

RETUL BIKE FITTING

Getting the correct bike fit will not only provide a comfortable ride, it could prevent injury and offer you better performance. Ian Osborne finds out more...

As triathletes we all have unique body biomechanics which can make finding the ideal bike set up trickier than it might first appear. An ill-fitting bike will not only be uncomfortable to ride but could cause long-term injury. Many triathletes suffer from injuries and niggles, including back, knee and hip pain, which are often related to poor bike positioning or fit. Even a bike that fits reasonably well and doesn't cause discomfort could still be incorrectly fitted. At best, this could cost you optimum performance for minimal effort; at worst, it

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could lead to an injury which could be easily prevented. Rather than get your body used to a certain position, it's far better to get the bike fitted to suit you, so it works with your individual body type. This is where Retul comes in.

Retul is a new bike-fit system that records and measures your cycling gait – the movement of your body as you pedal. The system, developed in Colorado by Todd Carter, is extremely accurate to within less than 1mm. The system gathers data from eight key anatomical points on the body while the rider is in the cycling position. The data provided is far more accurate than the old static method of using a tape measure and plumb line. It means there's no room for human error either in reading, measuring or recording data.

The Retul system not only captures movement two dimensionally, but it also records lateral movement, making it three dimensional and taking it far beyond standard video capture. It's been used by many top pros including the GB elite squad, two-time Ironman Hawaii winner Normann Stadler and current Ironman World Champion Craig Alexander.

There are now several Retul bike fitters in the UK. Velomotion,

in Milton Keynes, is one of them where chartered physiotherapist John Dennis oversees the Retul bike-fit process. He has an impressive track record, having worked with the British badminton team before starting work with the GB triathlon team.

STARTING OUT

We began by discussing my training history and injuries before doing a body assessment, checking flexibility and my overall body structure. Dennis got me standing barefoot doing various stretches to check flexibility and any imbalances. He soon discovered from my one-legged squats that my left ankle isn't as flexible as my right. We also found that my right hip isn't as stable or as strong as my left. A range of stretch tests showed I have reasonably good all-round flexibility otherwise. It helped knowing that I was being assessed by someone with so much experience in physiotherapy and tri-specific knowledge.

Dennis explained the importance of the body check prior to the bike fit, saying: "I don't think a bike fit is complete until the individual is assessed for flexibility, stability and mechanics. I can pick up on areas of tightness and weakness that will often be asymmetrical. These make more sense if they show up when we find measurements that are asymmetrical also. This is an additional assessment to individualise someone's bike fit without being prescriptive."

He told me I would need to do some glute stability work to address my hip imbalances. It was then time for initial testing.

TESTING TIMES

After a warm-up, Dennis stuck several Velcro dots on my ankles, knees, feet, hips, wrists, elbows and shoulders. He then pulled out a small pack with lots of wires. Each Velcro dot was hooked up to a small LED with a data transmitter pack in my back pocket. This sends data to the Retul sensor device which is positioned a few metres away. Dennis gradually increased the power as I pedalled to my half Ironman pace (in watts). I held the pace while the Retul machine worked its magic.

We then turned 180 degrees to assess my opposite side to check for any imbalances and differences between my right and left side. The Retul software firstly shows all the angles of the body in a two





dimensional form. It then tracks my legs as they move side to side three dimensionally as I pedal. This means Dennis could check the lateral movement for each rotation of the cranks. The whole procedure was extremely thorough and my pedalling movement could be watched live as a stickman on a large screen. After the test was completed, Dennis showed me the data for my pedalling gait.

THE RESULTS

To me the data was just a screen of figures but to the resident expert he could instantly see where I was in or out of parameters that I should be within for my body type, flexibility and level of

“OPENING THE HIPS IS ONE OF THE PRIMARY CONCERNS OF THE TRIATHLETE”

training. The first thing Dennis noticed was my knees were moving too much laterally during the pedal stroke and this had become even greater as we upped the power. My back angle wasn't too bad nor was the angle of my arms and shoulders in relation to my back. Dennis also thought we could open up the angle of my hips further without any negative trade-off. He also pointed out there was some hip movement as I pedalled.

MAKING CHANGES

The first thing Dennis did was raise my saddle about 10mm. This was to help eliminate the knee movement and open up my hips. At first it felt odd having the seat so much higher. We did the test again and despite feeling odd the perceived effort to achieve the same power was easier. The results were good too. My knee movement had been reduced, my hips had opened and

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were rocking less as I pedalled. It was amazing that something so simple could have such drastic changes. Once again we went through all the data and Dennis felt the seat could go up a little higher to help reduce the knee movement yet further while opening the hips even more.

JOHN DENNIS

John Dennis is a chartered physiotherapist who has been working in elite sport for 11 years. He has been a member of the British Triathlon Federation Team since 2006 and was part of the team that helped Tim Don become World Champion in Switzerland the same year. Dennis has been to several Olympics, firstly with the British badminton squad at the Athens Games in 2004 and with the British tri team in Beijing in 2008.

For the past three years Dennis has been working with the elite British Triathlon team in Loughborough. More recently he has been demonstrating the Retul system to the Team Sky Cycling Team. He regularly competes in triathlons, having completed Ironman as well as various cycling events and Xterra. Recognising the importance of bike position when it comes to performance, comfort and injury prevention, he saw the limitations of static bike fitting and 2-D video analysis. After researching the scope of the Retul 3-D dynamic fit system, he saw how it is the most accurate form of data analysis to correctly fit a bike to a rider.

TRI-SPECIFIC BENEFITS

Dennis explained how the opening up of the hips should be one of the triathlete's primary concerns. He said: "If the hips are closed too much, especially for the pros who have to run a rapid 10 km off the bike, the hip flexors are in a shortened position and when transitioning into the run they then have to work through completely different ranges. This is an issue for the pros and those who race on road bikes, especially road bikes with clip-on bars. For a triathlete, the bike position should be set up for the run."

TWEAKING AND TESTING

We repeated my test with my hips opened up and Dennis was indeed correct. I then threw a spanner in the works when I informed him I was thinking of moving over to using Pro's Missile bars and would like to see if we could work this into the equation. While the bars are flat like my current Stealth bars they don't have the same spacing on the arm rests. This meant we'd need to play with the bar height and use a different stem because the Missile's are 31.8mm diameter compared to the Stealth's 26.0mm. Fortunately Dennis has a neat adjustable device that sits in place of the stem. This can be tweaked both in terms of height and length.





We repeated the tests with a 70mm stem equivalent, the same as what I had been riding, but instead of it being flipped we tested with it a six degree rise and added a small headset spacer. This proved to be spot on and my figures were near to the zone Dennis felt better for someone racing longer distances. We also repeated the process with the equivalent of an 80mm stem. This didn't alter the figures much and came down to personal preference and which felt better. We decided to stick with a 70mm stem. This might sound short but having a shortish body this is required because the bike I ride (a Cervelo P3) is better suited to those with longer bodies than mine. Dennis did say I could probably ride a little more of an extreme position should I race a shorter distance than my usual half or full Ironman.

He said: "Shorter course athletes can tolerate a more extreme position simply because they aren't riding as long, but this shouldn't be at the expense of comfort. Being uncomfortable for any length of time is going to lose you power. For long course racing this is more of a concern, both for comfort and also the ranges you are working through. The back angle would be the significant measure of where someone is riding. Likewise triathletes will ride a different position to a roadie doing a time trial. A long distance athlete might ride with a back angle of 25-30 degrees where as a pro time trial racer might be nearer to 10 degrees."

CRANKING IT UP

We then went on to discuss crank length and Dennis suggested that I could probably ride shorter cranks than my current 170mm's, which would open my hips even more. Research has shown riders don't lose power using shorter cranks and it makes it easier to open up the hips because the knee isn't coming as far up into the chest. It also makes it easier to get into a more aerodynamic position. John Cobb, a triathlon tech guru and advisor to Lance Armstrong (see box), has been pushing the same idea for the last couple of years.

Dennis explained: "Shorter cranks would be the main way to open the hips a little further once everything else is dialled in correctly. If the joint angles are closed down at the top of the pedal stroke at the hip and knee, we could consider shorter cranks. Another key measurement that may indicate the need for shorter cranks is the vertical travel of the hip: longer cranks can make your hips rock. A lot of the pros are now riding shorter cranks than what you would normally prescribe for them. Personally, I like shorter cranks for triathletes because of that transition from bike to run. A lot of the pros in Hawaii are now riding shorter cranks and we have moved some of the GB elite guys onto shorter cranks too."

THE OUTCOME

The Retul experience was a long and thorough one. I was constantly impressed with the accurate and quick output of results and, more importantly, Dennis's great knowledge. The final part of the day saw us measure and record the set up of my bike in its ideal position. Rather than spend hours with a tape measure calculating differences in height between the seat and stem, Dennis used the Zin recorder. This is a probe that takes data from all the vital points, records each point and calculates all the distances and differences. It was all very high tech yet quick and simple. This meant I left Velomotion armed with every conceivable piece of bike set up data – all totally unique to me – which will prove invaluable in the future should I ever change components or ride a different bike. Having put my tri bike through the Retul test, I came away feeling very positive about my new set up and will soon be returning to get my road bike correctly fitted too. ▶

JOHN COBB'S THOUGHTS ON CRANK LENGTH

"I'm convinced that crank length and pedal rate (cadence) should be more directly related to one's natural running cadence and stride length than anything else. Every muscle has a natural contraction rate that will yield maximum efficiency. The game is to keep the muscle in its efficient extension range and at its most efficient rate of rotation.

"My initial motivation for experimenting with shorter cranks was to get riders lower on their bikes by rotating them forward and down with their legs hitting their rib cage, and without restricting their breathing. But first, I had to determine that shorter cranks and the lower seat heights they afforded, because of improved upper-body clearance, would not adversely affect the power output or efficiency.

"That led me to Professor Jim Martin at the University of Utah. Martin conducted a study using 60 racers of all skill levels. He would vary the crank length in 15 mm increments both longer and shorter. His findings showed that there was no power difference from one length to another but that oxygen uptake was always better with shorter.

"I've worked with a rider who is 6'5" and has worked down to 165mm cranks over the last three months. In this time he has gained 65 watts of power."



