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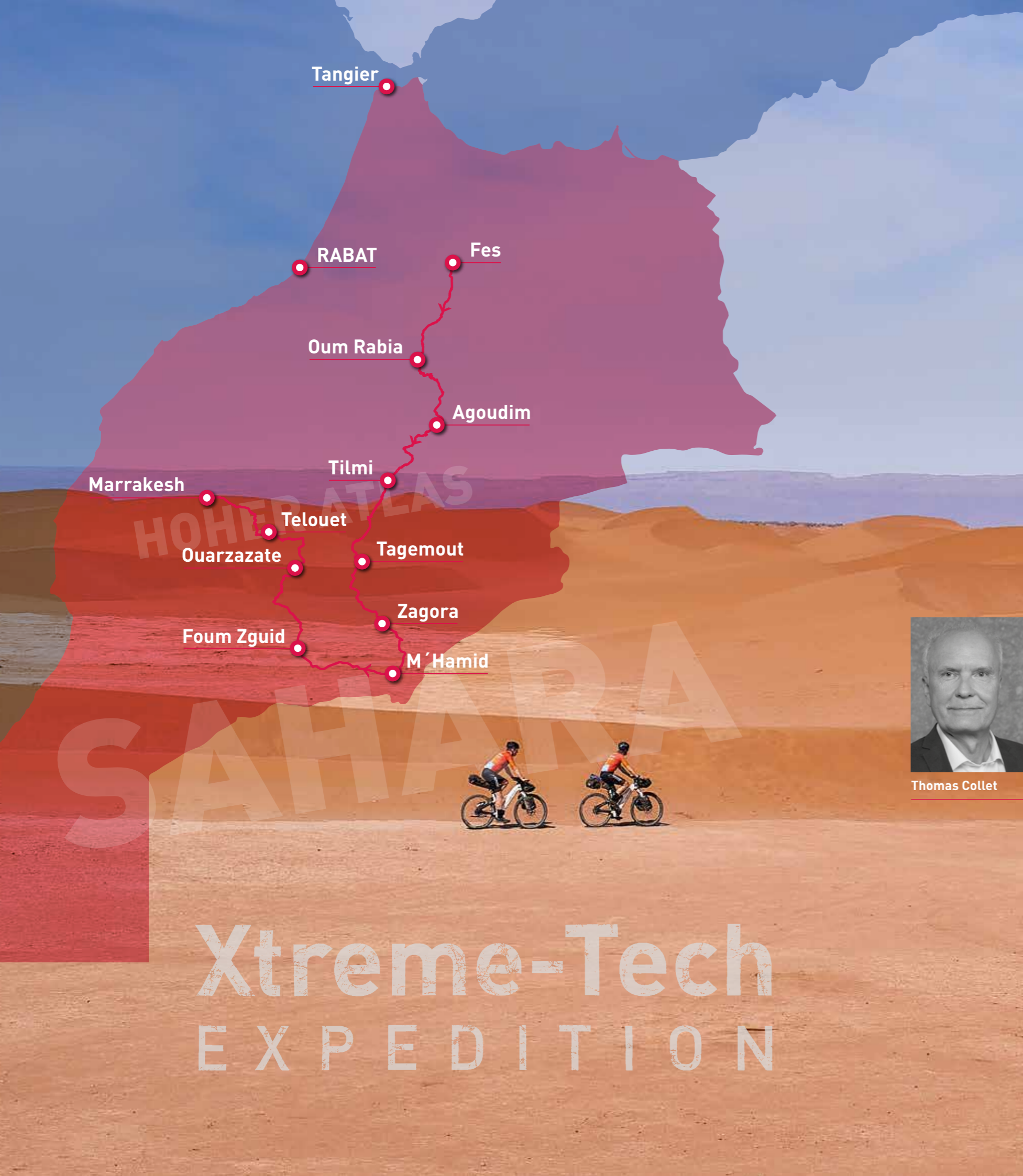
**Fès –  
Sahara –  
Marrakesch**

**10 stages  
1,400 km**



**Xtreme-Tech**  
EXPEDITION





# Xtreme-Tech EXPEDITION

It is with great pleasure that we present this travel report covering an extraordinary expedition that not only pushed the boundaries of what is possible, but also demonstrated innovation and team spirit. Three enthusiastic adventurers were out and about in the vastness of Morocco, equipped with e-bikes whose frames were made of thermoplastic, carbon fiber-reinforced plastic - a pioneering development in bicycle construction.

The Xtreme-Tech expedition was no ordinary adventure, as it also involved intensive testing of various materials and components. It was the result of intensive preparation, passionate dedication and the cooperation of numerous partners. Led by the LEHVOSS Group, a pioneer in the development of high-performance thermoplastic compounds, this project was a resounding success.

Morocco, the land of contrasts and untouched landscapes, was the ideal backdrop for this expedition. It led over rugged mountain passes, through picturesque oases and across the desert. Every kilometer was both a challenge and a reward - a chance to overcome limitations and experience the beauty of nature in its purest form.

The decision to equip our e-bikes with frames made of thermoplastic, and carbon fiber-reinforced plastic, proved to be a trend-setter. This innovative technology not only offers new design possibilities and mechanical resilience, but also a particularly high level of sustainability. Only the combination of pioneering materials and innovative design, as well as processing, made this technological leap possible.

However, an expedition like this would have been unimaginable without the support of our partners. Renowned companies from the bicycle industry, plastics technology and beyond, joined our mission and contributed significantly to its overall success. Their expertise, resources and, above all, their unwavering belief in our vision were the driving force behind every pedal stroke.

We are very grateful that we were able to successfully complete this expedition. This little brochure is intended as documentation and a reminder of the journey. I hope you enjoy reading it.



Thomas Collet

**Director Marketing,**  
Lehmann&Voss&Co. KG,  
Business Unit Customized Polymer Materials



As project manager, I am moved by the feeling of both relief and excitement at the outcome of such an extraordinary journey: our successful e-bike expedition, the Xtreme-Tech, through the fascinating country of Morocco. This project involved not only a challenging route through spectacular landscapes and untouched nature, but also the organization and cooperation of many companies and, of course, the riders themselves.

The idea of exploring Morocco on e-bikes may seem like a daring venture to some. But for us, it was an opportunity to cross borders and discover new horizons. What made this expedition so special was not only the breathtaking landscapes and cultural diversity of Morocco, but also the technologies that make our bikes so unique. Our bicycle frames, made of thermoplastic and carbon fiber-reinforced plastic, were not only light, robust and sustainable, but also proof of the possibilities and potential of innovative plastics.

Thanks to the comprehensive support we received, we were able to draw on technologically outstanding components from many well-known companies. This enabled us to design and carry out an expedition that was not only sustainable and environmentally friendly, but also trendsetting.

An expedition like this requires not only courage and determination, but also a strong organization and motivated participants. I would like to take this opportunity to express my deepest gratitude to all our project participants and, of course, the drivers. Their dedication, commitment and willingness to pull together made this expedition an unforgettable experience. The smooth organization, together with all our partners, has also been an enormous joy.

Each and every one of you has made an important contribution, be it through your technical expertise, your physical endurance or simply through your positive attitude and team spirit. Together, we have overcome challenges, conquered obstacles and shared unforgettable moments.

This expedition was not only a journey through the landscapes of Morocco, but also a journey to explore ourselves. It showed us what we are capable of when we stick together and focus on a clear, common goal. It inspired us to leave our comfort zone and break new ground. And it reminded us that true adventures begin where roads end and courage for the unknown begins.

May this expedition not only live on in our memories, but also serve as inspiration for future innovations and adventures.



**Eric Folz**

**Project leader Xtreme-Tech-Expedition**  
Business Development und Product Manager LUVOCOM LFT,  
Lehmann&Voss&Co. KG, Business Unit Customized Polymer Materials



David, Mike and Oliver (from left to right) in front of one of the venerable city gates in the old town (Medina) of Fes.



## The Buddies on the Buddy Bikes

### David Arlandis →

David was born in Spain. When he's not working as a civil engineer, you'll usually find him on a road bike, MTB or gravel bike. Prior to the Morocco tour, e-bikes weren't really his thing, but the buddy bike has made an impression on him. His conclusion: „The most important thing for me is that it is able to maintain an athletic spirit, with legs and motor supporting each other optimally. This leads to an elevated fun factor without excluding the necessary satisfaction for the exercise performed.”

### Mike Fuchs →

Mike is a photographer and experienced expedition manager. „For me, it's always incredibly important to be able to rely on the equipment and still have reserves in the material so that extremes can also be mastered. I know that there are many important features in and on the frame, big and small, that make it possible for me to concentrate on what is critical now. I couldn't believe that we were so fast and conquered the 3,500 meters of altitude – which I honestly had a lot of respect for during the planning.”

### Oliver Gehrking →

Oliver has been cycle racing intensively for over 25 years. Mainly on racing and cross bikes, but also on MTBs. The graphic design graduate, responsible for the design of the expedition clothing, was initially surprised that the expedition was to be carried out with e-bikes - „How am I supposed to justify this in my community?” – but then realized: „Setting the lowest motor power, putting a lot of pressure on the pedals, motivating yourself to always do a little more than the bike, is really fun. Training effect included.”





Stopover on the way to Barcelona. We have a look at the production of our clothing partner INVERSE. The design on the screen corresponds to our „Morocco expedition design“.

## From Berlin and Bremen to the Royal City of Fes.

- By train and catamaran from northern Germany to North Africa.

*The journey and stage descriptions are formulated from the perspective of Mike Fuchs.*

**Monday, January 29:** David and I meet at Berlin Central Station at 8:35 am. It's cold and I don't really feel warm on the 6 km route. But hey, we're soon sitting on the train for 6 hours to Saarbrücken, where we meet Oliver from Bremen. We both dismantle our bikes to take them on the train as normal luggage. The best thing: David is beaming with happiness just as much as I am.

**Tuesday, January 30:** Off we go by ICE to Paris (with a short bike tour of the city) and then by TGV to Barcelona. We spend the evening and the following morning with our clothing partner INVERSE and take a look at the production facilities.

**Wednesday, January 31:** We set off on our journey to Tarifa in the afternoon. Due to the batteries and the motor, the bike now weighs a few kilos, but can still be handled by one person. This is exactly what I had in mind. We continue overnight to Tarifa, where we arrive in the early hours of the morning.

**Thursday, February 01:** The ferry to Africa at 9 a.m. is ours. We have enough time to put the bikes together and attach all the bags properly. Yes, for the most part it really is just a matter of assembling them. The components on the bike are often designed so that everything fits together easily and everything sits firmly with a bit of cranking. The crossing is stormy and the huge catamaran ferry rocks a lot.

We cycle through Tangier City to the train station and dismantle the bikes again. It's great that the departure for Fes is almost every hour, so we arrive in the royal city in the evening. And yes, we are impressed by the Medina and our hotel. One last big dinner and then it's back to packing and charging all the batteries. Everything needs to be at 100 percent - because tomorrow is the longest day of our expedition. I fall asleep restlessly.

Expedition partner

## INVERSE to be more you, to „Be True“

**INVERSE** lives from and for athletes – and has done so for more than 50 years. We make sure that doing sport is fun. Founded in Barcelona in 1969 under the name CIRO SPORT, we produce high-quality clothing made from materials that are tailored to every type of cycling, triathlon and running sport and enable optimum performance in training and competitions.

**INVERSE** stands for the highest quality clothing and original designs. All departments – design, pattern making, printing and tailoring – are under one roof, use the latest production technologies, and are subject to strict quality controls. As a result, the best athletes choose us. For example, INVERSE equips the Spanish Olympic and national teams, as well as professional teams. The close contact with our users enables us to recognize trends early on and to offer products that best meet the requirements and needs of the athletes. Today, our products are available in more than 25 countries.



**INVERSE** Germany  
GuS Sportmarketing  
Oliver Gehrking  
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www.inverse-teams.de  
www.inverseteams.com





Electricity for the batteries, water for us. In the riad - a traditional Moroccan house - we make the final preparations. Typical of a riad are the numerous „zellige“ (from the Arabic: „small polished stone slab“).



## Goodbye Fes. Hello Loneliness!

- 164 km and 1,500 m of altitude lie ahead of us.



After the alarm clock rings at 7am and a big breakfast (outside temp 9 degrees), we are on our bikes at 9am. The way out of town takes 1.5 hours - which is annoying. Then we make good time – until David crashes. Oliver and he get tangled up, but apart from some scrapes and a slight bruise, everything is ok. The landscape passes by. First, agriculture and olive groves, then it becomes more mountainous and desolate. We stay on the road heading south, saving 10 kilometers of gravel road.

We only change the e-bike batteries at lunchtime. Oliver hardly uses the assistance, which is why we regularly wait a few minutes on the passes. We glide along on

asphalted roads, as motorists wave to us. Finding accommodation is difficult and we eventually reach a dark house around 7:30 pm. „Hello, anyone here?“ ... A man appears. He answers our question in the affirmative, conjures up a great soup for us and offers us three wonderful beds – and electrical outlets! – .

### HIGHLIGHTS

- Exceptional phone reception
- Fast LTE network
- A house full of chrome. It shines everywhere.

#### Expedition partner



ZF is a global technology company. We supply mobility systems for passenger cars, commercial vehicles and industrial technology.

**ZF Micro Mobility GmbH**  
Escher-Wyss-Straße 25  
88212 Ravensburg  
Germany

In the four technology domains of Vehicle Motion Control, Integrated Safety, Automated Driving and Electric Mobility, ZF offers comprehensive product and software solutions for established vehicle manufacturers and newly emerging transport and mobility service providers. We are constantly driving our transformation forward with focus and speed. The increasing presence in global growth markets, investments in high yield products and future technologies as well as an efficient and resilient organizational structure are top priorities. In short, we are continuously expanding our strengths. This also includes the Group's unique ability in the market to transfer innovations and technologies across segment boundaries.

The ZF Group is represented with 162 production locations in 31 countries. With some 168,700 employees worldwide, ZF reported sales of €46.6 billion in fiscal year 2023.





# Xtreme-Tech EXPEDITION

## After Downhill Comes Uphill Again.

- 2 passes with 3,500 m of climbing ahead.

Breakfast – attach your luggage – switch on the navigation app. That’s how we start the day. The first 700 m downhill. Now we’re in the middle of the Atlas Mountains.

In the last two days, we’ve been on the bikes for a good 10 hours. That’s actually too long – it shouldn’t be more than 8. All the better that we can really rely on the equipment and components and that there are no handicaps at the moment.

We ride the bikes through calf-deep water and also take them well downhill. We don’t hesitate and rely on the equipment - even if it takes a hard knock.

It’s already dark again when we reach a small mountain village. My sat nav takes us down a side road in the village. We only have 11 km left in the battery. We enjoy a shower with hot water. The alarm clock is set for 01:00 – time to change the battery. There are proper comforters and a clean pillow here.



## HIGHLIGHTS

- We are already expected with drums and singing from young and old
- The smart phone makes it possible ...

Expedition partner

## BIKE ERGONOMICS

**ERGON** is the leading innovator in the field of ergonomics for the contact points between rider and bike. Our products ensure less pain, better control and more riding pleasure. We offer the best ergonomic bike components for every discipline, whether touring, road or mountain bike. Through intensive research and close co-operation with cycling professionals from various disciplines, Ergon has developed ergonomic products that relieve the problem areas of the body and are comfortable to ride. The special features of the individual disciplines have been taken into account.

As a result, Ergon’s products not only provide maximum relief, but also enable greater performance with optimum control of the bike. Gender-specific saddles, handlebar grips, pedals and other ergonomic accessories are developed, tested and often produced in Germany. Ergon – Beyond better.



**Ergon International GmbH**  
Am Autobahnkreuz  
756072 Koblenz  
Germany





At the highest point of our tour: the Tizi-n'Ouaro Pass, over 2,900 meters high in the Atlas Mountains. It connects various valleys/regions with each other and plays an important role as a transport route or trekking route.



## Down the Mountain at 40 km/h.

- The first flat tire forces us to make a 6-minute pit stop.



We are now at an altitude of 1,900 meters and the temperature is -2 degrees. The sky is cloudless again. We had actually planned for snow and rain in the Atlas Mountains ... After our obligatory photo and a self-drive attempt by the hostel manager, we set off. First thing in the morning, we cycle up to 2,300 and then 2,900 meters. One magnificent mountain panorama after another.

Of course – I get my first flat tire on the rapid descent from the 2,900-metre-high pass. Too bad, it was just so much fun to ride down 24 km in one go at up to 40 km/h on loose stones and gravel. Dust really means dust on this stretch. The tires sink a good 15 cm into a very soft brown-grey dust.

Even after 5 hours non-stop in the saddle, we don't get exhausted or feel any tired body parts. The bikes are perfectly adjusted to us. We can concentrate fully on the ride and enjoy it.

## HIGHLIGHTS

- Spectacular sunshine again instead of the expected miserable weather
- Spontaneous accommodation found along the way

Expedition partner



## SMALL PARTS ACHIEVE BIG IMPACT

**baier & michels**  
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Carl-Schneider-Str. 1  
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products@baier-michels.com

With 500 employees at nine locations worldwide, the **baier & michels Group** (b&m), headquartered in Ober-Ramstadt, supports the manufacturing industry with fastening solutions. The basis is formed by high-quality cold extruded parts such as direct screwing systems and sealing elements developed and produced in-house. The small parts have a major impact on the inner structure of assemblies: they optimize the interplay of quality, cost efficiency and ecological balance.

The company's customers include manufacturers and suppliers, primarily from the automotive, plant engineering and electrical, agricultural and construction machinery sectors. b&m also offers connection testing in its own laboratories, application technology consulting and specialist training. As a member of the Würth Group, b&m not only stands for innovative spirit, but also for stability and social responsibility in terms of sustainable operations.



# Xtreme-Tech EXPEDITION



Along the picturesque winding roads of the Dadès Gorge. It owes its name to the river Dadès, which flows through it. The Dadès originates in the High Atlas Mountains and runs through the gorge before flowing into the Drâa River.

## Everything is Actually Going Great Today ...

- Aggressive dogs and brilliant hosts.



Our navigation device indicates a rideable route, but then the road simply stops. For 5 km, we alternate between pushing and riding until we come across the wide tracks of an off-road vehicle. We use the path to continue along.

Shortly afterwards, David has an encounter with three aggressive dogs. Oliver and I are about 80 meters behind him at that moment and are not noticed. The dogs chase David at 28-30 km/h along the gravel road. They only let go of him after several hundred meters. Completely out of breath – just like us, in fact.

At our hostel in the evening, after 3 hours of searching for cables, the batteries are charged using an ancient diesel generator. It can produce 220 volts via a leather belt and a long shaft.

It is a long and wonderful night. We are at an altitude of 1,700 meters and there is hardly any ambient light. The starry sky – even the Milky Way – looks accordingly; absolutely overwhelming.

### HIGHLIGHTS

- Once again, hosts who really do everything they can to support us.



Expedition partner

## KEEP ENJOYING!

Do you need protection from the sun, wind or rain for all your outdoor activities? Do you want to climb mountains, run a marathon or simply cycle to work? Then **BLOOVVS EYEWEAR** is perfect for your every need. Contemporary but also classic designs, maximum functionality thanks to flexible materials, high-quality technologies for polarized or photochromic lenses – maximum performance at attractive terms. Be authentic!

Custom design? No problem! Sunglasses in a color that matches your team apparel with your team or club logo? Or exactly in your company color with company branding? We can realize this for you personally and individually. Perhaps you need larger quantities for your team, your club or for an event? Maybe you are looking for an attractive give-away at attractive terms for your customers or employees? We are committed to delivering good solutions.



**BLOOVVS** Germany  
GuS Sportmarketing  
Oliver Gehrking  
Am Tabakquartier 62  
28197 Bremen

[www.bloovvs.de](http://www.bloovvs.de)





## Oliver Gehrking on his Experiences with the Buddy X1:

„For me, the Buddy X1 is a sophisticated piece of sports equipment. Sophisticated in terms of the ability to precisely control your own power input/performance and thus adapt the personal „training effect“ – or battery power – exactly to your needs.

It is not at all demanding in terms of maintenance/care. In the first few days, we kept „reminding“ ourselves to allow some time for material maintenance in the evening. We did that too – but then quickly abandoned it completely. For one straightforward reason: there was simply nothing to maintain.

### Two flat tires in 4,200 kilometers. That was it.

The riding position is relatively flat, leaning forward, with an even weight distribution on the hands, arms and buttocks. During a bike fitting by our expedition partner ERGON in the fall of 2023, each of us had found

our optimal position with millimeter precision. And in fact, I didn't have to change this position at all in preparation for the expedition and during the ride through Morocco.

The factory-fitted suspension seatpost was superfluous for me in this context and was replaced with an unsprung one. The fixed stem was retained. The optimum tire pressure, good riding technique, and flexible shoulders, as well as arms, were enough, at least for me, to compensate for rough bumps comfortably and safely.

Off-road, with steep climbs on loose ground, the strong motor power - and the associated higher speed - clearly provided more riding safety. And on my last tour with the Buddy X1 – from Weyhe near Bremen to LEHVOSS in Hamburg with minimal motor support – the battery charge was still 60 percent after 130 kilometers.”

## Buddys Big Data

### Spec Buddy X1 Rohloff

- FRAME**  
 Material LUVOCOM® (thermoplastic polyamide reinforced with carbon fiber), frame designed by Eker Design Norway, frame size Unisize with a height of 155 cm to 205 cm
- FORK**  
 Rigid carbon tapered, Thru axle Ø 15 x 110 mm
- CONTROL BEARING**  
 Semi-integrated for 1 1/8" - 1.5 (Ø 44mm top Ø 56mm bottom) for tapered forks
- WHEELS**  
 Rim Ride Andra 321 – 21C x 622, spokes Sapim Race, front hub Bitex – Thru Axle Ø 15x110, rear Rohloff Speedhub QR 135mm
- MOTOR SYSTEM**  
 Sachs ZF, motor RS 48V 250W 112NM, Sigma View 1200 display, Sigma EOX 500 remote, BMZ 48V 650Wh battery
- BRAKES**  
 Shimano XT 8100, brake rotors Ice Tec R86 Ø 180mm
- DRIVE**  
 belt Gates CDX system transmission, motor pulley 50T rear pulley Rohloff Speedhub 19Z
- TIRES**  
 Vittoria Mezcal 29 x 2.1 tubeless, maximum size 55-622



Expedition partner

Buddy Electric are specializing in e-mobility products. We started production of the Buddy M9 micro car in 2001, and was making this until 2014. After 2014 we started with e-bikes, and has manufactured bikes the last decade.

Since 2020 we started with the X1 project and injection molding of bike frames. We have now succeeded in setting up a serial production of this model, and are proud to present one of the most environment friendly e-bikes on the planet.

**buddy**

**Buddy electric AS**  
 Økerntorgvei 1  
 0580 Oslo  
 Norway





Change of scenery: in the morning, breathtaking canyons with gravel and dust, from midday „flat land“ take us in a straight line towards Zagora, a town of 40,000 inhabitants on the edge of the Sahara Desert. Zagora is primarily known as a starting point for desert tours and camel safaris in the surrounding desert areas - including Erg Chegaga, one of the largest sand dunes in the Sahara.



Expedition partner

## FESCHD

### PERFECTED FOR YOUR EVERYDAY SPORTING LIFE

FESCHD GmbH  
Waltorstraße 57  
35390 Gießen  
Germany

www.feschd.com

With the mobility transition, the bicycle is gaining in importance. It is becoming increasingly digitized in order to navigate, display performance data and much more. However, previous solutions for connecting to the bike are impractical, unsafe and cumbersome.

That's why we developed FESCHD: a patented cell phone holder system that is safe, simple, fast and versatile. Your cell phone can be attached to your bike effortlessly and reliably within a second, while offering practical functions for your everyday life.

Our goal is to get more people on bikes, especially in developing countries. With the proceeds from the sale of 50 cell phone holders, we finance a bicycle and make people mobile. Sustainability is important to us, which is why we rely on the „cradle to cradle“ principle and produce from recycled plastic, locally in Germany.

FESCHD makes cycling more comfortable, safer and more sustainable.

## Will the Batteries Last Today?

- With only 80 % charge, it's off to the next strenuous pass.

A tractor wakes us up at around 5 am. But we stay in bed until 7 am. At breakfast we learn that the tractor ride was for us - our host has fetched some extra breakfast and drinking water from the neighbor. We are always impressed by the helpfulness of the local people. Many have almost nothing and give their all just to make sure their guests are well.



In the evening in Zagora, we look for a place to stay on the side of the road. Suddenly we are approached by a Moroccan. It turns out that David went on a bike tour with his boss 20 years ago. Everyone laughs. We get great accommodation through the gentleman – even with a pool. David is the first to land in the cold water. Electricity, a warm bed with its own comforter and hot water in the shower. We are thrilled. There's even soap again. We are overjoyed.

## HIGHLIGHTS

- The batteries have held out.
- We glide the last 40 kilometers into the city.





The first sand dunes await us south of Zagora, on the way towards M'Hamid – also known as the „Gateway to the Sahara“.



## The Last Day before the Great Sandy Desert

- Relaxed during the day. Slightly tense in the evening.

It's a good 93 km to the next accommodation just before M'Hamid. The kilometers are done quickly and in the afternoon we relax and check the equipment.

The bikes are checked for dust, sand on the belt and tire damage. The engine is well sealed and doesn't cause any problems. We tighten the grips and the stem/headset every now and then and only clean the inside of the panniers. After 20 minutes of riding, everything is dusty again anyway.

The accommodation has palm trees everywhere, which provide plenty of shade. The day before, we were freezing in the mornings and evenings in our weight-optimized clothing. We can no longer imagine that here.

We haven't seen a cloud in the sky for 7 days here in Morocco. It's supposed to stay that way, but there's now a south-westerly wind for the next few days. This is actually our direction and so we fall asleep in the evening with a bad feeling.

### HIGHLIGHTS

- We don't have to do anything today.
- The feeling of wanting to stay longer.

Expedition partner

## HIGH-END PARTNER FOR MACHINING

**Hufschmied Zerspanungssysteme** has over 30 years of experience in the development and production of process-optimizing, material-related tools. Our strength is to advise our customers in their efforts to achieve the best possible manufacturing process and to optimize the processes in partnership with tools such as milling cutters and drills of the highest precision.

It's not just about the pure tool geometry, but we not only advise, develop, program, train and commission tools with our customers, but we also establish significantly more efficient processes not only on the machines, but also in the mindset of our customers.

**HUFSCHMIED**  
ZERSPANUNGSSYSTEME

**Hufschmied Zerspanungssysteme GmbH**  
Edisonstraße 11 D  
86399 Bobingen  
Germany





Xtreme-Tech  
EXPEDITION

## The Sandstorm Stage to the Riad

- There is only peace and quiet before and after the storm.

Expedition partner



### CONTINUOUS PLEASURE OF NEW EXPERIENCES.

Rohloff was founded back in 1986 as to enrich the cycle trade with products reaching far further than a short-lived trend. Every Rohloff product that exited our premises has been subject to our intensive quality control that ensures you the cyclist, are able to enjoy ten's if not hundreds of Km's cycling enjoyment. This quality has countless fans and loyal customers over the last 30 years and has taken touring cyclists to the remotest regions on the planet.

Everyday consumers, have put their faith in Rohloff products thanks to the low maintenance offered. Enjoy the 14 speed Rohloff experience yourself with a SPEEDHUB 500/14 equipped bicycle – regardless of E-Bike, MTB, Fatbike, Tandem, Trekking bike, Cargo bike ...

**Just Facts** – Almost 100% of all components required for Rohloff products are produced exclusively in Germany by one of 150 specially selected, HQ partner. Every individual component must successfully pass a stringent quality control process before moving on through our facility to become part of an exclusive Rohloff product. The Rohloff HQ is located in central Germany. Over 60 individuals are employed here, all ensuring the constant high production quality of our products.



The huge wall on the horizon is still around 20 km away from us at first. But it gets noticeably closer. Then the sandstorm hits us full force. Visibility shrinks to 100 meters, then you can't see more than 15 meters ahead. The tube scarves and sunglasses protect us a little from the billions of grains of sand, which turn us more

and more orange-brown. It is difficult to see and think clearly. The wind is penetrating us too much. Don't lose the team now.

We fight our way forward hour after hour and are overwhelmed by the engine that keeps pushing us forward. Every now and then we see the sun in the sky through a thick filter of sand. It's actually still a sunny day. Just with a 50-meter-high layer of sand above us.

It's 9:30 pm. We don't know how we made it, but we have arrived at our traditional Moroccan riad. After a sugary drink and a tajine, we fall into bed and enjoy the night.

### HIGHLIGHTS

- The engines that simply carry on as if nothing is wrong.
- We don't have to sleep in a sandstorm.





Withdraw money – fill up with drinking water – remove some sand from the ball bearings. Then continue north.

Our motto today: stay on paved roads. Too much dirt road yesterday! We make very good progress and make optimum use of the engines. Our average speed is a solid 23 km/h. That makes a difference: We whizz up and down the mountain passes at a decent rate.

Around 4 pm, we discuss whether we can make the 60 km to Ouarzazate. At the current speed, we would be there around 7 pm. That's what we do. Two more passes and then only downhill. As far as the town.

## Things Are Running Smoothly. Despite the Headwind.

- 12 km before the finish, the wind turns into a confrontation course.

A good 12 km before the finish, however, the wind has an easy game with us. We ride right up against it. What an ordeal so close to the end! We make it to a kind of campsite with some permanent accommodation. The food is delicious, but is so closely supervised by a member of staff that hardly anyone dares to take a second piece of bread.

## HIGHLIGHTS

- Asphalt. • Asphalt. • Asphalt.

Expedition partner

## 1982. THE START OF AN ORIGINAL.

**More than 40 years characterized by inventive spirit.** Unconventional, innovative, visionary – this is what ORTLIEB Sportartikel GmbH has stood for since 1982. Driven by founder Hartmut Ortlieb, who, together with today's more than 300 employees, has chosen his very own ORTLIEB path to find new solutions.

**Keep dry what you love. Waterproof – without compromise.** We now have over 40 years of experience with waterproofing. ORTLIEB's production technology isn't the only thing that's special about us - we apply for a large number of patents every year and never run out of ideas.

**Our roots and our future in one place – Made in Germany.** All over the world, ORTLIEB stands for the honest promise of waterproof, durable outdoor equipment. All waterproof products are manufactured sustainably at the campus in Heilsbronn, because „Made in Germany“ is our brand promise for high quality, regional jobs, environmentally friendly production, respectful cooperation and a high level of innovation.



**ORTLIEB Sportartikel GmbH**  
Rainstrasse 6  
91560 Heilsbronn  
Germany

[www.ortlieb.com](http://www.ortlieb.com)





We pass the Noor solar power plant. The sun shines on the approximately 500,000 collectors of the 25 square kilometer plant, practically 365 days a year.



## Our Second Last Day on the Bike

- The Atlas Mountains show us their most beautiful side

We really want to see the Noor solar power plant near Ouarzazate. We drive directly along the road with the many panels and are impressed by the glistening brightness and size. What an enormous amount of power is produced here every day. Without any noise, without any stench, without any further pollution. We look forward to the future! Both the landscape and the trail are special. At first there is still a lot of sand and dry vegetation, but it becomes greener and more beautiful the higher up you go. It's really beautiful here. Hardly any civilization, endless plateaus, deep valleys, and snow on the mountain peaks.

We stop off in a large mountain village and happen to find the accommodation that was still being used by some of the Atlas Mountain Race (AMR) participants earlier that morning. We meet the AMR organizers by chance and are pleased to see that an outsider is leading the field by a wide margin.

### HIGHLIGHTS

- [Cycling in the Atlas Mountains](#)
- [Spirit of Noor](#)

#### Expedition partner



**Mike Fuchs Fotografie**  
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 fuchs@mikefuchs-fotografie.de  
 www.mikefuchs-fotografie.de

With an insatiable hunger for discovery and an unerring eye for the beauty of the unusual, Mike Fuchs Photography has traveled the world to reveal its secrets. His photography is characterized by a combination of technical sophistication and a deep understanding of the emotional nuances of the moment.

Through his lens, the majestic peaks of mountains become tangible reality, the fleeting moments of sunsets become timeless masterpieces, and the hidden corners of the world become stages for epic stories. Each image tells of a journey, be it through untouched landscapes, quiet deserts or the souls of the people he meets.

His expeditions are not just physical journeys but also spiritual pilgrimages that lead him to look beyond the surface of things and capture what is essential.

Immerse yourself in the world of Mike Fuchs' photography and let yourself be enchanted by the beauty and depth of his images. Because through his stories, the ordinary becomes extraordinary and the unknown becomes a source of endless inspiration.





## Towards the Finish Line at Almost 70 km/h.

- A wonderful end to an impressive expedition.

Once more up to 2,250 meters and then down to Marrakesh. We are now going so fast uphill that we are reaching the limit of the engine's assistance. That's around 26.5 km/h. The trucks don't look bad when we pass them instead of them passing us. We take it in turns to ride the last 30 kilometers in the slipstream and arrive in the afternoon.

In the evening, we eat everything we haven't had in the last two weeks. Interestingly, we like the simplest local food best. The lentil soup in the workers' soup kitchen is one of the tastiest things we find here in Marrakesh.

All three of us are really looking forward to going home, so it's a long last evening. First conclusion – what did we experience? Nothing dramatic (apart from the dogs and the sandstorm). But that's exactly how it should be. That's how we planned it. Maximum adventure, minimum loss.

### HIGHLIGHTS

- The wonderful feeling of flying uphill and downhill more than riding.



### Expedition partner

The company's production program extends to the industrial painting of parts for the well-known automotive industry as well as for other industrial customers. The painting can be done classically by hand, automatically using the Venjacob automatic surface spraying system or using the robot spraying system.

We are active in the small mass segment but also in individual painting. Better and consistent quality, delivery reliability within the agreed time frame and cost reduction on one hand, more intensive trust-building customer-supplier relationships on the other hand, this is how we see our contribution to achieving customer satisfaction.

#### Coating specifications:

- » Processing of all known coating systems on plastic and metal surfaces.
- » Automatic coating of front and rear possible,
- » Part dimensions H300xW800xL800 Venjakob, H500xW1000xL1200 robot system,
- » Manual coating also possible for larger formats.



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## The Buddy X1 Bicycle Frame – The Material

As structural components, bicycle frames are subject to strict testing standards. Ideally, therefore, all the requirements that a bicycle must fulfill over the course of its life should be taken into account as early as the material development stage:

- The material used should represent an optimum effective balance between strength, stiffness and impact energy absorption,
- It must be processable using water injection technology (WIT) or conventional injection molding,
- Finally, be able to be optimally painted, and
- Both CO<sub>2</sub> footprint optimization and recyclability should be taken into account from the very beginning of development.

This results in a highly demanding set of requirements that cannot be met with classic „off-the-shelf“ materials. For particularly sustainable products, it is ideal

if these technical and high-quality materials already contain recycled content. An art that we at LEHVOSS know very well.

In many cases, we also manage to produce locally, so as not to burden the CO<sub>2</sub> balance with unnecessary transportation. One special feature is our own production plant for recycled materials. Here we process all raw materials for production and are also able to create a truly closed cycle for bicycle frames: The processing of bicycle frames at the end of their life, in order to produce new high-quality recycled plastic pellets from them.

Our product range includes such tailor-made materials for the production of bicycle frames (see table). LEHVOSS will continue to translate the industry's new technical requirements for frame materials and other components into suitable compound solutions and develop customized solutions.

LUVOCOM® Type <small>optimiert für Wasserinjektionstechnik (WIT)</small>	PA66-rCF-WIT	PA66-rCF/GF-WIT	PA66-XCF-WIT
<b>Reinforcing Fiber</b>	<b>Recycled Carbon Fiber</b>	<b>Recycled Carbon Fiber Glass Fiber</b>	<b>Carbon Fiber</b>
<b>Differentiating Features</b>	smallest CO <sub>2</sub> footprint, highly modular	favorable tensile modulus to impact strength ratio	highest strength and toughness, highest tensile modulus
<b>Material data</b>			
<b>Tensile Strength MPa</b>	285	290	340
<b>Elongation at Break %</b>	1.0	1.5	1.5
<b>Tensile Modulus GPa</b>	40	30	40
<b>Charpy Impact Strength kJ/m<sup>2</sup></b>	50	65	90
<b>Charpy Notched Impact Strength kJ/m<sup>2</sup></b>	9	12	15
<b>Carbon-Footprint* kg CO<sub>2</sub>-Äq.</b>	4.70	4.60	15.80

\* ref. DIN EN ISO 14040, 14044, 14067

### Expeditionspartner



## YOUR EXPERT IN THE WORLD OF CHEMICAL AND MINERAL SPECIALTIES.

The LEHVOSS Group develops, produces and distributes chemical and mineral specialty products worldwide. Founded in 1894 as a trading company in Hamburg, the LEHVOSS Group has built up an international reputation in its 130-year success story and operates production sites in Europe, the USA and Asia.

From the initial idea to the finished product, the Customized Polymer Materials division has been setting outstanding records in the industry since 1983. The specialty of this agile unit is the development of plastic materials for technical applications that perform far beyond the usual market standards. The interdisciplinary development team uses a wide range of polymers, reinforcing materials and additives, state-of-the-art laboratory and application technology and a huge wealth of experience, intuition and passion for the perfect solution. [www.lehvoss.de/compounds](http://www.lehvoss.de/compounds)

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# Xtreme-Tech EXPEDITION





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