Submarine Life Extension (LIFEX)

Changing fiscal and operational environments can put pressure on existing submarine programmes, often resulting in the need to extend the life or roles of current platforms. At BMT Defence Services, we work with Operating Authorities and industry alike to help get the most out of existing platforms.

Platforms are traditionally designed to a defined service life, with commissions and upkeep periods scheduled along the way. However, even where new platform procurement programmes exist, there is often the need to enhance capability or expand the role of existing fleet assets beyond their original design life.

BMT Approach

The objective of any submarine life extension programme is to ensure that the vessel remains tolerably safe and meets the required state of readiness. Capability needs must also be met if the platform is to be operated beyond its original design intent. In addition, life extension projects can also mitigate future programme delays and capability gaps, whilst managing current or potential budget overruns.

From strategy and policy development, performing technical assessments to acting as independent assessors, BMT’s team of highly knowledgeable Suitably Qualified and Experienced Personnel (SQEP) use proven methodologies to:

• Understand performance, cost and programme factors.
• Appraise options: evaluate, accept and independently assess extensions to submarine in-service life beyond original design intent.
• Provide assurance that life extensions are tolerably safe and capability needs are met.

When it comes to keeping an asset active longer, there are a number of options available to Operating Authorities. BMT has developed and applied various approaches to assess the feasibility of life extension for submarines. Such methods provide operators with the confidence that all limiting factors have been adequately assessed and that appropriate actions have been put in place to ensure that the submarine remains tolerably safe, available and capable throughout the LIFEX period.

Submarine LIFEX Considerations:

Technical

• Safety, Age Related Degradation Mechanisms, Marine Engineering Systems Integrity, Structural Integrity, Component Life and Availability, Electrical Cable Life, Margin Management, Obsolescence, Legislatory & Regulatory Compliance, System & Equipment Upgrade, Equipment Support.

Non-technical

• Submarine Enterprise Factors, Crew Morale, Infrastructure Availability, Manning, Fleet Availability, Partnering, Financial Planning, Foreign Policy, Training, National Pride.
Vanguard Class SSBN LIFEX (VLIFEX)

Vanguard Class was originally designed for a service life of 25 years, comprising three commissions of approximately seven years each, interspersed with two major upkeep periods. Service life was extended to 30 years+ following the UK Strategic Defence and Security Review, a consequence of improvements in reactor core design and the need to maintain deterrent capability pending future submarine programme introduction into service.

The VLIFEX activities undertaken by BMT defined the work needed to ensure that various equipment and structural elements would achieve the life extension and functionality to support a third commission. The output consisted of a programme of work to be undertaken at Deep Maintenance Period (DMP) that would ensure system functionality and availability throughout the extended life. Delivery was built around two packages of work:

- Engineering assessment of the individual components, equipment and structure to achieve the required functionality through to end of life.
- Provision of evidence to justify the continued safe operation of the platform systems through to end of life.

Through study review work supported by a series of workshops and decision conferences, preferred options to mitigate the threats to VLIFEX were identified. These decisions were based on safety, cost, availability and impact on the DMP.

ULA Class SSK Ship Life Extension Programme (SLEP)

BMT has supported the Norwegian Defence and Logistics Organisation (NDLO) with LIFEX studies for their ULA Class submarines. The technical support provided by BMT helped the NDLO to understand the feasibility, risk, limitations and trade-offs associated with extending the life of their submarines beyond the planned design life. The outputs of the initial ULA study informed much wider capability and programme related decisions, ultimately contributing to high level decisions on the options for future submarine capability.

© BMT Defence Services 2014
All information contained within this datasheet is the copyright of BMT Defence Services
SBPD003-04/14

LIFEX CORE COMPONENTS

- **DESIGN LIFE INFORMATION**
  Understanding equipment and systems that would require replacement in a LIFEX supporting work package.

- **EQUIPMENT FAILURE CRITICALITY**
  Determining probability and severity of equipment failure critical to submarine operation and safety.

- **DESIGN REVALIDATION**
  Assessing design revalidation costs and feasibility.

- **MAJOR HAZARDS ASSESSMENT**
  Understanding management mechanisms to ensure availability and inform LIFEX management options and safety case.

- **OBSOLESCENCE MANAGEMENT**
  Submarine cost and supportability improvement via the identification and mitigation of obsolescence issues through all project life cycle stages.

- **LEGISLATION COMPLIANCE**
  Design adaptation to suit new or changes in compliance such as environmental and safety legislation.

- **LIFEX MANAGEMENT OPTIONS (LMOs)**
  Developing options to provide the actions needed to manage each equipment or issue and reduce likelihood and impact of future LIFEX issues.

- **PERFORMANCE, CAPABILITY AND COST TRADES**
  Defining capability/cost profiles for each LIFEX Management Option.

BMT Defence Services
Bath, United Kingdom
Tel: +44 (0) 1225 473600
Fax: +44 (0) 1225 448714
Email: submarines@bmtdsl.co.uk
Web: www.bmtdsl.co.uk