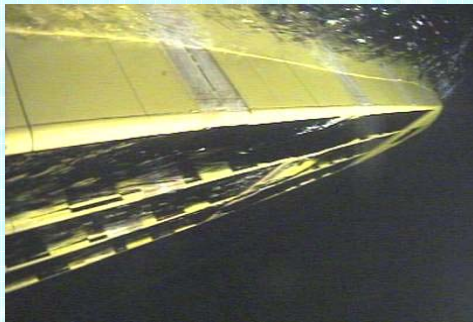


**SUSTAINABLE METHODS FOR OPTIMAL
DESIGN AND OPERATION OF SHIPS WITH
AIR LUBRICATED HULLS**

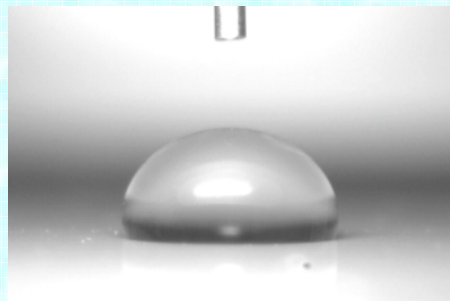


SMOOTH



"Air lubricated hulls will significantly improve ship operation through energy savings, cost-effective design and environmental protection"

"SMOOTH paves the way for the practical application of air-lubrication techniques in the maritime industry"



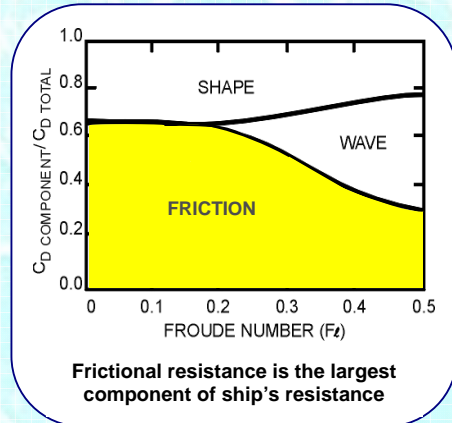
OBJECTIVES and POTENTIAL IMPACT

The SMOOTH project is an **innovative solution** which uses cutting edge technologies with the aim of introducing **air-lubrication into inland and coastal shipping**.

1. **Provide validated computational tools for a real ship design**
2. **Validate scale effects of air-lubrication**
3. **Evaluate the economy of air-lubrication in practice**
4. **Prepare the safe introduction of air-lubricated ships in practice**

Insulating the ship from the water by providing an **air-layer** between the hull and the water is a promising means to **decrease the frictional resistance** and so to further reduce the required propulsive power, fuel consumption and CO₂ emissions.

Within SMOOTH three techniques are surveyed: micro bubbles; air cavities; and air films. The focus of SMOOTH is on **air film techniques**.



“Reducing fuel consumption and CO₂ discharge by up to 20%”



Air-lubrication may, in theory, **reduce net energy demand** by up to 20%. Measures currently in service are already providing a fall in the range of 5-7%.

SMOOTH is aiming to bridge this gap by applying **optimisation techniques**.

CUTTING-EDGE TECHNOLOGIES

MARIN holds a key position in the project as Project Manager and Coordinator. MARIN will lead experiments on air-film lubricated ship models with the aim of investigating scaling effects and validate design tool codes for Micro-bubbles and Air-Cavities. It will draw on its world-class facilities and long-standing experience.

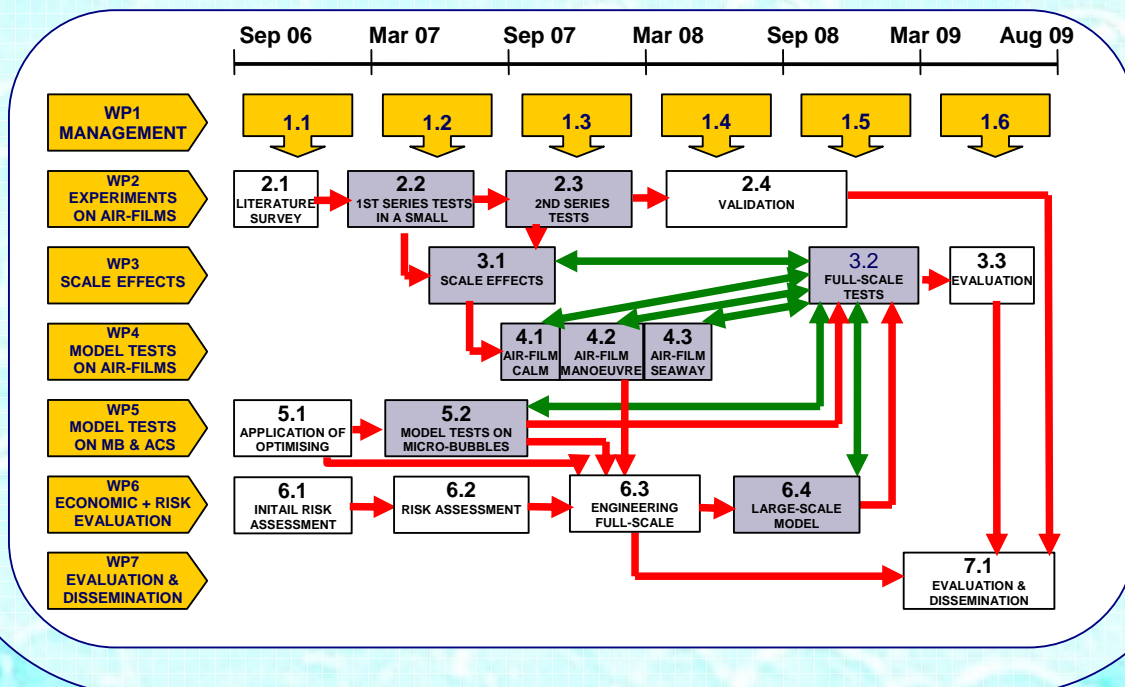
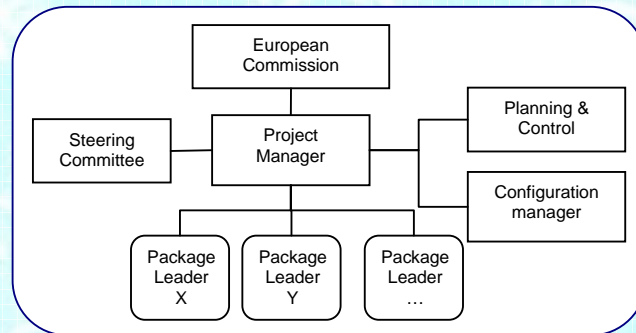


Air-lubrication performance is very much dependent on surface properties, so the participation of **INTERNATIONAL PAINT (an Akzo Nobel company)** is a great benefit. This coating expertise will provide water repellent coatings needed for air-layer production.

MANAGEMENT and PLANNING

The **organisation structure** is typical of transnational research projects and will ensure a sound management of technical, financial and communication issues.

End-users of air-lubrication technology will be involved in the project through a Supervisory Board to ensure that the results meet the market's needs.



EXPLOITATION and DISSEMINATION

- A **Consortium Agreement** sets out the strategy related to **Intellectual Property Rights** and **patents** to exploit the results as much as possible.
- With the view to implementing air-lubrication on inland and coastal navigating ships, a **Technology Implementation Plan** is used to ensure the results and developments are in line with industrial opportunities and perspectives.
- **Members of the Supervisory Board** are entitled to have the first usage rights of the research results. Hence, controlled result dissemination is enabled and the benefits of the project are exploited in order to strengthen the European shipbuilding industry.
- Dissemination of results will be carried out through participation in **international symposia** and organisation of **workshops**.

CONSORTIUM DETAILS



International Paint (an Akzo Nobel company) is a world leader in products for the protection of hulls, interiors, and superstructures for ships. They contribute their thorough knowledge of coatings and interfaces.



Bureau Veritas is an international group specializing in QHSE management. They contribute their experience in risk assessment of new technologies to ensure the novel air-lubricated systems are safe and cost-effective.



Damen Shipyards Group is engaged in the design and new building of ships, as well as ship repair. They contribute their expertise for integrating air-lubrication into a ship design.



The Development centre for Ship technology and Transport systems provides consulting services for all kind of marine transport concepts. They contribute their unique tank facilities and experience in model testing.



Imtech Marine & Offshore is one of the global leaders in ship automation and electrical systems. They contribute their knowledge of controlling and testing the motions of advanced ship designs.



The Faculty of Naval Architecture and Ocean Engineering of Istanbul Technical University is a centre of excellence for research and ship design in Turkey. They contribute their testing facilities and research resources.



Atlas Copco Ketting Marine Center supplies the maritime industry with compressed air technology and other auxiliary equipment. They contribute the air-supply system and their expertise to deliver the test set up.



The Maritime Research Institute Netherlands has a leadership position in hydrodynamics and nautical R&D. They contribute model tests building and testing in addition to the overall management and coordination of the project.



New-Logistics is specialised in the development and engineering of innovative maritime systems. They contribute one ship equipped with air-lubricated technology that will be used for full-scale testing.



SSPA Sweden AB provides services ranging from ship design to infrastructure development. They contribute their recognised expertise as well as their test facilities that include a large cavitation tunnel.



ThyssenKrupp Veerhaven is a modern and prominent push-tow shipping company on the Rhine. They contribute a ship to be fitted and tested with SMOOTH technology. They represent typical end-users for the system.

MORE INFORMATION

- Please visit our website: <http://www.smooth-ships.eu>
- Alternatively contact our coordinator:

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