

NEW, ADVANCED AND VALUE-ADDED INNOVATIVE SHIPS

The European maritime technology sector generates an annual turnover of € 112.5 billion and creates more than 500,000 direct jobs and more than 400,000 indirect jobs, primarily for European citizens. However, world-wide competition is fierce, and in order to maintain world-leadership in complex, value-added and highly specialised vessels European shipbuilders must develop tailor-made

innovative concepts that are efficient to design and build. NAVAIS develops a platform-based modular product family approach supported by the **3DEXPERIENCE®** integrated business platform. This concept will increase efficiency in vessel design and flexibility in production networks. NAVAIS focus-ses on passenger/road ferries and multi-use workboats integrating sustainability in the design

of the ships. NAVAIS supports the transfer from an engineered-to-order business model to an assemble-to-order business model, which allows shorter process leadtimes, constant quality, reduced design and production costs and, thereby increasing competitiveness of the European shipbuilding industry.

NAVAIS has started its activities on 1 June 2018 and will last until 31 May 2022.

CONCEPTS AND RESULTS

The NAVAIS innovative solution is the adoption of platform-based product family and modular product architecture principles for passenger/road ferries and for workboats. Key results of the NAVAIS concept are expected to include:

“30 % higher efficiency in ship design development, production lead-times and cost, testing and approval times for customised vessels and in reduction of rework during the warranty period”.

NAVAIS introduces two innovative platform-based product families that use modularity in design and production. The core element of this approach is the re-usable library of modules that are:

1. Of stable quality due to the re-usable character of the modules;
2. Faster to produce due to the already proven and approved (class) module characteristics and;
3. Cheaper to produce due to economies of scale and the repetitive element.



AREAS OF INTEREST

NAVAIS works on the following areas of attention throughout the lifetime of the project to achieve its goals:

1 REQUIREMENTS AND ASSESSMENTS:

setting and aligning the detailed requirements, ensuring the different work packages remain aligned, validating and verifying the project results. Cost-benefit, including societal costs, are an important element for defining requirements in NAVAIS.

The principal role of this workspace is that of alignment and interoperability within the project. On the one hand, it ensures that what is required by one area of attention is delivered by another area of attention. As such it supports the planning and insight for the project management. On the other hand, it performs the verification and validation of important tools, models and designs throughout the project, to make sure these fulfil the (original) requirements. In this way it functions as a stage gate for the project.

Recently the first deliverable was successfully completed. The focus of this report was solely on the alignment and further detailing of the work plans. Through this process all partners increased the awareness of their roles within the project, as well as their relations to other partners and roles. For the next period, the development of an economic assessment model is the primary focus. This model will verify the economic qualities of both the NAVAIS design and production approach compared to the current shipbuilding practices, as well as the potential for the NAVAIS low-impact designs, compared to design not optimised to reduce their impact.

2 PLATFORM BASED FERRY PRODUCT FAMILY:

creating a platform-based modular ferry product family and creating a digital twin to verify simulations of the production process.

The challenge of this workspace is to introduce a ferry product family, to be used in a platform-based modular product design method for double-ended ferries. At the end of the NAVAIS project, this will result in the development of a “digital twin” of a low impact double-ended ferry with battery powering and capacity up to 400 passengers and 120 cars. This will be achieved by using the determined modular scaling ranges from an extensive market study to create a modular ferry design. These modules will be used to verify the modular design method and production processes.

The main focus of the activities in this workspace was on a market study in the past couple of months. Initially a worldwide market size has been determined resulting in both the market expectations and a database of vessels representing the market. This database has been used to analyse different parameters of the double-ended ferry market and created the initial scaling ranges of the modular design. Not only the modular ranges have been defined, but also interesting development topics arose from the ferry database.

3 PLATFORM-BASED WORKBOAT PRODUCT:

to develop a platform-based workboat family for a wide range of customer demands. The concept is based on the analysis and redesign of standards and scalable functional modules often present in the workboat industry.

Several steps have been taking towards the final goal of developing a platform-based workboat family in the first nine months of the project. The concept is based on the analysis and redesign of standards and scalable functional modules often present in the workboat industry.

In these nine months an in-depth market analysis has been carried out and a first setup of the workboat family has been introduced. In addition, the first five functional modules have been defined.

In the next months a proper and deeper analysis, and development of the functional modules will be the main activities in this area of attention.

In the meantime attention will of course be paid to the interactions of the workboat family with the environment above and under seawater level.





4

LOW-IMPACT DESIGN AND OPERATIONAL PRINCIPLES:

to provide guidelines and goals for low-impact design of vessels.

This activity not only deals with emissions coming from the exhaust, such as CO₂ and NO_x, but also with underwater radiated noise (URN) because of a growing concern that URN has a negative impact on marine life.

An overview of existing rules and regulations concerning the various emissions has been compiled. The low-impact vessels should not only comply with those rules, but they should surpass those rules; the emissions should be as low as possible and preferably zero. Various techniques to reduce the environmental impact are already available. These techniques will be collected in a database. Additionally, a set of selection criteria will be compiled. These criteria take boundary conditions such as weight and volume into account but also whether specific technologies can actually work together.

The database and the selection criteria will be used to create a technology selection tool. This tool will assist the designer by selecting the appropriate technologies that work together to reduce that specific ship's impact. The final low-impact ship designs also need to be validated: does the ship actually meet the goals? That means that tools for predicting the emissions are required. For some emissions, tools are already available, while for others the tools require further study. Within this activity the tools for predicting URN during dynamic positioning and during deceleration will be developed.

5

PLATFORM-BASED MODULAR PRODUCT FAMILY DESIGN AND PRODUCTION:

will develop the principles for implementing the NAVAIS main ideas.

The main drivers and objectives of this activity are:

1. Definition of modularisation principles and implementation of platform-based product families.

The objective is to define groups of related products that share common features, components, subsystems, interfaces and manufacturing processes that satisfy a wide range of customer requirements, supporting:

- Functional decomposition of a ship product structure;
- Implementation of functional modules and their attributes.

2. Definition of modular design process and library of modules for re-use.

Design and production data, business rules, documents, and spatial information are stored inside the library, allowing to enforce and standardize production by allowing multi-user environments to model, experience behaviour and centralize information for digital data production.

3. Definition and simulation of modular production process.

In the context of modular ship design, the manufacturing plan can be made per production module and the process plans of the different modules can be combined to create the master process plan for the entire ship. The network of production facilities mirroring a production line of dedicated production modules or units then needs to be simulated.

4. A single work environment.

The DNA of the **3DEXPERIENCE**¹ platform is to place consumers at the heart of participative product development. The NAVAIS project requires a single collaborative environment supporting a Systems Engineering approach. The intent is for the NAVAIS project members to use the **3DEXPERIENCE** platform as a "virtual plateau".



1) The **3DEXPERIENCE** platform is a business experience platform that incorporates 3D design, analysis, simulation, and intelligence software in a single collaborative, interactive environment. It connects all company disciplines and all stakeholders across the Marine & Offshore value creation chain, from suppliers to shipyards to owners to operators to classification societies.

6

DISSEMINATION AND MARKET-UPTAKE:

are key to maximize the impact of the NAVAIS project, to involve the SME supply chain and to pave the way to market uptake of the project results.

The activities in the framework of dissemination and market-uptake are executed in four interrelated domains:

1. The development of a strategy for dissemination and exploitation of the project results. The dissemination and exploitation activities will target a number of key stakeholders, amongst others: general public, shipbuilding companies and shipowners/ship operators, competent authorities, the (SME) supply chain of ship building companies, design offices, etc.;
2. The development of dissemination and communication measures and tools, the organisation of events, and the facilitation of the involvement of the SME supply chain are key to ensure a proper dissemination and exploitation of the project results. In this task, the website will be developed and maintained, the graphical identity prepared, newsletters, presentations, leaflets,

brochures etc. will be developed. Special focus will be put on media production (video journals, animations) to ensure clear explanation of NAVAIS ideas;

3. Implementation, monitoring and assessment of the implementation of the strategy and tools developed to ensure they meet the expectations of the target audience, thereby ensuring the maximization of the impact of NAVAIS;

4. The set-up of the involvement of the (SME) supply chain, to facilitate the adaptation to new business models. An SME forum will be created to ensure the supply chain of shipbuilding companies is aligned during the execution of the project.



Any relevant stakeholder that would like to participate in the SME-forum that will be initiated, please contact the project by sending an e-mail to: info@navais.eu

For next issues of the NAVAIS newsletter, please register by using the link on the NAVAIS website:

<https://www.navais.eu/news>

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