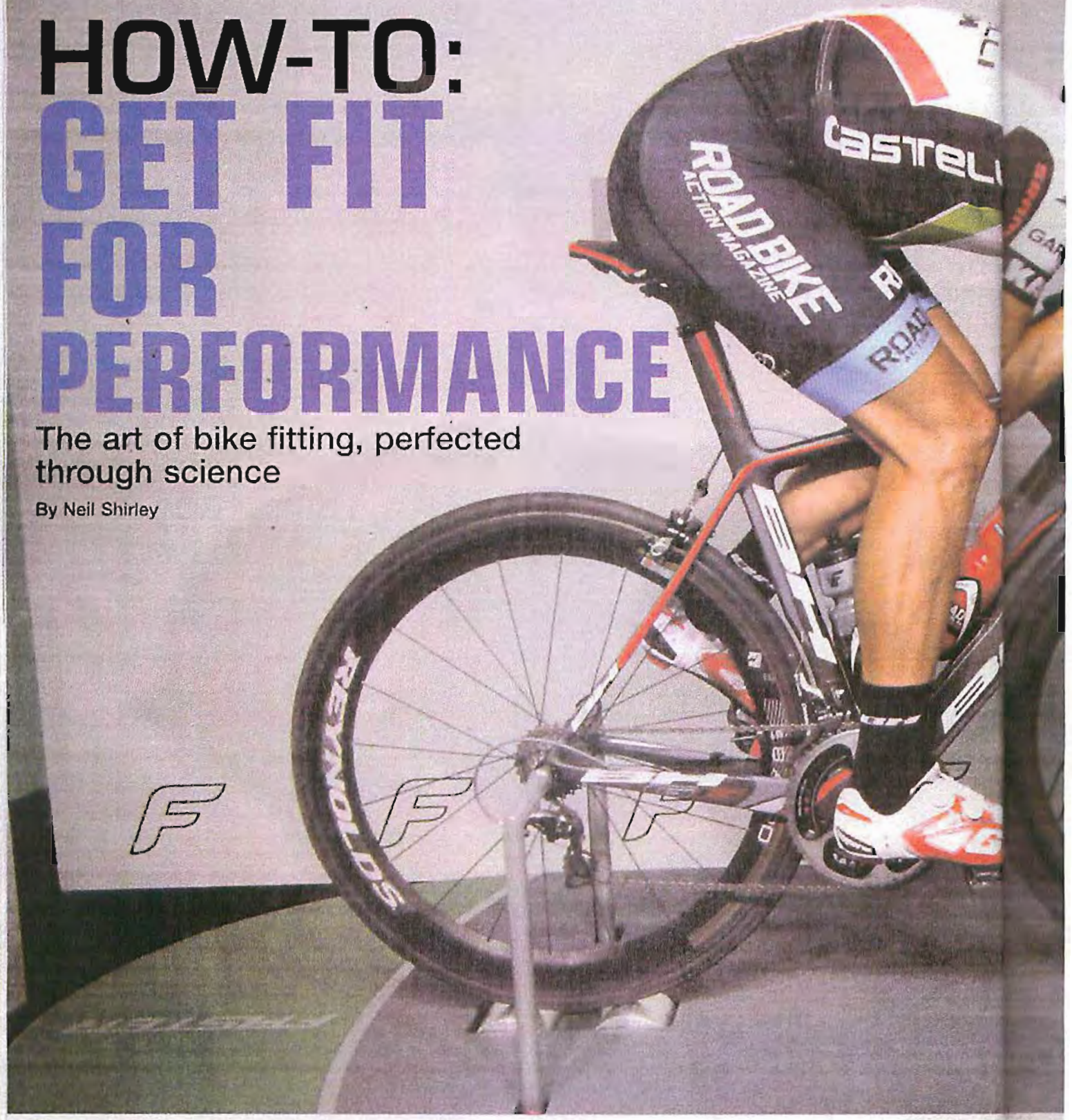
HOW-TO: GET FIT FOR PERFORMANCE

The art of bike fitting, perfected through science

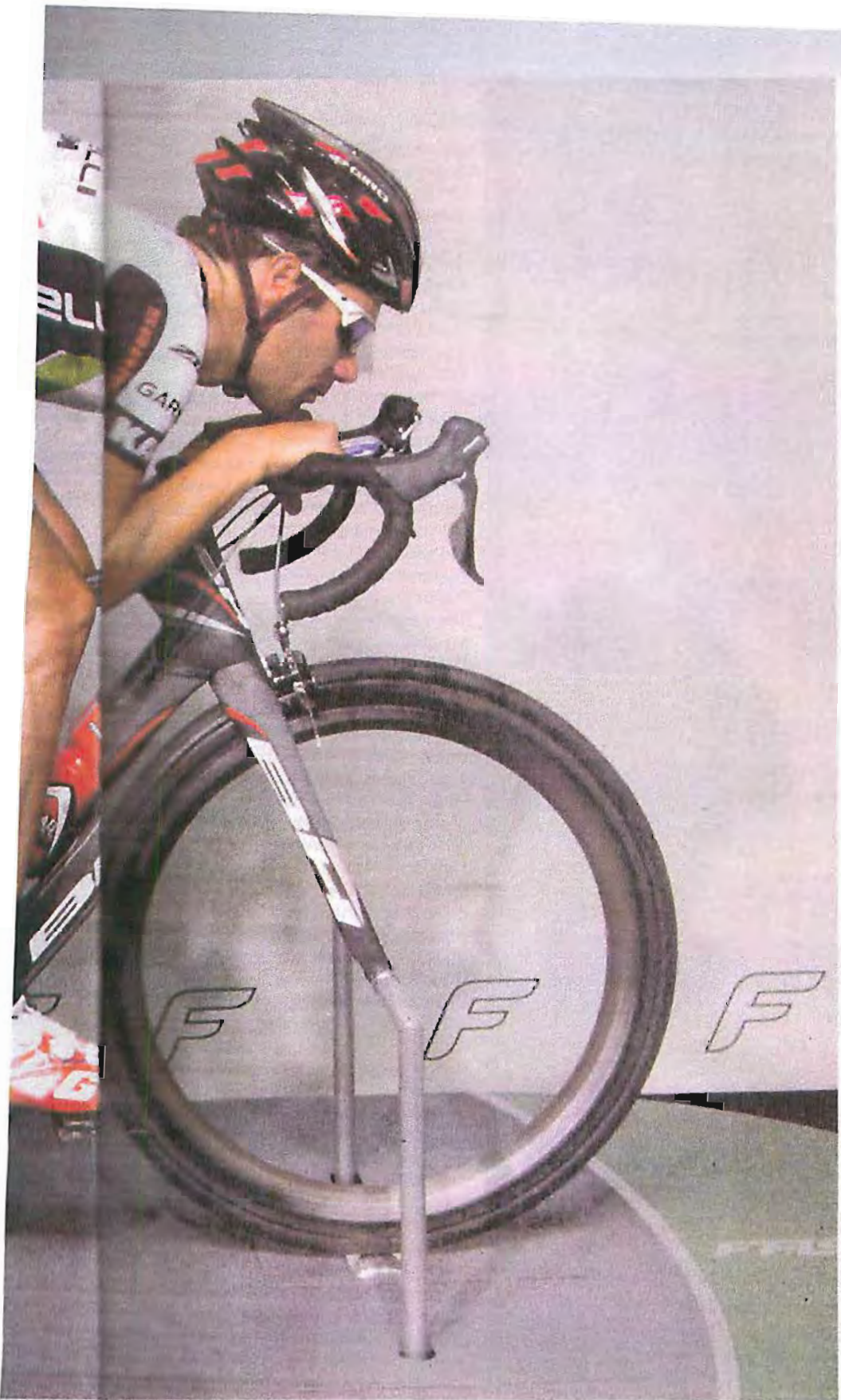
By Neil Shirley



A bike fitting is one of those things that most of us have had at some point or another and is typically only something we think about when experiencing pain or discomfort while riding. What if we told you there's more potential performance to be gained from a professional bike fit than what a pair of aero wheels, or just about any other equipment upgrade, could fetch—and at a much lower cost? What about when you factor in a more comfortable position? Better aerodynamics and/or improved power efficiency are a boon, but as the age-old cycling adage advises, "You can't go fast if you're not comfortable."

REVOLUTION IN FITTING

Historically, getting a personalized bike fit was the exclusive providence of elite riders and pro racers, in just the last few years, it has become an increasingly mainstream practice. And perhaps there is no greater evidence of this than watching the big bike brands jump into the game. Specialized has long touted the benefits of proper fit, and they have introduced a five-day course where they train dealers in their



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Body Geometry fit system that was co-developed with biomechanics expert Dr. Andy Pruitt. Adding another layer to Body Geometry is Specialized's recent investment in Retul's 3D fit system, which has been long revered as the proverbial measuring stick of fitting tools. A full Body Geometry bike fit typically runs in the $250 range, but varies from dealer to dealer.

Most recently, Dorel (owner of Cannondale, GT and Schwinn) added their name to the list of bike brands interested in better serving their customers' through fit when they acquired Guru. This had less to do with the custom bikes Guru was famous for building as it did gaining access to their Dynamic Fit Unit that uses an adjustable fit cycle to hone in on the cyclist's ideal position so it can then be recreated on their own bike. Dynamic Fit Units are just starting to find their way into Cannondale dealers. This is going to open the door for more cyclists to reap the benefits of a custom fit at their local shop, just as Specialized has been offering.

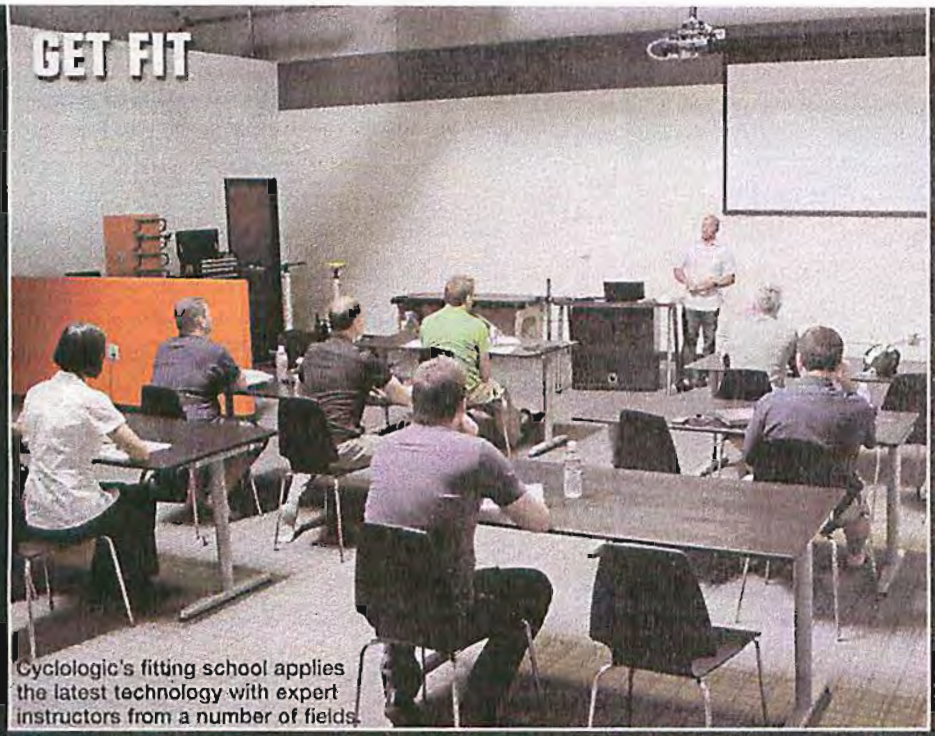
Other brands have also seen the need to offer more than just the bare minimum when it comes to meeting their customers' different physiological needs. Shimano jumped in with the acquisition of BikeFitting.com, a site Shimano valued for its vast database of cyclists' fit measurements. They wasted no time in applying the data to their PRO saddle line, where dealers now have a "butt box" to measure a customer's sit-bone width to ensure they're getting the right saddle to best fit their anatomy.

A BLOOM IN THE DESERT

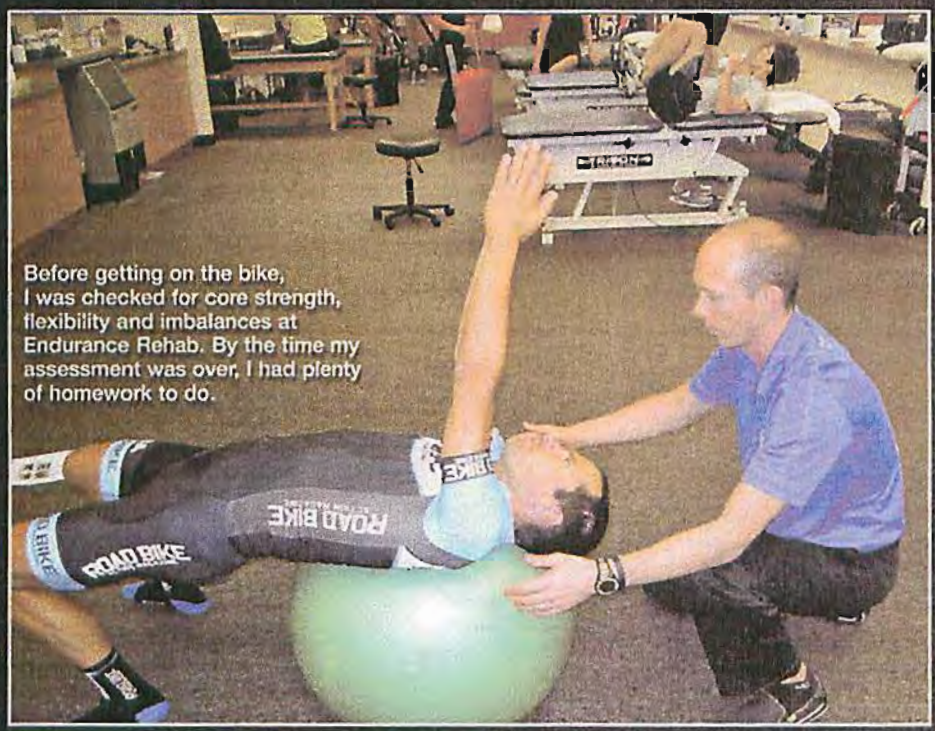
At this point, there's no shortage of tools available for bike fitters. But as most of us know all too well, having a pipe wrench and a roll of Teflon tape doesn't make you a plumber. Lasers, fit cycles and cameras are only part of the equation; the other—and bigger—part is knowing what to do with them. One of the people helping develop fitting technology and, more important, the application of it is Paraic McGlynn. A longtime cyclist and club racer in his home country of Ireland, Paraic came stateside in 2000 to work for Intel as a training specialist. Eventually he was able to combine his cycling and software experience and wound up directing Serotta's fit lab and International Cycling Institute for three years.

In 2011, Paraic headed to Scottsdale, Arizona, for the opportunity to help start the most advanced bike/performance shop known to man (at least in our opinion). Faster was built to serve the large number of triathletes and performance-seekers in the Phoenix area, not only for their high-end equipment needs, but also in offering physiological testing, recovery services (hot- and cold-water pools, recovery boots and muscle stimulation) and—the biggie—a wind tunnel! That's right; a wind tunnel right in the bike shop, and the only wind tunnel in existence that was designed specifically for bicycle use. The shop brought new meaning to the phrase "full-service bike shop" in combining all the needs of a performance-minded athlete under one roof.

Once Faster was up and running, Paraic left his role as director of operations to fulfill his long-held desire to teach fit and develop his own tools for



Cyclologic's fitting school applies the latest technology with expert instructors from a number of fields.



Before getting on the bike, I was checked for core strength, flexibility and imbalances at Endurance Rehab. By the time my assessment was over, I had plenty of homework to do.

bike fitting. He didn't go far this time. Just two blocks away from Faster, he opened Cyclologic, a classroom for potential fit specialists, complete with five workstations decked out with the latest tools and software of the trade, many of which are his very own designs. Paraic believes, "Bike fitting has changed through the years—not so much in the actual position the fitter is looking to put the rider in; it's the technology that has evolved, allowing the fitter better visibility to see what's going on with the rider in a 3D perspective rather than the static fit of old." Cyclologic combines the tools with instructors that represent some of the best in their field, including aerodynamics, biomechanics, metabolic physiology and sports medicine.

While the main focus of Cyclologic is the fitting school, Paraic still handles individual bike fits and invited us out to experience a cycling analysis fitting, utilizing not only his own fitting expertise, but also a "body assessment" from Endurance Rehab and an aerodynamic optimization of my new position in the Faster wind tunnel. The idea was to not only make me faster and more comfortable, but also to highlight muscle imbalances and any other issues so I can address them before they become limiting factors.

THE FIT PROCESS

Consultation

Upon first arrival at Cyclologic, Paraic asked me a number of different questions pertaining to my athletic background, current fitness level, performance goals, current and past injuries, and if I was currently suffering from any pain. He also took my bike's baseline XYZ measurements for saddle height, fore/aft, handlebar height, stem length and shifter hood height using a 3D position plotter (a fancy laser), and plugged all the data into an app he created called Pure Position.

Physical Therapy Assessment

Located next door to Cyclologic is Endurance Rehab, where Paraic likes to have each client undergo a body assessment done by Nate Koch, one of their physical therapists. Nate checked me for a leg-length discrepancy, muscle imbalances, skeletal alignment, range of motion, core strength and flexibility. During the assessment, Nate discovered that I have scoliosis, and though it doesn't affect me now, if I didn't take preventative measures, it could be debilitating down the road. Like most cyclists, my hip adductors and abductors are weak, so I was prescribed some simple workouts to strengthen them, along with a basic core workout routine and post-ride stretches—all things that will help prevent overuse or imbalance issues later on.

Initial Bike Assessment

After Paraic consulted with Nate, it was finally time to jump on the bike. But before making any changes, he captured a dynamic video to view the biomechanics of my pedal stroke using the Dartfish Motion Analysis software, which accurately shows joint angles. Since I wasn't suffering from any pain or nagging injuries, it would be a straightforward fit of trying to improve my efficiency on the bike. It only took a minute of pedaling for Paraic to spot both my knees diving in toward the top tube on the downstroke. Paraic attributed this to not having enough arch support, which was causing my arches to collapse and my feet to pronate, setting off a chain reaction of misalignment from my ankles on up.

Insoles and Cleat Placement

The body has three contact points

with the bike: hands, butt and feet. Of the three, your feet are the only thing fixed to the bike, as well as being the conduit for power transfer to the pedals. Since my stock insoles had little in the way of arch support, Paraic recommended a pair of eSoles custom footbeds ($80) to improve my hip, knee and ankle alignment. "The difference between a good and great bike fit is what they do with your feet," said Paraic, emphasizing the importance that insoles can play.

Next, my cleat position came under the microscope. I've been setting up my cleats for the past 15 years the same way, with the center of the cleat under the ball of my foot. That's what I had learned was the best all-around position, and it had worked for me. Paraic admitted that he used to center cleats the same way; but more recently he had gone to moving the cleats to a rearward position to give the foot better stability with less heel drop, so we went ahead and slid my cleat 3mm further back.

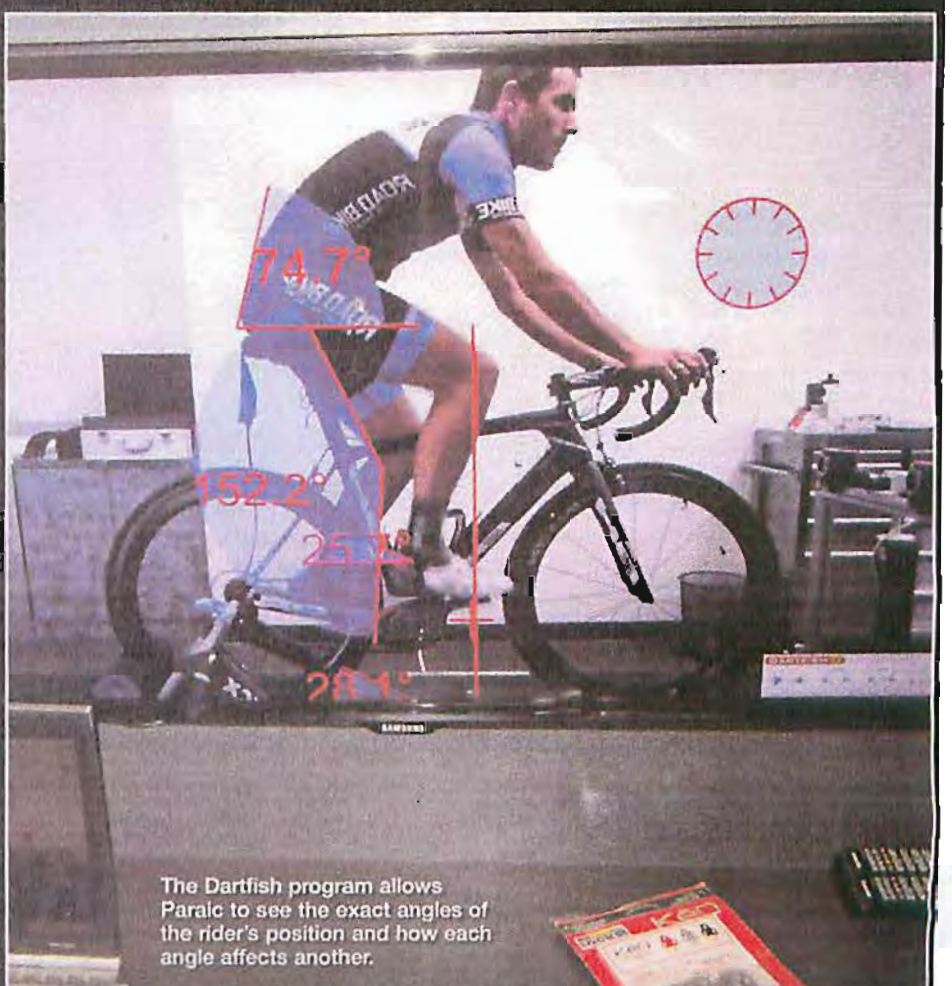
THE BIKE FIT

At the time of my fit, Paraic was only able to do 2D image capturing, but not long after I left, he had six 3D cameras hooked up to provide a live stream, capturing 30 different parameters. Thanks to the insoles, once back on the bike, my feet felt like they had a true foundation beneath them. My knees were much straighter throughout the pedal stroke too, so one hurdle down.

Saddle height was the next thing he checked, and Paraic felt it needed to be lowered. The maximum knee angle he likes to see is approximately 145 degrees—that way you have the ability to drop your heel to functionally extend your leg extension when you need to generate higher power. My leg extension was over 150 degrees, making me reach for the pedals and not allowing any versatility in my pedal stroke. A 5mm saddle drop put me into the correct range Paraic was looking for.

Next up was my back angle, and again there was work to be done. I was sitting at a very comfortable 75-degree angle, perfect for a recreational rider, but since I wanted a performance-oriented position, it wasn't going to do. According to Paraic, "Ninety-three percent of your power is used to overcome wind drag at 30 mph," which is exactly why pro racers use a low, stretched-out position. Since my assessment at Endurance Rehab revealed that I have good core strength, Paraic recommended stretching me out a whopping two centimeters. Off came my 110mm stem, replaced with a 130mm, which gave me

My shoes required a bit of work. Getting a new pair of insoles helped prevent my arch from collapsing under power, and a 3mm rearward cleat adjustment provided better foot stability.



The Dartfish program allows Paraic to see the exact angles of the rider's position and how each angle affects another.

My position evolved from recreational to performance with a 2cm-longer stem, helping to keep my torso from being a giant wind scoop.

The man at the controls, Jay White, is Faster's wind-tunnel engineer and aerodynamics guru.

a 7-degree change in my back angle. Obviously, without decent flexibility and core strength, such a dramatic change wouldn't have been possible, but thanks to the little body maintenance I've done off the bike, I was able to adopt the more efficient position. The final part of the fitting process was quantifying it.

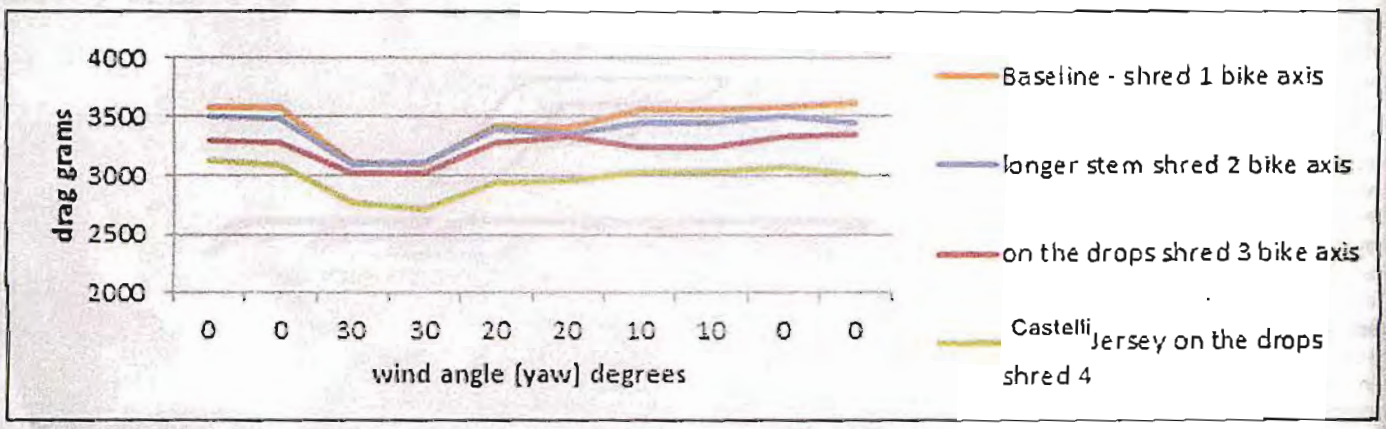
IN THE TUNNEL

While wind-tunnel time has traditionally been reserved for time-trial bikes, in recent years, more road racers have sought the aero benefits achieved with tunnel time. When I went to South Carolina's A2 wind tunnel a few years back, I learned there was as much to be gained from the shoulder and head position as there was in the equipment itself. With wind-tunnel time running $499 an hour, there was no time to waste, and Paraic already knew exactly the protocol he wanted to use before we ever stepped foot into the tunnel.

After putting in a pair of ear plugs (yes, it's loud!), we performed four separate "shreds" (runs), which consisted of maintaining the same exact position for four different degrees of yaw, with each one taking about one minute. A rotating platform the bike sits on is unique to the Faster wind tunnel and allows them to simulate just about any degree of yaw desired. The first shred was for baseline drag numbers, with my shorter stem and me on the hoods, while the next was me still on the hoods but with the longer stem. The drag reduction was 2.1 percent—not huge, but definitely going in the right direction. For the third shred, I kept the longer stem and went into the drops, giving me nearly an 8-percent drag reduction from baseline.

While going through the shreds, Paraic and Jay White, who runs the tunnel, noticed some jersey flap around my shoulders. Even though the jersey wasn't loose-fitting, they wanted me to try something tighter, and

Surprisingly, a tighter-fitting jersey had nearly the same drag savings as going from the hoods to the drops. Photo: Courtesy of Faster



Finishing off the fit with a wind-tunnel-position analysis was the final element in the most complete fitting experience possible.

Castelli's Body Paint jersey seemed like just what they were looking for. And with the next shred, it was evident why. Just the jersey change alone gave nearly the same benefit in drag reduction as going from the hoods to the drops! Those extra gains were something I would have definitely left on the table if it wasn't for the time in the tunnel. We also played around with a few non-pedaling positions to tuck into while descending, since the potential gains in drag reduction increase as the speed does. All in all, a tighter jersey, a longer stem and being in the drops netted me nearly five seconds of time savings per kilometer at 30 mph (or 50 kph).

1000 MILES LATER

Now that I've had some time in the new position, it's clear that the gains made in the drag reduction haven't had any negative side effects in comfort, which encourages me to continue with the stretching and core-strength routine so I can maintain such an efficient position. Of all the things done during the fit session, the addition of an insole with better arch support is what I really feel the benefits of every time I'm on the bike. Even if you're not ready for a full bike fit, getting a pair of quality insoles has the potential to increase your comfort and power.

The lower saddle height took a little getting used to. But once I did, I realized what Paraic meant when he said it will give me better pedaling versatility. I can drop my heels for extra extension when climbing while keeping a perfectly neutral height for spinning on the flats. A fit from Paraic lasts a good four hours and ranges between $299 and $599, with ours running $499 (wind tunnel time is in addition to this). Fortunately you don't have to travel to Scottsdale to get the same level of treatment, since Cyclologic-certified fitters will soon be coming to a shop near you.

www.cyclologic.com
www.ride-faster.com

A custom or semi-custom insole could make a huge difference in comfort and performance if you have any type of foot abnormality.

THE PRO-FIT QUICK HITS

• Spending 10 minutes a day on stretching and core-strengthening exercises can help you achieve a more efficient riding position without sacrificing comfort.

• It all starts with the feet! Your feet have an important job to do on the bike, and giving them the support necessary to get every bit of power out of them is worth the cost of a quality insole, which ranges between $40–$90.

• Saddles are one of the most important components on the bike, and there's no one perfect-fitting model for everyone. Try multiple saddles (many bike shops have demo ones available), and pick one based off of fit, not aesthetics.

• A cleat position slightly behind the ball of the foot helps stabilize the foot throughout the pedal stroke.

• Once the correct saddle height and fore/aft are found, they should not be adjusted to compensate for a bike with too long or too short of a top tube (i.e., sliding the saddle forward to reduc handlebar reach). Fore/aft should be locked in, with the necessary adjustments coming via changes in stem length.

• Clothing can be a much greater cause of drag than one would think. Going from a "comfortably fitting" jerse to a skintight jersey can help you shave minutes over the course of a ride or race.

A bird's-eye view of the Faster showroom, which is decked out with a variety of high-end bikes and parts.

RBA MINI-VIEW: JAMES KRAMER

James Kramer is the founder of the Faster bike shop. He is a certified bike enthusiast. How else would you describe a guy who not only installs a wind tunnel in his bike shop, but then decides to promote a Gran Fondo when the shop is just over a year old? We decided to find out.

RBA: Tell us about your background that brought you to open Faster?

James: I first got turned on to cycling by watching the Tour de France in 1988. I watched Pedro Delgado, and then Greg LeMond, seal the deal. From there I started racing and spent some time racing the Kermesse in Europe. My business was in wireless communication and consulting, and that kept me pretty busy. Well, a few years ago I realized that I had gotten out of shape and decided to start riding again.

I visited the wind tunnel in San Diego, and although I got some really good data, my one takeaway was that the guys that work there aren't cyclists. I mean, they are smart guys and it was helpful, but they're really aviation engineers. That's when I started to think that there wasn't a single place that cyclists could go to get everything they needed to get faster on their bikes. San Diego was a lot like Phoenix in that there was a big population of cyclists with good year-round weather, but there wasn't a one-stop shop that they could rely on for good service. That was when I started thinking about opening Faster. There are a lot of road riders out here, but for some reason the tri scene is really vibrant, so there are a lot of local cyclists who are looking at aero products.

RBA: So the wind tunnel was all it took?

James: Well, one of our first ideas was to have an altitude training room, but the more we thought about that, it didn't seem like it would get a lot of use. But the wind tunnel, well, I mean how many chances do you get in life to say that you did something that had never been done before? Of course, at the time, I couldn't have imagined the amount of money and stress that it would involve, but we hired a wind engineering design firm to build it, and now we have something that you won't find anywhere else. I had Paralc help design the features of the shop, and he's been a big help in creating the software we use in the wind tunnel, as well as the fit room with the motion analysis cameras.

RBA: So just over one year into this, has there been one big lesson you've learned about the bike industry?

James: Yeah, the one thing I don't understand is how they can advertise certain products or display them at the bike shows, but then not have them hit the market for over a year later. If I could get my hands on either the Look or Garmin power pedals, I know I could sell about 25 pairs of them in a week!

RBA: So how about the Gran Fondo?

James: Well, you can see that where the shop is located, it doesn't have a lot of foot traffic. From looking at the calendar, I saw all these towns that were having Gran Fondos, with a lot of them hosted by pro riders like Levi Leipheimer and George Hincapie. I decided to be the first to have a Gran Fondo in *Phoenix*, and we secured Bob Roll as our master of ceremonies. We had a few glitches, but *no one got hurt, and it was a great* way to get a few hundred people through the shop and out on the road enjoying a beautiful Arizona morning. ■