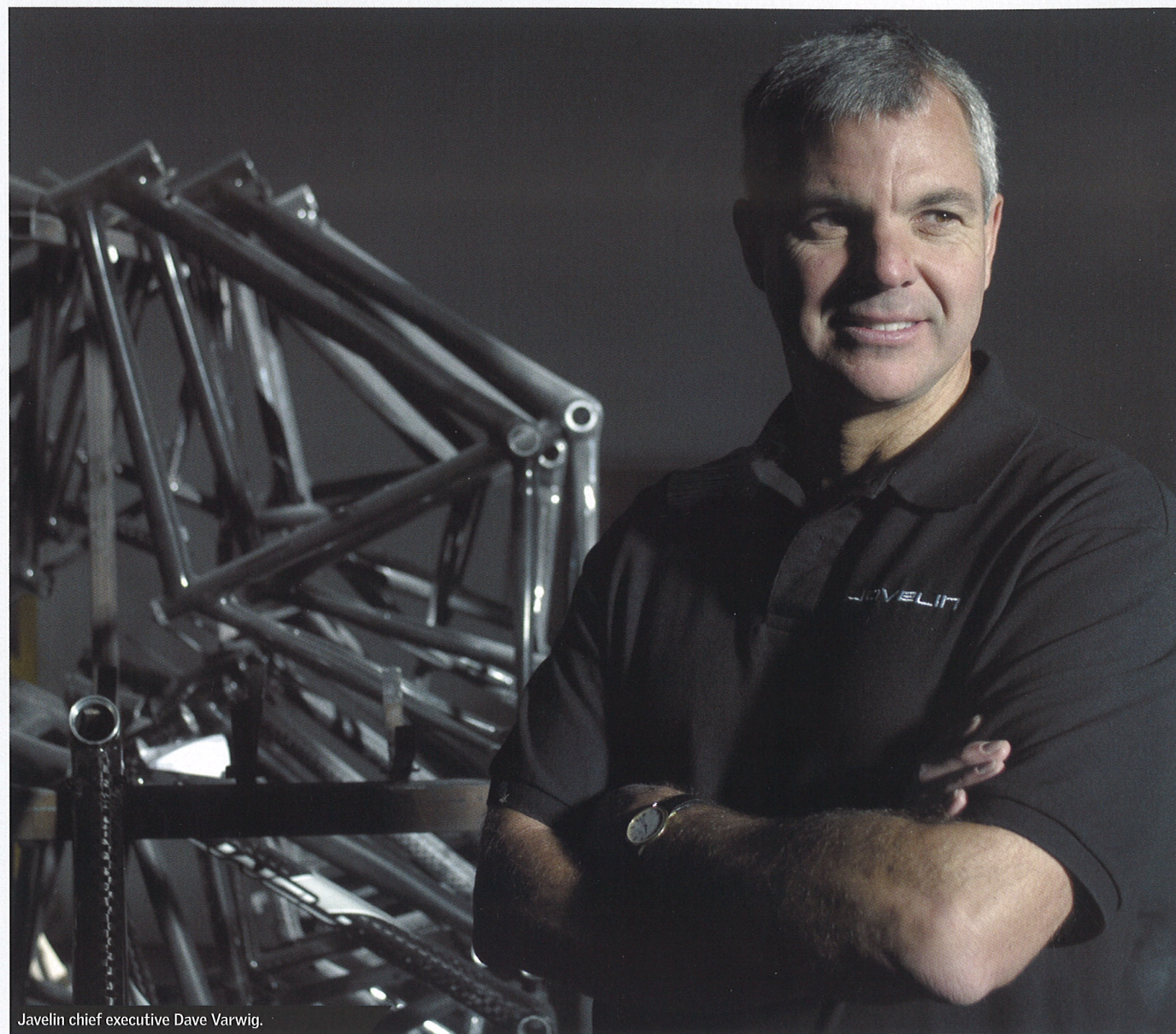


THE BIKE BOUTIQUE

Combine cutting-edge American technology, timeless Italian craftsmanship and the experience of Lance Armstrong's aerodynamics advisor and what you get is a Javelin product. *Proccycling* visits their small-scale operation which builds state-of-the-art bikes.

Words: Richard Hallett Photography: Mike King

JAVELIN



Javelin chief executive Dave Varwig.

No matter how technically and aesthetically accomplished the products of large-scale manufacturers, there will always be a special place in the heart of the regular road cyclist for the small-scale, the specialist, the "boutique" offering, with its promise of individuality and personal satisfaction. If the boutique operation in question can boast an enviable record of competitive success allied to some serious technological fireworks, then so much the better.

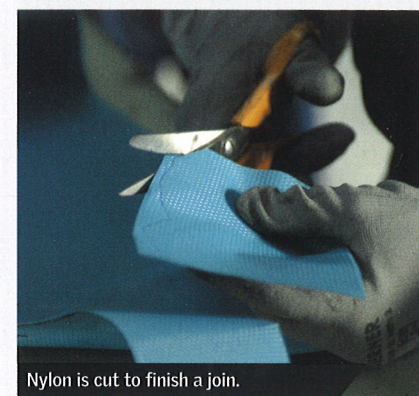
The reason for this continuing popularity is not so hard to figure. Throughout the history of the sport there have been artisans hard at work catering for the requirements of racers both amateur and professional alike, tackling anything from modifying leather saddles to creating frames of supreme artistry. Today, the world of the boutique manufacturer is at the same time more demanding and considerably easier than it once was. While the big boys have become ever better at building machines that meet any reasonable performance parameters,

they are, by definition, stuck with the production line ethos of mass manufacture. Besides, the technology to beat them, albeit at a price, is surprisingly easy to acquire.

This may take the form of Finite Element Analysis, which requires a computer, the software and someone capable of running it, or it may take the form of a small-scale, specialist, highly skilled construction facility, where innovative techniques and high-end materials are combined to state-of-the-art effect. Taken together, these make up as good a description



A join is hand-cleaned.



Nylon is cut to finish a join.



Javelin take pride in their Italian artisanship.

"Javelin have built an impressive competition record in all disciplines, from cyclo-cross to track."

as any of the resources available to Illinois-based lightweight specialists Javelin. Three years on from a re-capitalisation programme, they are developing a range of competition cycles based on frames hand-made in Italy to their own designs, conceived and modelled using computerised analysis and proven through testing in the wind tunnel and also on the road.

Founded in 1994, Javelin have built an impressive competition record in the US across all disciplines, from cyclo-cross to the track, and in particular in triathlon and on the road time trial scene. To those familiar with the brand's extensive range of time trial and triathlon frames, this will come as no surprise. Indeed, Javelin claim to offer the only full custom carbon fibre time trial frame currently on the market, and back it up with "against the clock" models in aluminium and titanium with a carbon fibre back end.

The company also take full advantage of the expertise of bicycle aerodynamics "guru" John Cobb, who is perhaps best known for his work with seven-time Tour de France winner Lance Armstrong. Cobb's relationship with Javelin stems from his interest in sports car racing, which he shares with the firm's owner, Dave Varwig. Cobb is primarily responsible for the tube shapes and layout of the fully custom aero Lugano time trial frame.

Sitting firmly at the top of the Javelin triathlon and time trial range, the Lugano is one of two models available through the Riserva Program, the other being the sub-1000g Torgiano road frame. Both are hand-made in Italy, and both represent the apogee of hand-crafted custom carbon fibre cycle frame-building.

A third frame, the Taurasi, is constructed in Italy using the same carbon wrap technique but

is available in stock sizes only, as are many other Javelin models including the Primitivo 7005 aluminium cyclo-cross frame, the Vigorelli 7005 aluminium track model as used by the Slipstream track team that has won multiple US national track championships, and the Gattinara, which marries laser-cut titanium lugs with Javelin's custom-made carbon frame tubes.

Want to go the custom route? A cyclist interested in either the Lugano or Torgiano starts with a fitting at the Javelin dealer, which generates a bank of information covering rider specifics, ranging from favoured riding characteristics and physiological parameters through to proposed geometries. These are taken by Javelin's engineers and turned into an optimised specification using computer-aided design. Since the Riserva Program is all about complete customisation, anything from the fibre lay-up and tube cross-section to details such as steering geometry is up for alteration.

The resultant specification forms the basis for the frame that will take shape in the factory in Italy. It is sited in the heartland of Italian

artisan cycle construction, in the famed Veneto region that is home to a substantial slice of the country's entire bike industry. A smart, new building in a bang-up-to-date industrial estate, the factory is, in fact, owned and operated by the Sarto family, who have been building small numbers of bespoke competition bike frames since the 1960s for some surprising names. Secrecy in such matters is, of course, par for the course, but there's nothing hush-hush about the Javelin connection. It was a conversation between

Varwig and Antonio Sarto at the Eurobike show that gave the impetus to the Riserva Program, which relies implicitly on the skill and craftsmanship of the Italian builders.

The construction process itself is a variation on the carbon-wrap lug concept developed by the Italian bike industry over the last few years. This really took off with the launch by Dedacciai of a carbon fibre tubeset in 2001, which was when Sarto started building in the material. Indeed, Dedacciai carbon wizard Lorenzo Altissimo is closely involved with the Javelin

Riserva Program, albeit in a supervisory role. He brings the experience gained in half a decade of carbon fibre tube development to the specification and manufacture of the tubes used in the two Riserva models.

Sarto's technique is surprisingly intricate and has been developed in order to address some of the perceived shortcomings of the more conventional method, which relies on atmospheric pressure to compress the join as it is cured. This can leave voids, where the pressure on the material around an air pocket

can prevent the air from escaping. In place of atmospheric pressure, the Sarto technique employs direct mechanical compression using elastic silicone strips, and demands great technical ability. Prior to this, however, the frame takes shape as the various tubes are bonded together in a preliminary stage that impacts on everything that follows. *Proccycling* watched as a custom Lugano time trial frame began life.

The aerodynamic down and seat-tubes are designed by John Cobb specifically for the Javelin application, and are moulded in Italy using the conventional technique, where pre-preg carbon fibre sheets are laid up around a bladder in a precise sequence of fibre angles and types. The package of fibre and bladder is laid in a female mould and heated to set the resin once the bladder has been inflated to pressurise the pre-preg carbon.

The Lugano's tubes are mitred in the same way and on much the same machinery as would be steel tubes. This permits a precise fit between the tubes and imparts the desired geometry. Now, a bonding epoxy resin is applied to the mitred tubes, which are constrained in a jig to ensure correct alignment and positioning. This assembly gets a 30-minute toasting at 60 - 80° Celsius to cure the resin, after which the fun can begin.

Pieces of pre-preg twill are cut to shape and wrapped around the tube join being worked on, and are pressed into place using the gloved fingers. When the layer is complete, it is covered in turn with a layer of nylon fabric. Small ceramic balls are pressed into the recesses. Next, the builder takes a length of silicone rubber band, pulls it taut and wraps it around the join, taking care to ensure that every angle is covered. Two or three bands may be needed,

depending on the complexity of the join. The bottom bracket assembly is obviously the most demanding. The tension in the band provides the compression needed to ensure proper compaction of the built-up "lug" – the ceramic balls conveying the pressure to every nook and cranny.

When every join between frame tubes is wrapped, the frame is heated to 130° Celsius for two hours, curing the resin. Initially, it becomes highly fluid, and flows away from the pressure points created by the tension in the silicone bands, using the porous nylon fabric as an escape route. Once curing is complete, the bands and nylon fabric are removed. The result looks a little lumpy until it has been cleaned up. This is structurally unimportant but vital to the appearance of the finished frame. A room is devoted to the dusty task, which is entirely done by hand. Careful sanding away of lumps and bumps produces the smooth contours beloved of bespoke frame enthusiasts. Left alone, this would still leave an uneven appearance under a clear coat finish, so a second, partly cosmetic "finish wrap" layer of pre-preg is applied.

"The Lugano and Torgiano represent the apogee of hand-crafted custom carbon fibre cycle frame-building."



Smoothing away the lumps for a bespoke finish.

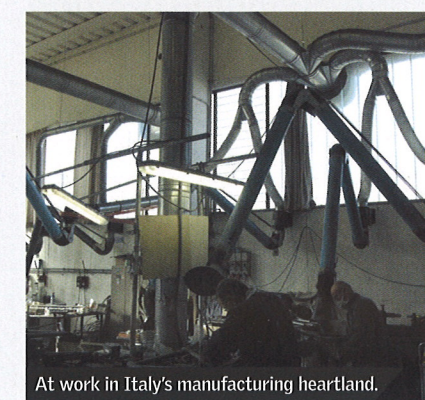
"Anything from fibre lay-up and tube cross-section through to the steering geometry is up for alteration."



The hand-finishing process continues.

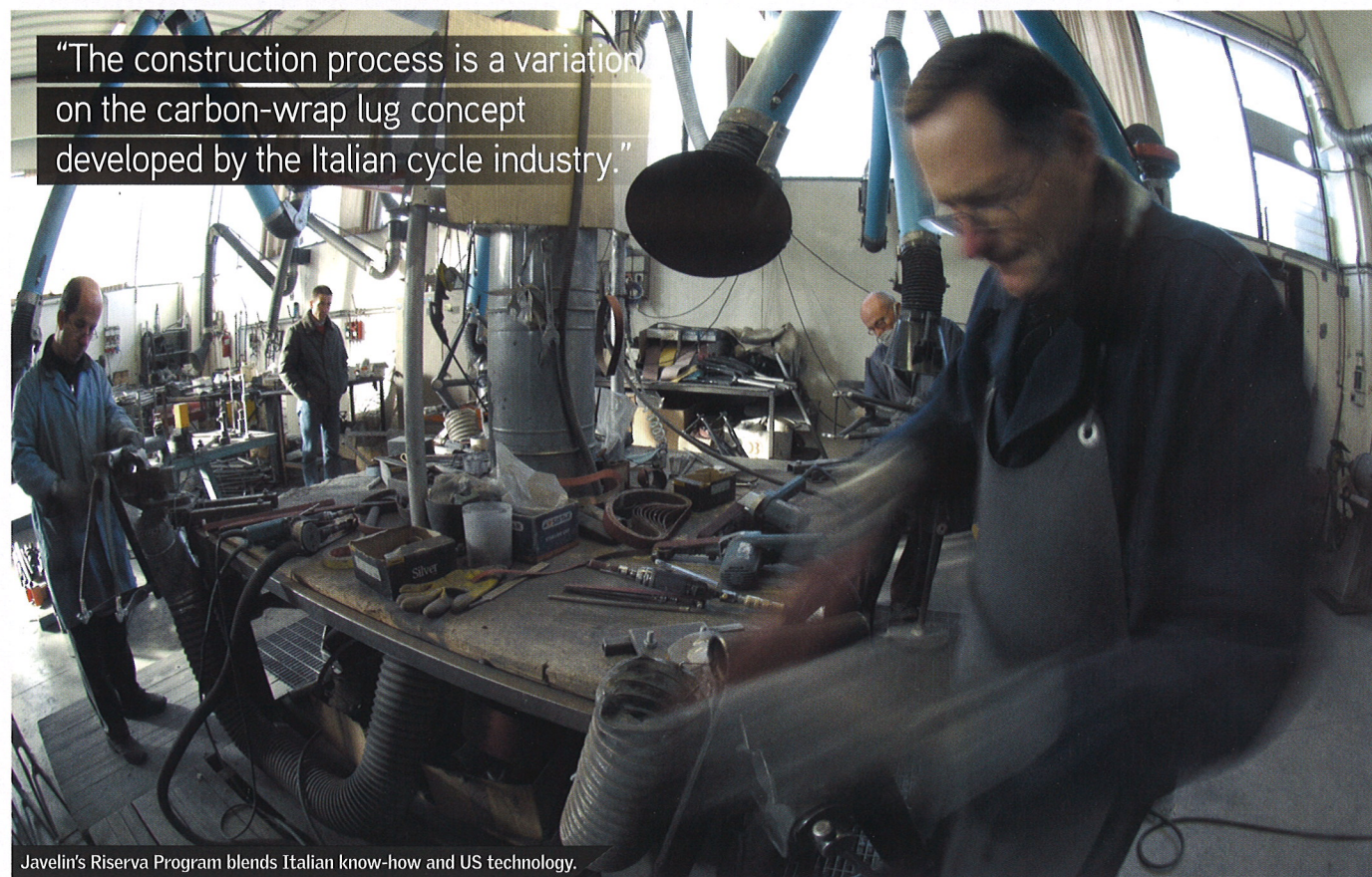


Javelin's COO Rob Henley.



At work in Italy's manufacturing heartland.

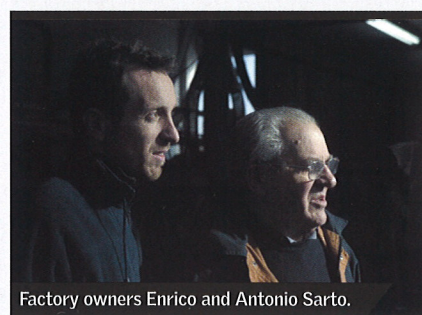
"The construction process is a variation on the carbon-wrap lug concept developed by the Italian cycle industry."



Javelin's Riserva Program blends Italian know-how and US technology.



The final product takes shape.



Factory owners Enrico and Antonio Sarto.




Reasons to smile: Henley and Varwig.

The process offers a number of possibilities, including bespoke sizing, the selection of tube sizes and profiles to suit the intended task, a joining system that obviates the possibility of weakening voids thanks to the high working pressure of the silicone bands and, last but not least, ease of repair in the event of a damaging "off". It also permits the construction of incredibly light bike frames that, according to those who have tried them, really do offer a different level of ride.

The same ethos informs the design and manufacture of Javelin frames made in Taiwan. More affordable than the Riserva models, these nonetheless offer a great ride. The Barolo time trial frame is Javelin's triathlon special, and is the frame of choice for multisport superstars Simon Lessing and Michael Lovato. Based on a butted 7005 aluminium front triangle, it incorporates Javelin's Speed Stay carbon fibre rear stays to enhance stability and quell vibration, and can be quickly switched between

a triathlon set-up and track specification using the firm's Morph dropouts. The Barolo can be ordered with a choice of 700c or 650c wheels, as can the reputedly even faster Arcole, which employs Javelin's Air Management seat stays.

When it comes to custom building however, the Javelin Riserva Program is the one to beat. Italian craftsmanship meets American technology in search of carbon perfection. 

Contact: +1 847 526 0100, www.javbike.com



STEALTH BOMBER

Fitted with so much carbon fibre that it probably wouldn't be picked up on radar, the Javelin Torgiano not only looks impressive, it delivers too. Chris Boardman tests it out on some of the worst roads Spain has to offer.

Photography: Pete Goding



SPECIFICATION

FRAME: Javelin Torgiano
FORKS: Zero Carbon
BARs: Oval Carbon
STEM: Oval Aluminium
SEAT: Fizik Arione Wing Flex
SEATPOST: Zero Carbon
WHEELS: Zero 024 carbon-rimmed
TYRES: Veloflex Carbon hand-made
CHAINSET: Campagnolo Record Ultra-Torque system
GEARS: Campagnolo 2007 Record Titanium
PRICE: \$4000 frame & fork
US CONTACT: 800 814 0133
WEB: javbike.com



Chris gets set to launch the Javelin in Andalusia's hills.



The understated Javelin gets full marks for style.



"There were no rattles at all – something I haven't come across for more than a year"

There is nothing in life that doesn't involve compromise or balance. Fancy a nice car? OK, but you'll have to take fewer holidays. A big house? Fine, but you'll need to work more to pay for it and so lose some free time. A nice meal? OK, but indulge too much and you'll inevitably put weight on. You get the idea; compromise is everywhere, it's simply up to each of us to find the balance that suits...

In the car park, after removing the copious amounts of packaging from the Javelin Torgiano, I had a chance to admire the newly assembled bike. It was a 'Stealth' machine of the first order: from the rims and frame to the bars and even bar-end stops to hold the tape in place, everything that possibly could be carbon,



was. I very much doubt this bike would show up on radar.

Compared to some recent machines we have looked at where manufacturers have treated every surface as a chance to advertise their brand, this one seemed to rely more on the quality of the components to sell themselves. This is an altogether more classy approach in my opinion and worthy of a bike in this price range. With its minimalist approach to finishing that let the quality of the components do the talking, this bike not only weighs in low, but looks light too.

Before starting my ride, I had cause to fine-tune my saddle both for height and angle. The Zero carbon seatpost was possibly the nicest I have come across so far, with a traditional cradle design finished to an exceptionally high

standard. With an easily accessible single Allen bolt to do all the adjustment I required in seconds, it was a joy to use and, with the range of movement it afforded, put all of the newer 'advanced' designs to shame.

It was late afternoon when I set off from a hotel in the small town of Nerja, an hour east along the coast from Malaga in southern Spain. The seaside roads quickly gave way to ever smaller lanes as I climbed inland towards Frigiliana and after six kilometres there was barely a car in sight.

I don't think this was entirely due to the fact we were heading away from the coast and the pensioners seeking the last of the sun and sand, but also because the road surfaces were bad enough to frighten off anyone not using a rental car with fully comprehensive insurance. The potholes were so big I swear I saw at least two cars disappear completely. As I picked my way carefully through the tough but tranquil countryside, I found myself wondering if the locals had cottoned on to this welcome side-



Making a few minor adjustments in the foothills of the Sierra Nevada range.

"My weight was evenly distributed between the two wheels, adding to the sense of balance on the set-up."

effect of their rough roads and decided not to hurry repairs along...

One of the first things that hit me as I wound through the scrub hills and olive groves was how quiet this bike was. Despite the challenging surface, there were no rattles at all – something I haven't come across since the Fondriest bike I tested more than a year ago. The indents in the toptube of the Torgiano meant the cables could bounce quite a lot before coming into contact with the tube... I wasn't sure this was why it had been shaped in this way – or why any of the other curves and dents were there, to be honest – but whatever the reason, the lack of clatter added to the feel of quality.

The second thing I noticed as I pushed on up the increasingly steep inclines was how much flex was present in the machine; there was as much movement as I have come across to date. I guess this is not surprising given the Javelin's extremely low weight – amongst the lightest we have tested in these pages. Most of the flex seemed to come from the toptube and bottom bracket area

and was probably exacerbated by the lateral movement in the lightly spoked wheels too. I can't say I would recommend this frame to heavier riders, but those in the mid to light range would probably find the 'give' an acceptable trade-off against the weight advantage.

A FEW KILOMETRES further up, past the town of Frigiliana, I found myself caught in the first snarl-up of the day as the local goat herd made its way home; it was rush hour after all! I thought the small brown animals seemed pretty impressed with the Torgiano.

This is the first time I have come across the new Campagnolo Ultra-Torque chainset, which is of a slimmer, lower profile than its predecessors and is certainly more aesthetically pleasing. This slimmer profile could have actually reduced the Q angle (the distance between the feet compared to the hips) slightly, but this potential advantage was neutralised by the now fully external bearings. I can't say I am qualified these days to fully assess the stiffness of cranks, and it would

have been hard to gauge this satisfactorily because of the flex in the frame, but they certainly seemed stiff enough.

With regard to the new 'split' bottom bracket design, I couldn't see the point in it before they made it and I can't say I am any the wiser now. I cannot fathom the logic behind making an axle in two parts and why this would ever be preferable to a single piece, particularly in an area that handles all the drive from the engine (the legs). Although this design is certainly an improvement on the original carbon offering, I would say Campag have left themselves plenty of room to move forward.

Gear changes from the Campag Record titanium gear system were refreshingly smooth on the rough roads and constantly changing gradients. There was no hint of misalignment right through the 10-speed range, and every selection was made without loss of traction from the chain even when switching while out of the saddle. The chain, with its drilled-out links and hollow rivets, was pretty scary, but I guess if

Super-light skewers are used to reduce weight and boost speed.



Oval R900 Carbon bars add to the 'Stealth' look of the Torgiano's set-up.



Initially sceptical, Chris was impressed with the braking power of the Zero 024s.





Chris gets the Javelin up to speed before he realises there's no glue on the tubulars.



people aren't breaking them then they're strong enough.

REGULAR READERS OF this column will know I hate carbon rims, so when I was approaching the end of the climbing section, I was dreading the challenging descent I knew was to follow. However, when I turned around and started to head

downwards, I was somewhat surprised that my pre-ride prejudice wasn't instantly confirmed. Yes, there was a little squeal when braking for extended periods, but nowhere

near what I had experienced before and, amazingly, there wasn't much at all in the way of brake grab.

Having run my thumb along the rim of the Zero 024 wheels in the car park earlier and felt the discrepancies in the surface, I was sure I was in for an 'auto braking' experience but, as it turned out, they were pretty smooth. They're not something I would like to use in the rain on a smooth surface, but compared to the Campagnolo equivalent, which sported rims of a very similar shape, they were much better. The only visible difference between the two I could see was that the Zeros have a matt finish compared to the high-gloss finish of the Campagnolos...

In my opinion, the carbon rims were saved by the new calipers and their heavily scalloped-out design. During assembly, I had the chance to handle these separately and it is hard to believe anyone can get brakes any lighter than this without risking failures. In fact, when applied in the car park, I could see a good few millimetres of flex in the arms! Rather than impairing braking efficiency, this extra flex probably compensated for discrepancies in the carbon rims, making for a good partnership.



It's named after a village in central Italy.

The frame geometry was great for me, although the front end had very light handling to which the movement in the toptube added. It stabilised somewhat when it really mattered, though – at high speed. I also found my weight was evenly distributed between the two wheels, adding to the sense of balance on the whole set-up. I had thought the Javelin would not cope with the steep descents and the terrible roads, but the curve of the rear stays and the absorption properties of the Fizik Arione Wing Flex saddle soaked it up incredibly well.

Earlier, when I had put the wheels into the frame, I had admired the minimalist skewers. Normally, lightweight parts like this suffer as the



currently in vogue titanium for the spindle stretches. This means you have to tighten them almost to the extreme in order to get enough purchase to ensure the rear wheel isn't pulled over under maximum effort. This didn't seem to be the case with these and the light serration on both nuts and the wheel axle probably added to the security. Unfortunately, the lever itself was of a type I have come across before – a simple 'rod' that screwed into the skewer head. Take my advice and make sure you get some thread lock onto these pronto or you might find yourself at the side of the road sans lever and unable to get your wheel out!

After a few kilometres of descending, I passed through a quaint, whitewashed village and hit a smooth piece of Tarmac and immediately noticed a bump, bump, bump... coming through the wheels. I stopped to have a look only to find that the Veloflex tubulars had absolutely no glue on whatsoever and that I could easily roll them off the rim with one hand! I had been very lucky... Note to self – check tubular tyres before test in future.

Despite this near-catastrophic experience, I really liked the Veloflex Carbon tubs when both climbing and descending. They definitely added to

the lively feel of the bike, as tubulars tend to, but they also gave a sense of grip on the rough surface. I would have been happy to race on these whatever the race or weather.

Heading back to the coast left me some time to reflect on the overall impression of the Torgiano. It was decidedly fragile when travelling fast, probably caused by its light weight and exaggerated by the flex of the frame and wheels. While 'solid' is not a word I would use to describe it, the Torgiano's foibles don't stop it from doing a impressive job. **P**



CONCLUSION

The Javelin Torgiano is a great bike: well thought through and with an air of class. The choice of equipment was perfectly in keeping with its specialist, high-end nature. With advances in carbon technology testing the UCI's minimum weight limit, we are seeing a rebirth of the specialist bike. The Torgiano is well positioned to compete in this increasingly competitive market, but at a cost. As yet, carbon technology is still lagging a half-step behind for the title of lightest bike. If you want super-light weight, be prepared to give up some stiffness. Only you can decide if this compromise works for you.

- + Great ride and classy looks
- A degree of flex