

MODULAR MULTIPURPOSE HYBRID SHIP DESIGN FOR HARBOUR AND WINDFARM SUPPORT VESSELS TO ACTUALISE ENVIRONMENTAL SUSTAINABILITY

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Environmental Protection and Sustainability often treated synonymous are similar but not same. Sustainability, unlike environmental protection is a multidimensional thought that focuses not only on technology but also on management factors.

Today, European maritime industry faces one such multidimensional problem, to achieve environmental protection during the economic slowdown. Thus, it requires an integrated solution of same nature. The idea behind this project is to provide a ship design that not only reduces emissions but at the same time provides a practical solution that can be implemented in current volatile market.

In accordance to UNFCCC Copenhagen 2009, all EU nations have pledged to reduce the CO₂ emissions to a tune of 30% by 2020 and 40% by 2030. To solve this, the first thought that comes to mind is use of LNG as operating fuel. This presents us with two constraints:

- 1) While LNG, the Green Fuel of future does solve the problem of SO_x and NO_x, its ability to reduce greenhouse gasses like CO₂ is limited to 20-25% as compared to MDO,
- 2) In addition, at this point installation of LNG power plant on small vessels like Harbour and Windfarm support vessels is limited due to large size of installation.

So, what do we do when the “*Green Fuel*” cannot provide the required solution?

We Re-Invent. The project proposes the idea of CM-SWAS(S)H, Common Modular - Small Water-plane Area Single (Stabilized) Hull, that will cater to three different types of vessels, Pilot Boats, Police/Custom Patrol Boats and Wind-farm Support Vessels for lengths between 18 to 24 m.

The technological focus is on design and optimization of a hybrid hull form, presented as SWAS(S)H and installing it with an Advanced Hybrid Diesel Electric AC/DC propulsion system for higher power plant efficiency with future adaptability to SOLAR powered propulsion. The hull optimization is carried out using FRIENDSHIP CAESES®, MAXSURF® and FINE Marine® (RANSE solver) to achieve lowest possible resistance while ensuring good stability and maneuverability.

The high efficiency power plant and the optimized hull reduce the fuel consumption, thus in-turn reducing emissions and operating cost, but, they call for high initial investment from vessel owners. High initial cost has proven to be the major deterrent in implementing advanced technology as it tends drive away the ship owners, especially in volatile market.

Technology can take us to the skies, but for technology to stand tall it needs a strong foundation, the foundation of management. The 3M's of management, Men (Design and Production Man hours), Material (Wastage) and Money (collective effect of Men and Material) can be reduced drastically by using modular hull approach. The idea of Common Modular Hull (CMH) will help in reducing the time and cost of production, thus the initial investment cost. The major constraints with CM-SWAS(S)H optimization is that, while optimizing for resistance we need to consider the longest hull (24m) and for stability the smallest hull (18m). The work will be extended to FEM based structural optimization to provide reduced lightship weight while ensuring structural safety.