

FINCANTIERI: DRY DOCK WORKS START FOR EXPERIMENTAL VESSEL ZEUS

The vessel will be equipped with a 130 kW fuel cell system for a zero emission navigation

Trieste, September 23, 2020 – The keel-laying ceremony of **ZEUS – Zero Emission Ultimate Ship**, an experimental fuel cell-powered marine vessel, was held today at Fincantieri shipyard in Castellammare di Stabia. The vessel, first of its kind in the world, is to be delivered in 2021.

ZEUS is the result of research activity aimed at improving the level of environmental sustainability of cruise ships, mega-yachts, ferries and oceanographic research vessels, by reducing greenhouse gas emissions, nitrogen oxides (NOx), sulfur oxides (Sox) and particulate. Measuring about 25 meters in length and weighing around 170 tons, ZEUS will serve as a floating laboratory to investigate fuel cell behavior in natural settings. Fuel cells are electrochemical devices that convert the chemical energy of hydrogen directly into electricity with no thermal combustion.

ZEUS will be fitted with a hybrid engine (2 diesel generators and 2 electric motors), which will be used as conventional propulsion system. Moreover, it will be equipped with a **130 kW fuel cell system** powered by about 50 kg of hydrogen contained in 8 metal hydride cylinders, using technologies already applied on board submarines, and a battery system which can guarantee a zero-emission navigation range of 8 hours at a speed of approximately 7.5 knots.

The propulsion system is designed to power the engines in four different ways:

- **Zero Noise**, using only lithium batteries, guaranteeing navigation range of 4 hours at a speed of 4 knots;
- **Zero Emission**, with electric power supplied by the fuel cells;
- Navigation using diesel generator while batteries are being recharged;
- Navigation using diesel generator for transfers and a navigation range of 60 hours at 9 knots.

The second research goal is to develop **a new way of generating electricity and heat on board cruise ships**. This will result in: greater passenger comfort, by reducing noise and vibrations from the power generating systems; increased energy conversion output by adopting power generating systems with no moving mechanical parts; higher ship safety by increasing the redundancy of existing systems; and smaller onboard diesel generating sets.

Research activities also include testing new ways of using **innovative green outfitting**, such as new covering materials and photovoltaic panels to keep batteries and low Watt OLED light bulbs charged.

Several Group shipyards and subsidiaries are involved in the project: Castellammare di Stabia and Palermo shipyards, Fincantieri SI, Seastema, Cetena and Isotta Fraschini Motori. Thus, Fincantieri once again confirms its ability to combine contributions from its in-house centers of excellence with those from the national research system, conceiving a prototype with extremely innovative features.

CNR (National Research Council of Italy), the universities of Genoa, Palermo, and Naples, the ENR (National Institution of Italy for Standardization Research and Promotion) and RINA acted as project's consultants. The vessel will be built as part of the project entitled "Low Environmental Impact Technologies" (TECBIA), co-funded by the Ministry for Economic Development as part of the National Operational Plan.

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Fincantieri is one of the world's largest shipbuilding groups and number one for diversification and innovation. It is leader in cruise ship design and construction and a reference player in all high-tech shipbuilding industry sectors, from naval to offshore vessels, from high-complexity special vessels and ferries to mega yachts, as well as in ship repairs and conversions, production of systems and mechanical and electrical component equipment, cruise ship interiors solutions, electronic systems and software, infrastructures and maritime constructions as well as after-sales services. With over 230 years of history and more than 7,000 vessels built, Fincantieri has always kept its management offices, as well as all its distinctive engineering and production skills, in Italy. With over 9,500 employees and a supplier network that employs nearly 50,000 people in Italy alone, Fincantieri has enhanced a fragmented production capacity over several shipyards into a strength, acquiring the widest portfolio of clients and products in the cruise business. To hold its own in relation to competition and assert itself at global level, Fincantieri has broadened its product portfolio becoming world leader in the sectors in which it operates.

The Group now has 18 shipyards operating in four continents, nearly 20,000 employees, and is the leading Western shipbuilder; its clients include the world's biggest cruise operators and the Italian and the US Navy as well as numerous foreign navies. Fincantieri is also a partner of some of the main European defence companies within supranational programs.

Fincantieri's business is widely diversified by end markets, geographical exposure and by client base, with revenue generated from cruise ship, naval vessel, Offshore and Specialized Vessel construction and from the supply of solutions for electronic systems and software and for maritime infrastructure and works. Compared with less diversified players, such diversification allows it to mitigate the effects of any fluctuations in demand on the end markets served.

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