MOTOVATED DESIGN & ANALYSIS
engineering your vision

YachtBot - Waterproof Data Acquisition

Case Study

BACKGROUND

Igtimi engaged Motovated Design & Analysis to supply the mechanical design and project management for the YachtBot, a completely waterproof data acquisition system for high performance water sports athletes. The system records multiple types of data, including heading, roll, pitch, wind speed, audio and even heart rates — all in real time.

The data collection device itself has to perform in extreme conditions – waterproof and durable enough to survive hitting the water at high speed. Market research carried out formed the specifications for the device – from usability, battery life, size and weight. This information was then fed into the concept and industrial design process, as well as some upfront analysis of the enclosure casing and sealing.

In high performance yacht racing the difference between first and the rest of the fleet is less than 1%. Igtimi required a single button operation product which provided real-time visualisation and allowed coaches and athletes to see what they did, assess how they are improving from session to session, and immediately learn from their mistakes. The enclosure casings needed to suit plastic injection moulding and also had to perform in extreme conditions – it needed to be waterproof and durable enough to survive wave hits at high speed. At powerboat racing events, speeds of around 200km/h are a common occurrence. And the product also had to have a high level of aesthetic appeal!

Figure 1: The YachtBot

SOLUTION

Motovated handled the mechanical design & testing of the YachtBot and subcontracted the industrial design to Christchurch consultancy Flip Design. The mechanical performance of the seal and casing was simulated and analysed to determine if the number of casing screws and the stiffness of the casing would compress the seal uniformly to provide a robust seal. This was then validated through prototyping and testing. When testing for water tightness, a process of rapid prototyping was used to quickly validate the design, since the seal for the case was identified early as a possible Achilles' heel. The YactBot was tested to IP68. The enclosure casings were designed to suit plastic injection moulding, with the filling and cooling of the mould checked using MoldFlow analysis.

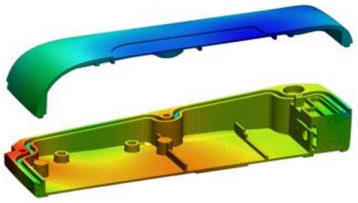

Figure 2: Casing Seal and Displacement Analysis

RESULTS

YachtBot is now invaluable to a number of Olympic Sailing Teams. The technology allows every move made by the yacht and its sailors to be recorded, and by means of live visualised feedback, analysed and remedied if required. YachtBot was used in the 33rd America's Cup and is currently used on the Volvo Ocean Race.

Virtual Eye (the Sports division of Animation Research Ltd) use the raw data to produce graphics showing entire sailing race courses. This includes marks, lay lines, advantage lines, and distances between boats. All of this information is then available in real-time and for post-race processing – a perfect fit for anyone wanting to do their own analysis or processing of the data the YachtBot system provides.

Figure 3: The Yachtbot is fully submersible.

+64 3 982 5283
enquiries@motovated.co.nz
motovated.co.nz