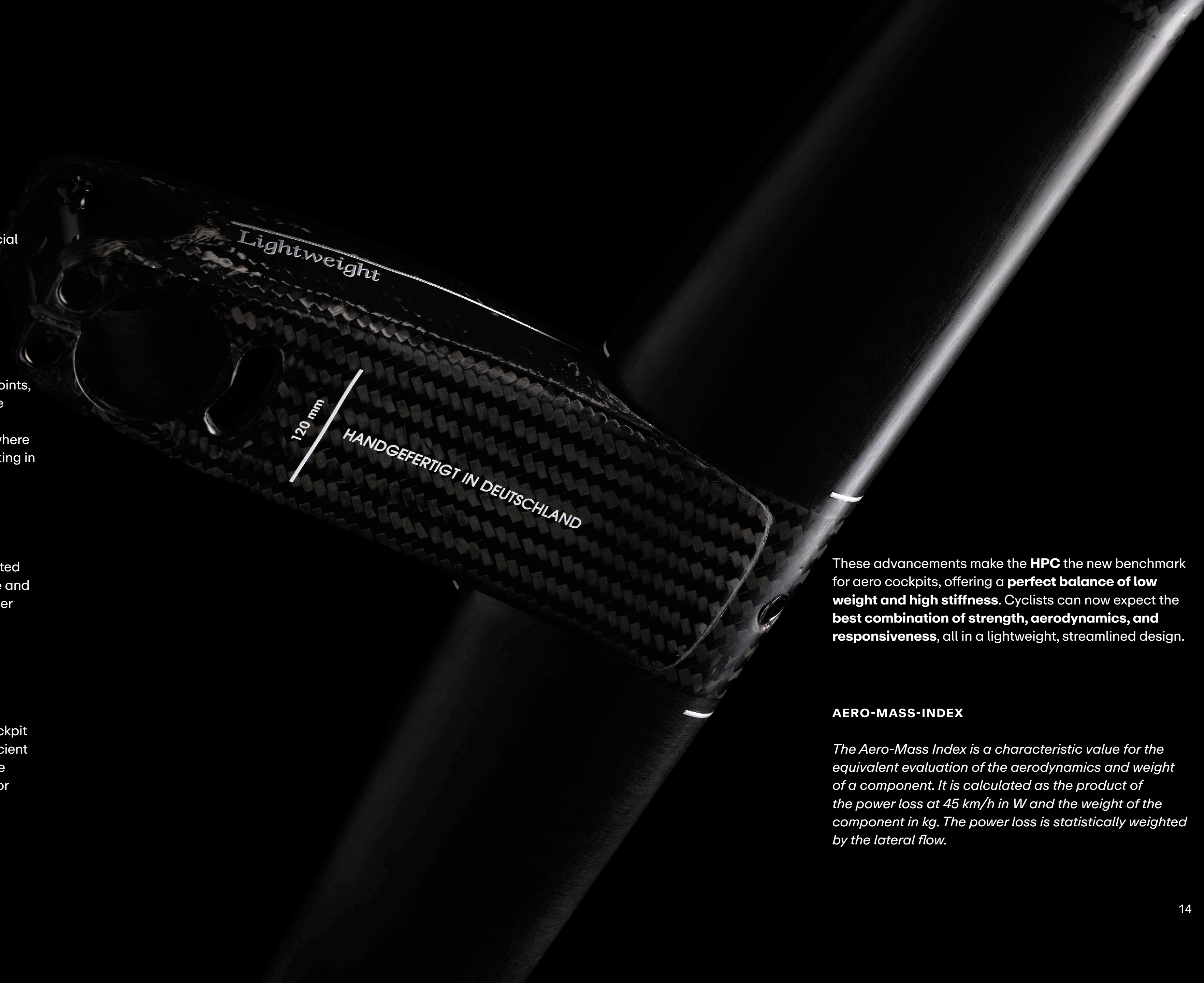
Extensive stiffness testing was conducted at multiple critical points, ensuring that each section of the cockpit was fine-tuned for the specific demands of competitive as well as every day riding. This process identified where reinforcement was needed and where weight could be reduced without compromising stiffness, resulting in a cockpit that delivers exceptional rigidity, especially during high-speed sprints and tight cornering.

### MONTHS OF DEVELOPMENT AND REFINEMENT

Crafting the perfect stiffness profile required months of dedicated testing and adjustment. Our engineers invested significant time and resources to ensure the HPC's structure delivers maximum power transfer while maintaining a sleek, aerodynamic profile. This rigorous development set a new standard for stiffness in aero cockpits.

### OPTIMAL FIBRE DISTRIBUTION FOR PEAK PERFORMANCE

The precise adjustment of stiffness at each section led to a cockpit that not only feels solid and dependable but also supports efficient power delivery. The lightweight design ensures that every ounce of effort translates directly into forward motion, offering superior handling and control, especially important at high speeds.



These advancements make the **HPC** the new benchmark for aero cockpits, offering a **perfect balance of low weight and high stiffness**. Cyclists can now expect the **best combination of strength, aerodynamics, and responsiveness**, all in a lightweight, streamlined design.

### AERO-MASS-INDEX

*The Aero-Mass Index is a characteristic value for the equivalent evaluation of the aerodynamics and weight of a component. It is calculated as the product of the power loss at 45 km/h in W and the weight of the component in kg. The power loss is statistically weighted by the lateral flow.*



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## DESIGN PHILOSOPHY

The **Lightweight HPC** merges aesthetics, ergonomics, and user comfort into a cohesive, high-performance unit. Its one-piece construction, featuring a 2-piece design approach, optimises strength while maintaining a minimal weight profile. This natural form prioritises performance without sacrificing stability or rider comfort.

The reach is purposefully designed to be longer, providing enhanced control and stability at high speeds. The drop varies depending on the size, ensuring a custom fit for every rider, contributing to tailored comfort and power delivery. This adjusted drop enables optimal weight distribution, making it easier to maintain control and balance during extended rides or sprints.

Aesthetically, the HPC combines form and function. The 3K carbon layup is strategically placed for areas that demand strength, while the UD (unidirectional) carbon finish on the handlebars gives it a sleek and smooth appearance, blending technical performance with visual appeal. This careful balance of design choices enhances both rider experience and cockpit performance.

With around 80 percent (most) of the aerodynamic drag while cycling being produced by the rider, the HPC focuses on putting the rider in the most aerodynamic position possible. With sizes ranging from 36 to 40 cm and 2cm of flare a very modern and aerodynamic rider position can be achieved.

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### REAL WORLD TESTING

The **Lightweight HPC Cockpit** has undergone extensive real-world testing, with feedback from riders highlighting both its performance and comfort during long-distance rides. Among the test riders, they shared a standout experience: with practical, everyday usability.

*“I couldn’t believe that a bike this light could also be so aero. The speed is just incredible—it feels like I’m flying, but with complete control. What really surprised me was how comfortable it is, even over long distances. You’d think going full aero with a **36cm width** would compromise comfort, but that’s not the case at all. The **6-degree angle** provides the perfect balance of aerodynamics and all-day comfort, even for non-pros like me. It’s a game-changer for both speed and endurance.”*

*“I am really impressed by the handlebars, the slight rise in the ramps made the regular riding position very ergonomic – almost like a handshake. When riding in the wind the ramps paired with the depth of the tops gave me a very stable platform for my forearms, they felt very locked in and made me able to ride in an aero position for an extended amount of time without much fatigue. The flare in the drops gives me all the stability I could wish for when descending and the refined layup eliminates a lot of road buzz making for a very comfortable ride, while still giving me all the stiffness I need when going for the next town sign sprint. All around a very well-made product.”*



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## COMPATIBILITY & INTEGRATION

The **Lightweight HPC Cockpit** is fully compatible with most modern race bikes, offering seamless integration for a streamlined, aero-enhanced look. Designed for ease of installation, it fits smoothly onto any bike, ensuring a sleek and fast appearance without the need for complicated adjustments.

Additionally, the cockpit is equipped with an integrated computer mount (sold separately), allowing you to keep your data at your fingertips for the entire ride. This feature enhances both functionality and convenience, making it the ideal upgrade for cyclists looking to combine cutting-edge aerodynamics with practical, everyday usability.





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## CONCLUSION

The **Lightweight HPC Cockpit** is launching in **Spring 2025**, bringing together Lightweight's signature precision with cutting-edge design. Made in Germany, this cockpit offers exceptional aerodynamics, strength, and rider comfort—all while being **incredibly light**. True to the **Lightweight factor**, it provides unparalleled performance without adding unnecessary weight, making it the ultimate upgrade for serious cyclists.

With a price of **€1,950**, the HPC cockpit is expected to be in high demand. We highly recommend placing **pre-orders** soon to ensure availability in your market.

For more information or to reserve your pre-order, please contact our sales team. Don't miss out on the chance to experience the perfect blend of **performance and lightness**.





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