

case study

Alex Thomson Racing

Developing a Carbon Composite Coach Roof

Alex Thomson Racing required a team of composite material design and manufacture specialists to bring their expertise to a number of areas of the IMOCA Open 60 yacht. A key component that required attention was the development and production of the yacht's sliding coach roof. The coach roof is designed to offer Skipper, Alex Thomson protection from waves crashing over the deck while still allowing him to sail the boat to its full potential while remaining highly robust and lightweight.



solution

To achieve the design goals of this project, simulation and optimization experts at Altair ProductDesign worked closely with its development partner and composites specialist, Caterham Composites. The team were provided with a limited budget and material options and the project required completion within a tight timeframe to fit into the overall refit and training schedule.

To achieve the weight and performance targets set by Alex Thomson Racing, Altair ProductDesign utilized Altair's HyperWorks simulation suite to conduct a two step optimization process, with a free size and a size optimization of the roof. In the first step, the free size optimization, the optimum shape and location of the ply patches are determined, essentially answering the question: which fiber angles are required where in the structure? In the following step, size optimization, the optimum thickness for the previously found ply patches were discovered. The results of these studies were used to inform the manufacture of a new composite coach roof which met performance targets but without adding unnecessary material and weight.

result

The final roof design suffered no failures in any load case at a total mass of 36kg, while working to exactly the expected and required stiffness. It provided shelter from the waves without limiting the physical capabilities of Alex when sailing the yacht. Due to the work completed with HyperWorks and the experience of the Altair ProductDesign and Caterham Composites engineers, the design was right the first time. The roof was designed, optimized and produced all within the given timeframe.