

NX

## Firewire Surfboards

NX CAD technology drives custom surfboard design

### Industry

Consumer products

### Business challenges

Offer boards customized to surfers' preferences

Minimize CAD time involved in design

Preserve design integrity and performance

Maintain tolerances through multiple manufacturing steps

### Keys to success

Investment in technology and infrastructure

ShapeLogic's introduction of Siemens' NX design technology

Co-development, deployment of custom board design application

Sophisticated design-through-manufacturing environment

### Results

Automated design and manufacturing of customized boards based on stock models

Automated checking to prevent flawed design changes

**Online 3D customization system by ShapeLogic allows Firewire Surfboards' customers to interactively modify surfboards to their own specifications**

### Innovation opportunity

Firewire Surfboards began operating in 2006, the beginning of an era of technological upheaval and intense innovation in the surfboard industry. Late in 2005, a firm that had supplied nearly all of the foam blank core materials for surfboard makers went out of business, forcing the industry to experiment with new materials and manufacturing methods. Firewire Surfboards, in collaboration with an innovative West Australian board builder, tapped the expertise of its staff, many of them world-class surfing enthusiasts, to develop innovative board-making techniques through an extended trial-and-error process.

Before 2005, "the basic materials and assembly methods for surfboards had changed very little for 40 years," says Firewire Surfboards CEO Mark Price. Price explains that currently, refinements in surfboard shape can produce only incremental performance gains: "Exponential performance improvements can only be achieved with new materials and construction methods, which in turn will open up new design opportunities."

Firewire Surfboards' innovative technologies, processes and materials



have given surfers those performance gains and more – superior flex, maneuverability, durability, and environmental friendliness as well. The boards are constructed through proprietary methods, utilizing a combination of high-tech materials previously not offered by any other large-scale commercial surfboard manufacturer, including expanded polystyrene (EPS) foam, aerospace composites, epoxy resins, carbon rod suspensions and bamboo decks. The boards are lighter, stronger and more lively and responsive than traditional polyurethane foam boards. The innovative materials also emit only two percent of the harmful compounds of traditional boards – a fact that has earned the company international awards for environmentally safe products.

### Innovation in custom board design

One of Firewire Surfboards' biggest challenges is the preference of hardcore surfers for boards that are custom-shaped to order – made for them specifically, to

### Results (continued)

Automated calculation of custom board volume

Sustainability: innovative materials emit only 2 percent of the harmful compounds of traditional boards

Customer-driven designs: the "Holy Grail of the individual surfer's relationship to his or her equipment"

Brand elevation through technological leadership

**"NX is an excellent 3D CAD system for online customization."**

Bruce Pettibone  
Founding partner  
ShapeLogic



suit their individual styles and local wave conditions. "It's important for any premium, high-performance surfboard brand to offer custom boards if they want to be recognized as an industry leader," says Price.

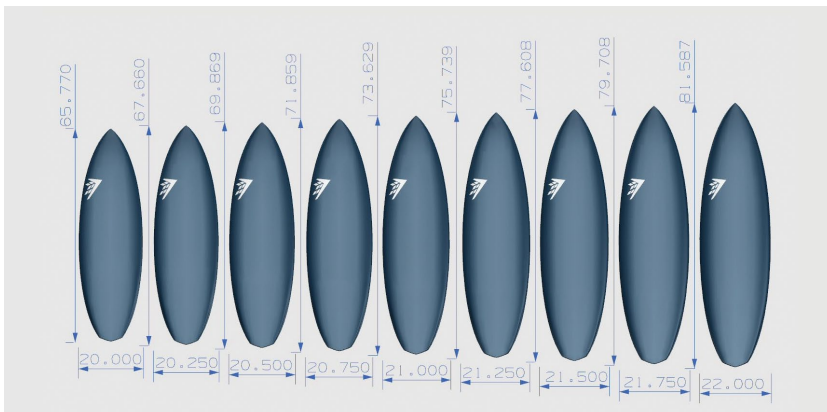
But due to the complexity of Firewire Surfboards' production processes and raw materials, custom board design placed an extraordinary burden on its computer-aided design (CAD) capacity. While the company was able to develop custom surfboards for its international team of surfers, offering custom designs to the market-at-large would have created an enormous CAD backlog and bottleneck.

What Firewire Surfboards sought was a cost-effective, easy-to-use tool that would enable customers to modify existing board designs, automate the behind-the-scenes CAD development, and feed the company's computer numerical control (CNC) manufacturing methods. "If you could go online, custom design your own board, visualize it from every angle, and all without the fear of creating something

that would not work, that would be the Holy Grail of the individual surfer's relationship to his or her equipment," says Price.

ShapeLogic, a Siemens PLM Software technology partner and channel partner, began developing sophisticated parametric models of surfboards at about the same time that Firewire Surfboards was formed. ShapeLogic had introduced Firewire Surfboards to NX™ software, the high-performance product development solution from Siemens PLM Software, but Firewire Surfboards had just chosen another CAD/CAM system. Price had the foresight at that time to suggest staying in touch – that perhaps they could work together in the future.

A few years later, ShapeLogic developed a new online customization solution using NX software. ShapeLogic's patent-pending solution, named ShapeLogic Design-To-Order Live! for NX, combines an internet-enabled user interface with intelligent parametric models and advanced 3D CAD tools to offer a direct-to-the-consumer customization system.

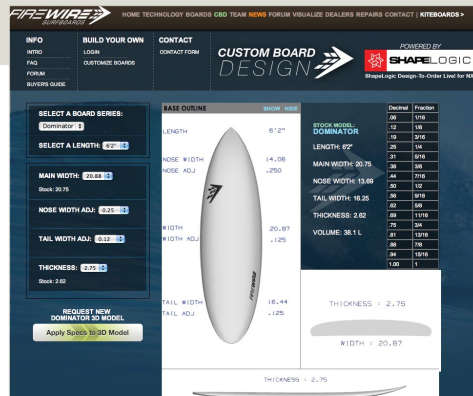


"NX is an excellent 3D CAD system for online customization," explains Bruce Pettibone, a 30-year CAD veteran and founding partner of ShapeLogic. "We made extensive use of the NX Open application programming interface with ASP (Active Server Page) scripting to create a dynamic, interactive web application."

Knowing that Firewire Surfboards had difficulty with customized boards, ShapeLogic approached Price in 2009,

proposing a web-based customization solution. ShapeLogic and Firewire Surfboards collaborated for more than a year to develop Firewire Surfboards' Custom Board Design (CBD) system. "We started with Firewire Surfboards' specific requirements, the needs of everyday surfers, and the company's knowledge of board design and construction," says Pettibone. "From there we used NX to develop parametric models of Firewire Surfboards' stock boards as the basis for customized designs."

"Before we developed the Custom Board Design system, most custom boards were ordered by submitting a piece of paper with various dimensions filled out," explains Price. "There was no way to see a visual representation of any requested adjustments, and no way to gauge the impact of those changes on the custom board's volume – perhaps one of the most critical specifications of any surfboard as the overall flotation directly affects paddling ability and performance. And we also had to ensure that customer-requested changes didn't compromise the integrity of the design to take out the 'fear factor' of literally designing your own board."

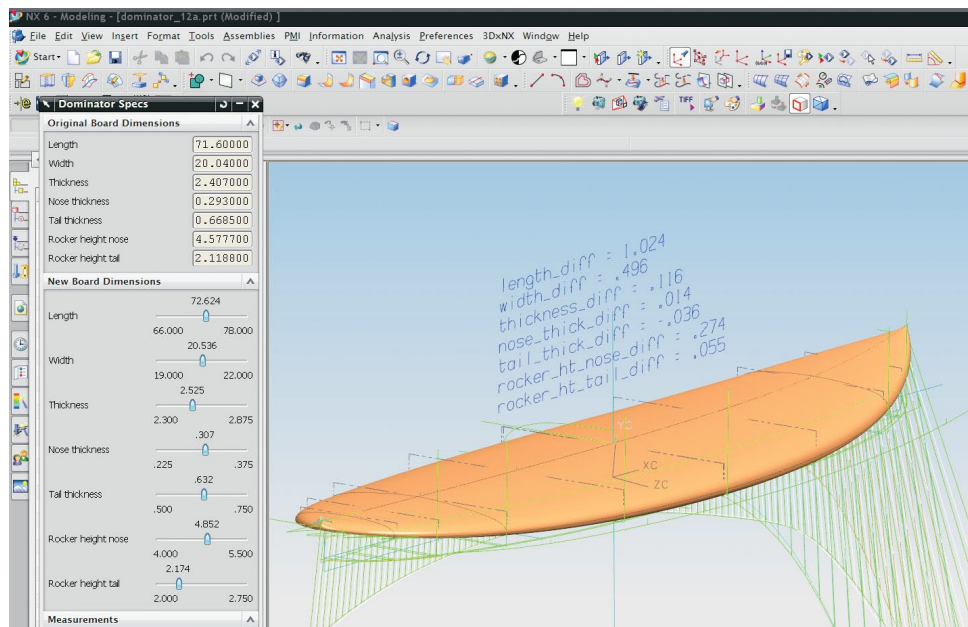


"The curves must be scaled selectively to preserve the complex interrelationships that affect performance. Without the powerful curve and surface design tools in NX, we couldn't have done it."

Bruce Pettibone  
 Founding partner  
 ShapeLogic

To meet this challenge, ShapeLogic employed the sophisticated freeform modeling tools in NX to precisely control the 3D models. "We embedded specific rules into the base parametric models that govern how the customer's dimensional changes affect the curves that define the board's shape," Pettibone explains. "The curves must be scaled selectively to preserve the complex interrelationships that affect performance. Without the powerful curve and surface design tools in NX, we couldn't have done it."

The Product Template Studio (PTS) in NX, a tool for creating re-usable design templates with custom interfaces, was ideal for prototyping the custom surfboard design-to-order system. Using drag-and-drop tools, ShapeLogic devised a simple user interface to drive the parametric surfboard





## Solutions/Services

NX  
ShapeLogic Design-To-Order  
Live! for NX  
[www.siemens.com/nx](http://www.siemens.com/nx)

## Customer's primary business

Firewire Surfboards provides Custom Board Design, allowing its customers to go online to customize a stock wire-frame model to their own specifications.  
[www.firewiresurfboards.com](http://www.firewiresurfboards.com)

## Customer location

Carlsbad, California  
United States

## Partner

ShapeLogic, LLC  
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*"If you could go online, custom design your own board, visualize it from every angle, and without the fear of creating something that would not work, that would be the Holy Grail of the individual surfer's relationship to his or her equipment."*

Mark Price  
CEO  
Firewire Surfboards

models. This interface served as a template for creating Firewire Surfboards' web-based interface. Use of PTS also facilitated testing of multiple parameter combinations to ensure the robustness of the models.

## Shaping the future of surfboard design

Firewire Surfboards' Custom Board Design system enables registered customers to select models from Firewire Surfboards' standard surfboards, and then alter the design with their own dimensions. CBD users can tweak the board's length, wide point, nose and tail width, and thickness to tailor the board to their preferences.

The output of the CBD program is a 3D portable document format (PDF) file that includes the custom board model, as well as the 3D design of the stock model used as the base design. All board dimensions and the board volume are documented in the PDF file. Customers can manipulate the models from all angles with a variety of viewing, lighting and rendering options, and easily compare the customized board model to the standard board. In addition, the customer can download a 3D model file in JT™ data format, the de facto lightweight model format developed by Siemens PLM Software. By providing 3D models, data and PDF files, Firewire Surfboards can ensure that customers fully understand their designs before placing orders.

When the customer orders a custom board with CBD, the system generates a precise CAD solid model of the board that is sent directly to Firewire Surfboards' factory, where it is used to drive the CNC machines that manufacture the board. The precision of the 3D model makes it possible to machine custom boards to about 97 percent of their net shape, which



minimizes the required finishing processes, manufacturing time and costs.

In addition to allowing customers to review their custom designs, the 3D output file lends itself to social networking: the customer can share it with friends, discuss it, solicit input and much more. The "social cloud" that this attractive file generates becomes a highly viral marketing channel that engages not only the original customers, but also their friends. With lead generation costs constantly escalating, and marketing becoming increasingly filtered by social influence, this social and viral behavior provides a further return on the investment of setting up the system. Firewire Surfboards' customer testimonials reflect that the output files created using NX enable a level of social interaction around board design that was impossible before.

## Shaping the future of product customization

ShapeLogic Design-To-Order Live! for NX is applicable to numerous other product categories. With working prototype systems already producing custom products in the golf industry, the system can be adapted to other sports equipment, such as bicycle frames and hockey stick blades, as well as products in the automotive and medical fields, and any product for which an intelligent parametric model can be built. Such systems can be designed for business-to-consumer or business-to-business applications.

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[www.siemens.com/plm](http://www.siemens.com/plm)

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