

Solid Edge

Challenge

Works of art on wheels

Industry

Consumer products

Business initiatives

New product development

Business challenges

Create lightweight, high-performance, good-looking bicycles

Communicate with suppliers and dealers all over the world

Keys to success

Ability model freeform surfaces, solids and sheet metal components

Motion and finite element analysis using CAD data

Realistic looking images from CAD geometry

Results

Higher level of professionalism

No limits on creativity/more stylish designs

Fewer errors in supplier communications

Solid Edge supports the combination of creativity and advanced technical design that gives these bicycles worldwide appeal

High tech meets high style

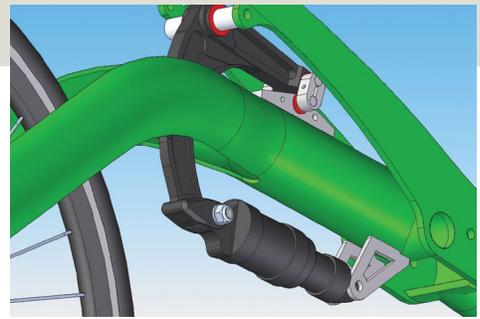
Challenge b.v. is a Dutch company that sells its products – recumbent bicycles – all over the world. The company makes recumbent bicycles for racing, commuting and touring (as well as a new recumbent tricycle). The appeal of these bikes is three-fold: advanced technical content, low weight and great looks.

Paul Voerman, president and founder of Challenge, remembers when recumbent

bicycles fit none of these descriptions. “The first recumbents looked like office chairs on wheels held together with garden fencing,” he says. “Passers-by would stop and stare.” People still stop and stare, but for a completely different reason. Recumbents have become works of art featuring creative frame shapes, dazzling paint jobs and a super comfortable ride.

The combination of high tech and high style that describes these bicycles also describes the process of creating them. It’s one part art and one part serious engineering. Challenge has found design software that supports the entire scope of the process – the Solid Edge® 3D modeling solution from Siemens PLM Software.





One program, multiple functions

Challenge's first CAD program was AutoCAD. The company introduced Solid Edge in 2002 when the problems associated with 2D became too difficult to work around. One of the main problems involved communicating with suppliers in the Far East. Even when Challenge sent lots of drawings, there could still be misunderstandings. Another problem was that working in 2D was limiting the level of creativity Voerman could incorporate into his designs. "Nothing is as frustrating as a program that can't create the shape you have in mind," he says. "Also, in 2D you just look at the side of the bike. You need a sample or a mockup to see if an idea really looks nice."



The choice of Solid Edge was really the choice between one program or several. "We could have purchased conceptual design software to handle the creative part of the design process," says Arjen van Noordenne, a design and analysis engineer at Challenge. "But then we would have needed a second program to handle technical aspects of bicycle design, such as motion analysis and component modeling. Solid Edge gives us the complete range of functionality in one program."

Bicycle design at Challenge typically begins with a sketch by Voerman that van

Noordenne enters into Solid Edge. He uses Solid Edge freeform surface environment to model carbon fiber and injection molded parts, its solid modeling environment to model many of the components, and its sheet metal modeling environment for certain components such as the wings in the recumbent tricycle. "On the screen, we can look at a design from every angle and we can see right away, without a mockup, whether the idea is working or not," says Voerman.

Solid Edge freeform surface modeling functionality is easy to use, according to van Noordenne, a fact that surprises colleagues who use different CAD software. "We were at a trade show talking with an engineer who uses a high-end CAD program and he told us it took him all day to join surfaces," says van Noordenne. "We can do that in Solid Edge in a few minutes. In another situation, one of our colleagues who makes recumbent bikes with a shell around them told us it took them a day to attach mirrors to the model of the shell. We could do something like that in minutes."

Leveraging the design data

Voerman and van Noordenne simulate many aspects of the bicycle's performance in software using the Solid Edge geometry in conjunction with finite element analysis

Solutions/Services

Solid Edge
www.siemens.com/solidedge

Customer's primary business

Challenge b.v. makes recumbent bicycles for racing, commuting and touring.
www.challengebikes.com

Customer location

Apeldoorn
Netherlands

Partner

Bosch Engineering

"We started becoming a more professional company after we got Solid Edge because it let us increase the level of complexity in our designs. With Solid Edge, we pushed our limits away and our bicycles became a lot more stylish."

Paul Voerman
President
Challenge b.v.

"Solid Edge gives us the complete range of functionality in one program."

Arjen van Noordenne
Design and analysis engineer
Challenge b.v.

Siemens PLM Software

Americas +1 800 807 2200
Europe +44 (0) 1202 243455
Asia-Pacific +852 2230 3308

www.siemens.com/plm



(FEA) and motion analysis programs. For FEA, they use the Femap™ and NX™ Nastran® finite element analysis (FEA) solution from Siemens PLM Software. FEA is particularly useful in removing excess weight from the bikes while making sure that the designs are strong enough to support a wide range of riders. Solid Edge also plays an important role in the weight-reduction effort by providing immediate feedback about the estimated weight of the product during the design phase. "It takes only one click of the mouse to get this information in Solid Edge," says Voerman. For motion analysis, they use the functionality that's built into Solid Edge to visualize the action of the chain and gears, for example.

One of the most valuable aspects of Solid Edge is its ability to turn CAD models into highly realistic-looking images. Challenge benefits from this both in house and in interactions with suppliers and dealers. One on project, for example, it was clear from looking at a Solid Edge model that a bike's fork needed to be longer. "It was a small amount, just three centimeters, but that extra length balanced the bike and was difference between 'beautiful' and 'just OK,'" explains Voerman. "We have



found that we can believe what the computer tells us. What we see in Solid Edge is very close to the real object." Realistic images are also used to improve the accuracy of communications with companies in the Far East, as well as to interest dealers in new products. "We make realistic images in Solid Edge, and it looks like the products already exist when they are still being developed," Voerman adds.

Perhaps one of the most important benefits of Solid Edge for Challenge is the effect it has had on the company's success in the recumbent bicycle market, which is highly competitive. "We started becoming a more professional company after we got Solid Edge because it let us increase the level of complexity in our designs," Voerman says. "With Solid Edge, we pushed our limits away and our bicycles became a lot more stylish."

© 2013 Siemens Product Lifecycle Management Software Inc. Siemens and the Siemens logo are registered trademarks of Siemens AG. D-Cubed, Femap, Geolus, GO PLM, I-deas, Insight, JT, NX, Parasolid, Solid Edge, Teamcenter, Tecnomatix and Velocity Series are trademarks or registered trademarks of Siemens Product Lifecycle Management Software Inc. or its subsidiaries in the United States and in other countries. Nastran is a registered trademark of the National Aeronautics and Space Administration. All other logos, trademarks, registered trademarks or service marks used herein are the property of their respective holders.
Z5 13718 2/13 B