Australian Government

ANSTO
Science. Ingenuity. Sustainability.

Advanced Manufacturing

Industry capabilities

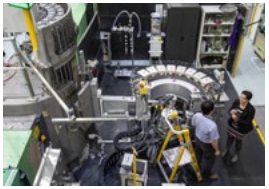
About ANSTO

ANSTO is home to Australia's most important landmark research infrastructure and expertise in nuclear science and technology. Drawing on more than sixty years of research on materials, from the time it operated under the auspices of the Australian Atomic Energy Commission, ANSTO has evolved to provide a unique set of facilities and expertise that support the requirements of the advanced manufacturing, materials and defence sectors.

Every year thousands of Australian researchers from industry, collaborating organisations and academia use ANSTO's infrastructure and capabilities which draw on the deep expertise of our staff.

ANSTO infrastructure

OPAL multi-purpose reactor



Australian Centre for Neutron Scattering

Centre for Accelerator Science

Australian Synchrotron

Facilities to characterise and develop nuclear materials

Gamma Technology Research Irradiator

Our people

People at ANSTO include expert scientists, engineers and technicians who contribute to industrial and translational research, collaborate with world leading authorities and foster promising early career professionals.

Collaboration and connection are pivotal to the best translational research outcomes. ANSTO has strong academic and commercial connections with all public research organisations currently supporting the delivery of goods, services and advice to the defence sector in Australia.

Our capabilities

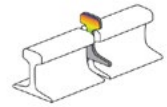
1. Characterisation

Defect imaging, investigating texture and condition, as well as dimensional tolerances.

Keeping our railways safe and reliable

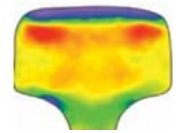
CHALLENGE:

Welded joints are a consistent manufacturing problem, as well as the maintenance and repair of squats or cracks in rails.



SOLUTION:

Detailed residual stress measurement studies undertaken by ANSTO in the weld and heat-affected zone provide valuable data for fatigue analysis.



Welding inspection

CHALLENGE:

Determine an approach to ensure the structural integrity of welds over time in samples which are difficult to analyse internally.

SOLUTION:

ANSTO's welding simulation group can verify all measurements from imaging and strain scanning and visualise the microstructure of the weld material.

Understanding stress distributions in granular materials

CHALLENGE:

Provide an approach to analyse the behaviour of complex granular materials to optimise industrial processes, such as steelmaking.

SOLUTION:

Neutron techniques at ANSTO verified numerical models of the behaviour of granular materials and visualised the microstructure.

2. Additive manufacturing

Additive manufacturing allows the production of complex parts that would not be possible using traditional methods. ANSTO's infrastructure is able to image and inspect the internal structure of parts non-destructively in high resolution.

Developing advanced metal and ceramic components

CHALLENGE:

Find an approach to eliminate microscopic defects like fractures or voids in components made by powdering, forging, or cast metal and ceramics processes, or additive manufacturing to avoid post-production treatment.

SOLUTION:

The use of the high temperature and pressure Hot Isostatic Pressing (HIP) method at ANSTO reduced defects and refined the microstructure — resulting in a part with improved properties to meet targeted performance requirements.

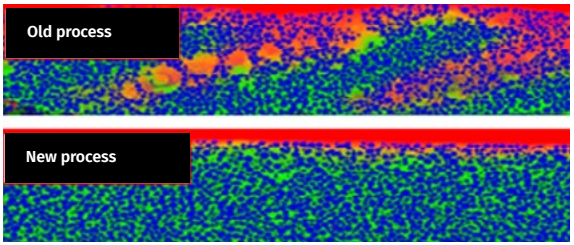
Laser cladding the surface of materials

CHALLENGE:

Assess a new form of laser-bonded metal coating.

SOLUTION:

Synchrotron techniques provided a detailed comparative analysis of both an existing and a new form of laser-bonded metal coating.



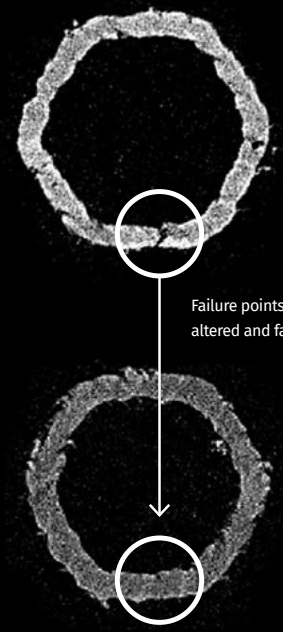
Improving the efficiency of additive manufacturing processes

CHALLENGE:

Support quality control and failure analyses in the manufacture of high-performance heat exchangers for Conflux Technology.

SOLUTION:

Use Synchrotron techniques at ANSTO to identify defects in parts and optimise production variables to eliminate defects. The techniques also revealed the microstructure in new parts to optimise the manufacturing process.



3. Materials

Materials at the most basic level define what a component can do and how long it will last. The Australian Centre for Neutron Scattering and the Australian Synchrotron provide tools that can help solve materials-based problems when more conventional testing techniques are not enough.

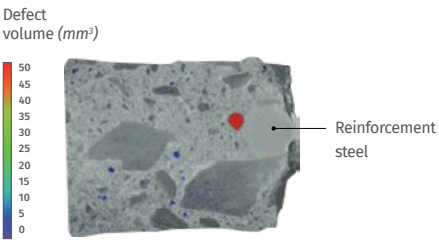
Analysis and visualisation of the porosity of concrete

CHALLENGE:

Find an approach to determine if voids, which can act as weak points or water channels, have formed in multi-phase concrete.

SOLUTION:

Highly penetrating neutron tomography at ANSTO proved to be an excellent method to analyse concrete cores; in particular, when reinforcement steel was present.



Friction stir processing of copper

CHALLENGE:

Improve the fabrication of Copper-Tungsten and Copper-Steel composites using highly localised heat in thermo-mechanical bonding.

SOLUTION:

Neutron strain scanning and imaging techniques at ANSTO measured residual stresses and assessed defects accurately to determine the ideal bonding for Cu-W composites.

Materials characterisation for additive manufacturing

CHALLENGE:

Support quality control and failure analyses in the manufacture of high-performance heat exchangers for Conflux technology.

SOLUTION:

Use Synchrotron techniques at ANSTO to identify defects in parts and optimise production variables to eliminate defects. The techniques also revealed the microstructure in new parts to optimise the manufacturing process.

Nuclear technologies: Advice and training

ANSTO expertise encompasses all aspects of the nuclear fuel cycle from the mining of uranium to ultimate waste solutions.

Scientists at ANSTO address key scientific questions related to both the current generation of nuclear reactors and future systems. Expertise and capabilities are applied to investigations of fuel, spent fuel and nuclear technologies, including next-generation systems.

As a leader in radiological measurement and understanding the impact of nuclear activities on the surrounding environment, ANSTO contributes to Australian, regional and international monitoring. Research strategies and obligations in environmental monitoring also support Australia's nuclear emergency preparedness and response, nuclear security and safety.

The Nuclear Stewardship science group undertakes activities in Radioactivity measurement standards, Radioanalytical chemistry, Nuclear security science, Environmental monitoring and operates the Environmental Radioactivity Measurement Centre.

ANSTO's Radiation Services and Waste Management teams comprise more than 50 experts; many of whom have lifelong experience and are national authorities. With safety driving all processes, ANSTO provides consultation services to government and industry, developing strategic partnerships and delivering solutions for source inventory management, radiation safety education and radioactive waste.

Specialist training services provide frontline responders with the tools to operate in hazardous radiological environments. Partnering with government agencies enhances interoperability in response. The interface between frontline responders and scientists ensures the latest technology developments strengthen Australia's ability to prepare strategic responses to extreme threats.

Collaboration

ANSTO enjoys the best of both worlds – secure and ISO accredited research sites, as well as long-standing collaborations with DST, CSIRO and Australian Universities. Security and intellectual property protection are a vital component of all business operations at ANSTO.

ANSTO can also accommodate work requiring Australian Government Security Vetting Agency (AGSVA) clearances.

A fundamental commitment to collaboration with industry and academia keeps ANSTO relevant. The ANSTO Innovation Precinct co-locates a community of industrial users with proximity and access to ANSTO scientists and infrastructure at Lucas Heights, NSW. The *nandin* deep tech incubator is home to a community of researchers, students and startup companies working on challenges relevant to the defence sector.

To complement this, the ANSTO Graduate Institute will further assist early career talent in Australia by co-developing graduate projects with Australian universities and other partners. Opportunities for student scholarships and joint supervision of student projects exist.

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Location

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www.ansto.gov.au

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