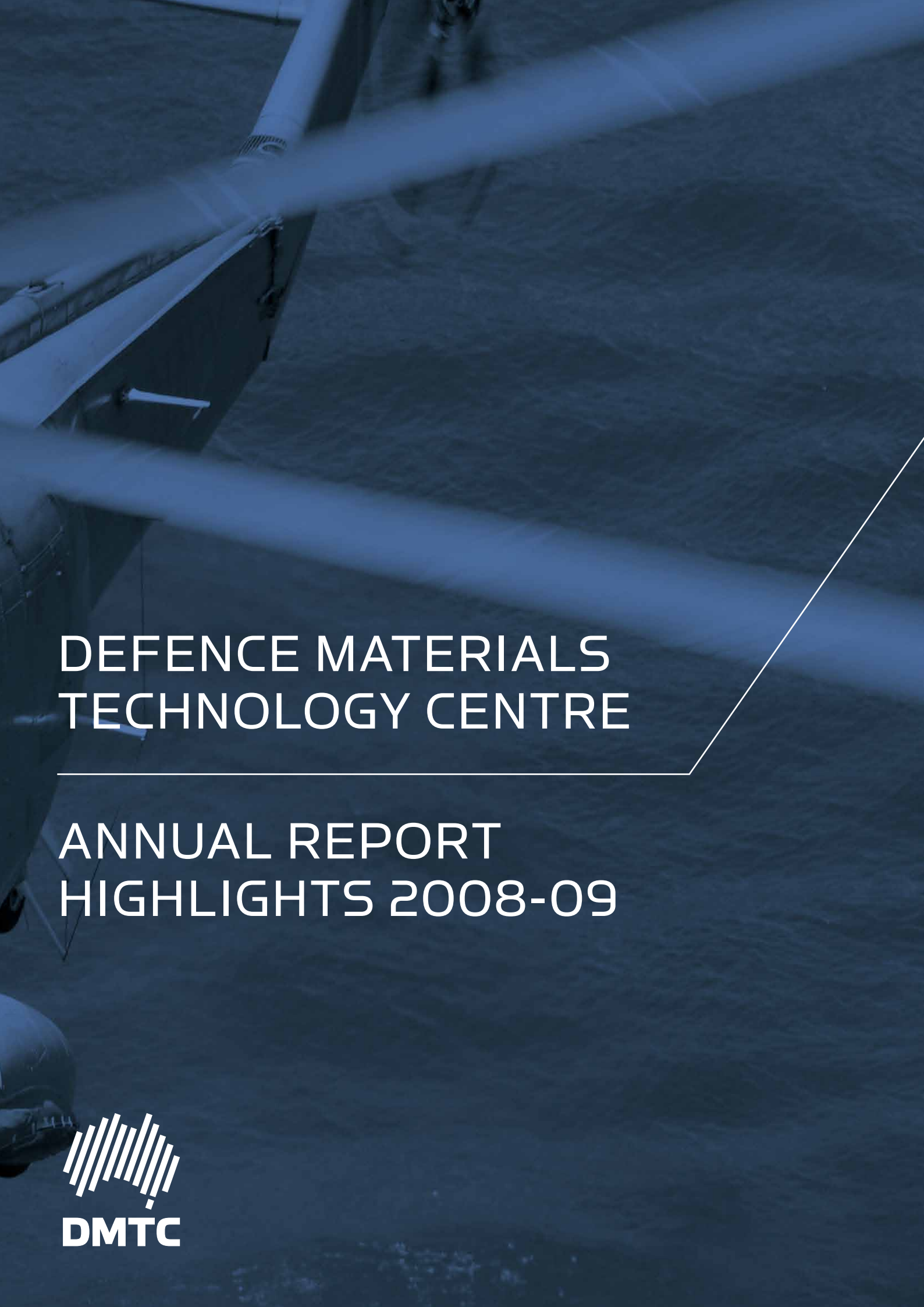


DEFENCE MATERIALS TECHNOLOGY CENTRE

ANNUAL REPORT HIGHLIGHTS 2008-09

DMTC

CAPABILITY THROUGH COLLABORATION

VISION

PROVIDE TECHNOLOGY SOLUTIONS ENABLING INDUSTRY TO ENHANCE AUSTRALIAN DEFENCE CAPABILITY

MISSION

THROUGH INDUSTRY-LED, COLLABORATIVE RESEARCH PROGRAMS, DMTC WILL DEVELOP AND DELIVER ADVANCED MATERIALS AND MANUFACTURING TECHNOLOGY TO DEFENCE INDUSTRY PRODUCTS AND SERVICES

CONTENTS

CHAIRMAN'S REPORT

DMTC was created under the Commonwealth Government's policy to develop and maintain a strong indigenous industry base to support the activities of the Australian Defence Organisation.

The concept behind DMTC is to harness the best materials science and engineering expertise available across Australia's research institutions; universities, government laboratories, and CRCs, and apply that expertise to the benefit of defence industry. Using that expertise, DMTC is developing new technology specifically directed towards the needs of its defence industry participants, particularly in the areas of design, manufacturing, and through-life support of Defence equipment. DMTC has 17 research projects underway at the end of its first year.

DMTC was established in June 2008 and now has 14 Core and 13 Supporting Participants, which include two of Australia's principle multi-national defence companies, and three other defence related companies. It has an elected, skills-based Board of Directors, and a small, focussed management team headed by the CEO. In its first year, the Board has adopted a code of practice for governance and established policies for the operation of the Centre, and has commenced development of a strategic vision for its future development. The Board is committed to ensuring that the Centre is run in the interests of the participants to enhance future defence capability through provision of relevant, ground-breaking, materials technology to defence industry. Dialogue with participants is crucial to understanding their interests, and a range of participant interaction processes at various levels are being implemented.

The Centre has had an excellent first year, meeting the majority of initial milestones. It is now poised to deliver some highly relevant new technology that will contribute strongly to defence capability. On behalf of the Board, I would like to thank all participants for their commitment and contributions to the Centre, and their excellent co-operation in our first year of operations.

DR PETER PRESTON

CEO'S REPORT

The challenges involved in generating a smooth pathway to utilisation from innovation and new technology is well documented, and becomes even more complex in the defence sector, where export restrictions, national security overlays and government equity in intellectual property are taken into account. The establishment of DMTC represents an important step in this process.

Australia currently enjoys a significant capability advantage relative to other countries in the region, and the investment in technology and indigenous research and development plays a significant role in delivering this advantage. DMTC was established specifically to improve acquisition and through-life support outcomes for the Australian Defence Organisation by improving industry capability through a pathway of technology insertion and adoption, thereby playing a key role in protecting Australia's defence capability edge.

DMTC's goal is to make a measurable contribution to Australian defence industry capability. We will do this by providing an integrated, coordinated mechanism of research and development to support streamlined take-up of materials and manufacturing technology in the defence sector. In our first year, we have made significant strides towards our goal, with the Centre fully established and all of our programs operational and delivering on Commonwealth milestones.

DMTC is a complex organisation with 14 Core Participants and several additional Supporting Participants, and establishment of the organisation has depended to a significant degree on a strong spirit of co-operation and shared purpose. This would not have been possible without our partners and in this context I acknowledge the flexibility and contributions of our partner organisations.

I have great pleasure in presenting DMTC's inaugural Annual Report Highlights 2008-09 and look forward to continued opportunity to build capability for the Australian defence sector.

DR R. MARK HODGE

OVERVIEW

- In May 2008, the Defence Materials Technology Centre (DMTC) was established as a corporate entity – a public company limited by guarantee.

- A Chairman, Board of Directors, CEO and five centre staff were appointed and the company established its headquarters at the Swinburne University of Technology in Hawthorn, Victoria.

- DMTC conducted its official launch event on 19 February 2009, notably as Australia's first Defence Future Capability Technology Centre. This launch was particularly successful and was attended by several Commonwealth and State Ministers, senior Defence and defence industry personnel from around Australia. The event received broad coverage in print, radio and regional television media.

- The first DMTC Participant Workshop was held in Bendigo in February 2009, attended by all Core Participants and several Supporting Participants.

- DMTC acquired and established a world-class tool coating facility to support project efforts aimed at developing and commercialising new and unique multilayered ceramic coatings for high-precision, high throughput component fabrication for the defence sector. While the project activities are being delivered through the Air Platforms Program, DMTC anticipates significant additional benefit from this facility will be felt across all DMTC programs, once the facility is fully utilised. The new machine will be critical to ensuring Australia's defence industry remains competitive and innovative in world markets.

- Seco Tools, Millatec and the University of Queensland successfully collaborated in a DMTC project to reduce machining time for high-precision stainless steel components. The project decreased processing time to 33% of its original value, thereby providing Millatec with a significant commercial advantage.

- A preliminary algorithm was developed for remote automated composite defect detection in aerospace components. This will provide end users, such as GKN Aerospace with a competitive advantage in the level and cost effectiveness of the design and qualification services it provides.

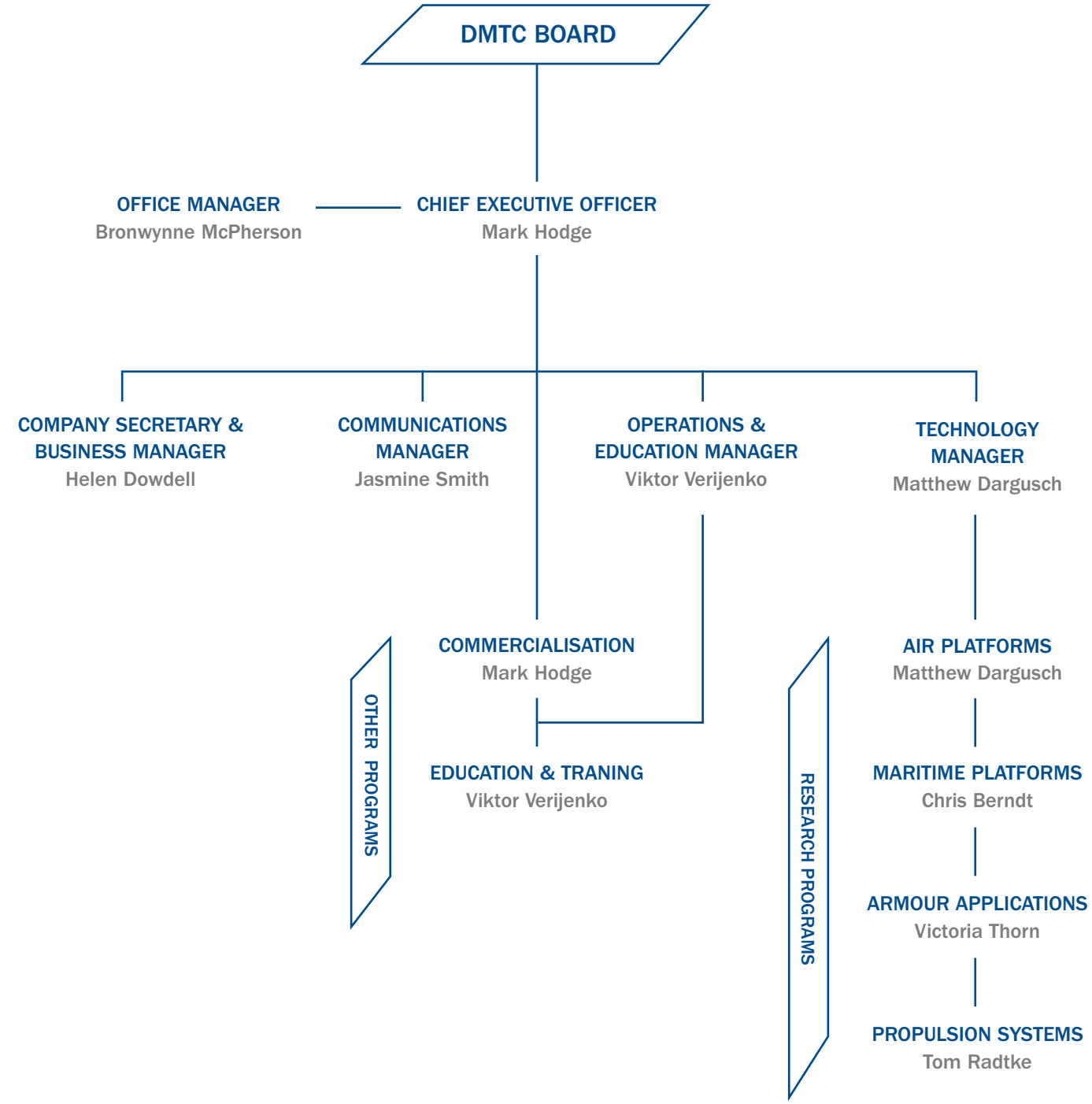
- The hypersonic leading edge and rocket vane environment has been characterised as part of a project involving BAE Systems, allowing commercial, off-the-shelf materials to be evaluated on a fit-for-purpose basis to support missile development activities.

- Candidate materials and materials systems have been down-selected for a range of land vehicle and personnel armour applications.

- The design concept for a composite materials application in conformal antennae on maritime patrol aircraft has been completed, and materials selection and development activities are underway. This technology will find wide applicability across a range of platforms and systems, including surface ship and maritime helicopters.

- A Defence Advisory Panel was established to provide guidance to DMTC management on issues of strategic direction, and to provide ongoing Defence context to DMTC activities. The Panel provides a valuable forum to discuss pertinent developments in Defence and their likely impact on current and future project strategies.

COMPANY STRUCTURE



BOARD

DR PETER PRESTON, CHAIRMAN

Dr Peter Preston has been a professional scientist for almost 40 years and involved in the research and analysis of Defence operations for more than 30 years. Dr Preston holds a Bachelor of Science from UQ, and a Master of Science and PhD from the University of Melbourne. From 1987 until his retirement in 2000, Dr Preston held a number of senior positions across a range of divisions within DSTO. He chaired the Defence Technologies of Australia Pty Ltd (1994-97) and the CRC for Advanced Composite Structures Ltd (2003-07). Dr Preston is a fellow of the Royal Aeronautical Society and a member of the Australian Institute of Company Directors (AICD).

DR ROGER LOUGH, AM, DEPUTY CHAIRMAN

Dr Roger Lough has been a Defence Scientist for over 45 years. He has a PhD in physical chemistry from the University of Adelaide. He originally worked in rocket propulsion and then guided weapons. He led several Divisions in the Defence Science and Technology Organisation (DSTO) from 1987 to 1999, before becoming First Assistant Secretary Science Policy at DSTO HQ. In 2001, he became Director of the DSTO Laboratory at Fishermans Bend in Melbourne and, in 2003, Chief Defence Scientist and CEO of DSTO. He retired from the public service in July 2008. He is a fellow of the Academy of Technological Sciences and Engineering (ATSE) and holds a graduate diploma from the AICD. He was made a Member of the Order of Australia in 2009.

MR FRED ESKE AM, DIRECTOR

Mr Fred Eske has more than 35 years' experience in Defence aerospace and industry in a range of engineering, project and business management roles. He studied Aeronautical Engineering at RMIT and post-graduate studies in Business Administration at the University of NSW. He served in the Royal Australian Air Force as an engineering officer for 20 years in fast jet and helicopter operational, technical and project management appointments in Australia and overseas. In June 1989, Mr Eske was awarded an Order of Australia for outstanding achievements as the Engineering Manager for the acquisition and introduction of the Black Hawk utility helicopter. As a joint owner and director, Mr Eske formed and developed Hunter Aerospace Corporation into a niche aircraft engineering, maintenance, repair and overhaul organisation servicing and supporting Defence and industry. Following acquisition and integration of Hunter Aerospace Corporation into BAE Systems Australia, Mr Eske became a General Manager at BAE Systems, leading a business unit with Defence and commercial contracts at 20 locations around Australia with an annual turnover of $100m. In 2004, Mr Eske was appointed Joint Strike Fighter Manager to lead the company's involvement in the identification, planning and establishment of in-country, through-life sustainment capabilities for the JSF program. Mr Eske is currently BAE Systems' Head of Strategy & Business Development.

AIR VICE-MARSHAL (RETIRED) PETER NICHOLSON AO, DIRECTOR

Mr Peter Nicholson is the Head of Government Relations at BAE Systems Australia. He holds a Bachelor of Engineering from the University of Western Australia and a Master of Public Administration from Auburn University in Montgomery. He retired from the RAAF in 2001 after 33 years' service having served in a variety of operational command and staff positions. Mr Nicholson is a Fellow of the Royal Aeronautical Society and is immediate past president of the Australian Division of the Society. He is a Fellow of Engineers Australia, the Australian Institute of Management, the AICD and is a member of the Society of Experimental Test Pilots.

PROFESSOR JOHN NORRISH, DIRECTOR

Prof John Norrish is Professor of Materials, Welding and Joining at the University of Wollongong. He has a Bachelor of Science in Metallurgy and a Master of Science in Welding Technology, and has worked in welding research for almost 40 years. Prof Norrish is author of Advanced Welding Processes. This book was originally published by the Institute of Physics in 1992. It was revised and re-published in 2006. Prof Norrish has more than 150 published articles in refereed journals and international conferences and is the recipient of many awards including the international E.O. Paton Prize for a lifetime of contribution to welding technology.

MR TONY QUICK, DIRECTOR

Mr Tony Quick was appointed to be the Director of the new Enterprise Connect Defence Industry Innovation Centre (DIIC) in July 2009. The focus of the DIIC will be on improving the competitiveness of Australian SMEs, primarily through productivity improvements and assistance to access the latest research. Mr Quick has spent most of his career in general management, international business development and program management within the aerospace and defence industries in the UK before emigrating to Australia in 2000. Mr Quick was Director and General Manager of GKN Aerospace Engineering Services from 2001 to 2009, a company heavily involved in the JSF program. Mr Quick is Chairman of the Design Victoria Advisory Board and is a member of the Future Manufacturing Industry Innovation Council. Mr Quick is an Adjunct Professor in the School of Aerospace, Mechanical and Manufacturing Engineering at RMIT and recently stepped down from the Board of CRC for Advanced Composite Structures following his departure from GKN Aerospace.

BOARD (CONT.)

PROFESSOR DAVID STJOHN, DIRECTOR

Prof David StJohn is Chair in Materials Processing and Manufacturing and Director, Centre for Advanced Materials Processing and Manufacturing at UQ and Chief Scientific Advisor of the CAST CRC since September 2008. He has a PhD in Physical Metallurgy from Queensland University and has held teaching and research positions at UQ, RMIT and CRA Advanced Technical Development. Prof StJohn was inaugural Chair in Solidification Technology at UQ in 1994 and joined the newly-established CRC in Alloy and Solidification Technology. He was appointed CEO of CAST Metals Manufacturing in 2003 and CAST CRC in 2005 until 2008. Prof StJohn is member of the Minerals, Metals and Materials Society, Materials Australia and the AICD.

MS MERRAN KELSALL, DIRECTOR (RETIRED)

Now an independent company director and executive coach, Ms Kelsall originally qualified as a chartered accountant and worked in a professional practice, including as a partner for 10 years. She has considerable experience in the work of audit, risk and compliance committees and has a particular interest in aligning performance management with corporate strategy. Industry experience encompasses health, education, financial and professional services, including contract management and government utilities. Former appointments include Colonial Limited and Deputy Chancellor of RMIT. Ms Kelsall holds executive or Board positions with the following organisations: Auditing and Assurance Standards Board, Public Transport Industry Ombudsman (Victoria), RACV Ltd, Melbourne Water Corporation, Cuscal Ltd and the National Gallery of Victoria.

DR GEORGE COLLINS, DIRECTOR (RETIRED)

Dr George Collins commenced his current role as CEO of CAST CRC Ltd and Professor of Materials Science at UQ in September 2008. Prior to this appointment, he was Chief of Research at the Australian Nuclear Science and Technology Organisation (ANSTO). From December 2001 to January 2005, Dr Collins was Director, ANSTO Materials & Engineering Science, leading a team of 90 scientists, engineers and technicians involved in a wide range of materials-based and engineering research projects. Dr Collins is also currently a Director of the Welded Structures Foundation and a Board member of the CRC Association. He is President of Materials Australia and an Executive Committee member of the Australian Research Network for Advanced Materials. He is a Director of two start-up companies, MIGfast Pty Ltd and Australian Membrane Technologies Pty Ltd. Dr Collins was appointed as a Director of CAST CRC on 15 September 2008.

MANAGEMENT TEAM

DR R MARK HODGE, CEO

Dr Mark Hodge was appointed inaugural DMTC Chief Executive Officer in June 2008. A professional engineer with a strong background in innovation and technology management, Dr Hodge holds a BEng (Hons) and a PhD (Engineering) from Monash University. He has completed executive management qualifications at the the Ohio State University and the University of Melbourne. In October 2008, he won the Monash Materials Engineering Alumni of the Year award. From 2005-08, Dr Hodge was CEO of Australian Aerospace and Defence Innovations Ltd (AADI) where he regularly engaged international and Australian defence sector stakeholders. Prior to AADI, Dr Hodge led the Victorian Government's commercialisation team in developing a new technology commercialisation support program. He spent five years as Senior Engineer and Director of Research and Development for METSS Corporation, a private defence-sector technology development company in the US, and has lectured at Monash and Victoria universities respectively. Dr Hodge has authored several US patents and is widely published. Dr Hodge is on the Advisory Board of the Sir Lawrence Wackett Aerospace Centre and was recently made an Adjunct Professor of Swinburne University of Technology.

HELEN DOWDELL, COMPANY SECRETARY & BUSINESS MANAGER

Mrs Helen Dowdell has extensive experience in business and financial management. Her skills in the areas of accounting, governance and business practices are fully utilised in her dual role at DMTC as Company Secretary and Business Manager. She is a qualified accountant who holds a BBus from Victoria University and is a member of the Australian Society of Certified Practising Accountants. Previous management roles in the area of finance and related areas include Australian Stem Cell Centre, CRC for microTechnology, National Electricity Market Management Company and ASP Ship Management.

DR MATT DARGUSCH, TECHNOLOGY MANAGER

Dr Matt Dargusch started at DMTC in the role of Technology Manager in late 2008. He has extensive engineering experience in both industry and university roles in the area of product and process development and holds a BSc (Hons), PhD and Grad Cert in Technology Management from the University of Queensland and BEd from Queensland University of Technology. Dr Dargusch is the former manager of Sustainability and Aerospace Programs within the CAST Cooperative Research centre where he earned a proven track record in delivering high impact R&D outcomes. His work is published in numerous industry journals and other publications.

MANAGEMENT TEAM (CONT.)

DR VIKTOR VERIJENKO, OPERATIONS & EDUCATION MANAGER

Dr Viktor Verijenko holds a Masters degree from Kiev Transport University, a PhD from the Kiev Civil Engineering Institute and a Doctor of Science degree from Kiev Polytechnic Institute and State University. Specialising in the fields of structural mechanics and solid mechanics/composite materials, Dr Verijenko was involved in several defence industry-related projects between 1977 and 1991, becoming one of the youngest professors in the former Soviet Union. In 1991, Dr Verijenko joined the University of Natal, in Durban, South Africa where he ultimately founded and directed the Centre of Composite and Smart Materials and Structures and became Head of the School of Mechanical Engineering. Dr Verijenko also established an engineering consultancy focused on research and technology in defence, mining, civil engineering and transport. In 2007, Dr Verijenko moved to Australia to take up the role of Research and Technology Manager at Composites CRC. He was instrumental in writing a research proposal for the successful DMTC bid and in setting up a research program on the application of composite materials. In May 2009, Dr Verijenko joined DMTC as Operations and Education Manager.

JASMINE SMITH, COMMUNICATIONS MANAGER

Miss Jasmine Smith holds a Bachelor of Arts (Journalism) from the University of Queensland and has made her career in the communications and public relations field. After beginning her journalism career in Brisbane writing for various trade publications, Miss Smith joined publisher Octomedia Pty Ltd, where she progressed from newsroom journalist to Editor, then Managing Editor. Titles under her editorship included Industrial Relations & Management Letter, Inside Retailing Weekly and Inside Retailing Magazine. Miss Smith has significant experience in communicating with diverse audiences across print and online mediums. With valuable skills in networking and contacts management, Miss Smith has attended numerous conferences and trade exhibitions during her career, both in Australia and Europe, frequently representing her company at high-level events and meetings. Miss Smith joined DMTC as Communications Manager in July 2009.

BRONWYNNE MCPHERSON, OFFICE MANAGER

Miss Bronwynne McPherson is responsible for the day-to-day smooth running of the DMTC headquarters. Her wide-ranging experience in executive and event management roles adds enormous value to her administrative duties at DMTC. Before starting at DMTC in September 2008, Miss McPherson supported the DSTO Strategic Director responsible for implementing the DFTC program in the role of Executive Assistant.

CAPABILITY DRIVERS

As the first and currently only Defence Future Capability Technology Centre (DFCTC) operating in Australia, DMTC operates in a unique industry and Defence-strategic context.

Defence industry operates in a monopsony market where several producers compete for business with a single customer and consequently that customer exerts considerable influence over the structure, performance and operation of the sector.

Customer influence is critical. Recent research[1] has shown that, like other nations, Australia's defence capability is directly impacted by the amount of resources it devotes to in-country defence related research. By this analysis, Australia currently enjoys an approximate six-year advantage in capability relative to a nation that conducts no internal research and development on its defence requirements and equipment.

In this regard, the investment made in the DFCTC program is a significant step towards integrating the technology development pathway in the sector, with research and development as a strategic enabler of capability development. As the ultimate customer of the technologies developed through DMTC, the Australian Defence Organisation's definition of capability requirements and future purchasing strategies provides a clear articulation of the drivers for DMTC research directions. In this context, several significant developments occurred during the reporting period, each with an impact on the tactical and strategic outlook for DMTC and its partner organisations:

- Defence White Paper (DWP): The Department of Defence released a White Paper on 2 May 2009. The document sets forth overarching strategic directions for Defence for the coming approximate period of 20 years. Purchasing decisions and industry policy flow-downs from this document are of critical importance to defence industry, and therefore also to DMTC.

- Defence Capability Plan (DCP): Following the release of the DWP, Defence also announced plans for the release of an update to the DCP. The DCP outlines purchasing decisions and timetables for a range of Defence materiel, equipment and through life support contracts for the period to 2013, with further estimates for 2019 and beyond. Although this document was released on 1 July 2009, its production was widely anticipated and of considerable importance to the sector.

- Priority Industry Capabilities (PIC): The development and announcement of PICs by Defence identifies several areas in which the customer regards as strategically important in terms of development of industry capability. Several of these areas are of direct relevance to current DMTC program activities, and others are further relevant to the proposed new program in Personnel Survivability.

Providing an underpinning to military capability development and defence industry competitiveness is core business for DMTC, and must remain our unique focus.

As such, our overarching concern is to ensure that our research strategies remain in close alignment with the capability drivers set by and for Defence, and defence industry.

1 — UK MOD Defence Industrial Strategy, p39 (2005)

Photographer: LS Kade Rogers. Image courtesy of the Australian Department of Defence.

PARTNERS

DMTC'S PUBLIC JOINT VENTURE MODEL BRINGS TOGETHER PARTNERS ACROSS DEFENCE INDUSTRY, UNIVERSITIES AND GOVERNMENT RESEARCH AGENCIES.

The collaborative partnerships created under DMTC will contribute significantly to the cost effective delivery of equipment and support to the ADF. Furthermore, DMTC's integrated supply chain provides defence industry participants, large and small, with a clear path to delivering on the specific needs of the ADF. DMTC executed partnership agreements with 14 Core Participants and secured 13 Supporting Participants in its first year of operation.

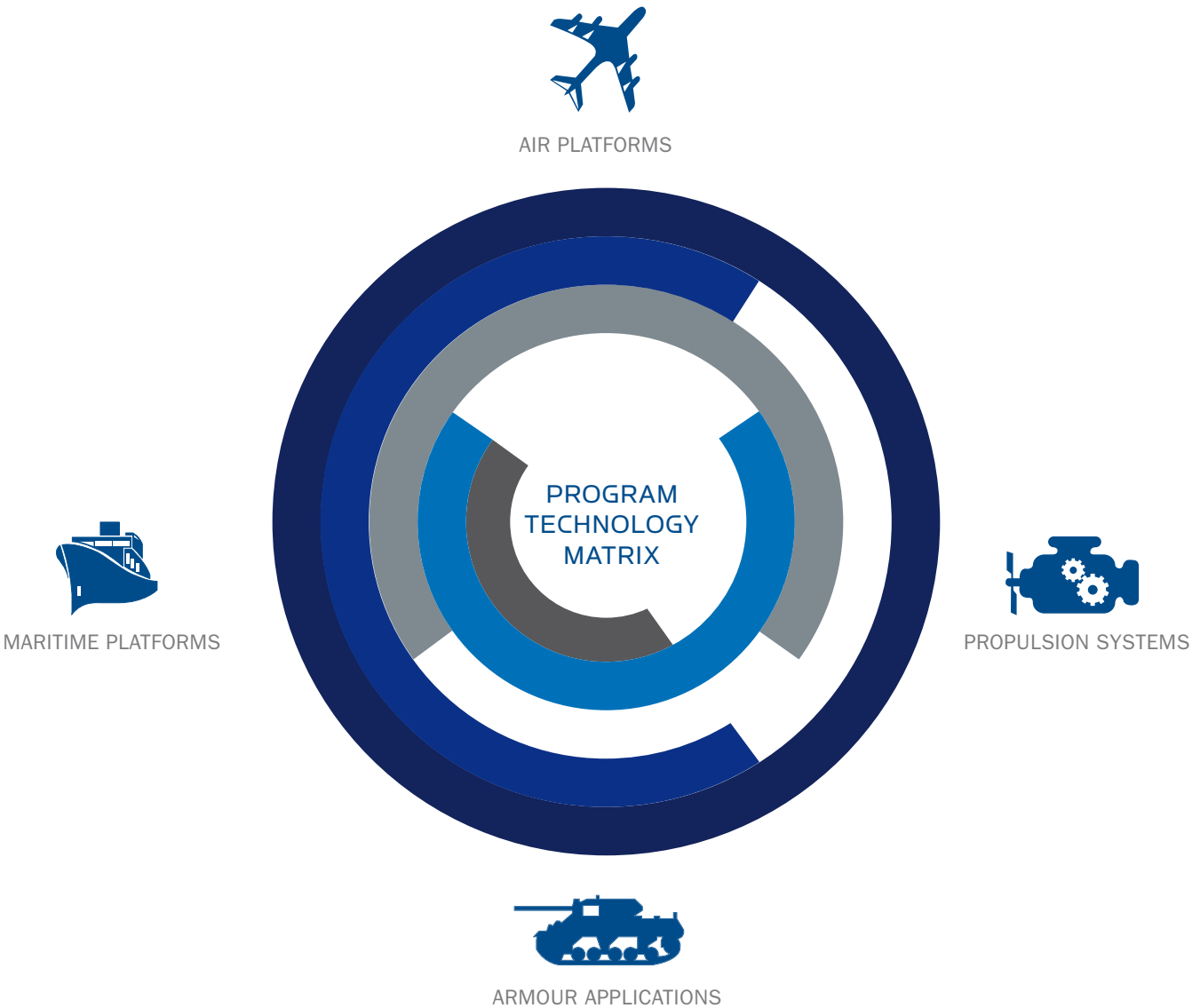
CORE PARTICIPANTS

- ACSA PTY LTD
- ANSTO
- BLUESCOPE STEEL LTD
- BAE SYSTEMS AUSTRALIA LTD
- CAST CRC LTD
- DEFENCE SCIENCE & TECHNOLOGY ORGANISATION
- GKN AEROSPACE ENGINEERING SERVICES PTY LTD
- RMIT UNIVERSITY
- SUTTON TOOLS PTY LTD
- SWINBURNE UNIVERSITY OF TECHNOLOGY
- THALES AUSTRALIA LTD
- UNIVERSITY OF MELBOURNE
- UNIVERSITY OF QUEENSLAND
- UNIVERSITY OF WOLLONGONG

SUPPORTING PARTICIPANTS

- AUSTRALIAN INDUSTRY DEFENCE NETWORK
- AUSTRALIAN DEFENCE APPAREL PTY LTD
- AVOCA PTY LTD
- BISALLOY LTD
- FCST PTY LTD
- GOODRICH CONTROL SYSTEMS PTY LTD
- VIPAC ENGINEERS AND SCIENTISTS LTD
- MILLATEC PTY LTD
- PACIFIC ENGINEERING SYSTEMS INTERNATIONAL
- ROSEBANK PTY LTD
- SEAL SOLUTIONS LTD
- SECO TOOLS PTY LTD
- HENKEL PTY LTD

RESEARCH PROGRAM STRUCTURE



- Robotics, automation and lean manufacturing
- Titanium component fabrication technologies
- New Generation composite materials and manufacturing processes
- Prognostics, detection and repair for aluminium alloys and composites
- New ferritic materials and joining technologies

AIR PLATFORMS

PROGRAM LEADER: DR MATT DARGUSCH

OVERVIEW

Projects in the Air Platforms Program seek to address key challenges facing the defence industry in both the manufacture and sustainment of aircraft components and systems. Industry is partnering with researchers to identify key capability gaps in Australia's supply chain in areas such as the affordable manufacture of difficult-to-machine materials through to developing prognostic health monitoring systems for detecting component degradation. Projects in this program focus on key materials in Australia's Defence air platforms including composites, aluminium alloys, titanium alloys for structural components and nimonic superalloys for engine components. Projects also focused on the development of prognostic tools for the early detection of damage in typical military paint schemes under different exposure environments and operating conditions along with prognostic tools to detect different forms of corrosion for in-service aircraft and other air platforms.

OUTCOMES

Outcomes of the Air Platforms Program will include advanced manufacturing technology for the manufacture of aircraft components from titanium alloys and the development of predictive tools for incorporation into the existing prognostic health management systems to enable in-service diagnosis and robust predictive capability through validation and verification of the models. This will provide local industry with a competitive edge in both cost and capability terms, allowing them to compete in global supply chain opportunities such as the Joint Strike Fighter, and a range of through-life-support and sustainment contracts.

KEY ACHIEVEMENTS

During the first year of research activities, project teams have been established and a detailed program of work has been developed and refined. Much of the initial work in the area of manufacturing technology has involved a process of prioritising the industry cost/performance drivers and technology gaps for the manufacture of aerospace components using titanium alloys and other difficult to machine materials. Initial experimental work has been undertaken on machining centres at BAE Systems (Australia) along with laboratory-based trials at both Swinburne University of Technology and the University of Queensland. Recent activities in the area of advanced precision manufacturing have already resulted in significant benefits to SME Millatec within the first year by reducing cycle times by 33% on key components. Another project focuses on the development of next generation cutting tool technologies utilising advanced surface coating technology. The first stage of this project involved the acquisition of an Innova coating machine and a Walter diamond grinder located at Surface Technology Coatings' facility in Thomastown, Victoria. Significant activity has also taken place associated with the spiral development and application of a prognostic tool kit to reduce the impact of corrosion on structural integrity, platform availability, maintenance effort and support costs. Research is also underway in the area of the rapid and reliable detection and analysis of composite defects, including the development of automated analysis of ultrasonic non-destructive inspection (NDI) data.

Below: Joint Strike Fighter

MARITIME PLATFORMS

PROGRAM LEADER:
PROFESSOR CHRIS BERNDT

OVERVIEW

In DMTC's Maritime Platforms Program, researchers are developing new materials technology for use in applications for ships and submarines, including the repair and maintenance of these platforms. The technologies will be important both in terms of production and procurement, given the anticipated increase in shipbuilding tempo in coming decades and in through-life support as Defence's announced Strategic Reform Program (SRP) cost savings objectives cause a renewed focus on sustainment outcomes. Project activities span a broad range of material types from the development of higher strength steels for marine applications through to multifunctional composites. This involves integrating antennas, sensors, wiring and connectors into the structure of the surface, while at the same time reducing weight, improving stealth characteristics and hardening the antenna/sensor structure against external threats such as foreign object impact. The program also includes activities centred on the repair and maintenance of submarines, including evaluation of laser treatment techniques along with the development of low cost automation and fabrication options for manufacture and repair of Defence equipment.

HMAS Darwin. Photographer: LS Kade Rogers. Image courtesy of the Australian Department of Defence.

OUTCOMES

Outcomes being sought from the program include improvements in hull strength, manufacturability and materials resilience issues, for example, allowing maritime platforms to better resist damage from more aggressive underwater weapons while retaining performance capability. Additional, more specific outcomes will be articulated with industry partners as they join the program.

KEY ACHIEVEMENTS

Project teams have been established and project plans have been developed across four projects. The first project focuses on the development and qualification of higher strength steels for Defence applications. During the first year, marine applications have been identified and the material requirements for this application have been evaluated. A project focused on repair and maintenance and improved performance of components for submarines has also commenced. In the area of multifunctional composites another project has been established with initial work to determine the requirements for fixed satellite services, electromagnetic interference conformability and structural health monitoring for air and marine platforms for a range of operational environments complete. Program activities also included an evaluation of the requirements for the system design options for robotic precision machining and fibre placement.

ARMOUR APPLICATIONS

PROGRAM LEADER: VICTORIA THORN

OVERVIEW

Research in the Armour Applications Program centres on the development of high performance armour materials that increase the level of protection offered to both Australian Defence Force vehicles and personnel. This program includes both evolutionary and revolutionary improvement of existing metallic armour materials and exploration of the capacity of lightweight alternatives to match performance and structural integrity of metal armours. Blast and ballistic protection in the face of threats ranging from small arms fire to improvised explosive devices, rocket-propelled grenades and a range of other threats are critical to Defence capability. Developed systems must have high consistency in their blast and ballistic performance and be affordable and durable in typical service environments. The Armour Applications Program focuses on ways to reduce weight and increase payload and mobility while providing superior platform and personnel protection. For individual combatant protection, it is crucial that materials are lightweight and flexible. The program also seeks to develop new materials and benchmark their properties against existing steel armour materials for ballistic performance, blast resistance, structural properties and multi-hit capability.

Below: Bushmaster armoured vehicle. Image courtesy of the Australian Department of Defence

OUTCOMES

The development of new armour materials and materials systems will improve capability by providing equivalent levels of protection at reduced cost and weight, allowing improved payload or military mobility, and providing better survivability for vehicles and personnel. Involvement in DMTC's Armour Applications Program will provide opportunity for industry partners to present a better capability option for future procurement activities (e.g. Land 121 Phase IV), both in terms of an improved product offering and a technical support capability in the event that the tender is successful.

KEY ACHIEVEMENTS

During the first year of research activities, DMTC established five project teams and developed a detailed program of work. Vehicle armour requirements were evaluated and, with the involvement of DSTO and key industry partners (Thales Australia, Bisalloy and Bluescope Steel), detailed designs and evaluation strategies for material enhancements were proposed. The program evaluated the requirements for alternative 'next generation' ferritic armour systems for vehicles and established possible precursor target material options and processing routes. In a similar way, the requirements for advanced personnel armour systems were evaluated and target material and applications were established. DMTC researchers have also worked closely with industry partners to identify applications, assessment strategies and develop designs for alternative construction and protection systems for land platforms. Initial applications, process requirements and system design concepts have been evaluated for robot-assisted jigging and welding using an intelligent multifunctional robot attachment.

PROPULSION SYSTEMS

PROGRAM LEADER: TOM RADTKE

OVERVIEW

Propulsion Systems research addresses key challenges associated with the development of new technology for repair of aircraft structures and engine components, along with the development of new materials capable of withstanding extended exposure to the extreme conditions associated with hyper and supersonic flight. Research includes advanced surface engineering and repair technologies capable of enhancing or restoring structural and component performance, including the assessment and certification of the technologies for aircraft structures and engine components.

OUTCOMES

The program will provide new materials for hypersonic vehicles, which will allow these vehicles to operate for longer periods of time in this aggressive environment than is currently possible. Materials issues in this application are critical to the development of the propulsion technology. Component repair technologies developed in this program will allow local industry to repair and sustain components in demanding propulsion systems, such as the F135/F136 engines powering the Joint Strike Fighter, which incorporate new components that Australian industry currently has no experience maintaining.

The ability to maintain components is critical to Defence capability, as it allows more 'time on wing' for the components and reduces the far more expensive option of replacing worn or damaged components. Additionally, high temperature materials developed under the hypersonic activity are applicable to a missile development program currently being pursued by a DMTC industry partner. Outcomes of the program will assist this partner in winning an international contract for production of a new missile, with customers across the western hemisphere.

KEY ACHIEVEMENTS

During the first year of research activities, two project teams have been established. Work has commenced on the development of high temperature materials solutions for application in prototype durable rocket thrust vectoring vanes and hypersonic leading edges. The rocket vane and the hypersonic combustor environment have been characterised. Analysis of research challenges in the area of repair technologies for current and next generation propulsion systems have taken place with input from key engine original equipment manufacturers and DSTO personnel. A program of work focused on the application and certification of laser cladding technology for repair of aircraft has commenced. A range of current Defence aircraft components to be used to demonstrate the laser cladding technology have been identified.

EDUCATION & TRAINING

DMTC has established a vibrant Education and Training Program which has received a significant boost with the appointment of a dedicated Education Manager in the second half of the reporting period. Additionally, DMTC established a formal Education Advisory Panel comprising experienced defence industry representatives and senior academics to advise the Education Manager on the needs of the industry participants as well as research providers.

EDUCATION

Five full-time PhD scholarships were awarded to PhD candidates in three participating universities (one scholarship at the University of Melbourne and two scholarships each at the University of Wollongong and RMIT). DMTC funds each of the PhD candidates directly within an appropriate DMTC project ensuring that, through interaction with industry participants and by being exposed to the industry-driven research environment, their research findings will directly contribute towards achieving the milestones and outputs of these projects, as well as providing practical training outcomes and generating graduates with more industry-relevant qualifications.

DMTC also embarked on an initiative to 'grow our own timber' and will offer scholarships for undergraduate students to undertake vocation internships (usually students entering their final year) with the view of exposing them to the defence industry and DMTC project activities, and attracting them to the PhD program after the completion of the first degree. DMTC will offer additional support of the final-year projects linked to the DMTC research program and will assist with co-supervision of these projects through its industry participants.

DMTC has also established a support scheme for students who wish to attend relevant conferences (local and international) as well as overseas internship support for the students who wish and/or need to spend time working and/or studying overseas.

TRAINING

DMTC facilitated training of the employees of core industry participant Sutton Tools, as well as training of one academic staff member at participating university, RMIT, in advanced coating technologies. This was required in order to operate the state-of-the-art Innova coating machine acquired by DMTC and located at Sutton Tools' Thomastown plant. This machine is currently utilised by number of DMTC participants working on different research projects.

A training course on blast and blast physics was conducted, which significantly updated the skills and knowledge of DMTC participants working on armour-related projects.

DMTC participated in a joint initiative between DMTC, CAST CRC and Advanced Manufacturing CRC to commission a study to identify industry skills gaps and the current training packages and Australian Qualification Frameworks (AQFs) relevant to CRCs, and to examine the current vocational training offered by different Registered Training Organisations (RTOs) within Australia.

COMMERCIALISATION & UTILISATION

During the process of formally reviewing DMTC projects, a section of the review (including the review document and project agreement) is devoted to commercialisation and utilisation strategies and progress. The review process expressly includes industry partners and their input is critical to the establishment of these strategies, as they are the presumptive utilisation partners, and provide the most logical pathway to utilisation of the technology being developed in the programs.

DMTC's IP model and its operational focus are both directed towards streamlining processes for utilisation of the technology, as opposed to traditional commercialisation strategies through vehicles such as license, royalty, spin-off etc., noting that there will be likely outcomes in these areas in later years of DMTC's operation, when project development activities have produced more mature technologies and saleable IP.

In summary, the IP model operates as follows:

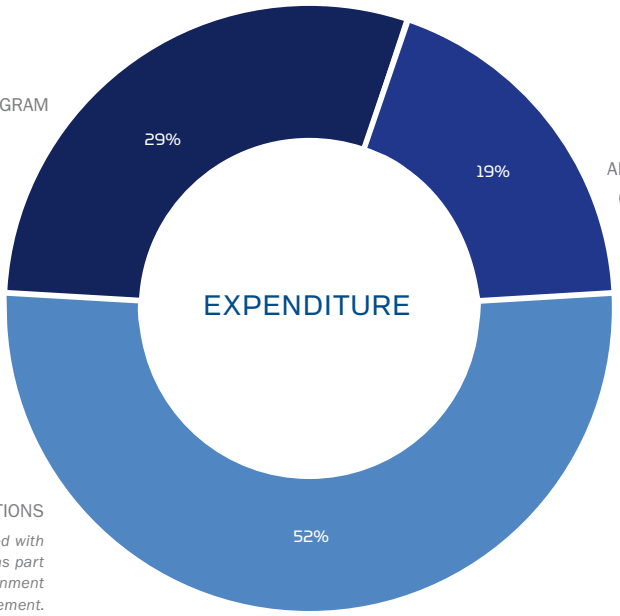
- DMTC owns all project IP.
- Participant organisations own any background IP brought into projects, but agree to allow it to be used under normal commercial terms by DMTC or its commercialisation partner.
- Participant organisations gain automatic, non-exclusive, royalty-free right of access to project IP in the participant organisation's field of use.

DMTC aims to transfer technology from the lab into the hands of its industry partners, and have those partners winning Defence contracts that utilise this technology. This by definition is enhanced Defence capability. DMTC success will of course be amplified if additional commercial returns can be generated from the technologies produced from DMTC project activities – in defence applications and non-defence applications, in so-called 'dual-use' applications – as this will both enhance the industry sectors in which the technology is commercialised, but will also offset the amount of future investment required from the Defence customer into future technology development activities.

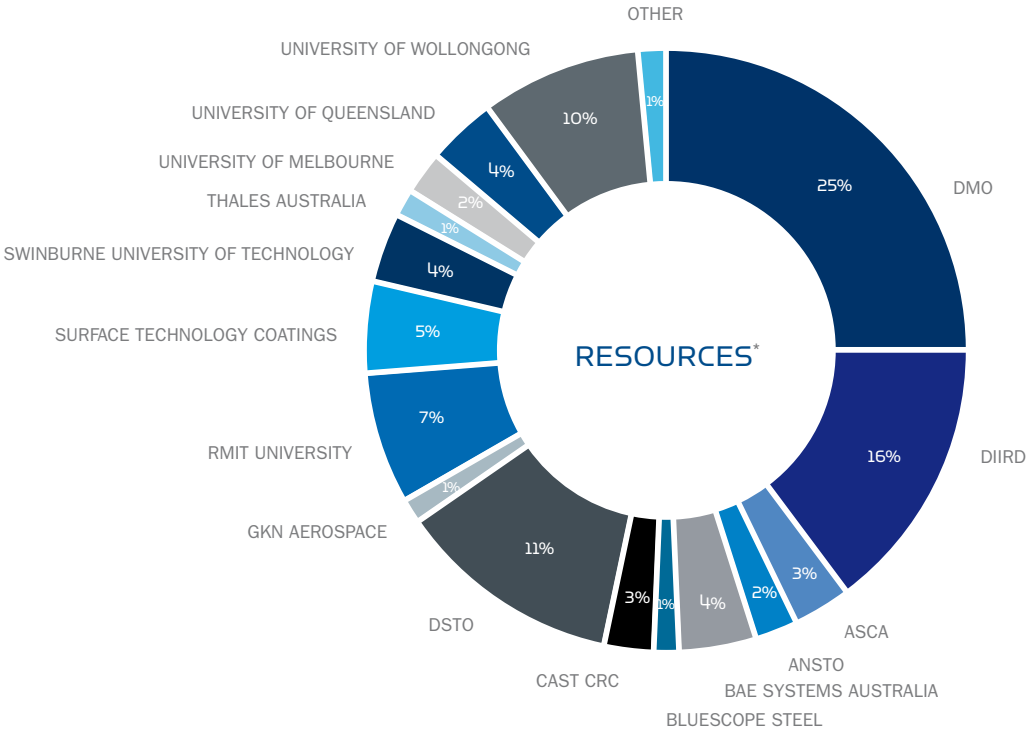
As such, DMTC commercialisation activities will increase in tempo during the coming years, and further, DMTC programs will continue to connect defence industry businesses, large and small, with their primary end user – the Department of Defence – allowing them to commercialise and supply valuable technological and manufacturing advancements that are consistent with ADF requirements.

Photographer: LS Kade Rogers. Image courtesy of the Australian Department of Defence.

FINANCIALS AT A GLANCE



Capital acquisition associated with ASSF establishment as part of Victorian Government funding agreement.



**Includes capital and in-kind contributions.*

OUTLOOK

DMTC's first year of operation has necessarily focused on start-up activities and reaching initial milestones. Going forward, our research programs are expected to yield significant innovations in materials and manufacturing technology for defence applications. The following summaries describe the future direction of DMTC's various programs.

AIR PLATFORMS

In the coming year, the program will expand its advanced process monitoring activity at BAE Systems and undertake both laboratory and industry-based field trials in the development of hybrid machining technologies. In addition, a new industry partner is being sought in order to expand the research program into cost effective, programmable and flexible lean manufacturing schemes for large area and 'near net' shape manufacturing of aircraft components. Non-destructive inspection and analysis work will continue with GKN Aerospace as will activities to develop and certify the corrosion prognostic tools.

MARITIME PLATFORMS

Activities in FY2009-10 will focus on broadening industry participation in this program. Work on high strength steels will expand to incorporate the fabrication of test panels from new high strength steel options. In the area of lean automation, project teams will continue work on the development of a robotic cell which can be used to demonstrate techniques that will form part of a suite of flexible, low cost automation and fabrication options for Defence equipment. DMTC is actively seeking new industry partners for this activity and invites inquiries from interested parties.

ARMOUR APPLICATIONS

This program has strong industry involvement and direction. In the coming year, research activities will expand in both vehicle and personnel armour applications with the involvement of Seal Solutions and a range of SMEs. If efforts to secure additional support from Defence for the proposed program in Personnel Survivability are successful, it is likely that the project in Personnel Armour in Program 3 will be linked more closely to the new program.

PROPULSION SYSTEMS

Detailed technical discussions have been undertaken with a number of major aircraft engine manufacturers. These discussions have been undertaken since the inception of DMTC and have progressed significantly. The involvement of these engine original equipment manufacturers in collaboration with Australian companies will be critical to the further development and expansion of the program. It is expected that the research program in the area of repair technologies for current and next generation propulsion systems will evolve significantly in the coming year as a result of these interactions.

EDUCATION & TRAINING

Activities in FY2009-10 will be focused on further development of a "grow our own timber" program with more support provided to promising undergraduate students (Australian citizens) interested to join DMTC research program after completion of their degrees as PhD candidates. DMTC will further support activities aimed at up-skilling personnel involved in DMTC activities through sponsoring their attendance of relevant short courses, workshops and seminars. Short courses and lectures will also be developed by DMTC for industry participants as well as for students in participating universities with the view of disseminating and sharing technical expertise acquired in DMTC research programs and attracting new PhD students to DMTC. Several prestigious DMTC Fellowships will also be awarded.

OUTLOOK (CONT.)

COMMERCIALISATION & UTILISATION

During the first year of operations, DMTC's primary focus was on establishment and resourcing of our research programs and activities. We anticipate that operational tempo in the Commercialisation & Utilisation program will increase in the coming months, as technology maturity increases and our business development activities begin to bear fruit.

SME ENGAGEMENT

DMTC has established an active SME program - several SMEs are currently engaged and further SME partners are sought. DMTC offers SMEs and other industry participants an opportunity to achieve industry best practice, to improve manufacturing processes and thus productivity and production capacity, up-skill employees, establish closer relationships with others in their supply chain and to access the benefits of collaborative R&D.

NEW BUSINESS

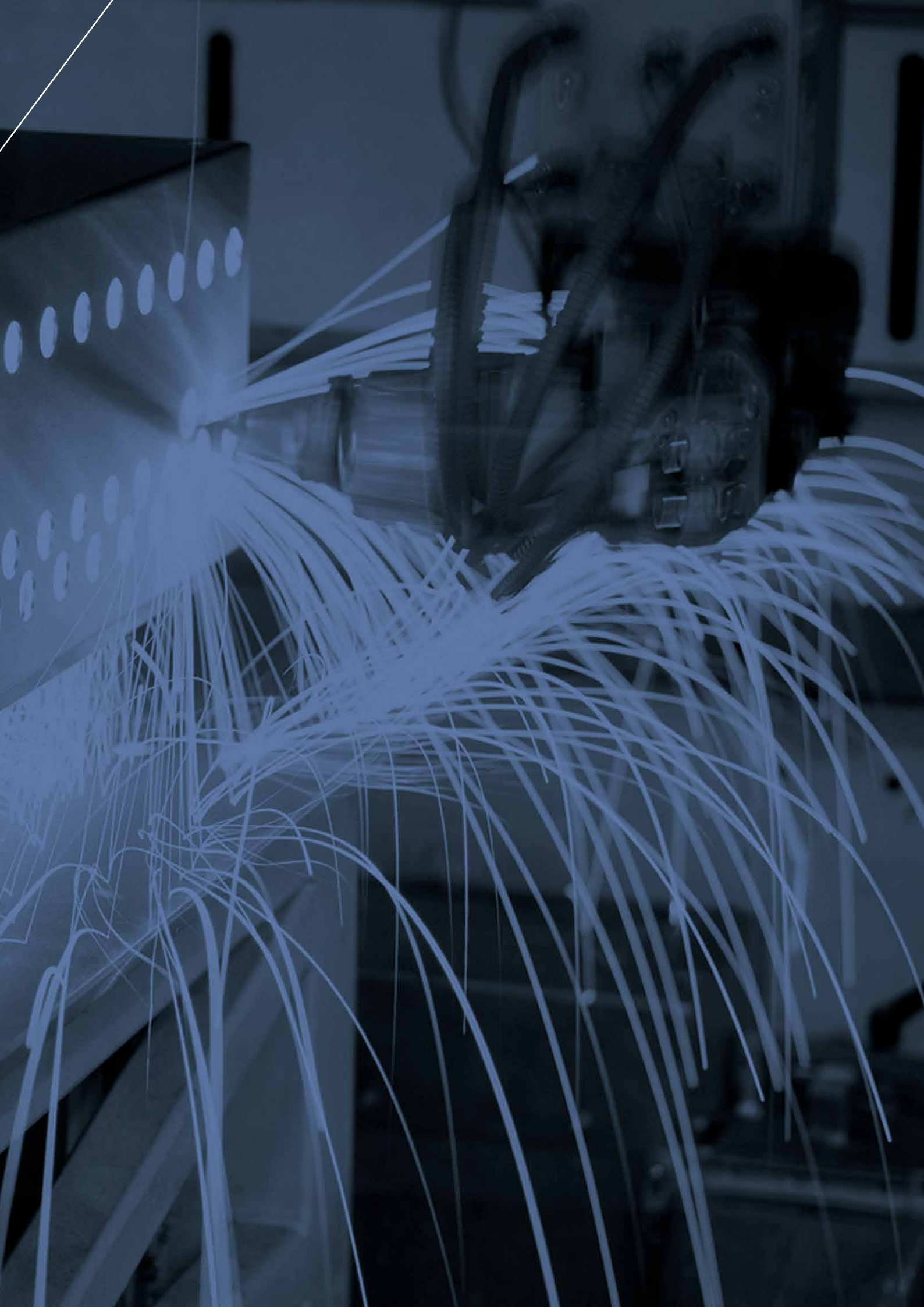
DMTC has developed a business case for the creation of a fifth research program to address aspects of Personnel Survivability. In support of this activity, DMTC has secured funding commitments from the Defence Science and Technology Organisation in excess of $2m and further indications of support from the industry and research sector of approximately $10m. The Defence Materiel Organisation has indicated in-principle support for the project and DMTC is currently developing this detailed business case for submission to Defence in early 2010.

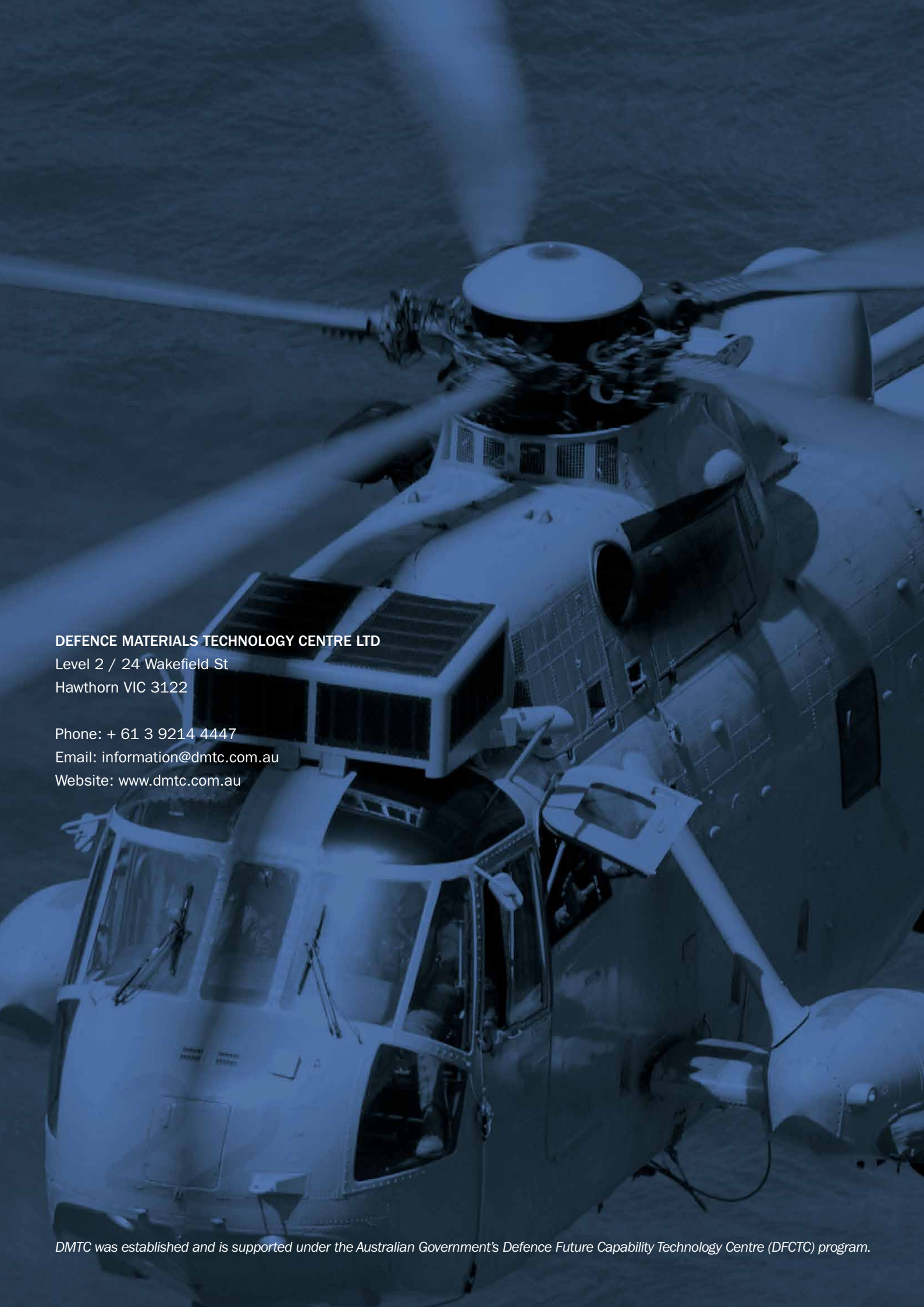
The preliminary business case was submitted to the Commonwealth based on a $20m activity that would be delivered in addition to current activities – i.e. the funding would be in addition to that currently in place. The Personnel Survivability program will provide significant survivability and utility outcomes for Australian men and women in combat and support roles in the Australian Defence Force.

The program will also benefit the industry and research sector organisations, but will depend on the development of a more detailed program proposal which is closely aligned with the objectives of the Australian Defence Organisation (ADO), and DMTC securing funding and support commitments from industry and research partners. If supported, DMTC anticipates the program could be implemented by late FY2009-10.

After discussions with the Defence Advisory Panel, DMTC will initiate a process of program milestone reviews, to occur approximately every two years. These reviews will assess ongoing relevance of existing milestones in the context of a range of issues in the sector, including the Defence White Paper, the Defence Capability Plan, industry requirements including Priority Industry Capability developments and Defence advice.

The intent is to ensure DMTC program directions, which were set down prior to establishment of the Centre, remain relevant to the requirements of end users of the technology.





DEFENCE MATERIALS TECHNOLOGY CENTRE LTD
Level 2 / 24 Wakefield St
Hawthorn VIC 3122

Phone: + 61 3 9214 4447
Email: information@dmtc.com.au
Website: www.dmtc.com.au

DMTC was established and is supported under the Australian Government's Defence Future Capability Technology Centre (DFCTC) program.