

## Versatile software supports versatile engineer

From high-end bicycles to complex machinery, Solid Edge supports the creative vision

BARDOU CONSULTING/XPREZO CYCLES



Siemens PLM Software

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### ► Business challenges

Support customers' demands for fast development of complex machinery

Design unique bicycles for the handmade, high-end segment of the market

### ► Keys to success

Modeling in Solid Edge® software

Using parametric modeling to quickly spin off variations

Building digital assemblies and finding interferences on-screen

Automatic updates of all documentation after design changes

### ► Results

Ability to turn creativity and passion into manufacturable bicycles

Three unique bicycles on the market and more to come

Faster machine design process; satisfied customers

### A passion for cycling; a talent for mechanical engineering

Hugo Bardou, a mechanical technician in Montreal, wears two hats – or maybe that should be one hat and one bicycle helmet. He owns two businesses: Bardou Consulting, which offers mechanical engineering services to companies in Quebec; and Xprezo Cycles, which designs and produces high-end, handmade bicycle frames. In the consulting business, Bardou helps clients develop large, complex machinery. The bicycle business is an outlet for his passion. “Designing bicycles and owning a bicycle company is a dream I have had since childhood,” he says. All production work for Xprezo Cycles is done locally (“I won’t go to Asian production,” Bardou asserts.) and his goal is to produce about 1,000 bicycles per year. Before an Xprezo cycle is released to the public, it is tested through a complete racing season by experienced cyclists.



The two businesses pose some similar and some different design challenges. The machinery Bardou designs for his consulting-business clients typically involves large assemblies with many interacting parts. Bicycle frame design involves some assembly modeling but brings aerodynamics and weight vs. rigidity considerations to the fore. In both businesses, Bardou uses Solid Edge to turn his (and his customers’) creative vision into real-world products.

### Moving from 2D AutoCAD to 3D

When Bardou started out, his CAD software was AutoCAD and he worked in 2D. This approach had limitations in both his endeavors. With large machinery, it was difficult to ensure error-free complex assemblies by reviewing sets of drawings. And when he had to change elements of a design, he had to make sure that changes were made to all related components and made on each and every drawing. With bicycles, the problem with AutoCAD came when Bardou wanted to adapt a frame design to fit different-sized riders. It was necessary to create a new set of production drawings for each frame size – a very time-consuming endeavor. A new bill of material had to be

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**Solutions/Services**

Solid Edge  
www.siemens.com/solidedge

**Client's primary business**

Bardou Consulting is mechanical engineering consulting business. Xprezo Cycles provides handmade, high-end mountain and cyclocross bicycles.  
www.xprezo.ca

**Client location**

Montreal, Quebec  
Canada

**“With Solid Edge, it’s harder to make mistakes.”**

Hugo Bardou  
President  
Bardou Consulting/Xprezo Cycles

generated for each size as well. Also, it was difficult to optimize a design using only 2D since it was difficult to visualize interacting components.

Working with solid models in Solid Edge solved these problems. In the machine design arena, Bardou combines solid models of individual components into digital assemblies, then views them on-screen to find interferences. This enables him to ensure an accurate fit before customers manufacture parts or assemble their machines. Compared to 2D, working in Solid Edge also allows Bardou to complete the work faster, which customers appreciate.

In bicycle design, a big advantage of Solid Edge is parametric modeling. “I can parameterize the frame and then change a couple of variables,” Bardou explains. “When the design is updated, all the production drawings are updated automatically. All the information needed to build the frame, including angles, cut lengths of raw material and so on are all changed at this same time. This is very fast and reliable.” Bardou also takes advantage of the ability to assemble a virtual bicycle on-screen and then move parts around to check for interferences. Solid Edge also allows him to model the complex curves that give the frame its aerodynamic shape.



**WUUU, hop and ultra hop**

Bardou is now selling three bicycles that he designed with Solid Edge. One is a double-suspension mountain bike called “WUUU” which is pronounced as one long word. “When you say it, ‘whoo-oo-oo,’ it’s the sound that a bicycle makes as it goes by on the trail,” he explains. A double-suspension frame consists of two triangles and is complicated to design. But otherwise, Bardou believes in simplicity. “If you build bicycles simply, they are more reliable,” he says. He has chosen to use both aluminum and steel in the construction of the WUUU frame. The front triangle is aluminum which was chosen for its light weight while the rear triangle is steel, for its rigidity. “Using steel made it possible to make the tubing in that area smaller, leaving more room for the tire,” Bardou adds.

Another frame is called the “Hop” which is for cyclocross. A cyclocross bike looks like a road bike but with wider tire. Cyclocross is a popular sport in Europe. Riders compete on a closed circuit (about three miles) that contains obstacles, so riders are hopping on and off the bike at times and carrying their bicycles over and around the obstacles. Thus, the name “Hop.” The Hop has a steel frame. The Ultra Hop is a cyclocross bicycle with an aluminum frame.

Bardou is currently designing two new bicycles in Solid Edge. The software assists him in this challenging endeavor by doing routine tasks (such as making production drawings) automatically, giving him time to focus on the creative part of the work. Solid Edge also helps him maintain accuracy, even while he is fine-tuning a design. “With Solid Edge, it’s harder to make mistakes,” he says. “When you change something it maintains all of the relationships for you and drawings update automatically. It is very helpful.”

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