ELLIPTIGO INC.

Giving the low-impact elliptical bike its "get up and go" with SolidWorks

EllIptiGO relied on SolidWorks design and simulation solutions throughout the development of the world's first low-impact elliptical bike.

Distance runners face a common dilemma: over time, the continual impact and pounding of running will lead to leg, foot, or hip problems. Marathoners, triathletes, and joggers face the possibility that the consequences of the very activity that they love will eventually require them to curtail their passion for running. That's the scenario that former Ironman triathlete Bryan Pate faced when he learned at age 32 that knee and hip injuries would limit his ability to run.

His doctor suggested cycling, but Pate had always found the bicycle saddle and riding position to be uncomfortable—not to mention the additional time required to obtain an equivalent workout. Instead, he turned to the low-impact elliptical trainer, which emulates the running motion without the constant impact of hitting the ground, to keep fit. Although Pate liked the exercise, he hated being restricted to a gym and thought about getting an elliptical trainer on wheels to use outside. The only problem was that no such device existed.

So Pate contacted his friend Brent Teal, also an Ironman triathlete, avid runner, and mechanical engineer, to discuss his idea for a low-impact, outdoor elliptical bike. In July 2005, the two sat down at a coffee shop in Solana Beach, California, sketched out a concept drawing on a newspaper, and shook hands. At that moment, EllIptiGO Inc. was born. Five years later, the company has sold more than 1,000 low-impact elliptical bikes.

According to Teal, developing the innovative, revolutionary product required hard work, determination, and access to advanced 3D design and simulation technology. "Without a 3D design tool, it would have been impossible to develop the EllIptiGO," Teal contends. "There was so much trial and error involved in engineering a completely new product that we needed a powerful design and simulation environment for iterating and gaining insight into our design."

Challenge:

Develop and commercialize the first-of-its-kind, low-impact elliptical bike, combining elliptical training with cycling technology.

Solution:

Use SolidWorks Premium software's design, visualization, and simulation tools to develop, refine, and produce the EllIptiGO low-impact, cross-training bike.

Results:

- Cut physical prototypes by an order of magnitude (1,000 percent)
- Supported development from concept through commercialization
- Reduced development costs
- Created revolutionary, first-of-its-kind product

SolidWorks

Teal had used both Pro/ENGINEER® and SolidWorks® 3D design software throughout his 15-year mechanical engineering career. He chose SolidWorks Premium software to develop the ElliptiGO because it is easy to use, provides the integrated design simulation and visualization capabilities needed to refine the concept, and supports manufacturing requirements.

"I knew that we would need to do a ton of iterations and analysis studies to get the design ready for commercialization and then support machining and production," Teal stresses. "SolidWorks simply provided the best set of tools for the job."

From garage to full-scale production

The first ElliptiGO prototypes were built in Teal's garage. In 2009, the partners quit their jobs to focus full-time on their new company. They realized that they were ready to build and market a product following their *Echo* prototype's performance in "The Death Ride," a grueling 129-mile bicycle race over the extreme terrain of California's Sierra Nevada Mountains, requiring climbs totaling 15,000 feet.

"The beauty of SolidWorks is that it allowed a small company with limited resources to develop the concept from the part-time, home-workshop stage through the ramp-up to full-scale manufacturing," Teal notes. "The tool allowed us to save money by doing most of the work to optimize the design in a virtual design environment."

Combining performance and aesthetics

Using SolidWorks Simulation, Teal conducted fatigue and strength analyses on the unique frame design as well as stress and motion studies on the bike's elliptical mechanism. By combining Simulation with SolidWorks collision detection and design visualization tools, Teal estimates that he reduced the number of physical prototypes required by an order of magnitude (1,000 percent), while simultaneously improving the overall performance and appearance of the ElliptiGO.

"We did hundreds of prototypes in SolidWorks on the computer," Teal recalls. "SolidWorks not only enables us to address engineering challenges, such as working through clearance and strength issues, but also helps us improve the bike's aesthetics. The software's surfacing functionality was very instrumental in creating the sleek, curvaceous lines of the custom frame, cranks, and carbon fiber drive arms used on the bike. The decal design and paint color visualization was also done in SolidWorks. For designing a product with the performance and visual appeal of the ElliptiGO, SolidWorks tools were invaluable."

Transforming an idea into a product line

Now that ElliptiGO has made its original idea a reality, the company intends to use SolidWorks tools to efficiently create an extended product line of different models to satisfy varying price points and to streamline interaction with manufacturing vendors.

"In addition to helping us refine the concept, SolidWorks software makes it easy to communicate complex design information in a high-production environment," Teal points out. "We anticipate that SolidWorks will continue to help us advance development and manufacturing as we extend our offering and increase our volume."

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Brent Teal
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With SolidWorks design and simulation solutions, ElliptiGO was able to conduct hundreds of design iterations to refine the bike's performance and improve its aesthetics.

ELLIPTIGO

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