TECH TRICKS WITH TETRICK

"Whatever is making you uncomfortable or ruining the fun, just change it." All the gear, some fine ideas and lessons in life from gravel royalty Alison Tetrick

words by
DAN CAVALLARI

If you were to choose a location in the United States to host a premier cycling race, Emporia, Kansas would not likely top your list. It's situated in the midst of the flattest part of the United States, which does not exactly scream cycling glory.

Yet, this tiny city has become an off-road Mecca, welcoming Unbound Gravel, the most prestigious gravel race on the calendar. Emporia has embraced its new notoriety with vigour, welcoming thousands of cyclists from around the world to a main street that blasts cycling culture and Americana, standing out with its stars and stripes flags, parking spaces full of pickup trucks and old-timers on park benches enjoying the buzz.

The race, which takes place in early June every year in the heart of the Flint Hills, treats riders to some aggressive gravel roads – sharp rocks, deep ruts full of loose stones and often puddles of muck, steep kickers to make the legs scream, and heat that sucks the life force out of the strongest riders – plus long miles through pastoral scenery, a long way from civilisation. The winner of the 200-mile version of Unbound will be in the saddle anywhere from ten to 12 hours; the 350-mile champions will come in around 24 hours after the start.

Two days before the 2021 edition, I met with former winner Alison Tetrick in the garage of her AirBnB. Tetrick started her racing career on the road in 2009 with US stalwart Team Tibco. Her palmarès include first place at the Tour Femenino de San Luis and a stage of the BeNe Belgium Tour, both in 2015. After retiring from the road two years later, this attacking competitor discovered gravel racing.

Helped by her big time-trial engine, Tetrick took home top honours at Unbound Gravel in 2017, third place in 2018, and second in 2019. This time round, Tetrick rode a special-edition Specialized Diverge. The paint scheme harks back to Specialized's first 'gravel' bike, the RockCombo, which hit the market in the early 1990s — well ahead of its time. However, aside from the looks, everything

else is modern and rapid. After all, in gravel racing, comfort is a priority alongside speed.

Alison gave me a rundown of her bike and the gear she carried with her during the marathon race, which includes a Camelbak Chase vest with some well-chosen tools – and a flask of whiskey...

ooo

Shock jock

"My Specialized Diverge has a Futureshock 2.0, so it offers a little bit of travel. You can lock it out and have it stiff or you can just get, like, 20 millimetres of travel, which is really nice. And for me that's important, because smoother is faster, and as the day gets long, you're constantly getting drilled by the Flint Hills.

Another important part of it is the huge tyre clearance. You can basically put mountain bike tyres on and the bottom bracket's high. So you're not clipping your pedals as much. The fork rake is nice and subtle.

There's some really fast sections where the gravel doesn't look intimidating, but it's just constantly grinding on. You need a really tough sidewall on your tyres. It gets chunky in some sections, but it's all rideable. It just wears on you.

But then by the end of the day, everyone's like, oh, so you locked out your shock? And I'm like, no, I just leave it open all day. All the comfort, the better. Your back hurts a little less, your hands are numb."

Under pressure

"I ran 42mm Pathfinders. They still have that really good, tough sidewall and in the centre is a smooth tread. Colin Strickland won on Pathfinders in 2019. They're strong enough to take on the course. But the rolling resistance is minimal, yet not compromising the integrity of the tyre.

There's a lot of luck involved out there. I joke that I don't want to know my tyre pressure because it stresses me out. Like, just give it your blessing! Sprinkle the water, or, whiskey, or whatever, on the bike. Just tell me it's going to be okay. But I think it's about 39, 40psi, a little less pressure up front than the back.

Coming from a road background, it was really hard for me to have that low tyre pressure. So when I won Unbound in 2017, [friend and training partner] Craig set my pressure and I told all the journalists I was running 50, 55, 60psi. And he's like, '30!'. But in my head, coming from a road background, where I like 88, 90, that's what I want.

So the thing about gravel: just lower your pressure. That's my biggest tip: the lower the better in so many ways.

I don't run tyre inserts. I use orange seal. So obviously, tubeless. I don't even know if that's a question any more. I used to race on 23mm. And then, as my racing career went further, I realised how much faster I was in these Flemish races with wider tyres. And so my Spanish mechanic used to give me 28s, 30s, because I was more comfortable and I was actually better."

Plugging away

"My saddlebag is completely stocked with everything, too. If you have a plugging system

right where your food goes — because I have the Camelbak Chase vest, I just have it immediately to push air in after it's sealed, and not panic.

I'm just trying to be prepared to be as quick as possible. So it's just learning how to use it. And I'm still terrified to use those tyre plugs like that. You have to stab those in and try to practise. But you can do it. You get the adrenaline and do it. It's counterintuitive, like your brain does not wrap around it at first. It's not rocket science, right? It's just riding bikes."

Whiskey and wheels

"The Roval Terras are so nice, really wide carbon wheels. They offer great compliance. Once again, smoother is faster, so anything we can do – wider tyres, tough wheels that really absorb, because you don't want to be breaking a spoke out there. It's crazy what happens on this course.

In 2019, I flatted three times and one was just like a stake. That wasn't catastrophic though. I still got second. Three flats and I'm just on the side of the road watching people pass me, and I'm like, 'Have a good race!'

That's where the whiskey flask comes in. You can still have a great day. That's the point. But if you're putting a tube in, it's going to be a long day, and it hasn't gone your way.

You know, I've passed world-class riders putting tubes in, and it's not their fault, it's not their equipment's fault. These rocks are just strangely aggressive. I didn't know what that meant until I met them. The gravel is sublime, it's great gravel. But it's sharp, sharp, sharp."

An absolute sitter

"The Specialized S-Works Power with Mirror Technology is my favourite right now. I work with Specialized in product development. We launched Mimic technology, which was amazing. And we have kept pushing that envelope on saddle comfort and soft tissue, because we all have soft tissue down there.

I'm riding the 155mm Mirror saddle. Don't call me wide! It takes our same concept of the Mimic technology, where instead of having a cut out, it still has a nice cushy fabric, and it's just soft. So it's a 3D-printed saddle."

Thrill of the Chase

"I have my Camelbak Chase vest with my snacks. I do a Bento box for easy access – I guess, a top tube bag. Your pockets get a little less crowded and full of food. You need a lot of snacks because now there's only two aid stations at Unbound, so you're not seeing your aid for four hours at a time.

It's so funny because roadies make fun of that, because it's such a triathlon thing, and now it's like the cool thing. Gravel has made a lot of things cool that were not previously cool. Like me!"

Flip reverse it

"In road racing, you have your neutral rollout, which is never neutral if you're racing in Belgium. Everyone starts jockeying for position, and then it's kind of hard, and then the break goes, and then you sit up and have snacks. Then you have to get ready for the finish.

In gravel races, take that and flip it. You get to frontload a little bit. I'm like a metronome. I feel every surge. You start Unbound, which is 206 miles, and they're going so hard and I'm looking at these guys thinking, I'll be showered with four beers and you're going to still be out there. Why are you putting me in the gutter?

You have to race the first part hard, so it's a reverse of road racing. In road racing, you start having your paninis and your snacks, and then you switch to just gels to the finish.

Gravel's the opposite. We start like we're racing a criterium. I don't know why. I still plead with people to not do that; settle down, people! It's gonna be a long day out here..."

Feed to succeed

"I start the event taking on more race food. I actually put electrolyte in my Camelbak Chase Vest, in case I lose a bottle too. I don't want to put all my nutrition in them.

I also have calories in my Camelbak and I try to do about 250 to 300 calories an hour, which my stomach can handle. I get a little bloaty and at about hour six, my quads start hitting my stomach. This is bad.

But it's nothing to do with the nutrition, it's just a matter of absorption and enough hydration. So as a rule of thumb, I always drink at least one bottle an hour. Also, I'm carrying 1.5 litres of fluid on my back and then two bottles, and 200 calories.

You can slip some calories in your bottle or your hydration pack and combine that with gels or whatever. The starts are really stressful. So that's where the hydration pack comes into play, because you're starting at six in the morning with 1,000 people: it's dark, people have little lights on, and there's dirt and dust. So it's easier to drink out of.

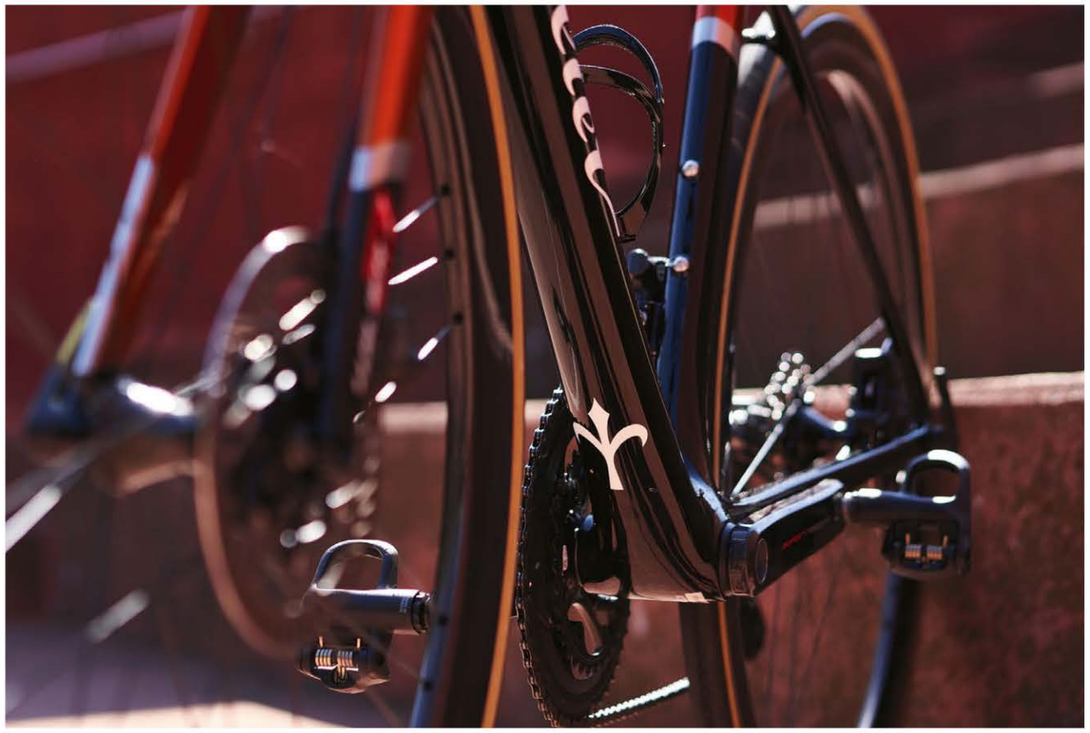
Once I get past the four or five-hour mark, you're by yourself, or in small groups. That's when I'm ready to have a bar or a *stroopwafel*. I start eating a little more real food instead of gels.

The Camelback Chase, that's key. They actually have a women's-specific design, which is really cool and helpful. Shockingly, women have different chest sizes than men!"

Hippy, hippy shake

"To be frank, most of the time, I don't need the hip flask. So it's not like I'm nursing a flask, alright?!

I need to remember I'm just riding my bike and it's supposed to be fun. And if I wasn't having fun, I'd change it. If I'm taking myself too seriously out there, just stop, and whatever is making you uncomfortable or ruining the fun, just change it." ●



WILIER TRIESTINA 0 SLR

Long live Italy, liberated and redeemed!

We'll forgive you for not knowing Wilier is an Italian brand — where's the telltale vowel at the end? — or that the name is an acronym for that bold rallying cry (*W l'Italia liberata e redenta!*). You can also cut yourself some slack for not knowing why that unusual grouping of letters is attached to another word, Triestina, based on the border city 200 kilometres from Wilier's headquarters in Bassano del Grappa.

Suffice to say that the Wilier Triestina moniker is a hopeful one, built upon a desire for union after World War II. Trieste had been invaded by Yugoslavia in 1945, but the company's founder Pietro Dal Molin had a patriotic hope that reintegration into Italy was possible, indeed, inevitable.

The 0 SLR takes that notion of unification to heart. It is, by all appearances, a wispy, nimble climbing bike. Yet like its leviathan competitors, Wilier has gone to great lengths to unify aerodynamic performance into every aspect of this WorldTour warrior. That has granted the 0 SLR space among the highest echelons of the sport, not just as a spectator but as a competitor.

Dress to impress, they say. And the 0 SLR certainly looks like it belongs on the world stage. It incorporates all the elements we expect from a world class superbike, like internal cable routing, dropped seat-stays for compliance, integrated cockpit, disc brakes, and gossamer carbon wheels. There are six colourways, including the Team Astana shade (shiny blue!), but take a look at that Ramato Glossy outfit to see the 0 SLR showing off for the cameras. That's the paint that screams Italian panache.

Italy already has its notable shape on the map, but if it hadn't, the 0 SLR might have been a decent stand-in. You'll know it's the 0 SLR from across the room with one look. What's that little bump where the top tube meets the seat tube? That's where the seatpost expansion clamp lives, and rather than try to hide this unique piece, Wilier proudly displays its technology. Heck, this little frame bump all but screams "look at me!" It is unmistakable.

Like Italy itself, the 0 SLR counters challenge after challenge. Cobbles in the spring? A contested climb up the Stelvio? Perhaps a bunch sprint in Milan? Cycling is as much an on-the-fly adaptation to the unexpected as it is pure grit and determination.

Much of that adaptability comes down to ride quality. But just as importantly, the Wilier has managed to marry a lightweight frame with exceptional stiffness, meaning the 0 SLR remains supportive and responsive while steering, without bogging you down on the climbs.

Aerodynamics, light weight and ride quality are all better together. Long live the ride, liberated and always redeemed.

A brief history of Dura-Ace

words by
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The stories behind five revolutionary derailleurs that helped everything to click into place for nifty shifters Shimano

Crane, 1971

Shimano fought against stereotypes during the early '70s when Campagnolo dominated the pro racing scene. The Italian marque's name was synonymous with quality and durability; everything else was fragile and not to be trusted.

For Shimano to upend that narrative meant a minor miracle. Enter a new derailleur, forged from aluminum and named for elegance in motion. Shimano's Crane derailleur was arguably the most significant driver of the Dura-Ace legend — and it wasn't even a Dura-Ace derailleur.

The Crane moniker attached to Shimano's then-top-end derailleur perhaps didn't help matters; birds are certainly graceful, but bring fragility to mind. Yet the Crane derailleur was a forged aluminum component with a dropped parallelogram design and a high quality finish. "The aluminum forging and finish were equal to that of the Campagnolo Nuovo Record, the top derailleur of the time," says Mike Sweatman, founder of Disraeli Gears — probably the most comprehensive derailleur reference website around.

The dropped parallelogram design meant that the derailleur pulleys remained parallel to the cogs as the rear mech moved across the cluster of gears. The Crane derailleur was Shimano's first big strategic move against the big players of the day, and it proved Shimano could create a better derailleur than Campagnolo and its European competition. But rival brand SunTour still had an advantage: the slant parallelogram.

This design allowed the derailleur to move across the cassette laterally, like a drop parallelogram derailleur, and to move up and down relative to the size of the cog in the cassette. In other words, the top pulley of the derailleur was always close to the cog, regardless of cog size, which made for smoother, quicker and more reliable shifts.

Despite SunTour's superior design, Shimano caught a break when Schwinn adopted the Crane. "Schwinn was a huge player in the US market, and very influential in the cycling world," says Sweatman. "Schwinn had been making a top-end touring model fitted with the Campagnolo Gran Turismo derailleur. This was a hideous steel object that weighed a ton and changed gear spectacularly badly. Schwinn decided that enough was enough and replaced the Gran Turismo with a long-armed Shimano Crane."

The response from dealers and consumers was overwhelmingly positive. This did not escape Campagnolo's notice; the Italian brand countered with its own derailleur to match the Crane, but with its notorious Italian styling. The powerhouse drivetrain manufacturer fully expected Schwinn to dump Japan and return to Italy, so to speak. But Schwinn felt the Crane was the better model and stuck with Shimano.

This coup gave the Japanese company a David-versus-Goliath victory. The Crane really took off, and major winds were starting to shift.

Dura-Ace AX-7300, 1980

In today's superbike era, it's hard to believe that aerodynamic design of any significance could play a part in derailleurs. Yet that's exactly what Shimano set out to accomplish with the Dura-Ace AX-7300 groupset, refining every component in the groupset. And it was both a revolution and a side step.

The finished product was a sight to behold, and it included an indexing system. Shimano had led other manufacturers into a new era, and everyone else was forced to play catch-up.

That meant new styling and refinements across the board for every brand. "Shimano's cash-strapped competitors spent millions smoothing off the corners of derailleurs and making new tooling to manufacture the new shapes," says Sweatman. "And Dura-Ace AX also established a new technological pecking order."

Shimano essentially surpassed SunTour's well-documented role as R&D masters, which cemented their place as the undisputed technology leader. Once again, David was making several Goliaths very nervous.

Yet the Dura-Ace AX-7300 groupset was not a big success for Shimano. The new look and feel divided opinions, and the indexing, as with other early attempts at the technology, was not totally reliable.

It seemed Shimano had made a mistake, yet forcing the hands of the competition ultimately worked out in the company's favour. This marked a turning point for the company's marketing as well. Gone were bird names that elicited images of fragility. The name Dura-Ace evoked strength and quality; Dura came from the duralumin — an aluminum alloy — used to construct the derailleur. And Ace conjured images of the top, the pinnacle. It was an insight into Shimano's future intentions: to become the best of the best on every race bike in every peloton.

Dura Ace 7400, S.I.S, 1985

Everything clicked into place when Dura-Ace 7400 launched – literally. While Shimano's previous cracks at an indexed shifting system had been unreliable, much like its competitors' attempts, Dura-Ace 7400 ushered in the Shimano Index System (S.I.S).

At the time, friction shifters still ruled the day. Index systems had come and gone, fading into obscurity due to unreliability. But Dura-Ace 7400 was the first that worked well and changed all that. "It was slick, reliable, and long-lasting – an understated triumph," Sweatman says. "From this point on, the future of gearing was clearly indexed."

The timing could not have been better. SunTour's slant parallelogram patent had run out, so Shimano created its own version to pair with its S.I.S. system. A force to be reckoned with: quicker and smoother shifting that clicked into place without having to coax the chain into gear – a major breakthrough.

While the Dura-Ace 7400 derailleur was a beautiful piece of machinery, it eschewed some of the aerodynamic touches that Shimano had tried in vain to make stick for the last several years. The more conventional look went a long way towards convincing the more conservative-minded riders to give it a go.

It is notable, too, that Shimano scored a massive win when a competitor's patent ran out. Perhaps this was the moment that the company recognised the outsized value in patents, going on to become notorious for its use of them – not only for products it intended to bring to market, but also for those that never saw the light of day. The latter helped protect Shimano from its rivals in a new way: by making them design around concepts Shimano had already considered, paying dividends for decades to come.

Dura-Ace 7970 Di2, 2009

Think of how many legendary racers came and went between 1985 and 2009. Dura-Ace changed with the times of course, but the next big revolution in shifting came a long time after S.I.S. changed the shifting game in Greg LeMond and Laurent Fignon's era.

Shimano still had to fight Campagnolo, which dominated sponsorship at the pro level. Andy Hampsten won the Giro d'Italia in 1988 using a Dura-Ace groupset, and a World Championship win arrived three years later with Gianni Bugno. Those victories helped Shimano on its journey to dominance, but it was not there yet.

Shimano made plenty of inroads in the '80s and '90s and Dura-Ace arguably had little to do with it, at least financially. Success on the balance sheet came largely through Shimano's dominance on mass-market bikes and less expensive, consumer-focused rides. All the while, they virtually owned the entirety of the mountain bike market, with SRAM playing the underdog role off-road.

On it, however, Shimano's true dominance was cemented in 2009 when it electrified the bicycle market with Di2. "Dura-Ace 7970 was the first real statement that the future was unquestionably electronic," says Sweatman.

Dura-Ace 7970 was Shimano's first Di2 (Digital Integrated Intelligence) system at the top of the line. The company had executed Di2 on the Nexave groupset eight years earlier, but it did not gain much traction, especially among racers.

Mavic had also given electronic drivetrains a go with the Zap derailleur and later the wireless Mektronic, but both systems were plagued by consistency and changing-speed issues. Campagnolo also toyed with prototypes for years. But Shimano meticulously designed its electronic system to not only beat Campagnolo to market, but get the technology right the first time. It had to be fast, reliable and, ultimately, impeccable. And it was.

Some cynics initially derided Di2 as unnecessary or gimmicky. But racers saw the value, as is often the case when one rider wins on new technology and the others are left wondering what they are missing out on.

Di2 swept through the bike world with a vengeance and became the race bike standard over the course of the next several years. While more conservative old guard racers stuck with cables, up-and-comers and future legends grew into the sport with batteries, wires and the lightning fast shifts that came with them.

There was no turning back. Shimano had ripped the spotlight away from Campagnolo with its Di2 system, and the electric future arrived with Shimano as its flag-bearer. By 2019, a decade after the first Di2 system and a host of revisions and refinements to the electronic system, cable-actuated drivetrains in the pro peloton became quaint novelties reserved for the most traditional riders.

Dura-Ace RD-R9250, 2021

Engineering often feels like a series of false summits. You reach the top of one only to see there's still further to climb, yet more advances to make. Such is the case with Dura-Ace and its brand new iteration that launched in August 2021.

After SRAM launched eTap in 2015, ditching wires altogether to create the first truly reliable wireless shifting system, journalists, fans, and racers besieged Shimano with the question — will you do your own wireless drivetrain? The Japanese brand simply pointed to the success of the Di2 system. The years ticked by and the wires remained.

Dura-Ace R9200-series represents Shimano's arrival at yet another summit. The RD-R9250 rear derailleur integrates a wireless unit, charger and switch inside the body to create an adaptable, fast and powerful shifting brain.

The R9200 system still uses wires to connect the front and rear derailleurs to a large central battery in much the same way earlier Di2 systems worked, largely to ensure the longest battery life possible. But the shifters communicate with the rear derailleur wirelessly, eliminating any hard-wired connection to the derailleurs and batteries. Shimano has officially entered the wireless era.

The derailleur cage is long enough that riders of yesteryear might have mistaken it for a mountain bike rear mech, such has been the drastic change to gearing over the years. The RD-R9250 can accommodate up to a 34-tooth cog in the cassette, a number unimaginable only a few short years ago.

One of Shimano's core claims with the RD-R9250 speaks to how far the technology has come in recent years. The new derailleur, they say, is 58 per cent faster than the RD-R9150 that came before it, itself setting a benchmark for quick shifting. In a sport driven by the most marginal of gains, you can bet it will be popular with pro racers.

Shimano is in the drivetrain driving seat once again. Whatever next? Watch this space…

Produced in association with Shimano.

CIPOLLINI DOLOMIA

Cipollini's Dolomia ventures upward in a hurry. Those who remember the eponymous rider's fastest days in the peloton might associate the name with speed, alongside a flamboyant and slightly maverick flair. But the design and manufacture of the Dolomia is quite the opposite – considered, meticulous and subtly different.

The Dolomia is hand-made in Italy, after all. There are no open moulds or shared moulds here. The Dolomia is a bike all its own, with original designs rooted in the Cipollini facility outside Verona. Going against the grain of the rest of the market, the carbon is laid by hand, moulded and cured in autoclaves in Italy.

That affords Cipollini certain unique manufacturing methods, not least because of the close proximity to Italian aerospace and motorsport brands. For instance, the frame is truly monocoque (classed as TCM, True Carbon Monocoque, by the brand). That's a term that is often thrown around with carbon bikes, but when Cipollini says it, the brand means it in the truest sense – the entire frame is moulded in a single piece, with no joins whatsoever. It makes for far smaller margins of error and relies on much more meticulous manufacturing, but the benefit is minimal weight and maximum strength. That's helped by top-tier material choice – a 3k weave and Toray T1000 carbon fibres.

A size-medium frame weighs just 780g. Add the fork and you've still got an assembly that weighs a smidge over a kilogramme. Perhaps more importantly, this featherweight features unique geometry for every size, so the ride quality and handling is perfectly tailored no matter how big or small the rider is.

As you might expect, aesthetics matter a lot to the brand, so the frames are painted by some of the best in Italy. But would-be Cipollini owners are also invited to bring their own creative flair to its frames. Using the MyCipo customisation portal on Cipollini's website, you can choose between matt and gloss finishes, and 600 overall colour variations.

While the Dolomia is optimised for 28mm tyres, you can fit up to 30mm for added versatility, should your daily rides take you off pavement frequently. The dropped seat stays and D-shaped seatpost allow fore-aft flex to lend plenty of comfort on those rough roads.

You may have already spotted the Dolomia in action under Bardiani-CSF-Faizané riders during 2021. Team Crimson Orientation Marketing have risen to the top of the British Cycling road and track club rankings on board Cipollini bikes, too.

And that's exactly what Cipollini has set out to do: create a bike that's equally at home underneath elite pros and everyday riders in pursuit of personal goals. The Dolomia combines comfort, stiffness and a lightweight package all laced with an innate Italian racing and bike building know-how – pretty classy, don't you think?

ASSOS MILLE GTC

Gravel is still a new kind of party, so it's okay if you're not sure what to wear. Fortunately, more and more kit options exist to accommodate the grit, grime, and abrasions that comprise the off-road fun. The Mille GTC line from Assos ensures you get to enjoy more of the dirty, rough-and-tumble world with kit developed over the course of two years.

Like gravel itself, the Mille GTC clothing line lives in the grey areas between road and mountain bike. From the road side, comfort, airiness, and performance fabrics. From the MTB side, durability, style, and freedom of movement. But it's clear Assos places a premium on durability. The bibs are, rather fittingly, called Kiespanzer – gravel tank.

Inside those bibs lives 19mm of thick, C2 chamois. A twin layer construction absorbs micro-vibrations and provides lots of cushioning when you're perched on the saddle. Assos has found in testing that the body continues to move on the saddle while you're pedalling, so its chamois inserts are designed to accommodate that.

And these bibs are made to haul: two pockets on the rear and two pockets on the legs make it easy to stash nutrition and tools. Assos developed an easier way to access those pockets too: pull tabs that you can grab while in motion.

To test the all-road mettle of the Mille GTC Kiespanzer bibs, Assos sent them to WorldTour team Qhubeka-Assos last year. Riders used the shorts during recon rides for Strade Bianche on the legendary white dirt roads around Siena. But the rest of the testing is a secret; Assos spent years getting the chamois insert just right, from the right thickness to the perfect length and position. And since crashes are part of the game, the Bunny Hop side panels protect against abrasions and offer exceptional breathability.

If you're the type to wear baggy shorts to the gravel party, Assos has you covered with the Mille GTC Zeppelin shorts. At first glance they look like their mountain bike cousins. But the Zeppelin shorts feature a more tailored cut to eliminate flapping or bunching. The legs run a bit shorter to accommodate the gravel riding position and pedal stroke.

Up top, the Mille GTC C2 Schwarzwald jersey offers the clearest indication that gravel style has become its own landscape. A slightly looser fit accommodates just about any rider and places a premium on comfort.

And since the Kiespanzer bib shorts pull most of the cargo duty, the Schwarzwald doesn't feature the standard rear pockets you'll find on most jerseys. Instead, Assos has tucked a zippered pocket on the side of the jersey, where you can quickly access small items, like your credit cards or a gel, while you're riding. And since gravel has established a trend of storing most of your bulky items on the bike itself, Assos has focused on comfort and fit — two features you'll appreciate as the gravel miles tick away.

All told, the Mille GTC lineup from Assos fits perfectly in the ever-shifting off-road wardrobe. What's going to happen at the gravel party? It's hard to say, but it's almost certainly going to get dirty. Whatever happens, it's nice to know you'll be dressed for success. ●

ORBEA TERRA M20I TEAM

In a way, Luis Ángel Maté is bringing the comforts of home with him on his gravel journeys. Orbea is, after all, a brand with firm roots in Spain. Orbea and Maté are two sides of the same coin: the company is from the north, Maté from the south.

His Terra M20i Team reflects that dichotomy nicely. Its monocoque carbon frame and full carbon fork scream race-ready with its aerodynamic shaping and focus on minimal weight. Yet the build is an invitation away from racecourses, into the unknown and down the twisting paths of adventure.

Shimano's GRX Di2 drivetrain lies at the heart of the adventure build. A wide-ranging 11-34 cassette pairs with a 48/31 chainring setup to offer flexibility and control regardless of the terrain. That terrain will vary, and challenge every part of the bike's build, and Maté himself.

These challenges offer opportunity. "Small crises and bad moments shall pass," Maté says. "And we need to learn to face these moments." That is, after all, what gravel is about: persisting through difficulties to find joy.

In between groomed gravel and smooth pavement lies, well, just about everything else. Maté's Terra rolls through it all on Fulcrum Rapid Red 900 disc brake wheels (Shimano's GRX hydraulic disc brakes provide the stopping power) wrapped in Pirelli's rugged Cinturato Gravel H 700 x 40c TLR tyres.

A Prologo Akero AGX STN saddle and OC GR30 Gravel handlebars round out the build. The bars feature a bit of flare to provide added stability when the going gets tough.

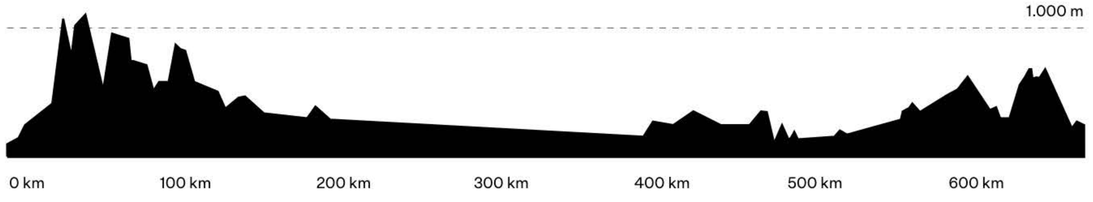
Maté's Terra is notable for what's not there as well. These rides offer rare opportunities for Maté to leave the power meter behind and enjoy the process of pedalling, the peace of rolling. With an Apidura Expedition Series saddle bag hauling what little clothing and gear he needs to get where he's going, Maté favours simplicity.

And the Terra is indeed a sleek beauty that captivates with simple lines. Yet the dichotomy persists once again. The Terra's true build is anything but simple; it holds within it years of research, development and technological marvels. They are silent and hidden, in respect of the adventure.

Distance
675 km

Elevation
7,280m

Highest point
1,198m



komoot

See the full gallery and the route on rouleur.cc

MET TRENTA 3K CARBON MIPS HELMET

Maybe you didn't recognise MET's Trenta 3K Carbon MIPS helmet without Tadej Pogačar's signature tuft of hair peeking out through the vents. Yet even without the defending Tour de France champ's errant locks, the Trenta 3K looks like a winner, a helmet ready to claim podiums – or at least a personal best or two.

It's proven protection already, after all. Pogačar and his team-mates have already ridden it to victory this season, and undoubtedly more success is to come. The helmet itself is built around 3K carbon technology – a carbon fibre cage embedded into the EPS foam. This reduces the foam's density by 20%, making the Trenta 3K extremely light (225 grams, size medium) without sacrificing energy absorption capabilities.

Inside of that engineered shell, you'll find the MIPS Air system. It's the lightest system available, and it provides 10-15mm of movement to protect your head from rotational forces in the event of a crash or impact. It's integrated right into the padding of the Trenta 3K carbon.

Speaking of the padding, only 30% of your head will be in contact with the padding and helmet. This allows better airflow through the 19 vents strategically positioned throughout the design. The NACA vent at the front of the helmet allows air to flow in, pushing warm air out through the massive exhaust vents at the back. It creates constant airflow but doesn't create drag.

MET even thought of cooling while your head is in different positions. The Flat Rear Deflector is inclined at 25 degrees, which optimises the airflow through the helmet when you're riding in the drops. And of course, the helmet's overall shape is aerodynamically optimised with a Kamm-Tail shape to keep you going fast.

The final touches: a handy sunglasses port to stow your shades out of the way when you don't need them; and more importantly, the Safe-T Orbital Fit System that snugs up around your head and allows for occipital adjustability for the perfect fit.

The Pogačar Tuft Port comes naturally to the helmet. Note: Tour de France-winning hair not included. ●

HAMMERHEAD KAROO 2

How do you take on the giants? Do something different, or do something better. Hammerhead changes that ‘or’ to ‘and’ with the Karoo 2.

Outwardly, the Hammerhead looks like any other GPS head unit. That is, until you turn it on and see the 292 PPI screen. The resolution doubles that of its closest rival, and indeed the screen’s colours, text, and images pop with incredible clarity. The Karoo 2’s touchscreen display is intuitive and responsive, so your navigation experience is more like a smartphone than a GPS device.

Hammerhead has invested its development into streamlining navigation. You can do route-planning right on the unit itself, drop pins, and even add points of interest, and then be rerouted back to your original path seamlessly. The Karoo 2 will provide turn-by-turn navigation, but those who choose to go route-free will also enjoy exclusive access to Suunto Heatmaps and Climber with Predictive Path Technology. You’ll find yourself, anywhere in the world, any time.

You can create custom riding profiles, and tailor the map and data page layouts to suit your needs. The Karoo 2 allows you to tailor screens to display heart rate, power, elevation, and much more.

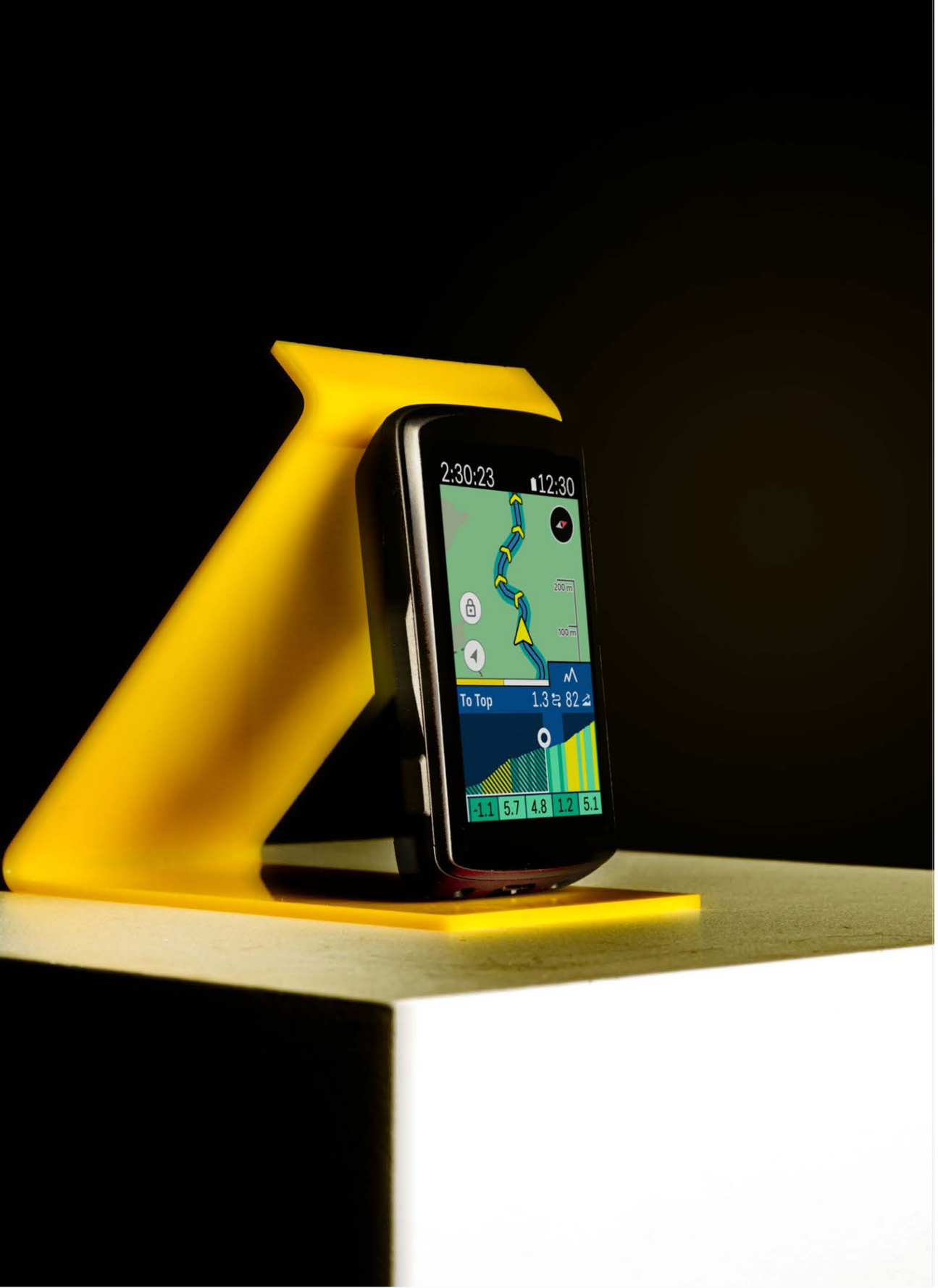
What about Strava Live Segments? Yep, the Karoo 2 has that, along with its exclusive Climber feature with Predictive Path Technology that detects upcoming elevation changes, regardless of whether you’re following a set route or not, so you know exactly what you’re in for. You can of course sync and share routes too, and the Karoo 2 integrates with TrainingPeaks, Strava, Komoot, and other third-party services. And the all-new Suunto integration gives you access to a robust and growing arsenal of heatmaps to choose your best route on the go.

But the real advantages of the Karoo 2 live behind the 3.2-inch touchscreen display. The Karoo 2 comes with a whopping 32gb of storage —26gb just for maps. There’s 2gb of RAM on board, and a Quad Core 1.1 Ghz CPU keeps everything running quickly and smoothly. It’s Bluetooth 4.0 and ANT+ capable and it has WiFi and 4G Cellular integrated. The Karoo 2 is a powerhouse in a 36-gramme package.

Hammerhead also takes a unique approach to keeping your device current. You’ll get regular software updates to ensure the unit works smoothly every time. Those updates are based on feedback from users, so Hammerhead knows exactly what it needs to improve and when. Best of all, Hammerhead won’t make you wait very long for those improvements, with updates pushed nearly every two weeks.

All of that is packed into a diminutive package that attaches to your handlebar via a unique quarter-turn mount. Pop it off, charge it via the USB-C port — a full charge takes three hours — and pop it back on your bars for up to 12 hours of riding in normal conditions. The Karoo 2 is ready for every ride, wherever you go. ●

Shop now at Hammerhead.io and use promo code ROULEUR to get a free heart-rate monitor with your purchase of a Karoo 2.



words by
Dan Cavallari

photographs by
Sean Hardy

Ahead of the curve

Swedish company POC have created a helmet, the Myelin, that is made out of 50 per cent recycled materials. But this is only the beginning

words by
DAN CAVALLARI

photographs by
SEAN HARDY

Everything on earth leaves a legacy. Politicians fret endlessly about what their long-time impact will be. Software developers look to legacy software for development references on future products. Bicycling gear and accessories leave a legacy, too, long after they're gone from your riding stable. And while the intangible impacts of those pieces of gear may contribute to the betterment of our nice sport, the physical legacy of these products has not always been positive.

POC's Myelin helmet aims to address one of those tricky downsides. What happens to our gear once we've finished using it? All too often it ends up in the landfill, where it can sit decomposing for hundreds of years.

The Myelin aims to change that with a unique design that allows the helmet to be completely deconstructed for recycling at the end of its usable life. But more importantly, it starts its life comprising 50 per cent recycled materials.

Product Lifecycle

The life of a product starts well before that product even exists. Companies need to source materials, which often means buying brand new raw materials. Only in recent years have companies begun to make the investments of time and money into recycled raw materials. That addresses only one facet of the overall product lifecycle, but it's an important one.

The Myelin Helmet is constructed with 50 per cent recycled materials by weight. "The innovative textile weave shell, the pad, and the straps are all made from recycled polyester," points out POC's design director Claes Nellestam. "And the bottom ring is made from recycled nylon."

That is just the start, of course. POC made it a high priority to use recycled or bio-based materials on the Myelin. But going into the design, POC had an even higher priority: rider safety. "Where we have not been able to find a recycled or bio-based material that could meet the needed function, the decision to have a virgin material is clear," says Nellestam.

So that's where the Myelin starts its life. Then it performs the function it was designed for: protecting a rider's head. That period of time can last years, if not decades. But once the helmet is no longer suitable for safe use, the Myelin begins the next phase in its life cycle: disposal and recycling.

To more easily facilitate that process, the Myelin is easy to break down into individual components. And that's where the truly cool design functions come into play.

The Myelin's construction

While the Myelin looks a lot like a normal helmet, its individual components come together in an entirely unique way. Most helmets use some sort of glue or adhesive to secure components to each other, but POC wanted to find a different solution so the individual components could be deconstructed

and sorted for recycling or reuse. Adhesives generally mean an entire helmet needs to be tossed in the trash rather than recycled. That was a non-starter for the Myelin development team. Deconstruction at the end of the life cycle was a must.

"We achieved this by creating the glue-free manufacturing process and zip-tie fastening system, which has never been done before," says Nellestam. "All the pieces are held together in a brand new and innovative way which was taken through all our usual testing and certification."

The outer 'shell' of the helmet is not a shell at all, at least not in the traditional sense. It's a woven recycled fabric that covers all the components within. The bottom ring of the helmet is made from recycled nylon, and the pads and straps are made from recycled polyester. Like many traditional helmets, the rest of the helmet is made of EPS foam that provides impact protection.

All of those components then come apart when you're ready to dispose of the helmet. The straps get cut off, the bottom part of the helmet separates from the top, and everything within can be sorted.

And that's an important step in the lifecycle process, says Nellestam. "In order to be able to recycle effectively, it's important not to have mixed waste that can't be handled and reused. It's important that a single material is one material only and not a mix of e.g. metal, glue and plastics, as that would reduce its future potential. The ability to separate optimises the individual materials for a life after recycling."

The end is the beginning

Once the helmet is deconstructed, you can toss the separate parts into your recycling bin. But if you really want to be sure that each component will have the best chance at being recycled or reused, it's best to head to the local waste station. There, each component can be sorted and placed with like materials. The straps and pads, for example, will get sorted into textiles that can be reused or recycled. The EPS foam goes with Styrofoam; and the rest of the helmet lands in the plastic category.

It's a good start. But POC is forthcoming about the path forward. The Myelin is one step in a long process, and as the company continues its future research and development, sustainability will only become a larger and more ambitious goal. So what's holding POC back from translating the Myelin's construction into other helmets in the lineup?

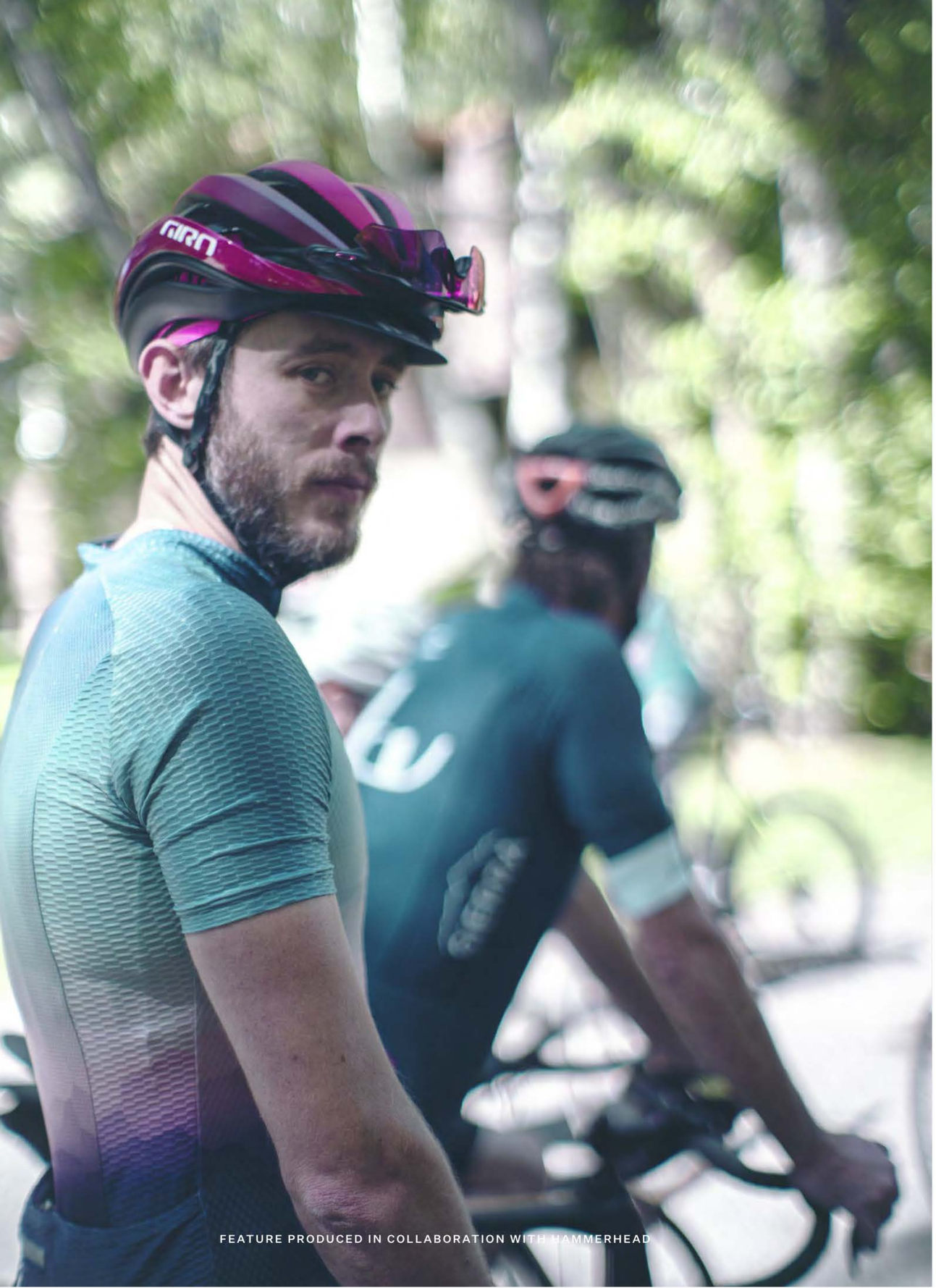
Bicycles and accessories face a tricky design challenge in the best of times. We often need a balance of safety, comfort, speed, light weight and performance, and those concepts often work at odds with each other. Sustainability adds yet another layer of complexity to the design process.

Nellestam emphasises repeatedly that POC's primary goal is safety, and while POC's long-term ambitions focus on maximising recyclability and sustainability of its products, sometimes new materials with less eco-friendly characteristics remain the best choice to optimise that long list of must-haves in the R&D process.

Still, technology changes rapidly. POC has made key hires to ensure the company is on the cutting edge of sustainable materials and practices.

"As a Swedish company, POC has always been environmentally sensitive and conscious of our responsibility to manage resources respectfully," says Nellestam. "To ingrain this idea and approach, we have a sustainability manager working full-time to evaluate our impact across the board, be it a single product or a company policy. One of the core tasks for our sustainability manager has been to evaluate materials with our product manager to find the best solutions to meet our specific demands for safety and sustainability."

The overall goal is to keep POC's products from becoming waste, as long as possible. In that sense, POC has defined part of its own legacy. It's not about perfection. It's about effort, foresight, and ingenuity. The company knows it has a long way to go, but it has a clear understanding of those challenges and a can-do attitude toward solving them. The Myelin will long become synonymous with a touchstone for a much longer process, one that can become the core of POC's innovation for years to come. ●



FEATURE PRODUCED IN COLLABORATION WITH HAMMERHEAD

THE WAY AHEAD

What do a desert in South Africa, Chris Froome and a coast-to-coast ride have to do with a bike navigation technology company? Quite a lot, as *Rouleur* discovered, in part one of a two-part feature series about Hammerhead

words and photographs by
DAN CAVALLARI

Somewhere on a stretch of tarmac between New Haven, Connecticut and San Francisco, California during the summer of 2005, Piet Morgan found himself astounded. Morgan, a student at Yale University, and some friends had undertaken a bicycle trip across the United States to raise money for Habitat For Humanity. Each successive day took Morgan further west than he had ever been, which was of course a thrill. Getting there, on the other hand, was proving to be far more difficult than Morgan imagined was necessary.

The scenery itself was epic, but what really astounded Morgan was the dearth of quality navigation tools available to him on his trip. Despite the intricate technology rolling beneath him on the bicycle itself, Morgan couldn't believe navigation had not progressed along a similar course. By the end of that 60-day trip, Morgan had already decided to see if he could fix that problem himself.

Seventeen years later, Morgan's company, Hammerhead, has made itself a major player in the GPS navigation space. Recently acquired by Sram, the company's ability to refine its already impressive navigation unit seems all but assured. But to arrive at this point – a feature-packed Karoo 2 head unit with navigation, training and tracking features, all packed into a compact, touchscreen-capable unit – Morgan had to take a big risk with a much more rudimentary product, the original Hammerhead.

To understand Morgan's original design, you first have to leave America behind and head back to Johannesburg, South Africa, where Morgan grew up, not far from the Karoo Desert. It's there that Morgan began to understand the vital importance – and consequence – of effective navigation.

Johannesburg classmates

Morgan admits that Johannesburg is not exactly a pleasant place to ride a bike. It's a sprawling urban landscape, congested and seemingly endless. The knots of roads clogged with cars make for a difficult traverse across town.

"That said, I was always passionate about bikes," says Morgan. "Me and a few friends from high school used to get on our bikes and participate in local mountain bike and road races. Chris Froome was part of that cycling club. We used to ride in the suburbs and streets."

It became clear to Morgan as he navigated those streets that it was vital to know where to ride, and where to avoid. But that's the innate adventurism that lives in any teenager. It wasn't until much later that the memory of those cross-town traverses became the basis for his first navigation product, the Hammerhead.

In the meantime, Morgan and his classmate Froome travelled down divergent paths: Froome to the WorldTour, and Morgan to the water. He spent several years as a rower, and he continued his passion for cycling by using the bike as a cross-training tool.

Fast forward to the end of his cross-country US trip and Morgan was left with an acute sense of what a successful, modern cycling computer could be: a tool that combined world-class navigation and all the training tools we count as vital now. "I was struck by how difficult it was to navigate with the technology of the time, which was paper maps and rudimentary cycling computers," says Morgan. "We sometimes found ourselves on fairly dangerous roads and interstates. So I spent a lot of time thinking about how to navigate correctly."

But creating such a unit proved to be quite tricky.

A quick glance

The original Hammerhead looked nothing like any other handlebar-mounted computer on the market. As the name implies, it looked a lot like a Hammerhead shark. It had no screen, just a series of LEDs that indicated which turn you needed to take coming up.

That alone separated it from its competition, but like so many truly exceptional developments, the Hammerhead's real benefits lie under the hood.

"I focused on navigation and started with looking at navigation that a phone would have," he says. "But the phone isn't a good user experience when you're on the bike." Morgan got cracking on a piece of hardware that could quickly give riders direction indicators at a glance, all by using the navigation capabilities of the phone most riders were carrying anyway.

"I built the original software, the proof of concept, myself," says Morgan. "The product would display a light pattern [to indicate directions]. I 3D-printed the hardware concept."

From there, Morgan and a friend from high school, Laurence Wattrus, moved into a small apartment in Jersey City with some friends, and focused entirely on building this product. "None of us had savings or investors at that time," he says. "So we earmarked $10,000 each to live, prototype, and launch."

Morgan began crowdfunding to get enough money to actually build the product. Crowdfunding was a success, and not long after, Hammerhead was officially born.

From the shark to the tank

Morgan learned from his original product that there was an appetite for better navigation tools. He also knew that it was only a start. "I knew from the earliest outset that this wasn't the product from which we could build a large company," he says. "But it put us on the map and showed we could create and sell something." Subsequent Hammerhead products would need to take usability and navigation up several notches. So Morgan set to work.

That work started with the hardest part: creating better navigation. It also became abundantly clear that it would be necessary to build a navigation platform from scratch in order to do it better. "Navigation was the hardest software to build, so we started there," Morgan says.

While navigation was certainly the most difficult aspect of development, it certainly wasn't the only one. An entirely new user experience meant an entirely new piece of hardware, as well as creating a software package that offered all the training tools riders expected at the time, and then some.

"We knew from the outset that we weren't going to follow the Hammerhead 1 product with Hammerhead 2," Morgan says. "We wanted to build a more fully fledged computer. It was extraordinarily challenging to build what we wanted to build. The Hammerhead 1 was hard, so we knew it wasn't going to be simple. But the challenges the Karoo presented were many."

For starters, the original Karoo – which, unlike its predecessor, would feature a screen as well as buttons – was the first computer to use Android software. It also had some smartphone capabilities, which made it more powerful and capable. That's impressive, but with all those monumental features came a very large piece of finished hardware.

"It was 20-30 per cent bigger and heavier than our targets had been," Morgan says. We didn't have the budget or time to optimise it. It was just a difficult product to create. It also took us longer than we anticipated. We didn't crowdfund it, so we didn't have an external target for ship dates. But we did have internal targets."

Morgan figured it was better to have it done right than done quickly, but as it turned out, fate had a little something to say about that. A government shutdown prevented Hammerhead from getting the approvals it needed from the Federal Communications Commission, the government body that regulates all radio and electronic communication. The product got delayed even further.

Despite the delays, the Karoo launched and shipped. And it indeed delivered on its promises of top-notch navigation and a beautiful user interface, albeit a big one.

Morgan was not satisfied.

A gain through loss

The Karoo Desert's boundaries in South Africa have no official definition. It's a nebulous space that's partly defined by its topography and partly by its less tangible aspects. As such, it is often colloquially divided into two sections: the Great Karoo, and the Little Karoo.

Morgan's first iteration of the Karoo computer was his Great Karoo. Now it needed to be distilled down to a more exacting definition and form. He needed to create his Little Karoo.

"The vision for the Karoo 2 was to make it smaller and lighter," Morgan says. "So we continued to push that envelope and solve a couple of things from the Karoo 1. For instance, we didn't have any audible indicators in Karoo 1. Karoo 2 took the misses from the Karoo 1 and added a more capable software stack."

The physical appearance of the Karoo 2 is reflective of the total transformation from Big to Little. The Karoo 2 looks like the Karoo 1 cut in half. Yet its capabilities only got grander.

Unsurprisingly, the improvements all start with navigation. The Karoo 2 uses a plethora of satellites on top of the standard sets the industry has been using for years. And Morgan says Hammerhead is looking into higher fidelity GPS for future products.

And the Climber feature demonstrates Hammerhead's user-first R&D perfectly: the rider can see the upcoming elevation, distance, and profile of climbs ahead of them, even without a pre-loaded course set in the unit – the way most of us ride, most often.

Morgan sees the Karoo 2 as a natural evolution, one that adapts to the needs of the riders more quickly. Hammerhead pushes out regular updates to the Karoo 2 to ensure riders are getting the features and functionality they need most, as quickly as possible.

To Morgan, it's just a natural extension of his desire to scratch the itch he found so problematic on his journey across the United States in 2005. And his drive remains rooted firmly to his earliest days on the bike, circumnavigating the streets of Johannesburg, fearlessly, with friends. With new tools at his disposal – some of which he created himself – Morgan's path forward – and that of Hammerhead more broadly – only seem clearer now. ●

Part two to appear in Rouleur 115

FIZIK TEMPO DECOS SHOES

The Museo Canova in Treviso, Italy houses the original plaster moulds for artist Antonio Canova's statues. The stark white plasters almost blend into the equally stark white walls. Yet the collection of moulds immediately transfixes; they appear simple but the finer details are much more complex.

This space was the inspiration for Fizik's Tempo Decos shoes. A minimalist design belies the complexities of fit and comfort that stem from years of development across Fizik's footwear line-up. The Tempo Decos shoes will not immediately captivate you – not until you start looking more closely at what truly defines them.

Perhaps you could argue that the beauty of cycling needs no accentuations. It is therefore fitting that Fizik sought to rediscover beauty in the simplest way possible. The carbon outsole, the single Li2 Boa dial and the understated, almost immaculate upper combine to create a quiet statement: we contain depth, quietly.

Just one Boa? Cutting down to a simple, one-dial compression system eliminates added complexity and weight. But note the cable winding its way up the top of the shoe and you'll see how much care and attention went into maximising simplicity to its grandest scale.

The PU laminate upper material combines with mesh to create a masterpiece all of its own. Your foot gets treated to uncompromising support for power transfer, yet the Tempo Decos shoes offer enough yield to keep you comfortable. It's a delicate combination, masterfully applied.

As is the case with Canova's plaster moulds, the subtle details of the Tempo Decos shoes can captivate. The Tempo Decos shoes take many of the performance advantages of Fizik's race-oriented shoes and slim them all down into an everyday cyclist's package. Their predecessors, for example, featured a fibre-composite outsole. The Tempo Decos upgrade to full carbon. The Tempo Decos are lighter at 228 grammes per shoe, quality is higher, and performance aspects get boosted with a stiff R2 unidirectional full carbon outsole.

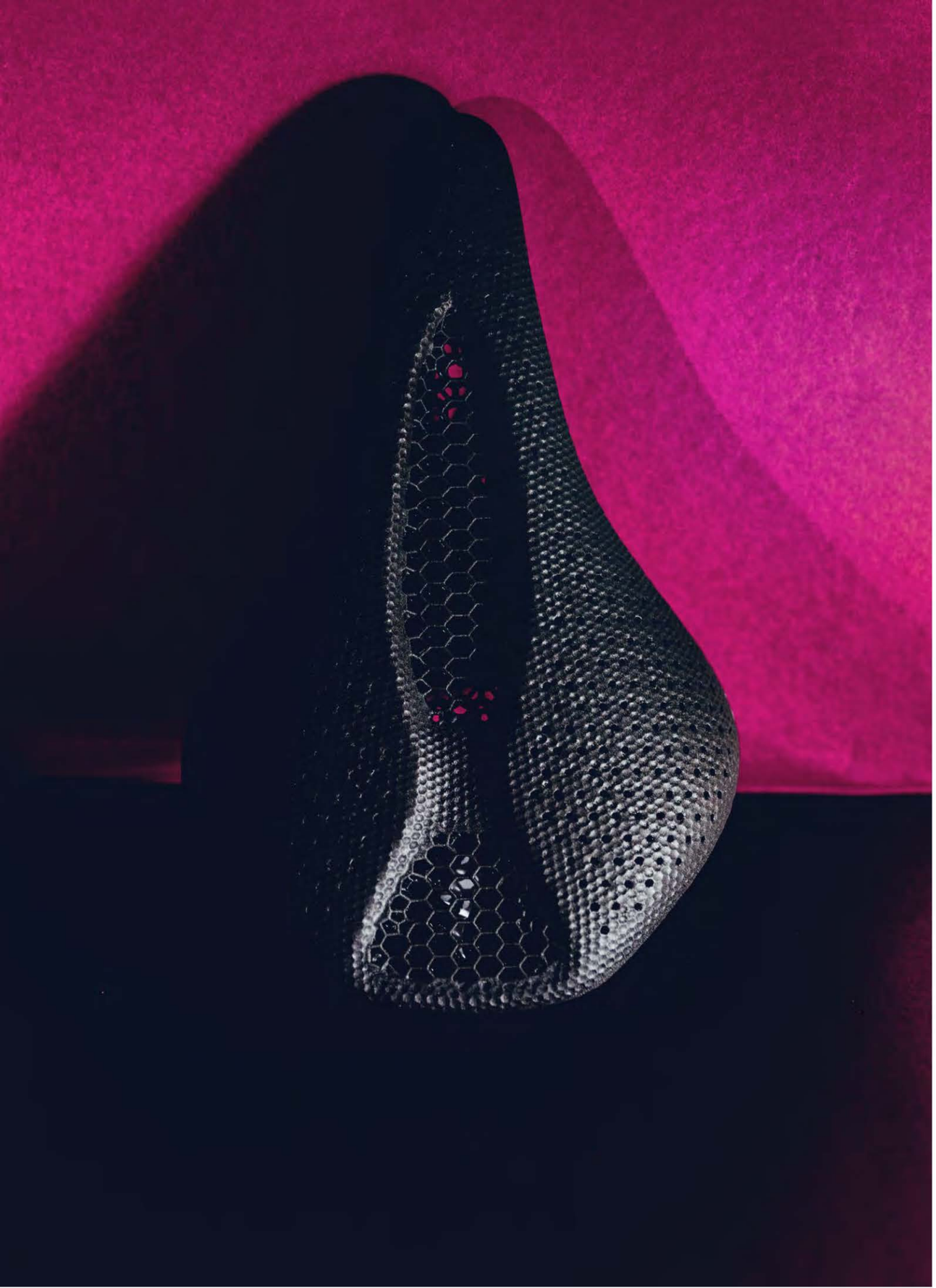
More details begin to emerge the longer you examine the Tempo Decos shoes. Look underneath and you'll find a wide inlet, a channel within, and an outlet behind the forefoot. This allows plenty of airflow to keep your feet cool on the hottest days. Blink and you'll miss it, but spot it and you could write volumes about it.

Lest you think these shoes aren't serious about speed, note another nearly-hidden detail: the cleat positioning, which is slightly set back compared to traditional settings. This improves your pedalling efficiency, especially when you're in aggressive, aero body positions. On top of that, the setback cleat position helps alleviate some knee compression, thereby keeping you fresher longer.

Minimalism doesn't have to be all about white-on-white. Sure, that's captivating in itself and the Tempo Decos shoes come in a pure white version. But you can also choose the all-black aesthetic, or push the limits of true minimalism with a splash of colour — purple and black.

In the Museo, Fizik has found the inspiration for its own masterpiece. It takes a discerning eye to spot all of the wonders. But the Tempo Decos shoes outwardly treat you to minimalist beauty, a complement to cycling's inherent grandeur. ●

words by Dan Cavallari
photographs by Sean Hardy



SPECIALIZED POWER WITH MIRROR AND ROMIN EVO WITH MIRROR

In the modern age of design, data rules the roost, and Specialized happens to have a mountain of it through its Body Geometry program. The company knows intimately what its riders want and need, not to mention the physiological data of thousands of riders who have undergone Body Geometry and Retül fit sessions over the years. Perhaps that's why the S-Works Power with Mirror has become something of an icon since its introduction.

Informed by that massive pile of data, Specialized engineers harnessed 3D printing to create a perch designed to be supportive and more ergonomic than any other saddle that came before it. While the latticework of 3D-printed material that makes up the saddle looks cool, that's hardly the most impressive aspect of it.

That latticework allows Specialized to tailor certain zones of the saddle to perform in different ways. By creating zones with different densities, it becomes possible to make the saddle more supportive in certain spots, and softer and more forgiving in others. While it's certainly possible to change the density of foam like that used in traditional saddles, it's much more difficult – if not impossible – to tailor different parts of that foam's density from one piece of foam. Enter 3D printing.

The 3D-printed EPU material also has rebound characteristics that foam simply can't compete with. That means it helps reduce vibrations and impacts, and keeps your body supported on the saddle as conditions throw curveballs.

If you put the S-Works Power with Mirror next to the S-Works Romin Evo with Mirror, the latticework remains but the shape changes drastically.

That all goes right back to that mountain of data. the S-Works Power features a truncated nose, while the Romin looks more akin to the traditional bike saddle shape. It's about 20mm longer than the Power. Both saddle shapes proved themselves long before Mirror technology came along. Add Mirror technology to both tried-and-true saddle designs and you've got the very pinnacle of comfort and performance.

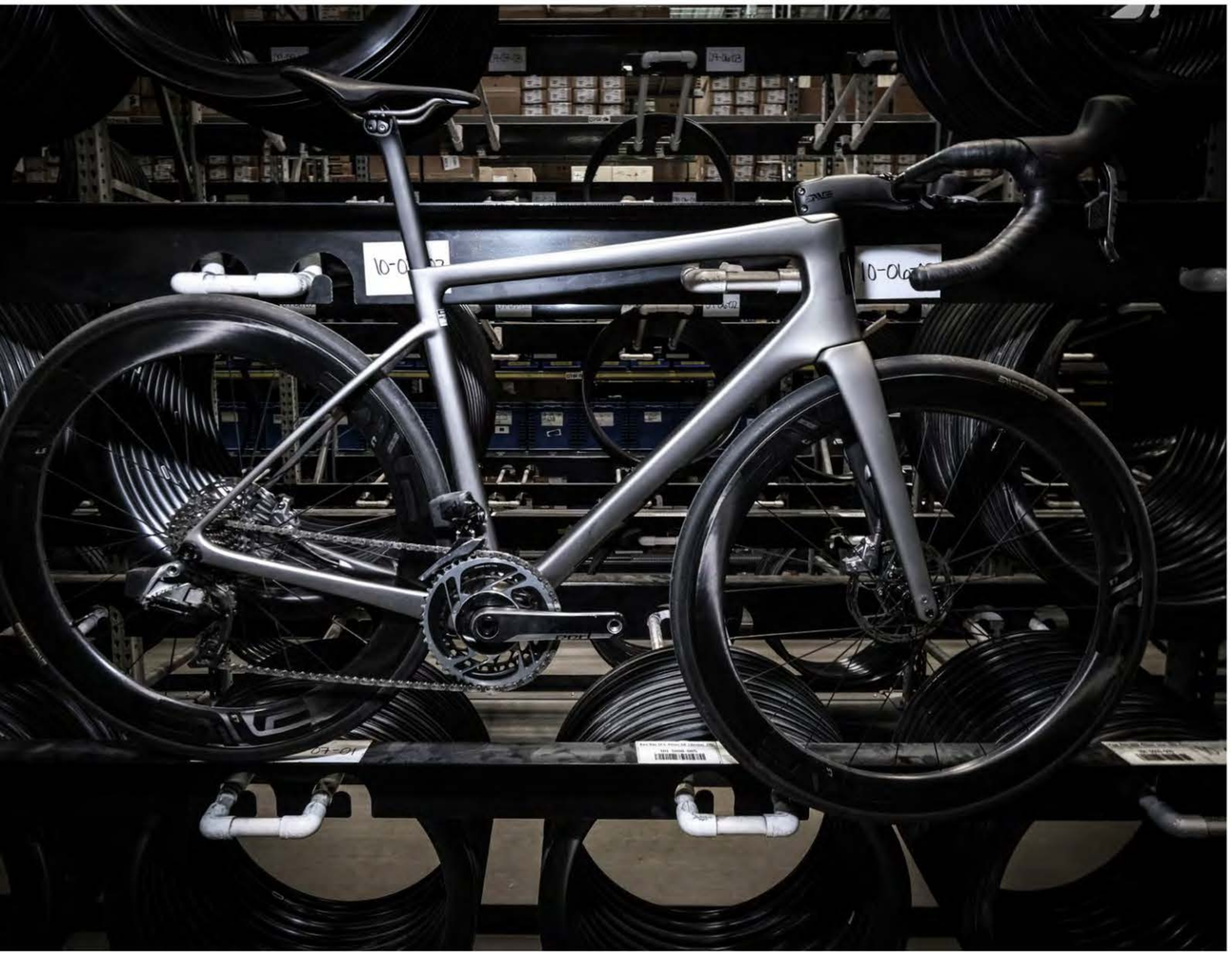
That's because everyone's body moves differently on the bike, and everyone needs different types of support. Data showed that many riders simply didn't need the long saddle nose, and indeed it could cause pedalling interference, chafing and other problems. Specialized designed the truncated S-Works Power with Mirror to eliminate the front section of the saddle, widen the back, and create a centre section that allows unobstructed leg movement.

On top of that, the voids in the latticework, combined with a feathery carbon fibre shell and rails, cut down on weight. Both saddles tip the scales right around 190 grammes, depending on which width size you choose.

That's all well and good, but how does Specialized know this 3D printing actually offers benefits? The answer lies once again in pressure. Specialized uses a high-resolution pressure mapping system that allows engineers to visualise exactly where pressure points can affect the rider. Through the 3D-printing process, engineers are then able to map out where on the saddle the 3D-printed latticework needs to be more supportive, and where it needs to be softer.

Data drives the design, but comfort drives the rider. The S-Works Power with Mirror and S-Works Romin Evo with Mirror are both the culmination of data working toward evolution. ●

words by Dan Cavallari
photographs by Sean Hardy



Move fast and make things

Enve have long been known as the makers of some of the best wheels and components in the industry. And with their latest bike, the Melee, they have come up with a pure race bike that is focused on going fast

words and photographs by
DAN CAVALLARI

Enve's engineers sit at desks in the centre of a large and bright room at the company's headquarters in Ogden, Utah. The space is littered with carbon rims, all finished in Enve's standard gloss black. They're stacked deeply enough that a toddler could mistake the tubes they create as especially dark playground features. Each black hoop is a test; on the sides, notes are scribbled here and there to indicate ideas, drawbacks, and successes.

And on the last table in the row of desks, more carbon sits in much the same state, though it's no hoop. It's a frame section – a bottom bracket junction covered in white ink scribbles.

Those of us looking in from the outside would consider this frame building a new step for Enve, which has built its name over the last 15 years as a wheel and component brand. But the engineers sitting in this room know Enve's original intent was to create bicycles. "The conversation about Enve doing bike frames happened way in the beginning," says Jake Pantone, Enve's vice president of product and consumer experience.

Pantone would know; he's been at Enve almost since the beginning and has seen the company progress from small upstart to bicycle industry staple. "We got a little distracted with wheels and components in between then and now," he explains.

It is perhaps with great relief that we consumers are finally seeing the fruits of Enve's long road to full bicycle production, with its Custom Road that's built in-house in Ogden, and the new Melee, a pure race bike based on Enve's mountain of knowledge gleaned from the original Custom Road project.

The engineers in the bright, rim-filled room in Ogden may have had an afternoon to celebrate a job well done when the completely bespoke Custom Road launched. Then joy was quickly replaced with another task at hand.

The Melee is the culmination of nearly two decades of preparation, and it's impossible to talk about what makes it special without first considering its sibling, the Custom Road. In that story, you'll hear the steady thrum of the engineering department's keen skills at work. It's that thrum that truly gives the sense of what makes the Melee a special bike, a race tool meant to stand out in a crowded field.

And while the Melee is a monocoque frame, its story starts with lugs.

Authenticity in pieces

Enve's Utah headquarters rise above the ghosts of the Ogden Stockyards, a former railroad hub where the bustle of cattle and the promise of commerce once ruled this patch of dust and scrub. The Stockyards met their demise decades ago and with it went Ogden's stability as a community. Years of decline robbed the town of its path into the future, and much of its optimism.

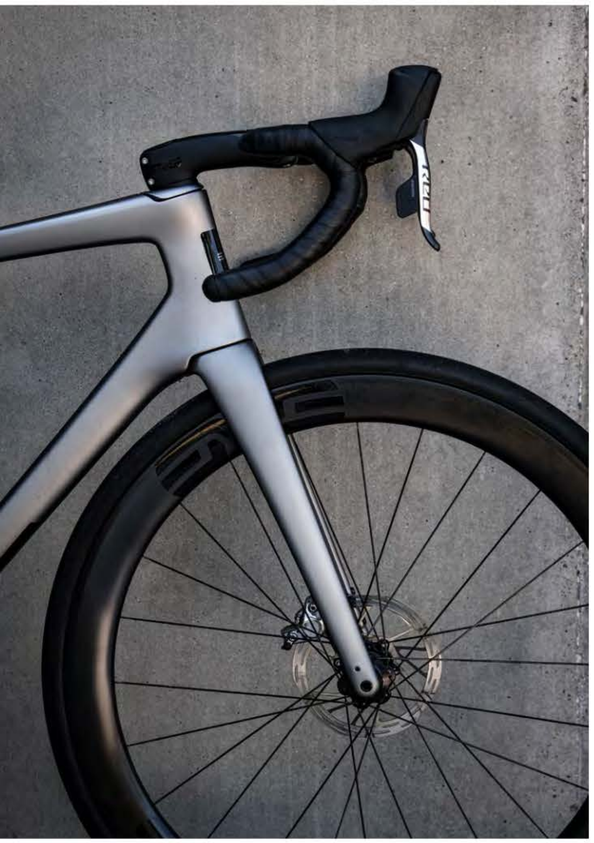
But the outdoor industry has provided an anchor to the space and a future for Ogden at large. Beautiful mountains loom in all directions, and Enve's headquarters sit like a centrepiece among small signs of this patch of land's unique past: stairs that led cattle from the ground up into railcars, the central exchange building poised for renovation and a swathe of open land ready to be filled with other outdoor industry headquarters.

Enve was the first brand to commit to the space before Covid hit. That commitment paid off, giving Enve a large and well-plotted facility in which to manufacture its wheels. The community is similarly making a comeback and has embraced the outdoor industry as an integral part of it.

Similarly, Enve made another total commitment, this time to the rider, when it put aside some space in the massive facility to build its bicycles. The Custom Road is constructed right in Ogden, at Enve's facility. In one room, workers are busy hand-laying carbon to create frame sections that will later be cut and assembled. In another, that very cutting and assembling takes place. Just down the hall, frames are prepped and painted.

"The Custom Road is a halo product," says Pantone. "It's 100 per cent US manufactured, and it's a truly bespoke road bike.

The Melee takes a sharp departure: more stiffness and aggressive geometry, lighter weight, and aerodynamic tube shapes



That's the priority of that project. It's as authentic a product as you can produce. It's exactly the bike the customer wants from a fit standpoint, paint and the parts collection. It's a very high-touch experience."

To buy a Custom Road is to invest in oneself, in other words. From raw carbon stored in freezers to finished bike, expert eyes and hands create each Custom Road with exceptional skill and care. Enve collects your fit data then cuts the frame parts to specific lengths. It's all done by Enve's trained staff of builders.

Then those parts get assembled, the frame gets painted, the parts the customer has chosen get picked and the bike gets built. A team of people are involved in creating this highly customised, beautiful tool specific to each rider.

And Enve knew immediately from its Custom Road experience that its next bike, the Melee, simply could not be produced in-house in Ogden.

A trip abroad

Once Enve proved to the world and to itself that it could provide riders with a halo experience, it became clear that it was time to bring some of that magic to the masses. And the engineering team knew it would be a completely different bike altogether.

Enve had already used all extra space in the facility to create the Custom Road. There was simply no feasible way to expand the frame manufacturing further at home in Ogden.

This meant that the Melee needed to be designed differently than the Custom Road in preparation for manufacturing in China. As such, chief engineer Kevin Nelson and his team began designing a pure race bike that would feature a monocoque design.

"The layups change quite a bit since you're not connecting pieces and bonding them," says Nelson. "It makes changes to the way that the bike feels."

Fortunately, Enve wanted a bike that felt a lot different than the Custom Road. The Melee's playground is the racecourse, whereas the Custom Road tends more toward everyday riding, big days with big miles, personal records, and, as the name implies, total customisation.

The Melee is a fighter. As such, its demeanour lends itself to the fray.

Nelson describes it as "a laser race bike". It's fully focused on going fast. The Melee's DNA may have been born from the Custom Road, and even borrows its basic silhouette, but the Melee takes a sharp departure from there: more stiffness and aggressive geometry, lighter weight, and aerodynamic tube shapes.

But Nelson, like many of his colleagues at Enve, has a racing background. He knows what makes a great race bike. And while the Melee is all about speed and performance, Nelson says it wasn't necessary to entirely abandon any sense of character in the ride.

"I don't like bikes that are crazy rigid," he says. "I like bikes that are comfortable. I like a bike that's capable of lots of different things, which means it can't be too much of any one thing. So we tried to push the Melee toward the race side without making it into something totally unrideable."

Nelson notes that while the Custom Road's seatmast system is technically more compliant, the separate seatpost on the Melee actually flexes more, fore and aft. That lends the rider a muted feeling that adds comfort without detracting from the ultra-responsiveness and stiffness that makes a race bike, well, raceworthy.

Not custom, but customised

Pantone isn't shy about touting the Melee's design goals. "The Melee is about scale and it's about performance," he says. "There's one geometry, one handling characteristic, and that is targeted at the road racer."

In that sense, the Melee doesn't have the same

"There's one geometry, one handling characteristic, and that is targeted at the road racer"

— Jake Pantone, vice president of product and consumer experience, Enve

marketing wow factor as the Custom Road. But controlling more parameters to create a bike for a broader market certainly has its perks. You can't call the Melee a custom bike, but it does have plenty of customisation options.

Enve sells the Melee as a 'chassis' rather than a full bike. When a rider orders a frame, it will come with the handlebar, stem, headset, fork and seatpost all included. The rider gets to choose the specific handlebar and stem sizes right from the get-go, no fiddling necessary once the bike lands on your doorstep.

On top of that, the monocoque design opens up advantages specific to the racer. There's only one bonded joint rather than several – as is the case with the Custom Road – which means Enve was able to make the Melee frame lighter because there are fewer carbon layer overlaps.

It also means the Melee becomes a bit more aerodynamic. "Because we're not dealing with the overlaps in the joints, we were able to make the entire bike a little bit narrower," says Pantone. And the frame's tube shapes directly complement Enve's SES rim shapes – another advantage of having control of design parameters in-house.

The two-piece cockpit also contributes both to the adjustability and the aerodynamics of the Melee. Cable housing gets routed through the bars, into the stem and directly into the head tube, keeping those round tube shapes out of the wind.

But that's where the customisation ends. And that can be an advantage in itself. With fewer sizing x-factors to consider, Enve was able to prioritise efficiency and speed. "It's about providing a solution to people who would prefer the performance and don't necessarily need the customisation," says Pantone. "You're paying for those things. Some riders are really just looking for a performance race bike that is designed as an Enve system. That's what we deliver with the Melee."

Lest there be concern that the Melee doesn't offer enough geometry versatility, it's available in seven sizes. Across those seven sizes, Enve has designed forks with five different rakes to ensure the ride characteristics remain consistent across the size spectrum. That means the smallest and the tallest riders will still feel the characteristics the Melee design intended.

It's small touches like the varied fork rakes that serve as a reminder of the Melee's roots. "We definitely used the custom road to establish the design language that's carrying through to the Melee, and frankly the future bikes that are in the works."

Envisioning the future

On the day of my visit to Enve's headquarters, chief engineer Kevin Nelson has his head down at his desk, poring over data and discussing details of a new, as-yet-unreleased project. I get a peek at it, but it's not ready for primetime.

On the other side of the room, Pantone and marketing director Neil Shirley have been discussing details of a "big stupid ride" they intend to take tomorrow. Shirley is certain it will be a tonne of fun. Pantone isn't sure he'll survive it at all.

Throughout the rest of the facility, wheels are being built. Custom Road bikes are being created. R&D testing hums along, with the occasional crash or explosion, all part of the fun of testing parts to failure.

And throughout the world, riders are finally getting their hands on the first production run of Melee bicycles. Despite the underlying excitement of all these new beginnings, Enve's headquarters remain somewhat subdued with the hum of engineering feats and production schedules. The future can't wait. And commitment to the rider remains the ever-present task at hand. New bikes on the horizon, big rides ahead. Enve's totally committed. ●

Hammerhead's team works together to elevate the experience of one: the rider

INFORMATION IS BEAUTIFUL

words by **DAN CAVALLARI**
photographs by **HAMMERHEAD**

To cycle is to explore the world. From the moment a child wobbles forward, liberated from the steadying hand of parental stabilisation, he or she is answering a fundamental question common to all cyclists: where shall I go next? At this point, the answer to this question is simple: to make forward progress is miracle enough. Cycling expands children's worlds; and for those of us lucky enough to retain that explorative spirit, cycling continues to open up new worlds, landscapes and experiences.

As adults we may be adventure cyclists, leisure cyclists, racers, commuters or a creative mix of all four, but at the outset of and during every ride, the same fundamental, existential question applies: where shall I go next? It's a metaphor for life.

It's the same question that Hammerhead asks, in terms of helping cyclists map, plan, improvise and measure their rides, but also on a more fundamental level, in working out and understanding what cyclists need. The most successful companies give people what they need. They also understand that it's important not to give them what they don't need.

Pieter Morgan founded the company to ensure riders could explore more efficiently and with technology that makes it easy. Since then, Hammerhead has expanded, and evolved navigation technology in such a short amount of time that, to the outside observer, it perhaps seems quite linear. However, the journey has been anything but. And that's the way the team at Hammerhead likes it.

While the shortest distance between two points may be a straight line, rarely is that straight line the most rewarding journey. Often it's a rather risky path, but there's far too much to explore between A and B to simply cast eyes forward. So Hammerhead's team has made it a point to explore the tangents off the straight shoot. It should come as no surprise that Hammerhead's future lives in the twists and turns. They're a mapping technology company after all.

Hammerhead's journey from here thrives on data, all plucked from points previously unknown. But the rider's needs remain the beacon that dictates the path forward.

Waypoint: connection

Hammerhead's Karoo 2 is a mapping tool. It aims to help riders navigate from A to B, whether that is via the most direct route, or via those tangents. It tells riders what is coming, even if there's no pre-loaded map, because even people making it up as they go along still benefit from that information. And the company learns from Karoo 2 users - riders - what they want and need, refine the software and improve that information. The aim is that the Karoo 2 enhances the riding experience.

"When you get in your car, you look at your dash and you see everything," says Ross McGraw, Hammerhead's Global Head of Marketing and Sales. "The head unit is the natural place for a cyclist. What you're seeing is a head unit being more additive and intuitive."

Part of that additive and intuitive growth is possible because Hammerhead now has more technology and resources at its disposal than ever after SRAM recently acquired the company. With a suite of useful software already developed, SRAM offers Hammerhead the tools it needs to create a

one-stop location for vast amounts of data, all distilled for quick and easy digestion.

The TyreWiz is a perfect example of that symbiosis. The TyreWiz measures your tyre pressure, front and rear, and reports that data to the rider in real time so they can make the best decisions possible for the ride. But that data needs to be delivered somewhere, and the display and function of it has to be intuitive. That's where the team at Hammerhead comes in: by understanding how the rider will use that information, and presenting it with as few roadblocks as possible.

Now imagine if you could get other data like that, right on your head unit. Want to know how many miles you've got on your chain? Or how many shifts your rear derailleur has performed?

The team at Hammerhead has already imagined it and is working toward an effective delivery of that data to the rider. But delivery itself isn't good enough; an intuitive delivery design is the only path forward.

Waypoint: intuition

Jess Braun, the Vice President of Product at Hammerhead, echoes McGraw's notion that consumers today expect all information at their disposal at all times. The car dashboard is a good analogy for that, especially in recent years as computers have taken over dashboards to instantly report more data than most of us can reasonably consume while driving. But just because you can present massive amounts of data during a ride, doesn't mean you should.

"It's too much for our human mind," says Braun. "It's a cognitive load that's more in a very short period of time than humans are evolving to catch up with. We're just not able to process all that information at once. You don't want that screen to be so distracting that someone is not paying attention."

That's a problem for car design, and it's equally a problem for cycling head unit design. So Braun's team has had to figure out the balance between the rider's desires and the rider's cognitive load capabilities.

"It's hard to figure out, when people are so used to all of the power of what they can experience instantly," says Braun. "How do you both provide value and make it something that they think is worth it and useful, but also dial it back? We need less cognitive load invisibly – to make that experience invisible, so it's helping you without you actually even thinking about it."

Invisibility is, in a sense, a design goal for Hammerhead products going forward. The less you're thinking about it, the better the product design.

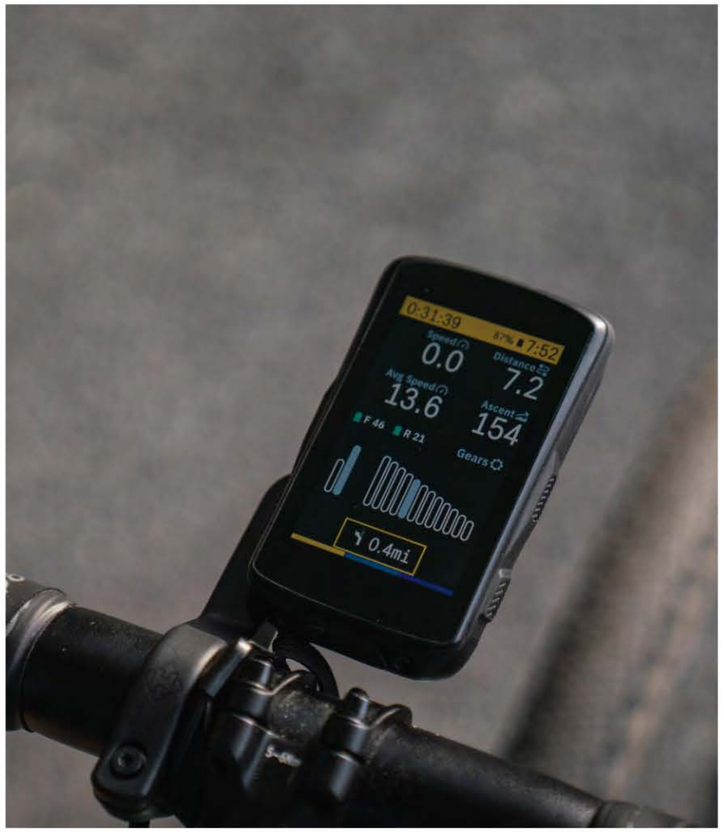
McGraw's own reaction to the Karoo 2 comes from his own riding experience, and his own experience with integrating more technology into his riding.

"The way digital stuff used to work is that it detracted from your experience, right? You're fumbling with your watch, and you weren't looking up and paying attention.

"Now, we're removing distractions and helping you focus on the experience itself. The objective is to build technology that allows you to get back to the enjoyment of cycling and riding, and looking up and experiencing it."

Waypoint: safety

Braun sees the future of the company in much the same way she sees the navigation screen on the Karoo 2. Zoom out and you'll see the big picture, but she's more interested in zooming in to see the ins and outs of what route to the future is possible. She sees data, and lots of it. To her, that's a useful tool – but as a means, not an end.



"Data is only useful if you know how to make sense of it and apply it," she says. "The bike industry is still stuck on: 'The more data we have, the better.' Well actually, no. There's a whole craft of data science, and making sense of data and actually making it digestible and meaningful, and making sure that the data is actually saying what you think it's saying. Hammerhead has been able to accumulate a lot of rider data. It now takes an entire team to disseminate that data and use it for future developments that serve the rider. The Karoo 2 makes rides safer and more efficient.

"A big detractor of getting anyone on a bike is safety. Our infrastructure is very scary. You are a very vulnerable road user. I can't imagine, if I was a parent, sending my kid out to school on a bike. That's a non-starter."

And the data is clear. It's not motivation that keeps most riders off the bike. It's safety and security.

"With data, we can get rid of dangerous intersections," says Braun. "All of the technology that Hammerhead is building and putting on bikes, that data is very, very valuable and very useful to help build a better infrastructure."

Hammerhead's navigation allows riders to see which routes riders who came before them have chosen. That means it's possible to navigate through a city, even if it's unknown to the rider, on the mellower, potentially safer streets. It's Hammerhead's rider-first thinking in action.

Waypoint: future of the product

While much of what's on the horizon for Hammerhead isn't ready to reach the public's eyes, some of the team's goals are simple: more product iterations, including software and hardware, that serve the rider. Hammerhead has already shown its strategy, with regular updates in riders' inboxes every two weeks that instantly improve the product and therefore the riding experience.

Morgan says more concrete goals are on the docket too. "Higher fidelity GPS is something we're looking at for future products,"

he says, which ultimately continues Hammerhead's original goal of redefining what's possible in navigation.

Morgan also says there's a companion app in the works that will allow Bluetooth data sharing. That's yet again a response to riders' needs – and their direct feedback. As Braun's team began to understand how riders were using Hammerhead devices and software, it became clear that Hammerhead needed to develop an app, even though it's quite easy to use the device without one.

"We know that people are used to using phone apps to set things up," says McGraw. "The original intent was, everything is on the device. But we also want to react to the way riders behave. We know that riders go on their phone and look for an app, even though we don't have one. So if that's what they want and it will allow them to connect more things, we can do that. Initially it was something we didn't want to do. We said, 'Hey, what if you didn't need your phone?' But we've noticed rider behaviour leans toward an app. And in the rider's mind, that's a good thing."

Co-founder Laurence Wattrus and Vice President of Hardware Engineering Rob Martinez have also been busy. The pair designed the original mount for the Karoo computer. The team at Hammerhead created a mount different to anything else on the market, something that gets away from the quarter-turn system that has dominated for years and has forced other designers to accommodate rather than innovate.

But it's likely we'll see more of the Hammerhead-style mount, which is aero, light, low-profile, secure and easy to use. Is wider adoption of the unique system on the horizon? It's more than possible. "The mounting system is a better system people are excited about, so we're working with other partners to build wider adoption of that standard," says McGraw.

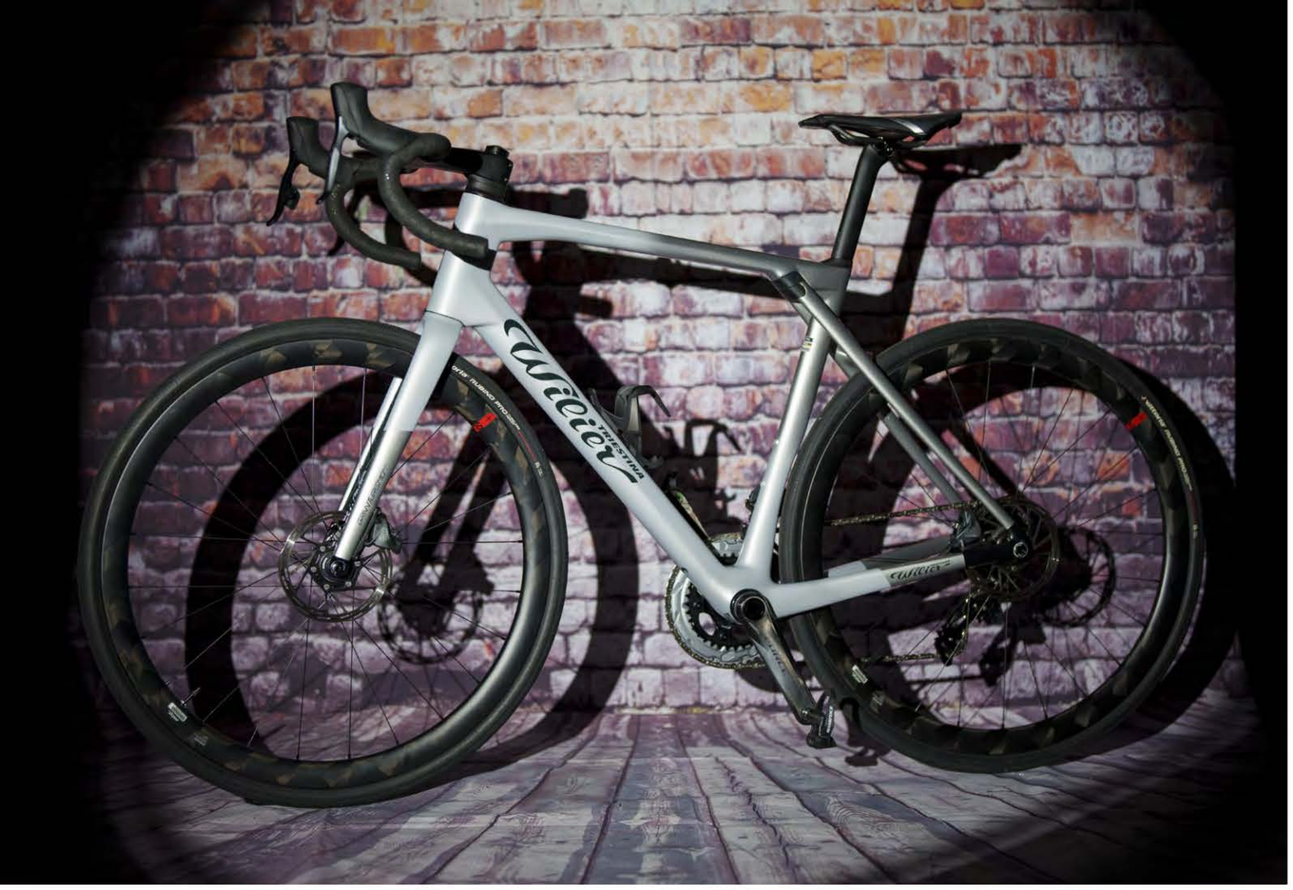
Waypoint: teamwork

One rider crosses the finish line and claims the win. But it's almost always the team that gets that rider there to raise their hands in victory. So it is at Hammerhead. The company's focus remains fixed on one person – the rider – but its ethos revolves around the team.

While Wattrus and Morgan got the ball rolling, there's a collective of talent and skill keeping it in motion. "Brian Oberholtzer and his team implement all the actual code," says McGraw. "They test it, and they ensure we put out those releases every two weeks. Brian is really amazing at building those software organisations in a way that's iterative and beneficial to the rider. His team ensures we're growing incrementally."

Braun's team takes all the data from rider feedback and develops a roadmap for future products. They essentially chart the course and advance the product – they are, in a sense, the GPX file of Hammerhead's company navigation. Whether it's building on something that already exists, or creating new features that serve the rider, the team is integral in what ultimately lands in the consumer's hands.

In a surprisingly symbiotic relationship, while Hammerhead's navigation provides direction and guidance to riders daily, so too does the rider provide direction and guidance to Hammerhead. Beyond hardware and shining lights, Hammerhead has forged a bond with its riders. It's invisible. It's intuitive. And it allows the rider to connect not with the blinking lights and soft chimes of a tool, but instead with the ride. That's what dictates Hammerhead's future. ●



WILIER TRIESTINA GRANTURISMO SLR

words by Dan Cavallari
photographs by Matteo Zanga

Do we all want pro bikes? Or do we just want comfortable bikes that look pro? Chances are the latter description fits a wider swath of riders, which is why Wilier Triestina's Granturismo SLR combines a stunning, race-inspired silhouette with an award-winning compliance system to quiet even the most aggressive roads.

The Granturismo SLR replaces Wilier's Cento10NDR, while capitalising on its predecessor's grand successes in compliance and performance. The Cento10NDR introduced the world to Actiflex, Wilier's vibration damping system, which was integrated into the seat stay/seat tube junction.

Actiflex 2.0 integrates differently into the Granturismo but maintains the same goal: exceptional comfort for long rides. The system now integrates into the frame in front of the seat tube rather than behind it. This not only improves the system's lateral stiffness, but it also protects the Actiflex components more efficiently from dirt, mud, sand and rain. That means there's less maintenance and wear.

Wilier Triestina would like to shatter the notion that endurance bikes are super-slack, heavy, and slow machines once and for all. The Granturismo looks like a race bike and offers many of the same aerodynamic advantages. While the geometry does indeed accommodate a more comfortable riding position, those geometric subtleties don't advertise themselves outwardly.

The HUS-MOD Carbon frame includes a liquid crystal polymer, which creates a laterally stiff platform for the Granturismo. Aerodynamic tube shapes combine with other wind-slippery touches like an aero seatpost, and a wide fork crown to make the Granturismo a fast and efficient machine. That means less fatigue for the rider over the course of long miles.

On top of that, Wilier has included the 0 bar, the same integrated handlebar/stem included on the Wilier 0 SLR race bike. It features a more rounded, ergonomic grip for comfort, yet also allows for internal routing through the handlebar and stem, directly into the head tube. This keeps inefficient round shapes – your cables and housing – out of the wind to further lower aerodynamic drag.

Wilier has the modern rider in mind from the outset. The Granturismo SLR clears 32mm tyres, so you can take this bike just about anywhere on the tarmac or on light gravel. The wider tyre clearance also allows you to run lower tyre pressures, which reduces drag and makes you faster over the long haul.

In another nod to modern riders' needs, the front derailleur plate is removable should you choose to run a 1x system. Wilier includes a replacement plate without a front derailleur mount to ensure you maintain aerodynamic integrity in this area of the frame – not to mention your bike's seamless, sleek appearance.

With the same comfort-oriented geometry as the Cento10NDR and six sizes to choose from, there's a Granturismo SLR for just about any size and style of rider.

Best of all, the Granturismo SLR treats the world to exceptional, race-oriented looks, in a package that has the comfort of your body at its heart. The Granturismo SLR presents an ideal tool for the performance rider who isn't necessarily toeing the line at races, but still requires efficiency, speed, light weight and comfort. In other words, it's the bike most of us should be – and should want to be – riding. ●

BMC EQUINOX + ADICTA LAB

words by Dan Cavallari
photographs by Sean Hardy

The clothing industry creates an awful lot of waste. Up to two thirds of garments produced globally end up in landfill, and some of it can sit there decomposing for more than 200 years. That's why when BMC launched ADICTA LAB, riding the line between performance and sustainability was placed at the very core of their garment line-up and brand mission.

That starts before the clothes even get manufactured. The Alate Jersey of ADICTA LAB's most recent Equinox + collection, is made from recycled PET plastic bottles. Sustainability starts at the materials source.

Yet sourcing recycled materials doesn't sacrifice the performance aspects of the jersey, or any other garment in the Equinox + line-up. The Alate is lightweight and made from premium Italian fabrics that offer exceptional breathability and a second-skin sensation. Mesh side panels integrate nicely to keep you cool during the heat of the ride.

The Valent Jersey, for example, features responsibly sourced materials, too, but the overall design incorporates highly breathable mesh embedded with 37.5® Technology. ADICTA LAB use 37.5® because it is organically derived from volcanic sand, and able to optimise the body's natural thermoregulation mechanisms, for scientifically proven longer, better cycling performance.

Of course, style matters to cyclists. So, ADICTA LAB's Equinox + jerseys take their design cues straight from nature. A focus on Terra and Aqua weaves its way through the graphics and layout of each jersey.

Jerseys are one thing. Bib shorts present complexities that can make or break a long ride. Like the jerseys, however, the Joule and Liana Bib Shorts are made from lightweight recycled fabric. Should you be worried? Not at all. According to ADICTA LAB, there are other benefits to the recycled fabrics they chose, beyond environmental stewardship and care.

There are technical benefits as well. The bibs offer high breathability on top of exceptional muscle compression. The Italian fabrics used throughout are also lightweight, once again contributing to that barely-there feel.

Most importantly, however, ADICTA LAB has not forgotten what makes a good pair of bib shorts vital to a long-distance cyclist. As such, the Joule and Liana bibs feature gender-specific 4D performance chamois pads to ensure comfort over the course of long hours and countless pedal strokes.

These are all excellent steps toward a better world. But BMC and ADICTA LAB went further by establishing the Terra Foundation. This Terra initiative dictates that ADICTA LAB supports a new environmental cause each year. For 2022, ADICTA LAB will plant a tree for every purchase of its clothing. What's more, BMC is a Swiss company, doing all of its manufacturing in Europe.

All of that adds up to a business model reflective of our world's current needs. Recycled materials and sustainably sourced products lead to less of an environmental impact. And stewardship over our lands should come as part and parcel of every business plan. While there's always more to be done to protect the future of our world, BMC and ADICTA LAB have initiated a new season of sustainability at the sister companies. Fortunately, the garments only benefit from these bold steps. And the Equinox +2.0 collection is coming in March. ●

CERVÉLO S5

Get a group of engineers together and you'll find an assembly of minds charged with thinking outside of the box. Get a group of bike engineers together and they'll be thinking very much inside the box – the ones within which the UCI constraints have limited frame design. Happily, those boxes recently expanded, so at least engineers got a bit more space to play with, or at least a bigger box to think inside.

The Cervélo S5 explores that space with a subtlety that's easy to miss, yet offers much consequence in our sport of millimetres and grammes of drag. The S5 is, in fact, three to four per cent faster than its predecessor, all while looking nearly identical.

Those similar looks belie a mass of big improvements. The process of reimagining what the S5 was capable of required goals to shoot for. Simplify, refine, and enhance: those were the directives guiding the redesign, and while you're likely to miss them with a casual glance, the improvements are vast to the careful eye that lingers.

User First

To simplify, Cervélo engineers designed a new, more user-friendly cockpit. The spaceship shape remains, but no more will riders need to order a dealer fit kit. The bike ships with spacers, and a new fork design means there's just one bolt length for all sizes and stacks. That's great if you need to adjust your position. And if you don't, you still benefit from a weight savings of 53 grammes.

Refining the S5 started at the front of the bike. Cervélo reshaped the handlebar to improve adjustability and comfort. The bars tilt from 0 to +5 degrees using a two-bolt interface – no finicky shims to contend with. The shape of the bar also streamlines the interface with your shifters, providing a flat transition and a more comfortable location for your hands.

With that same user-first design process in mind, Cervélo expanded the S5's tyre clearance. Riders can now fit up to a 34mm tyre with 4mm of clearance on every side of the tyre. The S5 comes stock with 28mm tyres, for which the new Reserve wheels are optimised. But if you're after big rubber, the S5 is up to the challenge.

Sneaky Slippery

While the general eye-catching silhouette of the S5 remains largely unchanged, a closer examination reveals tweaks and tabulations that make the bike vastly more slippery in the wind. Part of that aerodynamic improvement lives in changes to frame tube shapes. But even more comes from the Reserve 52/63 wheels.

Cervélo managed to chop 50 grammes of drag through the wheels as compared to the Reserve 50/65 wheels. As the name implies, the front wheel is 52mm deep, while the rear wheel is 63mm deep. And the front wheel features a slightly wider 25.4mm inner rim width than the rear wheel, which sports a 24.4mm inner rim width. Different dimensions benefit different wheels based on the position on the bike, so that's exactly what Cervélo did with the 52/63 wheels. They're optimised to work in conjunction with the frame to reduce drag in the overall system.

The front wheel profile is slightly smaller, not to mention wider and rounder, to counteract the effects of crosswinds on the wheel. You get more stability balanced with as much drag reduction as possible. The rear wheel is taller and asymmetrical, since it's partially shielded by the frame and the rider. The taller rim profile also lessens the effects of crosswinds, since winds hit the rear wheel at narrower yaw angles.

Boxed in, boxed out

But what about the frame? And what's the story with these UCI boxes? Cycling's governing body, the Union Cycliste Internationale, has written rules that constrain frame design. Until recently, designers had to ensure each tube shape did not exceed a 3:1 ratio – that is, the length of a tube shape could not be more than three times its width. The result? Less aerodynamic frames.

The 3:1 rule went away a few years ago, and since then the UCI has further opened up more possibilities in frame design by refining its regulations to include thinner tube sections. Notably, frame designers can now add compensation triangles.

Without getting too deep into the weeds, you can see a compensation triangle on the S5 at the bottom bracket junction. A taller, flatter bottom bracket helps increase aerodynamic performance, and it even works in conjunction with water bottle placement to improve airflow.

Both the head tube and the bottom bracket have gotten deeper. And the head tube extends forward in an 'aerodynamic nose' that further decreases drag over this leading edge of the frame.

Less noticeable are the new aero shapes on the tubes. Frame engineers can tweak tube shapes to improve airflow in key sections of the frame. Another example is the sharper, more modern corners you'll see throughout the frame. This helps discourage 'dirty air' from forming behind tubes, thereby creating drag.

Overall, the S5 is lighter than its predecessor, yet its surface area has increased by 1.5 per cent. Lighter and more aero? Not a bad combo.

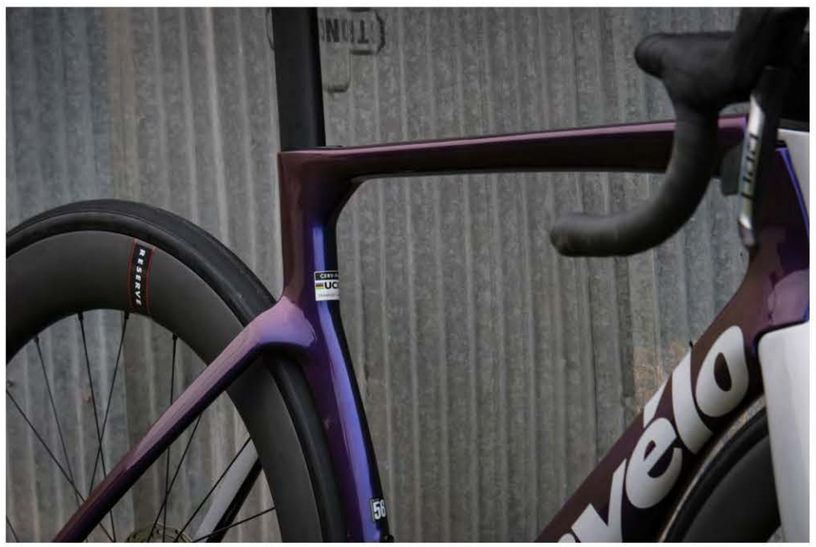
(Not so) secret testing

Pro riders have been aboard the new S5 for quite some time now – perhaps even before many of us even noticed. Given the consistency of the bike's silhouette, only keen eyes would have noticed anything.

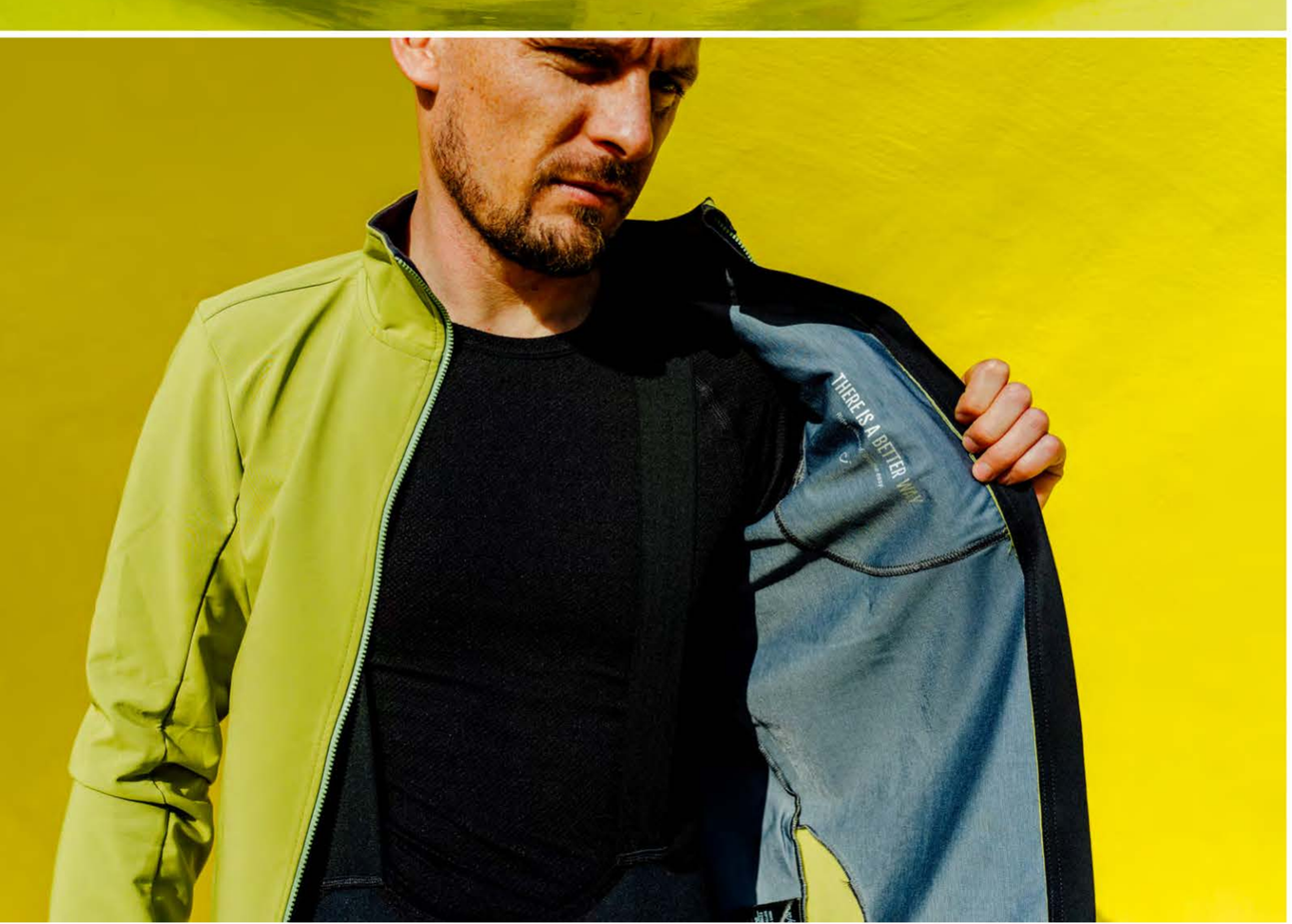
Yet there it was, the S5 crossing the finish line first underneath Jumbo-Visma riders at Paris-Nice, Omloop Het Nieuwsblad and the E3 Saxo Bank Classic. And again on the podium at Gent-Wevelgem men's and women's races, Dwars door Vlaanderen, and Liège-Bastogne-Liège.

Oh, and perhaps you watched the Tour de France this year? The S5 had more than a few shining moments. If you didn't notice, well, that's good enough reason to go watch some replays, right?

All told, Cervélo's holistic approach to the S5 redesign has netted riders a faster bike that's lighter and even more user-friendly. It's race-proven but more ready than ever for everyday riding too, with added tyre clearance, comfort, and adjustability. ●



words and photographs
by Dan Cavallari



VELOCIO WINTER KIT

words by Dan Cavallari
photographs by Sean Hardy

A winter chill can have polarising effects on cyclists. Some retreat indoors to spin. Others embrace winter as an opportunity, full of bonus miles for those willing to prepare for them. Velocio designed its winter riding kit for bold riders; as such, it's full of bold colours and design choices for those who seek out the heartiest and hardest-fought winter rides.

Unsurprisingly, layering is the core concept of the Velocio winter riding kit. A Merino Mesh LS Base Layer provides next-to-skin softness and warmth on which to build your winter armour. From there, it's all about options to counter the extremity of the weather.

On the darkest and coldest winter days, the Zero Bib Tight creates a warm and breathable barrier between you and the elements. It's windproof on the front and breathable thanks to Thermoroubaix fabric out back. You'll want these tights when the temperatures dip below freezing.

Aside from the Zero Bib Tights, you won't need much else to keep you warm below the waist except the Zero+ Bootie. They're made from a proprietary Italian-made softshell fabric that looks like neoprene but is actually much warmer and lighter. There's an outer membrane to protect you from wind and water, and then an inner fabric designed for warmth. In between lies a cavity where warm air gets trapped.

Now that you're protected down low, layering up high becomes a simple and lightweight affair. The Alpha Long Sleeve mid-layer helps eliminate extraneous layers by providing exceptional warmth without exceptional weight. Polartec's Alpha Direct Insulation is strategically placed throughout the garment to ensure you remain warm without the bulk. Throw in some Merino fabric and you've got lots of breathability as temperatures change throughout your ride.

Of course, the weather can be cruel on winter rides. The Signature Softshell Jacket features a proprietary three-layer design that Velocio created in conjunction with eVent. Inspired by the articulated shoulders and chest of motorcycle jackets, Velocio created a piece that moves with the rider and makes the riding position comfortable and non-restrictive.

A one-jacket solution for winter riding? The Signature Softshell Jacket very well comes close by offering a waterproof membrane, a DWR treated face, and unparalleled breathability. When combined with the Alpha Long Sleeve mid-layer, you've got a combination that can take you from around 10 degrees Celsius all the way to below freezing, in a light and lithe package.

What if you combined the mid-layer and softshell into one? You'd have the Alpha Glove. Less bulky and plenty warm, the Alpha Gloves also take you through a wide range of riding temperatures and conditions. The DVStretch Softshell outer layer protects you from wind and water, while the Polartec Alpha Direct material inside provides a sky-high warmth-to-weight ratio.

All told, Velocio has created a winter riding system that gives you your own cold weather armour. We've seen that before, but never in such a light and warm package that ditches the Arctic bulk. Get your winter miles outside — now in comfort. ●

PRIME COMPONENTS

words by Dan Cavallari
photographs by Sean Hardy

Sometimes it's best to just come out and state your intentions boldly. Such is the case with Prime Components, a company whose singular goal gets stated right in the name. Bold proclamations are one thing; top-of-the-line performance is quite another.

Fortunately for Prime Components, the company had an ace in the hole while developing the Primavera 56 Wheelset. Prime is a sponsor at the Silverstone Sports Hub Wind Tunnel Room, which means it can test and develop its wheels quickly and continuously. With immediate feedback at the company's fingertips, Prime can adapt quickly to changing needs, technology, and rider feedback.

At 1,482g, the 56 wheelset is Prime's lightest and most aerodynamic wheelset ever. And on top of that, the Kevlar-infused T800 UD Carbon used in rim construction makes the wheels tough and responsive. The 23mm inner rim width takes full advantage of modern road tyres for maximum aero and rolling resistance benefits.

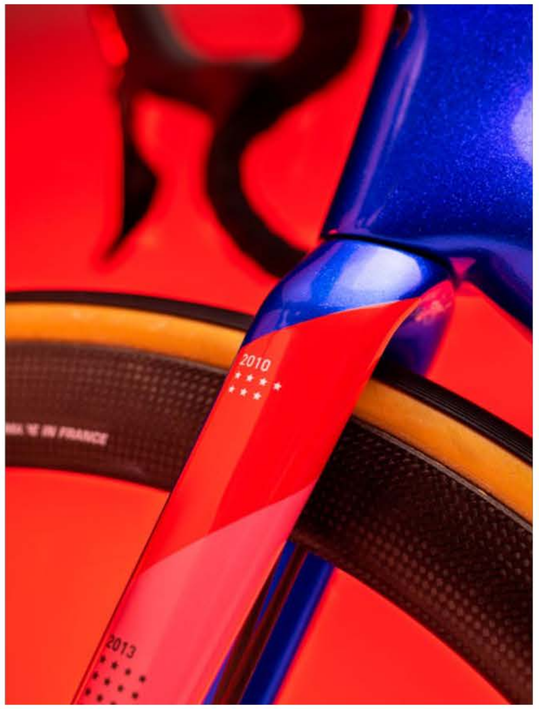
That's all wrapped around Prime's Star ratchet system hub. It's ultra-lightweight and features a dual-spring mechanism and a 36-point engagement system to get your pedal power transferred to the wheel almost instantly. The ratchet rings are made from heat-treated carbon steel, which means you should get a very long life out of them. Should you need to service the hub, Prime has made that super simple, too.

What's a wheelset without a host of other Prime components to outfit your ride? Prime's Primavera lineup also includes the Carbon Stem, Shorty Carbon Saddle, Seatpost, and Aero Handlebar.

The Primavera Carbon Handlebars are lighter and faster than their predecessor. The bars are 13 per cent lighter to be specific, and on average they are 20.6 per cent stiffer with 16 per cent less deformation. That translates into exceptional power transfer, combined with an aero design to cut down on wind resistance. Internal cable routing gets the wind out of your hair – and your cables – too, making the bars that much more efficient. They come in five sizes from 36mm up to 44mm.

Prime hasn't lost sight of the criticality of other touchpoints either. The Primavera Shorty Carbon Saddle takes full advantage of a truncated nose design that keeps you planted in a power position. The stiff 3K carbon shell and rails increase power transfer, but the PU foam padding ensures you're still comfortable after all the miles you can handle and then some.

If all of that wasn't already truly remarkable, Prime's top-of-the-line Primavera components come in a price friendly to the budget racer in search of high-bling equipment. For all its impressive aero performance, the Primavera 56 wheelset costs only £900. That's incredible value for a performance wheelset with a thorough design pedigree and proven aerodynamics. ●



WILIER 0 SLR FOR VINCENZO NIBALI

words by Dan Cavallari
photographs by Wilier

Vincenzo Nibali's storied career came to a close at the 2022 Giro di Lombardia, and Wilier Triestina simply couldn't let the occasion pass without honouring the Shark of Messina. Nibali rode his custom-painted Wilier 0 SLR for the last 257 kilometres of his career, ultimately crossing the finish line in Como to distinctly Italian celebration from fans across the world.

Indeed, Nibali electrified WorldTour races and beyond for 17 years and the Wilier 0 SLR featured custom paint as a nod. "Not just a successful career, but also our sense of gratitude for giving us so many thrills along the way," said Andrea Gastaldello, president of Wilier Triestina. "A bicycle manufacturer's job is undoubtedly technical. But as technical as it may be, the feelings of those who dedicate themselves to a project always shine through."

Coming with Corima wheels, Shimano Dura Ace components, and Wilier Triestina's integrated handlebar and stem, Nibali's Wilier 0 SLR rolled to the starting line built as a tool fit for the elite. But it was dressed up in its finest garb, tailored to Nibali himself.

The base colour for Nibali's celebratory ride was blue, which represented the colours of the Italian's fan club in his hometown of Messina. The seat tube and seatpost featured a splash of cycling's most weighty colour: yellow, for Nibali's successes at the 2014 Tour de France.

The pink fork perhaps carried the most significance for Italians, as it represented Nibali's two Giro d'Italia wins. And the subtle hints of red on the chainstays celebrated Nibali's 2010 Vuelta a España win.

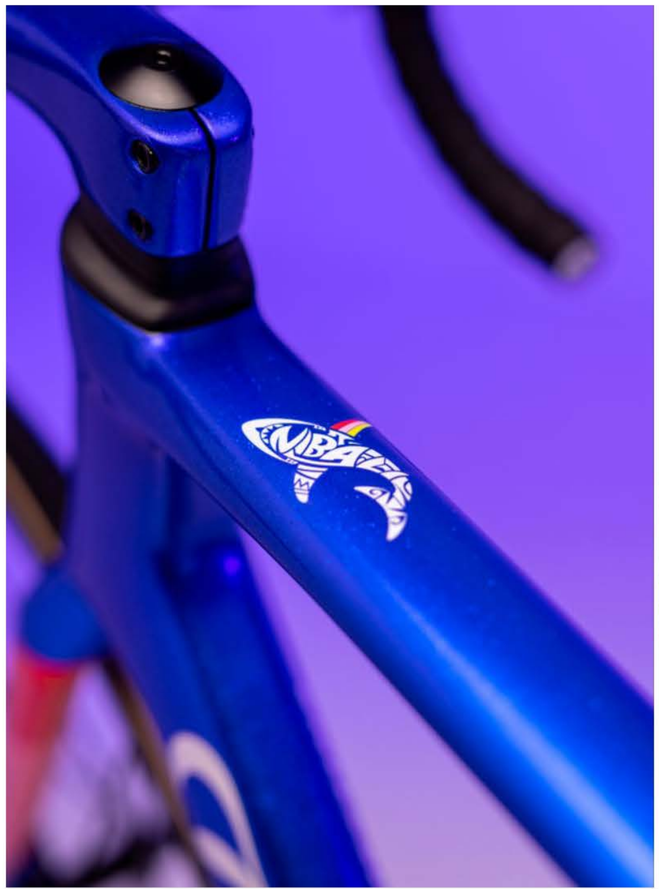
Less obvious were the subtle touches that tell the story of the ardour that comes with battle. Stars were scattered throughout the frame to represent each day Nibali wore the leader's jersey in Grand Tours. And no tribute to Nibali would be complete without the notorious shark, *Lo Squalo*, which lives on the top tube just behind the stem.

It is fitting that Nibali drew his career to a close at the Giro di Lombardia, a race he has won twice. A monumental career capping at one of the most hallowed monuments was sweet; doing it in his home country was even sweeter.

Wilier Triestina honoured Nibali in the hope of carrying him through his last kilometres as a pro as he carried cycling fans through nearly two decades of thrills and victories. "The Wilier 0 SLR that he rode is unique and our greatest show of appreciation," said Gastaldello.

The company paid tribute to Nibali in the best way it knows how. In Wilier Triestina's headquarters in Veneto, history, honour, and hard work come together in a simple statement, emblazoned on the wall: *Ecco il frutto del nostro lavoro: biciclette*.

This is the fruit of our labour: bicycles. ●



HUNT 25 AND 40 CARBON GRAVEL RACE WHEELS

words and photographs by Dan Cavallari

It is perhaps a testament to the complexity and diversity now driving the gravel world that the gear we use has broadened dramatically. Hunt Wheels has reacted to that diversity and complexity by widening its range of gravel-specific wheels to keep pace with those who want to, well, keep pace.

The 25 and 40 Carbon Gravel Race Wheelsets have stature and capabilities specific to the racecourse and those that test their mettle thereupon. Perhaps more consequential, however, Hunt Wheels believes that type of performance should come at a price that leaves room left over for other must-haves, like post-ride beverages and all the burritos you can stuff into a top tube bag.

That's a tall order to fill. Yet a quick glance at the specs of either wheelset proves Hunt has done just that. The 25 Carbon Gravel Race wheelset features a 25mm rim depth and a 26mm internal rim width, combined with a 33mm outer rim width.

To cut down on weight and increase durability, Hunt has opted for a hookless rim design. Fewer pinch flats and better aero performance are baked in.

All of that plays nicely with just about any tubeless gravel race tyre of your choice. And the total wheelset weight, just 1,380 grammes, should get the weight weenies among us palpitating excitedly.

Lest you think the 25 Carbon Gravel Race wheels are gentle souls, the asymmetric rim profile ensures plenty of impact resistance and compliance for brutal, chunky courses. Yet they maintain their climbing DNA, so get excited for these on hilly routes.

Every gravel racecourse challenges your gear with varied terrain and conditions. Hub engagement therefore matters to the gravel racer who needs immediate and reliable acceleration. Hunt's Sprint SL 7.5 hub sticks with a tried-and-true pawl design to ensure super-quick engagement – the multi-point pawls are angled at 7.5 degrees to grab the hub shell almost instantly.

The Sprint hubs have also slimmed down thanks to 6066 aluminium CNC-machining refinements that have dropped the weight to just 95g on the front hub and 230g for the rear hub.

Those same Sprint SL 7.5 hubs provide the core of the 40 Carbon Gravel Race wheels, as well. If the 25 Carbons are the climber's companion, the 40 Carbons keep pace with the sprint fanatics and flat-course grinders.

The deeper 40mm rim profile boosts the rider with a heft of lateral responsiveness, while the aero design helps mitigate wind drag. A 25mm internal rim width and 30mm external rim width on these hookless rims make them ideally suited to just about any modern tubeless gravel race tyre.

Surprisingly, despite the deeper profile, the 40 Carbon Gravel Race wheels come in just three grammes heavier than their sibling at 1,383g.

Despite that gravel-gossamer weight, the 40 Carbon Gravel Race Wheels are built for the punishment of the harshest racecourses and those – shall we say, graceless? – moments at the end of a six-hour day when perhaps you're not riding at your most careful.

All told, Hunt Wheels has considered the most vital gravel racing performance elements and worked them into two wheelsets prepared for the ups, downs, and in-betweens of any gravel event out there. ●

DESIRE

GIRO ECLIPSE HELMET WITH MIPS SPHERICAL

words and photographs by
Dan Cavallari

Giro has been manoeuvering through a complex dance for years now, attempting to find the most striking and effective balance between aerodynamic performance, light weight, venting and impact dissipation. The Eclipse helmet with MIPS Spherical protection has provided a dramatic climax to the dance, a fortissimo finale of all elements in fine balance.

It is, in fact, the fastest road helmet that Giro has ever created. But designers know fast is only one element of success when it comes to aerodynamic performance. That's why the Eclipse is also the coolest aero helmet Giro has ever brought to market. Just to further sweeten the deal, the Eclipse is designed with some of Giro's most innovative impact protection systems.

To ensure the Eclipse succeeded where so many other aero helmets have struggled, engineers used a 'Therminator' head form that measures cooling efficiency. Iterations of the Eclipse's design were subjected to heat dissipation testing on the Therminator, and ultimately, the Eclipse in its final form is nearly as efficient at cooling as Giro's best-in-class Aether Spherical helmet.

It takes 14 perfectly crafted vents to pull air from the front of the helmet over the rider's head and out the back to ensure air flow can do its job even in toasty conditions.

One look at the Eclipse tells you everything you need to know about what Giro engineers were really after, though. The sleek lid has been tested in the wind tunnel, and Giro says it is faster than its nearest aero road helmet competitor by a full 14 seconds over 100 miles at 25 miles per hour. The Eclipse bests its predecessor, too: it's a whopping minute faster than the Giro Vanquish.

Perhaps the coolest features of the Eclipse helmet are hidden almost entirely. Spherical technology, powered by MIPS, offers rotational force dissipation unlike any other design currently on the market. The Eclipse hides a ball-and-socket design made of an outer EPS foam shell, and an inner EPS foam shell that rotates freely within the outer shell.

On top of that, Giro uses progressive layering in its EPS foam construction. That means the layers of EPS foam differ in density depending on what types of impacts it will encounter. The outer shell features a denser EPS foam, while the inner one features a less dense construction. All that helps dissipate more force in the event of a crash – force that would otherwise transfer right to the rider.

As Giro's top-of-the-line aero road helmet, the Eclipse gets treated with the excellent Roc Loc 5 Air fit system, which adjusts quickly with the turn of a dial and wraps snugly around your head with no pinch points.

All of that impressive technology gets packed into a 270-gramme (size medium) package. With five colours to choose from and three sizes, there's an Eclipse ready and eager to complement your wardrobe, your race ambitions, and your hottest days climbing cols or tackling neighbourhood KOM segments. ●

PRINCETON CARBONWORKS DUAL 5550 WHEELS

words and photographs by
Dan Cavallari

Among the seemingly endless design challenges bicycle engineers face, none are perhaps as vexing as the myriad factors that dictate the parameters of a good wheel. Fast, stable, and light? Talk about three concepts that are not at all aligned with each other.

Princeton CarbonWorks has gone to great lengths to find the best combination of those three elements. So confident was Princeton in its design capabilities that the company added a fourth parameter to master: versatility.

The Dual 5550 wheels are the natural extension of Princeton's sinusoidal patterned wheel lineup. As road riding has evolved in the last several years to include more multi-surface riding and, to a grander extent, gravel riding, wheel manufacturers have had to meet the moment with a host of new technologies to scratch all itches. Princeton has done just that with this wheelset, which comes in at 1,440 grammes.

The competitive weight is perhaps not even the most impressive thing about the Dual 5550 wheels, though. That unique shape is designed to create more stability even in windy conditions. The waves help reduce drag and minimise eddies of air behind the rim that can lead to buffeting in the wind, among other aerodynamic enemies.

Another side benefit of those waves: the spokes all connect at the highest point in the rim depth (55mm) to increase strength and lateral stiffness. And reducing the rim depth in between those peaks to 50mm allows Princeton to reduce the overall weight of the wheel by reducing the amount of material where it's not needed.

Versatility rules the road world right now, which is why Princeton opted for a hooked rim design. That means a wider selection of tyres are compatible with the Dual 5550 wheels. Run tubes if you like, or go tubeless. The Dual 5550 wheels are designed to accommodate either setup. A holeless rim bed makes tubeless setup vastly easier and more reliable, while increasing the overall strength of the wheel.

It seems Princeton CarbonWorks has considered any and all riders out there. The Dual 5550 wheels are available as clinchers or as tubular wheels, not to mention rim-brake or disc-brake ready. And in keeping with the 'wider is better' trend in tyres, the 22mm inner rim width of the Dual 5550 wheels takes full advantage of wide road tyres (the wheels are optimised for use with 28-31mm tyres) all the way up to 50mm gravel rubber.

One of the less obvious benefits of the Dual 5550 wheels lies within the Tactic Racing TR01 Hubs. A conical driver system increases surface area within the interface, which means you'll get nearly-instant engagement for optimal power transfer. There's less opportunity for wear, more opportunity for power, and little maintenance to contend with.

If you're still unsure as to whether Princeton CarbonWorks is up to the most brutal conditions, consider this: the Dual 5550 wheels were tested incognito at Paris-Roubaix in 2021 under Team Ineos riders. Testing grounds for wheel durability, stability, and performance don't get tougher than that. ●

MYTHOS ELIX STEM

words and photographs
by Dan Cavallari

The Elix stem from Mythos looks futuristic, but it's rooted firmly in the present with the intention of upending componentry. It's probably not lighter than your carbon stem, despite the ample voids throughout. And at £500 it costs just as much, if not more.

So what's the big deal?

For starters, it's entirely possible you're looking at the future.

The Elix stem is the first commercially available 3D-printed stem. Until recently, 3D-printed parts worthy of placement on exceptional bicycles were limited by cost and access to the pros at the highest levels of the sport. Mythos changed that with the Elix, which uses additive manufacturing to create a Scalmalloy woven structure that defines the model.

Scalmalloy – an alloy made from a combination of scandium, aluminium, and magnesium – is stronger than titanium. Mythos used the material to design for "the most extreme load paths experienced by a stem". It's 15 per cent stiffer than an alloy stem, which means you can throw as much torsional terror into it and it will support your meanest sprint. Mythos was able to tailor the structure to remain comfortable too, in the directions that matter most to the rider.

And sure, it looks aces. But looks alone do not dictate the future of stem design. Dimitris Katsanis, the designer behind the Elix stem, has spent much of his career working with bicycle manufacturers and riders to create components that make sense and go fast. He can prove his success, too, with more than 100 gold medals across the Olympics and World Championships to show for it – not to mention results in all three grand tours.

It's that unique perspective on the rider's needs that has helped Katsanis develop a stem indicative of what's to come. The Elix stem represents a new way to create top-of-the-line products at mass scale. Until now, machinery required for additive manufacturing was cost-prohibitive, not to mention difficult to acquire and maintain. But Mythos has patiently waited for the technology to catch up with the 3D revolution, and it's uniquely prepared to bring a new wave of component design to the masses.

Another nifty advantage to additive manufacturing: the process requires less energy, produces less waste, and makes waste processing much simpler. In other words, additive manufacturing has the potential to lower the environmental impact of bicycle componentry.

So are we really staring at the future hidden in the geometric voids within the Elix stem? It's entirely possible that additive manufacturing can take hold in the bike industry thanks in part to its ability to harness new shapes, weight savings, and tailored stiffness. The applications are endless, and now Mythos has taken the first step toward bringing those endless possibilities to the masses. The Elix is only the beginning; everything else lies nestled in the matrices and honeycomb structures of what's now possible. ●

Feared, revered, big or small, it's the personal connections and memories that inform the climbs that lodge in our brains. Rouleur contributors hit the heights and scale the peaks of their favourite ascents

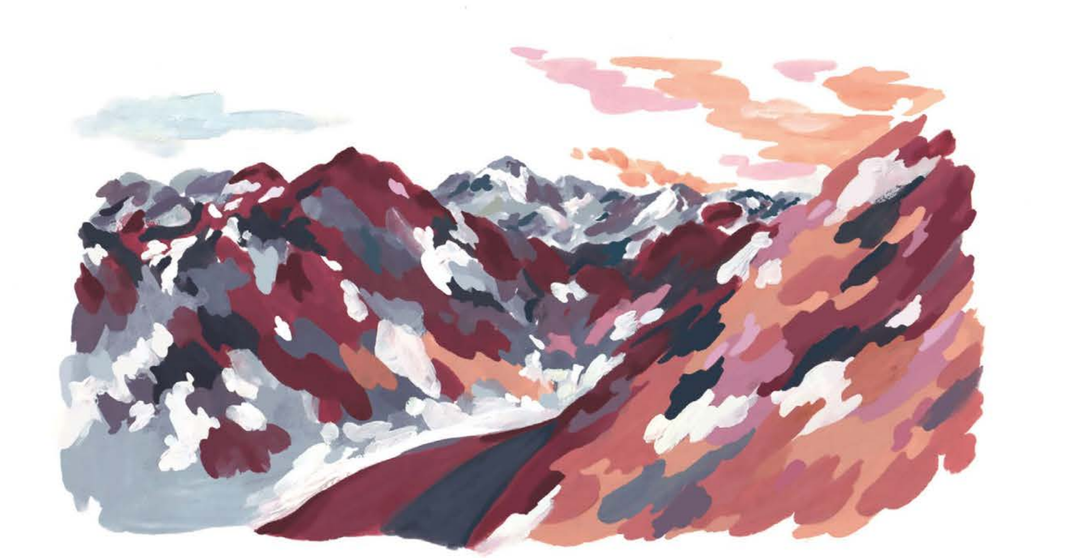
PEAKY BLINDERS

words by
ROULEUR CONTRIBUTORS

illustrations by
ELENA MOMPÓ

Mount Evans

by Dan Cavallari



I have a lot of favourite climbs. Mount Evans is not one of them. But the legendary road that winds its way up to 14,130 feet always occupies the top spot on bucket lists here in Colorado. I finally succumbed to peer pressure last summer, and while I hope to never do it again, it's impossible to deny the lure of that rutted, sky-high ribbon of tarmac.

While the scenery is gorgeous enough to make Ansel Adams blush, the pavement that runs beneath the wheels is mutinous. It has heaved with winter frost and the quick thaws that often accompany it. The ruts could trip up mountain bike riders, yet here we are, the sadistic skinny tyre crowd, rolling over those very chasms with nothing but 25mm of rubber.

Why such a fascination with this brutal ride? For starters, the Mount Evans Scenic Byway treats bold cyclists to more than 7,000 feet of climbing over 28 miles. It's the highest paved road in North America, so when you reach the summit, be sure to soak in the sight – if you can.

It took me three hours and 42 minutes to reach the top last July – the Strava KOM on the climb is just one hour and 44 minutes – and even though I live in Colorado, my body didn't react well to the daunting elevation. I cramped for the last hour of the ride, eventually pedalling squares into the parking lot at the top of the mountain a good 15 minutes behind my companions.

Long before that, the ride started pleasantly enough: just roll out of Idaho Springs, past the breweries, restaurants, ice cream shops, museums and historic mines, and head southwest along some rolling terrain until the road starts, almost imperceptibly, to steepen. After 13 miles you'll have yourself convinced: this climb will be a piece of cake.

But then something happens when you reach Echo Lake Park. On this particular day, the rest of the road to the summit was closed to car traffic. It was on the quiet of this stretch that it occurred to me: the real climb was now just beginning, and the 15 miles to come bear no resemblance at all to the pleasant pace and pitch of the first 13.

As cyclists, we all understand the subtle beauty of suffering, the pleasure in the brutality. It often serves as the core of the most dramatic moments in racing history. Yet when you're grinding up a climb alone, with your legs revolting against the abuse and your head backflipping as oxygen vacates the premises, the beauty vacates with it. The pleasure escapes you. There remains only one drive: to make it stop.

And you know there's only one way to make it stop. You must reach the top. It is a test of will, and if you are to succeed, you must convince your body to do what it cannot. You must keep pedalling.

So I did.

It was not pretty, nor was it quick. But after nearly four hours, I rounded the last switchback and some deeply selfish part of me stood up and applauded simply for performing the human feat of survival.

In true Mount Evans fashion, the exercise in brutality does not end there. The descent punishes in a different, ruthless way. Those deep ruts your arms, neck and shoulders cushioned on the way up? They come at you five times as fast and hard. Be ready to bunny-hop.

The last 13 miles back into Idaho Springs erase all the pain. Smooth, fast, sweeping tarmac eases away the neckache and memories of stiffened leg muscles binding in desperation. It's a reward of sorts, such a relief that you could ease off into a peaceful sleep at 40 miles per hour. A summit all its own, perhaps.

Clearly I did not love this experience. So why is Mount Evans special to me? Because I did it. I made it to the top. I accomplished the big one. And I never have to do it again.

But I probably will.

Mauna Kea

by Peter Stuart

In the middle of the Pacific Ocean, on the island of Hawai'i, sits the world's tallest mountain. Measured from its base, deep beneath the sea, Mauna Kea is 10,210 metres in height – far outstripping all the giants of the Himalayas. Though you'd struggle to start a bike ride from its subaquatic base, there is a road that leads from sea level to its summit at 4,207m.

You can cycle all the way, and chances are you'll only ever do it once. I barely managed that, but it will forever be etched in my mind as the definitive mountain, somehow meaning so much more than a mass of stone and volcanic rock.

Mountains often have mystic and religious associations, but few carry as many as Mauna Kea. The first western account described it as resembling a "stately pyramid" like the silvery dome of a magnificent temple, often adorned by white snow that gives it its name – Mauna Kea, or mountain white. The Polynesians who lived in its shadow for thousands of years, considered the summit the meeting place of the spirits of the Earth and sky, and it became an ancestral burial site considered too holy for some to set foot on. Hawaiian chants still tell of nobles who walked to its top, devoid of Lycra or carbon fibre assistance.

For years, a dispute raged between indigenous Hawaiians, who considered the land to be the most sacred in the region, and astronomers intent on building one of the world's most powerful telescopes at its summit. It brought to light a great conflict on the mountain between spirituality, tradition and modernisation.

It's a controversy that has led to there being little organised tourism on Mauna Kea. Cycling to the peak is allowed, but not encouraged – though if authorities needed material to discourage would-be riders, they'd have to look no further than the climb's terrifying statistics.

From the northwestern shore of Hawai'i, dipping a rear tyre in the ocean on the beach of Waikoloa, the road to the peak of Mauna Kea is 92 kilometres in length, 4,300m in ascent and bedecked with 20 per cent ramps. The numbers are enough to make you weep.

That's the very reason I found myself in Hawaii. In my time as a cycling journalist, I had ridden up some of the world's highest and hardest climbs. After a four-hour slog up Pikes Peak in Colorado, I was buzzing. I was certain it was the hardest climb there was, and I was proud that I had managed it in one exhausting go. But, alas, it took a few minutes of research to find a route that was far longer and far harder. For some unknown reason, I wanted more than anything to see if I could climb it in a single day, and my editor at the time was eager for the story I could write about the adventure.

It was October and a friend of mine was racing at Kona Ironman. He offered up a sofa bed after the race, and 28 hours of flying later, I began the long journey that ended at a sparkling white observatory in the sky. It was far harder than I thought, but also much, much more beautiful than I had imagined.

Hawai'i is unique for having eight of the thirteen climate zones on Earth, all in a single island. For that reason, this climb rolls through pastoral green, scorched desert orange and black fields of lava. Up above 3,000 metres, though, is a high altitude rocky desert where no plants dare to grow. Amid the dryness and the lack of oxygen, volcanic rock paints the landscape red. It feels like pedalling along the surface of Mars.

It took me 11 and a half hours to climb from the sea to the sky – taking in more than 4,300m of ascent in a single brutal dose. I stopped, I walked, I ground to a halt and I gave up repeatedly, but eventually I made it to the top. The view from the summit, amplified by a mild hypoxia, was stunning; the landscape of the entire island of Hawai'i spread out in full view, the gigantic Mauna Loa volcano (a climb for another day) dominating the centre of the landmass. When I was there, perfect white plumes of smoke rose from the live Kalapana lava flow at the island's edge. It's no mystery why the ancient Polynesians considered this to be the summit of all the universe.

The park rangers, seeing me zigzag across the road as I climbed, unable to answer their questions coherently, told me they wouldn't allow me to descend the mountain by bike. So we spent an hour driving downhill before we reached the low clouds, by then saturated in a deep orange sunset. Passing through them, losing view of Mauna Kea felt strangely permanent. I hope to one day see the top again, but never by bicycle.

"Hawaiian chants still tell of nobles who walked to its top, devoid of Lycra or carbon fibre assistance"