The Mechanics of Proper Bike Fit (Part 1)

At every race you see them…a rider with a seat that's far to low, aero bar extensions pointed skyward, seat set nose down, elbows locked out reaching for a handlebar that's too far away, and hips that roll from one side to the other with each pedal stroke. In short, a "bike fit" that's just not quite right.

And while you'd be tempted to say: "*I bet that fit is rough on their bike-leg split*." You'd be only partially right. Fact is, it has just as great a negative impact on their RUN split as well.

But while blatant offenders are easy to spot (i.e. follow the bouncing head/shoulders or the toes pointed in or out), the more subtle biomechanics of a body matched to a perfectly fit bike can be harder to judge. So where does an athlete begin?

The Stool Sample
No, not THAT type of stool sample! Rather a literal 3-legged stool. Imagine that each leg of the stool represents one of three critical parts of an athlete's perfectly fit bike. If one of those "legs" is bit short…the stool wobbles. If a leg is completely missing, the stool falls. Just like a well fitting bike, each support relies to some degree on the other two.

Each of the legs of the stool represents **a body contact-point** by which the perfectly balanced athlete propels the perfectly fit bike. So ask yourself, "*What points does my body touch the bike*?" That's the 3 legs of your stool.

1- your rear-end
2- your hands or hand/elbows *(depending on whether your riding w/ aero bars or not)*
3- your feet

So let's address EACH of those critical contact points in the order of greatest importance and construct the ideal bike fit.

Your rear-end
It is very important to always, always, always BEGIN the bike fit with the back half of the bike. This is where wattage, the power, is produced…glutes, legs, & core. This "back half" of the bike deals with 3 elements of a fitting by addressing:
1-the saddle height
2-the saddle fore/aft
3-the saddle tilt

Very often I have seen an athlete who has slid his/her saddle too far forward or too far back simply to make his/her reach (from saddle to bars) more comfortable…or worse, dropped the front end in order to "*get lower and more aerodynamic.*"

This would be akin to building a racecar and shrinking the size of the engine, (say from a V8 to a 4-cylinder), so that you could put a more aerodynamic hood on it. Understand that aerodynamics means very little if power production (wattage) isn't there or has been sacrificed for it.

Moral of the story: Fit the back half of the bike (from the rear-end) FIRST, then make the front half match what's been ideally set from the saddle.

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Seat height
Though there are as many complex formulas to arrive at one's ideal seat height as there are bike fitters, it is commonly agreed that what you want to achieve in the end is a knee flexion that is close to 30 degrees when the pedal is at the bottom of the pedal stroke (at 6 o'clock).

A ***few*** degrees on either side of the 30-degree benchmark is ok for circumstances such as large or small feet (relative to one's leg-length) or a leg-length discrepancy (also addressed by 'shimming' the cleats, *see below*). Also, one's optimal cadence can determine whether you end up slightly more extended than the 30-degree knee angle, or slightly less. As a rule, if you tend to push larger gears, then you can use the leverage of a slightly more extended knee angle. While those who spin smaller gears may find that being a degree or two less than 30 is beneficial.

A quick and easy way to check knee angle is to unclip BOTH feet and simply hang the legs down by the side of the bike as you sit on it (holding on in a neutral hand position, not upright, not low-n-aero). This assures that the pelvis is equally weighted on both sides.

With feet dangling by the side of the bike, have a friend spin a crank arm to the 6 o'clock position…pointing straight down. The HEEL (w/ shoes on) of the dangling leg, with knees locked out, should barely miss touching the pedal spindle while it's pointing straight down. Yet if a thumb (5 to 7mm in depth) is placed on that spindle, the heel will touch the top of that thumb.

If you do this, you will be within 28 to 32 degrees of knee flexion 99% of the time.

When we do a professional bike fitting, we do this to get in the right ballpark, then use a goniometer to perfect the knee flexion angle, and then can check it using a Computrainer or other wattage meter to get 'real world' feedback on the changes.

Seat height is just that important.

****[Stay tuned for Part 2 of "The Mechanics of Proper Bike Fit" in our next installment. There, I'll cover saddle fore-aft and tilt as well as forefoot varus/valgus (cycling's version of pronation/suppination, Q-factor, and cleat-fore/aft.]*