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ISSUE 1
23 March 2017

CAPABILITY THROUGH COLLABORATION

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From the CEO...

As I write this note, it's a little alarming to realise that 20 per cent of the year is already behind us. How has it gone so quickly?

It's been a busy start to the year for DMTC, with a strong focus on our Defence relationships and on critical early steps for some of our new programs. Significantly, we have reached agreement with Defence on the finer points of detail surrounding DMTC's relationship with the Defence Innovation Hub.

The Defence Innovation Hub is now open and seeking submissions from individual companies and collaborative ventures/consortia. It is vitally important to us to ensure that DMTC continues to be well-placed as an industrial capability partner of choice to work with Australian industry, particularly SMEs, to address technology challenges and pursue capability enhancements in areas identified as priority innovation needs by the Defence Innovation Hub. Further detail on DMTC's relationship with the Innovation Hub can be made available to DMTC's industry and research partners on request.

Calls for industry and research proposals for one of our new programs – High Altitude Sensor Systems – have just recently closed and evaluation of proposals is progressing. Expressions of interest have been sought for the second phase of our [Medical Countermeasures Program](#) and are currently being sought for industry capability developments in support of the [F-35 Joint Strike Fighter](#).

This is a busy but exciting time for all three programs, and I look forward to providing more detail in future newsletters. Of course, we are also busy with preparations for our Annual Conference on 28-29 March, and I hope to see many of you there.

Dr Mark Hodge
DMTC CEO

A special week at the Airshow



Pictured: F-35A Lightning II departs RAAF Base Amberley for the Australian International Airshow which is held in Avalon. © Commonwealth of Australia, Department of Defence.

Australian Air Force pilots Wing Commander Andrew Jackson and Squadron Leader David Bell have been to the Avalon Airshow before, but until this year they've never arrived in a F-35 Joint Strike Fighter. While the arrival of the F-35 was the undisputed highlight of a busy flying program at the Airshow, there was also a high level of activity in the trade exhibition halls.

DMTC exhibited alongside the Centre for Defence Industry Capability and the Defence Innovation Hub team, and took advantage of the opportunity for many positive business interactions across the week-long event. A key focus for the week was both high-level and working-level discussions with potential industry and research partners interested in collaborating through DMTC on our existing and new aerospace, high altitude sensors and JSF programs. Details of DMTC's past and present activities were also briefed to counterparts and officials from Australia's Defence Science and Technology (DST) Group and the US Department of Defense.

The final word on the week goes to Australia's Chief of Air Force, Air Marshal Leo Davies: "Our Force is incredibly well equipped, with some of the best military aviation and technology in the world.

"The Airshow is a great opportunity for Australians to talk to our personnel and understand just how advanced our Air Force is, how innovative our personnel are, and see the latest technology for themselves.

"In collaboration with Aerospace Australia Limited, Avalon Airport, the Australian aerospace industry, visiting international military forces, and our Army and Navy colleagues, we delivered a spectacular Airshow. I congratulate everyone who contributed to this outstanding success," Air Marshal Davies said.

We couldn't agree more.

Marand engages with DMTC to tackle technology challenges

Victorian company Marand Precision Engineering (Marand) is supporting a DMTC project that is developing a unique technology – Double Diaphragm Deep Drawing (D4) – that has potential to be utilised in the manufacture of a range of composite and ballistic components.

D4 represents a new and innovative technology platform that can be used to curve and harden composite materials into customised shapes using thermal forming. Potential enhancements to defence and related capabilities are envisaged through reductions in weight but comparable or better levels of protection.

The technology was developed to Technology Readiness Level 7 through DMTC's Personnel Survivability Program. Work is underway to develop the technology further.

Project leader, Dr Mino Naebe, from Deakin University, said Marand built the initial D4 research machine and continued to be engaged in the program "because of their engineering expertise, excellent support and willingness to work to tight schedules to achieve the targets".

Team explores net shape casting for armoured vehicle component



Pictured: computer assisted design model of casting design for an armoured vehicle side step (three parts - middle grate and two side arms).

A DMTC project team involving industry partner Thales Australia is investigating aluminium net shape casting as an alternative to welding for the manufacture of an armoured troop carrier's side step, currently manufactured from plate-welded steel.

The aim of the new material and manufacturing method is to deliver multifunctional, lightweight components that can be manufactured at lower costs.

The project relies on a close collaboration between different organisations with complementary skills, facilities and expertise. The research team has designed a casting solution that consists of three parts. This has required close interaction between researchers at the University of Queensland (UQ) and industry partner Melbourne Gravity to ensure high-quality castings at the lowest possible cost.

The application of an additive manufacturing technique using CSIRO Melbourne's 3D sand printing facility has enabled the fabrication of innovative sand moulds for casting prototypes of the new side steps. The new mould manufacturing process has facilitated a very short lead time for the production of the prototype castings compared with conventional mould manufacturing techniques.

The first prototype side steps have successfully been cast and are currently being tested to ensure they meet design specifications. The next stage of the project will explore the potential of new, cost-effective tooling methods to produce medium batch size aluminium castings using the side step as a sample part.

Better blast modeling to inform vehicle design



Pictured: Researchers from the University of Melbourne (UoM) visiting Thales in Bendigo as part of DMTC project 6.06.

Researchers in DMTC's Land (Mounted) Program are developing a systems-level simulation capability that could be used in the design and service life evaluation of military land vehicles. DMTC's

Advanced Vehicle Modeling project (Project 6.06) aims to build on previous successes and knowledge built in the program.

Thales Australia's Protected Vehicles division, UoM, ANSTO and DST Group are collaborating to develop a high-fidelity capability in component level models of blast interactions.

Advanced numerical models have been developed and rigorously validated throughout the course of the project to provide reliable predictive capability. The team conducted significant flying plate blast tests last year in Cooma and performed comprehensive onsite and laboratory soil characterisation providing high fidelity material data sets for modeling.

With the Australian Army's future vehicle acquisition plans including vehicles that are smaller and lighter, engineers are faced with the challenge of minimising the weight of the vehicle while still meeting structural performance, protection levels and endurance requirements.

Meeting these challenges has pushed engineers to develop a better understanding of extreme threats including improvised explosive devices (IEDs) and to design smart materials with innovative design concepts through employing state of the art engineering tools.

Ultimately, it is hoped the new simulation developed through DMTC could be used by Australian industry in the design of future protected land vehicles to provide improved protection and performance.

New skills demonstrated at student conference

DMTC's most recent student conference gave students a valuable opportunity to present their research to an audience of research, industry and Defence partners.

The conference, held in Melbourne in November, was conducted in collaboration with the Research Training Centre for Naval Design and Manufacturing (RTCNDM) and the Defence Science Institute (DSI). Nineteen students each provided 300-word abstracts and a 15-minute presentation on their research work.

"It was a great opportunity for students who have attended workshops on clear science writing and dynamic presentation skills to put their new skills into practice," said Mr Miles Kenyon, DMTC's Education Program Leader.

"Just as importantly, the conference and conference dinner gave students the opportunity to network with each other and academic supervisors. It was very encouraging to see a number of students already discussing the links between their individual research topics and future potential collaboration opportunities."

Topics ranged from materials and manufacturing, motion planning and mapping – robotics, shock and CFD modeling, sustainment and through-life assessment models and simultaneous localisation and mapping (SLAM) algorithms.

Students were from a wide range of universities, including Swinburne University of Technology, RMIT University, UQ, the University of Wollongong, Flinders University, the University of Tasmania (Australian Maritime College), Monash University and UoM.

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

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