LAND
Overview

The Australian Army is seeking to realise a step-change in capabilities that aligns with a vision for a protected, connected, lethal and enabled force.

Land combat vehicles as well as next-generation soldier systems and combat clothing survivability and signature reduction technologies, have been identified by Defence as sovereign industrial capability priorities.

With an extensive network of innovation and technology development partners in Australia and globally, DMTC works across multiple disciplines to support the development of key elements of these sovereign industrial capabilities.

Our collaboration model accelerates technology development and supports rapid utilisation and adoption of new technology. In Land and other domains, DMTC has identified key areas of technology forecasting and development to pursue. Among them are the application of **smart automation, robotics** and **machine-learning**, and **digital twin** technologies.

Digital twin concepts have many applications across the defence sector and benefits at each step of the manufacturing process from engineering and design through to production and asset management. Harnessing the power of computational models, digital twins allow for visualisation and analytics that can predict, detect or prevent problems and provide greater levels of quality assurance.

> “Army capability is all about people. The soldier is at the centre of everything we do”
>
> **Major General Simon Stuart AO, DSC,**
> **Head Land Capability - Army**

LAND
Highlights

Two projects in DMTC’s Land Program are making extensive use of digital twin and advanced computational modelling to deliver enhanced industrial outcomes.

Blast modelling

A long-term project involving researchers from ANSTO and the UoM, alongside research partner Thales Australia has developed and validated a new blast test methodology for Land combat vehicles. Full-scale blast testing of manufactured vehicles is prohibitively expensive and time-consuming.

The DMTC project team has developed and validated the methodology and parameters to translate small scale blast test data into full scale precise computational models, to accurately simulate and assess the impact of blast events on both vehicle structures, crew and passengers.

For design changes to current fleets and for future Australian vehicle procurements such as those contemplated in Defence’s LAND 4107 (Protected Vehicle Fleet) Program, this project will inform enhancements in vehicle design in a bid to improve on an already enviable safety record. It is also expected to support the export potential of Australian-designed and built protected mobility vehicles.

This result creates a lower cost pathway for keeping computational models updated with new material data, and also improves the level of confidence with which numerical simulation can be used to inform and influence the design of armoured and protected vehicles. The outcomes will be utilised in assessing issues and design changes of current Protected Mobility Vehicle’s (PMV), and in the design of future PMVs.

Next-generation soldier systems

DMTC activities in the Land domain during the reporting year also included contributions to the Networked Future Augmented Small Arms Technologies (or Networked-FAST) project that seeks to design and produce next-generation soldier systems for Australian defence personnel.

The project consists of a series of parallel technical investigations and activities led by industry partner, Thales Australia to explore and take advantage of breakthroughs in digitisation, lightweighting and advanced manufacturing. DMTC’s contribution is principally through collaboration partners at UQ and RMIT.

Investigations into new material compounds have achieved both reductions in component weight and improved thermal management of small arms systems. Candidate materials and modified manufacturing processes must pass rigorous testing to demonstrate that weight reductions do not compromise performance, reliability or safety.

Simulation and modelling to support design activities is another key area of activity. Modelling techniques being employed include computational fluid dynamics, and machine-learning architectures are being utilised to optimise the modelling outputs. Backed by earlier work on more basic models, this research effort has been accelerated and has achieved exceptional results, using multi-physics and machine-learning techniques to generate high-fidelity models which have been validated on a current platform. This is a major step toward a digital twin of the platform.

The outcomes achieved include improved speed of test procedures and more accurate results which, in turn, provides greater confidence and assurance for the industry partner and Defence.