



OPTIMISED HYBRID SYSTEMS FOR SMALL DISPLACEMENT VESSELS

HYMAR is an EU supported, collaborative research and development project. Its aim is to develop state of the art marine hybrid systems for displacement vessels up to about 24m in length. HYMAR hybrid systems are being optimised for energy efficiency and are based on design principles which will allow any compliant equipment to be used regardless of supplier.

HYMAR has ambitious targets:

- A reduction in total fuel consumption of 30% and even higher in some types of vessel
- Virtually zero emissions and zero external noise under electric drive
- More on board electrical power providing more consumer choice
- Simple and reliable operation
- Single fuel (no gas or petrol on board)

The HYMAR project will complete in 2012 but practical results will become available before then.

For the latest information, contact the HYMAR project manager at ICOMIA

HYMAR is being delivered by a group of EU partners, individually selected for excellence in their specific field:

- ICOMIA (BE)
- EnerSys (UK)
- Mastervolt (NL)
- Bruntons (UK)
- INSEAN (IT)
- Malo Yachts (SE)
- Bosch Engineering (DE)
- ESP (UK)
- Steyr Motors (AT)



Malo 46 "Nada" - the HYMAR test boat

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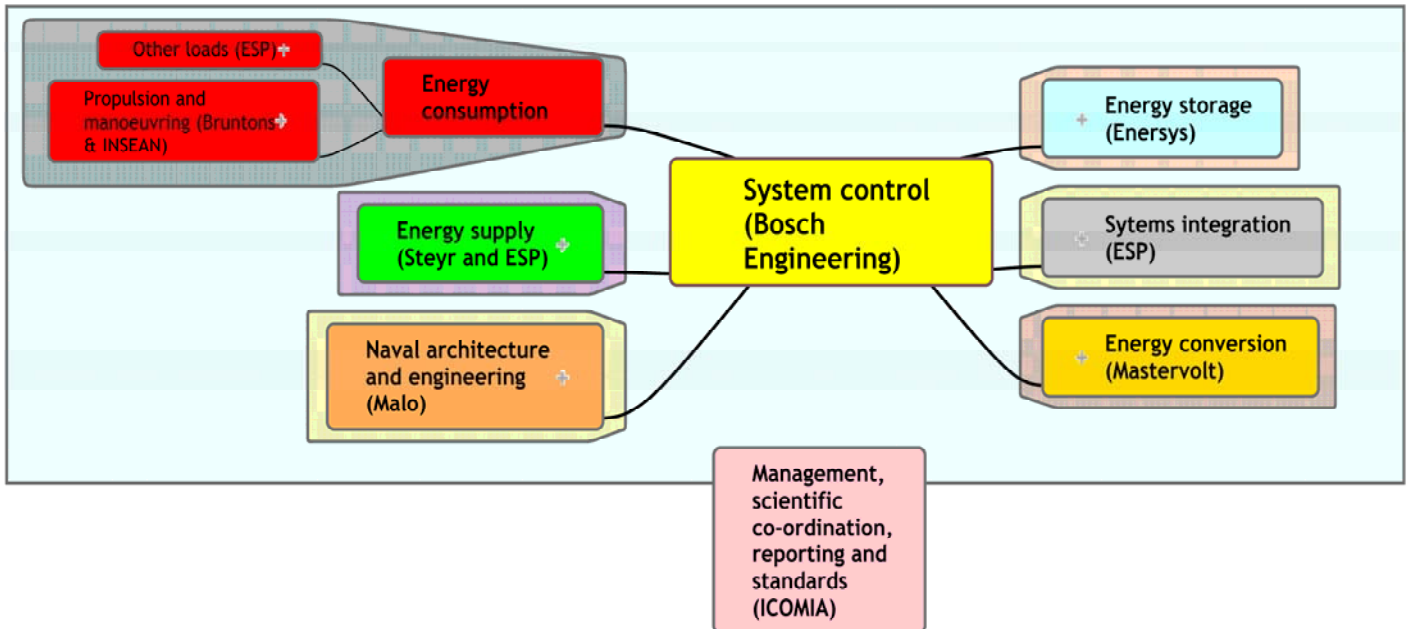
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Schematic of the main HYMAR tasks

The critical challenge for HYMAR is to minimise losses in the supply, storage and consumption of energy throughout the entire vessel. Compared to a simple diesel drive, electric hybrid propulsion has more energy conversion steps between burning the diesel fuel and turning the propeller. Each one of these introduces losses and must be made as efficient as possible if there is to be any overall benefit. The use of electricity as the single source of energy on board creates the opportunity to scavenge power from other sources such as wind, solar and by using the propulsion motor as a generator. These alternative energy sources, together with sophisticated control systems and improved component parts, create great opportunities for energy savings.

KEY PROJECT TASKS

Project management - ICOMIA represents marine industry associations from around the world and is leading the project. ICOMIA's presence will help to ensure that marine hybrid systems will be widely available by adopting an open systems architecture. ICOMIA is overseeing the drafting of new standards and methods to ensure the safe installation and operation of these systems.

Energy storage - High power density, durability and affordability are essential features of marine hybrid batteries. Energys are developing a new range of long life, deep cycle batteries for hybrid applications

Propulsion - Being able to match the propeller to the electric drive motor is critical to achieving the best fuel efficiency. Bruntons and INSEAN are analysing the well known self pitching Autoprop and then optimising it for use with hybrid systems. The new concept propeller will also be used to regenerate power on sailing boats.

Motors and generators - In order to minimise energy conversion losses, a new type of diesel generator is required, and a new electric motor. Steyr motors, working with ESP and Homewood Products from the USA are analysing the specific needs of HYMAR hybrid systems and are producing a new permanent magnet DC motor and generator.

Energy conversion - The HYMAR propulsion system operates at 144V DC but other electrical systems within the vessel require different voltages. Mastervolt are developing new, highly efficient power conversion devices to ensure that all the vessel's power needs can be met with minimal losses. Mastervolt will also produce a novel battery monitoring and control system to handle the different characteristics of hybrid batteries.

Naval architecture and engineering - HYMAR's comprehensive trials programme involves making a lot of changes to the Malo 46 test boat. These changes are being carried out by Malo Yachts in Sweden. Malo are also reviewing the longer term implications of hybrid systems for vessel design.

System Integration - Carrying out trials, specifying common communications protocols for all system components and determining the key operational logic is the main task of ESP.

System control - With so many different elements all interacting, a sophisticated whole boat monitoring and control system is required. Bosch Engineering are adapting an automotive controller to carry out this task, which should ensure that HYMAR designed marine hybrids are as easy to use and as reliable as a modern car.

