

Thinking About Bike Fit

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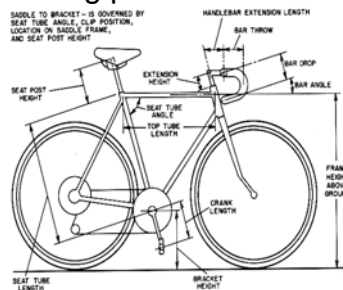
Having purchased a new bike for this year I've been trying to tune it up to fit right. I thought you might be interested in some Of these rules of thumb.

The requirements for a good fit of rider and bicycle depend on what you are trying to accomplish by riding a bicycle. As the time spent riding, the length of rides, and the speed of your riding increase, the requirements get more demanding and precise. What we're looking for is biomechanical efficiency and comfort.

" On a flat road, aerodynamic drag is by far the greatest barrier to a cyclist's speed, accounting for 70 to 90 percent of the resistance felt when pedaling. The only greater obstacle is climbing up a hill: the effort needed to pedal a bike uphill against the force of gravity far outweighs

the effect of wind resistance".

1. The rider contacts the bicycle at three points: the seat, the handlebars, and the pedals. With a correct setup, the rider's weight is divided between his feet, his seat, and his hands. On a racing bike, the torso will be angled forward and there will be some weight on the hands when coasting on level ground. This position is of course more aerodynamic than the more upright touring position.



On a properly set up racing bike, a rider will feel quite comfortable in his head-down, body-forward position as long as he is pedalling hard, but if he tries to take it easy he will find the weight on the hands a little uncomfortable. On a properly set up touring or casual-use bike, a rider will feel quite

comfortable pedalling relatively gently. However applying full force to the pedals in the sitting position will require pulling up a bit on the bars. This is not good for comfort and that pulling will expend some energy.

2. How far will the rider bend at the waist? That depends on the shape of the rider. If the rider has a gut, the bike will need to be adjusted for less bend at the waist. The general idea will be to move the seat forward and the handlebars higher straightening the waist and ruining the aerodynamics but otherwise maintaining a comparable balance on the three contact points. The need to bend at the waist for a good aerodynamic position on a bicycle means that competitive cycling imposes an additional incentive to be thin above and beyond the need to be fit. In many other aerobic sports, competitors of a stocky or even pudgy

build can compete at the highest levels, but cycle racing requires its competitors to be skinny.

3. Frame size is perhaps the most important dimension in choosing a bicycle. Frame size is a measurement made from the middle of the bike's "crankset" upward to a point at the top of the seat tube. Usually, you want to have one or two inches of clearance between your crotch and the crossbar when sizing a road bike, a trail bike, or a hybrid.

The frame size determines the height of the handlebars above the ground. The handlebar stem attachment only provides perhaps an inch of adjustment up or down, so starting with a frame size at least close to correct is essential for establishing the handlebar height. By comparison, the seat post can slide up and down several inches. (Red/Green tip-there are other things that can be done to correct handlebar height

when the frame size is wrong like simply turning the handlebars upside down)

4. The seat tube angle should be selected based on the type riding expected. Those who plan to race will want an aerodynamic position that allows them to apply maximum force to the pedals without having to tire themselves yanking on the handlebars. They want the seat forward and the handlebars forward and down. This position puts a lot of weight on the hands. A seat can be adjusted forward and back an inch or so on its mount for fine tuning.

The rider looking for a more relaxed riding position will want the handlebars higher and rearward and the seat rearward. This will take weight off the handlebars and put it on the seat.

5. On either touring or racing models the seat angle needs to be nearly level. If mounted either nose-down or nose-up, weight applied

vertically would tend to cause sliding down it.

6. Proper saddle height can be determined in several different ways. The easiest way is to allow one pedal to drop to the 6-o'clock position and observe the angle of flexion in the knee joint. There should be a 25° to 30° flexion in the knee when the pedal is at the bottom-most point. Another method is to measure your inseam (from crotch to bottom of shoes) and multiply by 0.883 to get the correct distance from the top of the saddle to the center of the bottom bracket. Women have longer legs than men.

A simple saddle height adjustment may ease the forces placed on the knee. Saddles that are too high or too far back can stress the biceps tendon. If the saddle is too high, pain may develop behind the knee. If the saddle is too low, too much stress is placed on the knee from the patellar and quadriceps tendons.

If the hips rock back and forth when pedaling, the saddle is too high; lower the saddle until a smooth pedal stroke is achieved.

7. Saddles that are too far back cause the cyclist to reach for the pedal and stretch the knees unnecessarily. Saddles that are too far forward will force pedaling in a hyperflexed position, increasing the force on the anterior knee.

Saddle position can be evaluated with the plumb bob technique. Seated with the pedal in the 3-o'clock position, a plumb hung from the most anterior portion of the knee should intersect the ball of the foot and the axle of the pedal.

8. Pedals and shoes work together. The purpose of a cycling shoe is to hold the foot rigid; everything below the ankle should behave as a stiff link. If the arch of the foot is allowed to flex, then the rider must expend energy in foot muscles holding it rigid when applying force to the

pedals. Most cycling shoes are very stiff; some even have metal beams in the soles.

The ball of the foot needs to be located correctly on the pedal to apply force without tilting the pedal forward or backward. With cleated shoes, this positioning is controlled by the location of the cleat on the bottom of the shoe. Cleats that are internally rotated too far may increase stress on the outside of the knee. External rotation can cause medial knee injury. Cleats should be positioned fore or aft so that the ball of the foot is directly over the axle of the pedal.

Without a cleat on the shoe, the foot location is controlled by the length of the toe clip where the point of the shoe runs into the clip and won't go any farther. This varies not only with the size of a rider's foot, but also with the configuration of the shoes he is wearing.

And cycling shoes and cleats do make the difference.



There is probably some way to apply the principles of the Modular man and the mathematics of human proportion and the Golden ratio to bike fit.

I hope that you find these tips as useful as I did. If anyone has further thoughts its open for discussion on the Velo Web Site. There are probably some other good formulas floating around out there....

