CASE STUDY

ANCHOR RP9 used Team Bridgestone Cycling affiliation Imamura (center of the photo). Courtesy of Satoru Kato

STREAMLINING TOP-NOTCH BICYCLES

BRIDGESTONE CYCLE CO. CHOOSES ALTAIR® ACUSOLVE® FOR LIGHTER, FASTER, STRONGER BIKES

About the Customer

Japanese bicycle manufacturer Bridgestone Cycle Co. Ltd. has a wide product lineup that includes power-assisted bicycles, road bicycles, commuting bicycles, and children's bicycles. Bridgestone covers all area of bicycle design and manufacturing, from product planning and development, to distribution and sales. Since its establishment in 1949, it has worked to popularize cycling not only through its products, but through safety classes, lectures, and more.

Bridgestone's ANCHOR track bike line has been a driving force propelling Team Bridgestone Cycling athletes and other top domestic athletes to win world championships, break personal bests, and more. The ANCHOR line has won consecutive top category honors in Japan and is one of the most prominent brands currently on the market. The bicycles are designed with precision and must meet rigorous weight, rigidity, safety, functionality, and design standards while maintaining a sleek, simple, and optimized design.

Starting in 2015, Bridgestone established an initiative to rebuild basic sports bicycle technology, and in 2017, the company started using computer-aided engineering (CAE) to perform aerodynamic analyses and other crucial development steps. In using CAE, the company hoped to optimize its existing engineering techniques and develop new bicycles that would weigh less, create less wind resistance, and perform better so athletes could reach their peak potential.

ACHIEVED ▲
AERODYNAMIC TARGETS

REDUCED ▼
FRAME WEIGHT

IMPROVED ▲
FRAME STRENGTH

Their Challenge

When Bridgestone was aiming to create the ANCHOR line of sport bicycles, it wanted to create a bike that maintained a slim, elegant shape that still met weight, rigidity, and aerodynamic targets. Before the introduction of CAE tools, the engineering team had to perform lengthy manual analyses to hone component design while ensuring the bike still met its targets. This process was labor-intensive, tedious, and left room for various errors that engineers could only detect after performing countless iterations.

In short, Bridgestone wanted a solution that would help its engineering teams speed and shorten development times while also giving them the power and flexibility to test multiple design iterations quickly so they could arrive at optimized designs faster. The company also wanted a tool that would make its calculations more accurate throughout the development cycle and reduce the potential for errors across the board.

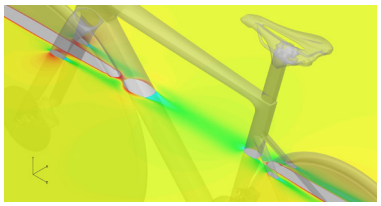
Our Solution

To satisfy all product demands, Bridgestone turned to Altair AcuSolve so its teams could optimize particularly intensive components like the head tube, front fork, stem, and other bicycle parts. "We were able to introduce AcuSolve into our workflows smoothly," said Kazuo Uchida, digital engineering division chief researcher, Bridgestone. "We used AcuSolve because it makes computational fluid dynamics (CFD) – which is generally complicated – easy and accurate thanks to its finite element modeling (FEM) capabilities. AcuSolve's calculation times are very short and the software integrates well with other FEM solvers."

"Our company uses AcuSolve for steering wheel adjustments in truck bike development. Our new ANCHOR RP9 road bike, which we released in September 2021, benefitted greatly from our truck bike experiences and built on our prior work," said Akihiro Hasegawa, design development department, Bridgestone. "AcuSolve makes it easy to analyze the entire bicycle in a short time – as such, I was able to test iterations many times and achieve our aerodynamic targets."

Results

Thanks to AcuSolve, Bridgestone's team met its aerodynamic targets and created the ANCHOR RP9 with top athletes' performance in mind while achieving the sleek look it set out to create. The design's quality hasn't gone unnoticed among the athletes who've been riding the bicycle. "The completed track and road bikes have been well-received by the players and many have told our team that their times have improved," said Hasegawa. **"By trying to achieve optimal aerodynamic performance, I think we've created bicycles that achieve functional beauty. We hope our bicycles are something that motivates more athletes and more people to ride."**



TOP: Altair AcuSolve analysis result
MIDDLE: Bridgestone Cycle Headquarters
BOTTOM: ANCHOR RP9.

All images courtesy of Bridgestone Cycle