



## Background

The shipbuilding process is widely regarded as being highly labour intensive. Despite robotic welding being introduced at shipyards several decades ago, the shipbuilding process still consists of large amounts of manual labour.

Apart from welding itself, shipyard operations consist of several other processes before and after welding, which currently feature little to no automation.

This highlights the lack of a highly modular and flexible production platform, which can handle the central shipbuilding tasks.

This PhD project will be part of the development of a multi-purpose/multi-robot automated production platform which ensures competitive, cost effective and efficient production of ships with minimal human interaction, as illustrated in Figure 1.

The project is a part of a joint venture between NFC, OMT, DTU and LSP's Ship Factory research project, which aims to develop a multi-purpose robotic production cell.

Furthermore, the PhD sets out to co-develop the intertwined perspectives of both the modular production platform, and corresponding modular naval architecture. This co-development will take place via a linked PhD project at DTU focusing on modular naval architecture of vessels, whereas the present PhD project will focus on the development of the production system for said vessels.

Ultimately, the goal of the research project is to strengthen the Danish maritime sector by providing tangible solutions to reactivate and reshore the necessary competencies and capacities to engage both in civilian and naval shipbuilding and maintenance activities in Denmark.

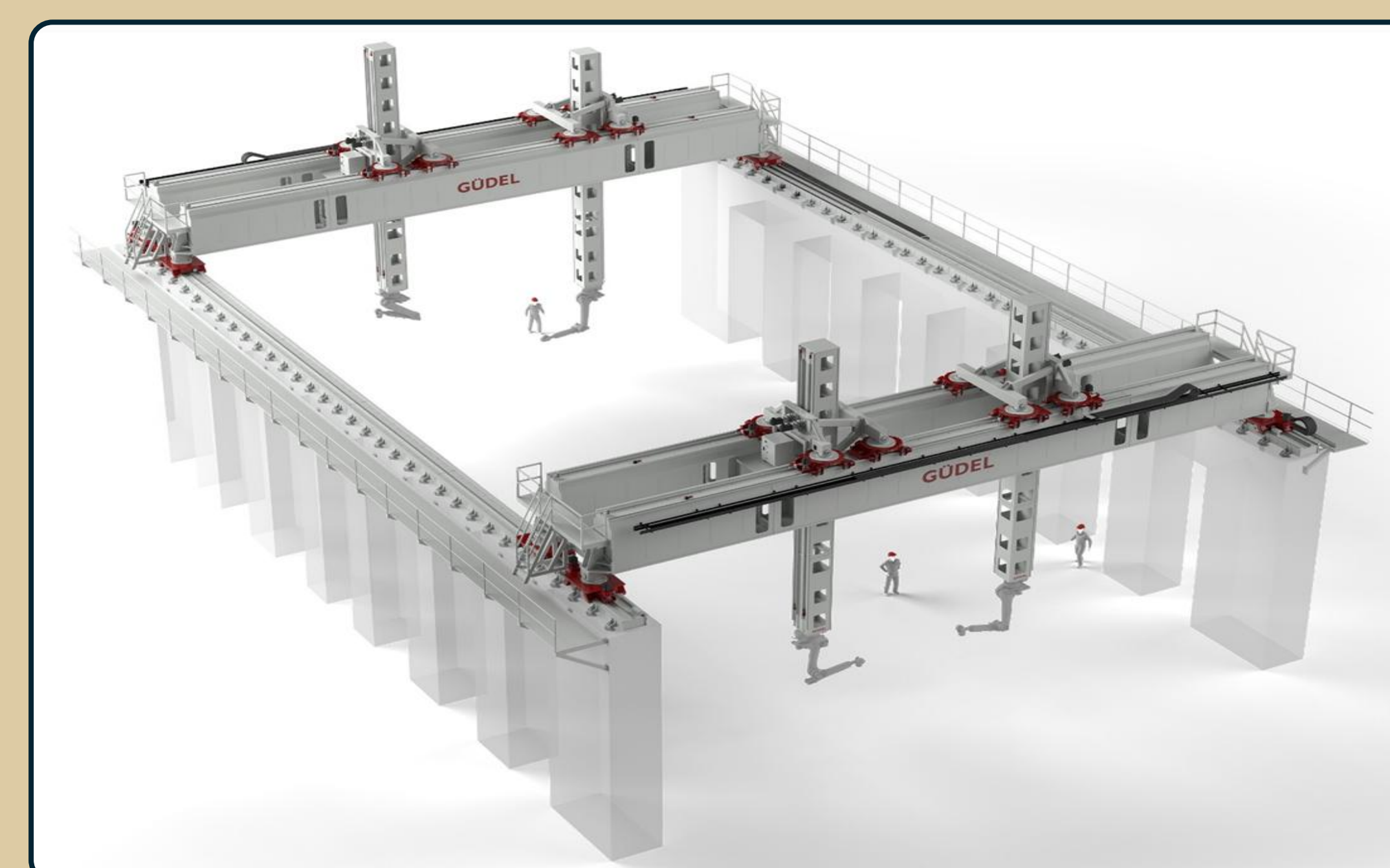


Figure 1 – Multi-purpose/multi-robot production cell

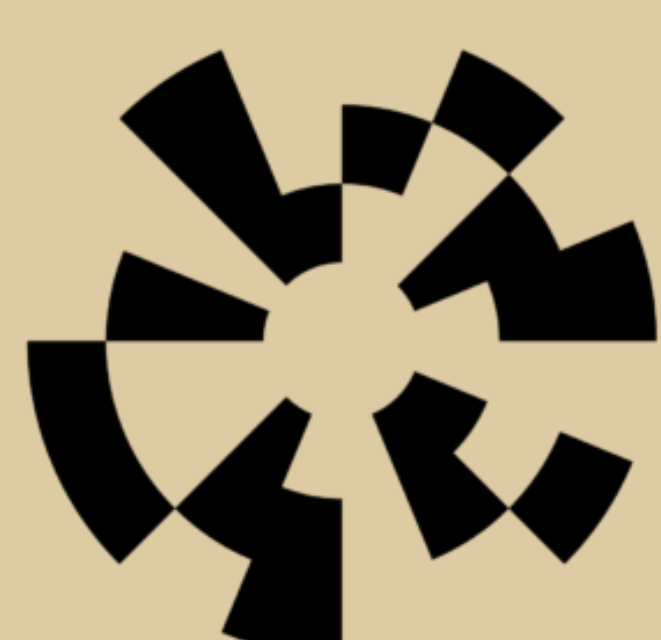
## Objectives

- Map shipyard operations and consider possible advancements to the level of automation.
- Assess and adjust process parameters to optimise quality and workflow.
- Co-development of modular naval architecture for future vessels in accordance with the Danish naval vessel program.

## Methods

- Map current shipbuilding workflow, processes and their interdependencies
- Investigate the current state of automation of shipyard processes and identify possible advancements
- Ensure satisfactory quality of roboticized shipbuilding processes by using function-specific test specimens of increasing complexity
- Optimise workflow by using Discrete Event Simulation methods
- Partake in the co-development of naval architecture for Danish naval vessels, ensuring that the naval architecture aligns with the novel cell-based production platform

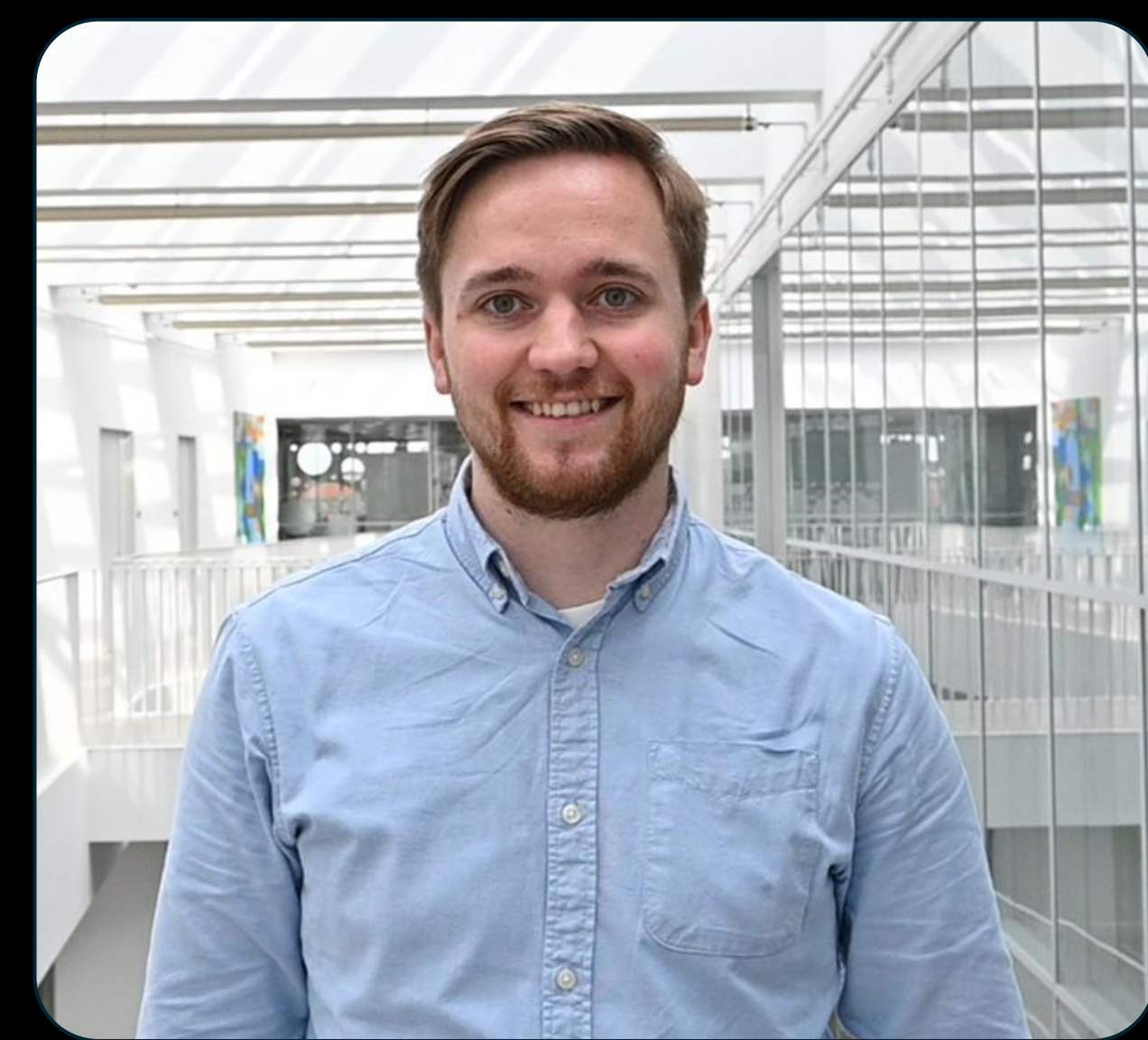
## Funding



**National**  
**Defence Technology**  
**Centre**

**OMT**





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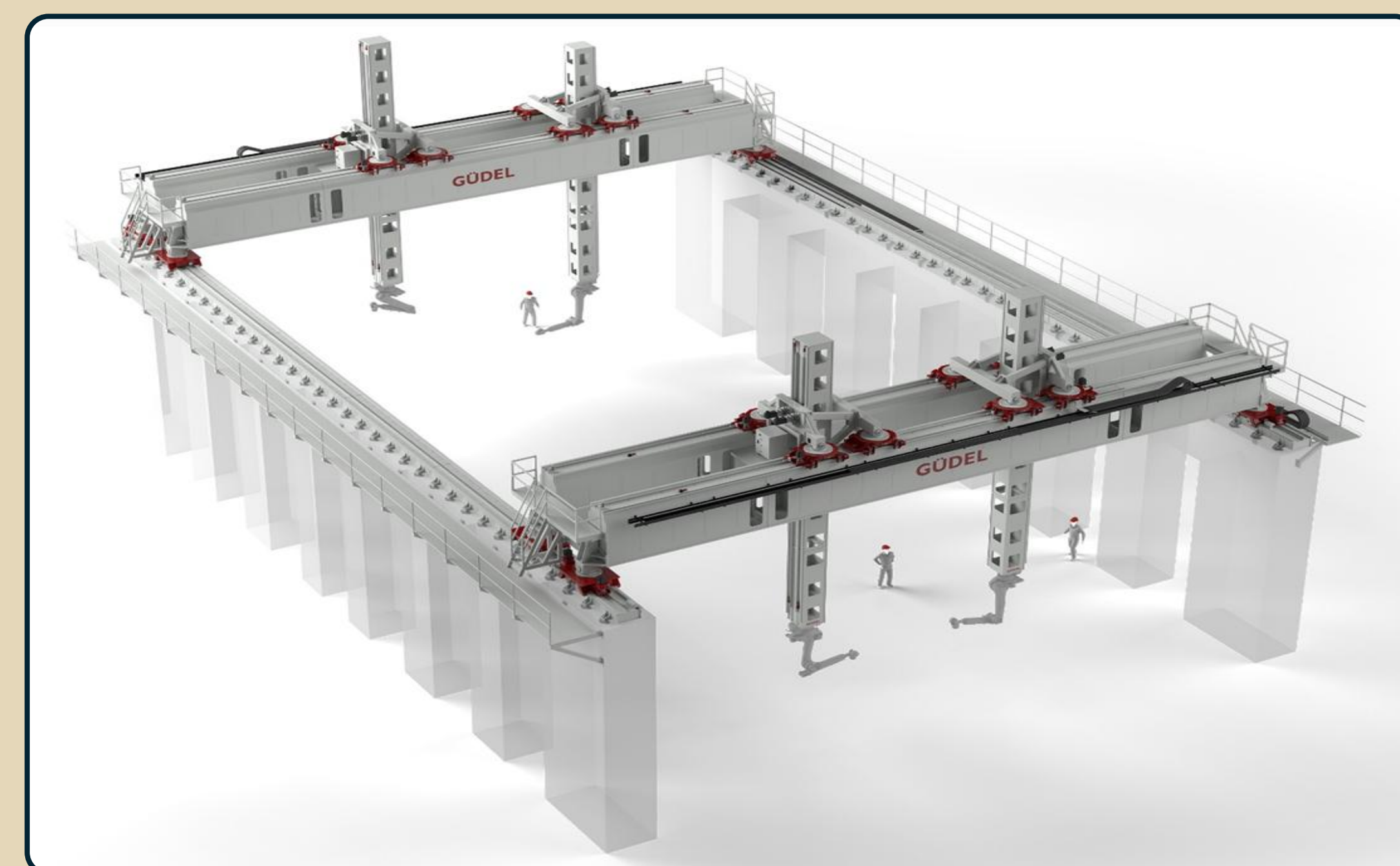


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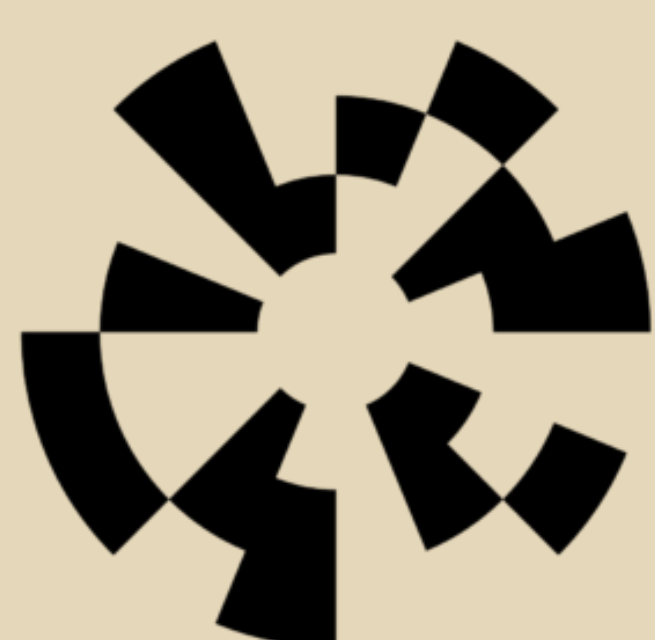
## Objectives

- Map shipyard processes and requirements for their successful execution
- Assess and improve the quality of roboticized shipyard operations experimentally
- Co-development of modular naval architecture for future vessels in accordance with the Danish naval vessel program

## Methods

- Map current shipbuilding workflow, processes and their interdependencies
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