This project has recived funding from European Union's Horizon 2020 research and innovation programme under grant agreement Nº 723360

FIBRESHIP 2ND PUBLIC WORKSHOP
La Ciotat (France) – 25TH May 2019

OVERALL DESCRIPTION OF FIBRESHIP PROJECT

ENGINEERING, PRODUCTION AND LIFE CYCLE MANAGEMENT FOR THE COMPLETE CONSTRUCTION OF LARGE LENGTH FIBRE-BASED SHIPS

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OUTLINE

1. MOTIVATIONS OF USING COMPOSITES
2. FIBRESHIP PROJECT DESCRIPTION
3. POTENTIAL BENEFITS IDENTIFIED
4. MAIN OUTCOMES

General view of advantages and disadvantages of using FRP (Fibre-Reinforced Polymers) in marine industry:

Advantages

- High mechanical resistance
- Resistance to corrosion
- Lightness
- Durability
- Flexibility in design and aesthetic aspects
- Dimensional stability
- Dielectric behavior
- Etc.

Disadvantages

- Expensive
- Complex production
- Combustible material
- Restriction from SOLAS in ships over 500 GT (approx. 50m length)
- Etc.

MOTIVATIONS OF USING COMPOSITES (2/2)

Making the most of the
ADVANTAGES

+

Trying to overcome the
DISADVANTAGES

Large-length vessels (>500GT // >50m)

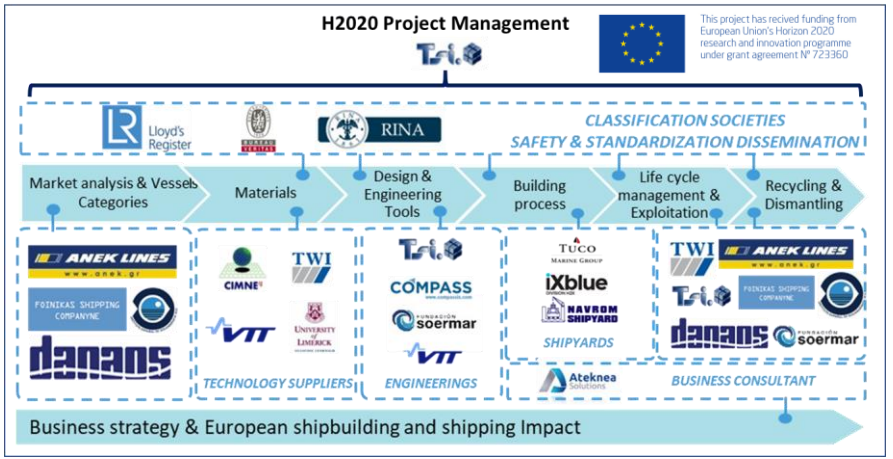
FIBRESHIP PROJECT DESCRIPTION (1/3)

FIBRESHIP Project

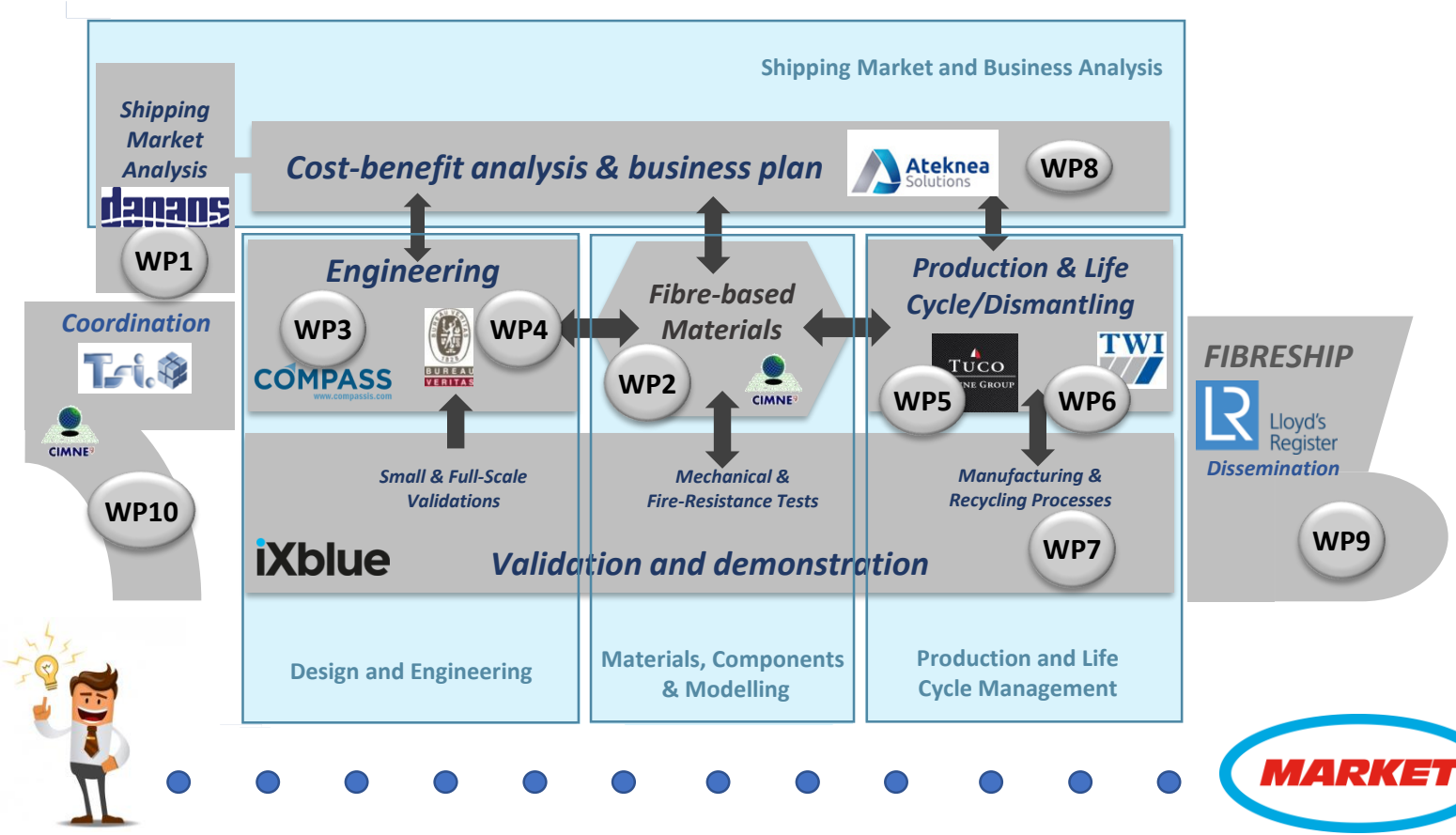
- FIBRESHIP addresses the **feasibility** of using **composite materials** technology for **large-length vessels**, trying to overcome technical challenges and to generate a change in the regulatory framework that will allow the design, building, and operation of this kind of vessels.
- The project consists of:
  - ✓ **analyzing** the possible **impacts** in the **market of this technology**
  - ✓ **evaluating** innovative **composite materials** for marine applications
  - ✓ **developing software tools** capable to assess the structural performance of the vessel and validated through experimental testing
  - ✓ **creating** new **design guidelines**
  - ✓ **generating** new **production** and **monitoring methodologies**

Main particulars of FIBRESHIP Project

- Grant Number: 723360
- Duration: 36 months (2 periods of 18 months)
  - ✓ Start Date: 1st June 2017
  - ✓ End Date: 31st May 2020
- Estimated Project Budget: 11,041,212.50 €
- Requested EU Contribution: 8,866,322.75 €
- TRL: 7-9
- Made up of 18 partners with broad skills and knowledge in different complementary disciplines.



FIBRESHIP PROJECT DESCRIPTION (2/3) – Thematic approach considered



FIBRESHIP PROJECT DESCRIPTION (3/3) – Vessels considered for the project

CATEGORY I
Light Commercial Vessels

Vessel selected:
Container Vessel

Other options:
- RORO vessel
- Car Carrier vessel
- Multi-purpose vessel
- Freezer vessel
- LNG vessel
- …..

CATEGORY II
Passengers Transportation & Leisure Vessels

Vessel selected:
ROPAX

Other options:
- Ferry
- Passenger vessel
- Megayacht
- …..

CATEGORY III
Special Services Vessels

Vessel selected:
Fishing Research Vessel

Other options:
- Fishing vessel
- Seismic Vessel
- Offshore Supply vessel
- Rescue vessel
- ……

POTENTIAL BENEFITS IDENTIFIED

A

B

Structural Weight reduction

- Fuel Consumption Reduction
- Increase Payload Capacity
- Underwater Radiated Noise (URN) Reduction
- Lower Greenhouse Gas Emissions
- Higher Recycling Rate

+

- Reduced Maintenance & Life Cycle Costs
- Immune to Corrosion
- Continuous Structural Health Monitoring
- Possibility of Using Wireless Sensors
- Aesthetic Improvements

MAIN OUTCOMES (1/3) – Expected Results

Engineering

- Design report for each vessel category.
- Project guidelines for design and certification of large-length vessels in FRP materials based on fire and structure performance criteria.

WP1

- Vessel Specifications.
- End-users assessment and roadmap of composite adoption in EU shipping market.

- European and global business trends analysis.
- Cost-Benefit calculator and global business plan.

WP8

- Guidelines on inspection, monitoring and maintenance applicable to FIBRESHIP approach.
- Guidelines on waste management in the implementation of FIBRESHIP approach.
- Structural health monitoring strategy & long-term damage control (as part of the Engineering Guidelines)
- Decision Support Tool on life-cycle performance of FIBRESHIP approach.

WP3 WP4 WP2 WP5 WP6 WP7 WP9 WP10

- Development of numerical tools for FRP vessels design (structure and fire).
- Numerical tools validation.

- Dissemination & Exploitation.
- Infodays & Open-door industrial days organisation (2 workshops).
- Regulatory and Standardization of the results.

- Optimum building strategy & production techniques.
- Modular subdivision and production sequencing recommendations.
- Analysis of existing shipyard facilities adaptation.

- Small scale material tests.
- Selection methodology of FRP materials.
- Catalogue of applicable materials & joining techniques.

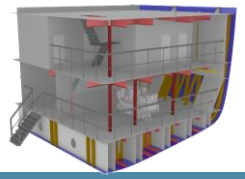
Materials

- Experimental test campaigns for validation:
  - ✓ Noise and vibration on board tests and URN measurement.
  - ✓ Full-scale vessel test for hydro-structural coupled numerical model validation.
  - ✓ Small-scale fire tests of FRP panels with and without insulation.
  - ✓ Modal tests of FRP panels for detection of changes in natural frequencies.
- Engineering solutions for aesthetic improvements.
- Demonstrator Building & Production Process Assessment.

Production

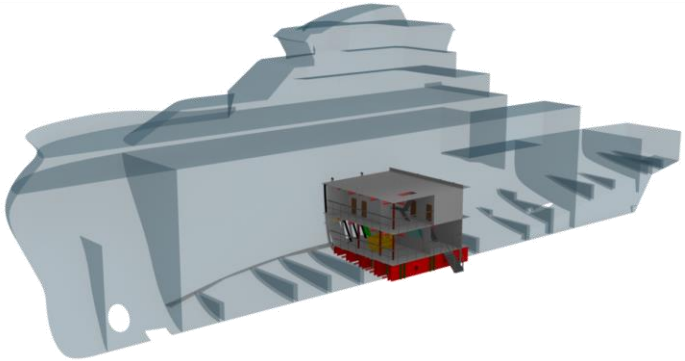






MAIN OUTCOMES (2/3) – Demonstrator

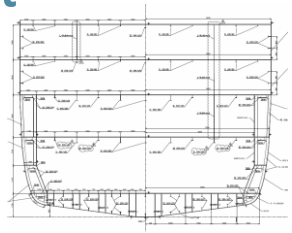
Real-scale demonstrator of a Fishing Research Vessel (FRV) module is being built at iXblue facilities in La Ciotat (France).



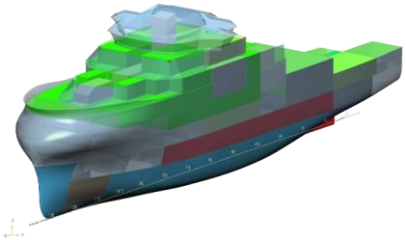
Fishing Research Vessel (FRV)
of 85m of length

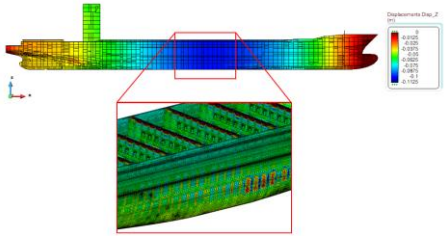
Demonstrator:
Engine room and other above accommodation spaces.
(Approx.: 11m x 11m x 8.6m)

Summary of expected overcome challenges at the end of the project



- Analyzing the potential **impact in the shipping market** of this technology
- **FRP methodology selection** and identification of innovative fiber-based materials
- **Structural design of large-length vessels** (>50m) based on composites according to:
  - ✓ Structural behavior (ULS)
  - ✓ Fatigue behavior (FLS)
  - ✓ Fire behavior
- Development and validation of **numerical software tools** capable to assess the structural performance of the vessel
- **Modular construction** of vessels in composite materials
- Identification of new **structural connections**
- **Adaptation** of the shipyards to the new construction procedures
- Request of **new regulatory frameworks** to allow the use of FRP in large-length ships
- **Structural health monitoring strategy** definition of vessels
- **Life cycle assessment** (LCA) of fibre-based vessels
- Building a ship block as a **demonstrator** of the project advances





FIBRESHIP 3
INTEGRAL COMPOSITE SHIP

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TSI

Any question?

THANK YOU

www.fibreship.eu

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BACK-UP SLIDES

MAIN OUTCOMES (2/5) – Expected Results

- **Short Term (0 Years)**
- **Medium Term (1/3 Years)**
- **Medium/Long Term (3/5 Years)**