Case Study | UAP | Urban Art Projects

Transforming a bespoke Brisbane-based art fabricator to AI-enabled advanced manufacturing.

ABOUT:

UAP is a global company that collaborates with artists, architects, designers, and developers to bring uncommon creativity to the public realm and expert resources to creativity. Founded in 1993, UAP is headquartered in Northgate, Brisbane, at a 5000-square-meter space formerly used for train fabrication.

The award-winning company is recognised as a global leader in public art and architectural design solutions and is driven by a diverse team with the core skills of curatorship, design, project management, fabrication, and construction. UAP works across all parts of the creative process: from commissioning and curatorial services, concept generation and design development, right through to engineering, fabrication, and installation.

DIGITAL TRANSFORMATION RESULTS:

ARM Hub staff worked closely with UAP to transform the bespoke 30-year-old Australian design studio, manufacturer, and foundry from traditional manufacturing to advanced manufacturing, enabling the company to maintain its global leadership in delivering public art and large-scale projects.

The journey began in 2017, following a $50K Innovations Connection grant that enabled ARM Hub staff to be embedded in UAP operations and identify technology adoption opportunities. This initial work helped leverage $8M in funds in R&D funding for UAP.

ARM Hub staff worked with UAP over four years to develop robots that 'could see' and were capable of processing spatial information to make decisions, which significantly improved the mass customisation capabilities of robotic manufacture.

This collaboration has helped UAP to dramatically increase the company's competitiveness, expand its unique capabilities in the global market, take advantage of changed global trade conditions, and boost its ability to re-shore its global manufacturing to the flagship workshop in Brisbane.

INNOVATION:

- Development of complex computer vision enabling robots to make decisions based on spatial awareness
- Automation of activities such as fettling and polishing, and 3D printing.
- Using augmented reality (AR) and virtual reality (VR), UAP staff were also able to digitise the entire design to manufacturing process – including welding and quality assurance – to dramatically reduce design to manufacture time.
- UAP have used their 4.0 digital skills to create a unique spin-out digital consultancy, FARM, with global prospects.

OUTCOMES

Since working with ARM Hub staff and implementation of the IMCRC grant, between 2017 to 2022 UAP has measured the following impact:

Increased AU Sales 148% from $16.2M to $40.3M	Increased Global Sales 89% from $44.1M to $83.7M
1 digital spinout company, THE FARM launched 2022	Projects engaged with industry 4.0 capabilities expanded from 5% of UAP projects in 2016 to 80% in 2022

STAFF

125 staff in Australia, representing 52% increase since commencing 4.0 journey

RE-SHORING OF PROJECTS

2022 sales of $40.3M will see only $735K imported from global workshops

Without 4.0 transformation, $15.3M would have been fabricated offshore

OFFICES

Chengdu in China *(NEW)*

Riyadh *(NEW)*

Los Angeles *(NEW)*

Sydney and Melbourne *(OFFICES EXPANDED)*

NEW FUNDING LEVERAGED

2022 –$825,000 from the Smart Foundry Program

CASE STUDY: UAP Industry 4.0 Transformation

	2017	2020	2022
CONTINUOUS INVESTMENT IN R&D			
UAP, QUT, RMIT (and subsequently the ARM HUB): identify & develop application for 3-year IMCRC Project on Robotic Vision for Mass Customization	July 2017 IMCRC Robotic Vision project commences	July 2020: IMCRC Robotic Vision Project completed	UAP continues to collaborate with the HUB for technology adoption opportunities
INCREASED INVESTMENT IN INDUSTRY 4.0 TECHNOLOGY			
INDUSTRY 4.0 CAPABILITY GROWTH	**KUKA robotic arm for milling**	KUKA robotic arm for milling	KUKA robotic arm for milling
		KUKA robotic arm for additive manufacture (3-D printing)	KUKA robotic arm for additive manufacture (3-D printing)
		VR capability for pattern-making in virtual space	VR capability for pattern-making in virtual space
		AR (Augmented reality) for manufacturing processes	AR (Augmented reality) for manufacturing processes
			SMART FOUNDRY: implementation complete August 2022
			UR10 (x2) Polishing Bay: implementation by September 2022
			Robotic Plasma Cutting: Testing by Oct 2022
			Robotic Drilling: Testing by Oct 2022
INCREASED COMPETITIVENESS MEANS INCREASED EMPLOYEES			
EMPLOYEE GROWTH	**82 STAFF AU**	**125 STAFF AU**	**85 INCREASING TO 125 STAFF AU** *reduced due to COVID impact but expected to recover to pre COVID numbers (greater than 125) based on current order book.
	145 STAFF GLOBAL	**252 STAFF GLOBAL**	**273 STAFF GLOBAL**
INCREASED COMPETITIVENESS MEANS INCREASED SALES			
SALES GROWTH	**$16.2M Sales Australia**	**$18.2M Sales Australia**	**$40.3M Sales Australia**
	$44.1M Sales Global	**$64.2M Sales Global**	**$83.7M Sales Global**
DECREASED REQUIREMENTS TO IMPORT FROM GLOBAL WORKSHOPS			
RE-SHORING FROM GLOBAL WORKSHOPS	Import $ value from Global workshops 38% of total AUS revenue.	Import $ value from Global workshops 5% of total AUS revenue.	Import $ value from Global workshops 2% of total AUS revenue.

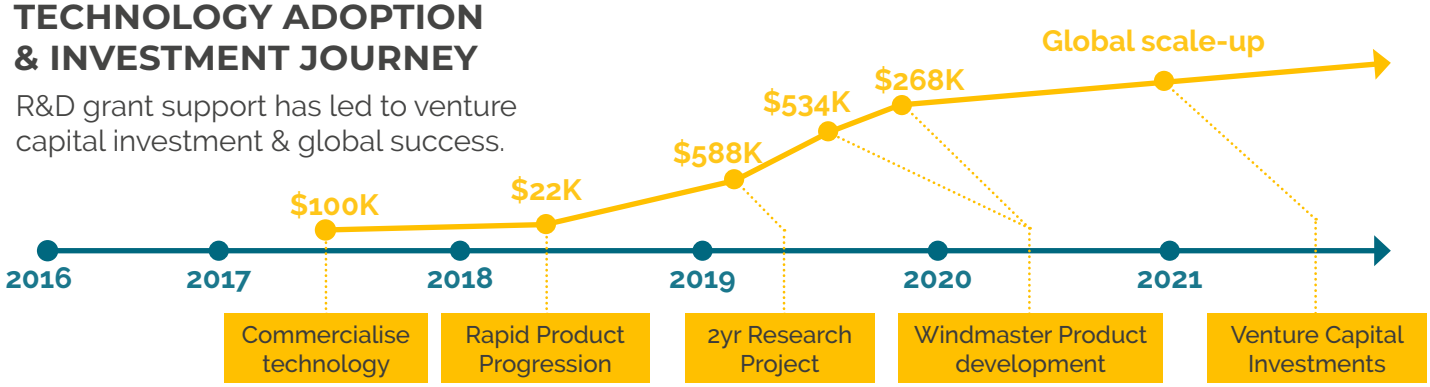
ARM ADVANCED ROBOTICS FOR MANUFACTURING HUB

CASE STUDY
VERTON AUSTRALIA PTY LTD

The invention and development of an AI and IoT enabled, remote-controlled load-management system, eliminating the need for human held tag lines on suspended loads.

TECHNOLOGY ADOPTION & INVESTMENT JOURNEY

R&D grant support has led to venture capital investment & global success.



RESULTS

Following the successful design, engineering, prototype and manufacture of their first remote-controlled, load-management system, in 2017 Verton engaged ARM Hub, the Innovative Manufacturing CRC (IMCRC) and QUT to further their product development.

Collaborating with ARM Hub experts grew into Verton becoming the first resident company within the Hub's Northgate Learning Factory. There, Verton pursued R&D and accessed expertise to inform the integration of software, robotics, control systems and artificial intelligence.

Technologies applied:

- Inertial sensing systems
- Closed-loop control systems
- Computer modelling and simulation

The innovations within the heavy lifting industries captured the interest and investment of global venture capitalists, increasing the value of their products, and contributing to the industry's technology uptake.

These successes paved the way for further innovations that would meet the unique demands of wind energy infrastructure, resulting in the development of a new product, The Windmaster. This new system contributes to both the erection of wind turbines and maintenance, increasing the longevity of sustainable energy infrastructure.

Since engaging with ARM Hub, Verton has achieved significant growth. Here are some highlights:

13 new jobs

$1.5 million in R&D investments

17 Verton R-Series deployed globally

8 countries using Verton technologies

3 offices opened globally

APPROACH

Collaboration – The Verton team, with ARM Hub and QUT's network of robotics and AI experts, demonstrated research and industry joining forces to adopt advanced manufacturing capabilities and increase competitiveness.

Expertise – ARM Hub and QUT's technical experts worked with Verton to enable the application of scanners, cameras, and sensors, facilitating the production of the remote-controlled and fully autonomous system.

Testing – During COVID-19, Verton used their space at the ARM Hub Learning Factory, to execute 7 full-scope product tests as well as develop and test new products.

Innovation – Maximising the ARM Hub's space and services, Verton continued to innovate its product offering and developed the next generation of its remote-controlled products.

OPPORTUNITY

To meet market demand and increase product development, Verton needed to access leading AI, data science and robotics expertise, more space to enable the scaling up of their manufacturing capability, and facilities to increase testing capacity.

Accessing ARM Hub created the opportunity to utilise the research and development strengths in Australia to grow and evolve their products, taking advantage of the latest advancements in technology.

EMERGING INNOVATIONS

The high-value AI-enabled units not only optimise crane operations but have created real market advantages for Verton by delivering market intelligence, system and task alerts, and product improvement insights.

Now embarking on its next phase of innovations, Verton seeks to incorporate further computer vision technology to actively detect problems, cementing competitiveness.

ABOUT VERTON

Verton Technologies Australia Pty Ltd reinvented heavy-lifting operations with their world-first range of remote-controlled load-management systems.

Their R-Series system uses revolutionary gyroscopic technology creating output torque and precision rotation that supports the full weight of suspended loads. The system eliminates inefficient, costly, and unsafe practices in lifting, to deliver safer, faster, and smarter crane operations.

From multi-national port operations to the installation of wind turbines on the North Sea, this Queensland based SME is transforming heavy lifting infrastructure globally with safety, productivity and sustainability outcomes. Verton has contributed to the continued successful installation of wind turbines across the globe, creating direct benefits towards sustainable future goals and contributing to global value chains.

PROJECT COLLABORATORS

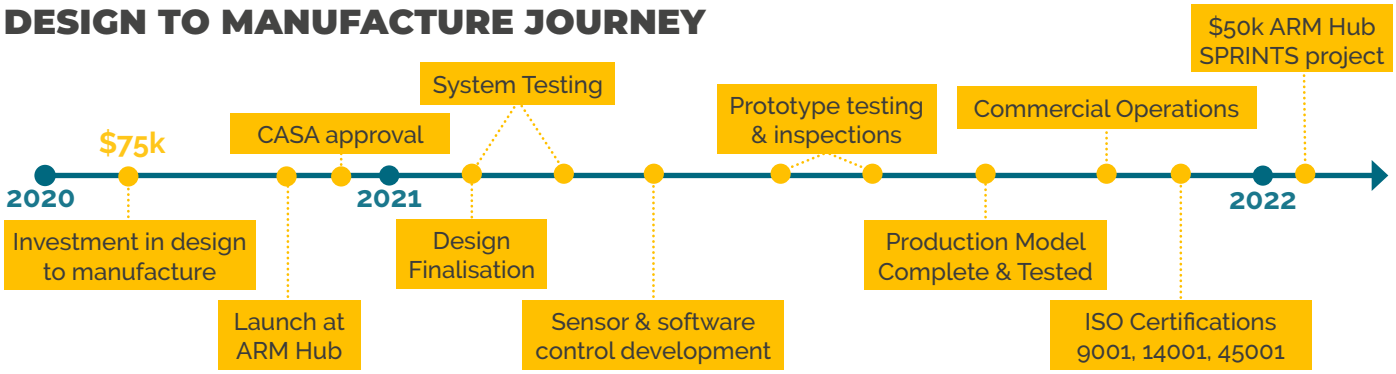
Verton Australia Pty Ltd, ARM Hub, IMCRC, QUT, Advanced Manufacturing Growth Centre (AMGC), Queensland Government

ARM ADVANCED ROBOTICS FOR MANUFACTURING HUB

CASE STUDY VOLTIN

Design, prototype and development of a world-first AI-enabled building façade inspection system, capturing the dangers of defects invisible to the human eye.

DESIGN TO MANUFACTURE JOURNEY



RESULTS

With great success from a design to manufacture process with collaborators ARM Hub and QUT, Voltin's original innovation, the AutoBAT, has evolved from prototype to commercial production model with full CASA approval. The AutoBAT is currently being used on commercial and residential towers and AutoBAT 3.0 is now in development.

Voltin's ground-breaking data analysis of buildings and infrastructure provides new, safer, more accurate, and more cost-effective assessments of building information integrated with modelling capabilities. The detection of defects and improvements on building façades not only improves safety but also generates demand for work from additional industries.

Through a workshop processes, Voltin made enhancements to their original prototype. The AutoBAT 2.0 boasted advanced features including

- Propulsion stabilisation
- Anti-collision sensors
- Artificial Intelligence technologies
- Digital data capture and geo-location
- Thermal and RGB image comparison
- Automated winch/boom controls
- Defect Analysis Imagery
- Software remote control systems

With a $50k ARM Hub SPRINT project Voltin are now developing AutoBat 3.0. The system will deploy a single sensor system with AI for sensor fusion to accurately identify salient features within the robot's field of view.

Since their launch at the ARM Hub in 2020, Voltin has achieved significant growth, including:

1	**new product to market**
7	**new staff by 2023**
800%	**forecast growth to 2023**
3	**international standards certifications**
200%	**increase in employees**

APPROACH

Innovation – Voltin's AutoBAT innovation reduces the laborious and sub-optimal process of traditional man-powered rope and gantry inspections with the tethered drone and vision systems.

Investment – Voltin invested with ARM Hub to define the design to manufacture requirements for a new façade inspection product and is proceeding with an second project to refine its AI and visions systems for ease of customer use.

Collaboration – Through ARM Hub, Voltin were able to tap into the expertise of industrial designers, data scientists and engineers at QUT, allowing for product development to continue with additional advice about drones, CASA and aerospace science. Voltin continues to collaborate with ARM Hub in 2022.

Testing – Testing in the prototyping phases allowed Voltin to improve the AutoBAT before it reached commercial operation, allowing Voltin to maximise data capture and expand services.

OPPORTUNITY

For 12 years, Voltin has been providing specialised building inspections, they recognised that an autonomous device operating in the urban environment could change the way their business and the industry operate. With aspirations to achieve the versatility of a drone, without the limitations of air traffic approvals, a unique combination of mechanical, electronic systems and a synchronised software controller was the solution.

EMERGING INNOVATIONS

On the cusp of rapid growth with interstate and international expansion on the horizon, strong registration of interest and a developing pipeline of work is securing Voltin as trusted innovators.

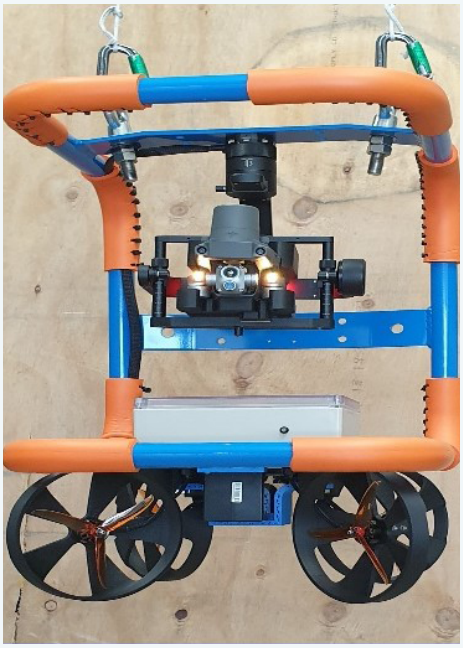
With AutoBAT 2.0 expanding on the original features to implement artificial intelligence into the product, Voltin plan to release AutoBat 3.0 with AI technologies for sensor fusion this year.

ABOUT VOLTIN

Voltin, a new Brisbane-based SME and spin out of Bells Property Inspections and Maintenance, developed a new technology for inspecting high-rise building façades. Voltin's AutoBAT system automates the recording, evaluation, and reporting of building façade defects, significantly transforming traditional methods of inspection.

The AutoBAT, an artificial intelligence (AI) engine, can be operated safely from the ground to accurately locate and identify defects and anomalies (e.g., peeling paint, watermarks, surface cracks, corrosion) and automatically generate inspection reports.

Drone use is highly regulated and limited in populated areas and controlled airspace, rendering drone use for remote inspection infeasible. Voltin's innovative façade assessment system is capable of high-resolution visual data capture for high rise buildings in dense population areas, employing the best of traditional inspection methods and advancing technologies.



PROJECT COLLABORATORS

Voltin, ARM Hub, QUT, Queensland Government