CYCLES DEVINCI, INC.

Spinning virtual intelligence into bicycle design with SolidWorks Simulation

Using SolidWorks Simulation solutions, Cycles Devinci has realized significant productivity gains, while simultaneously increasing the number of innovative concepts it develops.

Making the steep, long climb from a fledgling company of two people in 1987 to becoming a major player in the bicycle industry, Cycles Devinci, Inc., has set its course on the use of cutting-edge product development methods. When company President Félix Gauthier purchased Cycles Devinci in 1990, he saw the company's potential and established an industrial manufacturing process that would lead to large-scale bicycle manufacturing. Today, Cycles Devinci has grown to become the top producer of bikes in Canada and a worldwide leader in the manufacture of high-end mountain and road bikes.

When the company moved into a large, modern production facility in 2001, its engineers explored migrating from 2D to 3D CAD tools as part of an effort to utilize the latest design technologies. Cycles Devinci had previously used Working Model® 2D, AutoCAD®, and Mechanical Desktop® design software, according to Bruno Gauthier, R&D department director.

"We wanted to take advantage of the power of 3D design to streamline and improve our product development process," Gauthier recalls. "In addition to accelerating time-to-market, we believed 3D would help us to leverage simulation and analysis tools not only to reduce the weight and improve the performance of our bicycle frames, but also to cut the number of prototypes needed."

"We are a fast-moving company of young people who are used to thinking in 3D," adds Philip Maltais, testing engineer. "So we needed to work in 3D to design more complex bikes, show concepts more effectively, and develop a virtual testing capability—utilizing finite element analysis (FEA) tools—to gain speed and boost performance.

Challenge:

Streamline the development of bicycle frames, while simultaneously reducing weight and improving performance.

Solution:

Implement SolidWorks Motion and SolidWorks Simulation capabilities in tandem with SolidWorks 3D CAD software to create a virtual test bench for bicycle frames.

Results:

- Shortened time-to-market from 18 to 10 months (44 percent)
- Decreased number of prototypes from three to one
- Reduced frame weight by an average of 25 percent
- Increased frame stiffness by an average of 30 percent

SOLIDWORKS

Cycles Devinci evaluated Solid Edge®, Autodesk Inventor®, and SolidWorks® 3D CAD software before choosing SolidWorks and implementing integrated SolidWorks Motion and SolidWorks Simulation software. The company selected SolidWorks because of its ease of use, 3D visualization capabilities, and simulation/analysis tools, which support the bike manufacturer's goals of reducing development costs and accelerating time-to-market. Cycles Devinci engineers also viewed the expertise of its reseller, SolidXperts, as superior.

Improving performance with virtual test bench

Using SolidWorks Motion and SolidWorks Simulation software, Cycles Devinci engineers created a virtual test bench, which enables them to simulate frame performance in software. With these studies, engineers modify and refine bike frame designs to achieve the optimal strength-to-weight ratio. This approach enables them to reduce the frame weight by an average of 25 percent and increase frame stiffness by an average of 30 percent, thereby producing lighter, stronger bikes.

"The combination of SolidWorks Motion and SolidWorks Simulation can do the same job as any of the big FEA packages at a fraction of the cost," Maltais stresses. "We have confirmed the accuracy of these analyses through actual testing. The results of the motion studies provide accurate loading conditions for conducting subsequent stress analyses. With load accuracy, we are able to increase and control fatigue life, while maintaining an acceptable factor of safety, allowing us to reduce frame weight and extend the life of the bike at the same time."

Reducing time and prototypes

Since implementing its perhaps: SolidWorks software-enabled virtual test bench, Cycles Devinci has realized significant productivity gains, while simultaneously increasing the number of innovative concepts it develops. With this capability, the company has reduced time-to-market for its bikes from 18 to 10 months—a reduction of 44 percent—and has cut the number of prototypes required from three to one, resulting in substantial cost savings.

"We have deployed the SolidWorks virtual bench test on all four of our product lines, which include road, mountain, and hybrid bikes, as well as the new BIXI Public Bike System in Montréal," Gauthier notes. "Our product development process has become faster and more cost-effective, and the quality of our bikes continues to improve."

Boosting innovation with BIXI

The design intelligence afforded by SolidWorks Simulation technologies has enabled Cycles Devinci to increase the number of new concepts it develops. One of its more innovative designs is the bike that is used in the BIXI Public Bike System in Montréal, a system of 300 bike stations with 3,000 bikes available for rental and use across the city. Riders can take a bike from one automated station and return the bike to any station. The design won the GOLD Best Product of 2009 Award in the Energy & Sustainability category of the prestigious Edison Best New Products Awards.

"We designed the BIXI bike, ran the virtual tests, and made adjustments prior to actually producing the prototype," Gauthier points out. "SolidWorks allows us to quickly take a product from design to production, even with an innovative project like BIXI."

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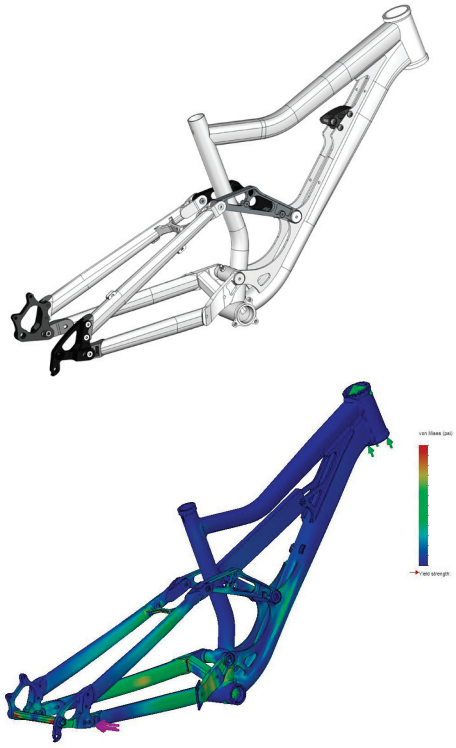
Philip Maltais
Testing Engineer



With SolidWorks Motion and SolidWorks Simulation software, Cycles Devinci engineers use a virtual test bench to simulate frame performance and optimize strength-to-weight ratios.

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