DMTC
DEFENCE MATERIALS TECHNOLOGY CENTRE

DMTC Ltd
Level 2, 24 Wakefield St
Hawthorn, VIC 3122
Australia

Ph: +61 (3) 9214 4447
www.dmtc.com.au

Submission by the Defence Materials Technology Centre (DMTC Ltd) to:

Part II of the inquiry: The future sustainability of Australia's strategically vital naval ship building industry.

Introduction

The Defence Materials Technology Centre (DMTC) was established by the government of Australia in 2008 under the Defence Future Capability Technology Centre Program. Its original term was 7 years but it has in recent years been awarded supplementary contracts for platform-specific development activities. Furthermore, DMTC's core contract was has recently extended for three years in line with the policy of conducting research and development programs linked to specific platform outcomes. The Mission of DMTC is:

> *"Through industry-led collaborative research programs, to develop and deliver advanced materials/manufacturing technology that is incorporated into Defence industry products and services".*

Executive summary

The challenges faced by shipbuilding enterprises in Australia are well-documented, and include issues of productivity and efficiency which DMTC suggests are substantially traceable to manufacturing tempo and issues relating to ongoing access to technology improvements and skills development.

DMTC is well placed to provide technology expertise and support to develop and sustain the manufacturing and design of naval platforms in Australia. DMTC's model utilises co-investment from the Defence customer, the industry and research sector to drive capability improvements delivered through industry, particularly through supply chain improvements and skill enhancements of the local workforce. DMTC programs are defined with input from key Defence agencies including DSTO, DMO and CDG. It has demonstrated its ability to provide technical solutions which enhance performance and productivity across the defence industry. It has also generated a

substantial cohort of engineers who are ready to take on the challenges of future defence manufacturing and through life support needs.

Background

DMTC has been successfully engaged with the Australian Defence industry and the key research providers for the last 7 years with a range of research & development and technology insertion programs across the Land, Air and Maritime domains. Some examples of its research in the naval shipbuilding area include:

- Detailed Investigation of candidate high strength steels for submarine hulls.
- Investigation of candidate steels for surface ship construction
- Development of low distortion – high productivity joining technology for surface ship fabrication.
- Lean manufacturing and robotic applications for shipbuilding.
- Corrosion in marine environments.
- Repair and surface treatment of Nickel Aluminium Bronze.
- Joining and additive manufacture of titanium alloys.
- Novel sonar sensors.

More details of some of these projects are provided in appendix 1 and in DMTC publications listed on the company web site[1]. DMTC programs are collaborative, involving the Defence customer at the program definition stage, with capability delivered to Defence by industrial partners with no compromise to the open competition principle.

DMTC's activities focus on development of industry capability, rather than a specific product. As such, the model offers Defence the opportunity to invest in industrial capability development and skills improvement in a pre-competitive environment. In this manner, platform independent activities (such as, for example, welding productivity improvements) can be addressed independently of design or prime contractor considerations, by focusing on supply chain improvements.

Much of the work of DMTC is 'cross platform' enabling the research results and technology to be transferred from one area to another, with several examples where industrial capability developed in on sector has been readily transferred across to another. DMTC's welding and production automation capability – initially developed for land platforms but later successfully transferred to the maritime sector, armour materials, advanced welding technology, corrosion prognostics for aerospace, surface engineering and additive manufacture are all examples of developments which can be utilised in naval shipbuilding.

DMTC also has a significant education program which seeks to develop both technical and business enterprise expertise in defence materials and manufacturing. In the last 6 years it has sponsored in excess of 30 post graduate students who are now entering

[1] http://www.dmtc.com.au

the workforce – many into industrial roles - with appropriate skills and expertise to support the Australian defence industry. The DMTC Education program was recently cited[2] as providing an example of best practice in postgraduate research education and professional development training. In addition DMTC is a partner of the recently established ITTC RTCNDM (ARC Research Training Centre for Naval Design and Manufacturing) which aims to provide 10 postgraduate students and 3 post-doctoral researchers with research and industrial experience specifically in the naval shipbuilding, manufacturing and design space.

DMTC's model utilises research and development activities and as such is particularly well suited to longer term research projects. The DMTC IP model ensures however, that it has developed expertise and technology which may be deployed rapidly and even longer projects have often resulted in progressive improvements in productivity during the course of the investigations.

Conclusion

DMTC was established to provide support for future defence manufacturing programs in Australia. It has already demonstrated its capabilities in this area and can provide significant support to a reinvigorated naval shipbuilding industry. It has established extensive linkages in the defence industry supply chain and appropriate research providers (see Appendix 1) and a track record of industry-driven capability improvement programs (see Appendix 2) which can join to provide an excellent support network for future projects.

I welcome the opportunity to discuss this submission further.

Yours sincerely,

Mark Hodge
CEO

[2] http://docs.education.gov.au/documents/initiatives-enhance-professional-development-research-students

Appendix 1 List of DMTC and ITTC RTNMD partners and associates

Australian Defence Apparel	**Levett Engineering**
ASC	**Pacific ESI**
ANSTO	**PMB**
ADI	**Quickstep**
AVOCA	**QUT**
AMOG	**RMIT**
BAE Systems Australia	**Rosebank Engineering**
BMT	**RIAS Technologies**
BlueScope Steel	**Sutton Tools**
Bisalloy	**Swinburne University**
Babcock Defence	**Seco Tools**
Bruck Textiles	**Seal Solutions**
CSIRO	**Thales**
CUC	**University of Queensland**
Composite Materials Engineering	**University of Melbourne**
DSTO	**University of Tasmania**
Forgacs	**University of Wollongong**
Formero	**United Surface Technologies**
Flinders University	**VCAMM**
Henkel	**Ventou**
Hardchrome	**Vipac**
Heat Treatment Australia	

Appendix 2: Some Examples of recent projects

Robotic automation, threat modelling, armour alternative and refined welding practices for Thales Bushmaster.

This group of projects were initiated some 6 years ago at the commencement of DMTC. Their success may be judged by the award of the 2013 Australian Museum Eureka prize. The DMTC team developed a novel automated offline programming system for the Bushmaster welding cell which increased the number of welds which could be achieved from around 30% to 95% with a major impact on productivity and design flexibility. This improvement was enhanced by a detailed investigation of welding procedures and the development of a more cost effective approach. Thales design teams also benefited from new blast and ballistic modelling tools provided by DMTC.

Robotic automation in shipbuilding

DMTC has recently completed a study of robotic fabrication techniques for naval shipbuilding and together with RTCNDM is currently investigating the application of robotic inspection for sustainment of submarine sections. This work is informed by the land platform developments described above.

Low Distortion Welding System

DMTC undertook a rapid investigation of deck plate welding processes to reduce distortion. It was shown that by employing the new tandem Gas Metal Arc welding process rather than traditional Submerged Arc welding gave significant reductions in distortion and post weld rectification. Forgacs purchased a system and DMTC assisted with initial trials which were promising. Unfortunately due to changes in delivery schedules and inappropriate shop layout the system could not be fully exploited. This type of system is used internationally in similar applications and could be deployed in future designs with appropriate installation changes. DMTC has continued to work on further developments in this area including in situ techniques for distortion control.

Repair, reclamation and surface treatment of Nickel Aluminium Bronze (NAB)

Nickel aluminium bronze is used in marine environments for propulsion components and seawater valves. In spite of its inherent corrosion resistant properties it may suffer service damage due to cavitation, abrasion or impact. Work to date has shown that robotic weld repair of 3D surface damage is feasible. It has also been demonstrated that post weld treatment by thermal means and friction stir processing may be used to enhance surface performance. A novel technique using equal angle pressing has also been developed to recycle NAB machining chips into material suitable for bolts and studs.