RESEARCH THEME

XL cycle – a.y. 2024/2025

Title of the doctoral research	Computational Yacht Design for Flexible Manufacturing

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Abstract

The yacht industry faces growing demands for customization and sustainability, challenging traditional manufacturing methods reliant on moulds and dies. These processes present several limitations that slow down the evolution of the nautical industry due to their low flexibility, environmental impact, and costs. To address these challenges, the yachting industry is starting to embrace advanced technologies via the gradual and increasing implementation of AM. However, this technological shift hasn't yet influenced yacht design processes, which remain rooted in manual operations on a spiral refinement process.

Nowadays, literature and few research projects highlight the capacity of AI and generative tools to offer substantial support during the preliminary design phase, facilitating the generation of innovative and unbiased solutions while enhancing performance, ultimately surpassing conventional design methods. However, the research in the maritime industry is behind the state of the art compared to other industries and is primarily studied for hull and structural design.

The proposed research will explore AI, computational design and engineering, and parametric analysis to define parallel approaches to yacht design, from exterior to interior ergonomics and furniture elements. Furthermore, it will investigate challenges and potentialities for co-design approaches, reflecting on the ethical implication of the use of AI and computational models in the creative field.

Keywords	Yacht Design, Computational Design, Additive Manufacturing