



“Where will our knowledge take you?”

University of Bath Industrial Placement Quarterly Report

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1. INTRODUCTION

1.1 Since October 2013, work within the Submarines Team of the Naval Engineering department at BMT Defence Services Limited (BMT DSL) has progressed on projects outlined within the first Industrial Placement Report (Ref 1). Further work also began for a range of other tasks, and has been supported by frequent visits to Royal Navy bases and commercial production and support sites.

1.2 Company Profile

1.2.1 BMT DSL is a leading independent centre of excellence in defence engineering, delivering complex engineering and design capabilities for UK and international customers. One of the few external organisations named by the Ministry of Defence (MOD) as a Delegated Naval Authority, BMT DSL is at the cutting-edge of technology and science. Based in Bath, BMT DSL is a part of BMT in Defence and is a subsidiary of BMT Group.

2. TECHNICAL WORK AND EXPERIENCE

2.1 Project Work

2.1.1 The very nature of an engineering consultancy has ensured the opportunity to continue working on several widely varied projects across the naval defence industry. As part of day-to-day business, contributions were made to several open tasks spanning project stages from the delivery of bid and contractual information, to quality assurance and final delivery.

2.1.2 In parallel to continued involvement in a raft of ongoing tasks, personal contribution to engineering technical work over the last quarter has focused on three primary jobs:

a. Condenser Modelling

Working with the In-Service Submarines (ISM) directorate of the Ministry of Defence (MOD) Defence Equipment and Support (DE&S), BMT DSL developed a model for the conditions within a steam condenser of the propulsion system across multiple in-service vessels in response to a range of potential scenarios. The model was built using a combination of Microsoft Excel and MATLAB, calling on heat transfer theory derived from first principles, calibrated with data recorded during in-service, and validated against data collected during sea trials.

b. Chilled Water Flowmaster Modelling

One of the major challenges associated with working on platforms designed and built decades ago is the unavailability of electronic data you would normally expect to have with a recently computer-designed equivalent. BMT DSL was tasked via the Submarine Support Management Group (SSMG) (a marine technology support services group comprised of commercial industry experts for the MOD) to produce an electronic model of the vast chilled water cooling system on-

board an in-service class of submarine. Hundreds of drawings initially produced by scanning a physical scale model of the system were analysed, documented and used to produce a model in Flowmaster which will be employed to simulate the system's response to a range of situations, identify design weaknesses and propose alterations.

c. Submarine Production Risk Based Surveillance Plan

The most recent class of the UK's nuclear powered attack submarine is being built by BAE SYSTEMS Maritime – Submarines (BAES MS) at their shipyard in Barrow-in-Furness. The Submarine Production (SM-P) branch of DE&S's Directorate Submarines (DSM) oversees the entire build process from a commercial and technical perspective. Based permanently on-site, SM-P's Assurance and Acceptance team (SM-P-AA) provide confidence that the platform is being produced to design and to an acceptable quality following stringent build procedures. SM-P-AA verify product integrity independently from BAES MS. To facilitate and optimise their surveillance activities, BMT DSL have developed a refreshed risk-based surveillance plan to mitigate the risk of defect inclusion. A software solution was developed, providing SM-P-AA with an electronic application to plan and record surveillance activities in a centralised, configurable and versatile manner.

2.2 Off-Site Visits

2.2.1 Following a visit to HMNB CLYDE in Scotland last year, multiple further visits to Royal Navy, MOD, BAES and Babcock International sites have supported work across several projects including half a dozen multi-day trips to the BAES shipyard in Barrow-in-Furness last quarter for the project outlined in Paragraph 2.1.2c.

2.2.2 Of particular interest was a visit to HMNB DEVONPORT to conduct surveys on submarines currently undergoing extended maintenance. In addition to providing further insight into the practicalities of work on a nuclear powered submarine, subsequent visits to the factories and workshops on-site to see the procedures involved in turbo-generator maintenance were extremely educational.

2.2.3 In day-to-day work there continues to be many occasions to work from DE&S and SSMG offices within the MOD Abbey Wood site in Bristol.

3. CONCLUSION

3.1 Work as a placement naval engineer in the Submarines Team of BMT DSL has continued to provide varied and fascinating exposure to the narrow and yet vastly complex world of submarine design, build and operation, as well as the naval and defence engineering sectors as a whole. With multiple prospective jobs forthcoming, the remaining months at BMT DSL will undoubtedly reveal a host of new challenges and uniquely valuable experiences.

4. REFERENCES

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- 1 Usborne, J., University of Bath Industrial Placement Quarterly Report, October 2013