

# ROMER ABSOLUTE ARM CEHIPAR, Madrid, Spain



ROMER Absolute Arm in naval research

by Andreas Petrosino

Rowing boats, container ships, fishing trawlers or dinghies – any floating structure is interesting for the naval engineers at the "Canal de Experiencias Hidrodinámicas de El Pardo" (CEHIPAR). Simulations and real-life scenarios contribute to ship building and operation, improving ship safety and efficiency. A portable measuring arm from Hexagon Metrology delivers accurate 3D measurement results.

More than 500 years ago, Spain's monarchs sent Christopher Columbus westwards to find a new way to Asia – with the known result. In the 15th century, this was a long and dangerous endeavour. Adventurers of today, and more importantly, professional shipbuilders can benefit from a competent institution which is just a stone's throw away from the Spanish Royal Palace: The CEHIPAR helps making all types of vessels safer



# Waves, stronger than a sports car

CEHIPAR operates several test facilities where they simulate open sea conditions. One of them, the Ship Dynamics Laboratory, is a water basin of 150 m length, 30 m breadth and 5 m depth, equipped with a 551 kW strong wave generator. This installation analyses ship models in regard to seakeeping and manoeuvrability which allows conclusions about any motion of a real ship at sea.

Another CEHIPAR field of expertise is research on hull forms, appendages and propellers. This enables any shipbuilder to create fairings and hull forms more accurately and to accelerate their construction. Also, ship propellers can be constructed and produced with the help of a CAD/CAM application for digital milling.

## Easy propeller inspection

For the propeller and fairing inspection, the CEHIPAR team uses a ROMER Absolute Arm with PC-DMIS software, both from Hexagon Metrology. This measuring arm is portable and can gather accurate 3D data in a workshop or factory hall environment. It is available with seven different measurement volumes between 1.5 and 4.5 m, and always certified according to international standards such as B89 or VDI/VDE. For their measurement tasks, CEHIPAR chose an arm with six rotational axes for tactile measurements within a volume of 3.5 m.



Inspection of a propeller prototype using the powerful PC-DMIS metrology software
Hard to reach points are no problem for the flexible ROMER Absolute Arm.
Tactile inspection of a boat fairing.

"The ROMER Absolute Arm is a very useful tool for us thanks to its accuracy and the powerful software", says Enrique Molinelli, naval engineer at CEHIPAR. "We use it to inspect propeller prototypes in different sizes. Since the arm is ready in a few moments, measuring our parts is quite easy for us three arm users here. The measurement results help us to analyse propeller shapes in terms of vibrations, stability and efficiency."

### Quality control for competitive sports

Another application for the ROMER Absolute Arm is the measurement of boat fairings. This type of measurement is often performed on boat models, but also on real-size pieces of professional sports equipment such as Olympic rowing boats. Naval engineer Eloy Carrillo: "Basically, we're running a quality control procedure with the sports boats. We're checking if the boat is symmetrical along the centre plane by collecting 3D data of around 500 points. We're also interested in deformation and torsion of boats that have already been used. Overall this helps the athletes, who are not only from Spain, but also from other countries, to optimize their equipment accordingly."

To measure the entire boat, the CEHIPAR engineers benefit from the ROMER Absolute Arm's mobility. The arm enables them to measure all relevant points on the boat without having to move it. This ensures accurate and reliable results leading to the right conclusions when comparing measurement results to CAD data. The arm's articulation allows reaching points that are difficult to access. "We can measure around the corner", said Eloy Carrillo.

### Travelling metrology tool

CEHIPAR uses the ROMER Absolute Arm also off-site. The arm travelled with the team to Santander in Northern Spain where the Spanish High Performance Centre of Sailing is based. Eloy Carrillo: "We supported the sailing centre by carrying out a series of detailed measurements to improve Olympic class sailing boats such as a 49er, which is a dinghy with a crew of two. Of course all measurements required a slightly different procedure – but it wasn't a problem thanks to the arm's flexibility."

Enrique Molinelli sums up: "The ROMER Absolute Arm was definitely the right decision, and we appreciate its ease of use and its mobility. We also know that we can count on the service provided by Hexagon Metrology Spain. Before we purchased the arm, we were given the chance to test it for a couple of days – a very convincing experience. So far, the cooperation has been perfect."





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