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WHISPER

OceanWings Prototype – public deliverable

Deliverable D2.5 – WP2

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ABSTRACT:

Public summary of the functional testing and validation of the wing sail.

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Executive summary

The present document outlines the manufacturing and testing activities for the OceanWings® system. This document is written 30 months after the beginning of the project. During this period, the manufacturing of the OceanWings® has been performed in order to come from a design to a product. Testings activities have also been performed to validate the OceanWings® properties and validate the product before installation.

Contents

List of Figures 5
1 Introduction 6
2 Prototype Manufacturing 7
3 Prototype validation 8
4 System Integration and Acceptance Testing 9
5 Classification and Certification 10
6 Conclusions 11

List of Figures

Figure 1 - OceanWings System Architecture 7
Figure 2 - Test pyramid 8
Figure 3 - Full scale element mechanical testing 8

1 Introduction

Within the WHISPER project, OceanWings has successfully completed the manufacturing and validation of a full-scale rigid wingsail prototype intended for installation on the ANT-TOPIC bulk carrier demonstrator.

The objective of this work was to transform the OceanWings technology from an engineering design into a fully operational industrial prototype while validating its manufacturability, integration process and operational readiness. The activities covered the production of the major structural and mechatronic subassemblies, their integration, and the progressive validation of the complete system prior to installation on board the vessel.

2 Prototype Manufacturing

The OceanWings prototype consists of several major subassemblies, including the boom, the orientation systems, the composite elements, the tilting mechanism and the electrical control cabinets.

A distributed manufacturing strategy was adopted to combine industrial expertise with efficient logistics. The core electromechanical assembly was manufactured and integrated at the OceanWings facility in Caen (France), while the largest structural components were produced close to the installation site in Asia to simplify transportation and final integration.

This industrial organization enabled most integration and functional verification activities to be completed before shipment, reducing installation effort at the shipyard while ensuring consistent product quality



Figure 1 - OceanWings System Architecture

3 Prototype validation

The development programme included an extensive validation campaign combining numerical simulations with experimental testing.

Validation activities covered:

- structural verification of the wingsail architecture;
- qualification of composite materials and manufacturing processes;
- validation of critical structural interfaces;
- full-scale testing of representative components;
- functional verification of the mechatronic control system.

This progressive approach significantly reduced technical risks before production of the demonstrator and provided confidence in both the structural design and manufacturing processes.

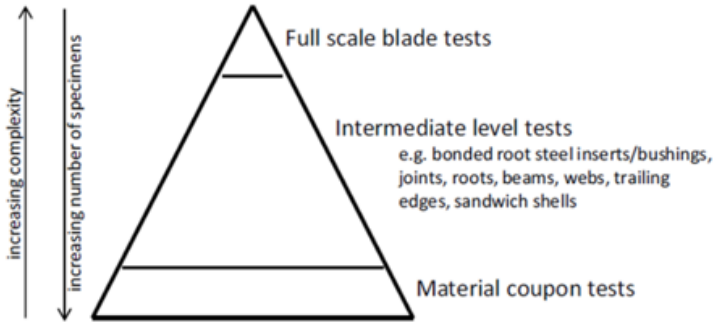


Figure 2 - Test pyramid

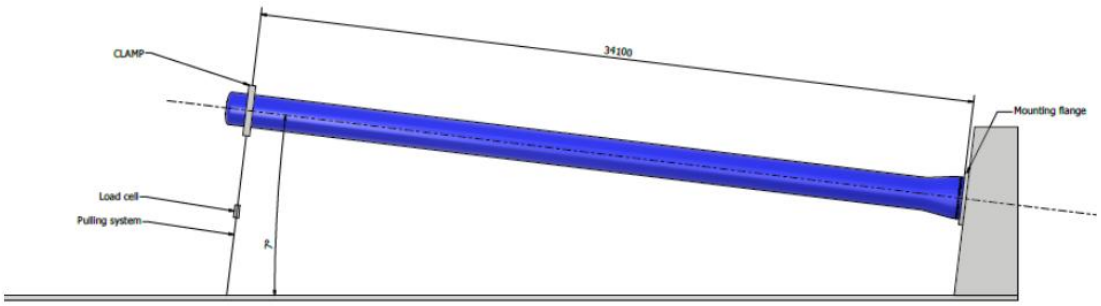


Figure 3 - Full scale element mechanical testing

4 System Integration and Acceptance Testing

Following component manufacturing, the OceanWings prototype underwent a staged integration and acceptance programme.

Testing progressed from supplier-level Factory Acceptance Tests (FAT), through functional integration testing at OceanWings facilities, to Harbour Acceptance Tests (HAT) and Sea Acceptance Tests (SAT) after installation on board the demonstration vessel.

This incremental validation strategy ensured that individual components, subsystem interactions and the complete wing system were verified under progressively more representative operating conditions before commercial demonstration.

5 Classification and Certification

As the OceanWings prototype is intended for installation on board a commercial vessel, its design, manufacturing and installation were carried out in close collaboration with **Lloyd's Register (LR)**, the classification society responsible for the demonstrator vessel.

Throughout the project, LR reviewed the design of the class-relevant components and supervised key manufacturing activities to verify compliance with the applicable classification requirements. Manufacturing inspections, material traceability, dimensional controls and functional testing were performed as part of the certification process.

The successful completion of these activities enabled the OceanWings prototype to obtain the approvals required for installation on board the demonstrator vessel, representing an important milestone towards the deployment of wind-assisted propulsion technologies on commercial ships.

6 Conclusions

The activities carried out within the WHISPER project successfully demonstrated the industrial manufacturing and integration of a full-scale OceanWings prototype.

The adopted manufacturing strategy enabled efficient production across multiple industrial partners while optimizing logistics for installation on the demonstration vessel. The comprehensive validation programme confirmed the readiness of the prototype for operational testing and represents an important milestone towards the industrial deployment of rigid wind-assisted propulsion systems for commercial shipping.

In addition to the successful manufacturing and validation of the prototype, the project demonstrated the capability to develop and certify an innovative wind-assisted propulsion system in accordance with the requirements of Lloyd's Register, paving the way for future commercial deployment.


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