Harnessing PhD skills to transform Australian manufacturing

The Australian Mathematical Sciences Institute's (AMSI) APR.Intern program is making it easier for manufacturing innovators to access specialist research skills, as a new report reveals the sector is among Australia's top PhD employers. By Laura Watson.

Released in May by AMSI and CSIRO Data61's student-employer matching platform, Ribit.net, *'Advancing Australia's Knowledge Economy – Who are the top PhD employers?'* shows over half of PhD students are hoping to work in industry. One of the biggest factors in this shift is the lack of university-based positions. PhD graduate numbers are overtaking academic demand, with annual completions soaring from under 4000 annually in the year 2000 to almost 10,000 today. This trend has seen some of Australia's largest business employers emerge as leading PhD recruiters.

An OmniTAINER purchased by global leasing giant Eurotainer leaves Omni Tanker's factory en route to Germany.

Aligned with the nation's growth sectors, medicine, pharmaceuticals, mining and finance join advanced manufacturing as top employers. There is also growing demand across emerging industries such as environmental services and media technology and services.

This is good news for big business and SMEs looking for quantitative, analytical and research expertise to drive advanced and digital manufacturing innovation. The scope of roles for PhDs continues to broaden, with global competition driving many firms to diversify their workforce with specialist skills across a range of disciplines.

The challenge is bridging the gap between academia and industry to produce a supply of PhDs equipped to make the transition. Australia's economy, innovation capability and global competitiveness is dependent on the effective skilling of this workforce to apply specialist expertise within a commercial business environment.

Helping meet this challenge since its launch in 2007 as AMSI Intern, APR.Intern remains Australia's only national postgraduate internship program. The program has refined a model that benefits both academia and industry. A significant ingredient in its success is its reach across Australia's academic and industry communities, including strong partnerships across the manufacturing sector.

A powerful doorway between two worlds with so much to gain from each other, the program's impact on research-industry collaboration is evident. While we are seeing a slow cultural change, universities are increasingly aware of the benefits of industry partnerships and the value of this research as a catalyst for academic success. Similarly, as the afore-mentioned report shows, industry is embracing PhD talent as an innovation accelerator.

"Platforms such as APR.Intern are critical to building pathways between academic research and industry, putting industry opportunities at reach for PhD students and helping industry access the skills they need," says Gary Hogan, APR.Intern Director and Melbourne Enterprise Professor.

With a long history of perfect research matches to accelerate industry innovation, Australia's only all-sector, all-discipline PhD internship program has Industry 4.0 sorted. The manufacturing sector is set to benefit from a funding partnership between APR.Intern and the Innovative Manufacturing Cooperative Research Centre (IMCRC). Under the agreement, 23 skilled PhD students will be matched to manufacturing innovators to help drive advanced and digital manufacturing and optimisation solutions.

"We are excited to be partnering on these opportunities to transform the sector, putting new technologies, business models and digitalisation in the reach of manufacturers including big business and SMEs," Hogan adds.

With manufacturing projects attracting up to $13,000 in IMCRC funding support, as well as a 50% Federal Government Rebate, APR.Intern is an effortless solution for manufacturing industry seeking to harness opportunities within advanced and digital manufacturing.

"These placements bring specialised research skills to the manufacturing table while also transforming university-industry research engagement," Hogan explains. "It is a win for all, and importantly, a boost for Australian innovation."

Injecting $28.2m into PhD internships, Federal Government investment in APR.Intern has led to a national-scale program expansion since 2017. A significant win for both universities and industry, the scheme is part of ongoing government strategies to boost the number of women in science, technology, engineering and mathematics – critical to reaching Australia's innovation potential.

Currently, women account for 16% of the STEM workforce, and will play a key role in meeting demand for skill supply as we seek to position Australia as an innovation nation. As well as encouraging female PhD students to apply, APR.Intern is helping stimulate critical national conversation about how the innovation sector can better support gender equity to protect future capability and capacity.

For SMEs looking to advance innovation capability, the program is a gateway to specialist research capability with opportunity to work with both a PhD student and academic supervisor. The best part is the business retains the IP, and with APR.Intern there to look after everything, there is little risk and no administrative burden.

"Low-risk, high-impact, it is the perfect platform for advanced and digital manufacturing leaders to discover the benefits of engaging with skilled researchers," says Hogan.

Thinu Herath is now a valued full-time member of Omni Tanker's engineering team.

Engineering export success

For Dr Luke Djukic, Chief Technical Officer at Omni Tanker, the program was a no-brainer for the composite technology leader. After being matched to then-PhD student Manudha 'Thinu' Herath, the company was able to engineer its way into the European market.

"We were matched with Thinu at a critical time in this project," says Djukic. "To be able to rapidly and seamlessly tap into his specialised engineering skills made a significant difference for Omni Tanker, and is one of the reasons APR.Intern is so successful."

Now employed full time with the company, Thinu applied his specialist engineering skills to design a lightweight, safe composite tank for the transport of corrosive and high-purity chemicals, compliant with stringent European standards. As well as structural design, he developed and tested the 4,000-litre tank's fire protection system. This was later tested in Germany and the tanks are now on the market in Europe and the USA.

"Thinu was able to offer a higher level of finite element analysis capability compared to that which already existed in the company," adds Djukic. "This improved design process efficiency and reduced development time."

In a world transfixed by the possibilities of technology, automation and big data, industry demand for research only continues to climb. Strengthened industry-research pathways are critical if companies like Omni Tanker are to flourish in the global market.

With increasing numbers of PhD students looking to open up their world with industry research, opening the gateway for collaboration is more important than ever. As Omni Tanker and Herath discovered, the chance to apply specialist skills to real-world challenges is transformative for all involved.

Unmatched access

At the core of APR.Intern's success in bridging industry and research is the program's unmatched access to industry and academia with networks across all-disciplines and sectors. The program works with all Australian universities, and with industry partners across defence, telecommunications, environmental conservation and agriculture, banking and finance, medical research and government.

As well as the IMCRC, the program has deepened its presence within the defence and health innovation sectors with partnerships to place interns through the Defence Science and Technology Group, Defence Innovation Network, Defence Science Institute and the Victorian Comprehensive Cancer Centre. Agreements that cement APR.Intern as the leading force delivering PhDs to the commercial innovation frontline.

With PhDs supported through their placements by an academic mentor, APR.Intern is also opening doors for established academic researchers looking to engage with industry innovation. A conversation long overdue with Australia trailing OECD counterparts in research-industry collaboration.

For manufacturing SMEs and big business, opening up the world of academic research means greater capacity to lead the advancement of new technologies, working smarter and importantly the ability to compete globally. It is a slip lane onto the innovation superhighway that they can't afford to miss. With over 52% of PhDs set to enter industry opportunities, there is a ready supply of specialist expertise to drive innovation into the future. Programs such as APR.Intern make it easier to find the right fit for your innovation challenge. AMT

These internships are supported by the Australian Government Department of Education and Training, through the 'Supporting more women in STEM careers: Australian Mathematical Sciences Institute (AMSI) – National Research Internship Program'. To discover how you can open up your world and accelerate innovation in your business with APR.Intern, visit: www.aprintern.org.au