Submarine Concept Design

Early stage design is an essential phase in the decision process for submarine programmes, both in terms of new builds and for feasibility studies of modifications to in-service platforms. At BMT Defence Services, we have a strong track record in successfully helping UK and overseas government organisations with this phase of development.

Design Philosophy

Due to the inherent complexity of modern submarines, the process of selecting a 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 including Non-Recurring Expenditure, Unit Production Costs and Through Life Costs
- Programme implications and design strategy risks
- Commercial procurement strategy

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. As part of this, possible trades need to be 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.

Combining our independence, innovation and growing portfolio, BMT’s knowledge and expertise is being recognised by customers around the world. 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;
- Independent design maturity review prior to entering into detailed design phases.
- Submarine Life Extension (LIFEX) and capability upgrade feasibility studies.

The submarine team at BMT Defence Services use a comprehensive array of submarine design tools and processes, and also houses a team of skilled people with extensive submarine design and engineering experience.
Design Methodologies

BMT’s flexible and professional approach encourages innovation, an essential feature of concept design. Our proven set of methodologies, tools and processes:

- Early stage submarine design development tools and experience.
- Technology management and support.
- Submarine costing and programme development.

Early Stage Submarine Design and Development Tools

We can bring the right experience to assess submarine design feasibility. This includes identifying sensitivities and risks, outlining options and mitigation strategies. BMT’s in-house tools together with our experience, allow for the rapid analysis of multiple design strategy options:

- Submarine sizing, balancing, performance analysis & 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 and Support

BMT’s 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.