

**FLAWLESS DATA AND
VIDEO TRANSMISSION
AT THE 36TH AMERICA'S CUP**

|| CASE STUDY



|| PIDSO



PIDSO

HIGH PERFORMANCE ANTENNA SPORTEVENT SOLUTION CASE STUDY

The America's Cup – Highlight of International Sailing Sports.

For more than 170 years, the event has captivated fans worldwide.

„Formula 1 on the water“ combines innovation, technology and athletics. That's what it takes to win the coveted „Auld Mug“, the oldest trophy in international sport.

PIDSO's innovative systems ensured flawless data and video transmission for the AC75 racing yachts at the world's oldest and most prestigious sailing regatta.

In March 2021, Auckland's Hauraki Gulf, New Zealand saw the 36th start of the America's Cup with the AC75 class racing yachts, whose novel hydrofoil system enabled speeds of up to 100km/h over water. Hostbroadcast partner Circle-O was commissioned in an international tender to implement the technology concept for the entire Cup.

In addition to innovative camera solutions and audio systems, the 360° concept also includes the entire communications equipment, including antenna and high-frequency technology on the water, on land and in the air. Thanks to its core competence of the latter task areas, the family member, antenna specialist, PIDSO was commissioned with the development, production and integration of various systems by Riedel Communications.

The high-tech event thus featured several technical innovations, with technology solutions from PIDSO, Riedel and host broadcaster Circle-O. The special requirements of the event posed enormous challenges for everyone involved.

THE CHALLENGE

This mega project presented several challenges all at the same time.

One of them was that the entire team of all the companies involved had never before outfitted an event as big as the America's Cup. In addition, they entered new territory, as broadcast technology, race management, event and broadcast technology on boats was a novelty for everyone.

In realizing and implementing these technologies, they strove to establish a unique concept that meaningfully connects all stakeholders across the entire project. This involved the technology on the boats via technology on land, where they created a new system in a unique and effective manner – the proposed 360° concept.



■ WIRELESS SIGNALS ONLY

One of the biggest challenges was that there were only wireless signals in the entire TV production – there was not a single camera tied to a cable. At the same time, one hundred percent system reliability had to be guaranteed, which was crucial for the broadcast technology to guarantee image and sound reception on land, as well as crisis-specific communication. The broadcasting technology was also of vital importance for the umpires, since they needed it to issue penalties on the water, for instance in the case of a false start or when the course boundary was crossed.

■ LIMITED WEIGHT AND SPACE BUDGET

The limited weight and space on the boats presented another challenge for the broadcast technology. The top of the mast was the only available area for placing all the broadcasting equipment. Because of this, there was barely an area of 40x40 centimeters for the antenna system.

EXTREME MECHANICAL STRESS

The mechanical stress on all the equipment was enormous, partly because of the environment and partly because of the range. The races for the 36th America's Cup were contested on one of five different race courses, depending on wind conditions. To be ready for all racing courses, the radio system had to cover an area of 20 by 20 kilometers and function flawlessly despite the enormous vibrations of the boat and the salt water.



USING NEW RACING YACHTS – NO TESTING OPPORTUNITIES

As well as all this, at the time of the development of the Race Management System and the transmission technology, the new AC75 racing yachts had not actually been built or even planned out completely, i.e. Circle-O, Riedel and PIDSO started their respective developments totally in the dark.

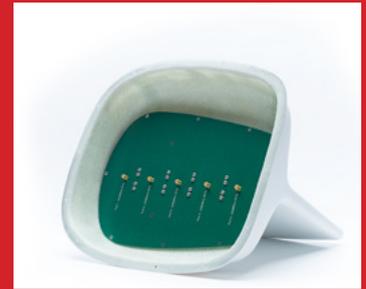
In the case of antenna and radio frequency technology, this meant that it was not possible to validate the complete system due to the lack of a test carrier for testing the system. The antenna could only be simulated in advance to a certain extent – so there was not much room for error and the developed antenna system had to work on day X.

THE SOLUTION

The initial situation for the implementation of the 36th America's Cup was an enormous challenge for the whole team. With creativity, dedication and the courage to try something new, they managed to come up with unique solutions for a unique event.

PIDSO was responsible for the communication equipment of the media system, i.e. for the antenna and radio frequency technology on the AC75 yacht.

At the centerpiece of the media system was the unique masthead antenna, which was developed, designed and built in-house by PIDSO. The newly developed antenna covered the entire video and telemetry data transmission. In this tight installation space, decoupling between the antennas must be kept at a maximum. To avoid interference, it was ensured that the corresponding signal paths were filtered in the process.



Masthead antenna

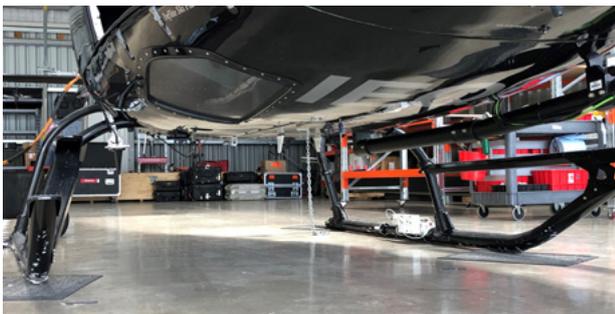
To ensure a stable connection over the enormous range of 20 by 20 kilometers, a video system with a relatively powerful transmitter on the boat was used, as well as a simultaneous mesh-capable telemetry system operating at different polarization levels.





■ In order to complement the mesh system, PIDSO's masthead antennas were also installed on the **video helicopters** and the **umpires' boats**, ensuring that all race participants were provided with the same information at the same time.

In this way, the masthead antenna is unique, firstly because it's a dual polarized space diversity antenna, and secondly because it has a shape optimized for lightweight, and aerodynamic, yet robust enough to withstand the special environmental conditions on the masthead of racing yachts.

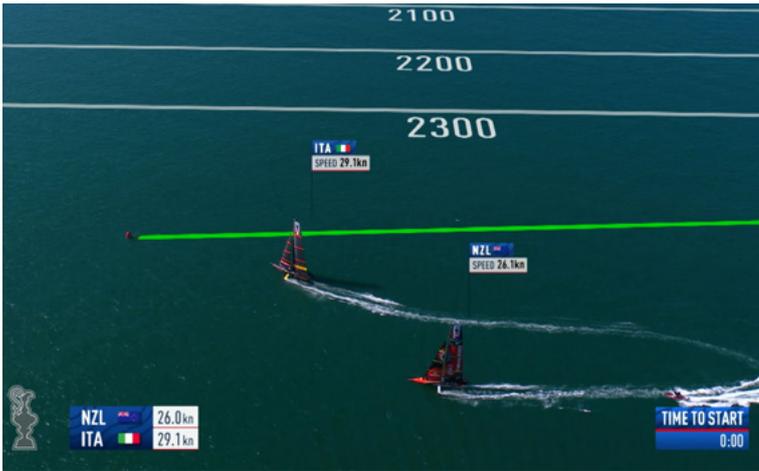




GPS information on the boat was used to ensure time synchronization with all participants.



For this, the data processing of the PPS signals in the GNSS receiver was included to ensure synchronization between all boats.



This means that PIDSO was not only involved on the radio frequency side, but also dug deep into the software, writing the C++ libraries to process all the sensors on the boat, including the power management, the biometrics and the altitude radar, and then making them available to the race management via a centralized interface.



The main requirements for PIDSO were the Class Rules and the 360° concept of Circle-O.

THE RESULT

The customer's expectations were extremely high.

The America's Cup claimed to break the records of the previous Cup in terms of the number of spectators, technical innovations on the boats and the boats themselves, as well as the transmission.

This circumstance alone put the entire team under enormous pressure.

On top of this was the company's own expectations; the goal was to make the 36th America's Cup production at least as good as the previous one.



|| This ambitious goal was in fact surpassed, with an innovative camera setup that captured images from never-before-seen angles.

Onboard equipment included pan-and-tilt cameras, two of which were located on the mast. Another one was at the back of the so-called media post, located at the stern of the boat.

There were also many small and fixed cameras that were able to show very close-up shots of the sailors, bringing the spectators even closer to the action in the cockpits.





The signals from a total of 10 cameras converged in the belly of the ship using Riedel technology and were transmitted to shore via the masthead antenna specially developed by PIDSO, among other things.

In this regard, PIDSO played a leading role in developing and implementing the transmission unit on the racing boats. This, in turn, was responsible for receiving all signals from water to land. A unique feature in this context was that it was a combination of different systems that could be transmitted via one transmission unit.

This affected video, audio and data too.

The system includes race management technology, broadcast technology, broadcast and event technology. It's a unique 360° approach that in some ways has also revolutionized the sport of sailing, with the use of its innovative technologies.





- New paths have been forged, a great deal has been risked, and new technologies have been applied, setting new standards in the field of television broadcasting, as well as in on-site operations. A 360° technical concept that ensured perfect racing on 21 regatta days and allowed more than 940 million viewers worldwide to participate in the event.

The broadcast of the 36th America's Cup was honored with the 2021 „Most Successful Sports Event Broadcast“ Award. The 360° technology has set new standards in sailing and we at PIDSO are proud to have played a significant part in this.



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