

AI ROBOTIC WELDING TECHNOLOGY



IR4 is a technology company specialising in advanced automation with a preliminary focus on fabrication. It has previously licensed its technology for the production of structural steel. By partnering with participants, including the Australian Centre for Robotics Vision and equipment providers, it is readying its fabrication technology for more complex applications in the defence sector.



How has the Growth Centre helped?

The Advanced Manufacturing Growth Centre has provided \$333,744 in co-funding. It has directly linked IR4 to several opportunities with new users and new applications.

What's changed?

The successful commercial and technical validation of the demonstration cell through this project opens up export opportunities with Rheinmetall, a German Tier 1 defence supplier, and with customers of project partners Faro, Bosch Rexroth and KUKA. Adoption of an Australian-made Industry 4.0 solution by a major German Defence manufacturer would be "the best marketing campaign we could ever hope to achieve," and lead to between five and 10 high-skilled jobs at IR4.

Success story overview

IR4 was established in 2016 and is a Yatala-based company specialising in Industry 4.0 solutions for flexible manufacturing applications.

IR4's technology is currently used under license by structural steel business SSS Manufacturing, enabling an extreme degree of flexibility and efficiency in production automation. This includes real-time decision making which accounts for material variability and system variables. This results in a decrease in labour content of as much as 75 per cent per tonne of steel produced.

The company's capabilities caught the attention of Germany's Rheinmetall. Rheinmetall recently won the contract for the LAND 400 Phase 2 project and will provide 211 of its Boxer Combat Reconnaissance Vehicles. They invited Chris Brugeaud, IR4's CEO, to Germany to review efficiency, quality and flexibility opportunities for their existing automation solutions.

“That came about when we actively started to engage industry for the application of our technology to alternate opportunities,” explains Brugeaud.

“They immediately recognised the opportunity to solve a number of their current production issues and the complications associated with automating those processes, specifically around the mission modules.”

This project will take what IR4 has provided for structural steel fabrication and apply it to building and sustaining CRV mission modules. This will deliver higher accuracy levels, adapted robotic collision avoidance methods, and the ability to handle a greater range of 3D CAD files. 3D files are used in IR4's solution as a single key input for automation and control across the platform.

It will enable the use of 3D scan data to create production-level code without human intervention. Further completing a 3D scan of the hull on completion of fabrication provides Rheinmetall with QA control data that can be used in assessing the serviceability of a hull when in service after an incident. This same technology can be used to compare a worn or damaged part with its original profile and automatically generate a robotic repair plan which either includes “robot paths for the required pad weld, or we can even attach a 3D printing head to rebuild the worn profiles,” adds Brugeaud.

Besides Rheinmetall, IR4 will collaborate with equipment providers Faro, Bosch Rexroth and KUKA Australia, which provides for a globally supportable solution. The Australian Centre for Robotic Vision, which featured IR4 as a case study in this year's *Robotics Roadmap*¹ and which has an existing relationship with IR4, will provide support on visual sensing.

SSS Manufacturing is providing in-kind use of its site and equipment for the development of the demonstration cell. IR4 will retain all IP developed.

“When there is product variability, it needs to be able to accommodate that without complication,” explains Brugeaud of one major challenge.

“Customers including Rheinmetall can make any drawing changes to the specific parts that they want us to automate and the system will automatically update the production platform and recode it to produce that particular product as it's drawn.”

If successful, the project will move the system from Manufacturing Readiness Level (MRL) 3 to MRL 7. It is envisaged that validation of the demonstration cell would lead to a turnkey system being built at MILVEHCOE, in Redbank, Queensland, the site where Australia will produce all but the first of the new Boxer CRVs. Following the success of this installation it is envisaged that a derivation of this same solution would be implemented at Unterlues, Germany.

IR4 has significant opportunities for its automation technology in sectors such as shipbuilding, automotive and construction.

Selling Industry 4.0 technology to a Tier 1 defence company in Germany, the home of Industry 4.0, would represent “the best marketing campaign we could ever hope to achieve,” offers Brugeaud. It would lead to a predicted five to 10 engineering and development roles at his company and opportunities through Bosch and Faro's customer bases, which are looking to increase productivity through new Industry 4.0 solutions.

He adds that the Advanced Manufacturing Growth Centre, which supported this project through \$333,744 in co-funding, had directly linked IR4 to several prospective users of its new solution, such as the weld repair aspects mentioned above.

“Their networking has given us the ability to be able to engage with much broader industry participants than those that we otherwise would have been exposed to,” he finishes.

¹ https://www.roboticvision.org/wp-content/uploads/Robotics-Roadmap_FULL-DOCUMENT.pdf

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