



# DATA ANALYTICS PROPEL SAILING GLORY

## AMERICAN MAGIC TEAM TAPS ALTAIR'S DATA ANALYTICS TOOLS IN THE QUEST FOR AMERICA'S CUP GLORY

### Background Information

Dating back to 1851, the [America's Cup](#) is the oldest trophy in international sport, and is the most difficult, most prestigious race in competitive sailing. Though sailing technology is ancient – possibly dating as far back as 5500 B.C.E. – modern competitive sailing vessels are a far cry from their leisurely ancestors. Today's cutting-edge craft, such as those featured in the America's Cup, can reach speeds of more than 55 mph in ideal conditions. To streamline development, test designs, and perfect performance, competing teams depend on top-of-the line [data analytics](#) technology in their quest for victory.

### About the Customer

The [New York Yacht Club](#) (NYYC) is older than the America's Cup competition itself, boasting a 180-year history that stretches back to 1844. The NYYC is also the winningest team in America's Cup history with 25 titles to their name – far more than any other competing team. In the 37th America's Cup, taking place in Barcelona, Spain throughout the latter half of 2024, the NYYC's [American Magic](#) team is searching to add title number 26 to the organization's trophy case and etch their name into the history books once again.

### Their Challenge

America's Cup teams must adhere to a myriad of design rules and limitations to ensure reasonable competitive parity. Most notably, teams are only allowed to build a single AC75 yacht for the entire three-year development cycle. They also have limits on how many components they can develop (hydrofoils, masts, sails, etc.). In addition, teams aren't permitted to perform most types of physical testing at a scale beyond 20 feet, meaning they can't use 1:1 physical testing environments like wind

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or water tunnels. Creating a yacht that maximizes on-the-water performance while staying within the rulebook is a delicate, effort-intensive task.

To equip their experts with best-in-class data analytics capabilities, NYYC and the American Magic team turned to [Altair](#). More specifically, they looked to harness the power of [Altair® RapidMiner®](#), Altair's data analytics and artificial intelligence (AI) platform. As American Magic's Andrea Mannarino, manager of AI and machine learning, put it, "Data analytics isn't something that's a luxury for teams competing in the America's Cup - it's a must-have tool in the toolkit." The goal for the American Magic team was to use Altair's data analytics solutions to find correlations and patterns within the data the team gathers from a variety of sources, such as sensors. From there, the team wants to take the raw data and transform it so that it's understandable and actionable for the team's designers and engineers. This is what propels design innovation and gives them a competitive edge.

But data analytics isn't always straightforward, especially in modern competitive sailing. In past eras, extensive quality data in sailing was hard to come by. But now the opposite is true - as sensor and simulation technology has improved, teams often find they have too much data than they can make sense of. But not having quality data analytics isn't a competitive option, as Mannarino explained. "The simulations can't tell you everything. When you put the yachts in the water, there's always something that physics and theory doesn't bring to the picture." As such, in their quest for America's Cup glory, American Magic turned to Altair's industry-leading data analytics solutions.



As seen here, America's Cup yachts appear to "fly" off the water when they reach racing speed.

### Our Solution

Within the Altair RapidMiner platform, the American Magic team benefitted greatly from [Altair® Knowledge Studio®](#), a powerful, easy-to-use machine learning and predictive analytics solution that rapidly visualizes data and quickly generates explainable results - without requiring a single line of code. Knowledge Studio brings transparency and automation to machine learning with features such as AutoML and explainable AI without restricting how models are configured and tuned, giving users control over model building. During the American Magic team's development and testing phases, they aimed to compare trends and correlations in data gathered from real-life runs to data generated from simulation runs and identify the overlap (or lack of) between the two datasets.

"Every time we take the yacht out and run tests, we want to see straight away how the data looked and what information we can extract from those sessions," Mannarino said. "For example, if the team changes the design of a foil, we'll run simulations on it to predict its performance. From there, we'll test it on the water and gather real-time data. Altair's technology helps us spot not only the discrepancies between the data, but also those discrepancies' potential causes. This helps us optimize our designs and solve problems."



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Andrea Mannarino, manager of AI and machine learning, NYYC American Magic

In addition to Altair's technology, the American Magic team also collaborated closely with Altair's data analytics experts to ensure their solutions and processes were optimized. Mannarino credits the teams' collaboration as one of best parts of the journey to Barcelona. "The collaboration with Altair has been very positive throughout the development cycle," he said. "The Altair team has been very proactive, which is key because every team needs a great technical partner. The America's Cup is an extremely competitive environment, so any edge a partner can bring goes a long way in helping us meet our goals."

## Results

The Altair and American Magic teams' dedication to success and proactive collaboration drove next-level insights and helped the American Magic team achieve their goals in all stages of product development.

Notably, Knowledge Studio capabilities were used to clean and prepare the data for the modeling phase. The team used some exploratory data analysis (EDA) techniques to streamline the input variable to the model. Measure of predictive power (MPP) parameters helped reduce the number of input variables from over 3,000 to just 32 potential predictors. The refined set of input variables allowed the team to pinpoint the primary contributors to boat speed across various sailing segments, including maneuvers. The final predictive model used within Altair® HyperStudy® optimized the vessel performance metrics by finding the best possible yacht setup to approach straight line segments and maneuvers, providing benchmarks for both the team's real time simulator and its sailors, advancing towards prescriptive analysis.

Overall, Altair's unique blend of technological and domain expertise was a pivotal part of the American Magic team's development, and helped the Altair team hit the ground running on whatever task the American Magic team needed assistance or advice with. "There was never a time where we had to catch the Altair team up, or where they weren't able to work on a project we gave them," Mannarino said. "During the run-up to the final stages, there's always a lot going on, a lot of people pulling in the same direction but from very different angles. But that's what makes it so fulfilling seeing it all come together. Every day is exciting, because we know we're building for something bigger, something that will allow us to test ourselves on the world stage."

To learn more, please visit [altair.com/american-magic](https://altair.com/american-magic)



Known as the "Auld Mug," the America's Cup trophy weighs nearly 31 pounds and is the most coveted accolade in international sailing.