Australian Government

ANSTO
Science. Ingenuity. Sustainability.

# Scientific ingenuity defending Australia

ANSTO supports the Australian Defence Force and Australian defence industry by providing access to scientific research infrastructure and expertise in materials engineering and advanced manufacturing.

Traditional materials characterisation methods can be enhanced by techniques available using ANSTO's neutron beam instruments at the OPAL multi-purpose reactor, synchrotron X-ray and infrared beamlines at the Australian Synchrotron, advanced microscopy, imaging and computer modelling.

## Aviation and aerospace research

Research at ANSTO's Australian Synchrotron helps deliver optimal performance and longevity for gas turbine engines used in aerospace applications. These investigations have found that densification of the zirconia components of the thermal barrier coating on jet engines following reaction with dust particles reduced the thermal barrier coating's ability to thermally insulate the engine and protect it from failure.

The Kowari neutron strain scanning instrument at OPAL provided measurements that supported an investigation of residual stresses that were generated by laser cladding and laser additive manufacturing, commonly used in aircraft repair. The investigation pinpointed the most effective enhancement procedure.

## Advanced modelling for vehicle design

Defence Materials Technology Centre (DMTC) together with ANSTO, Defence Science and Technology (DST), Thales Australia (Thales), Bluescope Steel, Bisalloy Steels, the University of Wollongong, University of Melbourne and Swinburne University of Technology won the 2013 Eureka Prize for Outstanding Science in Safeguarding Australia. The team developed and commercialized high-performance armour materials and manufacturing techniques which are increasing the levels of protection and performance offered by military land vehicles and to operating personnel.

## Assessing repair technologies

DST researchers also make use of Kowari to evaluate repair techniques and technologies, such as welding components. Research allowed various titanium alloy weld processing parameters to be examined, enabling the optimisation of residual stresses within the final components.

## Next-generation acoustic system transducers for submarines

Materials researchers at ANSTO, in partnership with Thales and DMTC, contributed to improvements in the production of single crystal piezoelectric ceramics for the next generation of underwater acoustic systems transducers for submarines.

## Protecting national security

ANSTO has a broad mandate in nuclear stewardship and nuclear forensics for Australia that contributes to nuclear security, non-proliferation and combatting nuclear terrorism.

A formal agreement with DST includes collaboration on a government radiological and nuclear spectrum database, a tool to help counter threats to Australia's national security.

Other collaborations between ANSTO and DST have included building a robot with a radiological sensor payload aboard to allow remote detection of potential radiological threats.

## DMTC Awards for Excellence

ANSTO scientists were honoured by the DMTC at the 2019 Awards for Excellence.

Michael Saleh, a senior structural engineer, received two awards for his leadership and research contribution over the past decade. His work on blast and shock models are leading to the development of advanced defence materials as well as predicting the operational life of engineered components such as those used on navy ships.

Dr Inna Karatchevtseva was recognised for her contribution to a partnership with Thales to develop an Australian supply chain for critical components of submarine sonar transducer equipment.

+61 3 8540 4238 andrew.peele@ansto.gov.au www.ansto.gov.au