PROVEN TO BE FASTER.*

AERODYNAMICS BY SWISS SIDE

»I love how comfortable it feels – and the results speak for themselves. It's incredibly fast.«

– MARLEN REUSSER, WORLD CHAMPION 2025

***DATA NEEDS CONTEXT**

All performance data are based on selected tests of the final prototypes or production configurations with Visor installed. The production version corresponds to the tested final prototype in all aerodynamically relevant external contours. Comparative helmets were tested in the respective sizes and configurations used during testing. Results may vary depending on helmet size, fit, rider position, Visor configuration, and wind conditions; aerodynamic performance may be significantly reduced when the Visor is not installed.

ONE HELMET.
MULTIPLE REALITIES.
YOUR SETUP MATTERS.

This Performance Paper gives you the tools to make informed decisions across positions, conditions, and rider types.
A personalized test – such as in a wind tunnel – remains the gold standard. But our data gets you as close as possible to the right decision for your individual setup.

AERODYNAMIC PERFORMANCE IS RELATIVE. PRECISION IS EVERYTHING.

AERODYNAMIC PERFORMANCE IS RELATIVE. PRECISION IS EVERYTHING.

Aerodynamics in time trialing is never absolute.
It is shaped by the interaction of rider, position, and race conditions. A helmet that performs best for one athlete may behave very differently for another.

That is the challenge – and the starting point for developing the ABUS TimeShifter. Our goal was not to create the single fastest helmet. It was to create the fastest ABUS helmet for the widest possible range of riders, positions, and real-world scenarios.

Too often, performance claims are built on isolated data points. We chose a different approach. No shortcuts – just a consistent focus on reliable, repeatable data.

112
112 CFD simulations

194
194 wind tunnel runs

39
39 velodrome test runs

Validated across riders, positions, and testing environments.

ENGINEERED WITH THE FASTEST MINDS

This document provides a transparent and scientific overview of the aerodynamic development process of the ABUS TimeShifter helmet.

Based on **112 CFD simulations, 194 wind tunnel runs, and extensive velodrome validation**, it documents the measurable performance improvements achieved through a unique partnership between **ABUS** and **Swiss Side.**

The TimeShifter is more than a product. It reflects a mindset:
Uncompromising in methodology, honest in feedback, open in collaboration.

This is how development becomes innovation – transparent, validated, and real. Every design decision is grounded in data. Every performance gain is measurable.



» We didn't want marketing claims – we wanted measurable answers. «

– LENNART BECHHEIM, PRODUCT MANAGER ABUS

REC 00:01:15:29

DEVELOPMENT SETUP: MULTI POSITION APPROACH

»No rider holds one position for an entire time trial. Our development approach reflects exactly that.«

– SWISS SIDE ENGINEERING TEAM



DEVELOPMENT SETUP: MULTI POSITION APPROACH

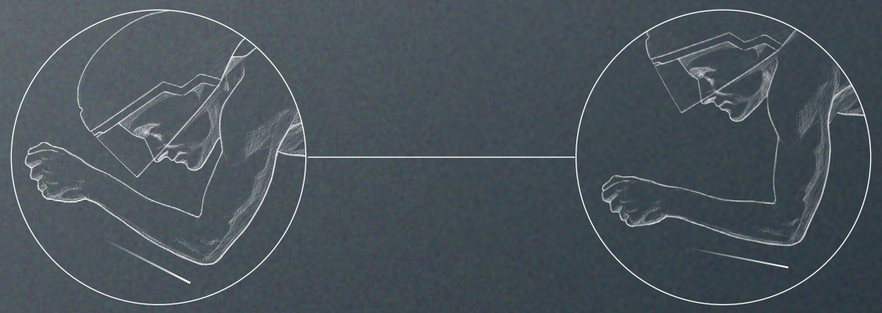
DUMMY CONCEPT

To develop a helmet that delivers consistent performance across a wide range of rider positions and race situations, we needed a stable and reproducible testing foundation. For this purpose, we used a dummy in a dedicated time trial position. Unlike real athletes, a dummy

- is always (digitally) available
- maintains an identical position at all times,
- enables precise repeatability
- and ensures comparable data across all test sessions.

ARM POSITIONS

In parallel to head positions, we also considered two characteristic arm positions commonly used in modern time trialling:



ANGLED ARMS

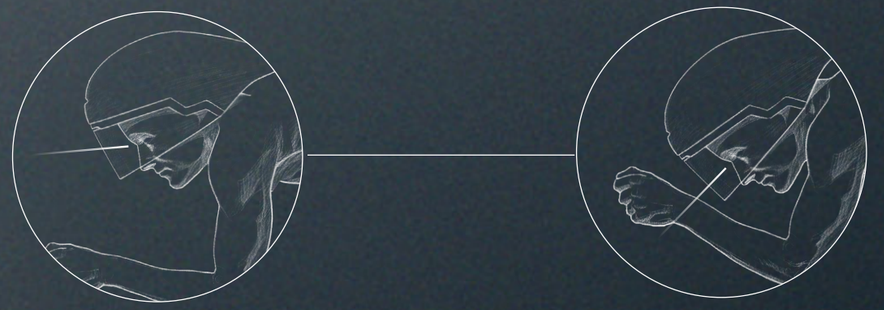
A modern and widely used position. Often improves comfort but also impacts visibility on the road ahead.

FLAT ARMS

A classic and less angled arm position. Allows for a lower head position and does not impact visibility on the road ahead.

HEAD POSITIONS

There is no single fixed head position in a time trial. The head naturally shifts – due to fatigue, course layout, or field of vision. In addition, head position varies significantly from athlete to athlete, depending on anatomy, riding style, and cockpit setup. This diversity has a direct impact on aerodynamic performance and presents a key challenge in helmet development. We reflected this real-world variability in our development process by defining two characteristic head positions:



HEAD UP

A slightly raised position, as commonly seen when fatigue sets in, when cornering, or on sections that demand a higher field of vision.

HEAD DOWN

A lower, more aggressive race position for maximum aerodynamic efficiency on straight sections – with a reduced but still sufficient field of view.

Rider safety is fundamental to ABUS. The TimeShifter is therefore optimized for typical time trial positions that maintain a high field of vision. Extremely low head-down positions, where the rider's face sinks between the arms, may offer marginal aerodynamic gains in theory but are neither safe nor practical over race distances – and were therefore deliberately excluded from the development targets.

ENGINEERING-INSIGHT

Combining both head and arm positions leads to four riding positions that closely represent real-world time trial conditions. These positions formed the foundation of all CFD and wind tunnel evaluations and ensured that our data was robust, consistent, and comparable. This positional bandwidth was crucial to developing a helmet that performs not only in a single "ideal" laboratory pose, but across the broad spectrum of postures riders actually adopt during a race. No athlete maintains one exact position from start to finish – and our development approach reflects this.

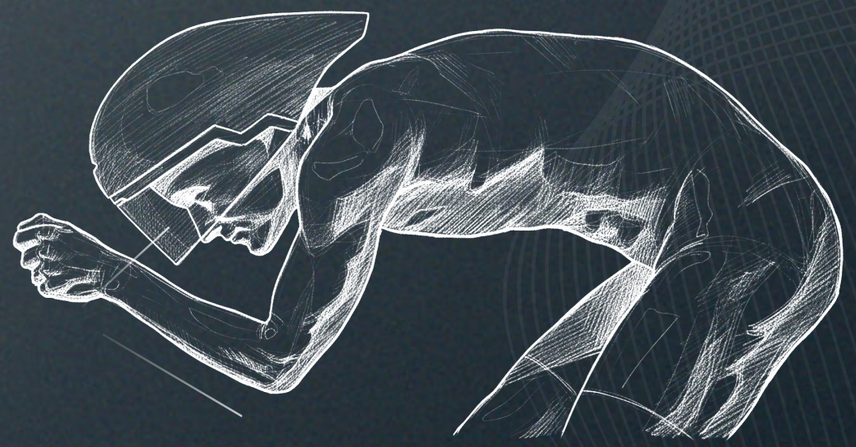
DEVELOPMENT SETUP: MULTI POSITION APPROACH

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HEAD UP – ANGLED ARMS

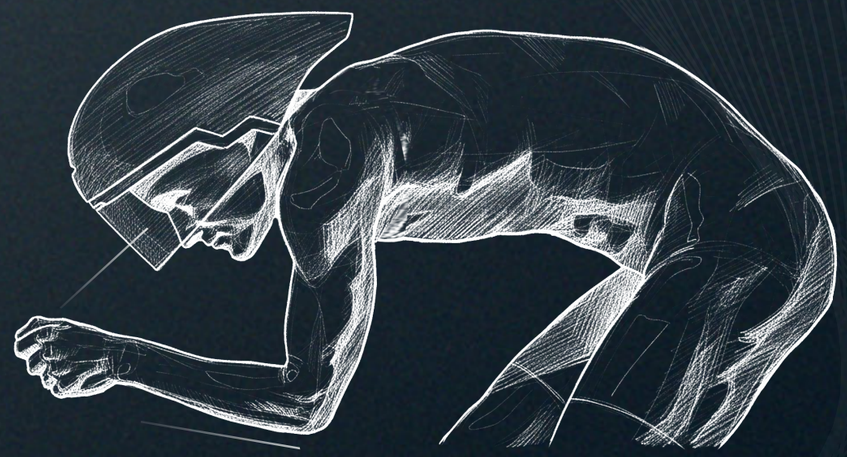


HEAD DOWN – ANGLED ARMS





HEAD UP – FLAT ARMS



HEAD DOWN – FLAT ARMS

DEVELOPMENT SETUP – CFD SIMULATION

CFD-PREDICTED PERFORMANCE GAINS

The CFD simulations predict drag savings of **10.5 to 14.7 watts** at 50 km/h compared to the ABUS Gamechanger TT 1.1 (overall weighted drag)

DEVELOPMENT SETUP–CFD SIMULATION

DATA-DRIVEN DEVELOPMENT – TURNING AIRFLOW INTO MEASURABLE SPEED

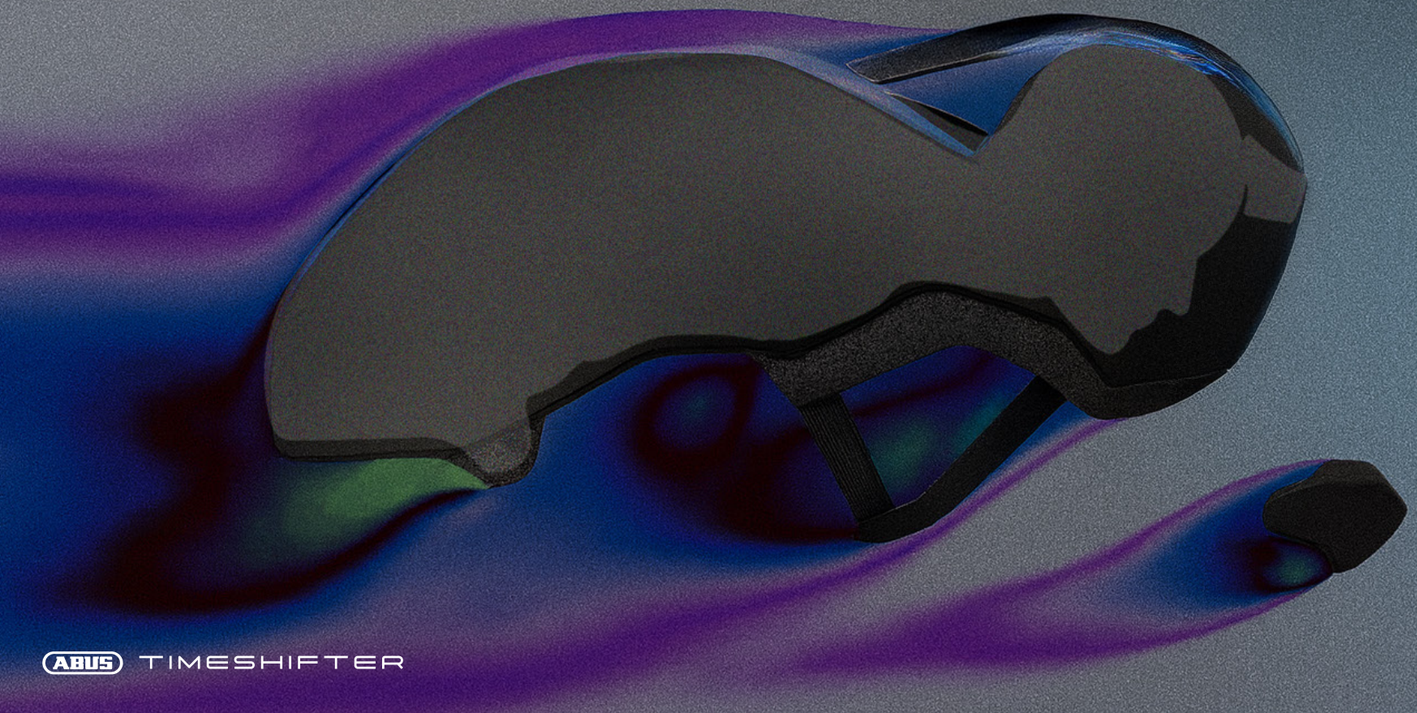
To evaluate aerodynamic performance at an early development stage, we analyzed all helmet concepts using Computational Fluid Dynamics (CFD). Simulations were carried out with a dummy rider in a realistic time trial position to ensure reproducible and comparable results across all design iterations.

RIDER MODEL:

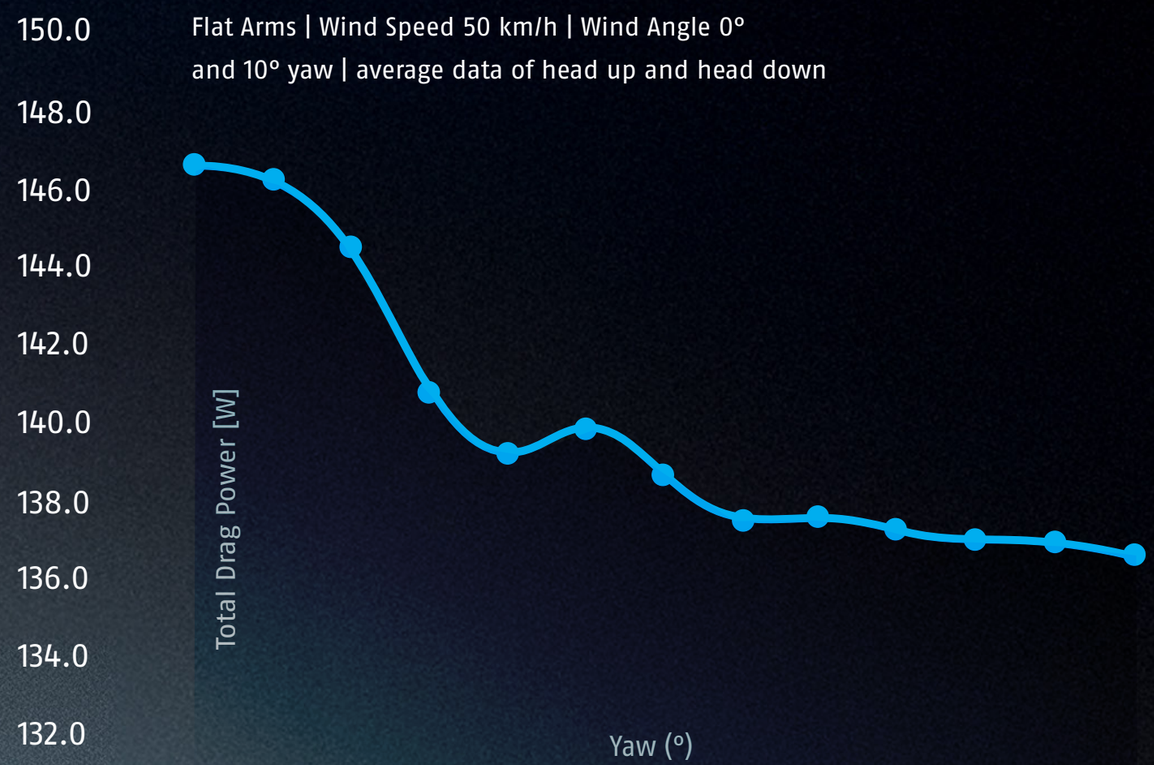
- Dummy rider in TT position
- 2 head positions
- 2 arm positions

SIMULATION PARAMETERS:

- Wind speed: 50 km/h
- Wind angle: 0° and 10° yaw



Flat Arms | Wind Speed 50 km/h | Wind Angle 0° and 10° yaw | average data of head up and head down



DEVELOPMENT SETUP–CFD SIMULATION



EXPLORING DIFFERENT HELMET SHAPE CONCEPTS

In an early development phase, we developed and analyzed multiple helmet shape concepts using CFD. Our goal was not to define a final design at this stage. Instead, we aimed to understand how fundamentally different shapes influence airflow behavior, drag sensitivity and cooling potential.

CFD DEVELOPMENT IN NUMBERS

28

28 CFD geometries including 20 helmet designs and different arm positions

2

2 head positions

2

2 yaw angles

112

112 CFD simulation runs in total

FROM GEOMETRY TO AIRFLOW: CAD MEETS CFD

The close integration of CAD geometry and CFD analysis allowed us to identify aerodynamic effects and directly implement geometry changes in CAD. We analyzed drag forces, pressure distribution, flow separation and wake behavior in relation to specific design features. This allowed us to refine the design in a targeted way – instead of relying on trial and error.

IMPROVED COOLING PERFORMANCE

While aerodynamic efficiency was our primary development target, we continuously monitored cooling performance throughout the CFD process. According to the CFD simulations, the TimShifter delivers 12–13% improved cooling performance than the GameChanger TT 1.1.

12–13%

improved cooling performance

WIND TUNNEL TESTING

ROBUST PERFORMANCE – PROVEN IN THE WIND TUNNEL

Across all wind tunnel tests – with a dummy and with very different athletes – the TimeShifter demonstrated exceptionally robust aerodynamic performance. The measured gains are not the result of a single optimized setup, but reproducible across positions, riders, and conditions.

RUNS

43

BENCHMARK TESTING:
43 runs

86

DEVELOPMENT DUMMY:
86 runs

65

ATHLETE TESTING:
65 runs

194

TOTAL:
194 wind tunnel runs

WIND TUNNEL TESTING

Aerodynamic performance doesn't come from a single idealized lab setup – it comes from testing across positions, yaw angles, and riders. That's why we tested the TimeShifter in multiple wind tunnels: with a dummy and with athletes, under controlled conditions. Our goal was clear: reliable data instead of isolated best-case numbers.

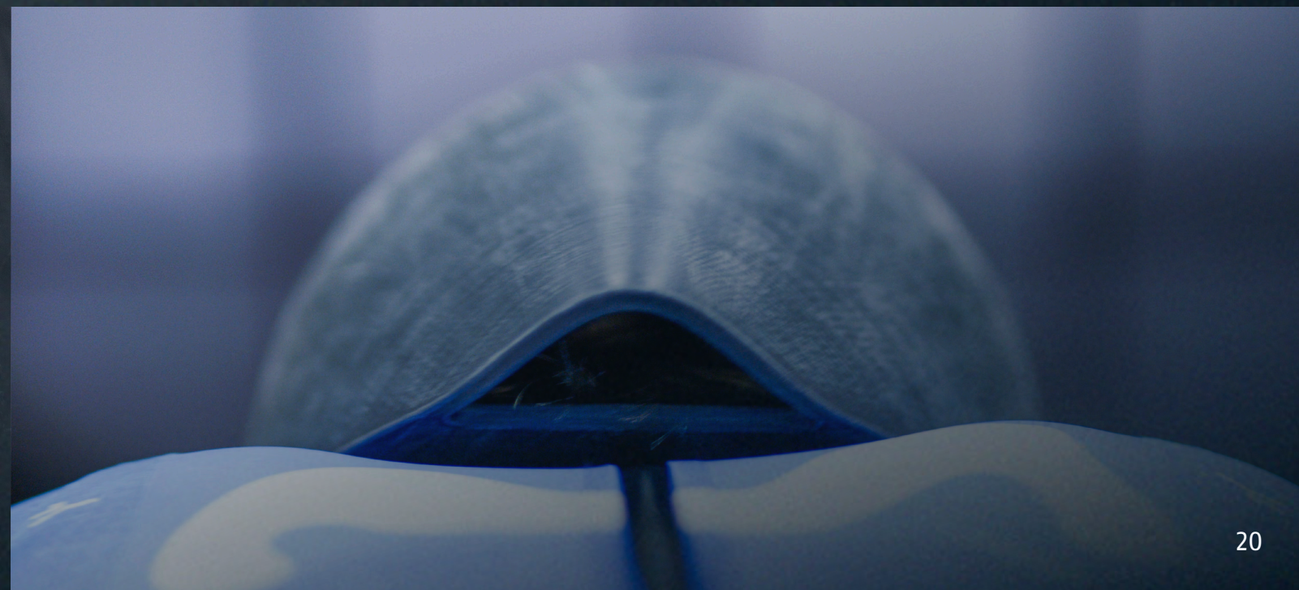
WIND TUNNEL TEST SETUP

- Wind speed: 50 km/h
- Yaw angle range up to 20°, depending on setup and wind tunnel
- Wind tunnels: GST wind tunnel, Silverstone wind tunnel
- Evaluation: Weighted values representing real outdoor conditions
- Measurement accuracy: Repeatability is naturally lower with athletes than with a dummy. In all tests, measurement variation was significantly smaller than the performance differences between helmets

A SHARED RESPONSIBILITY IN PERFORMANCE TESTING

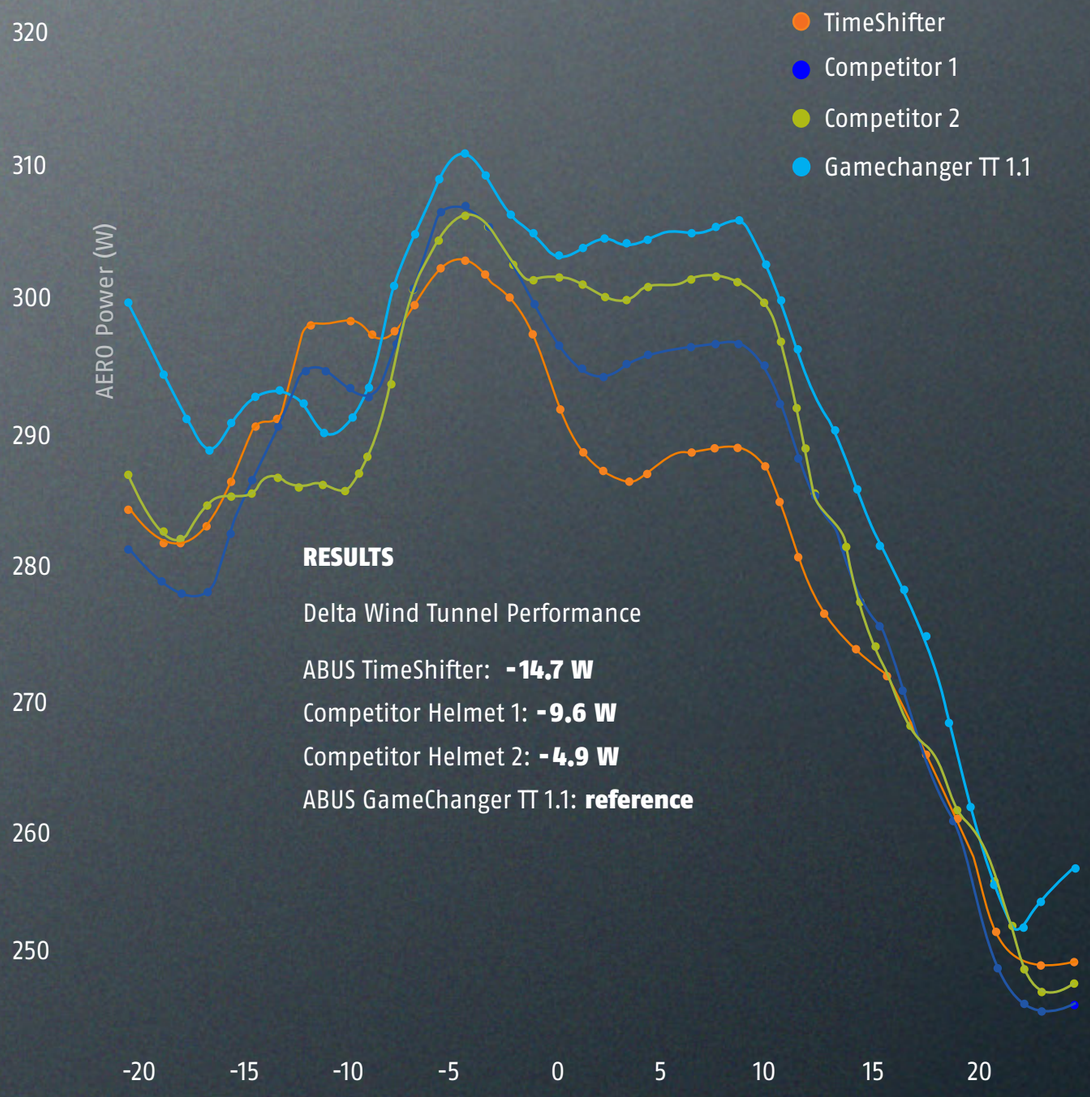
In the wind tunnel, we systematically compared the developments concepts with the TimeShifter Proto with the ABUS GameChanger TT 1.1 and several competitor helmets. Competitor products are shown anonymously by design. This reflects our belief that innovation should not be built on calling out others, but on contributing to the advancement of the sport as a whole. As part of the industry, we share a common goal: creating the best possible experience for riders.





WIND TUNNEL PERFORMANCE HEAD DOWN | WIND SPEED 50 KM/H

In dummy testing, the TimeShifter Proto was clearly the fastest helmet measured. Compared to the GameChanger TT 1.1, it delivered a significant aerodynamic advantage, reproducible across different head positions and yaw angles.

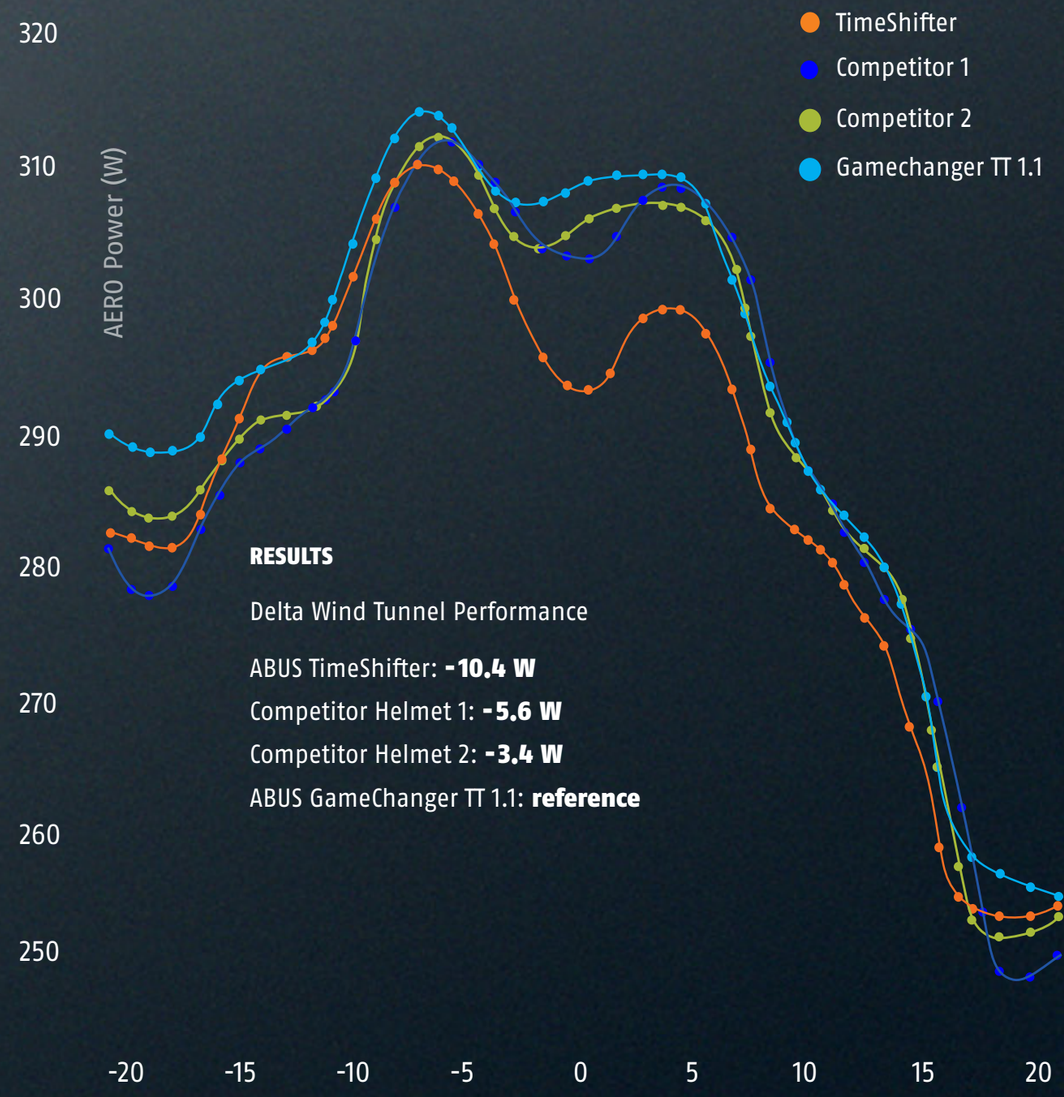


RESULTS

Delta Wind Tunnel Performance

ABUS TimeShifter: **-14.7 W**
Competitor Helmet 1: **-9.6 W**
Competitor Helmet 2: **-4.9 W**
ABUS GameChanger TT 1.1: **reference**

WIND TUNNEL PERFORMANCE HEAD UP | WIND SPEED 50 KM/H



RESULTS

Delta Wind Tunnel Performance

ABUS TimeShifter: **-10.4 W**
Competitor Helmet 1: **-5.6 W**
Competitor Helmet 2: **-3.4 W**
ABUS GameChanger TT 1.1: **reference**

VELODROME TESTING

CONFIRMED ON TRACK

Velodrome testing confirms the TimeShifter's aerodynamic performance under real, dynamic conditions.



VELODROME TESTING

PERFORMANCE IN DYNAMIC, RIDER-DRIVEN CONDITIONS

CFD simulations and wind tunnel tests provide controlled and highly comparable data. Velodrome testing adds a crucial next layer: performance under dynamic, rider-driven conditions. That's why we tested the TimeShifter on the track – at sustained high speeds, with natural rider movement, real pacing, and continously changing head positions. This allows us to validate aerodynamic performance in a setting that reflects real racing dynamics, while maintaining full control over external variables.

TEST OBJECTS

- Production TimeShifter helmet in two sizes (M & L)
- Narrow and Wide Visor

RIDERS

- Three male athletes (Movistar)

TEST PROTOCOL

- 2 warm-up laps
- 7 laps at high speed (50–55 km/h)
- 1 cool-down lap

RESULTS SUMMARY

- Helmet performance was confirmed once again, consistent with CFD and wind tunnel data
- The TimeShifter (production version) was the fastest helmet tested for all riders
- No measurable difference between Narrow and Wide Visor*
  - This was expected, as there is minimal crosswind in the velodrom
  - Visor differences become relevant primarily under yaw conditions in the wind tunnel
- Riding without a Visor resulted in a significant aerodynamic penalty up to +12.8 W

DRAG SAVINGS COMPARED TO THE GAMECHANGER TT 1.1 AT 50 KM/H:

in Track Testing

- 8 to - 19.2 W

*Further details on the Dual Visor Concept: **page 32**

PERFORMANCE SIMULATION

SIMULATED RACE SCENARIOS:

Olympic Time Trial Paris 2024 **(32,4 km)**

Challenge Roth Bike Course 2024 **(180 km)**

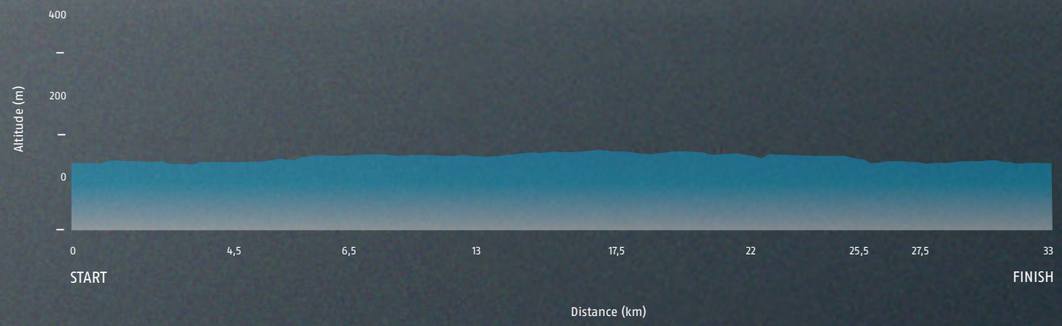
TRANSLATING DATA INTO REAL-WORLD RACE OUTCOMES

Aerodynamic gains are measured in CdA (aerodynamic performance is measured in Cda and can be reported in watts). Races are won in seconds. To translate measured aerodynamic advantages into real-world relevance, we used the „Swiss Side Performance Platform“ developed by our technology partner Swiss Side, to simulate the time differences of using the different helmets.

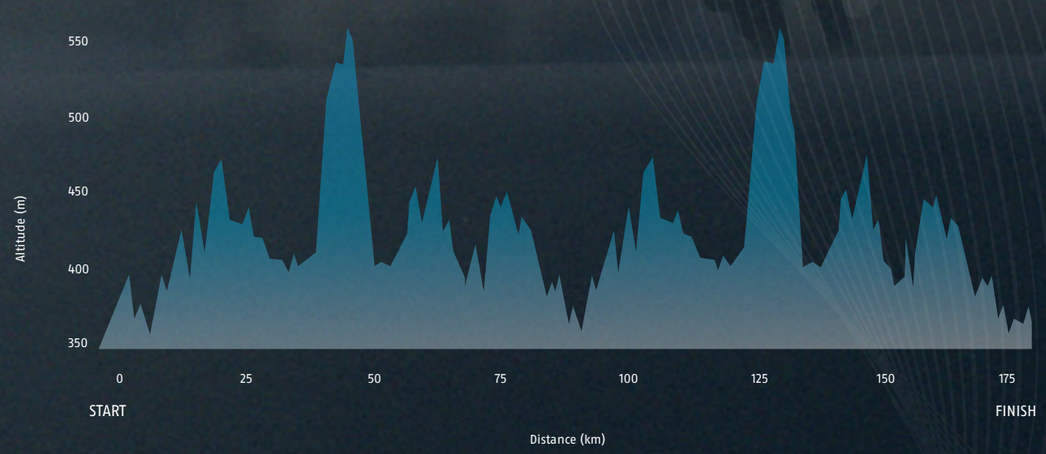
Based on real race courses, rider power data, wind–tunnel–derived CdA values and varying wind conditions, these simulations show how the TimeShifter's performance can translate into time gained over an entire race.



PARIS / OLYMPIC TIME-TRIAL



CHALLENGE ROTH



Simulation Results

The simulations shows the significant benefits of using the new ABUS TimeShifter helmet. Compared to the ABUS GameChanger TT 1.1, the ABUS TimeShifter provides a time gain of **34-42 seconds** on the 2024 Olympic time-trial and **2:00-3:57 minutes** on Challenge Roth depending on the wind conditions.

DUAL VISOR CONCEPT

THE DUAL VISOR CONCEPT OFFERS TWO INTERCHANGEABLE VISORS

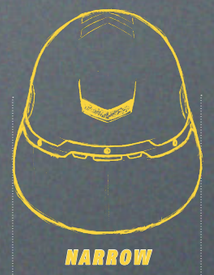
To extract the last marginal gains from an individual setup, each Visor subtly adjusts the helmet's effective frontal width and the way airflow interacts with the rider's shoulders, arms, and cockpit. This enables targeted aerodynamic fine-tuning tailored to the rider's position, while maintaining full visibility, ventilation, and system integration.



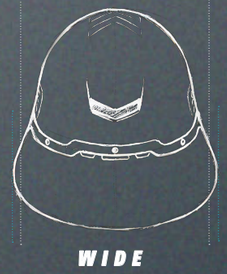
DUAL VISOR CONCEPT

AERODYNAMIC FINE-TUNING THROUGH INDIVIDUAL VISOR GEOMETRY.

During the final development phase of the TimeShifter, we introduced an innovation that allows aerodynamic fine-tuning without changing the helmet's core geometry: the Dual Visor Concept. This approach acknowledges a simple reality of time trial racing: riders differ in anatomy, shoulder width and cockpit setup – and small differences can matter. The TimeShifter is the first time trial helmet to offer true aerodynamic individualization through Visor geometry – turning marginal gains into a measurable advantage, tailored to the rider.



Narrow Visor
Optimized for compact setups, narrow shoulder profiles or tight arm positions.

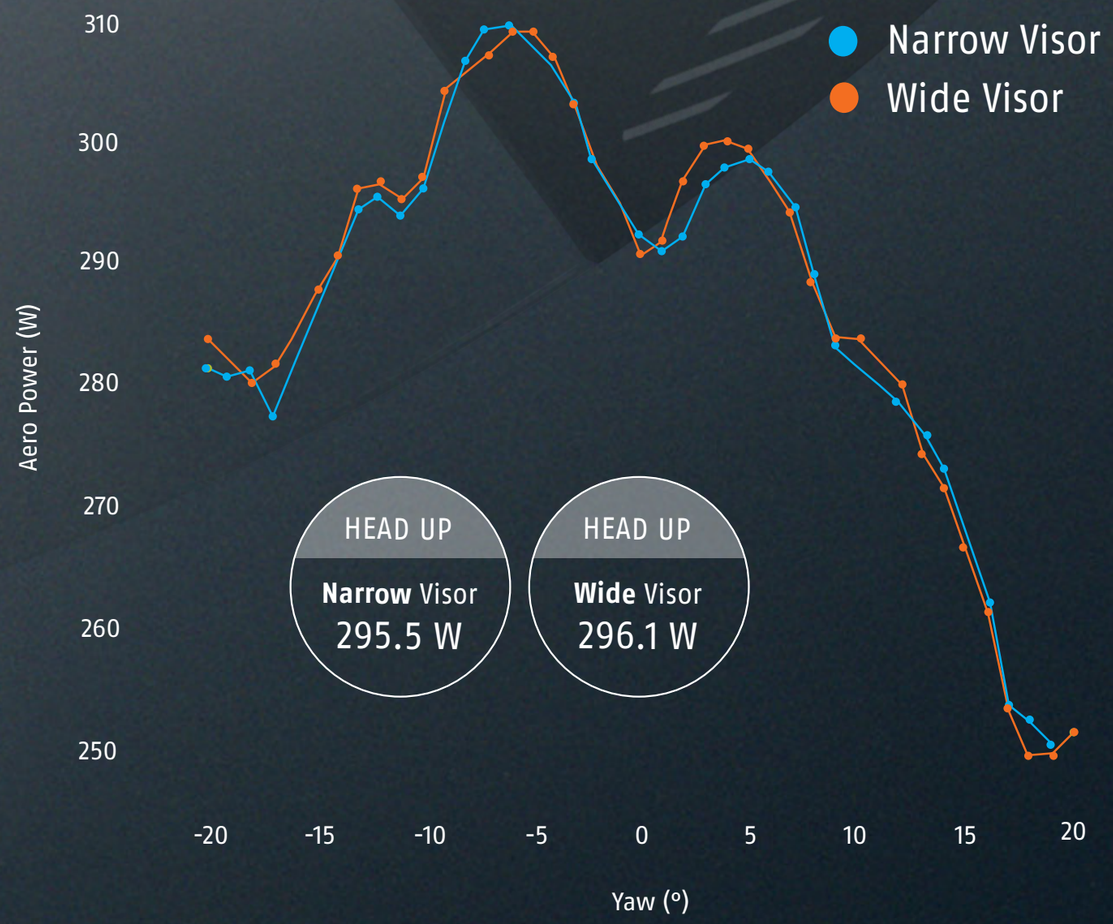


Wide Visor
Optimized for riders with broader shoulders or more open arm positions.



Cut Visor – for extreme racing positions
In addition to the Narrow and Wide Visors, a Cut Visor is available – designed to minimize interference in tight cockpit configurations, the Cut Visor supports riders who prioritize maximum integration in extreme aero setups.

WIND TUNNEL PERFORMANCE HEAD UP | WIND SPEED 50 KM/H NARROW VS WIDE



MARGINAL GAINS

- Small but decisive differences in drag – depending on rider position and crosswind
- Effects become more relevant with changing head position or crosswind exposure
- Enables meaningful aerodynamic fine-tuning without modifying helmet shape

Wind tunnel testing confirmed that even subtle changes in Visor geometry can influence airflow interaction. In "Head Up" positions, the Narrow Visor showed an average drag reduction of around 1 watt on the dummy – with potentially larger effects for individual riders.*

*For riders seeking maximum optimization, individual testing under side-wind conditions can further refine Visor selection.

ABUS SAFETY COMMITTED TO RIDER PROTECTION

ABUS SAFETY COMMITTED TO RIDER PROTECTION

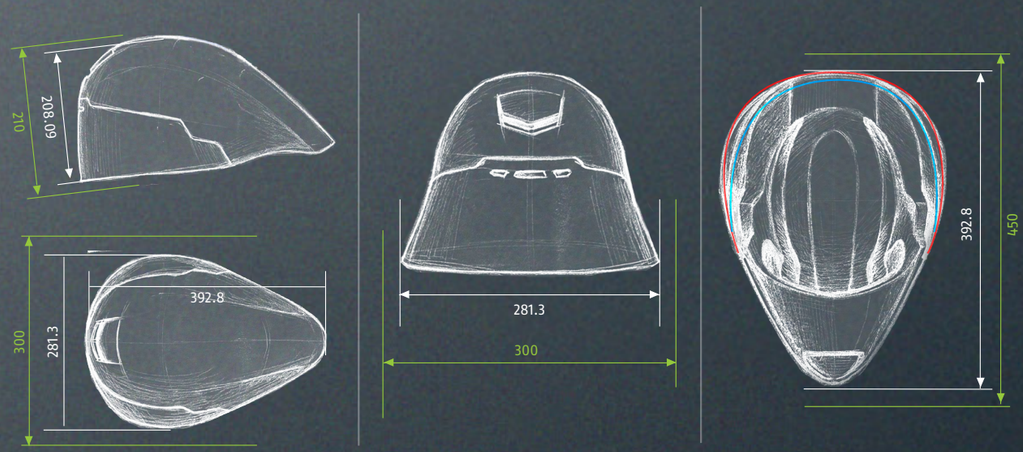
Performance only matters if protection is uncompromising. That's why the TimeShifter is developed, tested and certified to meet high safety standards – in racing and beyond.

TESTED. CERTIFIED.TRUSTED.

CERTIFIED FOR COMPETITION AND BEYOND

- UCI-compliant: Developed in full accordance with UCI helmet regulations for time trial competition.
- TÜV-tested & CE certified (EN 1078): Independently tested and certified according to European safety standards for cycling helmets.

Identical external dimensions for sizes M and L



● Narrow Visor ● Wide Visor ● Maximum Dimensions according to UCI Regulations

LABORATORY TESTED

Every helmet undergoes extensive internal and independent testing, including:

- Drop tests: Evaluating protection performance under controlled fall scenarios.
- Retention system tests: Verifying secure fit and stability under load.

From the lab to the start line – the TimeShifter is built to protect when it matters most.



FACTS AND FIGURES



VISOR SYSTEM

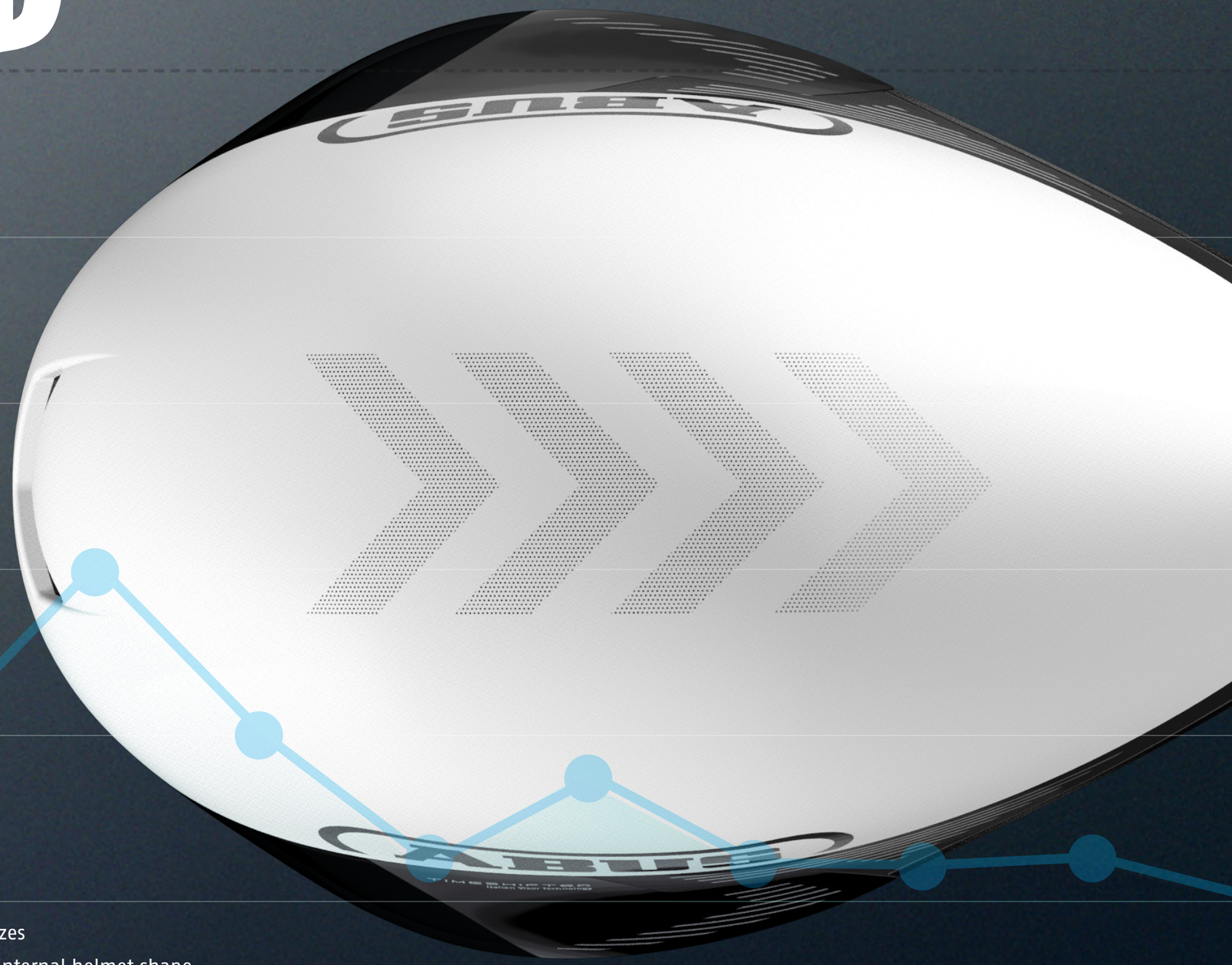
- Made in Italy
- Magnetic attachment system
- Quick-release mechanism
- Secure hold, clean removal
- Anti-fog treated lenses



FIT CONCEPT

Aerodynamics should not depend on size:

- Two sizes: M (54–58 cm) and L (57–61 cm)
- One identical aerodynamic outer shape for both sizes
- Size adjustment achieved exclusively through the internal helmet shape



FACTS AND FIGURES



ZOOM™ SPIN ADJUSTMENT SYSTEM & PONYTAIL FIT

Secure, personalized fit with Zoom™ Spin. Ponytail-friendly for added comfort.



MAGNETIC BUCKLE

Quick, one-handed magnetic buckle for easy, secure fastening.



FORCED AIR COOLING

Optimized airflow keeps your head cool and comfortable on every ride.



SLIDE DIVIDER™

Easy-to-adjust strap divider for a precise, comfortable fit.



MAGNETIC VISOR

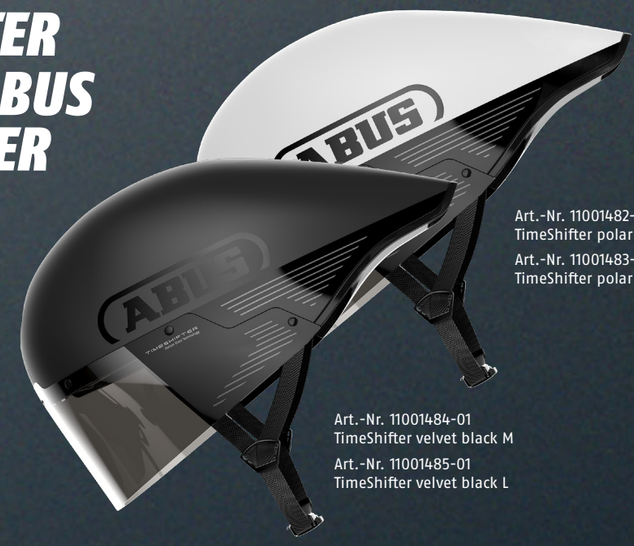
Magnetic Visor attachment for quick, secure handling on every ride.



HALF RING

Half Ring design provides a secure fit with reduced weight and added comfort.

ABUS TIMESHIFTER THE FASTEST ABUS HELMET EVER



Art.-Nr. 11001482-01
TimeShifter polar white M

Art.-Nr. 11001483-01
TimeShifter polar white L

Art.-Nr. 11001484-01
TimeShifter velvet black M

Art.-Nr. 11001485-01
TimeShifter velvet black L

MSRP 599,95 €

velvet black

polar white

WHAT'S INCLUDED



Premium Carrying Bag





Narrow Visor

smoke

OPTIONAL ACCESSORIES



Narrow Visor in

clear | Art.-Nr. 11001674-01 | 129,95 €

smoke | Art.-Nr. 11001676-01 | 139,95 €

mirrored | Art.-Nr. 11001677-01 | 149,95 €



Wide Visor in

clear | Art.-Nr. 11001678-01 | 129,95 €

smoke | Art.-Nr. 11001679-01 | 139,95 €

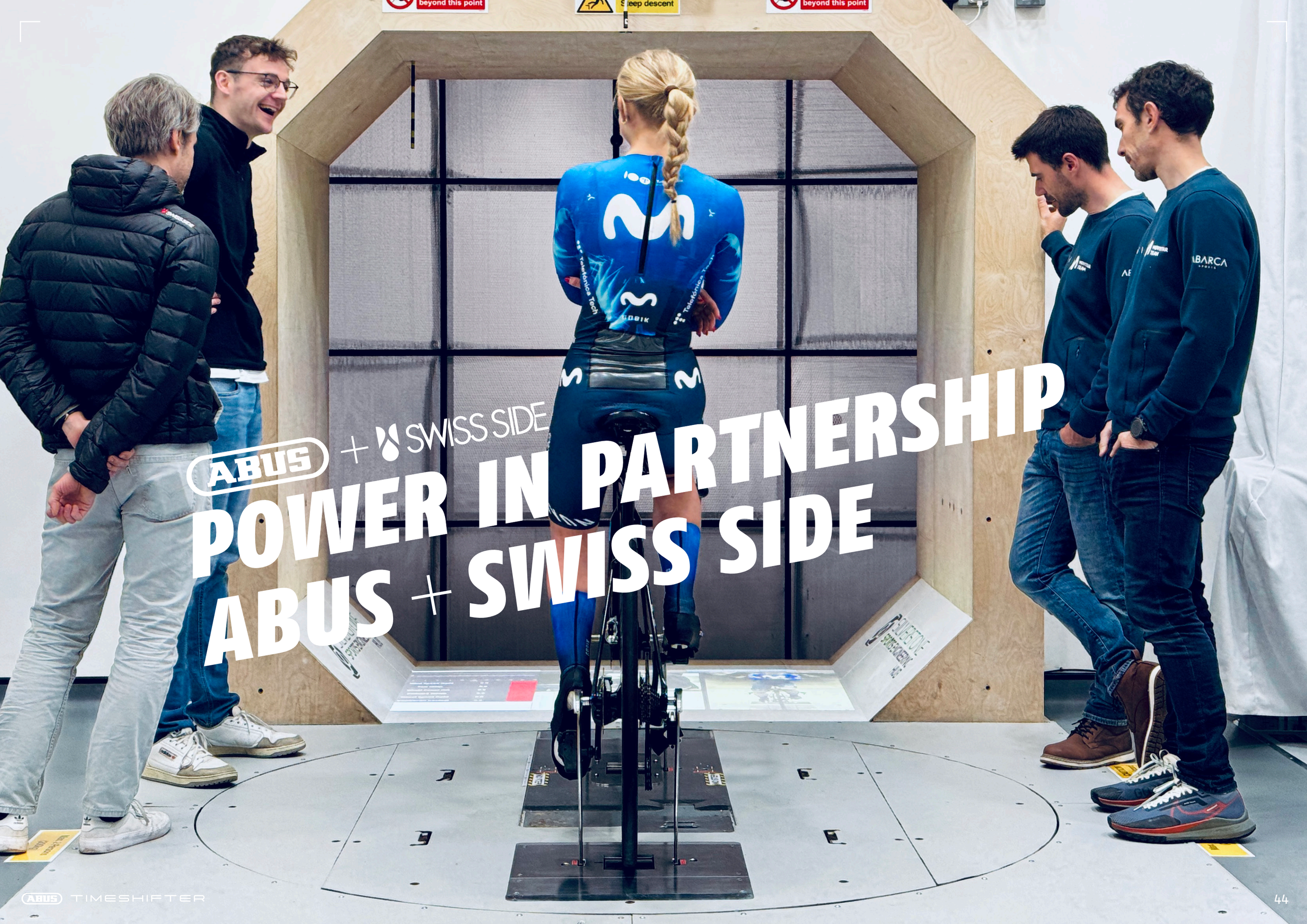
mirrored | Art.-Nr. 11001680-01 | 149,95 €



Cut Visor

clear | Art.-Nr. 11001681-01 | 129,95 €

mirrored | Art.-Nr. 11001682-01 | 149,95 €



ABUS + SWISS SIDE

POWER IN PARTNERSHIP
ABUS + SWISS SIDE

POWER IN PARTNERSHIP – ABUS + SWISS SIDE

What happens when German engineering meets Swiss aerodynamics? A partnership built on trust, precision, and shared ambition. Swiss Side brought decades of experience from Formula 1 and Cycling aerodynamics. ABUS contributed it`s expertise in helmet safety, production, and close collaboration with elite athletes.







»Innovation only happens when you open up. The TimeShifter is more than a product – it's a mindset.«

– LENNART BECHHEIM, ABUS PRODUCT MANAGER



»Until now, there hasn't been a helmet that performs exceptionally fast across such a wide range of riders. That may have just changed.«

– BJÖRN SCHEIBNER, SWISS SIDE DESIGN-INGENIEUR

VALIDATED BY CHAMPIONS

ONE DESIGN.
PROVEN ACROSS MANY.
BUILT WITH THE WORLD'S BEST.

VALIDATED BY CHAMPIONS



IVAN ROMEO

ONE DESIGN. PROVEN ACROSS MANY.

We deliberately stepped outside controlled environments. The TimeShifter was tested across multiple independent facilities – including different wind tunnels across Europe – as well as on the track and in real race conditions. The focus was never a single perfect aero setup. It was the real variability of the peloton: different body sizes, shoulder widths, cockpit setups, and constantly changing head positions.

Ivan Romeo was involved from the very beginning, from wind tunnel sessions to track testing, and went on to race the TimeShifter at the highest level, including his first Tour de France:

»I SPENT HOURS IN THE WIND TUNNEL AND ON THE TRACK. EVERY DETAIL WAS ANALYZED. SEEING THE FINAL RESULTS – AND KNOWING I WAS PART OF THAT PROCESS – MAKES ME PROUD.«

– IVAN ROMEO, TEAM MOVISTAR



CAT FERGUSON

BUILT WITH THE WORLD'S BEST.

Two of those athletes, both part of our development partner, the Movistar Team, could not be more different: Cat Ferguson (1.66 m) and Ivan Romeo (1.93 m). Opposite in stature, position, and riding style – yet both showed consistent aerodynamic gains with the TimeShifter in testing. Again and again.

"That was a defining moment," Bechheim recalls.
"Because it proved exactly what we set out to achieve:
a design that adapts to real athletes – not to an idealized model."

For Cat Ferguson, the data spoke for itself:

»THE RESULTS WERE GENUINELY IMPRESSIVE – CLEAR AND CONSISTENT, NOT JUST FOR ME BUT ACROSS DIFFERENT RIDERS. CONFIDENCE IN MY EQUIPMENT MAKES A REAL DIFFERENCE MENTALLY, AND THIS HELMET GIVES ME EXACTLY THAT.«

– CAT FERGUSON, TEAM MOVISTAR

HALL OF FAME



PROVEN IN THE WORLDTOUR

Even before its official launch, the TimeShifter had already proven itself under the toughest conditions imaginable – in the UCI WorldTour, across Grand Tour stages, and in the world's leading triathlon events.

THE TIMESHIFTER QUICKLY ESTABLISHED ITSELF AS THE HELMET OF CHOICE FOR TOP ATHLETES ACROSS ROAD, TRIATHLON, AND TRACK DISCIPLINES.

The ultimate validation came at the UCI World Championships 2025 in Rwanda, where Marlen Reusser powered to her first world title in the individual time trial – conquering the 38 km course in 43:09.34, with an incredible 51.89-second lead over the competition.

»I love how comfortable it feels – and the results speak for themselves. It's incredibly fast.«

– MARLEN REUSSER, WORLD CHAMPION 2025

»Seeing our athletes win with our product is the best validation imaginable. It highlights how science and sport, when combined, lead to measurable performance gains.«

– LENNART BECHHEIM, ABUS PRODUCT MANAGER

BEYOND THE FINISH LINE

Every test, every adjustment, every win added up to more than a product. It became a proof of what's possible when passion meets precision.

At its core, the ABUS TimeShifter is about people – engineers, riders, and partners united by a shared belief in progress. It's about the moments behind the data: the late nights in the tunnel, the first race under pressure, the quiet debriefs after testing, and the conversations in hotel lobbies where ideas became solutions and colleagues became friends.

»Teamwork isn't just a process – it's what makes innovation possible. Out of this project came real friendships, and that's something I'll never forget.«

– LENNART BECHHEIM, ABUS PRODUCT MANAGER

A HELMET THAT MERGES SCIENCE AND SOUL – MEASURABLE PERFORMANCE AND HUMAN INSIGHT.

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THANK YOU FOR PROVING THAT TRUE PERFORMANCE IS A TEAM EFFORT.