Submarine Concept Design

In uncertain economic times, submarine concept design becomes an increasingly important phase in meeting the demand for cost effectiveness in defence procurement, with the majority of programme costs being committed in early design stages.

In order to make key decisions early in the programme and ensure that value for money is achieved, requirements and the manner in which they are met in the design need to be fully understood and possible trades identified in order to ensure that capability requirements are met, the chosen design is suitable for construction within the constraints of available technology, and that resources and costs are available and affordable.

Due to the inherent complexity of modern submarines, the process of selecting a single preferred design requires the iterative process and comparison of a decreasing number of multiple design strategies in terms of:

• Technical and performance characteristics feasibility;
• Total cost of ownership implications (includes Non-Recurring Expenditure, Unit Production Costs and Through Life Costs);
• Programme implications;
• Design strategy risks;
• Commercial procurement strategies.

The submarine team at BMT is able to boast a comprehensive array of submarine design tools, processes, and skilled people. BMT has successfully helped numerous government organisations, both in the UK and overseas, make key decisions both in terms of new builds and feasibility studies for modifications to in-service submarines. Some key examples include:

• Future Submarine technology opportunities studies;
• Future SSBN Concept Phase support;
• Batch 2 Trafalgar Class, now Astute Class, concept and successful bid design; Design maturity review prior to entering into detailed design phases;
• Submarine life extension and capability upgrade feasibility studies.
Design Methodologies
BMT’s flexible and professional approach encourages innovation, an essential feature of concept design. Our proven set of methodologies, tools and processes include:

**Early Stage Submarine Design Development Tools and Experience**
We can bring the right experience to assess submarine design feasibility, including identifying sensitivities and risks, and outlining options and mitigation strategies. BMT’s in-house tools together with our experience, allow the rapid analysis of multiple design strategy options, including but not limited to:

- Submarine sizing, balancing, performance analysis and development of principal characteristics;
- Margins definition and management;
- Weight estimation;
- Hydrostatics, trim and stability analysis;
- General Arrangement development;
- Structural design including early stage pressure hull design;
- Resistance and propulsion estimates and analysis;
- Manoeuvring and control assessments;
- Platform system development;
- Combat system definition and integration.

**Technology Management & Support**
BMT Technology Management capabilities provide an essential management mechanism to effectively mature and integrate emergent technologies within candidate systems and assets. The identification and mitigation of development risks, and the integration of technologies within whole system or platform concepts, is incorporated into the BMT whole submarine design process. The BMT approach to Technology Management critically assesses the maturity of candidate technologies and identifies those development activities that must take place to mature and demonstrate them within suitable timescales in order to support costing and programme development.

**Submarine Costing and Programme Development**
BMT has the people with the skills, knowledge and information required to develop robust design and build programmes and understand the total cost of ownership of potential design options during the early design stages.

Combining our independence, innovation and growing portfolio, BMT’s knowledge and expertise is being recognised by customers around the world. BMT has the vision, tools, people and experience to undertake the activities required as part of a submarine feasibility study or concept design. BMT has a proven track record of helping customers develop their requirements and ensuring they get the right capability at the right price.