PROPULSIVE FORCE MAXIMIZATION ANALYSIS TECHNOLOGY

The latest analyzing and simulation tech applied to frame manufacturing

It has been our mission to quantify the “feeling” of the ride and incorporate it into the production of our frames over the years. We have repeatedly pursued the ideal ride by working to understand the countless unknowns present in the world of the bicycle frame.

Bicycle development is all about paying attention to small details. Further, it is the riders who are able to evaluate them. Even our experienced development team had to guess how the design would affect the test riders’ sense of the ride and feel. In the past, these kind of speculative, unclear evaluations were what most bicycle development had to rely on.

A new standard of the development procedure has been set with PROFORMAT (Propulsive Force Maximization Analysis Technology), which was created by the Bridgestone central laboratory. This laboratory is the research division of the entire Bridgestone group. We focus on testing and developing materials such as rubber and urethane for Bridgestone’s key product, car tires.

We applied the analysis and simulation technologies in this industry to bicycle manufacturing with a higher standard than ever. Our goal was to optimize the propulsive force, namely the pedaling efficiency. We created a design theory and applied it to the actual frame after gathering numerical values concerning the variations and deformations that riding creates in each part of a frame. PROFORMAT is the latest frame development system and a general cover term for the entire process of analysis.

Transforming ride feel into numerical specs, then back into ride feel

PROFORMAT has allowed us to analyze and quantify the performance that professional racers demanded more precisely than ever. We quantify the precise ride feel by considering the efficiency, material, aerodynamics, shape, measurement, rider, strength, stiffness and weight as a whole. Based on this comprehensive simulation, we can optimize frames with different purposes such as “winning races” or “riding long distances comfortably”.

The R9R carbon road racing frame and its aluminum version R6R are the first frames produced using the PROFORMAT research results. By maximally optimizing the propulsive force, we managed to allow the racers go faster while minimizing their physical fatigue even in extreme racing situations.

On the other hand, we have added suppleness to the long-ride models to reduce fatigue by improving propulsive force and decreasing energy loss. This is the design philosophy for R9L the carbon model.

With PROFORMAT, we can simulate everything from selecting materials to determining thickness, which allows us to optimize the frame designs for different purposes. Fewer prototypes need to be produced and simulated numbers can be easily connected with the actual prototype bikes. Fewer prototypes, more evolution. This development system scientifically set a higher standard for the procedure of “connecting the ride feel and the manufacturing numbers”. Bridgestone bicycle manufacturing has evolved more with PROFORMAT than ever before.