

CAPABILITY STATEMENT

Innovative Manufacturing



UNIVERSITY
OF WOLLONGONG
AUSTRALIA



The University of Wollongong is well positioned to help Australia meet the challenge of competing in a global race for next generation manufacturing.

While Australia's traditional manufacturing industries such as motor vehicles, white goods, electronics, footwear and clothing have declined and, in some cases, disappeared, the University of Wollongong recognises that there are clear opportunities to be at the forefront of exciting new manufacturing opportunities based on innovation and technology.

The University of Wollongong's research efforts in next generation manufacturing span 3D printing, high strength alloys, better battery materials, bionic implants and nanomaterials, while it is also has a strong focus on developing innovative new building materials such as photo-voltaic roofing.

Researchers are also developing innovative machinery like 3D printers, high productivity welding systems, metal forming systems and autonomous robots.

Manufacturing Innovation is one of the three themes in the University's Global Challenges program, which is responding to some of the universal challenges facing the world in the 21st century.

The theme is led by Professor Geoffrey Spinks, an Australian Research Council Fellow based at the ARC Centre of Excellence for Electromaterials Science (ACES), which has its national headquarters at the University of Wollongong.

ACES is leading the nation's research into development of new industries and manufacturing opportunities in next generation materials such as biomedical implants, batteries and solar cells. Professor Spinks has a background in both engineering and chemistry and extensive experience in manufacturing-related research and industry collaboration.

ACES is based at the Australian Institute for Innovative Materials (AIIM) building at the University's Innovation Campus. The complex includes a dedicated Process and Devices building that was the first in Australia to bridge the gap between research breakthroughs, prototyping and commercialisation.

While the University of Wollongong has a strong focus on exploring next generation manufacturing opportunities, it has not neglected its historic links to Australia's steel industry. The University of Wollongong is the headquarters for the ARC Research Hub for Australian Steel Manufacturing which was established to drive innovation and improve global competitiveness for the industry.

Safeguarding troops

Welding and automation expertise developed at UOW is supporting Australian manufacturing as part of a major new defence contract. UOW's welding automation group will be 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 three and a half years from 2017.

The highly mobile armoured vehicle, known as the Hawkei, will provide Australian soldiers with increased protection and mobility. The Hawkei follows on from the success of the larger Bushmaster vehicle, also developed with UOW's help.

The contract will lengthen the welding group's research and development contribution to defence projects, particularly in robotic welding automation and armour materials, as part of the Defence Materials Technology Centre (DMTC). DMTC is a joint venture between Defence, industry, universities and government research agencies. 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.

The success of the group's research and innovation was recognised when DMTC's Armour Applications Program won the 2013 Defence Science and Technology Organisation Eureka Prize. The welding group's contribution to naval research and development was recognised with the National Innovation Award at the Pacific 2015 Maritime Exposition. UOW is now engaged in providing DMTC program management and research for the new maritime platform program recently announced by the Federal Government in the recent Defence White Paper.



Professor Geoffrey Spinks leads the Manufacturing Innovation theme in UOW's Global Challenges research program.

Australian Institute for Innovative Materials

AIIM is home to two of the University of Wollongong's flagship research institutes, the Institute for Superconducting and Electronic Materials (ISEM) and the Intelligent Polymer Research Institute (IPRI), which is also the lead node of the ARC Centre of Excellence for Electromaterials Science (ACES).

ISEM is a world-leading research institute dedicated to developing new and innovative technologies to generate, transport and store energy and improve the efficiency of electronic devices. The institute's research program focuses on developing new technologies and materials for applications in hybrid vehicles, medical equipment, telecommunications technologies, biomedical applications, and turning waste heat into an energy source.

ISEM has engaged with industry on a four-year project to develop 'game-changing' sodium-ion battery technology. The consortium, led by Prof Shi Xue Dou from ISEM, will develop low-cost, high-density battery storage to integrate renewable energy sources, such as solar power, into the grid.

The \$10.6 million project involves \$2.7 million from the Australian Renewable Energy Agency (ARENA), while UOW and industry partners are contributing more than \$1.8 million in cash and substantial in-kind contributions and Chinese partners are also adding significant support.

When IPRI was established in 1990 it was the world's first intelligent polymer research laboratory, and it has remained at the leading edge of research in this field ever since. Its researchers work with nanomaterials in areas such as renewable energy (plastic solar cells, lightweight batteries and electronic textiles), medical science (nerve and muscle regeneration and cell communications), sustainable industries and 3D printing.

AIIM Process and Devices facility

The Process and Devices facility at AIIM was established with a \$43.8 million investment from the Australian Government in recognition that new and innovative materials need new and innovative production methods. It is hugely advantageous for simultaneous development of both the new materials and machines that can produce them.

The Process and Devices facility allows researchers to take their new materials from fundamental research, through the proof

of concept stage and into real world applications through novel fabrication, processing and manufacturing methods.

For example, 3D printing technology researchers at IPRI are developing biomedical devices that replicate organs and other body parts, while also designing and manufacturing machines to make them.

Southern Manufacturing Innovation Group

Innovative manufacturers in the region have joined with UOW researchers within the Southern Manufacturing Innovation Group (SMIG).

SMIG, a collaboration between UOW's Global Challenges Program and the Innovation and Commercial Research team, was launched in May 2015 and is focused on developing innovation through collaboration between businesses and University researchers. The common characteristics of the group are innovativeness, an interest in learning from each other as well as collaborating on projects.

About 20 companies are now involved with the group and a number of these are exploring collaboration on new product development as a result. At the moment, SMIG is connecting 40 UOW researchers with local innovative manufacturers.

Sustainable Buildings Research Centre

The Sustainable Buildings Research Centre at the University's Innovation Campus is a research centre that helps the building and construction industry achieve better environmental and economic outcomes through more sustainable energy practices.

Critical to SBRC's success in attracting industry research partners is its ability to showcase the kinds of sustainable energy and cost-saving technologies that its researchers are espousing. It is in effect a "living laboratory" – a demonstration facility for industry and the community for activities relating to resilient and sustainable buildings and energy efficiency, while also demonstrating the financial advantages of energy efficiency.

SBRC is working with major corporate partner BlueScope on development and testing of next generation steel building products including photo-voltaic thermal roofing, cool roof products and other innovative building envelope systems. It is also working with other key industry partners on innovative control systems for building services, including air conditioning systems and automated natural ventilation systems.

Research hub for steel manufacturing

The ARC Research Hub for Australian Steel Manufacturing is a national centre headquartered at the University of Wollongong that brings together the best and brightest engineers from Australia's steel manufacturers and research institutions to drive innovation in product development and manufacturing techniques.

Product innovations include a project to develop a self-cleaning, anti-microbial organic coating for painted steel to prevent the build-up of mould, algae and other bacteria on steel surfaces. They are also developing an archetype multi-unit mid-rise cold-formed steel building using the latest six-dimensional building information modelling.

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