LAND ROVER BAR

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Siemens PLM Software and Land Rover BAR

History shows the odds are stacked against any new entrant winning the America's Cup, but Land Rover BAR refuses to consider the past prologue. The Land Rover BAR team under the command of Sir Ben Ainslie – a five-time Olympic medalist (four of them gold), an America's Cup winner and perhaps the most decorated British sailor since Admiral Nelson – is squarely focused on bringing home the America's Cup for the first time since 1851. The 2017 America's Cup will be held in June on Bermuda's Great Sound.

With this objective, Land Rover BAR is developing high-performance catamarans at its United Kingdom (UK) headquarters in Portsmouth, England, relying on a broad selection of Siemens PLM Software technologies.

In the middle of 2014, the Land Rover BAR team began a two-and-a-half year timetable to design, evaluate and verify an America's Cup Class wing foiled catamaran. By the start of 2016, Land Rover BAR had already built an overhauled AC45 class catamaran to compete in the America's Cup World Series. The experience gained in developing this boat was vital for becoming a competitive America's Cup contender.

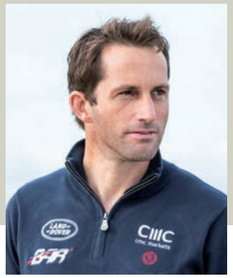
Since teams are not allowed to launch their America's Cup Class catamarans until 150 days before the 2017 America's Cup Qualifiers, each team must have complete confidence in their boat. To compete successfully, Land Rover BAR must be able to modify designs and make or acquire new parts rapidly in order to conduct reliable performance testing and refine developments prior to the final launch of the America's Cup Class boat in December, 2016.

For Land Rover BAR, the only choice for meeting this deadline was to adopt an integrated virtual environment for digital modelling and simulation tools consisting of NX™ software, Teamcenter® software, Femap™ software and the Fibersim™ portfolio of software for composites engineering. They are all from Siemens PLM Software and offer comprehensive capabilities for managing the product lifecycle. These tools are being used in conjunction with computational fluid dynamics (CFD) analysis tools from CD-adapco STAR-CCM+ software.

As a result, the simultaneous analyses of structural parts save time and the simulation of complex composites avoids potential damage. This synergistic environment enables the team to develop an optimal design process for 3D printing and a clear markup for manufacturing that ensures accuracy. The team enhanced its efficiencies by operating in a single virtual environment and using tools that support innovation and continuous improvement, facilitating a nimble response to changes made by competitors.

"The Siemens PLM Software systems really enable us to collate our ideas and make sure they are put into practice. That's why we wanted to use Siemens PLM Software, and we've been extremely impressed with the progress we've made so far."

Sir Ben Ainslie,
Land Rover BAR,
Team Principal and Skipper



Reaching the pinnacle of sailing technology

Siemens PLM Software is a world-leading provider of product lifecycle management (PLM) and manufacturing operations management (MOM) software. We help thousands of companies realise innovation by enabling them to optimise their processes, from planning and development through manufacturing, production and support.

Performance differentiation in sailing is usually created by shaping a hull to reduce drag; enhancing the way in which keel and rudder systems create a righting moment; and using the sails for maximum thrust, keeping aerodynamic considerations in mind.

Siemens PLM Software solutions enable Land Rover BAR to quickly analyse multiple geometric options and reliably find the best balance of speed and stability.

"Generating geometries quickly and easily is fundamental because every question we ask ourselves starts with geometry," says Andy Claughton, chief technology officer of Land Rover BAR. "The ability within the NX system to use scripts and produce hundreds of CFD geometries at the press of a button is immensely powerful."

The design team must produce a light and efficient system that can cope with enormous loads yet remain within the margins of safety. For Land Rover BAR, the use of Siemens PLM Software solutions is critical for simulating the performance of the daggerboards; evaluating the aeroelastic capability of the wing; defining the behaviour of composite materials; modelling the hydraulic systems; optimising development processes and streamlining workflows.

Land Rover BAR represents an ideal partner for Siemens PLM Software. Continuously pushing the software's limits in an effort to improve performance, the team consistently drives its products to the highest level of innovation. The cooperation, in turn, serves as a unique showcase for Siemens PLM Software to highlight its ability to supply customers with invaluable data and metrics for the development of future products and solutions for other industries.

In light of current sustainability trends, Siemens PLM Software also understands its engagement with Land Rover BAR can help serve as a source of innovation throughout its business by creating invaluable synergies with other business activities. Siemens PLM Software is proud that as a result of its work, Land Rover BAR has significantly improved the stability and safety of its boats, complying with the strict regulations of the America's Cup. Meanwhile, designers who were once bogged down in performing tedious and repetitive portions of the design process have regained a substantial amount of time to deal with more value-added tasks.

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Andy Claughton,
Land Rover BAR,
Chief Technology Officer

Realising innovation with Siemens PLM Software

A racing catamaran is the product of great innovations; not just the big ideas, but the thousands of smaller innovations that lead up to the greater whole. Anyone can make the enhancement that makes the difference between winning and losing. It could be the design engineer, the skipper or the stress analyst. The Siemens PLM Software vision of realising innovation is to give everyone involved in the development of processes a clear view of the digital product and associated technical information needed to make optimal performance decisions. Siemens PLM Software has built an immersive decision-making environment in which people don't search for information; the information finds them.

And they don't have to interpret information because it comes in a context that they readily understand.

By delivering intelligently integrated product and process information at exactly the right time, in the right context and with the right level of detail, Siemens PLM Software helps the sailing team achieve a new level of productivity, make smarter decisions and deliver great results:

Innovate more – Sailors and shore crew are able to access PLM design data from tablets and phones to streamline processes and speed development.

Move faster – Finite element analysis (FEA) loops have been reduced to 20 seconds each, enhancing their ability to audit last-minute part changes during competition.

Be compliant – Noncompliant components and conditions are avoided by fully addressing regulations and requirements.

Get optimised – Automatic scripting generates multiple geometries for a thousand different hulls overnight.

Go global – By using PLM to establish a highly secure, real-time digital environment, the team can unite individuals in a distributed organisation and maximise the advantages of a global platform.

To establish an effective PLM digital backbone, the information technology (IT) strategy must be built on a coherent data structure that enables real-time virtual collaboration and data sharing. Siemens PLM Software unites the work of functionally or geographically separated teams in a single shared environment to ensure efficient communication and reliable exchange of product and process information.


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Engineering Process Management
Mechanical Design
Lifecycle Visualisation
Digital Product Development
Bill-of-Materials Management
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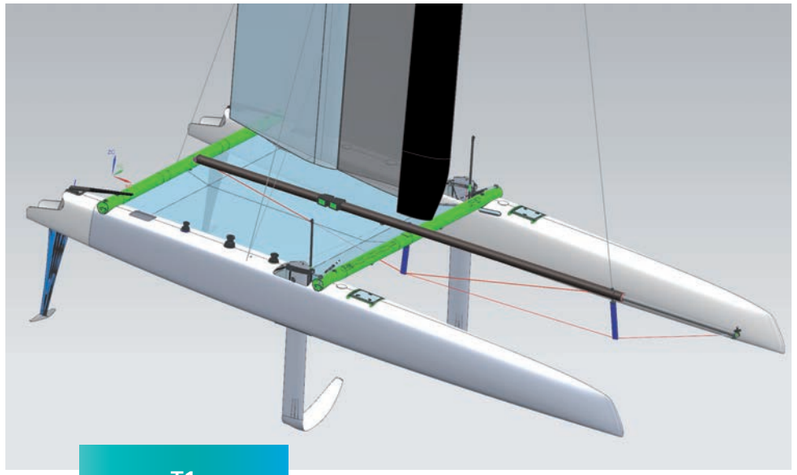

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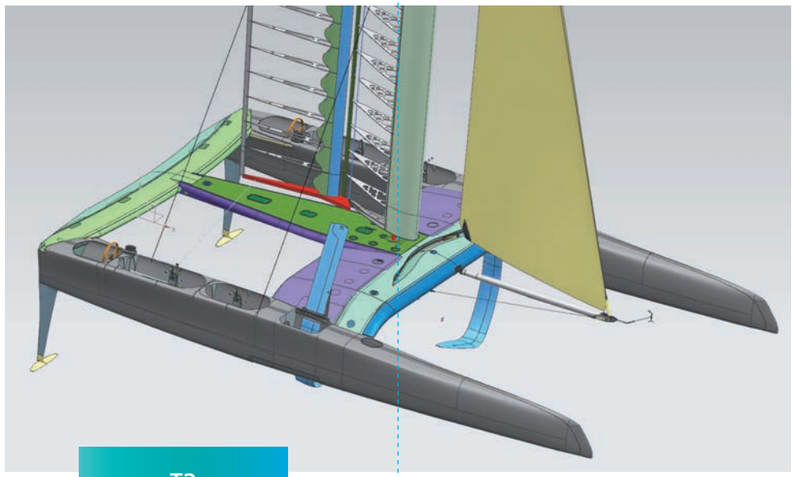

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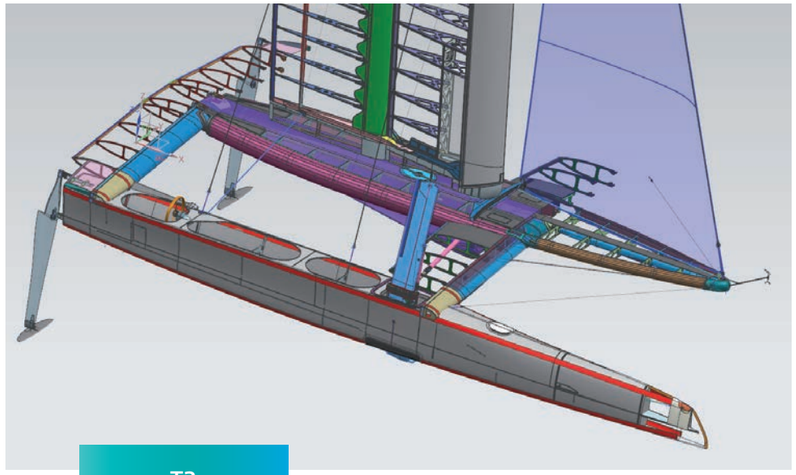

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Providing a comprehensive development process

Designers need to analyse every part upfront in order to maximise both performance and reliability. From the early stages of the design process, the Land Rover BAR boat has been developed entirely using Siemens PLM Software based on functional requirements and regulations. Using NX facilitates interaction between the sailing and engineering teams. The bulk of the design, analysis and performance testing must be completed on much smaller scale digital-simulation models and on AC45 class catamarans, which are used for America's Cup World Series races.

Experience in these tests allows sailors to think about where they want items such as controls and foot chocks to be positioned in future test boats. The design team can respond to these requests in 3D immediately.

The digital lifecycle management and visualisation capabilities of NX and Teamcenter together with the CFD analysis tools from CD-adapco facilitate a comprehensive development process from concept to putting the boat in the water.

Land Rover BAR designers use NX and Teamcenter to streamline processes and speed development, one of the keys to their success. Using NX scripting makes workflow customisation possible, while Teamcenter enables the team to manage all technical data and documentation. Siemens PLM Software solutions facilitate complex, integrated design and analysis iterations that open up new levels of performance in a speedy generation of possible shapes so that sailors and shore crew can readily access design data from a tablet or phone.

All this work behind the scenes is done for a variety of reasons: Safety; reliability; speed of assembly and to achieve/audit last-minute part changes during competition.

This is all managed within the digital lifecycle management and visualisation capabilities of Teamcenter. The fully integrated Siemens PLM Software solutions provide an integrated design-to-manufacturing environment, setting the stage for a highly competitive and innovative racing boat.

Teamcenter holds it all together

Using Teamcenter enables Land Rover BAR to engage all parts of their business in the introduction of a successful new America's Cup catamaran. Integrated idea capture and management, real-time engineering collaboration and project management tools are combined with industry-leading product design and development solutions in a single shared source of product and process knowledge.

Land Rover BAR uses Teamcenter to achieve control of the entire development process, from computer-aided design (CAD) through simulation and issuance of drawings ready for manufacture and installation. The aim is to build a complete and up-to-date design profile; a fully serialised boat with all components linked to a service schedule that shows how long they have been in use and how well they have performed. Teamcenter is intended for shore support so that floor staff can enter queries and data as they track test performance or manufacture a part. The intention is to readily keep track of the sailing configuration and know which parts have been taken out, making maintenance easier for the crew.

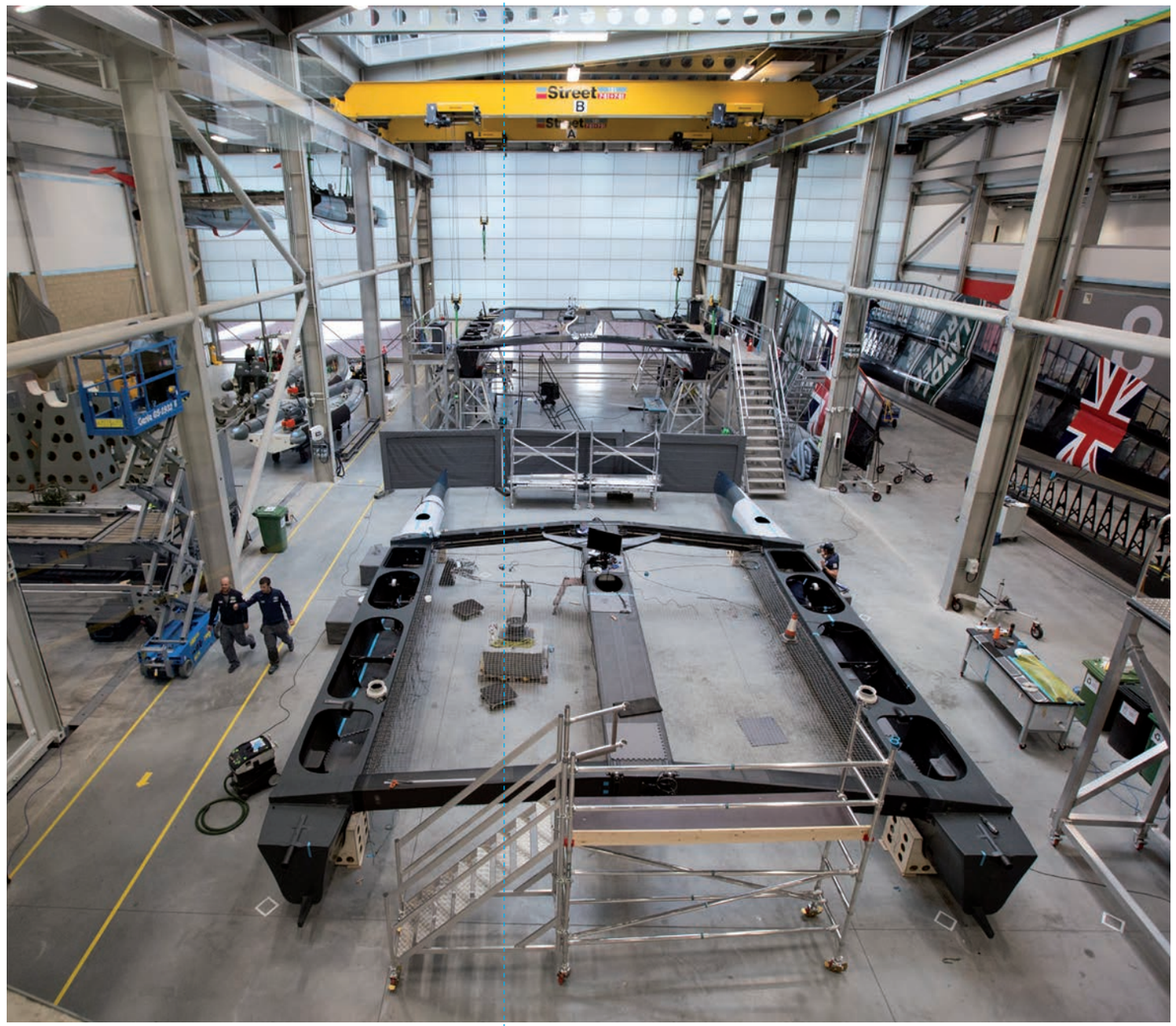
Teamcenter is used not only to manage the complete product definition and revisions as the boat is developed, but also to manage the process of introducing changes. It maximises the power of product and process knowledge to drive productivity and innovation.

NX covers the waterfront

NX is a leading choice for primary design and engineering. It transforms the entire product development process by enabling Land Rover BAR to reduce physical prototyping, improve quality, shorten cycle time and deliver more innovative products. Design engineers can reference other areas of responsibility as they create the digital boat, using the PLM system to control access and manage geometric and non-geometric data.

During the sailing competition, as modifications to the boat are ordered, designers revise the digital model and review a 3D image of the changes with the team's senior technical management. Digital data drives in-house manufacturing machines to produce new and redesigned parts. Outside part suppliers also work from digital data. The modelling capabilities of NX help to make sure that defined geometric relationships, such as those required by regulations, are maintained as design modifications are considered.

NX is the industry's only unified solution that addresses every aspect of product development from concept ideation to manufacturing.



Supporting sustainability

In such a highly-competitive endeavour, creating the right environment for productivity is essential. In today's world, where resources are scarce, minimising the environmental impact of business activities is not an option; it is a necessity. Therefore, Siemens PLM Software's innovative solutions are designed to create the highest levels of sustainability, energy efficiency, safety and comfort.

Siemens PLM Software solutions are helping the Land Rover BAR team to also meet their environmental goals by working efficiently with suppliers and improving their development and prototyping processes, thus minimising material waste. By understanding exactly what has gone into the boat, the team can work out what to do with all the components at the end, re-using and recycling material in order to drive down the carbon footprint of the boat.

"The Siemens PLM Software systems really enable us to collate our ideas and make sure they are put into practice," says Ainslie. "That's why we wanted to use Siemens PLM Software, and we've been extremely impressed with the progress we've made so far."

For more information about our partnership with Land Rover BAR or our products and services portfolio, please contact:

Siemens plc
Sir William Siemens Square
Frimley
Camberley
Surrey
GU16 8QD

www.siemens.co.uk/plm
info.cc.uk@siemens.com

siemens.com/plm