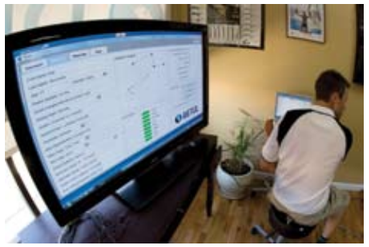
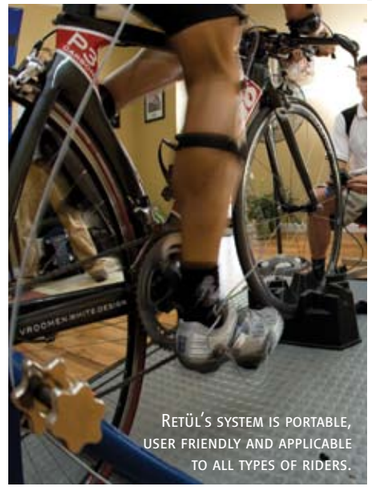
Head fitter Todd Carver attaches LEDs that will help him determine what changes need to be made.

Bike fit for the new century

Retül helping to advance cycling's hottest trend



DON KARLE (5)



Retül's system is portable, user friendly and applicable to all types of riders.

You can almost see the idea balloons popping up over Cliff Simms' head. The Northwestern-educated mechanical engineer is the brains behind Retül, an emerging Colorado company that's developed the first cycling specific, three-dimensional motion capture fit system.

Simms and his business partners launched their company last December, and already they've sold 50 of the $10,000 devices to customers ranging from a coach in Israel, to bike shops across the country (including Lance Armstrong's new store), to Carmichael Training Systems, which bought three. Retül also runs a pair of fit studios (one in Denver, the other in Boulder) where it does a minimum of 40 fits a month

More impressively, it's become the go-to fit system for the Garmin-Chipotle cycling team, which used the device to transition new riders to new bikes during a pre-season training camp, and subsequently traveled with the system through the year, lest Christian Vande Velde, David Zabriskie or any other member of the Argyle Armada needed a little mid-season tweaking.

But this is old news to Simms, whose internal wheels seem to be in perpetual motion. In the not-to-distant future, he tells *VeloNews*, Retül will unveil a hand-held digitizer that will allow fitters to quickly measure and record key locations on a customer's bike and/or body.

"It will take the guess work and potential for human error out of the fitting equation," explained Simms, dragging a prototype probe across the length of a saddle to demonstrate ease of use. "We really see it as the future of the custom bike building process. You'll be able to send these measurements straight to custom builders."

Even more exciting is what Simms has dubbed Retül Red, a modified version of the current fit system that will be outdoors friendly. This means that while you're hammering the hometown time trial circuit or grinding up a local climb, a fitter will be able to take accurate measurements from out a car window or on the back of a motorcycle.

Indeed, the idea of measuring while in motion — be it outside or inside — encapsulates Retül's technological breakthrough. Unlike old-style static bike fitting systems where you either have to stop the rider or freeze the video to capture data, Retül allows fitters to take simultaneous full-body measurements while the rider is pedaling.

"That gives us almost instantaneous results," added Simms. "We can do real time calculations because our system individuates each body part, knows every movement it takes, and can then average those movements together. To do that with video would take hours."

A quick history lesson helps to understand where Simms is coming from. The concept of 3D bike fitting is not new. For years now, operations such as the acclaimed Boulder Center for Sports Medicine have been using the same 3D motion capture technology that video game makers use to recreate human movement. But that system has its limitations, not the least of which is a $100,000 price tag.

Systems like BCSM's also require more space and are susceptible to light artifacts (say from a pair of shiny — and reflective — cycling shoes). Retül, on the other hand, costs a tenth as much, and instead of using reflective markers (think white ping-pong balls affixed to the body), Retül is a light-based infrared optical tracking system that does full 3D coordinate acquisition using active LED (light emitting diode) markers.

After an initial consultation where injury history and other key fit factors are discussed, the Retül fitter attaches eight LEDs to the client's foot, heel, ankle, knee, hip, shoulder, elbow and wrist. A few feet away is a small rectangular sensing device that resembles a tripod with a level on top. Next to that is a data storage hard drive and a laptop computer.

The result is a synchronized system that provides real-time feedback, not the burden of post-processing. "When you're looking at a knee angle at the bottom of the pedal stroke, that changes with almost every pedal stroke depending on rider movement," explained Todd Carver, a biomechanist who previously worked at BCSM, and is now Retül's lead fitter and client educator. "Older motion-capture systems require post processing to accurately interpret data, but we get information in real time which is what I need to give the best possible fit."

Another potentially-revolutionary innovation is what Retül partner Franko Vatterott calls the development of a common bike fit language. Right now bike fitting is a bit of a black art, with a wide array of systems, methods and theories precluding the establishment of exact science. But as more and more Retül systems go on-line, information sharing will allow fitters from all over the world to compare notes, fostering a more uniform set of standards.

"Bike fitting is one of hottest trends in the cycling industry right now," explained Vatterott. "There's an entire sub-economy that's being developed around it. Retailers are starting to use fit as a foundation for how bicycles are sold, there are adjustable 'fit bikes' and fitting tools now on the market, there are several fit schools each with their specialty focused curriculums, and well trained bike fitters are certainly going to be in demand in the newest fit studio models that we see popping up around the world. We see Retül as a perfect tool to help advance this trend." ■