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SETTING SAIL WITH DIGITAL TWINS

ALTAIR GIVES THE LUNA ROSSA PRADA PIRELLI TEAM AN EDGE IN THE AMERICA'S CUP

About the Customer

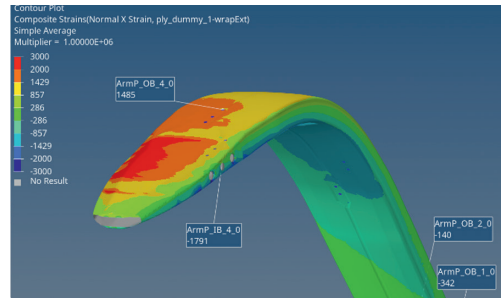
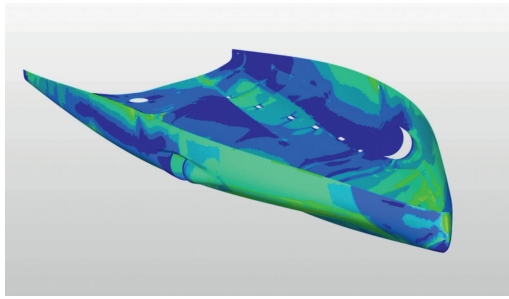
First held in 1851, the America's Cup (AC) is the oldest competition in international sport and one of the most respected sailing competitions worldwide. One of the competitors in the upcoming 37th America's Cup (AC37), taking place in Barcelona from August to October 2024, is the Italian team Luna Rossa Prada Pirelli, who have already participated in five prior AC competitions. The team has experience with Altair solutions, as they leveraged the Altair suite to build the best possible boat in the "AC75" foiling boat class for the 36th America's Cup – presented by Prada (AC36). However, in the AC36 competition, the team only leveraged Altair simulation tools.



Altair's simulation, HPC, and data analytics solutions supported us and helped us optimize our work on the boat's structure like never before. These cutting-edge upgrades and technology are key to Luna Rossa's design process.

Alessandro Franceschetti,
head of structural engineering,
Luna Rossa Prada Pirelli

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LEFT: Altair solutions for a detailed composite structural analysis helped the Luna Rossa Prada Pirelli team improve the design. **RIGHT:** Using simulation, HPC, and data analytics tools in the development process the engineering team quickly identified components with the highest potential for optimization.

In the AC37, Luna Rossa Prada Pirelli is taking innovation to the next level by using the full spectrum of Altair's technologies – alongside in-person Altair engineering experts – to ensure they're getting the best results possible with a strong focus on structural simulation and high-performance computing (HPC).

Their Challenge

Each edition of the AC follows a special protocol in which the defending team has the freedom to establish the venue and boat class rules. For the AC37, teams must use an updated version of the AC75 racing yacht, first utilized in 2021. Another key point in the AC37 protocol is cost reduction, which includes limitations on the number of foils and other boat components that can be used. All competitors and their boats must comply with these rules to ensure an even playing field. Since the Luna Rossa Prada Pirelli team already built a revolutionary AC75 boat for the AC36, their goal was to identify new areas they could improve to achieve significant performance gains. To identify these opportunities and get ahead of the competition, the team needed to employ a holistic suite of advanced technology that would give them unparalleled insights.

Our Solution

Luna Rossa Prada Pirelli worked closely with both Altair's solutions and on-site experts. The team used Altair's structural simulation tools as they did for the AC36; but for the first time, they were able to take advantage of on-site engineering support. This provided an additional layer of expertise and expanded their technology scope to include HPC.

Leveraging Altair's cutting-edge HPC tools in the development process helped speed up the component screening process to identify components with the highest potential for optimization. HPC tools enabled the team to perform many different optimization tasks at once instead of having to submit one job after another. Based on the optimization results obtained faster thanks to HPC, the team identified the best component candidates in a fraction of the time compared to what was previously needed. For later development phases, HPC might also be applied when working with data analytics tools to quickly process the vast amount of data collected from real-world trial runs, which drastically sped development and optimization.

In addition to HPC, digital twin solutions also helped the Luna Rossa Prada Pirelli team improve their boat. In a four-step digital twin concept, the team created a virtual representation of the entire boat, which helped them monitor the entire system in real time and create maps of critical areas. Via boat-mounted sensors, the digital twin provided the team with real-time information on the entire state of the boat – dubbed its "virtual structural health" – empowering them to review and improve upon the existing structure.

Results

Altair's advanced solutions – along with in-person, on-site expertise – helped the Luna Rossa Prada Pirelli team improve the design of the boat they will use in the AC37. Reduced simulation time freed engineers to conduct more simulation analyses, which helped them improve more parts and find the optimal boat design much faster than before. Thanks to a faster, more streamlined development cycle – enabled by Altair solutions and experts – the Luna Rossa Prada Pirelli team gained a competitive edge and looks forward to success in the latest edition of the America's Cup.

To learn more, please visit altair.com/hpc-cloud-applications