

Note: The following document was created by Jeff Archbold, who developed it to compliment his custom frame building hobby. Jeff currently works as a bike fit specialist at La Bicicletta in Toronto. Jeff can be reached through La Bicicletta at 416.762.2679

## **BICYCLE FITTING: AN INTRODUCTION**

Bicycle fitting. When you are a child, it is very simple. First 12 in. wheels, then 14 in. wheels, then up to 20 in. wheels. The seatpost is raised or lowered slightly, and then you are done.

If you want to get a “bike that fits” from a discount store, the rule about having an inch or two clearance as you straddle the top tube with your feet on the ground at least means that the size of the bike is in the right ballpark.

The fitting of high performance bicycles, however, is not so simple. An elite-level racer or someone looking to be as fast as possible on a bike requires more than just a frame size to get an optimum position. These riders require positions that allow them to be fast, both on the drops of a race bike, and on the brake hoods, where they will likely spend most of their riding time. The rider must also be reasonably comfortable, whether a serious racer or an avid recreational rider. If the racer is not comfortable, it will be difficult to generate optimal power during the last two hours of a four hour race due to fatigue/duress. If the avid recreational rider is not comfortable, he or she will just do shorter rides, which reduces the enjoyment.

Finding the proper fit on a high-end bicycle requires finding the optimal balance between aerodynamics, power output, and comfort.

If the handlebars are installed in a position that produces a very upright body position, the rider may be comfortable, but will result in excessive wind drag. This will reduce the speed of the both the recreational rider, which takes away a lot of the enjoyment, and the racer, which significantly reduces the likelihood of high placings in races.

While lowering the handlebars will typically provide a more aerodynamic position, there is a significant risk of lowering the power output of the rider due to a ‘cramped’ position. In addition, lowering the handlebars excessively will cause many riders to lose efficiency when climbing with their hands on the brake hoods.

Obviously, fitting a rider results in a compromise in some aspect of riding. A proper bike fitting, however, will result in the best overall combination of riding factors.

### Rules of Thumb

The first introduction for many people to bike fitting are 'Rules of thumb'. These 'rules' developed over time, based on the personal experience of riders. For instance;

- “The handlebar should block the view of the front hub when on the hoods.”
- “You should have a slight bend in your knee when the pedal is lowest.”
- “The front of your knee should be vertically in-line with the pedal axle when the crankarms are horizontal.”
- “The handlebars should be located at your fingertips when you place your elbow against the front of your saddle.”

While these 'rules' are better than nothing, they don't take into account differences in physiology between people, and also don't usually incorporate differences in frame geometry between different manufacturers. These 'rules' are a good starting point, but a bike fitting could do much better for individuals.

### Biometric Data Charts

An early attempt to provide a reproducible guide for fitting of bicycles for faster riders was a type of 'fit' to a 'kit'. (I won't say the actual name of this fitting system, but it is easy to figure out.) This fitting system measured the biometric data for hundreds of elite-level bike racers and compared leg length to seat height, torso and arm length to top tube and stem length, etc. The measurements were averaged, and any person could get a bicycle fitted to them if they were a 50<sup>th</sup> percentile racer.

This fitting system is an improvement over using 'rules of thumb' in that the fitting takes into account the biometric length data of a rider, and translates this into data for the contact points on the bicycle, namely the seat, pedals, and handlebar.

Unfortunately, very few riders are 50<sup>th</sup> percentile racers. People don't all have the same flexibility in the back or hamstrings. Some people pedal faster or slower than 50<sup>th</sup> percentile racers. Some people don't want, or need, to have a position as aerodynamic as an elite-level racer. This fitting system gets a racer at least into the correct section of seats in the

ballpark. For individuals, however, a fitting system that tailors the fit of the bike to their unique size, flexibility, muscle strength, and the type of riding they want to do requires a more individual fitting system.

### Individual Fitting

At 'la bicicletta', we feel that we have developed a fitting system that is based on each individual rider. This system started when I began making custom steel frames. Since the frames were custom-made, I wanted to make the fitting as personal as possible. I took into account not only the size of the rider, as they pedaled on an adjustable fitting bike, but also how flexible and efficient they were in different positions.

Instead of measurement charts, the rider actually gets on an adjustable fitting bicycle and pedals. The adjustable bike is adjusted, using input from both the person doing the fit and the rider. The power output is measured is measured by the adjustable bike under varying positions. The aerodynamics of varying positions can be quickly compared. The rider themselves can compare the comfort of varying positions. Every point of contact to the bicycle is altered until the best compromise between comfort, power, and aerodynamics is achieved. The contact points are them measured relative to one another and recorded.

Using this information, the proper size frame of a certain model can be chosen, and the appropriate seatpost, stem, crankarm, and saddle can be installed. The actual bike will match the measurements from the bike fitting to within 2 to 3 mm. (Unfortunately, stems only come in 10 mm increments.)

This system fits the individual rider, not a preconceived size for 'most' riders.

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NEXT: Why different riders fit bikes differently, and how we determine the fit.