Bike fit: why every cyclist needs one...

Who needs a bike fit? You do! Everyone from novices to pros will feel the benefit

Words: Simon Smythe

Whether you've decided it's time to lose a few pounds and have just bought your first bike since you were a kid, or you've been riding for years at the top level, it's absolutely vital that your current bike is the right fit for your body.

A correctly fitting bike will reduce the risk of injuries, which can range from a mild ache or niggle to something far more sinister. Not only that, if your body isn't in the optimal position, you can't use it to its full potential and you'll need to produce more power to create the same forward motion. It's even possible that the way you sit doesn't allow you to breathe fully, meaning that you can't supply enough oxygen to your muscles.

Lastly, different-sized bikes handle differently, and whether you're competing or riding for pleasure, you don't want to be fighting your bike.

Not like the old days

In the old days, to find out what size you needed, you would stand astride the bike and pull the 'crossbar' up into your crotch. If you had a few inches clearance, that was fine.

Now it's not so simple, partly because the crossbar (more often referred to as the top tube) is rarely horizontal, whether it's a mountain bike or a road bike you're after. Which means that the old way of measuring a frame by the length of the seat tube doesn't tell us enough.

Even more confusing, modern thinking has it that it's no bad thing to have a lot more seatpost sticking out than before. Some frames are a lot more compact than others, too.

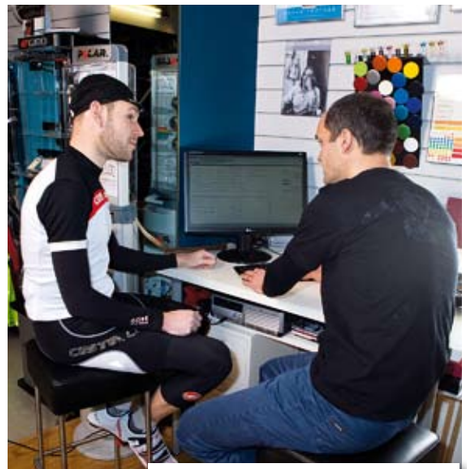
Nowadays, there are no rules regarding frame sizes, which is why you need to know your own personal measurements, independent of the way the big brands designate sizes.

Over the past decade we've seen a revolution in bike fitting, in line

> "The old method of working out frame fit by the length of the seat tube doesn't tell us enough"

Did you know?

Your pedalling force is acting on your knee about 5,000 times an hour, so it's no wonder incorrect load distribution can cause problems.



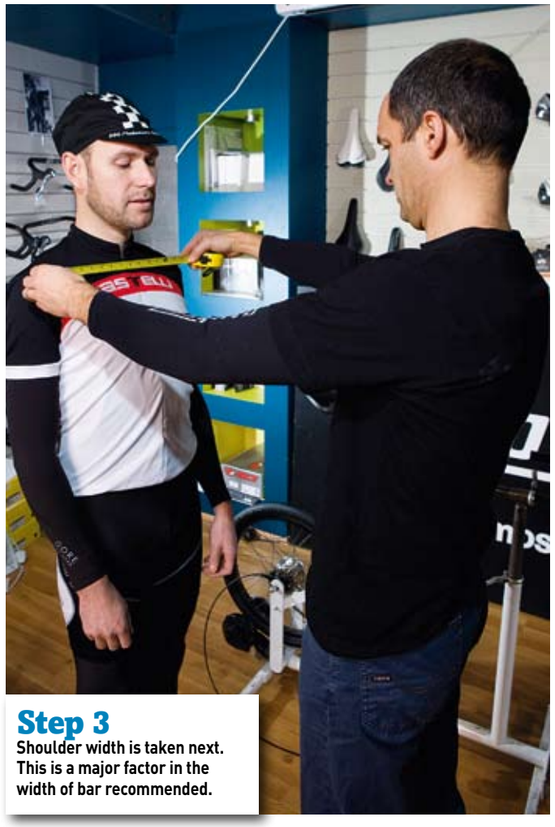
Step 1

The Serotta fitting process starts with an interview. Here the rider's personal information is entered onto an Excel spreadsheet. Not just age, weight, level of fitness, cycling experience and type of riding are recorded here, but also details that will help determine the final position, such as injuries that might affect riding comfort or efficiency. If you suffer from lower back pain or have a weak left knee, now is the time to own up because it's all taken into account.

Step 2

Next comes the measuring stage. Using a telescopic inseam-measuring device placed in between the legs, Phil takes the inseam measurement minus shoes. Being spring-loaded, the device forces up underneath a rider, mimicking the effect of bodyweight pressing down on a saddle. Heels are placed against the platform back. The type of shoe and cleat the rider uses are also recorded.

Photos: Mike Prior



Step 3
Shoulder width is taken next. This is a major factor in the width of bar recommended.

Step 4
Feet next! It's like having your feet measured again for your school Start-rites, except this time you're not going to grow into them. The weighted and unweighted measurements are taken for left and right, and a size of cycling shoe is suggested. The arch is also checked to see whether the rider pronates or supinates, in which case stabilising footbeds might also be recommended in the final report.

Step 6
The hip flexors determine the mobility of the hip and Phil also observes how the knee moves as the leg moves up — it can drift outwards (varus) or inwards (valgus).

Step 7
With the body measurements and flexibility tests done, it's time to set up the SizeCycle jig. Based on what he's just seen, Phil can set the saddle height and he can make an educated guess at other factors including bar height to start with.

with the progress of sports science and coaching techniques. And now the message is getting through to cyclists that the right fit is just as (if not more) important as the right bike.

High fliers
Mosquito Bikes in London's Islington offers a range of custom frames from the likes of Pegoretti, Zullo and Independent Fabrication.

Mosquito's Roger Graver and Phil Burnett are qualified Serotta Bike Fit Technicians (they studied at the Serotta International Cycling Institute in the USA, home of one of the most highly respected systems) and for every bespoke frame they sell, part of the process is spending two hours with the customer in advance, collecting body-measurement data and fitting them to the 'SizeCycle', developed by Serotta, which will serve as the template for the future frame.

These bikes aren't cheap, and for that reason, the SizeCycle fitting is thrown in. However, Mosquito also offers its fitting service completely independently of its frame sales, at a cost of £180. Customers take away a CD and printout of all their optimal bike set-up measurements, and whether they want to tweak an existing bike or get a custom frame built using the data, it's up to them.

Mosquito has a designated area at the back of the shop for the fitting. It's a little bit like a stage — anyone who comes into the shop for an inner tube while you're getting fitted will be very interested in what's going on there.

> "You might not enjoy a public performance, but most nosey onlookers will end up pretty envious of you"

Letting it all hang out
You might not enjoy doing a public performance, but you can be sure that onlookers will be pretty envious. After all, you're going to come out of those two hours with a bicycle — your own or a brand new one — that fits you perfectly and a set of measurements that should last you the rest of your cycling life. That's worth a little bit of squirming in public, isn't it? Your slack-jawed audience should be green with envy as they are probably operating on their own best-guess, shot-in-the-dark, hit-and-miss system. Which would you prefer? **Ends**

Step 5
Flexibility is the thing most cyclists don't pay much attention to, but which actually plays a large part in the way your final, optimised position is determined. It's the hamstrings that Phil is checking here. (See the box to the right on why flexible hamstrings can prevent lower back pain and knee injury.) Phil looks at the basic 'can-you-touch-your-toes?' stretch as an initial indicator, then he measures the angle of the bones using a goniometer. He uses stickers to mark the bones' pivot points so that he can be sure he is lining up the goniometer correctly each time. With the rider lying flat on his back with legs fully relaxed, Phil lifts the leg straight up — to the point where the pelvis begins to lift. The angle is taken from the greater trochanter.

PREVENTING LOWER BACK PAIN

Hamstring stretch

Rest one knee on the floor (put a mat or a towel down to make this more comfortable) and extend the other leg straight out in front of you. If your hamstrings are already flexible, lean forward until you feel the stretch in the hamstring of the extended leg. Hold it for 30 seconds, then swap legs and do the same with the other hamstring. Work up to three alternating sets on each side. You may also feel a stretch in the quadriceps of the bent leg — think of this as an unexpected bonus!

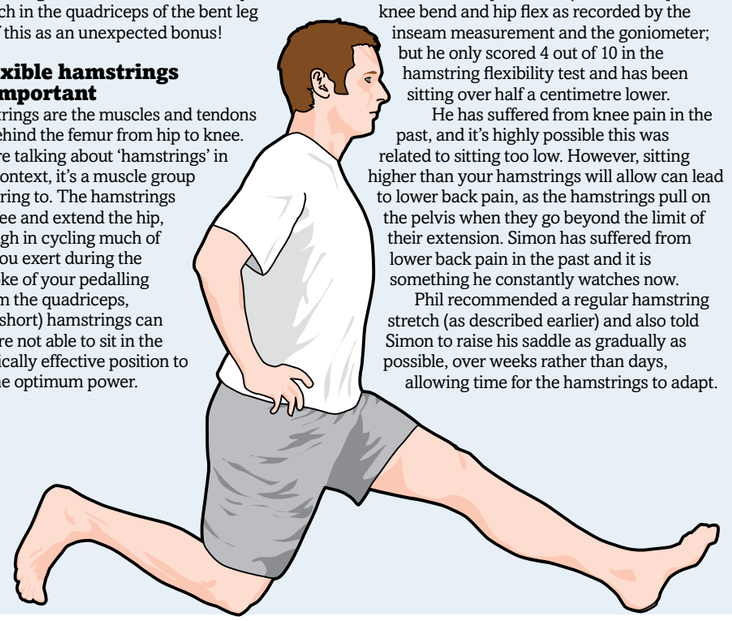
Why flexible hamstrings are so important
The hamstrings are the muscles and tendons that run behind the femur from hip to knee. When we're talking about 'hamstrings' in a cycling context, it's a muscle group we're referring to. The hamstrings flex the knee and extend the hip, and although in cycling much of the force you exert during the power stroke of your pedalling comes from the quadriceps, inflexible (short) hamstrings can mean you're not able to sit in the most physically effective position to produce the optimum power.

Cyclists tend to have shorter hamstrings than, say, runners, because in cycling the hamstring never fully extends. So unless you have an active hamstring-stretching routine in place, your hamstrings could be holding you back.

Simon, our guinea pig in the bike-fit pictures, should be sitting at a height of 78.5cm (centre of bottom bracket to top of saddle), based on optimal knee bend and hip flex as recorded by the inseam measurement and the goniometer; but he only scored 4 out of 10 in the hamstring flexibility test and has been sitting over half a centimetre lower.

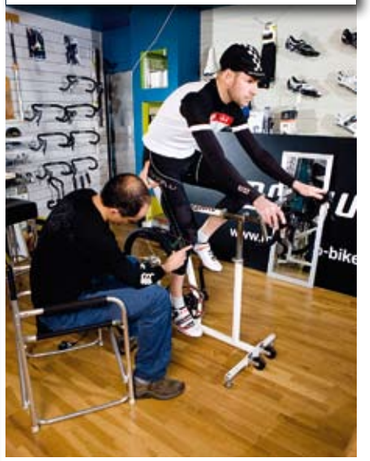
He has suffered from knee pain in the past, and it's highly possible this was related to sitting too low. However, sitting higher than your hamstrings will allow can lead to lower back pain, as the hamstrings pull on the pelvis when they go beyond the limit of their extension. Simon has suffered from lower back pain in the past and it is something he constantly watches now.

Phil recommended a regular hamstring stretch (as described earlier) and also told Simon to raise his saddle as gradually as possible, over weeks rather than days, allowing time for the hamstrings to adapt.



Step 8
Badly positioned cleats can be at the root of all sorts of injuries. Phil stops the foot at key points in the stroke to check the position of the cleat in its float. The top and bottom of the stroke are the points where there is most variation in terms of instability.

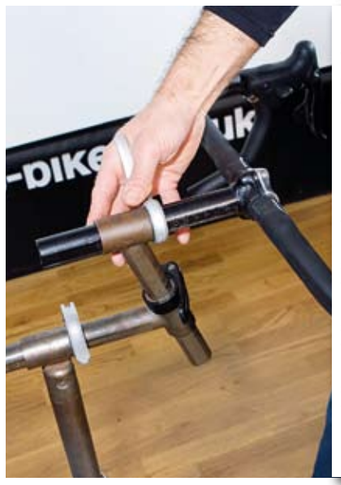
Step 9
Now Phil checks the angle of the knee when the foot is at the bottom of the pedal stroke. The optimum angle, right in the middle of the goniometer's green zone, is 30°.



Step 10
Getting the saddle height right is an ongoing process throughout the fitting.

Step 11
Now Phil measures the knee over the pedal spindle using a plumb line. The tibial tuberosity (just below the kneecap) should be directly above the spindle. Saddle setback is adjusted at this point.

Step 12
Now we're cycling! Phil shoots using the stills camera, with the screen pulled down for a clean background. He checks individual measurements by analysing the rider's position at different stages of the pedal stroke.



Step 13
The aim is a 'neutral spine' position, so Phil moves back in and makes adjustments to the stem length and bar height. Achieving the 'neutral spine' is something of compromise, however. Phil admits that the healthiest position of all for your back while cycling is something like the one the vicar uses when he pedals around the village on his sit-up-and-beg. But while that's fine for the vicar, if you're doing serious mileage or racing, you need something different. Phil explains that the spread of the rider's weight between saddle and bars is something like 60:40, which means a fairly aggressive position. So the last piece of the jigsaw is to get the stem length and the hand position right.

Step 14
The measurements are transferred from the jig to some software, and from there, Mosquito will order your custom frame or work out the best off-the-peg frame for you, then set it up with the correct length stem, stem rise, headset spacing, saddle height, saddle setback position and saddle-to-bar drop. You get a copy of everything through the post, including a CD with all the interview, flexibility and jig data, plus the photos of you with the optimised position, to use for future bike set-ups or custom builds.

ROGER GRAVER

Who has a bike fit?

"We get as many people coming in for fittings with their own bikes as for a custom frame that they're buying from us," says Roger Graver, Mosquito Bikes' other qualified fitter.

"They're often prompted by some sort of injury — usually knee or back. They start feeling something bad after a long ride and realise they can't ignore it any more. Or they get referred by a chiropractor or osteopath.

"We're fitting probably on average two to three people a day. There's more awareness of how important a professional bike fitting is. At the moment there are just two of us qualified, but it would be good to train Gill too — women may feel more comfortable being fitted by a woman.

"What sort of feedback do we get? People say, why didn't I do this earlier? We recommend people come back for a refit in a year or a year and a half, because injuries, social activities, changing fitness or riding ambitions could mean the old position isn't appropriate any more. That costs £100."

www.mosquito-bikes.co.uk

SIMON SMYTHE

Why the bike fit helped me

"I have had fun messing about with various formulae for saddle height in the past and I settled on Bernard Hinault's version of Greg LeMond's method (inseam multiplied by 0.885), but after a year of bouts of back pain, I started lowering it, and I stopped time trialling every week, which seemed to aggravate it.

"That seemed to solve it, but when the time-trialling bug bit again a couple of years on and I began training again, I started getting knee problems, something I'd never suffered from before.

"I was always adjusting the saddle-to-tri-bar measurement on my time trial bikes, but with my road bikes — which I spent all my time riding and training on — I never bothered. I couldn't really see the point, until now that is!

"The Mosquito session taught me how crucial every single measurement is if you're going for the best possible biomechanical efficiency — and I think it's fair to say, deep down, every cyclist is.

"I haven't had any knee pain since raising the position of my saddle, and my back is still OK. I'm stretching my hamstrings regularly now, but it's probably still not regularly enough. I never, ever bothered with them before. Still, better late than never.

"The Mosquito fitting also raised my bar height a little, which as well as making the position on the hoods more comfortable, made the drops more accessible, and I think my position on the drops is more aerodynamic now because my forearms are closer to horizontal.

"It's very useful that Mosquito gives you a printout of all your measurements, plus a CD with more photos of the final position on it; I will definitely use it as a template for the future. £180 seems like a lot of money, but getting professional, qualified bike fitters to have a look at your position in detail is priceless if you do a lot of cycling."