CASCADE
ENGINEERING

DEPENDABLE ENGINEERING,
CERTIFIED SOLUTIONS

Photo: Courtesy Royal Navy

MARINE & NAVAL DESIGN & DEVELOPMENT

ANALYSIS, SIMULATION AND DESIGN SOLUTIONS FOR METALLIC AND COMPOSITE STRUCTURES

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CAPABILITY STATEMENT

DESIGN & DEVELOPMENT

- Involved at the heart of development programmes.
- Naval Architecture and design experience/ capability.
- Marine Engineering experience across the entire vessel.
- Providing integration between our customer (the OEM) and its suppliers.
- Ceaseless drive to streamline analysis approaches, utilising technology and data handling techniques to improve robustness and expedite any analysis to allow decision making.
- Optimisation against multiple design drivers.
- Ensuring teams work with the best current data.
- Developing loading – ship motion and shock events, developing whole unit FE models.
- Safety assessment, including – shock analysis, captivity of items, lightning strike, etc.
- Development of Means of Compliance strategies and evidence requirements.
- Negotiation with the Cerification societies about appropriate approaches and designs, such as the MoD or LLoyds.
- Development of test plans, review of testing arrangements, test witnessing, results review, correlation of data and models.

EXPERIENCE AT A GLANCE

- Type 45 Destroyer.
  Equipment Seat Sizing and Structural Design & Analysis.
- QEC Carrier.
  Equipment Seat Sizing and Structural Design & Analysis.
  Lifting and Turning Design & Analysis.
- Type 26 Frigate - See overleaf for more details.
  Composite Mast, Sponsons, Shaft Bracket Fairings & Steel Yardarm Design and Structural Design & Analysis.

CASE STUDY

TYPE 26 FRIGATE COMPOSITE STRUCTURES

STAGE 1

Reviewed, modified and enhanced the composite architecture of the foremast, a four-storey octagonal structure, 8m square at base, that contains the combat mission systems, supports the main radar at the top and various communication systems externally.

Optimised the structure against improved load distributions based on further iterations using FE models and structural design.

Weight is key to all superstructure and optimisation of structural requirements against minimal weight was paramount to ensure the mast remained within the limits mandated within the BAE Systems & Navy requirements.

STAGE 2

Our sector experience meant we not only accounted for the specific drivers within the superstructure, but also integrated the design solution with the adjacent steelwork, as well as the radar, SATCOM & combat systems, mast top bulwarks and mast sponsons.

We had to agree structural solutions and negotiate routes forward with Lloyds Register for the novel material systems employed.

STAGE 3 & MANUFACTURE

Following the detailed structural design, we worked alongside a specialist Norwegian marine composite manufacturer to ensure a smooth transition from design into production and subsequent assembly onto the ship.

As the first mast passed into production, it met with some teething problems. Our team remained on hand throughout the initial production process to help resolve early issues and answer questions, working directly with the suppliers at their Norwegian yard to help keep the challenging timescales for the complete programme delivery on track.

CASCADE HIGHLIGHTS

- Analysis of steelwork to Lloyds Rules for Naval Ships.
- Analysis of complete structural elements, such as the units, comprising of decks, bulkheads, equipment seats, penetrations and system supports.
- Completed specific features such as yardarms, bridge wing and RAS bulwarks, shaft bracket fairings, plus SATCOM sponsons and associated installation structures.
- Integration of mechanical systems, such as the radar, SATCOM & combat systems and life raft.

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