MARITIME AND NAVAL SHIPBUILDING TECHNOLOGIES

SOVEREIGN SHIPBUILDING CAPABILITY FOR AUSTRALIA

The DMTC Maritime Program provides a strategic framework that ensures that our industrial R&D programs are appropriate, aligned and applicable across the continuous national naval shipbuilding enterprise. This ensures alignment with Defence's stated ambition to establish a sovereign and sustainable shipbuilding capability for Australia.

The structure of the DMTC Maritime Program continues to evolve with the needs and requirements of the Naval Shipbuilding Plan, but has five guiding principles:

- reduce manufacturing costs (costly rework, weld distortion, modern joining techniques, automation);
- increase material strength requirements (weight savings, broader operating environment);
- increase performance (next generation sonar, high strength steels, corrosion resistance, multifunctional materials, power and energy applications);
- support current fleet availability (corrosion management, repair, life extension); and
- provide detailed defence sector studies including industry and research capability and capacity to meet specific Naval Continuous Shipbuilding requirements.

DMTC's Maritime Program is guided by a series of Defence-commissioned Horizon Studies that cover the full Hunter Class program lifecycle, and also take into account considerations from the broader Continuous Naval Shipbuilding program. The Horizon Studies identify key industrial R&D initiatives and interventions covering materials, system equipment technology and industry development (competitiveness and resilience).

DMTC's industrial R&D initiatives are managed under DMTC's program management and partnering arrangements, backed by both ISO 9001:2015 Quality System and ISO 44001:2017 Collaborative Business Relationship Management Systems accreditation. DMTC's model is specifically designed to facilitate multi-party collaborative industrial R&D projects involving industry partners, research organisations and Defence and national security customers.

Case Study:
Advanced Joining & Production Techniques

DMTC has conducted extensive programs of work, through various industry partners (Naval Group, Forgacs, Bluescope and Bisalloy), and research partners (University of Wollongong, ANSTO and DST Group), in developing lean automation technology for advanced manufacturing of maritime defence components and assemblies, including:

- material characterisation of various maritime steels and other specialist maritime materials;
- advanced joining techniques;
- active weld distortion control techniques for complex component geometries;
- weld and distortion simulation modelling;
- robotic application and fixtureless jigging; and
- rapid and robust programming techniques.

Case Study:
Breakthroughs in Surface Coatings

DMTC is working with partners MacTaggart Scott Australia, United Surface Technologies and Swinburne University along with DST Group to develop and characterise high velocity oxygen fuel (HVOF) coatings for maritime applications. The project has developed industrial capability across an in-country supply chain of SMEs and demonstrated that HVOF can be used to apply single layer carbide-based coatings to naval hydraulic components. These coatings offer improved performance and cost reductions over current coating solutions through the option to repair – as opposed to replace - key marine hydraulic components of naval platforms. This promises significant savings to Defence in through-life (sustainment) cost of ownership and improved in-service availability of platforms.

Case Study:
Next Generation Sonar Materials

The need for improved performance of sonar systems is driven by the increasing stealth of modern naval platforms, and the need to operate in the harsh acoustic environment of littoral waters. DMTC has invested significantly, through Thales Underwater Systems, ANSTO and the University of Wollongong, in the development and production - in Australia - of single crystal piezoelectric ceramics for the latest generation of acoustic transducers to improve the sensitivity of sonar equipment. Various methods for producing single crystals exist, however their industrial viability is limited by compositional uniformity and reproducibility, crystal size, crystal growth rates and post growth processing. Demonstrating large-scale processing capacity and repeatability will ensure a sovereign and enduring industrial capability to design and fabricate next-generation sonar equipment.

Case Study:
Steel Sector Study

DMTC, on behalf of CASG, conducted an assessment that confirmed the capacity of the Australian steel industry and the feasibility of it supporting Australia's Continuous Naval Shipbuilding and Future Submarine programs. DMTC reviewed the steel requirements of these programs that included plate steel grades and thickness profiles for the range of elements of ship and submarine production, and approximate volumes and demand profiles for each. This information was then mapped against the capability and capacity of the Australian steel industry (and its supply chain) to meet these requirements.

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