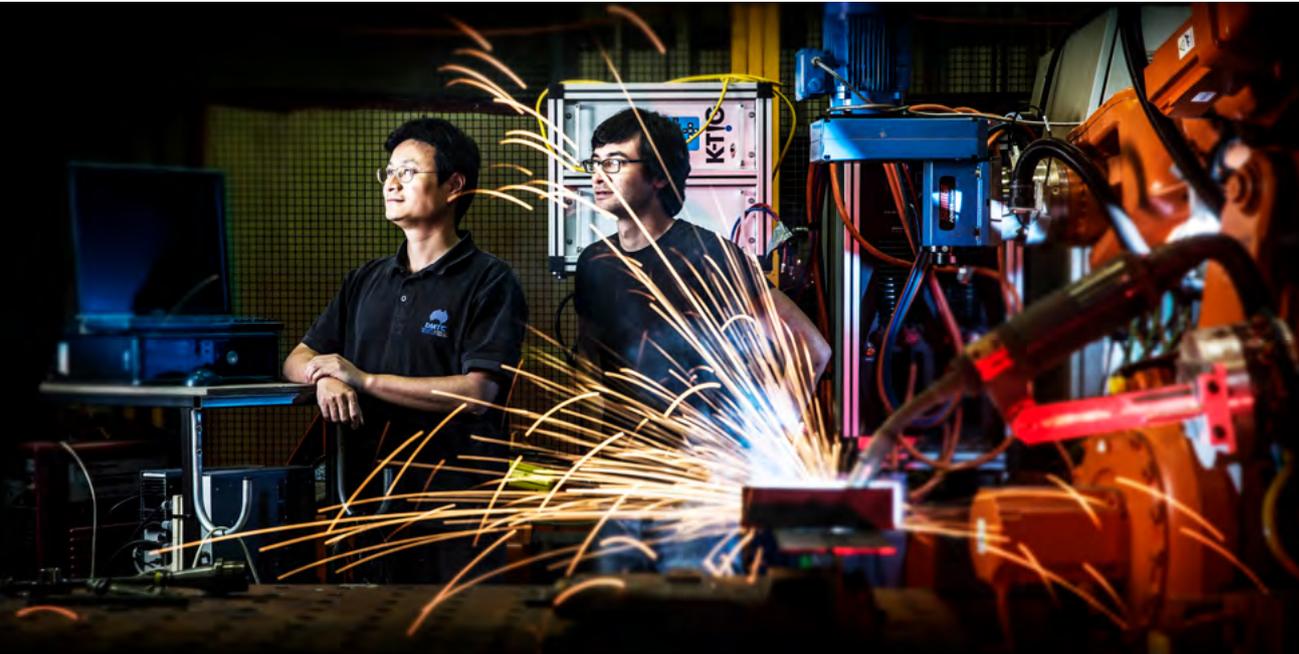


CAPABILITY STATEMENT

Defence Research and Training



UNIVERSITY
OF WOLLONGONG
AUSTRALIA



The University of Wollongong is helping link Defence with industry and academia through its strong presence in Defence-related research and training and maritime security.

The University (UOW) was a founding member of the Defence Materials Technology Centre (DMTC) – a national collaborative research centre partnership of defence industry and research providers which is supported by the Department of Defence. Within the DMTC, UOW draws on its traditional strength in materials engineering - particularly steel research - welding and joining to develop improved armour steels for a range of defence uses on land and at sea.

UOW also provides post-graduate training for Australian Defence Force (ADF) personnel through its Faculty of Business and the Australian National Centre for Ocean Resources and Security (ANCORS).

The University's Centre for Human and Applied Physiology has been working with the Defence Science and Technology Group (DST) since 2009, when UOW received funding to establish a National Centre of Excellence in Physical Employment Standards. A key focus of the centre's work is to accurately evaluate the physical demands of service in military occupations that will both increase operational capability and reduce injuries.

Defence Materials Technology Centre

The DMTC NSW node was established at the University of Wollongong in 2008 with government and industry support to provide the Defence industry with materials and manufacturing solutions to enhance Australia's defence capability.

DMTC is a joint venture between Defence, industry, universities and government research agencies. NSW Government funding enabled a technology demonstrator – the Lean Automation and Fabrication

Facility – to be built at UOW for use by DMTC's participants, including BlueScope Steel, ANSTO, Bisalloy and several NSW SMEs. Many of the capabilities of the Lean Automation and Fabrication Facility involve advanced equipment which is not available elsewhere in Australia.

Within DMTC, UOW conducts research into alternative armour materials for defence platforms and personnel protection. The team at UOW have been responsible for the development of an innovative automated offline programming systems for robotic welding of the complex hull of the Bushmaster vehicle, which has protected troops in some of the most challenging combat environments. This work includes Thales, DST Group, ANSTO, BlueScope Steel and Bisalloy Steels, co-ordinated by UOW project leaders and researchers.

BlueScope Steel, in conjunction with Bisalloy Steels, successfully supplied the steel plate for the Collins Class submarine fabrication and is now drawing on this experience to work with DMTC on high strength steels specifically designed to suit the construction of Australia's future maritime platforms.

UOW's welding automation group forms a critical part of the estimated \$1.3 billion contract awarded to Thales Australia to supply the Australian Defence Force with 1,100 four-wheel drive vehicles over 3 ½ years from 2017. The highly-armoured vehicle, known as Hawkei, will provide soldiers with increased protection and mobility.

The welding group's contribution to naval research and development was recognised with the National Innovation Award at the Pacific 2015 Maritime Exposition. The award was for a range of technologies developed with partners DST Group, ANSTO and ship builder Forgacs, for work in improving the quality of welding in naval shipbuilding and therefore improving shipyard productivity.

UOW is now providing DMTC program management and research for the new maritime platform program recently announced by the Federal Government in the recent Defence White Paper.

Facilities and expertise

UOW also applies its expertise to Defence projects in:

- Materials engineering for titanium and aluminium alloy development and welding and joining for aircraft components
- Electromagnetic technology for the development of lightweight energy-harvesting kits that soldiers can wear in the field
- IT for defence-related cyber security projects. UOW has an international reputation as being at the forefront of cyber security research through the ICT Research Institute. The institute works closely with the Australian Signals Directorate and the DST Group.
- Intelligent systems for the development of intelligent agent software and neural networks to support real-time combat decisions
- Automation systems for military vehicles
- Robotics that facilitate new advanced aerospace joining, machining and assembly processes
- Surface engineering expertise to machine light alloys with improved wear qualities, for machine tool life extension
- Lean automation skills for manufacturing high cost, low volume components for aerospace uses
- Development of two agent-based simulations to support organisational change within the Australian Defence organisation, architecture design for model-based systems engineering applications to support evolvable systems integration management and the development of software agents to replace humans in the loop in Defence and T&E environment
- Whole of life sustainability and maintenance
- Explosive resistance of structures and buildings
- A wide range of additive manufacturing technologies
- Single crystal growth technologies for next generation sonar

Steel manufacturing research hub

Under the umbrella of the ARC Research Hub for Australian Steel Manufacturing (Steel Research Hub), UOW is currently engaged in the following three programs:

- **Market-focused product innovation.** Improved abrasion resistant and high-strength Q&T steels; steel-intensive, mid-rise residential building designs and anti-fungal coatings for steel surfaces.
- **Innovative coatings technologies.** Innovative coatings technologies for existing BlueScope coatings and processes.
- **Sustainable steel manufacturing.** Involving researchers from UQ, the University of Newcastle and Monash University, this program covers a broad array of projects focused on environmentally and economically sustainable steel and iron manufacturing for BlueScope and Arrium.

SMART Infrastructure Facility

The SMART Infrastructure Facility at UOW has significant expertise in Model Based Systems Engineering (MBSE), which is used in Defence and infrastructure applications. The dedicated team of researchers also apply System of System methodologies (SysML), which has multiple Defence applications.

SMART can provide assistance in:

- **Development of Agent Based Models (ABM) and simulations.** Used in the development of decision support tools for military applications, in particular for special operations and for joint deployments.

- **Training in software systems.** SMART is certified to supply training in the specific vendor UPDM and SysML tools which the DST Group has chosen to use. We have the capability to provide similar training in other vendor tools.
- **Evaluation of virtual reality training programs.**

SMART has recently engaged with DST Group to develop SysML modelling language to assist in providing a framework for modelling Joint Fires, which is required by Defence.

Australian National Centre for Ocean Resources and Security

The Australian National Centre for Ocean Resources and Security (ANCORS) is Australia's only multidisciplinary university-based centre dedicated to research, education and training on ocean law, maritime security and natural marine resource management. ANCORS was established as a joint venture between the Royal Australian Navy and the University of Wollongong in 1994. Originally named the Centre for Maritime Policy (CMP) and focusing on marine strategy and security, the Centre has expanded significantly over the years in recognition of the increasing importance of the sea and the consequent need for improved management of the oceans and as a response to growing challenges to security at sea.

Training for Defence Force personnel

UOW provides post-graduate training for Australian Defence Force personnel and officers from nations across the Asia-Pacific region on Department of Defence scholarships as part of Australia's aid contribution to neighbouring nations.

UOW's Faculty of Business provides three Masters degrees that qualify for Defence Force Advanced Standing, in Business Administration, Management and Science (Logistics/Project Management). The Logistics/Project Management degree in particular has proved popular with ADF scholarship holders.

The Department of Defence provides a number of scholarships each year for Navy and Coastguard officers from Asia-Pacific nations to undertake the Master of Maritime Policy degree at the University's Australian Centre for Ocean Resources and Security (ANCORS).

The University of Wollongong is a member of the Research Training Centre for Naval Design and Manufacture. This centre was established in 2015 specifically to provide training for future Defence industry personnel in the maritime sector. This is a collaborative centre funded by the Australian Research Council and comprises three academic institutions, industry and DST Group. This centre is providing 10 PhD scholarships, three of which have been taken up by UOW.

Innovative opportunities

Advantage Wollongong is a partnership between Wollongong City Council, University of Wollongong and the NSW Department of Industry and in July 2016 launched the Wollongong Defence Advantage Strategy with i3net, a network of industry-based companies in the Illawarra.

Wollongong has a proud history of providing innovative Defence technology and services to Australia's defence industries. The city has a well-developed and sophisticated ecosystem that ensures it is at the cutting edge of applied research and industry collaboration which is essential in servicing the Defence industry. As a traditional steel manufacturing hub, the region has a track record in converting technical know-how into Defence capability which protects service personnel.

Contact:

Judy Raper

Deputy Vice-Chancellor (Research and Innovation)
University of Wollongong

Ph: +61 2 4221 3915
E: judy_raper@uow.edu.au
uow.edu.au



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