

## Utilizing Modern Technology to Optimize Bike Fit

It is well understood that obtaining a proper bike fit is vital for optimal performance, injury prevention and overall comfort on the bike. Cyclists pedal in a relatively fixed position for long durations, with only slight alterations in positioning to compensate for climbing, descending and cornering. A cyclist pedaling at 90 rpm for three hours will complete approximately 16,200 pedal revolutions in that time frame. An improper fit can apply added stress leading to overuse injuries. The majority of overuse injuries in cycling can be directly linked to poor bike fit and are easily relieved with the proper adjustments.

The bike frame itself cannot be adjusted, so different components on the bike are manipulated in order to properly fit the bike to the specific rider. Contact is made between the rider and the bike at three locations: cockpit, saddle, and pedals. Adjustments are made at each of these positions to accommodate for the individual anthropometrics of each rider. Typical adjustments include: cleat placement, crank arm length, saddle height, saddle fore and aft, handlebar width, stem length and stack height. Specific criteria exist for adjustment in each one of these areas.

Utilizing the correct fitting methodology and the ability to accurately measure positioning is vital for obtaining optimal fit. This follows the same concept utilized in computer development: “junk in, junk out”. An improperly conducted fitting session will lead to an improper fit. It is surprising how many bike shops utilize improper methodology when conducting a bike fit. To truly conduct a proper bike fit it is necessary to precisely measure joint angles utilizing a motion analysis system. Until recently, motion analysis systems were prohibitively expensive and difficult to use. Innovision systems, Inc. has developed a bike fitting system that is affordable, accurate and easy to use. This system utilizes a biomechanical computer analysis system (MaxTRAQ) to conduct a 2D analysis of the cyclist’s position on the bike. Innovision’s bike fit system is a streamlined version of the MaxTRAQ software utilized in scientific laboratories across the world. The software is intuitive and point and click friendly.

MaxTRAQ allows the user to precisely measure joint angles while stationary or during motion. To conduct a fit, place reflective markers on the desired points of interest and film. By utilizing the MaxTRAQ software the fit specialist will be able to measure the angle at each joint and then make the proper adjustments. Adjustments can also be made based off of horizontal and vertical reference lines, which can be applied to the video frame. This system will allow the fit specialist to make all of the necessary adjustments mentioned earlier in this article. MaxTRAQ also allows for better interaction between the cyclists and the fit specialist. The fit specialists can utilize the software to show the cyclist flaws in his positioning and the altered positioning after completion of the fitting session. Providing concrete visual evidence will allow the cyclists to feel more confident concerning the alterations made to bike fit. Once the bike fit is complete, the MaxTRAQ software will automatically create a printout containing the cyclist's bike fit information, which can be referenced for later fits or necessary adjustments.

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