



## ADVANCED MANUFACTURING GROWTH CENTRE

PROJECTS REPORT 2020



# 343

nation-wide collaborations



# ~2,361

jobs projected



# \$66.8 million

committed (AMGC,  
industry and in kind)



# ~\$1.2 billion

in estimated  
revenue generated

**\$101  
million  
total**

**NORTHERN TERRITORY**



**20 jobs**



**1 project**

EXPORT OPPORTUNITIES

**\$33.9  
million  
total**

**WESTERN AUSTRALIA**



**113 jobs**



**4 projects**

**\$300  
million  
total**

**SOUTH AUSTRALIA**

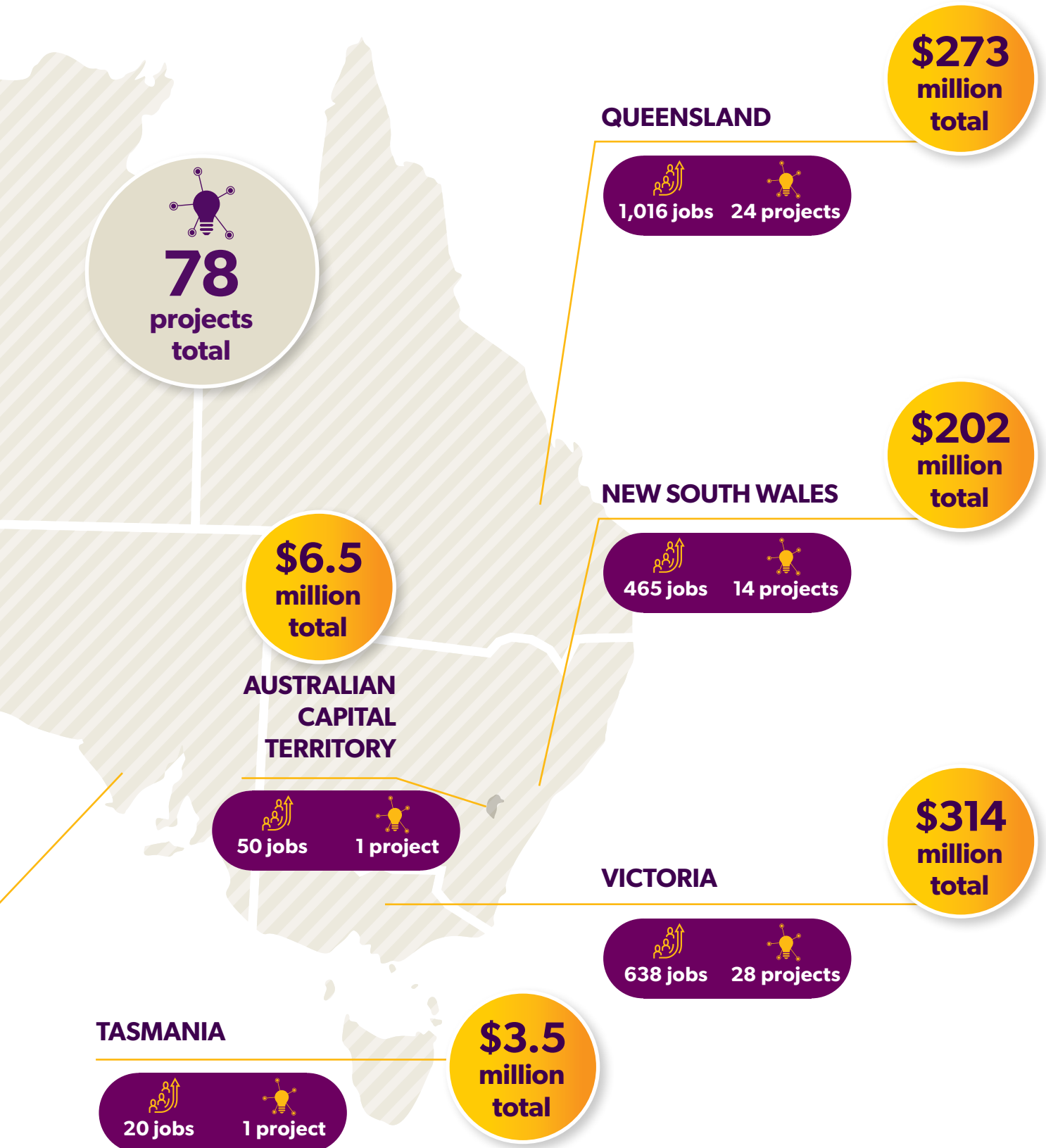


**39 jobs**



**5 projects**

## EXPECTED OUTCOME OF OUR PROJECTS



# AMGC PROJECTS BY SUB INDUSTRY AND ADVANCED CAPABILITIES

	Aerospace/Aviation	Agriculture/Agribusiness	Apparel/Textile	Arts/Recreation	Automotive	Chemicals	Construction/Furniture	Defence	Electrical/Electronics
<b>Additive Manufacturing/ 3D Printing</b>	0	0	0	1	0	0	0	0	0
<b>Advanced Composites/ Materials</b>	4	1	3	3	3	1	4	2	1
<b>Artificial Intelligence</b>	0	1	0	0	1	0	1	0	1
<b>Augmented Reality</b>	1	0	0	0	0	0	0	0	0
<b>Bio-manufacturing</b>	0	2	0	0	0	2	0	0	2
<b>Digital Data (Sensors, IoT, Industry 4.0, ect.)</b>	5	1	1	2	3	0	2	4	4
<b>Digital Design and rapid prototyping</b>	2	0	1	2	1	0	2	1	0
<b>Nano-, Micro- and Precision-manufacturing</b>	0	0	0	0	0	0	0	0	0
<b>Robotics/Automation</b>	2	1	1	1	1	0	3	2	0
<b>Sustainability and Life cycle</b>	0	2	0	0	1	1	1	0	2



Projects (n=74) may influence several sub-industries and/or advanced capabilities



Energy, Gas, Water, and Waste	Food and Beverage	Logistics and Distribution	Machinery and Equipment	Medical equipment, pharma, and Health	Metal fabrication and primary metal production	Mining	Paper	Plastic, Rubber, Other non-metals	Ship/Marine and Railroad	Wholesale and Retail Trade	Wood Products
0	1	0	4	4	1	1	0	3	0	2	0
3	0	1	6	4	3	3	0	3	1	4	0
0	4	1	0	2	2	2	0	0	0	0	0
0	0	0	1	0	0	0	0	0	0	0	0
2	1	0	0	2	1	0	0	0	0	0	0
4	5	4	10	4	4	4	0	1	4	1	0
3	1	0	4	2	1	1	0	3	1	1	0
0	2	0	1	2	1	0	0	0	0	0	0
0	1	0	9	4	2	3	0	1	1	3	0
7	1	0	4	2	1	4	0	0	1	1	0



# FOREWORD FROM THE MANAGING DIRECTOR

I am delighted to advise that in almost five years in operation, the Advanced Manufacturing Growth Centre (AMGC) has helped more than 215 Australian companies and 24 research institutions to collaborate on industry-led projects. The commercial outcomes of these new projects are real, export-worthy products that utilise complex manufacturing processes.

The projects profiled in this report are unrivalled. Each highlights Australia's strength and ingenuity in advanced manufacturing. You will see examples of local organisations leading the world in areas such as advanced composites and materials, 3D printing, robotics, Internet of Things systems, virtual reality, bio- and precision-manufacturing, digital design and rapid prototyping.

AMGC is facilitating over 78 projects nationwide that are expected to lead to the generation of more than \$1.2 billion in revenue and the projected creation of 2,361 direct jobs and 8,474 jobs indirectly. These include a palm biometric scanning solution that could reach \$27.3 million in sales by 2024, a rocket propellant and motor project that could create 300 jobs and a project to reshore the production of 'smart' sea bins to reduce plastic refuse in oceans.

As part of our project portfolio, the first 10 completed projects have already realised approximately \$60 million in revenue and 164 jobs were created or upskilled. This is through enabling or accelerating the production of sophisticated prescription eyewear, bicycle wheels, building components, car parts, orthotics, industrial sensors and water purifiers.

The Australian Government established AMGC in 2015 as an industry-led, not-for-profit organisation. It is AMGC's purpose to transform and scale Australian manufacturing to be more globally competitive and to generate the demand for jobs.

A key part of achieving this goal is to fund innovative projects that have the potential to make Australia's manufacturing industry more productive and competitive, but which companies may not have the capacity or expertise to complete on their own.

AMGC matches the investments that manufacturers make in such projects and works with them to attract further funding, including in-kind, from multiple sources, other industry partners and/or research bodies. AMGC provides funding directly and administers grants through its two projects' funds. The Core Project Fund of \$15.6 million or its \$4 million Advanced Manufacturing Early Stage Research Fund (AMESRF), which was part of the Australian Government's \$100 million Advanced Manufacturing Fund initiative in 2017.

As of 30 June 2020, AMGC's funding capacity was fully utilised across the range of projects shown in this report. The success of these projects is particularly important in the context of the COVID-19 pandemic, which is driving up unemployment and making it even more relevant for Australia to generate new sources of prosperity.

In response to COVID-19, AMGC collaborated with the Department of Industry, Science, Energy and Resources to create the COVID-19 Manufacturer Response Register. This site connects buyers with Australian manufacturers that can provide products such as gowns, cleaning supplies, sneeze guards and hand sanitiser stations.

By the start of September, more than 1,500 manufacturers had joined the register. You might notice that one of AMGC's projects is supporting the local manufacturing of 2,000 ventilators for COVID-19 patients.

I hope you find the following project profiles informative and inspiring. AMGC commends all the innovative professionals who are bringing these ideas to life and, through manufacturing, helping transform the lucky country to a smart country.



A handwritten signature in dark ink, reading "Jens Goennemann".

**Dr Jens Goennemann**  
**Managing Director**

Advanced Manufacturing Growth Centre Ltd



# PROJECT EVALUATION CRITERIA

Success in Australian manufacturing is less about what you make but how you make it; Advanced Characteristics and skills development are strongly linked to this success. That is why AMGC uses Advanced Knowledge, Advanced Processes and Advanced Business Models as the primary frame of reference when evaluating projects.

**AMGC projects are industry led and seek to demonstrate the following advanced characteristics:**

	<h2>ADVANCED KNOWLEDGE</h2> <p>Projects should enable Australian manufactures to become <b>Innovation Leaders</b> through increased demonstration of Advanced Knowledge characteristics, in areas such as:</p> <ul style="list-style-type: none"><li>» Increase R&amp;D expenditure</li><li>» Increase collaborations with other firms/Research institutions</li><li>» Increase the use of STEM skills.</li></ul>
	<h2>ADVANCED PROCESSES</h2> <p>Projects should enable Australian manufacturers to become <b>Process Winners</b> through increased demonstration of Advanced Process characteristics, in areas such as:</p> <ul style="list-style-type: none"><li>» Increase capital intensity expenditure</li><li>» Increase new operational processes</li><li>» Increase ICT and technology asset intensity.</li></ul>
	<h2>ADVANCED BUSINESS MODELS</h2> <p>Projects should enable Australian manufacturers to lift the value of their products by acting as <b>Niche Players or Service Champions</b> through increased demonstration of Advanced Business Models characteristics, in areas such as:</p> <ul style="list-style-type: none"><li>» Increase new goods offered</li><li>» Increase trade intensity (exports)</li><li>» Increase new service offerings.</li></ul>



The Advanced Manufacturing Growth Centre is an industry-led, not-for-profit organisation that supports the development of a world-leading advanced manufacturing industry in Australia. It is run by an independent board and management team of industry experts.

AMGC's role is to unlock new commercial opportunities and drive innovation in Australian manufacturing. It does this by fostering collaboration between industry enterprises and the scientific and research community.

The key to AMGC's success is the strength of its membership. The opportunity to join AMGC's membership program is open to manufacturers of all sizes, and to universities and other research institutions – at no charge.

Joining brings immediate entry into a vibrant ecosystem of like-minded participants who care about developing a more innovative, globally competitive manufacturing industry.

AMGC uses projects to demonstrate best practice strategies to advance manufacturing in Australia and pave the way for other companies and research institutions to model these practices with similar initiatives.



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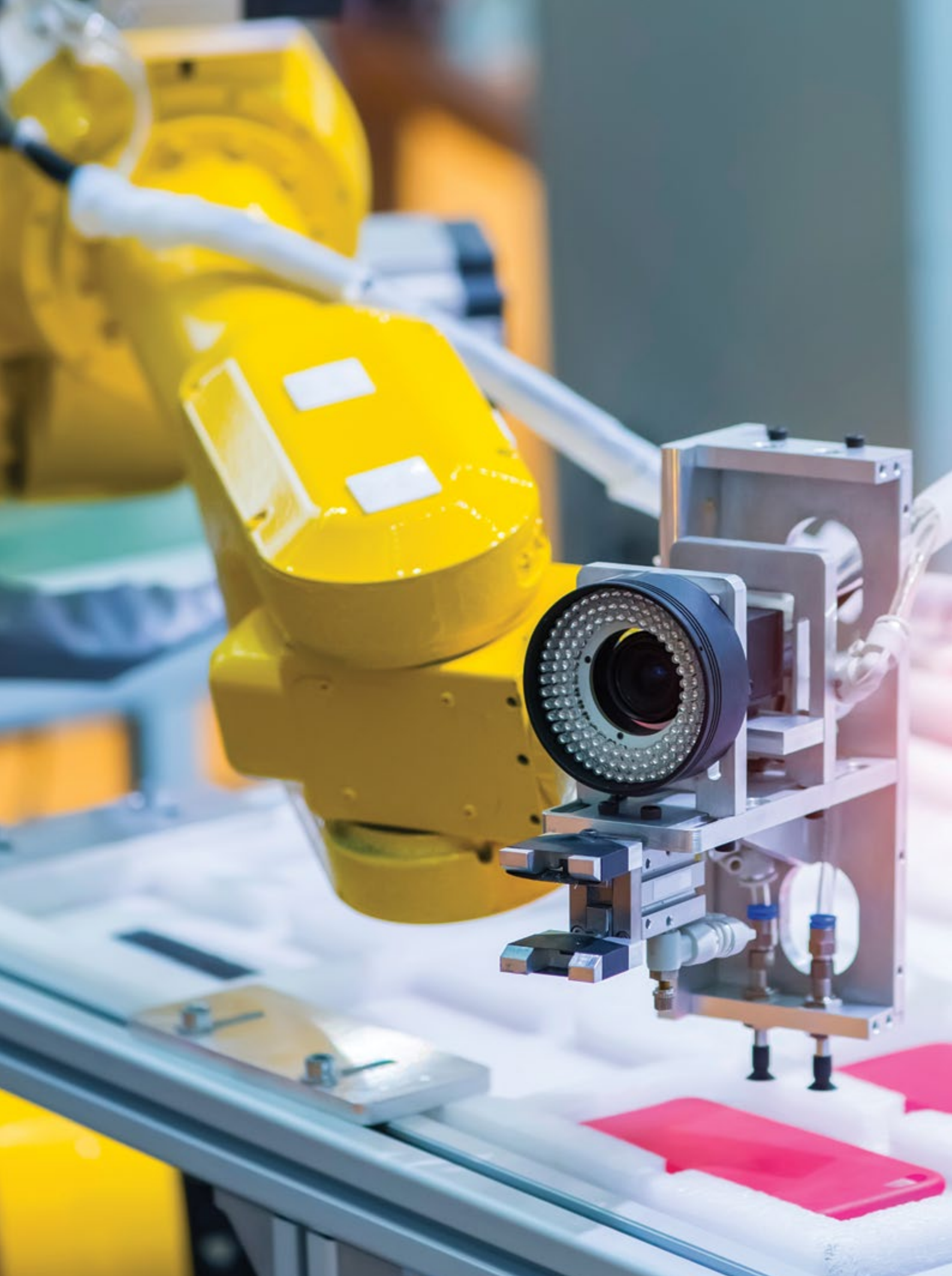


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ANCA 2018





# COMPLETED PROJECTS

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<b>B&amp;R Enclosures</b> – Digitised Manufacturing Value Chain	14
<b>Davies</b> – Wear Plate Sensing System	16
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<b>Ozwall Manufacturing</b> – Concrete Column Building System	26
<b>Quickstep</b> – Carbon Fibre Composite Fender	28



## PROJECT IMPACT



**10 (15%)**  
completed projects



**\$8,049,922**  
committed (AMGC,  
industry and in-kind)



**\$2,317,225**  
committed (AMGC)

### Commercialise innovation



**~224%**  
Average ROI on  
project funding



**~\$31 - 33M**  
estimated increase in  
domestic sales



**~\$25.5 – 27.5M**  
estimated increase in  
export sales

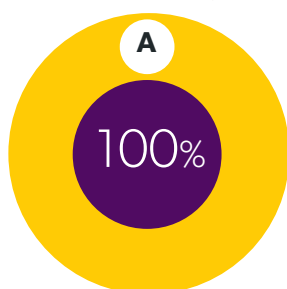


**~\$1.4M**  
estimated net  
difference increase  
in R&D Expenditure

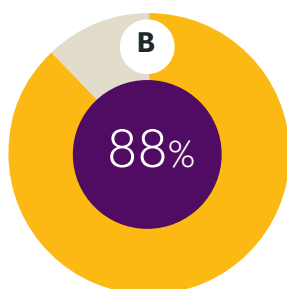
## PROJECT PARTICIPANTS REPORTED AN INCREASE IN...

Compared to before the project

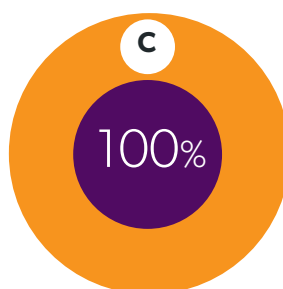
Profitability



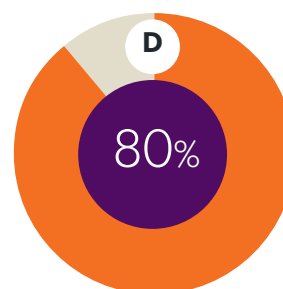
Productivity



Range of products  
or services



Margin



# MANUFACTURERS REPORTED IMPROVEMENT ACROSS THE SMILEY CURVE<sup>1</sup>

**90%** Reported research efforts (R&D) of a good, service or process improved



**90%** Reported changes to the design of a good or service improved



**80%** Reported logistics & supply chain methods for goods and services improved



**100%** Reported methods of manufacturing or producing goods/ services improved



**88%\*** Reported changes to the packaging of a good or service improved



**80%** Reported sales business development

**60%** Reported new media or techniques for product promotion

**60%** Reported sales or distribution methods improved



**90%** Reported new methods of pricing goods or services

**50%** Reported new methods of product placement of sales channels



**90%** Reported supporting activities for business operations improved

- 1 Questions developed using the Business Characteristics Survey
- 2 Questions developed using the Management and Organisational Capabilities Survey
- 3 Questions developed using the Business Expenditure on Research and Experimental Development (BERD)

N=10  
\*N=9

## IMPROVING SKILLS



### Job Growth

**164** jobs were created or upskilled

- 97 New jobs created
- 66 Employees were upskilled
- 67 Employees received formal training\* (\*i.e. obtained certificate, diploma, etc.)



### STEM Skills

Increase in STEM skilled staff

- 90% Of manufacturers reported an increase in STEM Skills in their business as a result of the project



### Management Skills

**70%** of manufacturers reported strong improvement in...

- Knowledge of management processes
- New methods of organising work responsibilities and decision making
- Reviewing business models and strategic direction
- Getting involved in high risk/high reward projects
- Taking a proactive approach to market competition

N=10



## IMPROVING COLLABORATION

Manufacturers engaged in the following collaborative arrangements as part of their project:

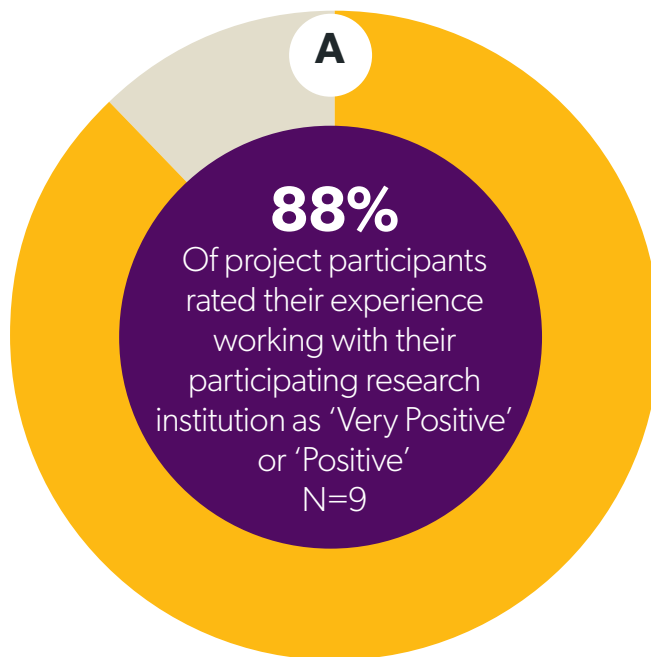
- Joint research and development (67%)
- Joint manufacturing/production of goods and services (44%)
- Integrated supply chains (22%)
- Other (11%)



**~314+**  
nation-wide collaborations



**~65-161+**  
Additional connections

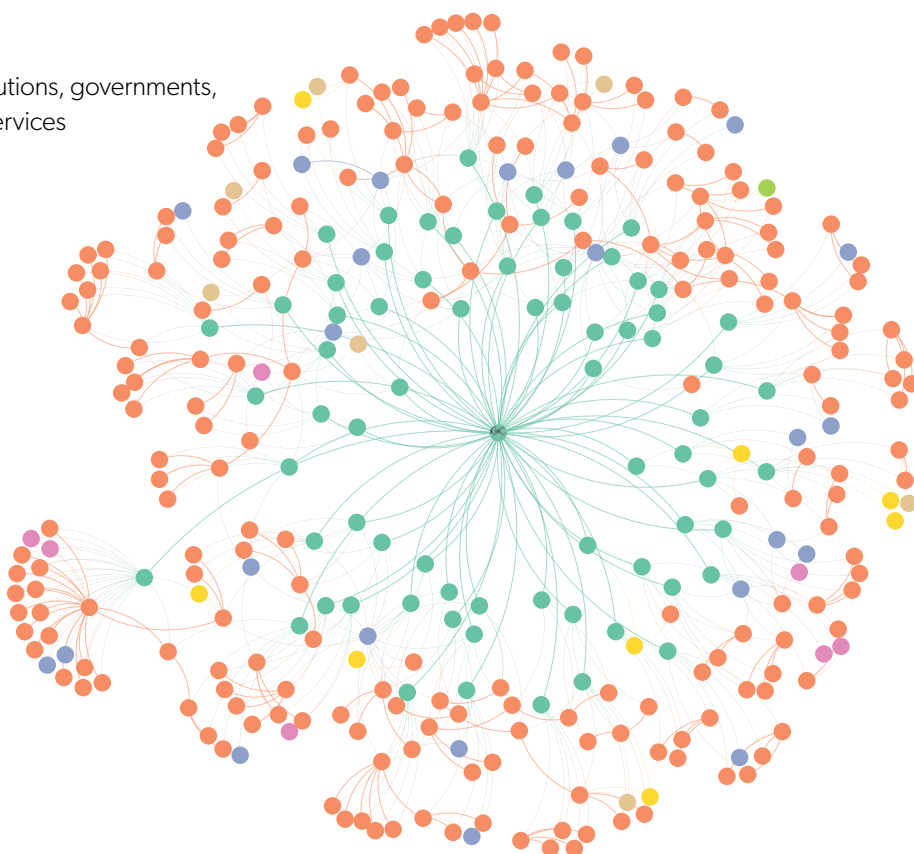


## AMGC Project Network

Connecting industry with research institutions, governments, industry associations and professional services

### Legend

- AMGC Project
- Manufacturing Company
- University/Research Institution
- Government Agency
- Industry Network
- Professional Services
- Other

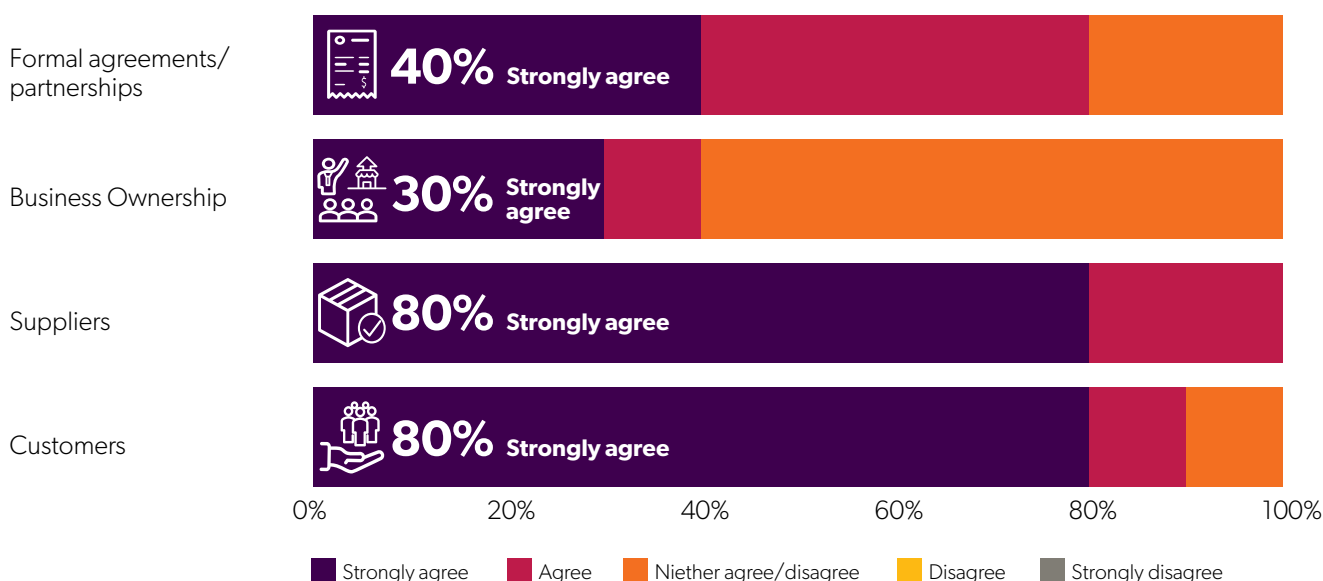




## IMPROVING MARKET ACCESS<sup>1</sup>

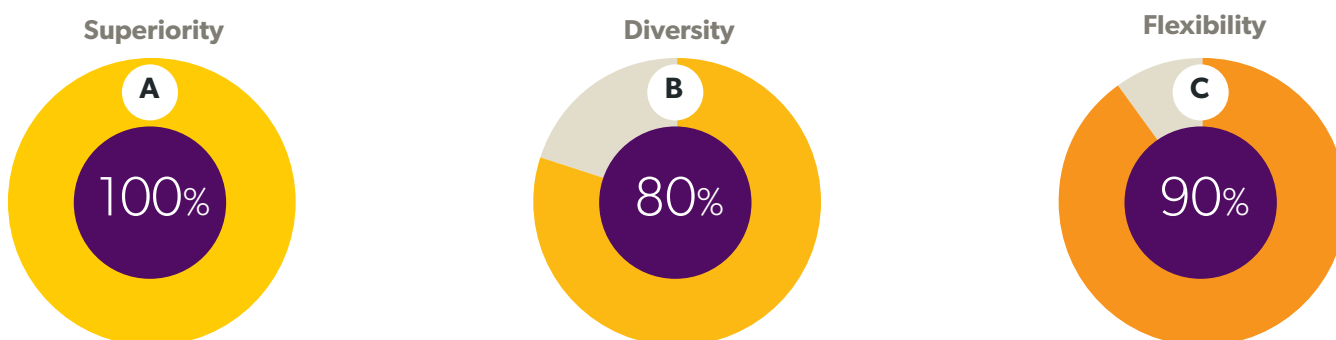


**80%** Of participants reported an increase in identifying or targeting export, niche, or underserved markets



## PROJECT PARTICIPANTS REPORTED AN INCREASE IN RESILIENCY STRATEGIES...

**Compared to before the project**



<sup>1</sup> Questions developed using the Business Characteristics Survey

<sup>2</sup> Questions developed using the Management and Organisational Capabilities Survey

<sup>3</sup> Questions developed using the Business Expenditure on Research and Experimental Development (BERD)



## CARBON COMPOSITE CYCLE WHEELS

# 36T

Upscaling of 36T's manufacturing capability and commercialisation of a 'multi-material' bicycle wheel via global value chain partners

36T has developed patented multi-material technology for manufacturing highly optimised bicycle components.

This AMGC project seeks to scale-up 36T's manufacturing processes and production capabilities. Success will be demonstrated by taking a prototype multi-material bicycle wheel through to commercialisation.

To validate its manufacturing processes, 36T will produce an 'off-tool' sample, which represents the starting point for commercial production of a high-performance cycle wheel for elite and enthusiastic cyclists. The multi-material wheel is 30% lighter than a standard wheel, without compromising component strength, aerodynamics or material integrity.

The project involves developing a robotic manufacturing cell to produce multi-material products. It will culminate with testing and validating the 'off tool' samples, at which point 36T will be production-ready.

Following validation of 36T's manufacturing capability, the company will pursue opportunities in adjacent growth sectors to position 36T as an international leader in multi-materials manufacturing. In addition to bicycle wheels, 36T will exploit its technical leadership and production capability across other global value chains, including in the defence, automotive and consumer products.

### MILESTONES

5/2/18	●	AMGC approval
16/3/18	●	Detailed plans for the robotic manufacturing cell designed, costed and confirmed
27/4/18	●	Robotic manufacturing cell, machining setup and testing completed
24/8/18	●	Production and testing of tooling completed
30/6/19	●	Testing and validation of 'off tool' sample completed. Team training on production processes completed

**CONTRIBUTIONS:** Government – \$175,000 | Industry – \$267,000 | In Kind – \$45,400



**\$487,400**  
committed (AMGC, industry  
and in-kind)



**123%**  
ROI on project funding



**\$100,000**  
estimated revenue in  
domestic sales



**~\$500,000**  
estimated revenue in  
export sales



**5 new**  
employees and 2 upskilled



**1 to 10**  
additional connections\*\*

\* Employees who received formal training may or may not be included within the employees being upskilled and therefore not included in the total number of jobs.

\*\* Additional connections do not include the original partnerships within the project

“Under the applicants own admission, the expected deliverables were not proportionate to the project budget put forward in the proposal. Project funding ran short early-on, and particularly as a start-up, this strained the progress and even feasibility of the project. The project was largely saved by personal contribution of the applicant’s founder, and business development activities outside the core scope of the project.

#### PROJECT PARTICIPANTS

**36T**

**BASTION**

**baum**  
PASSION PRECISION PERFORMANCE



**PLASTOOL**

**zedtux**

## INTEGRATED CNC ROBOT



CNC Grinding Machines

Transitioning a locally developed prototype of an integrated CNC Robot to production ready status

ANCA Machine Tools, in collaboration with its project partners, seek to commercialise a locally developed prototype robotic and digital control system for computer numerical control (CNC) grinding and milling machines. The project aims to replace limited-functionality pneumatic solutions that are currently integrated with many CNC machines. This will enable full automation of common production so that users can achieve unsupervised 24/7 CNC operating capabilities.

The prototype robotic system integrates with ANCA CNC machines and should have broad market appeal in other industries such as pharmaceuticals and food production. The robotic solution is a flexible alternative to traditionally operated CNC machines, aligned with Industry 4.0 technologies. Real-time production data will be available for use within enterprise resource planning (ERP) systems, while the programmable robot's flexibility will help optimise production and enable rapid reconfiguration between manufacturing tasks.

When the project is completed ANCA, and its subsidiary companies will be equipped to provide an integrated robotic solution to its customers and establish a new robot export industry for Australia.

### MILESTONES

22/1/18		AMGC approval
6/7/18		Final product design review completed
12/10/18		Product validation, testing and adjustments completed
28/3/19		Process validation completed and first commercial product produced
31/7/19		Volume production achieved and product launch completed

**CONTRIBUTIONS:** Government – \$325,000 | Industry – \$325,000 | In Kind – \$145,836

Advanced knowledge

Advanced processes

Advanced business models



**\$795,836**  
committed (AMGC, industry  
and in-kind)



**166%**  
ROI on project funding



**~\$750,000**  
estimated revenue in  
export sales



**~10**  
jobs created/upskilled\*



**1 to 10**  
additional connections\*\*

\* Employees who received formal training may or may not be included within the employees being upskilled and therefore not included in the total number of jobs.

\*\* Additional connections do not include the original partnerships within the project

## PROJECT PARTICIPANTS



Total Precision





## DIGITISED MANUFACTURING VALUE CHAIN



### Short interval decision making via an Industry 4.0 application

This project seeks to achieve a profound shift away from large-scale, production-centric manufacturing of commodity products, towards a more customised, smart and competitive manufacturing model. This new approach is backed by highly skilled individuals, and is more responsive to the rapidly changing needs and priorities of global value chain partners.

This project applies Industry 4.0 principles and technologies, embracing agility and delivering superior customer experience as a demonstration of the AMGC Sector Competitiveness Plan. In doing so, it aims to influence Australian manufacturing much faster than had previously been possible.

The technology aspect of this project involves collecting real-time manufacturing data and transforming it into meaningful analysis and visualisations. Project partners collaborate on designing and implementing digital technologies including smart sensors, location tracking devices, analytics, digital workflows and scheduling, and data visualisation tools.

B&R Enclosures is working with its project partners to develop a competitive advantage by enhancing decision-making capabilities across the manufacturing value chain. This will allow B&R Enclosures and every link in its value chain to more effectively respond to changing customer needs.

The project will result in an enhanced customer experience and accelerate participants' export growth into new and existing markets.

### MILESTONES

1/8/17		AMGC approval
31/8/18		Design and development of the data collection system
29/1/19		Data validation, integration and output
29/5/19		Development and implementation of decision-making tools

**CONTRIBUTIONS:** Government – \$245,000 | Industry – \$245,000 | In Kind – \$580,000





**\$1,826,150**  
committed (AMGC, industry  
and in-kind)



**\$245,000**  
Committed (AMGC)



**\$12M**  
estimated revenue in  
domestic sales



**\$2-4M**  
estimated revenue in  
export sales



**~46**  
jobs created/upskilled\*



**11 to 25**  
additional connections\*\*

\* Employees who received formal training may or may not be included within the employees being upskilled and therefore not included in the total number of jobs.

\*\* Additional connections do not include the original partnerships within the project

“This project allowed us to go from a 100% commodity manufacturer to a service/package manufacturer offering solutions. Solution sales now account for 55% of revenue with a higher margin. This occurred in 2017/18 about when the project started. B&R are now able to provide turn-key solutions.”

#### PROJECT PARTICIPANTS



Complete Wiring







## WEAR PLATE SENSING SYSTEM



**Davies**

Smart never wears out

Commercialisation of a prototype wear plate sensing system for the global mining industry via a servitisation business model

Wear plates are the armour plating of the mining industry and are used to protect the mining assets (fixed and mobile plant) from wear and degradation due to high volumes of ore flowing over their surface. Wear Plate Maintenance, which comprises the assessment and replacement of wear plates, is a major element of the operating costs of all global mining operators with up to \$400 million/year spent on wear plate replacement alone across Australia.

Davies has developed a wear sensing system (WearSense) that captures live measurement data, such as: wear, temperature and other characteristics of wear plates. This enables real time condition-based wear management that improves productivity, safety and profitability. The Davies technology replaces manual procedures for measuring wear plate degradation.

Project participants will collaborate to trial the Davies WearSense system in an operational environment with major mining company partners. This will enable Davies to optimise the product hardware specifications and test the software interface. Once the final product hardware specifications are known, Davies will develop production ready manufacturing processes and procedures.

The Davies software platform will provide real time wear data and an analytical service and platform to predict wear maintenance requirements, which will enable mining companies to utilise condition-based wear management. This in turn, will enable mining companies to plan for more efficient and less costly maintenance shut-downs. The Davies technology enables a new and enhanced level of service, which is not currently available through any other technology provider.

The project will assess the potential for broadening the commercialisation of the Davies IP to other markets where the management of surface wear is critically important. When successful, this project will provide the Australian manufacturing sector a tangible demonstration of the development and commercialisation of leading IP across global markets.

### MILESTONES

19/11/18



AMGC approval

30/3/20



Commercialisation model and integration plan complete

**CONTRIBUTIONS:** Government – \$227,000 | Industry – \$227,000 | In Kind – \$266,000



**\$720,000**  
committed (AMGC, industry  
and in-kind)



**\$227,000**  
Committed (AMGC)



**7.5%**  
ROI on project funding



**\$126,669**  
estimated revenue in  
domestic sales



**~8**  
jobs created/upskilled\*



**11 to 25+**  
additional connections\*\*

\* Employees who received formal training may or may not be included within the employees being upskilled and therefore not included in the total number of jobs.  
\*\* Additional connections do not include the original partnerships within the project

“The results obtained at the end of the project were of a high standard. Davies have been able to use the data obtained to inform the ongoing development of the wear analytics within the Wearsense reporting.”

#### PROJECT PARTICIPANTS



## CUSTOMISED PRESCRIPTION EYEWEAR



Implementing an automated production system to scale-up manufacturing of mass-customised prescription eyewear for a global consumer market

Dresden Optics and its project participants are developing a fully automated production system to scale up the manufacturing output of Dresden's market proven prescription eyewear product.

The collaborative partnership between Dresden and Astor Industries seeks to improve production processes and enable mass customisation of spectacles manufactured from recycled material. This project is the first step in realising Dresden's advanced business model over the next 18 months.

The primary objective is to increase production volume by implementing an automated robotic system that will double current production from 400 units to 800 units per day.

When this project is complete, Dresden will have established a fully automated production system. The enhanced manufacturing capability will reduce operating costs, improve production efficiency and reduce resource inputs, including materials and electricity requirements.

### MILESTONES

15/12/17	●	AMGC approval
15/3/18	●	Robotic system design completed
31/10/18	●	Robotic equipment commissioned and installation completed
30/11/18	●	Programming robotic functions for automated manufacture completed
31/12/18	●	Digital integration with materials handling system completed
31/1/19	●	Testing, refinement and validation of the robotic system
30/6/19	●	Fully operational robotic sub-cell production completed

**CONTRIBUTIONS:** Government – \$250,000 | Industry – \$250,000 | In Kind – \$467,000



Advanced  
knowledge

Advanced  
processes

Advanced  
business  
models



**\$967,000**

committed (AMGC, industry  
and in-kind)



**\$250,000**

Committed (AMGC)



**\$4.7M**

estimated revenue in  
domestic sales



**~\$1.8M**

estimated revenue in  
export sales



**~7**

jobs created/upskilled\*



**1 to 10+**

additional connections\*\*

\* Employees who received formal training may or may not be included within the employees being upskilled and therefore not included in the total number of jobs.

\*\* Additional connections do not include the original partnerships within the project

“The relationship with the participating research institution has grown especially as the research institution has built capacity, including access to PhD students, equipment, and other partners.”

#### PROJECT PARTICIPANTS



ELEMENTAL  
MANUFACTURING

CONSONIC



## THE EVOLVE GROUP – PLASTIC BOTTLE REDESIGN



Intensive and fast tracked design project with the objective of reshoring the manufacturing of their customer's plastic injection moulded bottle range to Australia

Marco Engineering, as part of The Evolve Group, is partnering with a customer and the University of Queensland in a fast-tracked project to redesign and relaunch a range of plastic bottle products.

This AMGC project seeks to counter the trend of growing imports by demonstrating how Australia's high-skilled labour can provide design modifications, resulting in:

- ▶ A higher-quality product for the customer
- ▶ A more efficient manufacturing process requiring less rework
- ▶ An enhanced safety reputation for the customer, based on the 'Made in Australia' provenance.

The final product will be the world's first 100% leakproof plastic bottle under most conditions, including position and temperature. In addition to reflecting a modern design language, Marco Engineering will use root cause analysis to improve features and benefits while enhancing usability, reliability, longevity and value for money.

Marco Engineering is working with its customer from the initial concept stages, so it has the opportunity to ensure the product and manufacturing process benefit the company, the customer, the distribution partners and the consumer. By designing and then harnessing these efficiencies, the products Marco Engineering works on have an inherent advantage over those manufactured offshore.

### MILESTONES

14/2/18	●	AMGC approval
15/6/18	●	Product and manufacturing process design completed
19/10/18	●	Prototype developed
30/9/19	●	Tooling completed
31/10/19	●	Quality control parameters established
31/12/19	●	Commercial manufacturing process completed

**CONTRIBUTIONS:** Government – \$221,000 | Industry – \$221,000





Advanced knowledge

Advanced processes

Advanced business models



**\$442,000**  
committed (AMGC, industry  
and in-kind)



**7.5%**  
ROI on project funding



**\$5,000,000**  
estimated revenue in  
domestic sales



**\$15,000,000**  
estimated revenue in  
export sales



**26**  
jobs created/upskilled\*



**1 to 10**  
additional connections\*\*

\* Employees who received formal training may or may not be included within the employees being upskilled and therefore not included in the total number of jobs.

\*\* Additional connections do not include the original partnerships within the project

“More project funding for other reshoring projects would be beneficial as there are many companies approaching Marco Engineering to reshore their manufacturing from China in particular.”

## PROJECT PARTICIPANTS





## CORRUGATED METAL SHEET BENDING



A manufacturing process for bending corrugated metal sheets, and its commercialisation through global value chain partners

FormFlow worked with its project partners to develop a patented process for bending corrugated metal sheets, which has the potential to realise new market opportunities in the \$1 billion per annum global sheet metal market.

This project seeks to overcome deficiencies in corrugated sheet metal roofing constructions by eliminating:

- › Caps and flashing, which reduces building costs and improves visual appeal
- › Gaps and drafts, improving insulation
- › Gaps where moisture can enter during severe tropical storms
- › Gaps where dirt or animals can enter a structure
- › Gaps that facilitate ember attack during bushfires.

In addition to the corrugated metal sheet bending process, FormFlow has designed a business model based on manufacturing and then licensing FormFlow bending machines to sheet metal manufacturers. This enables other manufacturers to include bends in customised sheet metal orders.

By developing and validating the FormFlow machine for installation and integration in the sheet metal manufacturing process, FormFlow has created intellectual property that will deliver manufacturing revenue, employment and return on investment.

### MILESTONES

10/11/17	●	AMGC approval
15/11/17	●	FormFlow machine operating environment and process engineering requirements identified and confirmed
20/11/17	●	Detailed design of the FormFlow machine developed and validated
15/12/17	●	Commercial FormFlow machine version 1.0 built and tested
31/7/18	●	Reference sites developed using products created on the FormFlow machine
31/10/18	●	FormFlow licensing model and technology integration plan established
31/3/19	●	FormFlow licensing model and technology integration plan realised

**CONTRIBUTIONS:** Government – \$250,000 | Industry – \$250,000 | In Kind – \$75,000





**\$675,000**  
committed (AMGC, industry  
and in-kind)



**\$1M**  
estimated revenue in  
domestic sales



**~10**  
jobs created/upskilled\*



**11 to 25+**  
additional connections\*\*

\* Employees who received formal training may or may not be included within the employees being upskilled and therefore not included in the total number of jobs.

\*\* Additional connections do not include the original partnerships within the project

“The project had 4 key collaborative partners. However, the project provided great exposure. For example, we were sought out by local government asking to bring students into the factory. Easily we made 26+ connections and future collaborative partners.”

#### PROJECT PARTICIPANTS



## CUSTOMISED ORTHOTICS

### iOrthotics

A mass-manufacturing process for customised orthotics

iOrthotics has invested in new printing technology, overcoming the limitations of its existing system and bringing larger markets within reach.

This project will allow iOrthotics to expand into the US market and create new areas for Australian manufactured goods, as a prelude to other overseas opportunities.

Using 3D printing within a fully digitised supply chain allows iOrthotics to reach new areas that previously used subtractive production techniques.

To achieve these expansion goals, iOrthotics and its project participants will scale up its new manufacturing processes. This will involve:

- ▶ Digitising the ordering process, including a portal that allows customers to submit their requests for fully digitised orthotics
- ▶ Developing a laboratory QR or barcode system to track the status of all orders
- ▶ Integrating digitised patient foot scans into the iOrthotics core system
- ▶ Refining the design to further reduce use of materials and consumables.

3D printing orthotics with the HP Jet Fusion printer is a first step in building new knowledge about how to 3D print other related plastic products. When this project is completed, iOrthotics will have an export-ready product for sale in global markets.

#### MILESTONES

1/11/17	●	AMGC approval
25/5/18	●	Digitisation of order-entry process completed
11/1/19	●	Laboratory QR/barcoding system completed to track all orders and order status
30/4/19	●	Digitised patient foot scan integrated into iOrthotics core system
14/5/19	●	Production optimisation to reduce material/consumables completed
20/6/19	●	Final product for export to the US market

**CONTRIBUTIONS:** Government – \$195,250 | Industry – \$195,250 | In Kind – \$60,000



**\$450,000**  
committed (AMGC, industry  
and in-kind)



**\$195,000**  
Committed (AMGC)



**\$750,000**  
estimated revenue in  
domestic sales



**~\$450,000**  
estimated revenue in  
export sales



**~25**  
jobs created/upskilled\*



**26+**  
additional connections\*\*

\* Employees who received formal training may or may not be included within the employees being upskilled and therefore not included in the total number of jobs.

\*\* Additional connections do not include the original partnerships within the project

“AMGC’s involvement in industry is vital for small to medium firms to access additional funding. The funding is central to a company like iOrthotics to undertake strategic and very specific R&D activities. Without it, it would have been very difficult to provide the overarching justification to undertake the material testing, the technology improvement, and enhance business processes across our supply chain”

PROJECT PARTICIPANTS

**iOrthotics**

**evok3d**  
3d printing solutions



**THE UNIVERSITY  
OF QUEENSLAND**  
AUSTRALIA

## CONCRETE COLUMN BUILDING SYSTEM



Validation of a prototype system for manufacturing and installing structural concrete columns in multi-storey buildings

This project seeks to validate a prototype system for installing structural concrete columns in multi-storey commercial building projects. The core activity of this project includes refinement of product design, comprising interlocking steel and plastic components that form a concrete mould for weight bearing columns, then demonstrating the construction system via a multi-storey building project managed by Piety.

Ozwall Manufacturing has developed a patent pending concrete column building system where pre-fabricated steel moulds are used to accelerate the concrete pouring process. The construction time of multi-storey buildings is reduced through the combined utilisation of prefabricated products, enhanced processes and a service orientated business model.

The steel columns are produced by using roll formed steel components and a patented system of plastic connecting clips. The unique design profile of the roll formed steel components allows a modularised system that achieves any desired column size, shape and structural engineering specifications.

Achievement of these two steps will enable the Ozwall Manufacturing IP to be commercialised in terms of manufacturing revenue, employment and investment. The project will provide Ozwall with the necessary manufacturing processes and equipment to begin low rate production and marketing of the concrete column building system to the construction industry. The OZM system will scale globally via licensing and service agreements to construction firms.

### MILESTONES

11/6/18		AMGC approval
6/7/18		Confirm process engineering requirements with project partner
13/8/18		Produce CAD files of final product design and patent filing completed
15/10/18		Produce roll form tooling, equipment and components
30/6/19		Production, installation and testing of prototype products
30/8/19		Licensing model and product specification manual completed

**CONTRIBUTIONS:** Government – \$159,725 | Industry – \$159,725 | In Kind – \$10,000





**\$329,450**  
committed (AMGC, industry  
and in-kind)



**\$159,725**  
Committed (AMGC)



**\$300,000**  
estimated revenue in  
domestic sales



**1 to 10+**  
additional connections\*

\* Additional connections do not include the original partnerships within the project

## PROJECT PARTICIPANTS



**PIETYTHP**

**Metsquare  
Pty. Ltd**

**UNIQUE ENGINEERING GROUP**



**UNIVERSITY  
OF WOLLONGONG  
AUSTRALIA**





## CARBON FIBRE COMPOSITE FENDER



A low-cost carbon fibre composite fender for the European automotive market

This project seeks to demonstrate the Quickstep production system for making carbon fibre fenders for a European automotive original equipment manufacturer (OEM). Quickstep's proposed method offers simplified tooling, quicker production from material to finished part, and less capital investment compared to traditional alternatives.

The AMGC project has seen Quickstep qualify to supply composite fenders for a German OEM, with a request for quote scheduled for mid 2018. The concept has attracted interest from other luxury European and British car makers.

Quickstep's position as a leader in technology depends on its collaboration with universities and other industry partners, as they work to develop solutions for global value chains. Quickstep has collaborated with Deakin University on this automotive project since November 2015. During this time 11 of the university's PhD candidates have worked on the Quickstep manufacturing process, now known as the Quickstep Qure Process.

The impact of the project is significant. The potential export value has been estimated at \$25 million and it could generate 30 new high-skilled jobs as production scales.

### MILESTONES

1/2/17	●	AMGC approval
31/3/17	●	Design tooling to facilitate flexible process solutions
31/7/17	●	Development of automated preforming technology
30/9/17	●	Development of the isothermal Quickstep Qure Process
21/6/18	●	Selection of material systems and development of smart designs to allow for rapid curing cycles

**CONTRIBUTIONS:** Government – \$250,000 | Industry – \$317,003 | In Kind – \$789,583



Advanced  
knowledge

Advanced  
processes

Advanced  
business  
models



**\$1,356,586**

committed (AMGC, industry  
and in-kind)



**\$250,000**

Committed (AMGC)



**\$7-9M**

estimated revenue in  
domestic sales



**~\$5M**

estimated revenue in  
export sales



**~22**

jobs created/upskilled\*



**1 to 10**

additional connections\*\*

\* Employees who received formal training may or may not be included within the employees being upskilled and therefore not included in the total number of jobs.

\*\* Additional connections do not include the original partnerships within the project

“Upscaling of the Qure process from 0.8 bar to 2.5 bar of consolidation pressure, allowing the process to meet automotive quality requirements and demonstrate its applicability for aerospace production. Qure 2.5 has been instrumental to attract the interest of aerospace OEMs.”

#### PROJECT PARTICIPANTS



**Special Patterns**  
Giving Shape to Innovation

# PROJECTS IN PROGRESS

<b>A-kin</b> – Limbic scaffolding for advanced support cobots	32	<b>Chiron Global Technologies (CGT)</b> – Advanced manufacturing of lightweight carbon fibre body composite armour	64
<b>AerVision</b> – Palm Vein Biometric Scanning Solution	34	<b>Cool Mine</b> – Compressed air powered UPS (uninterruptible power supply) for underground mines	66
<b>Ailytic</b> – Artificial Intelligence Countermeasures	36	<b>Cytomatrix</b> – Advanced Fibre Bandages	68
<b>Alpha HPA</b> – High Purity Alumina manufacturing process	38	<b>Darkly Labs</b> – Emblaser3 – worlds first safe portable laser cutting device	70
<b>AMSL Aero</b> – Electric vertical take-off and landing aircraft	40	<b>Dematec Automation</b> – Industry 4.0 Digitisation of SME Infrastructure	72
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<b>Bastion Cycles</b> – Full Customisable 3D-Printed Bicycle	50	<b>Fusetec 3D</b> – 3D printing of anatomical tissue	82
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<b>Cast Equipment &amp; Chain Products Pty Ltd (CECP)</b> – Innovative Crutch Wear	60	<b>HeliMods</b> – Closed Loop Manufacturing	92
<b>Cellr</b> – Wine-bottling hardware	62		

<b>HSV</b> – Product Lifestyle Management System	94	<b>Segnut</b> – Development of Segnut FIRST system	132
<b>Innodev</b> – Dassault Systèmes Virtual Shipyard	96	<b>Shellfish Culture</b> – Laser etching of individual oysters	134
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# LIMBIC SCAFFOLDING FOR ADVANCED SUPPORT COBOTS

ADVANCED MANUFACTURING EARLY STAGE RESEARCH FUND



Validating 'limbic scaffolding' AI software to enable faster development and integration of cobots and robots

Industrial robots have become a common feature in modern production-line processes, but are limited to simple, repetitive tasks. Interactive cobots are more advanced and capable of customised tasks, working alongside humans, accepting feedback, problem-solving together, and reporting on progress.

Industrial and commercial cobots/robots suffer from the lack of a common interface that can link sensory input to analytical and interactive capabilities. A 'scaffolding' layer is needed to couple deep intelligence, software controllers and robotic hardware such as actuators and sensors

A-kin's solution brings together brains and bodies via a limbic scaffolding for advanced support cobots. A-kin wants to build intelligent robotic assistants to enable advanced manufacturing via complex production tasks, while interacting with humans and performing real-time analytics. They will be able to take unique instructions from people to complete tasks and analyse task performance. A-kin will develop a limbic scaffolding layer that will make it easier to couple a brain, controller, and hardware embodiment together. The purpose of this scaffolding will be to enable faster development and greater component interoperability for custom cobots/robot prototypes that need to be integrated with an AI core.

A-kin calls this platform the 'limbic scaffolding' as an analogy to the equivalent part of the human brain, which is responsible for integrating sensory, cognitive and effector functions. Therefore 'limbic scaffolding' represents its role in bringing together sensory awareness, cognitive function, and actions.

## MILESTONES

6/08/20	●	AMGC approval
30/11/20	●	Integration matrix of common embodiment and AI platforms completed
31/01/21	●	Platform code – initial version completed
30/03/21	●	Platform code – testing and refinement completed
30/5/21	●	Platform code completed
30/08/21	●	Testing software in hardware completed and integration of AI and embodiment using the developed platform demonstrated
30/10/21	●	Test platform scaling completed
31/12/21	●	Student competitions or internships for rapid prototyping completed

**CONTRIBUTIONS:** Government – \$200,000 | Industry – \$200,000 | In Kind – \$75,000





## IMPACT

- › Increased spending on R&D
- › Larger patent portfolio
- › Increased collaboration with other manufacturers
- › Increased number of staff with science, technology, engineering and maths (STEM) skills
- › Increased levels of automation and digitalisation
- › Higher marketing expenditure
- › Larger geographical reach



## GROWTH

A-kin estimated revenue:

- › 2022 \$300,000
- › 2023 \$800,000
- › 2024 \$1.2 million
- › 2025 \$4 million



## JOBS

- › A-kin anticipates this project will employ an additional two software engineers

### PROJECT PARTICIPANTS



**Jet Propulsion Laboratory**  
California Institute of Technology



# PALM VEIN BIOMETRIC SCANNING SOLUTION



## Manufacturing the next generation of a Palm Vein Biometric Scanning Solution

Card or token based identification and access control is commonly used by organisations and in locations with large numbers of users and/or members. At Universities for example, staff and student ID cards are issued to manage personal identification, physical access to campus locations, electronic payments on campus and various other transactions such as library borrowing.

Considered to be the only viable solution to any card-based identification problem is biometric technologies which use scanning patterns of a person's anatomy. Biometric technologies provide enhanced security and convenience, as well as eliminating complexity and security risks. They are inextricably linked to individuals and therefore cannot be forgotten, counterfeited, or stolen. They enable users to automatically confirm identity by comparing patterns of physical or behavioural characteristics in real time against enrolled computer records.

Of all potential biometrics solutions, Palm Vein (PV) biometric identification, over which AerVision has patented technology with its AerPalm system, is an advanced solution. AerVision's proposed palm vein biometrics solution (AerAccess) has the following advantages; highly reliable, encrypted repository for template storage and enterprise level event logging capability, fast and easy registration, fully compliant with cyber security and privacy requirements, contactless, can be retrofitted into any wall or surface, cost effective and AerAccess's PV system has 99.99% accuracy compared to 95% accuracy of only facial or finger biometric systems.

The aim of this project is to design and manufacture, a commercial version of the Palm Vein Biometrics Solution.

### MILESTONES

18/5/20	AMGC approval
30/9/20	Detailed project objective and design of Palm Vein Biometric device with university campus users in mind completed
31/12/20	Development of a beta prototype and software development and testing completed
31/3/21	Refining design requirement specifications document for final product completed
31/6/21	Beta prototype trial and customer feedback completed
31/10/21	Final market ready product completed

**CONTRIBUTIONS:** Government – \$263,377 | Industry – \$263,377 | In Kind – \$191,962



## IMPACT

- › Increased spending on R&D
- › Higher information and communication technology (ICT) intensity
- › Larger patent portfolio
- › More automation
- › Larger geographical reach
- › Increased trade intensity



## GROWTH

AerVision Technologies estimate sales for the Five years to 2025 are:

- › FY2020 \$840K
- › FY2021 \$3.4M (requires the conversion of two major accounts)
- › FY2022 \$9.6M
- › FY2023 \$19.3M
- › FY2024 \$27.3M



## JOBS

AerVision anticipates adding:

- › Two to 3 additional staff with engineering and software development domain skill
- › Fifteen to 18 technical service and support personnel on conclusion of the project

### PROJECT PARTICIPANTS

**AerVision**  
Technologies



**D+I**<sup>TM</sup>

**CIRCUITWISE**  
Electronics Manufacturing

**GENESYS**  
ELECTRONICS DESIGN

# ARTIFICIAL INTELLIGENCE COUNTERMEASURES



## Real-time Artificial Intelligence Countermeasures for Production Anomalies

This project will deliver automated real-time countermeasures to address manufacturing production anomalies as and when they arise within manufacturing operations. The project will demonstrate the technology in four project participants.

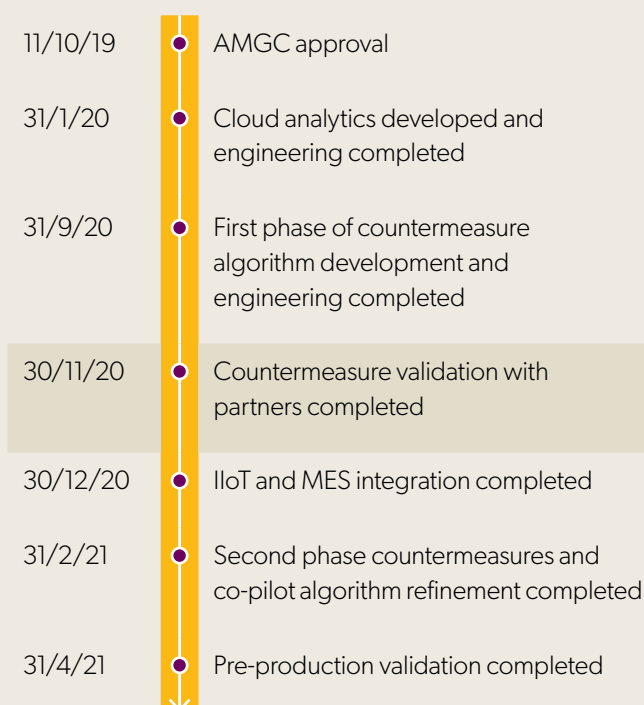
The solution will act as an operational “co-pilot” that provides AI generated recommendations that can be applied by the human operations team to optimally and efficiently resolve production issues in real-time.

This project will demonstrate the convergence of AI, IIoT devices, advanced simulation, cloud computing, and analytics. Real-time process monitoring via IIoT sensors (where PLC/SCADA automation or MES do not exist) to model productive time on equipment and count production quantities will feed live data into the Ailytic cloud-based AI and simulation engine. The engine will identify anomalies, explore simulated anomaly permutations and recommend optimised actions to improve workflows and counteract adverse real-time events.

This countermeasure capability will deliver more than standard manual or optimised deviation management of traditional decision support tools and will attempt to anticipate likely issues impacting production, predict production rate changes and provide pre-prepared alternate scenarios that production management can rapidly execute to achieve plan compliance.

Upon project conclusion, each of the project partner manufacturers will have demonstrated the generation of real-time AI scheduling and countermeasure recommendations in their respective operational environments via a production pilot.

### MILESTONES



**CONTRIBUTIONS:** Government – \$224,370 | Industry – \$224,370 | In Kind – \$43,200





## IMPACT

- » The solution intends to address a global market for integrated IIoT and Industrial Process Optimisation in target industries valued at USD\$2.2bn and growing at CAGR of 7.4–12.2%. The total Industrial Automation and Supply Chain Optimisation software market was USD\$120bn according to the ARC Advisory: Automation and Software Expenditures for Process and Discrete Industries 2018. The project will deliver operational efficiency improvements via AI driven live process optimisation in a solution that is accessible to smaller manufacturers



## GROWTH

- » \$25 million in sales within three years



## JOBS

- » Five people during the project and growth of 25 people post project

### PROJECT PARTICIPANTS



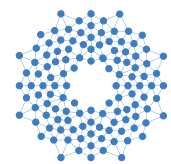
**Yalumba**  
Family Vignerons c. 1849





# HIGH PURITY ALUMINA MANUFACTURING PROCESS

ADVANCED MANUFACTURING EARLY STAGE RESEARCH FUND



Alpha **HPA**

Validation of an innovative high purity alumina manufacturing process and verification of a commercial plant design

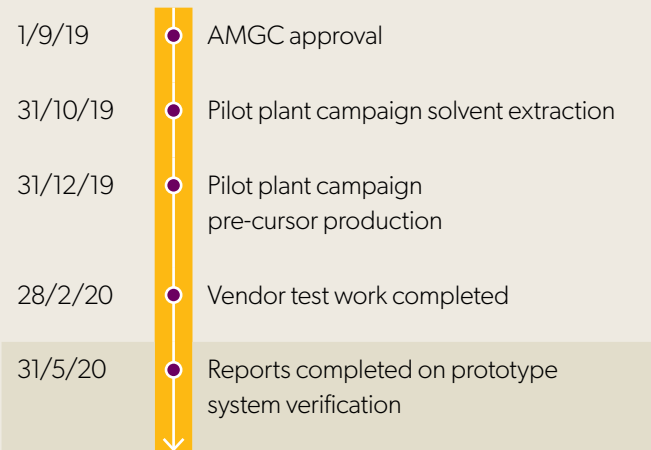
Alpha HPA, in collaboration with its project partners, has developed an innovative and unique manufacturing process. This new manufacturing process is capable of selectively extracting alumina from a proprietary solution using a solvent extraction process.

The Alpha HPA process is estimated to have production costs that are conservatively two-thirds of the other commercial processes.

To realise this opportunity of validating and defining a commercial plant, Alpha HPA plans to design, build and operate a pilot plant that will run largely continuously for an extended period to validate end-to-end production processes, confirm material and energy balances, define commercial plant equipment requirements, thus complete key components for a final investment decision to be made in regards to the commercial plant.

The core financial metrics from smaller scale testing suggest that the commercial plant will be strongly profitable and able to make 4N purity HPA at a cost significantly lower than any other current commercial process. These pilot plant trials provide a final step in technical de-risking of the commercialisation project, which will likely then attract considerable investor interest and further investment.

## MILESTONES



**CONTRIBUTIONS:** Government – \$400,000 | Industry – \$410,000 | In Kind – \$330,000



Advanced knowledge

Advanced processes

Advanced business models



## IMPACT

- Alpha's technology enables simpler purification and lower cost production processes that indicatively will produce a HPA that is as pure or purer than any known alternative method. Additionally, based on the simpler process, WH&S and environmental risks are considerably lower



## GROWTH

- Annual sales of \$20 million



## JOBS

- The commercial plant will employ an estimated 100 staff

### PROJECT PARTICIPANTS



Alpha HPA

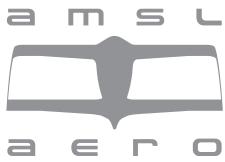


HPAlumina Pty Ltd



# ELECTRIC VERTICAL TAKE-OFF AND LANDING AIRCRAFT

ADVANCED MANUFACTURING EARLY STAGE RESEARCH FUND



## Filament wound and advanced composite structures for Vertiia – an electric vertical take-off and landing aircraft and Test flight of the assembled prototype

The AMSL Aero Electric VTOL (Vertical Take-off and Landing) aircraft is being developed at a time of rapid innovation in the aerospace sector around the general concept of personal, electrically powered (or hybrid) VTOL vehicles.

The AMSL Aero entrant into this market is their Vertiia configuration which is a novel electric vertical take-off and landing aircraft that combines the vertical take-off and landing capabilities of a helicopter with the efficient high speed flight of a fixed-wing aeroplane. It has several patented features, including the wing structure and the system that tilts the wings from vertical (hover flight mode) to horizontal (aeroplane flight mode) which gives it a unique value proposition.

This new Vertiia configuration will take advantage of filament wound parts due to the unique shape of the Vertiia wing structure and lower sensitivity to local skin thickness.

There are four parts to this project:

- 1 Design, build and test a representative full-sized filament wound wing structure and determine the limitations of the filament winding process when applied to an aircraft primary wing structure.
- 2 Design, build and test a representative full-sized prototype composite fuselage.
- 3 Evaluate, select and prototype manufacturing methods such as automatic fibre placement, resin transfer moulding, resin infusion and vacuum assisted resin transfer moulding techniques.
- 4 Assembly of all aircraft components and a successful test flight of the Vertiia eVTOL prototype.

The AMSL basic configuration has some design attributes that are viewed as significant advantages over other eVTOL concepts and which make the design adaptable to a range of different missions.

### MILESTONES

1/8/19	●	AMGC approval
30/9/19	●	Initial design optimisation
31/3/20	●	Detailed design of wing and fuselage completed
31/3/20	●	Building and testing of wing structure completed
30/6/20	●	Building and testing of fuselage structure completed
31/8/20	●	Assembly of wing a fuselage completed
31/12/20	●	Integration of systems onto the assembled structure

**CONTRIBUTIONS:** Government – \$400,000 | Industry – \$482,108 | In Kind – \$150,000



## IMPACT

- › Increased spending on R&D has enabled a new growth area of electrical vertical take-off and landing aircraft
- › Increased collaboration with research and industry partners will allow these products to be manufactured in Australia
- › More staff with STEM skills
- › Greater levels of automation in the manufacturing process
- › Greater share of services in total revenue by the use of a 'power-by-the-hour' business model



## GROWTH

- › AMSL's projected revenue is forecast to exceed \$5 million by 2023, with significant double digit growth from 2024 onwards



## JOBS

- › The company expects the full team in Australia to grow significantly in Engineers/Technical Specialists during the pre-production phase until 2021, with growth to the hundreds during production, including growth in manufacturing specialists and management

### PROJECT PARTICIPANTS





# CUTTING TOOLS USING ADDITIVE MANUFACTURING



## Hybrid manufacture of complete cutting tools

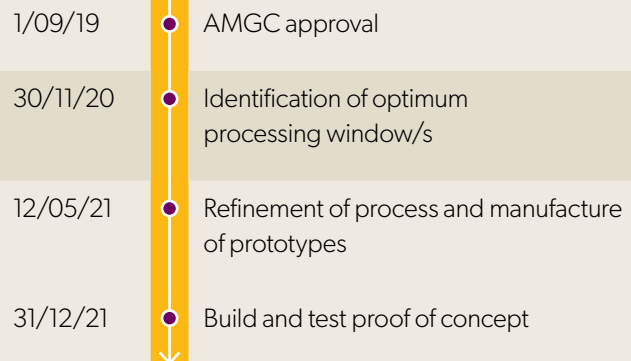
Tungsten carbide cutting tools account for 70% of the cutting tool market, with the 30% balance being High Speed Steel (HSS) tools. China produces 84% of the world's tungsten carbide and Chinese Government controls on supply of this material in the last 10 years has resulted in prices for tungsten carbide becoming highly volatile.

As an innovative alternative, ANCA has been working with CSIRO to develop an additive manufacturing (AM) process to produce a near net shape tool with a hardened cutting edge which can then be finished using a grinding process. A 6-month pilot project was completed in early 2019 which proved that an additive manufacturing machine can successfully deposit a matrix with acceptable cutting performance.

The near net shape of the cutting tool means less material is used and less material needs to be removed in the grinding process, reducing waste and saving processing time. It makes sense to try and incorporate an additive manufacturing process inside the ANCA machine to eliminate this double handling process.

This project will position ANCA as a global leader, since there does not appear to be any dedicated hybrid machines. There is the potential with a new ANCA machine platform that the entire tool manufacturing process can be automated from start to finish.

### MILESTONES



**CONTRIBUTIONS:** Government – \$390,000 | Industry – \$390,000 | In Kind – \$1,483,000

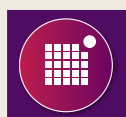




Advanced knowledge

Advanced processes

Advanced business models



## IMPACT

- › This project will enable ANCA together with its project partners to develop a patented and world leading technology, which has the potential to add significant value to manufacturing processes across many global industries, such as mining (drills, drill buttons, buckets and blades), aerospace (turbine blades), agriculture (blades and augers) and other manufacturing (hardened journals)
- › A significant number of carbide tools are manufactured in China and imported into Australia due to a lower cost base. The more competitive nature on the new ANCA manufacturing process will allow Australian manufacturers to replace these imports in sizes 30mm and above



## GROWTH

- › ANCA conservatively estimate a revenue increase of AU\$9.80 million per annum



## JOBS

- › Five to 10 skills jobs including research engineers

### PROJECT PARTICIPANTS



suttontools

SURFACE  
TECHNOLOGY  
COATINGS

# PREDICTIVE MACHINE HEALTH MONITORING



Development and pilot of a machine health monitoring system that can predict unplanned stoppages

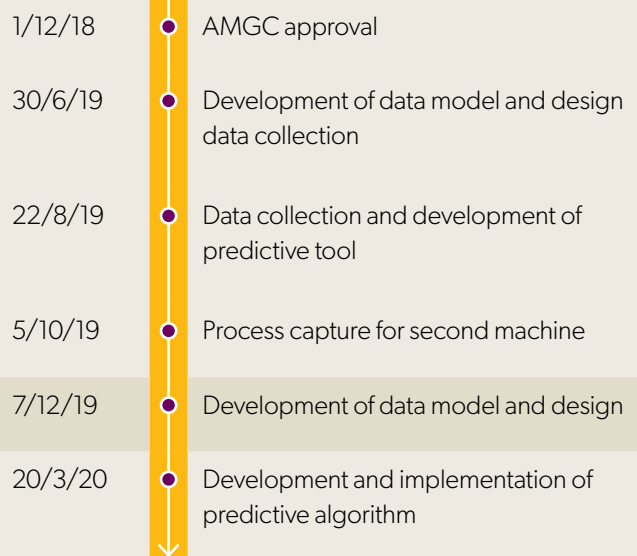
This project seeks to improve factory productivity by reducing unplanned production line stoppages and downtime. This is a costly major global industry challenge and source of frustration for management, customers and shop floor teams. Asahi Beverages and the project participants plan to co-develop and pilot a machine health monitoring system.

The project aims to minimise unplanned stoppages and downtime by developing a data-driven approach and machine learning algorithms, working towards moving from preventive maintenance to predictive maintenance.

As a result of this project, manufacturers will be able to forecast future production line stoppages. This will assist them to plan preventive maintenance routines, and extend the working life and utilisation of their assets through increased monitoring of actual equipment condition. Maintenance teams can switch from performing reactive and preventive tasks to undertaking value-adding and strategic activities. Asahi Beverages aims to increase production line throughput and efficiency, including overall productivity.

Asahi Beverages is confident that its experience will serve as an inspiring case study for Australian SMEs seeking to implement new predictive maintenance technologies. The company will open its doors for site visits and industry education sessions during the lifespan of the project and following its successful completion. It is hoped Australian manufacturers will gain valuable insights to digitalise their operations and implement Industry 4.0 practices, a key marker of competitiveness in today's internet-driven world.

## MILESTONES



**CONTRIBUTIONS:** Government – \$119,250 | Industry – \$119,250 | In Kind – \$10,425



## IMPACT

- › Increased ICT intensity through the integration of the monitoring system
- › Collaboration with project participants to develop and pilot the system
- › Increased capital efficiency by preventing unplanned stoppages
- › Better energy efficiency via the use of sensors



## GROWTH

- › Asahi Beverages aims to increase production line throughput and efficiency, including overall productivity



## JOBS

- › Maintenance teams can switch from performing reactive and preventive tasks to undertaking value-adding and strategic activities

### PROJECT PARTICIPANTS



# CARBON FIBRE REINFORCED GEOPOLYMER CONCRETE



Production of a pedestrian bridge and validation of new construction material for the global supply chain

Victorian engineering firm Austeng is leading an AMGC project to develop a world's first construction industry innovation. The project involves members of the Advanced Fibre Cluster Geelong, Carbon Nexus and Rocla.

Combining Austeng's experience in polymer concrete projects with the world-class carbon fibre expertise of the Carbon Nexus research facility has allowed for the creation of a high-value product for use across the global construction industry.

Geopolymer and carbon fibre offers superior thermal stability, corrosion resistance and durability than concrete, plus it is rust-proof, acid-resistant, salt-resistant and thermally stable up to high temperatures. Austeng's Managing Director Ross George calls it "a cure for concrete cancer". This project is the first in the world to combine carbon fibre and geopolymer in concrete.

In addition to the product itself, Austeng will offer post-production design services based on this unique composite material.

According to IBISWorld research, the Australian concrete products market is worth \$2 billion. It has already been estimated that Austeng's new material could capture up to 1% of this (\$20 million) and enter the export market.

## MILESTONES

15/11/17	●	AMGC approval
1/12/18	●	Bridge beam design
1/12/18	●	Computer modelling and optimisation
31/7/19	●	Manufacture and testing of a 'sleeper beam'
30/9/19	●	Modelling review in light of testing
30/10/19	●	Manufacture and testing of bridge beam

**CONTRIBUTIONS:** Government – \$50,000 | Industry – \$85,000 | In Kind – \$35,000





## IMPACT

- › Increased spending on R&D to validate complex new product for the construction industry
- › Advanced knowledge achieved through collaboration with Carbon Nexus and members of the Advanced Fibre Cluster Geelong
- › Better energy efficiency and performance than cement



## GROWTH

- › \$20 million plus export revenue in early earnings forecast
- › Carbon fibre will be domestically manufactured
- › There is a patent pending on the solution



## JOBS

- › Ten jobs (medium term) as a result of commercialisation

### PROJECT PARTICIPANTS





# GLOBAL SUPPLY CHAIN INTEGRATION



## Increasing Australian SME Manufacturers’ ability to Digitally Integrate into Global Supply Chains

This project will identify and explore options for establishing a practical, openly published specification for trusted digital interoperability between supply chain participants. A prototype implementation will be explored and proven using the F-35 Joint Strike Fighter Australian manufacturing supply chain. Successful implementation within the aeronautical domain is expected to lead to broader adoption of the approach within the Hunter Class Frigate program, JORN, and throughout the Defence industry and beyond.

Manufacturing, business and information technology experts from Advanced Focus and Flinders University will work with BAE Systems, their F-35 supply chain partners Axiom and RUAG Australia, Special Processing Centre of Excellence, and a cross-section of SME Manufacturers from BAE Systems’ broader supply chain to derive a practical digital information exchange approach.

Increased supply chain transparency between supply chain participants promises to deliver faster issue identification and resolution, improve trust relationships between customers and suppliers, provide a collective understanding of supply chain priorities, support improved risk management, and enable resource utilisation. Significant savings are expected across the supply chain via the elimination of paper-based processes that will become digital and dynamic, improving timeliness and minimising errors, rework and delays.

This project’s value in demonstrating real-time, cross-enterprise manufacturing status and digital supply chain management goes beyond advanced Defence manufacturing. Both direct and indirect transfer of this technology into other key Australian

industries such as mining, agriculture and construction sectors is anticipated. These sectors have similar challenges with real-time transparency of upstream and downstream supply chain, materials, people and tools.

### MILESTONES



**CONTRIBUTIONS:** Government – \$362,650 | Industry – \$362,650



## IMPACT

- › Demonstrated bi-directional supply-chain transparency between Australian F-35 manufacturers
- › Reduced supply chain transactional costs for Australian F-35 SME manufacturers
- › Prototype specification outlining a viable, non-proprietary approach to supply chain digitisation
- › Recommendations for progressing the prototype specification into a potential de-facto standard via either a standards body or an industry consortia
- › Recommendations for potential broader roll-out of the validated supply-chain digitisation approach to other defence projects such as the Hunter Class Frigate and JORN upgrade, and beyond defence
- › Case study illustrating a global Prime collaborating with Australian SME Manufacturers and academia to achieve mutually beneficial and tangible outcomes in relation to the Australian F-35 manufacturing value chain



## GROWTH

- › Knowledge gained via this project will contribute to a longterm goal to devise a freely available, broadly adopted, open standard that will aim to remove the burden on manufacturers having to adopt expensive proprietary commercial solution offerings in order to achieve inter-company digital supply chain interoperability



## JOBS

- › This project will demonstrate that greater transparency amongst manufacturing supply chain partners has mutual benefits, and illustrates viable pathways for digital transformation and cost effective participation of Australian SMEs within global supply chains.

### PROJECT PARTICIPANTS



# FULL CUSTOMISABLE 3D-PRINTED BICYCLE



Development of the world's first mass-customisable premium bicycle and establishment of in-house additive manufacturing capabilities

Bastion Cycles aims to become a world leader in the application of additive technologies for manufacturing premium bicycles by developing the world's first fully-customisable 3D-printed bicycles for domestic and international customers.

This project will enable Bastion and the project partners to achieve a valuable and highly differentiated market position by offering superior products that leverage Bastion's technical leadership in manufacturing lattice structures using Titanium alloys. This project also represents a gateway for the spill-over of Bastion's technology into other markets and mainstream products.

To achieve this objective Bastion Cycles together with the project partners must complete the following:

- ▶ Establish domestic in-house additive manufacturing capabilities and skills.
- ▶ Redesign, test and certify mass-customisable bicycle components.
- ▶ Develop mass-customisable carbon fibre components using 3D printed plastic moulds.
- ▶ Design and manufacture new Bastion bicycle model for commercialisation.

On completion of this project, Bastion and the project participants will have established the additive manufacturing capability, knowledge and skills to commercialise fully-customisable premium bicycles.

This project will serve as a case study on how Australia SMEs can establish additive manufacturing capabilities for manufacturing mass-customisable products in a high-value global market. The capabilities, knowledge and skills developed in this project are transferable to other industries that consume high-strength, light-weight components, i.e., aerospace, defence, automotive, marine and recreational sports.

## MILESTONES



**CONTRIBUTIONS:** Government – \$306,750 | Industry – \$306,750 | In Kind – \$134,800



## IMPACT

- › Greater share of services in total revenue
- › Newer equipment to establish domestic in-house additive manufacturing capabilities and skills
- › Increased automation
- › Bastion's technology has significant potential to transfer to other markets



## GROWTH

- › Forecasted sales growth of 330% through the additional models from 60 bicycles per year in FY18 to over 200 bicycles per year in FY20
- › Long term potential to produce over 1,000 units p.a., generating revenue in excess of \$10m p.a.
- › Re-shoring additive manufacturing capability will increase efficiency and gross profit margins on additively manufactured components by 40–50%
- › Projected sales growth will also generate significant new work for project partners



## JOBS

- › Five to 10 new jobs will be created over the next two years with a further 10 forecast beyond 2020

### PROJECT PARTICIPANTS





# SOLID FUEL ROCKET PROPELLANT AND SOLID ROCKET MOTORS



## Manufacture of solid fuel rocket propellant and solid rocket motors (SRM's)

There is no sovereign manufacturer of solid rocket propellant and subsequently solid rocket motors (SRM's) in Australia, which means all SRM's are currently imported. This project proposes to manufacture solid rocket propellant and SRM's locally for the civilian market initially (export and defence markets to follow) at far more economical prices and with quicker turnaround times.

It is expected that locally produced propellant and SRM's will also alleviate the burdens for international customers coming to Australia attempting to import propellant from overseas due to International Traffic and Arms Regulations (ITAR). Black Sky Aerospace (BSA) are able to supply a significant export market for other countries that are burdened with these regulations which BSA is keen to develop. It is estimated the international market could generate a further \$25–\$30 million per annum within the next five years.

BSA undertook initial lab scale prototyping at their USA facility by adapting and modifying existing equipment. They identified deficiencies with the existing rocket propellant manufacturing process. Through this work, BSA were able to characterise propellant, comparing traditional methods versus their new methods. The new process, whilst still manually controlled is automated in the extrusion and vacuuming.

This project is the foundation for future BSA opportunities. The framework developed from manufacturing rocket propellant for SRMs will enhance and contribute to grow a sustainable market leading presence for BSA.

### MILESTONES

01/3/20	●	AMGC approval
30/5/20	●	Pre-market strategy developed
31/8/20	●	Design and prototyping of SRM completed
31/10/20	●	Market preparation completed
28/2/21	●	Product realisation of ARM completed

**CONTRIBUTIONS:** Government – \$184,500 | Industry – \$184,500 | In Kind – \$60,000





## IMPACT

- › Increased focus on R&D
- › Increased collaboration with research institutions
- › Increase in staff with STEM skills
- › Larger geographical reach
- › Higher trade intensity
- › Increase in automation



## GROWTH

- › BSA estimate they will generate \$25-30 million revenue per annum



## JOBS

This project will generate the following increase in employment

- › An additional Five to 10 skilled jobs at BSA including researchers
- › An additional 300 jobs over the next five years across domestic project partners and prospective future proponents
- › Both ELA and Southern Launch expect to employ over 100 staff to manage their respective launch facilities

### PROJECT PARTICIPANTS



Department of  
Defence

# MANUFACTURE OF AN RPCVD MACHINE



## Manufacture of a large-area Remote Plasma Chemical Vapour Deposition (RPCVD) machine

In an increasingly connected world, the demand for smarter, more powerful, and efficient electronics, delivered at lower-cost and higher-volume, continues to grow. This demand is starting to test the limitations of the incumbent manufacturing technology. This project aims to drive the commercial adoption of a game-changing Australian invention for the manufacture of semiconductor electronics such as Laser Diodes, LEDs, and microLEDs around the globe. The successful execution of the project will place Australia's technical leadership of plasma deposition technologies at the global forefront, in readiness for this continued industry growth.

BluGlass' breakthrough deposition technology called Remote Plasma Chemical Vapour Deposition (RPCVD) is a revolutionary, low temperature approach for the manufacture of semiconductor materials such as gallium nitride (GaN) at lower temperatures to create higher performing devices at lower cost. BluGlass has validated the RPCVD technology on 2-inch circular wafers, and now aims to increase the uniform deposition area suitable for up to 12-inch wafers in order to meet customer demand and scale up production.

The RPCVD technology, because of its low temperature and highly flexible nature, offers many potential benefits over existing technologies. These benefits include higher efficiency, lower cost, and substrate flexibility including GaN on silicon.

### MILESTONES

22/6/20	●	AMGC approval
30/7/20	●	Design of prototype plasma source and Nitride film deposition experiments on existing RPCVD reactor commenced
30/10/20	●	Experimental tests of small-scale plasma source prototypes completed
30/12/20	●	CAD design of reactor plasma showerhead completed
28/2/21	●	Experimental tests of full-scale plasma showerhead prototypes completed
30/5/21	●	Manufacture of reactor plasma showerhead completed
30/7/21	●	Nitride film deposition experiments on plasma showerhead RPCVD reactor completed

**CONTRIBUTIONS:** Government – \$250,000 | Industry – \$250,000 | In Kind – \$421,116



## IMPACT

- › Increased spending on R&D
- › Increased collaboration with other manufacturers
- › Increased collaboration with research institutions
- › Larger patent portfolio
- › Better qualified employees
- › Increased number of staff with STEM skills
- › Greater share of services
- › Higher trade intensity
- › Larger geographical reach



## GROWTH

- › BluGlass economic scenarios – GaN laser diodes target revenue
- › BluGlass' target revenues for its laser diode business (subject to a number of economic scenarios) are estimated to grow to (AU\$M) \$40M\* – \$74M\*\* by FY2025

\* Downside revenue target is based on a delay in the attainment of certain technical milestones that reduces the number of laser diode products for sale or slower customer demand and market growth

\*\*Upside revenue target is based on the timely achievement of BluGlass' technical milestones and accelerated customer demand and market growth



## JOBS

- › During the project, BluGlass will employ nine highly skilled engineers and scientists to deliver the project milestones
- › On successful completion of the project, BluGlass estimates up to 50 new jobs will be created

### PROJECT PARTICIPANTS



Australian  
National  
University

**Objective 3D**  
Printers – Parts – Scanners

**Akela**  
Laser Corporation

# INDUSTRY 4.0 PILOT



**BOSCH**



Connect. Inform. Grow.

Industry 4.0 audit of 12 manufacturing SMEs to assess their readiness to integrate digital technology into their manufacturing processes

This pilot project is designed to help 12 Australian manufacturers, operating in a diverse range of industry segments, to improve their knowledge and adoption of Industry 4.0 technologies. This will provide a compelling demonstration to the wider Australian manufacturing sector of the benefits and pitfalls of integrating a fully integrating digital technology into operations and production processes.

Bosch has developed an audit tool that identifies technological capability gaps preventing SMEs from embracing Industry 4.0. The tool makes recommendations on how these companies can transition their businesses to the digital manufacturing era. Implementation recommendations may span the breadth of Industry 4.0 topics and will not be tied to specific proprietary technology platforms.

Implementation projects will assist companies to expand their technology capabilities and develop advanced characteristics. Depending on the site, these could include embracing highly integrated robotics, digitalisation of production processes, development of cyber-physical systems and high levels of automation. The implemented solutions will always be in line with the SME's business goals and ambitions delivered through IIoT and Industry 4.0 digital solutions.

After project completion, all SMEs will have taken steps to implement digital technologies that allow them to increase their contribution to global value chains. These SMEs will also serve as reference sites for three years and feature as Industry 4.0 case studies – made available to the broader manufacturing industry via site visits, AMGC's website, as well as via social media and partner channels.

## MILESTONES

1/8/18	●	AMGC approval
1/12/18	●	First eight SME Industry 4.0 readiness audits completed
06/05/19	●	Remaining seven SME Industry 4.0 readiness audits completed
16/07/19	●	Implementation projects commence
30/11/20	●	First six implementation project completed
31/03/21	●	Remaining implementation projects completed
30/06/21	●	12 case studies completed

**CONTRIBUTIONS:** Government – \$273,700 | Industry – \$273,700





Advanced  
knowledge

Advanced  
processes

Advanced  
business  
models



## IMPACT

- › Higher spending on R&D to transition their legacy equipment to the digital manufacturing era
- › Increased ICT intensity using the Industry 4.0 audit tool outcomes
- › More collaboration with other manufacturers by producing case studies and facilitating site visits
- › More automation through implementation projects



## GROWTH

- › After project completion, all SMEs will have taken steps to implement digital technologies that allow them to increase their contribution to global value chains. These SMEs will also serve as reference sites for three years and feature as Industry 4.0 case studies – made available to the broader manufacturing industry via site visits, AMGC's website, as well as via social media and partner channels



## JOBS

- › New and highly skilled jobs are expected to be created as Industry 4.0 principles are implemented, allowing manufacturers to increase their contribution to global value chains

### PROJECT PARTICIPANTS



**BOSCH**



Connect. Inform. Grow.

**+ Ecosystem of 12 SMEs to be announced**



# HEAT TO ELECTRICITY ENGINE

ADVANCED MANUFACTURING EARLY STAGE RESEARCH FUND



## Pilot-scale demonstration of heat to electricity engine

This project aims to develop a new (patent-pending) concept for power generation from waste heat at a comparative nominal cost of 5 cents per kWh. The project scope will build on learnings from the 10 kWe proof of concept model, and via three-dimensional CAD and fast prototyping, turn this into a factory-tested minimum viable commercial scale product using bottled gas as the heat source.

The Barton engine, uniquely for its small to medium scale, extracts energy from external heat sources generated by industries such as:

- » Piggeries
- » Feedlots
- » Abattoirs
- » Industrial processes (e.g. furnace offtake)
- » Agricultural waste (e.g. straw).

In applications based on these heat sources, the Barton engine takes full advantage of high temperatures with the engine in this project designed to achieve 33% efficiency at 450°C. The Barton engine will be able to use a greater variety of external heat sources and will operate at pressures less than 20 bar which allows use of standard, low-cost materials.

The Barton engine will compete in the gas flare market, where it will compete against internal combustion technology like gas-fired reciprocating engines or gas turbines. The engine has external combustion and simply exchanges the heat from an existing, or new, gas flare flue.

## MILESTONES

1/12/19	●	AMGC approval
28/2/20	●	Detailed engineering design completed
14/4/20	●	Sub system supplied
14/5/20	●	Valves and working gas delivery system supplied
14/7/20	●	Workshop testing and system commissioning completed
30/7/20	●	Control system completed
30/9/20	●	Project completed using heat generated from bottled gas

**CONTRIBUTIONS:** Government – \$306,000 | Industry – \$306,000 | In Kind – \$180,000



## IMPACT

- › Larger patent portfolio
- › Better energy efficiency
- › Increased R&D investment
- › Increased collaboration with research institutions and other manufacturers
- › More staff with STEM skills
- › Greater share of services in total revenue



## GROWTH

- › 2020/21 – \$1,350,000 (of which \$0.1m is SME electricity sales)
- › 2021/22 – \$7,360,245 (of which \$1.2m is SME electricity sales)
- › 2022/23 – \$37,066,545 (of which \$6.7m is SME electricity sales)



## JOBS

- › This project is a key enabler for expansion and further technology development, with product development and advanced manufacturing positions becoming available at Austeng. With this project investment, the company is expected to grow by 10 people during 2019 and, meeting commercial milestones, double in size each year

### PROJECT PARTICIPANTS



CAPRICORN  
POWER



synapse design

Bruce Energy

# INNOVATIVE CRUTCH WEAR

ADVANCED MANUFACTURING EARLY STAGE RESEARCH FUND



## Mine site testing of innovative crutch wear on hoist chains for mining dragline machines

Cast Equipment & Chain Products Pty Ltd (CECP) have invented and patented a new chain system which is part of the immense Dragline Bucket assembly. Dragline machines remove overburden and dig out clean coal, iron ore or other resources at mines. This CECP chain will revolutionise the chain business globally by significantly increasing the life expectancy of chains, improving productivity, saving on maintenance costs and reducing downtime for the mining sector, locally and globally.

Limited trials of these drag chains were undertaken, which verified the 50% reduction in wearability of the crutch design. This current project aims to prove the commercial viability of the chains, resulting in the eventual sale of trial chains.

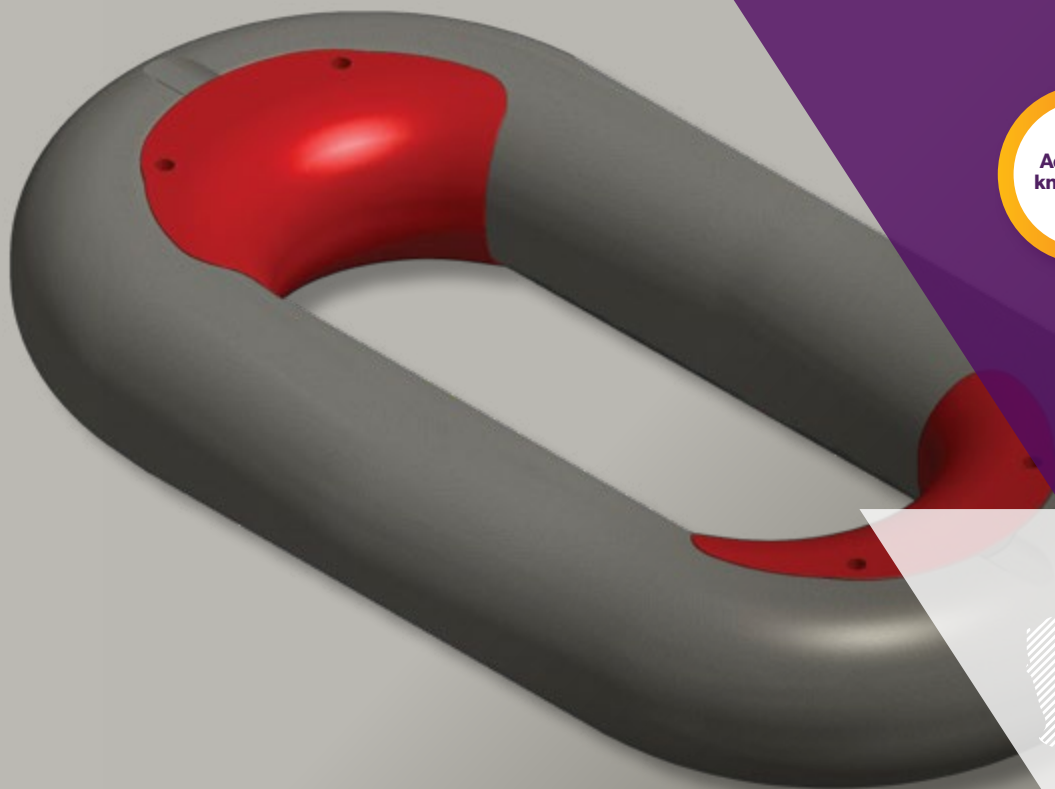
The technology for dragline chains has not changed in more than 40 years. This Australian patented invention demonstrates advanced processes with technical leadership in designing a 400+ BN removeable crutch system.

Drag chains used in the Australian mining industry are currently imported from US companies such as Columbia and cost \$100 million annually. This project will provide an opportunity for a local manufacturer to reshore a portion of this market back to Australia.

### MILESTONES

15/5/18	●	AMGC approval
08/01/19	●	Foundry designs drafted
01/06/19	●	Patterns completed and samples manufactured
04/07/19	●	Sample metallurgical test completed
31/10/20	●	Sets 1 and 2 chains manufactured
31/12/20	●	First eight week trial completed
28/02/21	●	Set 3 chains manufactured
30/04/21	●	Second eight week trial completed
31/05/21	●	Third eight week trial completed

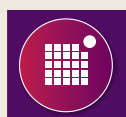
**CONTRIBUTIONS:** Government – \$398,941 | Industry – \$398,941 | In Kind – \$4,800,000



Advanced  
knowledge

Advanced  
processes

Advanced  
business  
models



## IMPACT

- › Higher spending on R&D and collaboration with research institutions to validate designs
- › Greater share of services in total revenue by charging a leasing or rental fee per bank cubic metres



## GROWTH

- › \$43.2 million per annum with a potential 10% market share



## JOBS

- › This project will generate additional jobs for 10 staff members at CECF, five at White Industries, six at Alfabs and three UQ graduates

### PROJECT PARTICIPANTS



GLENCORE



# WINE-BOTTLING HARDWARE

ADVANCED MANUFACTURING EARLY STAGE RESEARCH FUND



## Design and prototyping of 'smart' anti-counterfeit wine-bottling hardware

Wine counterfeiting is a global issue that costs wine producers and retailers billions of dollars each year.

This project seeks to overcome shortcomings in anti-counterfeit solutions within high-speed production environments. It also aims to solve RFID (radio-frequency identification) readability issues that occur near liquids and metal, which is a global issue in itself. The main objective of this project is to develop and validate an innovative, anti-counterfeit sealing system, building on the manual proof of concept Cellr has already developed.

This project will embed Cellr's technology into the capsule of cork and screw caps for wine and other beverages. The manufacturing challenge is in the unique design that allows this technology to be deployed automatically within the high-speed manufacturing environment. The solution must be robust enough to handle the rigours of a commercial bottling line, but fragile enough to be destroyed when the bottle is opened or there is an attempt to dislodge the sealing arrangement, thereby destroying its authenticity. Creating a tamper-proof element within the manufacturing process is a long-awaited solution that will bring significant innovation to the wine industry.

Cellr's product verification solution uses a blockchain system to automatically create immutable records on the bottling line, and will include the ability to communicate with customers directly through a web-based customer engagement platform, using the NFC protocol within the sealing arrangement. The project will also aim to create new intellectual property (IP) that can be applied across other industries that monitor and verify liquids, building on technology developed so far.

### MILESTONES

1/10/19	●	AMGC approval
30/11/19	●	Hardware design completed
31/12/19	●	Software design completed
29/2/20	●	First prototype completed
30/6/20	●	Proof of concept completed

**CONTRIBUTIONS:** Government – \$150,000 | Industry – \$250,000 | In Kind – \$59,800





## IMPACT

- › This project will generate new IoT technologies that will create value throughout the global supply chain from production to consumer, in the areas of track-and-trace, automated inventory management, customer engagement, marketing and product authentication. It will offer tamper-proofing, low costs for producers (by replacing slow, manual stock management with a low-cost automated solution) and other capabilities not currently available – such as the ability to read data at a minimum distance of one metre and at high speeds, using portable devices such as smartphones



## GROWTH

- › Between \$4.9 million and \$7.2 million per year in licensing revenue
- › Between \$5 million and \$7.6 million per year in revenue via the customer engagement platform



## JOBS

Cellr anticipates adding:

- › Four to 8 jobs for skilled electrical design engineers and micro-electronics specialists
- › Six to 10 jobs for skilled sales and marketing professionals
- › Four jobs for skilled operations and administrative professionals

### PROJECT PARTICIPANTS



# ADVANCED MANUFACTURING OF LIGHTWEIGHT CARBON FIBRE BODY COMPOSITE ARMOUR



Advanced manufacturing process validation for composite carbon fibre body armour and commercialisation through global value chain partners

Chiron Global Technologies (CGT) have developed a lightweight carbon fibre body composite armour that provides very high levels of protection and extended mobility, allowing unparalleled levels of realism in training. Chiron's armour is unique in design and functionality and has been identified as world-leading by industry experts.

The Chiron technology was validated with extensive testing undertaken to demonstrate the safety and degree of movement that is possible when wearing the armour. CGT received positive feedback from all of these trials, including that the current armour provides more protection than much of their operational armour.

In this project CGT will develop and validate, at commercial scale, the Chiron-X1 body armour – building on the Gen 1 prototype armour that they have developed and trialled with multiple defence and law enforcement users over the last 12 months.

The CGT business model includes close collaboration with global distributors to scale exports of the body armour to allied defence forces, law enforcement agencies, security companies and corrections facilities globally. Once these vital steps are achieved, CGT's IP will become a commercial reality in terms of manufacturing.

Following successful development of the Chiron-X1 armour, the product development pathway includes the development of armour with embedded biometric and impact sensors that record the force and location of strikes for training and operational use ('Chiron-X2') and ballistic operational armour ('Chiron-X3').

## MILESTONES

02/4/20	●	AMGC approval
30/10/20	●	Stage 1 in development of analogue prototypes for the Chiron-X1 production armour completed
31/11/20	●	Stage 1 in development of 3D solid model CAD files, Finite Element Analysis, Prototype evaluation and testing completed
31/12/20	●	Stage 1 of development of tooling and calibration of manufacturing equipment completed
31/01/21	●	Stage 2 in development of analogue prototypes for the Chiron-X1 production armour utilising in house resources completed
31/03/21	●	Stage 2 in development of solid model CAD files, Finite Element Analysis, Prototype evaluation and testing completed
30/06/21	●	Stage 2 in development of tooling and calibration of manufacturing equipment completed and prototyping testing completed
30/08/21	●	Performance testing of prototype completed

**CONTRIBUTIONS:** Government – \$362,045 | Industry – \$362,045 | In Kind – \$74,000



Advanced  
knowledge

Advanced  
processes

Advanced  
business  
models



## IMPACT

- › Higher spending on R&D
- › Increased collaboration with research institutions
- › Larger geographical reach
- › Higher trade intensity



## GROWTH

Chiron Global Technologies estimate to generate \$144M in revenue over five years from 2020 as follows:

- › 2020 – \$1.3M
- › 2021 – \$4.9M
- › 2022 – \$28.2M
- › 2023 – \$50M
- › 2024 – \$60M



## JOBS

The project will generate the following increase in employment:

- › Approximately 6 staff will be engaged directly by Chiron Global Technologies
- › One to 2 additional staff may be engaged by The Smart Think

After the project it is anticipated that new staff opportunities will occur as follows:

- › Thirty to 40 skilled jobs at Chiron Global Technologies
- › One to 2 skilled jobs at The Smart Think
- › Up to 20 jobs across domestic project partners and prospective future partners

### PROJECT PARTICIPANTS



# COMPRESSED AIR POWERED UPS (UNINTERRUPTIBLE POWER SUPPLY) FOR UNDERGROUND MINES



Development, testing and production of a compressed air powered Intrinsically Safe UPS (uninterruptible power supply) for underground mines and hazardous atmospheres

Underground coal mining has gone through many rapid changes in the last 20 years, with the introduction and revision to Safety & Health Legislation, the advancement of technology supporting this legislation and operational progressions incorporating technological advancements. Geographically this has seen mines become more complex and an increase in physical size with life of mine extensions. With the increase in mine size comes an increase in mine activities and ultimately an increase in exposure to principle hazards.

Underground coal mining relies on either electricity, pressurised water, or compressed air for energy sources to enable the mining activities. When a mine's underground workings advance, so do the three reticulated services supplying the mining equipment and processes. Harnessing a mine's widespread and reliable compressed air supply for energy conversion, Air2Volts™ (UPS) offers an inexpensive and reliable solution for supplying intrinsically safe power to critical and non-critical mine environmental monitoring, communications and control systems.

With no moving parts, Air2Volts™ provides a convenient, reliable and uninterruptible power supply for underground roadways geographically too remote or areas without ease of access to electrical reticulation. It is a more reliable and economically viable solution to powering communications equipment in today's smart mines. Air2Volts™ is a platform technology employing two phenomena that when combined, controlled and applied, create electrical energy through the energy conversion and harvesting of a compressed air supply.

Cool Mine has patented and completed Stage 1 Concept Design of the development of Air2Volts™. With Phase 1 completed and successful, this project will continue and allow Cool Mine to develop, design, test, review, certify and commercialise.

## MILESTONES

01/04/20	●	AMGC approval
30/05/20	●	Site visits for pre-inspection and Risk Management documentation completed
31/06/20	●	Final design test completed, and mechanical components supplied
31/08/20	●	Prototype trial completed, PCT ISO & ISR rebuttal completed
30/10/20	●	Certification of Air2Volts™ IEC Ex Certification
28/02/21	●	Pilot units installed, tested and reporting completed
30/05/21	●	Pilot trials close out reports, pilot unit's recovery for bench tests offsite completed, pilot trials test units inspected, striped and tested

**CONTRIBUTIONS:** Government – \$388,900 | Industry – \$388,900 | In Kind – \$73,800

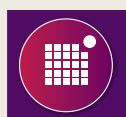




Advanced  
knowledge

Advanced  
processes

Advanced  
business  
models



## IMPACT

- › Increased spending on R&D
- › Increased collaboration with research institutions
- › Increased collaboration with other manufacturers
- › Better qualified employees
- › Newer equipment
- › Better energy efficiency



## GROWTH

- › Cool Mine estimate the following projected revenue:
- › 2021 – \$2M
- › 2022 – \$5M
- › 2023 – \$10M



## JOBS

During this project Cool Mine estimate they will employ approximately 10 additional people

### PROJECT PARTICIPANTS



ingenuity



# ADVANCED FIBRE BANDAGES



## Advanced Fibre for targeted delivery of bio-active molecules to treat chronic wounds

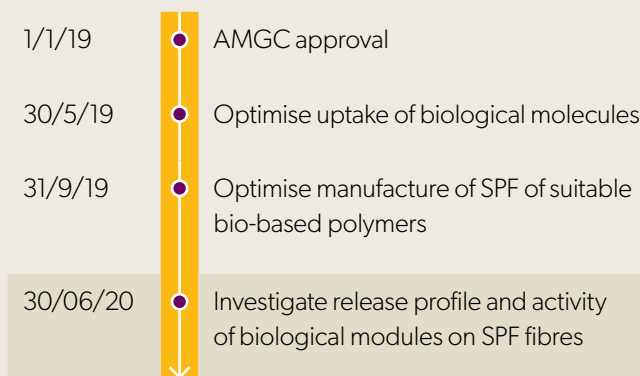
The project will utilise short polymer fibre (SPF) biomaterial manufactured via a novel, patented method developed at Deakin University's Institute for Frontier Materials with commercial partners (HeiQ Australia and Cytomatrix). Unlike the conventional electrospinning method of manufacturing polymer fibers, this novel manufacturing method is highly efficient, is extremely versatile both in terms of the dimensions of the fibre produced and the possible polymer composition and is gentle enough that it does not damage biological molecules. This means that biological molecules can be incorporated into biodegradable SPF during manufacture. These biologicals are then slowly released from the SPF at a specific target site such as a chronic wound.

Granulocyte-macrophage colony-stimulating factor (GM-CSF) plays an important role in wound repair, as well as being an immune stimulating factor that causes migration of immune cells to wound sites. Clinical studies have demonstrated that local application of GM-CSF promoted wound healing of burns and chronic ulcers. GM-CSF is slowly released from SPF over time and remains biologically active. The process of incorporation into SPF actively protects GM-CSF, increasing its stability compared to GM-CSF in solution giving it enhanced longevity.

This project will investigate and optimise the incorporation and release profile of GM-CSF in SPF manufactured from two other biocompatible polymers, such as gelatine and chitosan. These unique, functionalised SPF will be the basis for new healthcare products to enter the global chronic wound care market, reducing the financial burden on the healthcare system and the frequency of antibiotic use in chronic wound care.

The initial product will be focused on promoting self-healing of chronic wounds, which will reduce the financial burden on the healthcare sector and reduce the use of antibiotics and therefore the development of antibiotic resistance bacteria, and generate significant revenue and employment within Victoria.

### MILESTONES



**CONTRIBUTIONS:** Government – \$50,000 | Industry – \$50,000 | In Kind – \$159,366



## IMPACT

- › Higher spending on R&D to enable development of the biological application
- › Larger patent portfolio



## GROWTH

- › The initial product will be focused on promoting self-healing of chronic wounds, which will reduce the financial burden on the healthcare sector and reduce the use of antibiotics and therefore the development of antibiotic resistance bacteria. Chronic wound care is a large and rapidly growing sector due to the increase in the proportion of the population developing diabetes and living longer, both high risk factors of chronic wound development



## INTELLECTUAL PROPERTY

- › Patented method developed at Deakin University's Institute for Frontier Materials

### PROJECT PARTICIPANTS



**CYTO  
MATRIX**



# EMBLASER3 – WORLDS FIRST SAFE PORTABLE LASER CUTTING DEVICE



## Manufacturing of Safe Portable Laser Cutting Machines Suitable for STEM Education

Traditionally, laser cutting equipment used in schools is large, expensive, and requires operation by trained personnel. Hazards, including ocular injury, toxic particles and fire, all add complexity to the use of laser cutting equipment in a classroom environment. Maintenance costs combined with these hazards have resulted in the under-use of laser cutting equipment in primary and secondary education.

The demand for laser cutting machines is growing in tandem with the increased use of automation and digitalisation in manufacturing facilities around the world. The computer-driven laser machines cut parts and patterns with superior speed, precision, consistency, and reliability.

This project will develop the world’s first classroom-ready, student-friendly, affordable (\$3,500) desktop laser cutting device, complete with STEM education materials for easy integration into primary and secondary curricula. The Emblaser3 will be a safe, affordable, low-maintenance, easy-to-use laser cutter, manufactured in Australia for a global market and is expected to significantly displace imported alternatives in the Australian education and small office/home office (SOHO) market sectors.

The Emblaser3 will be designed for portability and hands-on use in the classroom by students and teachers alike. The solution will include a number of unique features relating to safety, maintenance and ease of use that will make it a leader amongst devices competing in the target market segments.

The solution will consolidate five years of research and development, lessons learned from two prior product

releases (including the successful Emblaser 2 desktop laser), and collaboration with the education sector to manufacture a globally competitive product.

The solution will also expand the use of solid-state laser technology, which Darkly Labs has pioneered, and which forms the backbone of their technologies and IP. This technology provides superior reliability, efficiency and safety over traditional and inefficient systems that use CO<sub>2</sub> technology for laser cutting and engraving.

### MILESTONES

18/5/20	●	AMGC approval
30/5/20	●	Mechanical Beta and Optics Alpha completed
31/8/20	●	Mechanical development continued, LightBurn stage 1, Tooling stage 2, FlameX beta and IP registration completed
30/11/20	●	Mechanical, Optics, Tooling, FlameX and STEM resources development completed
28/2/21	●	Lightburn, compliance and STEM resources completed
30/6/21	●	Machine revision completed and marketing completed

**CONTRIBUTIONS:** Government – \$200,560 | Industry – \$200,560 | In Kind – \$35,000



## IMPACT

- › Increased spending on R&D
- › Higher information and communication technology (ICT) intensity
- › Upskilling of current workforce
- › More staff with increased STEM skills
- › Increased use of automation
- › Newer equipment
- › Better energy efficiency
- › Higher trade intensity
- › Larger geographical reach



## GROWTH

Darkly Labs estimate they will be able to increase their domestic and export sales revenue with the Emblaser3 as follows:

- › 2021 – Domestic +30%, International +30% – \$1,350,000
- › 2022 – Domestic +30%, International +50% – \$2,500,000
- › 2023 – Domestic +25%, International +50% – \$3,250,000
- › 2024 – Domestic +25%, International +30% – \$4,500,000
- › 2025 – Domestic +25%, International +30% – \$5,250,000



## JOBS

The project will generate the following increase in skilled employment:

- › Seven additional full time employees
- › Three additional part time employees

### PROJECT PARTICIPANTS



# INDUSTRY 4.0 DIGITISATION OF SME INFRASTRUCTURE

## DematecAutomation

Industry 4.0 realisation via digitisation of existing SME Manufacturing Infrastructure and IIoT augmentation of manufacturing equipment being locally manufactured by Australian SMEs

Dematec Automation and 17 small-to-medium sized Australian manufacturers from across the country will demonstrate how Industrial Internet of Things (IIoT) sensors can instrument existing manufacturing equipment to elicit valuable real-time operational data and identify opportunities for optimisation of manufacturing operations. Several SME Manufacturers will augment their manufacturing equipment product offerings with IIoT to introduce or increase servitisation opportunities.

The 17 manufacturers service a diverse range of industry sectors including metal fabrication, materials handling, textiles, chemicals, concrete, hydraulics, joinery, marine, masonry and packaging. They will each become case studies that help other manufacturers in allied sectors readily identify the potential return on investment for digitalising legacy manufacturing plant and equipment and bringing their operations into the Industry 4.0 context.

The project spans Western Australia, South Australia, Victoria, Tasmania, Australian Capital Territory, New South Wales and Queensland, and is associated with the Department of Industry, Innovation and Science’s Entrepreneurs’ Programme.

Digitisation of manufacturing equipment offers immediate and long-term benefits, not just limited to analysis of current operational workflows and resource utilisation. It is a critical step in achieving high-value-add product offerings such as detailed traceability throughout the manufacturing process and therefore opportunities for servitisation through predictive maintenance offerings. It supports the adoption of digital supply chain transparency and the optimisation of manufacturing resources at a supply chain level.

### MILESTONES

15/05/18	●	AMGC approval
19/12/18	●	Deployment and handover of monitoring system equipment for sites 1–3
28/02/19	●	Deployment and handover of monitoring system equipment for sites 4–6
30/05/20	●	Deployment and handover of monitoring system equipment for sites 7–9
30/07/20	●	Deployment and handover of monitoring system equipment for sites 10–12
28/09/20	●	Deployment and handover of monitoring system equipment for sites 13–17
30/06/21	●	Case studies complete

**CONTRIBUTIONS:** Government – \$248,470 | Industry – \$248,470





## IMPACT

- › Higher spending on R&D during the AMGC project
- › Increased ICT intensity by integrating IIoT technology on existing infrastructure
- › More automation as a result of integrating IIoT technology on existing infrastructure
- › Better energy efficiency as a result of enhanced analytics
- › Case studies across multiple manufacturing sectors



## GROWTH

- › Better efficiencies garnered from hi-fidelity, real-time knowledge and analytics of manufacturing plant and equipment will enable better utilisation of capital infrastructure
- › Dematec will achieve deployment of their IIoT systems infrastructure to a broad range of sectors
- › Increased value offerings via integration of IIoT within manufactured product lines will help secure and improve market position for manufacturers offering B2B products



## JOBS

- › High-skilled jobs will be devoted to further development of Dematec's IIoT systems infrastructure during this project
- › Better understanding of capital infrastructure utilisation for participating SMEs

### PROJECT PARTICIPANTS

**DematecAutomation** + Ecosystem of 17 SMEs to be announced

# ROBOTIC LASER DENTAL DEVICE

ADVANCED MANUFACTURING EARLY STAGE RESEARCH FUND



## Development of the Dentroid® robotic laser dental device

Dentroid Technologies (Emudent) will develop a hands-free robotic dental device that combines the precision and efficiency of laser with the appropriate digital control. The dentist will attach the device to the tooth being repaired, then use a joystick to fire and move the laser. The system will automatically correct the operator in case they accidentally go beyond pre-specified parameters. There is no need to manipulate different settings for varying level of skills and procedures.

The technology also represents a platform for mobile and remotely controlled dentistry, with particular benefit to rural, remote and disadvantaged communities; conflict and disaster zones; offshore naval vessels; and cruise ships. Additionally, early stage diagnosis and intervention may be performed through units installed at schools, rural health centres and aged care facilities. This can potentially save critical time by avoiding waiting lists and commuting, as there will be no need for a dentist to be physically present at this initial stage; a nurse or a staff member with basic training can clip the device onto the tooth of concern and the dentist will log-in, check and analyse remotely.

The technology is expected to reduce the costs of dental treatments. Automation reduces physical and mental burnout of dentists and increases productivity. Dental treatments can be done in fewer visits, particularly when Dentroid is paired to an in-clinic milling machine. Improved precision and standardisation will also reduce human errors and consequently medico-legal complications.

Until now, dental clinics have not existed on the data grid. Industry 4.0 has had little applicability in the dentist settings and armamentarium. Dentroid will not only automate clinical work, but it will also convert the manual/analogue mode of working into a complete digital process. Hence, the visual feed will be recorded and analysed. Data can be shared, aggregated and processed by artificial intelligence (AI). It is through this AI that Dentroid will introduce Industry 4.0 to the dental industry which will allow clinical guidance and optimisation of the surgical work.

### MILESTONES



**CONTRIBUTIONS:** Government – \$250,000 | Industry – \$250,000 | In Kind – \$290,160



## IMPACT

- › Increased spending on R&D
- › Higher information and communication technologies (ICT) intensity
- › Larger patent portfolio
- › Increased levels of automation
- › Greater share of services in total revenue
- › Increased level of extensive backward links



## GROWTH

- › Dentroid Technologies expects sales of \$347,750,000 over the next five years



## JOBS

- › Dentroid Technologies anticipates that the project will generate six -10 employment opportunities over the coming 12 months
- › Dentroid Technologies anticipate that within the first year of the manufacturing stage 40+ jobs will be generated

### PROJECT PARTICIPANTS

DENTROID

 **Griffith**  
UNIVERSITY

**SDI**



Australian  
National  
University

**Lastek Photonics**  
**Technology Solutions**

# ACTIVE WHEEL ALIGNMENT SYSTEM



## Scaling DOFTEK's Active Wheel Alignment System for the global automotive market

It is well-established that one of the major factors influencing the handling, performance, safety, fuel efficiency and tyre life in any vehicle is the wheel alignment. Until now, wheel alignment can only be adjusted manually by a mechanic in a workshop, where a single wheel alignment setting is chosen. In an ideal world, wheel alignment should vary in real-time.

To address this challenge, DOFTEK has developed and patented the first commercially viable solution to this problem, namely DOFTEK's Active Wheel Alignment System. The system electronically adjusts and optimises the wheel alignment under different driving scenarios, and in real-time. The benefits of the system include:

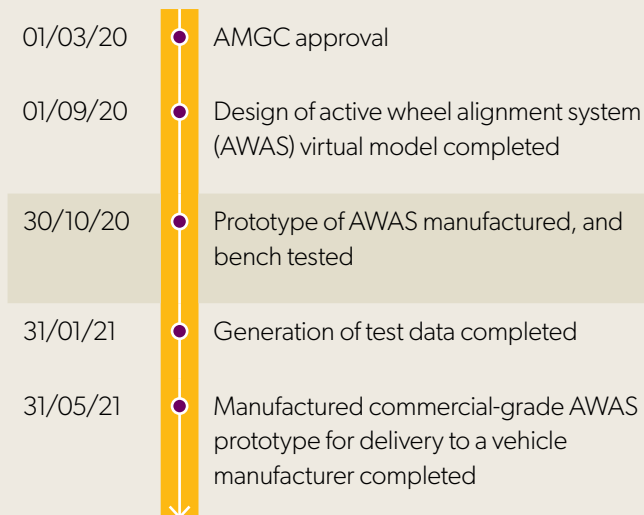
- Fully compatible with front axle, rear axle and existing suspension geometries used by the vehicle manufacturers today;
- Rapid, independent control of wheel camber, toe and castor;
- Adjustment provided by push-button, dynamic control (semi-active) or adaptive control (real-time);
- Compact and bolt-on fitment with no changes to the vehicles required, and
- Lightweight with a negligible increase in fitted weight.

DOFTEK's goal is to translate their system into as many new cars as possible, with mass scalability being a major consideration for their product from the beginning. DOFTEK's system has been designed to leverage as many existing

automatable manufacturing processes as possible, such as CNC machining, injection moulding, additive manufacturing and robotic assembly/handling.

In this project, DOFTEK and its engineering partners will develop a scalable and commercial-grade Active Wheel Alignment System for testing in a vehicle's production and operational environment.

### MILESTONES



**CONTRIBUTIONS:** Government – \$196,425 | Industry – \$196,425 | In Kind – \$50,160





## IMPACT

- › Increased spending on R&D
- › Increased collaboration with other automotive manufacturers
- › Upskilling of current workforce
- › Increased levels of automation
- › Larger geographical reach
- › Increased trade intensity
- › Increased fuel efficiency and tyre longevity



## GROWTH

- › Potential to generate significant new revenue for Australian manufacturing ahead of global licencing and export opportunities



## JOBS

- › Forty new jobs across DOFTEK, its domestic project partners and prospective future partners

### PROJECT PARTICIPANTS



FlexiCut Engineering





# LITHIUM ION BATTERY MODULE

ADVANCED MANUFACTURING EARLY STAGE RESEARCH FUND



Design of a safe, hot-climate lithium-ion battery (LiB) module and associated automated advanced manufacturing production process

Energy Renaissance is leading the development of a purpose-built LiB manufacturing factory called 'Renaissance One', which will eventually leverage Australia's competitive advantage in abundant natural resources of lithium. The LiB manufacturing factory will produce batteries for industrial battery energy storage application such as solar farms, defence assets, mine sites, utilities, commercial and industrial applications, etc.

Energy Renaissance is seeking to exploit a market niche for safe LiBs in hot-climate operating environments. This project will bridge the gap between new product development and manufacturing of Australian made battery energy storage solutions.

This project comprises two key areas, as follows:

- ▶ Design of LiB components for hot-climate conditions
- ▶ Design of automated production processes for manufacturing LiBs.

Australia is the only country in the world that has all the mineral components required for LiB manufacture:

- ▶ Lithium – Australia is the lowest cost producer and has 20% of worlds reserves
- ▶ Lithium carbonate is now being manufactured in Perth and in NT (within 18 months)
- ▶ Battery Grade Graphite – Concentrate manufactured in South Australia.

The following items are mined in Australia but currently sent overseas for processing: Copper, Cobalt, Nickel, Aluminium, Manganese. When demand by Australian LiB manufacturers is sufficient, these minerals will be processed in Australia. At that point, input costs for the manufacture of LiBs in Australia will be considerably reduced and as a result, it is conceivable that Australia will become a manufacturing powerhouse for LiBs, utilising domestic commodities.

## MILESTONES



**CONTRIBUTIONS:** Government – \$246,625 | Industry – \$246,625 | In Kind – \$155,000



## IMPACT

- › Increased spending on R&D
- › More collaboration with other manufacturers to develop hot-climate LiB
- › More advanced manufacturing and automation



## GROWTH

- › Based on Energy Renaissance's view of the evolving market demand, their projections for battery orders in Australia in 2019–20, 2020–21 and 2021–22 respectively are 200MWh, 712MWh and 984MWh



## JOBS

- › Twenty full time employees during this project, including a Plant Manager, QC Engineer, IA Engineer, Project Manager and Line Engineer

### PROJECT PARTICIPANTS



# MANUFACTURE OF SUPERIOR LITHIUM-ION BATTERY (LIB)

ADVANCED MANUFACTURING EARLY STAGE RESEARCH FUND



## Initial feasibility testing of FELINE's novel Li-ion battery (LIB) cell format architecture

As passenger vehicles move to energy efficient electric vehicles, battery options for larger vehicles and marine vessels are also being sought. This sector includes buses and trucks with a general requirement for a battery with a capacity of 350kWh compared to electric vehicles with a battery around 80kWh capacity. An emerging market is also developing for the electrification of marine vessels with an immediate emphasis on efficient, small, high-speed ferries.

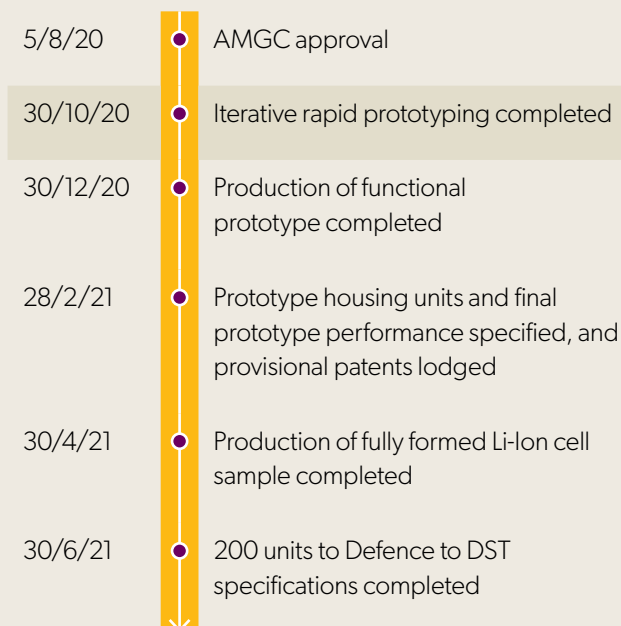
A well-known problem with some current lithium-ion battery designs is that the batteries overheat when high currents are used. This presents safety issues and limits the battery life and performance.

FELINE intends to manufacture a superior lithium-ion battery that addresses the performance and safety requirements in a range of applications which are currently not possible due to insufficient balance between power and safety. This project will expedite the rapid initial feasibility testing of FELINE's novel Li-ion battery (LIB) cell format architecture.

FELINE's solution is to deliver a LIB cell that includes a new, large format design that when discharged, has a very low internal impedance, therefore reducing heat generation. This will permit a high-power draw without generating significant internal heat in the cells that would severely affect cell performance.

On completion of this project, FELINE and the project partners will have manufactured 200 prototype cells for testing by Defence Science and Technology Group (DST) for a maritime application. Demonstrated successful project outcomes is expected to have an immediate lift in business and product profile. It will allow a sovereign manufacturing capability in Queensland.

### MILESTONES



**CONTRIBUTIONS:** Government – \$192,350 | Industry – \$192,350 | In Kind – \$226,040



## IMPACT

- › Larger geographical reach
- › Increased collaboration with other manufacturers
- › Increased spending on R&D
- › Higher information and communication technology (ICT) intensity



## GROWTH

- › The FELINE battery selling price is intended to be cost-competitive with competing high-performance battery systems. Using standard materials, chemistries and manufacturing processes, they are not anticipating higher costs than those seen in the market today



## JOBS

- › FELINE estimate that this project will generate an increase of more than Fifteen+ skilled jobs within 1–2 years

### PROJECT PARTICIPANTS

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**FELINE Advancing Technologies**

**PWR Advanced Cooling Technology**

# 3D PRINTING OF ANATOMICAL TISSUE



## Additive Manufacturing of Anatomical Training Models

This project will develop and field-test novel methods for extending the haptic and tactile properties of 3D printed replica human tissues for use in surgical training models.

Fusetec 3D recently released the world’s-first 3D-printed sinus model that accurately replicates the tactile and haptic characteristics that surgeons would experience when operating on a human patient. The 3D sinus model is available with a range of pathologies to enhance surgical training scenarios. However, the models already push the boundaries of currently available high-end commercial 3D printing technologies.

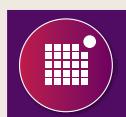
While Fusetec 3D’s sinus model has already been broadly accepted by leading ENT surgeons around the world, the tactile and haptic fidelity required to accurately replicate certain other human tissues is not achievable using off-the-shelf 3D printing technologies. This project seeks to augment commercially available additive manufacturing technologies with other techniques and processes to achieve the material characteristics necessary to replicate a range of human tissue types for use in high-fidelity surgical training scenarios.

### MILESTONES



**CONTRIBUTIONS:** Government – \$183,344 | Industry – \$183,344 | In Kind – \$28,000





## IMPACT

- › Increased collaboration with research institutions
- › More staff with STEM skills
- › Optimised automation and energy efficiency
- › Broader export-focused product portfolio
- › Larger geographical reach



## GROWTH

- › Fusetec 3D projects 20X growth by 2024



## JOBS

This project will generate the following increase in skilled employment:

- › Fusetec 3D – During: Two, Post Project: Six
- › University of South Australia – During: Two
- › University of Adelaide – During: One

### PROJECT PARTICIPANTS

**fusetec**



**Quinlan Engineering  
Design Service Pty Ltd**

# THERMALLY BONDED GEOCOMPOSITE MATERIAL

## GEOFABRICS®

### Re-shoring thermally bonded geocomposite manufacturing

Geocomposites and geotextiles are used for soil stabilisation in landfill, dams, water, roadways and mining tailings dams where steep inclines are encountered in these applications.

Geofabrics is proposing to develop a new “commercial grade” thermally bonded geocomposite material with superior technical performance characteristics and cost competitiveness. The thermal bonded geocomposite will have the following competitive advantages compared to existing imported products:

- Higher bond strength
- Improved drainage performance
- Capability to manufacture to project specific requirements such as length and width
- Cost competitive product from reduced manufacturing costs.

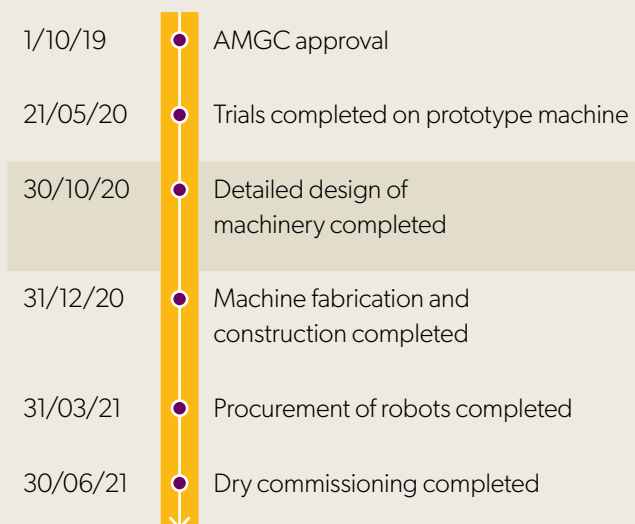
The cost benefit to the customer using the Geofabrics’ thermal bonded geocomposite will be:

- Reduced project installation cost – soil is added to the top of the geocomposite to achieve the filtration specification.
- Improved project implementation costs – by eliminating lead times of imported product and providing higher level of responsiveness, Geofabrics can react to changes in project specification or requirements

The project will involve the following stages:

- Finalise prototype development
- Trials of commercial scale machinery that has the capability for manufacturing at full scale
- Design and trials of automation and robotic technology for high risk (manual handling and high temperature operating zones) tasks.

### MILESTONES



**CONTRIBUTIONS:** Government – \$322,000 | Industry – \$322,000 | In Kind – \$110,000



## IMPACT

- › Introduce Australian capabilities for the manufacture of thermal bonded laminate geocomposites to replace imports
- › Introduce additional revenue opportunities for export of the new and more competitively priced product
- › Improved product performance in the field due to use of different technology (thermal bonding)
- › Use of automation and robotic technology to operate high risk tasks and make processes more efficient



## GROWTH

- › A revenue increase of \$3 million annually is expected to be delivered



## JOBS

- › Geofabrics currently have 45 people working at the Albury manufacturing site and 35 people at the Ormeau site. The project will play an important role in developing the technical skillset in advanced manufacturing and automation for North-East Victoria and Murray region in NSW. The availability of these gained technical skills will provides an indirect assistance to other manufacturing organisations in the region

### PROJECT PARTICIPANTS

**GEOFABRICS**

 **RMIT**  
UNIVERSITY

 **TPI**  
SOLUTIONS  
Manufacturing, Maintenance & Projects

**Quinlan Engineering  
Design Service Pty Ltd**

# COMPOSITE-WOUND ROCKET TANKS



## Developing Composite-wound Tanks for Space Vehicles

Gilmour Space Technologies is developing a hybrid propulsion launch vehicle to deliver payloads of up to 250 kg into Low Earth Orbits (LEOs). Their most recent suborbital prototype was constructed primarily using aluminium tank components. However, whilst aluminium is cheaper, it does result in a heavier launch vehicle. Gilmour anticipates that by using carbon fibre composite tanks for their three-stage rocket, they would be able to achieve a lower weight mass for their launch vehicle which will be needed for a globally competitive LEO orbital launch vehicle.

Typical launch prices quoted by rocket launch companies are around \$45,000 per kg. The effect of the weight savings would translate into an increased revenue potential of \$945,000 per launch for Gilmour and conversely, it will make them more competitive by a similar amount.

The composite tanks will be designed using filament winding process. This involves an automated process of wrapping resin impregnated filaments (rovings or tows) in a geometric pattern over a rotating male mandrel. The component is then cured under high pressure and temperature.

This project will enable Gilmour Space in Australia to design, develop, test and produce high-quality carbon fibre wound rocket propellant tanks for their hybrid propulsion motor systems. It is a capability that would enable this leading rocket company to manufacture and export lightweight, price-competitive rockets for customers around the world as well as launching rockets in Australia.

### MILESTONES

TBA

Gilmour is targeting to conduct ground tests of a flight-grade composite tank by the first quarter of 2021.

**CONTRIBUTIONS:** Government – \$224,500 | Industry – \$224,500 | In Kind – \$25,000





Advanced  
knowledge

Advanced  
processes

Advanced  
business  
models



## IMPACT

- › Increased collaboration with other manufacturers
- › Increased spending on R&D
- › Increased collaboration with research institutions
- › Larger geographical reach
- › Reshoring of rocket tank manufacturing
- › Newer equipment



## GROWTH

- › Gilmour forecasts that the business of launching small LEO satellites to space using their launch vehicles could bring in revenues of over \$100 million by 2025



## JOBS

Gilmour estimate that deployment of their tank manufacturing facility will see the appointment of the following skilled staff:

- › Two production engineers
- › Five semi-skilled production assistants

### PROJECT PARTICIPANTS





# MANUFACTURING OF LIQUID GRAPHENE



## Development of graphene powder into a range of graphene fluid dispersions

Graphene Manufacturing Group (GMG) has already developed scalable and relocatable process to manufacture graphene powder from hydrocarbon feedstock. GMG's graphene powder can be manufactured in a platelet size to order which is required as different applications require different sized platelets for different performance outcomes. No other known manufacturing methods can produce different size platelets so readily and easily and this advantage is paramount in many plastic, battery and paint applications.

With the collaborative support of UQ AIBN, and co-funding from AMGC for this project, GMG now intends to move to an improved technology and develop their graphene powder into a range of graphene fluid dispersions which will be, more readily, and easier to use in customer applications. This graphene fluid is classified as an "enabler" and compared with powder it has the following advantages:

- ▶ Liquid can be dispersed more accurately in compounds than powder
- ▶ Liquid can be diluted easier than powder
- ▶ Liquids are much easier to work with from a material handling viewpoint
- ▶ Liquids can be transported more economically (2,000 times less bulk than powder).

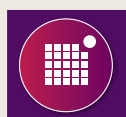
This project will trial and validate the benefits of liquid graphene in various commercial applications with the project participants.

The development of various specific dispersants is to enable a globally competitive, low cost, low carbon footprint process to manufacture graphene fluids in a scalable fashion. This would then be used to advance the usage and benefit of graphene's energy saving features through local and international markets.

### MILESTONES

1/08/19	●	AMGC approval
15/04/20	●	Products, applications, desired features defined
14/05/20	●	Application mix defined and agreed
30/09/20	●	Design completed and dispersant mix finalised
31/12/20	●	Review completed to improve dispersion trial outcomes
31/12/21	●	Full scale production tests completed

**CONTRIBUTIONS:** Government – \$226,861 | Industry – \$226,861 | In Kind – \$241,500



## IMPACT

- › Increased spending on R&D
- › More collaboration with research institutions and manufacturers
- › Higher relative salaries and wages
- › Graphene has enormous potential to provide mechanical property enhancement to a broad range of manufacturing processes and products. When graphene fluid is used as an enhancement within products such as plastics, concrete, rubber and composites, it reduces weight and increases properties such as thermal and electrical conductivity as well as strength



## GROWTH

- › Increase volume scale impact by adding sometimes only 0.01% (1/10,000th by weight) of graphene into a fluid to give world leading energy or strengthening features to various bulk material products
- › Enable the production and sale of graphene fluids at higher volumes than previously possible



## JOBS

It is anticipated that new employment opportunities will occur as follows:

- › An additional Five to 10 skilled jobs at GMG including research engineers, product scientists, sales and operations staff
- › An additional >50 jobs across domestic project partners and prospective future partners

### PROJECT PARTICIPANTS



# ON-SHORE MANUFACTURE OF NOTUS VIVERE INVASIVE VENTILATORS FOR COVID-19 PATIENTS



## On-shore Manufacture of Notus Vivere Invasive Ventilators for COVID-19 Patients based on Smiths Medical license

Invasive ventilation is an essential supportive treatment for patients in the critical-care stage of COVID-19. There is a world-wide shortage of invasive ventilators. Globally, there are many existing manufacturers, but they are swamped with orders and are manufacturing at the limits of their production capacity or supply chains.

While it is not easy to determine how many additional ventilators will be required to cope with the coming surge in demand in Australia, between 2,000 and 4,000 additional invasive ventilators are reasonable estimates given currently promulgated projections and recurring COVID-19 exposure. ResMed is the only Australian manufacturer of invasive ventilators, and the current approach by ResMed for manufacturing additional invasive ventilators is fully supported.

This project offers a well-considered and feasible, non-competitive ventilator supply strategy which resonated at a State and Federal level. Grey Innovation negotiated a licence agreement with Smiths Medical.

The licence agreement arrangement is to manufacture a minimum 2,000 Notus Vivere Emergency Invasive Ventilators in Australia derived from the Smiths Pneupac® ParaPAC® Plus Ventilators design with the initial 2,000 to be sold to the Australian Federal Government. Grey Innovation is leading this effort together with the Advanced Manufacturing Growth Centre to combine forces with other leading domestic manufacturers to make the Notus Vivere Emergency Invasive Ventilators in Australia. Production of key components and

sub-assemblies, as well as final assembly and testing, will be undertaken by Grey Innovation and members of the AMGC manufacturing network.

In this project AMGC will provide funding to support Grey Innovation to manufacture sufficient Notus Vivere Emergency Invasive Ventilators, patient circuits and other consumables suitable for TGA approvals.

This project will cover the design and engineering needed to set up local production scale-up, with automation a consideration to efficiently manufacture machines in the shortest possible time span, due to the COVID-19 emergency.

### MILESTONES

27/4/20	●	AMGC approval
08/05/20	●	Local supply chain established
08/05/20	●	Supply chain contracted and materials ordered
18/06/20	●	Manufacturing line completed
14/08/20	●	300 units delivered
31/10/20	●	1,700 units delivered

**CONTRIBUTIONS:** Government – \$500,000 | Industry – \$500,000



Advanced knowledge

Advanced processes

Advanced business models



## IMPACT

- › Increased collaboration with other manufacturers
- › Better qualified employees
- › More automation
- › Greater share of services in total revenue



## GROWTH

- › This project includes the production of 2,000 Notus™ Vivere Emergency Invasive Ventilators with an estimated sales value of \$32 million and related consumables with an estimated sales value of \$5 million



## JOBS

- › During this project Grey Innovation estimate that the consortium will generate or retain employment for 300 people

### PROJECT PARTICIPANTS



# CLOSED LOOP MANUFACTURING



## Implementation of a Manufacturing Execution System (MES) to deliver Closed Loop Manufacturing (CLM)

HeliMods is a uniquely vertically integrated aerospace technology company with complete capability across design, engineering, manufacturing, certification, and integration. Due to the nature of the work in which HeliMods specialises, there is a high proportion of ‘first-of-type’ items produced when compared with other manufacturing organisations.

First-of-type production requires much higher levels of control and oversight to ensure:

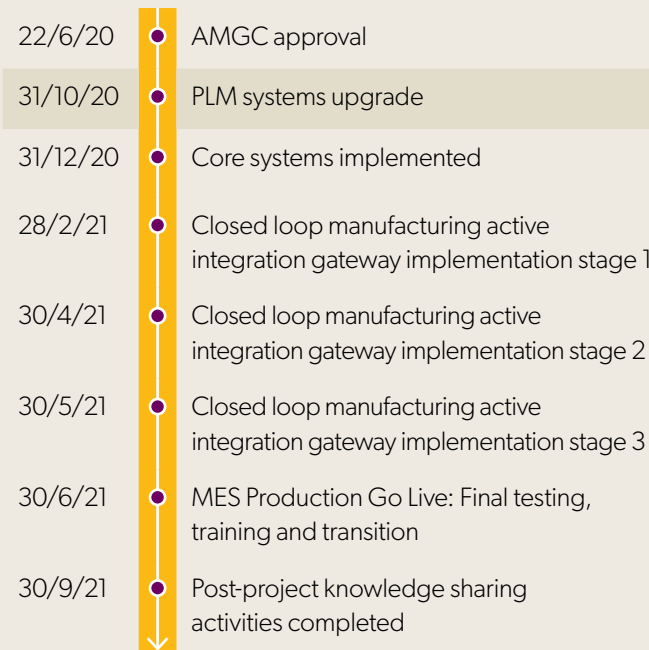
- » New item information is interpreted and understood by manufacturing as intended by the design capability
- » Process steps are validated
- » Quality is maintained throughout production
- » Any issues encountered are accurately captured and fed back for update
- » Any improvements can be suggested and incorporated for review and update

HeliMods has identified that through Closed Loop Manufacturing (CLM), many elements relating to these points can be addressed to greatly improve the effectiveness and efficiency of both first of type production and production in general, which will significantly improve HeliMods’ competitiveness in local and global markets, positioning the business to scale and continue offering unique sovereign industrial capability.

The aim of this project is to apply CLM across HeliMods’ manufacturing capability through implementation of a state-of-the-art Siemens Manufacturing Execution System

(MES), closely integrated with existing advanced Product Lifecycle Management (PLM) and Enterprise Resource Planning (ERP). While MES provides numerous benefits when considered independently, it is the close integration of all three systems (PLM, ERP and MES) that can be classified as CLM and provides the greatest overall potential benefit. HeliMods’ aims to integrate its systems across the organisation.

### MILESTONES



**CONTRIBUTIONS:** Government – \$350,000 | Industry – \$428,543 | In Kind – \$30,000





## IMPACT

- › Higher information and communication technology (ICT) intensity
- › Increased levels of automation
- › Increased operational effectiveness and efficiency
- › Larger geographical reach
- › Increased collaboration with other manufacturers



## GROWTH

- › This project will aid HeliMods to become even stronger and more competitive in the global marketplace, opening new, high-value export opportunities with larger customers in key European and North American markets



## JOBS

- › During this project HeliMods estimate they will employ approximately 10 additional people

### PROJECT PARTICIPANTS

**HeliMods**

**SIEMENS**

**Lucidity IT**

**PhoenXPLM**



# PRODUCT LIFESTYLE MANAGEMENT SYSTEM



## Digitalisation of manufacturing process and SME supply chain integration

This project aims to introduce a digital manufacturing environment, centred around a digital-twin, which enables advanced manufacturing processes and improved collaboration, increased responsiveness and flexibility between the various supply chain partners that contribute to the HSV end-product.

HSV has identified a range of process improvements that must be implemented to enable product line expansion and to take advantage of export opportunities. HSV and the project participants will implement a state-of-the-art Product Lifecycle Management (PLM) system. The resulting platform provides a digital collaborative working environment that enhances the design and production of a vehicle and its components. The project will deliver the following operational advantages to HSV:

- Improved design efficiency and production preparation processes
- Improved product design integrity due to new technology
- Enhanced services between suppliers and customers due to improved business model
- Improved compliance monitoring and adherence due to improved external collaboration capabilities.

To realise these opportunities, HSV must now implement the PLM system as well as the necessary changes to internal processes and supply chain partner integration.

AMGC and the project participants will conduct a series of five workshops (one in each mainland capital city) entitled “How to apply Digitalisation as a strategy for process improvement and enhanced supply chain integration”.

The workshops will be presented and hosted by AMGC and the workshops will note that attendees will not be tied to a specific proprietary technology platform.

The intended output of the workshops is to increase the uptake of digital technologies in Australian manufacturing firms via peer-to-peer knowledge sharing of HSV’s experience in implementing the PLM system, as well as educating SME’s on the benefits of digitisation and enhanced supply chain integration.

### MILESTONES

1/06/19	●	AMGC approval
15/06/19	●	Phase 1 of software implementation
30/06/19	●	Phase 2 of software implementation
31/07/19	●	Testing of Engineering Change Notice software
31/12/20	●	Testing of digital mock-up system
	●	Production and supplier integration completed
	●	HSW production testing and feedback
	●	Delivery of 5 SME workshops completed

**CONTRIBUTIONS:** Government – \$392,295 | Industry – \$392,295 | In Kind – \$635,190



## IMPACT

- › Increased ICT intensity
- › Increased collaboration with other manufacturers
- › HSV anticipates an increase of 350–500 new components per product line, with these components being designed and manufactured by Australian component suppliers
- › Benefits also extend to supply chain partners that develop new products for HSV in the new digital-twin working environment, which enables SME's to enhance their new product development capabilities



## GROWTH

- › On completion of the PLM system implementation, HSV and its Australian supply chain will be positioned to evolve beyond what is seen, in global terms, as a local, bespoke engineering firm, to become a viable low-volume Australian manufacturer of premium automotive products for both domestic and export markets



## JOBS

- › Over the past three years HSV has grown staff numbers from just under 300 to over 500

### PROJECT PARTICIPANTS



# DASSAULT SYSTÈMES VIRTUAL SHIPYARD

## innodev

Industry 4.0 maturity program to raise the global digital supply chain readiness of Australian manufacturing SMEs in preparation for future naval shipbuilding, mining and energy project participation

The Dassault Systèmes Virtual Shipyard is the first national level Industry 4.0 capability development program in Australia, benchmarked against world's best practise approaches.

This project identifies and bridges digital capability gaps of 14 SMEs looking to advance their Industry 4.0 capabilities and improve their readiness to participate in major future manufacturing opportunities such as Australia's Future Submarine program.

The project will facilitate critical knowledge transfer from global experts to the University of Adelaide, TAFE South Australia and University of South Australia to build curriculum for future independent training delivery.

AMGC is co-funding the provision of ICT support and 12 months of post-training access to cloud-based infrastructure to enable participating SMEs to embed their new-found skills into standard day-to-day operations.

Upon conclusion of the project, the SMEs will have gained the skills necessary to integrate themselves into global value chains, and will have applied those skills within their own companies on real manufacturing projects.

The project will provide the Australian manufacturing sector a tangible demonstration of increased digital capability and advances the Australian manufacturing eco-system towards achieving a world class Industry 4.0 capability to exploit global value chain opportunities in multi-billion-dollar defence, mining, health, water and energy industries.

**CONTRIBUTIONS:** Government – \$534,152 | Industry – \$534,152

# VIRTUAL SHIPYARD TRAINING PROGRAM



## MILESTONES

14/11/17

- AMGC approval
  - ICT Support to training facility and cloud hosted software environment.
- 12 months post-training partially-subsidised access to cloud-hosted 3D Experience software platform.
- To support:
- › SME Business Value Assessments
  - › SME hands-on training in up to 12 digital capabilities using the Dassault Systèmes 3D Experience software platform
  - › SME self-learning programme

See over for project participants





## IMPACT

- › Higher information and communication technology (ICT) intensity and increased SME digital capability to increase opportunities for global supply chain participation within major projects
- › More collaboration with other manufacturers during the AMGC project
- › Higher manufacturing digital literacy as a result of training on the Dassault Systèmes 3D Experience platform
- › Newer equipment and systems as a result of integrating the Dassault Systèmes platform into SME manufacturing operations
- › Larger geographical reach and increased potential for accessing global value chains using the Dassault Systèmes platform
- › Multiple future I4.0 tertiary education options via University curriculum development supported by Dassault Systèmes during the Virtual Shipyard project



## GROWTH

- › Curriculum developed by University of Adelaide, TAFE South Australia and University of South Australia with assistance from Dassault Systèmes as part of the Virtual Shipyard project will help grow Australia's high-skilled workforce ready for I4.0 jobs required by global supply chains to deliver future naval ships and submarines, mining, health and energy sectors
- › Participating SMEs will have the digital literacy of relevance to global primes, enabling them to more easily participate in digital supply chains for major projects



## JOBS

- › SMEs are expected to create new high skilled jobs, enabled by increased efficiencies driving increased revenue streams in new and existing markets

## PROJECT PARTICIPANTS

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**innodev**

**DS** DASSAULT  
SYSTEMES

**APC**   
Technology



# MANUFACTURE OF LIGHTFIELD 3D RETINAL IMAGING SYSTEM

ADVANCED MANUFACTURING EARLY STAGE RESEARCH FUND



## Develop 3D-RPS Retinal Plenoptoscope, a Light Field Fundus Camera

More than 285 Million people globally suffer from preventable blindness. This has imposed an estimated US\$23 billion costs on healthcare systems worldwide. In 80% of cases, blindness can be prevented or cured through better and earlier access to both imaging and diagnostic capabilities.

Integral Scopes has developed a lightfield 3D retinal imaging system that uses lightfield/plenoptic imaging and improves the alignment precision requirements that complicate the use of most portable retinal imaging devices. The Integral Scopes technology will improve the detection and diagnosis of diseases of the retina in professional and primary care settings.

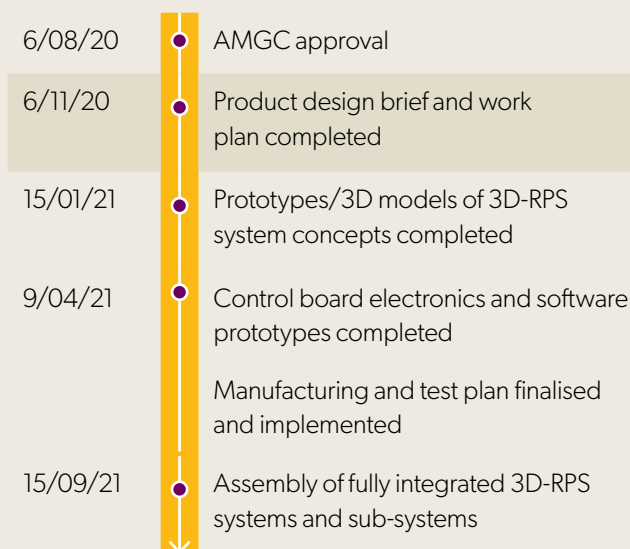
This project will enable Integral Scopes to offer the following product advantages over existing solutions:

- ▶ Superior 3D colour image quality
- ▶ Additional 3D diagnostic information that can enhance patient-specific outcomes
- ▶ Lower purchase costs
- ▶ Lower lifecycle costs
- ▶ Smaller, lighter, robust physical footprint for improved portability

On completion of this project, Integral Scopes will have developed a prototype of its patented Retinal Plenoptoscope focused lightfield camera. The prototype will allow Integral Scopes to run clinical validation, develop market acceptance and pass regulatory clearance for the 3D-RPS product in the growing ophthalmic imaging market.

The project will also enable Integral Scopes to offer a flexible platform technology from which to develop other advanced 3D medical diagnostic instruments. This project will demonstrate high-tech manufacturing in Australia and create a platform technology for a range of locally developed imaging products.

### MILESTONES



**CONTRIBUTIONS:** Government – \$300,000 | Industry – \$300,000 | In Kind – \$180,000



## IMPACT

- › Increased spending on R&D
- › Higher information and communication technologies (ICT) intensity
- › Larger patent portfolio
- › Increased collaboration with other manufacturers
- › Greater share of services in total revenue
- › Higher marketing expenditure
- › Increased level of extensive backward links



## GROWTH

- › Integral Scopes is targeting 3D-RPS ophthalmic camera sales of 200 units during the first year of production climbing to 1,000 units per annum within 5 years



## JOBS

- › Integral Scopes forecast of 11 FTE positions when they achieve full production

### PROJECT PARTICIPANTS



# SUPERCAPACITOR ELECTRODE MATERIALS



## Manufacturing of roll-to-roll supercapacitor electrode materials for powering next-generation IoT devices

There is a wide range of energy storage solutions available for the plethora of devices that are available to consumers today, all of which have a different balance of energy and power.

New applications are increasingly hungry for both power and energy, and the challenge for modern energy storage technologies is to create devices that combine high energy and high power. One way to achieve this is to create supercapacitors that store more energy while retaining their capacitor qualities of high power and long lifecycle.

Ionic, in collaboration with researchers at Monash University, has developed roll-to-roll electrode materials for use in fabricating high-performance graphene supercapacitors (SC). Specifically, the team has developed a proprietary ink that is combined with several printing and curing processes to deliver more energy while retaining their capacitor qualities of high power and long lifecycle. This project seeks to commercialise this technology and realise the market opportunity.

The surface area of activated carbon used in supercapacitors is one of the limitations of supercapacitors. A higher surface area would mean a better energy charge storage. Nano-engineered graphene materials show excellent potential as a replacement for activated carbon in supercapacitors, in part due to graphene's high relative surface area which is significantly greater than that of activated carbon. In addition, graphene-based supercapacitors capitalize on its light weight, elastic properties and mechanical strength.

This project will provide the Australian manufacturing sector with a tangible demonstration of the development and commercialisation of leading IP. The project will enable Ionic and its supply chain partners to transform the energy storage market in Australia and globally.

### MILESTONES

1/2/20	●	AMGC approval
31/01/21	●	Detailed formulation and characterisation completed
30/04/21	●	Electrode production in industrial scale trials completed
31/07/21	●	Accelerated testing of devices developed completed
31/10/21	●	Licensing agreements completed

**CONTRIBUTIONS:** Government – \$204,000 | Industry – \$204,000 | In Kind – \$183,000





## IMPACT

- › Better energy efficiency
- › Larger geographical reach
- › Increased collaboration with other manufacturers
- › Newer equipment
- › Larger patent portfolio



## GROWTH

Over the next five years Ionic conservatively estimates USD\$ sales to be:

- › 2020/21 – \$160,000
- › 2021/22 – \$800,000
- › 2022/23 – \$1,600,000
- › 2023/24 – \$8,000,000
- › 2024/25 – \$16,000,000



## JOBS

Ionic estimate:

- › Three full time plus casual staff for the pilot plant
- › 10–30 full time staff for the final manufacturing set-up

### PROJECT PARTICIPANTS



MONASH  
University



constellation  
technologies



# PRODUCTION SCALING OF ORTHOTICS



## Manufacture of Thermoplastic Poly-Urethane (TPU) top covers and Ethylene-Vinyl Acetate (EVA) base replacements

The first AMGC grant was utilised to allow mass customisation of material orthotics to replace the rigid orthotics manufactured by subtractive machining of polypropylene. These orthotics types account for 50% of the iOrthotic product range and result in an annual reduction of around 60 tonnes in waste polypropylene.

This new project is focussed initially on replacing top cover and add-on materials with Thermoplastic Poly-Urethane (TPU) powder material in a new HP Fusion Jet printer model (HP5200) suitable for that material. This will enable significant scale of production. The findings from TPU material testing will be used to develop a replacement for subtractively manufactured Ethylene-Vinyl Acetate (EVA) orthotics which will result in an annual reduction of 15 tonnes of waste EVA.

Substantial product advantages and variations for other specific medical conditions together with manufacturing improvements will be achieved through this technology development, as the current process is the most manual labour intensive manufacturing step in any orthotics laboratory.

This contrast in material deposition inclusive of the interface between macro and microstructures is what is being obtained through the technology advancement of this grant. To achieve this, iOrthotics will require the purchase of a new Model 5200 3D printer that can print TPU and

thereby remove the reliance on traditional CNC milling. The second goal of this project is to develop the technology components for a fully integrated ERP (Enterprise Resource Planning) system.

### MILESTONES



**CONTRIBUTIONS:** Government – \$450,560 | Industry – \$450,560 | In Kind – \$95,000



Advanced knowledge

Advanced processes

Advanced business models



## IMPACT

- › Increased collaboration with research institutions
- › More staff with STEM skills
- › Better qualified employees
- › Newer equipment
- › More automation through technology development
- › Smarter inventory management
- › Larger geographical reach



## GROWTH

- › An additional \$25 million globally within five years



## JOBS

During the project, iOrthotics will require:

- › One junior applications developer
- › One senior applications developer
- › One web developer
- › Five to 10 full time positions will be created within two years of the project

### PROJECT PARTICIPANTS

iOrthotics

THE UNIVERSITY  
OF QUEENSLAND  
AUSTRALIA

AUTODESK.



# AI ROBOTIC WELDING TECHNOLOGY



## Development of a demonstration cell that showcases artificial intelligence technology

This project seeks to develop a demonstration cell in conjunction with its project partners, that showcases how IR4's artificial intelligence technology can be used to develop flexible automation solutions applicable across various industries.

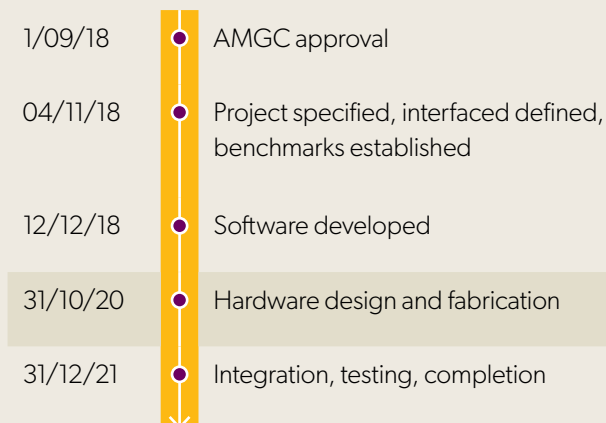
Rheinmetall have engaged with IR4 in the development of the demonstration cell at SSS Manufacturing's premises, to validate that the AI automation technologies developed by IR4 has the ability to automate specific production processes for the Land 400 build program. The first 25 combat vehicles will be built in Germany, and after successful commissioning of the demonstration cell proposed in this project application, it is envisaged that in early 2019 Rheinmetall would look to engage with IR4 for the implementation of the derived solution into their manufacturing facility in the MILVEHCOE in Queensland and with the success of this implementation, Unterlues, Germany. This turn-key solution will include a gantry system with one welding robot and one pick and place robot utilising IR4 software.

Further opportunities for the application of these technologies also exist across an array of industries and applications which will also be considered as part of this project.

SSS Manufacturing currently operates this technology under license from IR4 to fabricate robotically welded structural steel. The automation solution uses the systems artificial intelligence to calculate in real time, the most efficient way to process the sections presented for fabrication. As a result, SSS Manufacturing has realised a greater than 70% reduction in the labour content required to fabricate steel sections.

This translates to customer benefits that include improvements in cost, traceability, quality consistency, scheduling and ease of implementation of design changes.

### MILESTONES



**CONTRIBUTIONS:** Government – \$333,744 | Industry – \$333,744 | In Kind – \$210,000





## IMPACT

- › Increased spending on R&D to develop IR4 software
- › Higher ICT intensity
- › Larger patent portfolio
- › More staff with STEM skills
- › Increased levels of automation



## GROWTH

- › After successful commissioning of the demonstration cell proposed, it is envisaged that in early 2019 Rheinmetall would look to engage with IR4 for the implementation of the derived solution into their manufacturing facility



## JOBS

- › Five to 10 full time engineering and development staff within IR4

### PROJECT PARTICIPANTS





# MRI COIL SET



## Optimisation of MRI coil set manufacture to achieve scale

Magnetica is developing and supplying customised coil sets and components to provide extremity musculoskeletal (MSK) scans for wrists, hands, elbows, knees, ankles and feet.

With AMGC's support, Magnetica is able to bring their coil set manufacturing from the TRL4 prototype level to TRL9, indicating that the system is proven and production-ready for full commercial deployment. This project will allow Magnetica to manufacture coil sets in Australia and distribute the manufactured goods to the global supply chain via the marketing arm of its OEM partner.

The challenge of manufacturing multiple coils economically while meeting customer demand for manufacturing at scale requires Magnetica to optimise two critical elements of the coil manufacturing process, RF coil testing and gradient coil potting.

Magnetica is collaborating with its OEM on test plans, test methods and criteria for commercial RF coils; validation of production volumes; and pricing strategies for gradient coils. The company will collaborate with University of Queensland to access the unique RF and gradient testing facilities at the university's biomedical imaging facilities. In doing so, Magnetica will contribute to the body of knowledge around coil design available to the Australian manufacturing sector.

### MILESTONES

1/1/18	●	AMGC approval
29/05/18	●	Pilot system architecture defined and pilot testing completed
31/8/18	●	Hardware design and value stream mapping completed
22/02/19	●	Integrated system software and hardware architecture defined and testing completed
30/10/20	●	Automated manufacturing equipment installed, integrated and validated to enable supply of finished coils
30/03/21	●	Coil testing/coil plotting

**CONTRIBUTIONS:** Government – \$269,825 | Industry – \$269,825 | In Kind – \$44,000



## IMPACT

- › Advanced knowledge achieved through development of complex new product for global markets
- › Increased collaboration with industry and researchers to develop compact and portable MSK scanner
- › Growth in the patent portfolio
- › Increased product value density and greater trade intensity to geographically diverse export markets
- › Greater number of staff members with STEM skills



## GROWTH

- › \$10.32 million in the next four years



## JOBS

- › One engineer
- › Five high-skilled technicians for the project

### PROJECT PARTICIPANTS



# DEVELOPMENT OF AN IOT-BASED BATTERY MONITORING SYSTEM



## Battery monitoring system

A battery energy storage system, stores energy to be used at a later time, usually using a bank of connected batteries called 'battery packs' that are set up to ensure that there is a steady flow of power.

To provide critical safeguards to protect the batteries from damage, battery monitoring systems (BMS) have been developed to manage the output, charging and discharging of battery packs. Megatronic has identified that the BMS currently available are not fully meeting customers' needs which can result in significant battery failures, which then impact operation, revenue and reputation. More reliable and affordable battery monitoring systems are needed to avoid such failures and to provide energy efficiency solutions to industry and residential markets.

To address some of these issues, Megatronic has already developed a first-stage industrial BMS prototype designed to reduce battery failures which offers system protection, reliability, risk reduction, efficiency and safety benefits, providing economic advantages to users.

Megatronic's first stage BMS, which has been trialled successfully on mine sites in Western Australia, is battery agnostic and suitable for any type of rechargeable battery. However, whilst Megatronic's initial BMS prototype is proving valuable, its customers would now like additional features that will allow automated, remote monitoring and testing of their battery systems.

Megatronic now seeks to develop an industrial IoT-based BMS that includes the following features:

- ▶ A user interface platform and a sensor-based power usage and testing measurement device which will enable the remote monitoring and management
- ▶ Further development of the hardware to integrate with the new IoT platform and improve performance

## MILESTONES

20/12/19	●	AMGC approval
30/03/20	●	R&D of the BMS sensor hardware and software completed
17/08/20	●	IoT software and cloud interface development completed
30/11/20	●	Electronics and manufacturing process design completed
30/11/20	●	Enclosure and manufacturing process design completed
31/12/20	●	IoT software and mobile app interface development completed
28/02/21	●	Advanced business modelling and business plan development completed
30/04/21	●	Data validation testing, further trials and performance testing completed

**CONTRIBUTIONS:** Government – \$304,918 | Industry – \$304,918 | In Kind – \$84,479



## IMPACT

- › Increased collaboration with other manufacturers
  - › Greater share of services in total revenue
  - › Larger geographical reach
  - › Better energy efficiency
  - › More staff with STEM
  - › Automated testing and increased business efficiency
- Reshoring of production resulting in :
- › a reduced lead time for the BMS equipment, from the current 8–10 weeks, to 3–4 weeks
  - › a more reliable, local supply chain
  - › more stable and competitive pricing
  - › better protection of IP
  - › greater control of the production process
  - › better-quality products and services



## GROWTH

- › Increased Employment for Megatronic and its collaborative partners
- › Megatronic is expecting to have significant revenue growth from 2021 onwards
- › Client business efficiency dramatically saving thousands of man-hours
- › Reliability of client operations increased
- › Potential to export overseas



## JOBS

- › Assembly and packing of the product in Perth, creating three additional jobs at Megatronic initially and an additional 10–20 jobs with the reshoring of the production to Australia

### PROJECT PARTICIPANTS



# "DROP-IN" FUEL

ADVANCED MANUFACTURING EARLY STAGE RESEARCH FUND



## Commissioning of pilot plant to covert bio-solids into "drop-in" fuel

Mercurius' long-term stated ambition is to build and operate up to five commercial biorefinery projects in regional Queensland, to convert biomass into biocrude along with one central processing facility to convert the biocrude into renewable fuels while concurrently producing high value biochemicals and bioplastics. The REACH™ technology will produce "drop-in" fuels faster, cheaper and with a higher quality than other biorefining processes. Drop-in fuels are a synthetic and fully interchangeable substitute for conventional petroleum-derived hydrocarbons (gasoline, jet fuel, and diesel), meaning it does not require adaptation of the engine, fuel system or the fuel distribution network.

In this project, Mercurius proposes to locate the pilot plant at Southern Oil Refining's (SOR) Northern Oil Refinery in Gladstone and conduct the trials in partnership with QUT and SOR.

The pilot plant will optimise their biorefining processes initially with bagasse (sugar by-product) and then aims to test additional non-food feedstocks, and further optimise the processes. Additionally, with potential strategic partner Kolon, Mercurius will be helping to develop and promote a new sustainable biochemical and bioplastics sector.

Mercurius is amongst a limited number of entities proposing to use second generation feedstocks such as municipal waste, waste food and cotton gin trash to create biofuels,

biochemicals and bioplastics. Mercurius also believes that the second-generation feedstock with lessened input costs will result in a product that will be price competitive with fossil based fuels.

### MILESTONES

10/07/19	●	AMGC approval
30/01/21	●	Construction of Pilot Plant completed
30/04/21	●	Hydrocarbon fuel and testing completed
30/10/21	●	Hydrocarbon fuel production using the adjusted plant parameters completed
30/11/21	●	Hydrocarbon fuel production using the optimised plant parameters completed
31/12/21	●	Fuels manufactured and final report completed

**CONTRIBUTIONS:** Government – \$246,520 | Industry – \$246,520 | In Kind – \$50,000





Advanced  
knowledge

Advanced  
processes

Advanced  
business  
models



## IMPACT

- › Increased spending on R&D
- › Collaboration with Queensland University of Technology
- › Increased collaboration with other manufacturers
- › Larger geographical reach due to the increasing emphasis on the replacement of carbon-based fuels with sustainable fuels
- › Development of this technology will reduce Australia's petroleum import bill significantly and provide access to local fuel source that is not subject to global price fluctuations



## GROWTH

- › Mercurius' long-term stated ambition is to build and operate up to five commercial biorefinery projects in regional Queensland, to convert biomass into biocrude along with one central processing facility to convert the biocrude into renewable fuels while concurrently producing high value biochemicals and bioplastics



## JOBS

- › Mercurius and SOR expect to employ five additional personnel during this project

### PROJECT PARTICIPANTS



# ELEVATING ADDITIVE MANUFACTURING

ADVANCED MANUFACTURING EARLY STAGE RESEARCH FUND



Development of a multifaceted bottom-up resin additive manufacturing platform for industrial applications

Mineral Technologies (MT) are not the nominal lead participant in this project. However, it is their vision that is driving it. MT have a five-year plan to adopt additive manufacturing for their spiral manufacturing and they see the Boundless AM technology as highly viable and are willing to collaborate with AMGC and Boundless AM to fund the development of the Boundless AM technology. This project seeks to deliver a commercially viable 2 metre single revolution 300mm spiral for Mineral Technologies. This is a project which attempts grow 3D objects such as spirals from the ground up, using new resins, new hardware, and new software.

The proposed Boundless AM system is a new conceptualized manufacturing platform that features bottom-up resin additive manufacturing and integrated curing for the creation of large composite products. Existing manufacturing techniques used to create large composite products have a number of disadvantages, which Boundless AM seeks to overcome with their portable solution.

The project will help speed up the development of the Boundless AM system to a TRL 4. The commercialisation efforts that will follow will initially be focused on manufacturing spirals for MT, hence the cash contribution by that company. This commercialisation effort will include a containerised version of the system, such that it can be transported to the site where spirals are being used so they can be manufactured on site.

## MILESTONES

15/11/19	●	AMGC approval
31/1/20	●	Manufacture and operational testing of lab equipment completed
31/5/20	●	Resin curing optimisation completed
30/9/20	●	Design and manufacturer of benchtop completed
31/12/20	●	One revolution spirals completed
31/3/21	●	Boundless AM unit completed

**CONTRIBUTIONS:** Government – \$270,000 | Industry – \$270,000 | In Kind – \$90,000



## IMPACT

- › Increased collaboration with other manufacturers
- › Increased spending on R&D
- › Smarter inventory management
- › Newer equipment
- › Larger geographical reach



## GROWTH

- › Increase of \$15 million in sales over Five years



## JOBS

- › This technology platform will be part of a solution to provide graduates of the new advanced manufacturing centre at Griffith University as part of the Gold Coast Health and Knowledge Precinct some of the following jobs they will be seeking such as chemical engineering; software engineering; industrial design; mechanical engineering; electrical engineering; mechatronics engineering; additive manufacturing technicians; sensor engineering; and optics engineering
- › Should this technology prove itself, Mineral Technologies could regain the 30% of sales currently captured by the two other global players in spiral manufacture, adding approximately 30 jobs to their Australian manufacturing facilities and potentially generating \$300 million over five years based on current financial projections

### PROJECT PARTICIPANTS



# DIGITISATION FOR MANUFACTURING SMES



Acceleration of innovative IIoT technology take-up by 50 Australian manufacturing SMEs that rely on continuous processes or machine-based production for their normal business operations

MOVUS FitMachine® provides 24/7 monitoring of the key equipment parameters and sends early alerts on equipment malfunction, therefore significantly reducing costs by minimising unplanned downtime, and reducing the need for manual routine machine inspections.

By installing MOVUS FitMachine sensors on business-critical and less reliable equipment, SMEs can immediately experience the benefits of Condition-Based Maintenance (CBM), an advanced maintenance regime that until now was unaffordable to SMEs.

The industrial sensor is magnetically attached to electrically powered equipment, making installation simple, with no need for tools or specialised knowledge.

FitMachine collects data on equipment temperature, vibration and acoustics, transmitting it to their secure cloud server. The cloud processes the data and provides equipment condition information 24/7 via the MOVUS Dashboard.

MOVUS and the project participants will provide 50 Australian manufacturing SME's with 50% discount on the subscription of the FitMachine 'Starter Kit' for the duration of 12 months. The 'Starter Kit' is comprised of 10 sensors, and an associated WiFi/4G gateway, as well as a smartphone/tablet application and access to the MOVUS Platform and Dashboard.

Business owners and plant & production managers get real-time visibility of their equipment – knowing when they are on, understanding their utilisation, watching their condition and degradation closely. This allows them to repair the equipment earlier and to plan downtime if needed, allowing maintenance staff to focus on proactive tasks rather than reacting to failures or following OEM preventive maintenance schedules.

## MILESTONES

15/3/19	●	AMGC approval
15/4/19	●	Project setup completed
30/6/19	●	National market research and marketing campaign
31/10/19	●	Installation of systems 1–10
31/3/20	●	Installation of systems 11–20
31/8/20	●	Installation of systems 21–30
31/1/21	●	Installation of systems 31–40
30/4/21	●	Installation of systems 41–50
30/6/21	●	Project completed and case studies documented

**CONTRIBUTIONS:** Government – \$250,000 | Industry – \$500,000 | In Kind – \$62,300





## IMPACT

- › Project participants can immediately experience the benefits of CBM by getting equipment visibility and utilisation 24/7
- › Participants usually realise return on investment in the first six months
- › Start Industry 4.0 Journey through the use of the MOVUS sensors
- › More collaboration with other manufacturers
- › Better energy efficiency



## GROWTH

- › AUD \$477,000



## JOBS

- › Six full time employees

### PROJECT PARTICIPANTS





# DEVELOPMENT OF A PROTOTYPE ROAD TANKER UNIT



## Development of a prototype road tanker unit for validation and commercialisation in the US market

Omni Tanker has identified a need for road-tankers with improved chemical resistance in the USA. Currently the demand for road tankers in USA is being serviced by road tankers referred to as fibre reinforced (FRP) tankers. FRP tankers contain an internal lining, which is comparable to the linings used in traditional Australian road tankers.

The objective of this project is to design and produce a prototype road-tanker, then undertake a field-trial in the US that enables Omni Tanker to validate and commercialise its technology in the US market. This project will re-design the Omni Tanker product to satisfy US regulations, and establish US supply chain partners for final assembly of the road-tanker in market. On completion of this project Omni Tanker will have validated the prototype in an operational environment and demonstrated low rate production.

The patented Omni Tanker vessels offer the following advantages over traditional tankers:

- Extended road tanker life
- Significantly reduced maintenance costs and downtime due to eliminating the need for vessel relining, which is a requirement for stainless steel vessels
- Light weight resulting in payload uplift via significant fuel savings over the life of the vehicle.

This project will develop the manufacturing tools, processes, supply chain partners and certification required to commercialise its patented technology in the US market. On completion of this project, Omni Tanker will have the capability in place to begin full rate production for the US market.

### MILESTONES

26/11/18	●	AMGC approval
28/4/19	●	CAD design of road tanker
30/3/19	●	Application of US special permit
30/6/19	●	Identification and selection of US supply chain partners
31/9/19	●	Manufacture of prototype unit
31/12/19	●	Delivery of field trial unit to customer

**CONTRIBUTIONS:** Government – \$250,000 | Industry – \$365,000 | In Kind – \$225,000



Advanced  
knowledge

Advanced  
processes

Advanced  
business  
models



## IMPACT

- › Larger patent portfolio
- › Smarter inventory management by allowing two-way loading of different class 8 chemicals
- › Better fuel efficiency by light weighting the vehicle
- › Larger geographical reach through new revenue export



## GROWTH

- › Omni Tanker's US variant will be a usable and viable option for Australian transport operators of highly corrosive liquids
- › Omni Tanker's patented technology can be transferred into other products and adjacent industries
- › Omni Tanker is uniquely positioned to commercialise their patented technology into the \$230M p.a. US chemical tanker market



## JOBS

- › This project will enable Omni Tanker to transform its business into a global concern and therefore increase Australian employment

### PROJECT PARTICIPANTS



# MANUFACTURING OF HIGH-VALUE ALGAE SPECIES



## Scale up of a biorefinery platform to manufacture high-value algae species

Many people suffer from infectious, inflammatory, and cardiovascular diseases. Protein-based drugs are the fastest growing class of drugs for the treatment of these diseases in humans and other diseases in animals. The numbers of people with diseases such as diabetes are growing, and while new technologies are making proteins easier to produce, the current methods of production of proteins for pharmaceutical applications are predicted to fall short of future demand.

Algae is an alternative basis for the manufacture of these protein compounds. Existing algae production systems are capable of producing only 12 (out of a possible 5 million) algae species in GMP compliant facilities. Production limitations restrict the potential discovery and commercialisation of high value natural products and impede the viability for algae to be used in pharmaceutical, agrochemical and food applications.

This project aims to scale up Provectus Algae's biorefinery platform for commercial production of high-value algae species and realise the commercial potential of their technology. Provectus Algae have established a minimum viable biorefinery platform by utilising algae which offers major production advantages over bacteria, fungal and mammalian cells for the synthesis of next generation biologics. The automated bioreactors with IIoT integration and AI capabilities are designed to be CGMP compliant and suitable for the production of pharmaceutical, food and agricultural products.

On completion of this project, Provectus Algae will have implemented a fully automated, commercial scale, algae biologics manufacturing facility. This project is expected to

benefit the Australian biological manufacturing industry by improving yields through real-time optimisation, and reduced contamination through automation.

### MILESTONES

03/06/20	●	AMGC approval
13/10/20	●	Operational 125L bioreactor completed
31/12/20	●	Operational 1200L (scale up reactor) bioreactor completed
28/02/21	●	Manufacturing capability for 6 x 125L modules proven
31/05/21	●	Manufacturing capability for 4 x 1200L modules proven
31/07/21	●	Purification of recombinant protein equivalent completed
30/09/21	●	Integration of operational 125L module producing algae completed
30/11/21	●	Integration of operational commercial 1200L module producing algae completed
31/12/21	●	Platform for the production of recombinant proteins validated and completed

**CONTRIBUTIONS:** Government – \$250,000 | Industry – \$385,000 | In Kind – \$466,000



Advanced knowledge

Advanced processes

Advanced business models



## IMPACT

- › Increased spending on R&D
- › Increased information and communications technology
- › Increased collaboration with other manufacturers
- › Increased number of staff with STEM skills
- › Increased levels of automation
- › Better energy efficiency
- › Newer equipment
- › Higher trade intensity
- › Higher market expenditure



## GROWTH

- › Provectus Algae expect to generate \$1–\$2 million/year per product range enabling the operation to continue and allow advancements on the pharmaceutical platform licencing to develop further



## JOBS

During this project Provectus Algae will generate the following increase in employment:

- › Three staff for R&D activities

Following the project, Provectus Algae will generate the following increase in employment:

- › One sales and business development
- › Two laboratory technicians
- › One logistics manager

### PROJECT PARTICIPANTS



# CURING TECHNOLOGY



## Automated out-of-autoclave curing technology for Aerospace Applications

Quickstep and AMGC have undertaken a project to develop a low-cost carbon fibre composite fender aimed for the European automotive market. This project has seen Quickstep qualify to supply composite fenders via a joint venture entity in Europe to satisfy requirements for just-in-time manufacture within 200km of their assembly plant. The concept has since attracted interest from composite material suppliers and aerospace manufacturers.

Quickstep is now seeking to adapt the Qure process for aerospace applications. The proposed 'AeroQure' solution will be an enhancement of the technology developed for the automotive industry in the previous AMGC project with Quickstep. In this follow-on project, the system pressure will be increased from 0.8 bar, used in the Qure process for Automotive components, to 2.5 bar in order to achieve the level of porosity and void content required for aerospace components while keeping production cycle times closer to typical production rates for sports and luxury cars.

Out of Autoclave (OOA) technologies promise those cost reductions and higher rates of unit production. The main OOA technologies the industry is currently focusing on still require significant cycle times or be some way from reaching technology maturity. These technologies have the potential to be much faster, but currently they involve significant risk and are slower than conventional autoclave technologies.

A closed mould, high rate curing technology like Quickstep's AeroQure 2.5 to be developed in this project, has the potential to reduce price per aerospace component by 25–35% due to a faster and more automated process and a lower capital cost amortisation.

### MILESTONES

1/11/19	●	AMGC approval
14/08/20	●	Material characterisation and flat panel studies commenced
31/10/20	●	Material characterisation and flat panel studies completed
31/12/20	●	Prototype trials commenced
31/04/21	●	Prototype trials completed
31/07/21	●	Airframe design completed
31/10/21	●	Airframe process qualification completed
31/12/21	●	Demonstrator trials and pre-industrialisation completed

**CONTRIBUTIONS:** Government – \$700,000 | Industry – \$1,136,000 | In Kind – \$947,000





Advanced knowledge

Advanced processes

Advanced business models



## IMPACT

- › This project aims to develop a superior product offering via an advanced manufacturing process that achieves the future rate needs of commercial aircraft manufacturers for current and new programs (expected to reach monthly rates close to 100 aircraft and higher). The process will be significantly faster and more cost competitive than traditional autoclave curing and will be competitive with other out-of-autoclave curing processes being developed internationally.



## GROWTH

- › Technology ready for increased production volume of 100 parts per month on completion of this project, with future potential to reach a monthly target rate of up to 500
- › Reduce product rework issues such as core crush (collapse of composites during the autoclave process)



## JOBS

- › Three to 10 positions when a contract is in place

### PROJECT PARTICIPANTS



# CONVEYOR TABLE AND MOTION-CONTROL SYSTEM



Developing a 'Smart Factory' conveyor table and motion control system for global logistics applications

Rotacaster and the project participants will design, develop, and install a 'smart factory' conveyor table and digital control system for Tesla at its Gigafactory battery plant in Sparks, Nevada. The project participants will use Rotacaster's patented omniwheel to create a modular, servo-driven conveyor transfer system. The conveyor transfer system is capable of handling large and heavy objects, such as Tesla vehicle batteries.

This project aims to achieve a shift from large production-centric manufacturing to customised, smart and competitive manufacturing that is backed by collaborative research and development (R&D) together with highly skilled workers. This project will deliver an R&D asset, associated intellectual property (IP) and a commercial product. It will create a world-class reference site in form of Tesla's battery factory, which will help Rotacaster to sell smart factory solutions to other large companies around the world that operate sophisticated factories and logistics hubs.

Rotacaster's solution will be modularised to accommodate the use of 'plug and play' components with Internet of Things (IoT) functionality. This will give customers more flexibility and create an advantage over large, expensive, single-system solutions. Rotacaster's digital control system integrates with existing production systems and responds to live factory data for tracking and recording product movement.

## MILESTONES

28/5/18	●	AMGC approval
13/8/18	●	Technical report of design guidelines completed
31/10/18	●	Production and verification of prototype for testing
30/6/19	●	Commercial design of conveyor table finalised
31/7/19	●	Production of market ready conveyor table completed
30/8/19	●	Installation of conveyor table at customer site completed

**CONTRIBUTIONS:** Government – \$211,122 | Industry – \$211,122 | In Kind – \$101,700



## IMPACT

- › Increased spending on R&D and collaboration with research institutions to design, produce and test a prototype of the conveyor table and digital control system
- › Higher ICT intensity through the integration of a digital control system
- › Digitisation of the conveyor table enables Rotacaster to gain a greater share of services in total revenue



## GROWTH

- › Rotacaster has the potential to take a \$1.15 – \$2.3 million share of the Australian Market and \$85 – \$170 million share of the global market



## JOBS

- › Five to 10 high-skilled jobs

### PROJECT PARTICIPANTS





# 3D PRINTED METAL AND CARBON FIBRE CUSTOMISED WHEELCHAIR

## rove

Development of a digitally designed lightweight 3D printed/carbon fibre customised wheelchair

Globally, there are 75+ million people that need or use a wheelchair according to the World Health Organisation (WHO). In Australia alone, there are an estimated 175,000 people who require the use of a wheelchair.

Getting a wheelchair fitted to each individual body is much like getting a pair of shoes fitted. There is no one-size-fits-all. For an active, full-time wheelchair user, the fit and weight of a wheelchair are extremely critical for good health and wellbeing all reducing ongoing health issues.

Rove Concepts has designed and developed a new wheelchair, using advanced manufacturing methods including 3D printed metal alloy lugs and carbon composite tube. This new design combined with advanced digital processes reduces manufacturing time, enabling the production of a lightweight and stiffer wheelchair that is mass customised to the body type of each user.

This solution will provide the following benefits to customers:

- Perfect fitment.
- Fast lead times.
- Lightweight.
- Modularity and Repairability.
- Improved measuring and scripting process.

On completion of this project, Rove Concepts will achieve the following capabilities and competitive advantages; Mass customisation of frames, manufacturing process becomes

more streamlined, improved measuring and scripting and lower labour cost due to improvements in process and automation which will minimise the amount of labour required for wheelchair build.

### MILESTONES

15/05/20	AMGC approval
31/7/20	A report detailing the manufacturing processes, user research and intended approach completed
15/09/20	Concept design of the Rove 3D Printed Wheelchair developed
28/02/21	Production and testing of prototype 1.0 completed
30/04/21	Design optimisation for prototype 1.0 completed and production and testing of Prototype 2.0 completed
30/9/2021	Three wheelchairs produced for trials and user testing completed
30/11/21	A report detailing the proposed manufacturing processes and machinery required for commercial manufacturing of 3D Printed Wheelchairs completed to TRL7

**CONTRIBUTIONS:** Government – \$180,000 | Industry – \$180,000 | In Kind – \$90,000



Advanced knowledge

Advanced processes

Advanced business models



## IMPACT

- › Increased spending on R&D
- › Higher information and communication technology (ICT) intensity
- › Increased collaboration with other manufacturers
- › Higher relative salaries and wages
- › Increased levels of automation
- › Smarter inventory management
- › Higher trade intensity
- › Larger geographical reach



## GROWTH

- › Rove Concepts has forecast sales growth of sales of wheelchairs from 60 units in 2021 to 350 units in 2024
- › Long term potential to produce over 1,000 units p.a generating in excess of 10m p.a
- › Projected sales growth will also generate significant new work for project partners



## JOBS

- › Up to five new jobs will be created over the next 2 years with a further 10 forecast beyond 2022

### PROJECT PARTICIPANTS

**rove**

**ACA** | ADAPTIVE CONCEPTS  
AUSTRALIA

**BASTION**



Australian  
National  
University





# SERVITISATION PLATFORM



Accelerated development of CleanPath software to provide remote monitoring of Smartline endoscope drying cabinets

Safetech's goal is to develop an interface that delivers equipment and job flow information in a format that is flexible and suited to individual customer needs. This interface must be adaptable by Safetech for new customers and to the changing requirements of established customers. The project will utilise IMF (project participant) sensors, hardware, and possibly their software if it is flexible and capable enough to meet all of Safetech's requirements.

The Safetech Information Management System – SIMS Plus will allow:

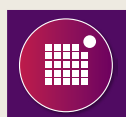
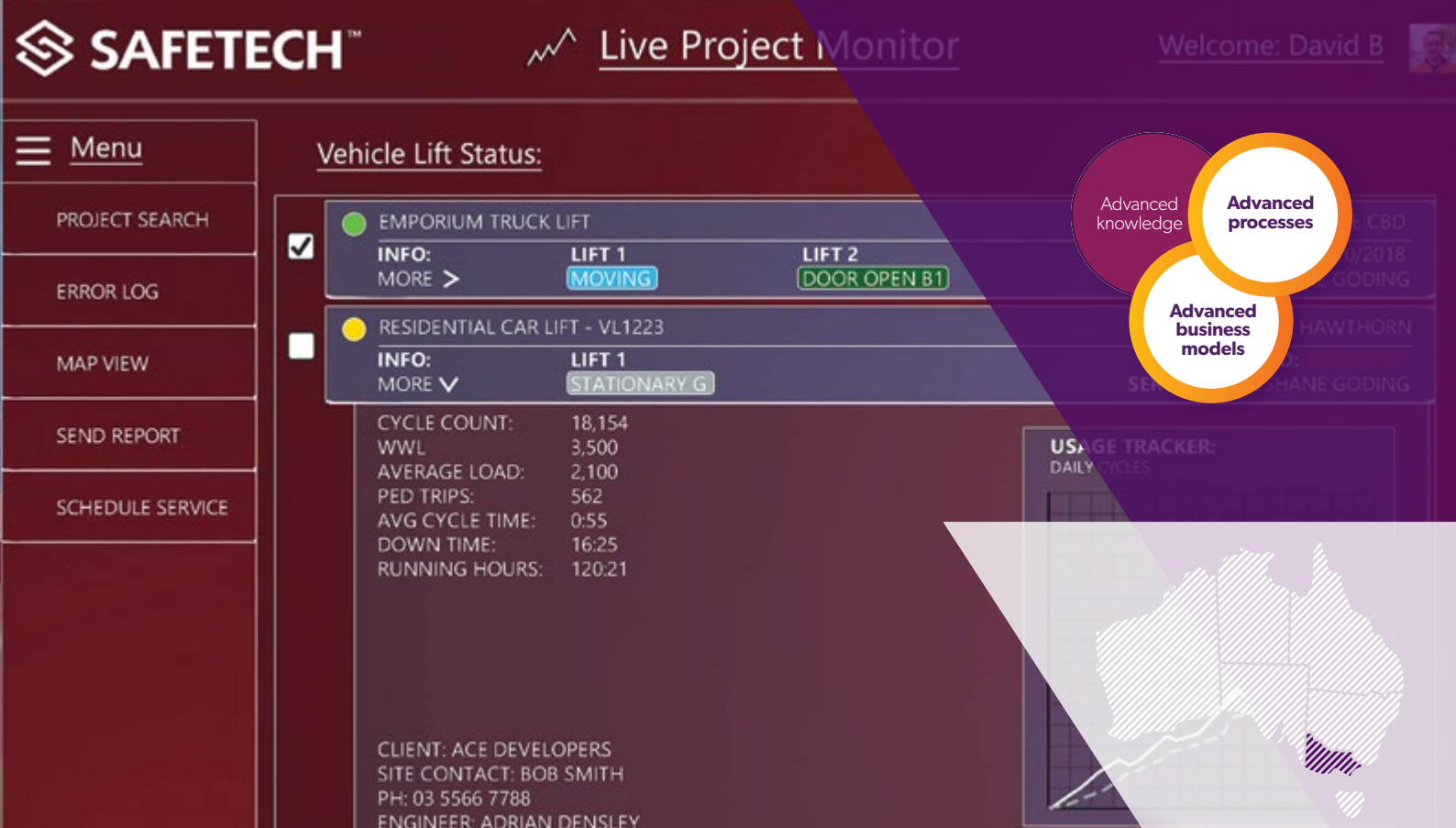
- Real time feedback from a range of sensors installed on their lifting and door equipment that will detect out-of-parameter incidents
- Real time product diagnostics and analytics which will provide predictive maintenance data for more efficient uses of customer resources
- Customers to access workflow data to improve their operating efficiency, lower their maintenance costs and improve future equipment purchasing decisions.

This project aims to make this detailed workflow information and problem solving capability widely available to service all their customers. Enhanced visibility over operations, real time KPIs, better scheduling and increased product performance feedback will all help their customers to generate greater operational insight and increase the value of Safetech's equipment to their end users.

## MILESTONES

03/09/19	●	AMGC approval
05/03/20	●	IOT Project Design Completed
29/06/20	●	SIMS Link Project Design Completed
30/09/20	●	System Installed and Tested
30/11/20	●	Data Library Structure Plan Complete
28/02/21	●	IOT vehicle hoist and reporting structure completed
30/06/21	●	SIMS Link and app for tablets installed
30/09/21	●	Install IOT
31/12/21	●	Install SIMS Link

**CONTRIBUTIONS:** Government – \$150,000 | Industry – \$150,000 | In Kind – \$40,000



## IMPACT

- Increased collaboration with research institutions
- Greater share of services in the total revenue through the selling of software
- Larger geographical reach
- Flexibility of maintenance cost by using a predictive maintenance schedule



## GROWTH

- \$1m per annum of new product from one major retailer alone if use becomes mandatory, increasing to \$5m per annum with other retailers.
- Between \$1m and \$1.3m in software sales to mining companies, in addition to the \$525k each in hardware unit sales



## JOBS

- Twelve product engineers, 2 control engineers, 3 production engineers, 2 draftsmen, 13 technical sales plus specialist marketers

### PROJECT PARTICIPANTS



# RESHORING AND MANUFACTURE OF SEABIN 6.0



## Reshoring manufacture of Seabin smart systems together with incorporation of IoT connectivity

Seabin Smart Technology was developed to collect ocean bound trash, microplastics, oil, fuel and even plastic fibres. The smart tech moves up and down with the tide collecting floating rubbish. Water is sucked in from the surface and passes through a catch bag inside the Seabin, with a submersible water pump capable of displacing 25.000 litres per hour, plugged directly into 240 or 110V outlet and also being solar compatible. The current Seabin is predominantly manufactured with HDPE and marine grade stainless steel. The next tech Seabin 6.0 will be designed for manufacture using a larger percentage of either Nylon 6 or HDPE recycled fishing nets and also will see a reduction of up to 70% in the steel components.

Incorporation of sensor technology and IOT connectivity will also be a key feature on the Seabin 6.0

This project seeks to re-shore the manufacturing of Seabins from France to Australia to create employment opportunities and in the process create a much more efficient, smarter and more sustainable product.

Seabin Project has partnered with Evolve Group, TPS and The University of Technology Sydney innovations department - Rapido Social to undertake an intensive and fast-tracked design upgrade. In the process it will begin phasing out virgin plastics and instead use recycled fishing nets. In addition, it will reduce the carbon footprint by decreasing the use of stainless steel components. As well as reflecting a modern design language, Evolve will use full root cause analysis techniques to focus on improving the Seabin's usability, reliability, longevity and value for money through improved features and benefits.

The development of the sensor and connectivity-enabled Seabin 6.0 is a critical element to be used in conjunction with the Pollution Index®, working with authorities like The United Nations Environment Program to become an indicator for the Sustainable Development Goal 14 (Conservation and Sustainability for Marine Resources) as well as working with Environmental Protection Agencies world-wide to quantify the health of our waterways and the amount of plastics in our oceans. The IoT enabled Seabin 6.0 and the Pollution Index® will be an important hardware and software platform combination to measure the success of solutions in the upstream marine environment.

### MILESTONES

02/04/20	●	AMGC approval
07/10/20	●	Product design and manufacturing process design
31/12/20	●	Parts prototyping completed
31/03/21	●	Tooling prototyping 50% completed
30/04/21	●	Tooling prototyping 100% completed
30/06/21	●	Quality control parameters established
31/08/21	●	Commercial manufacturing process completed to TRL Level 9

**CONTRIBUTIONS:** Government – \$400,000 | Industry – \$476,000 | In Kind – \$117,000



## IMPACT

- › Higher spending on R&D
- › Increased collaboration with research institutions
- › Increased collaboration with other manufacturers
- › Higher information and communication technology (ICT) intensity
- › Better qualified employees
- › Increased number of staff with science, technology, engineering and maths (STEM) skills
- › Newer equipment
- › More automation



## GROWTH

Seabin estimates its sales will be as follows:

- › 2020 – \$5,806,091
- › 2021 – \$11,844,130
- › 2022 – \$18,094,951
- › 2023 – \$27,682,030
- › 2024 – \$31,003,873



## JOBS

The project expects to generate the following increase in Australian based skilled employment:

- › Two positions at Evolve
- › Four positions at UTS
- › Three positions at Seabin Group during the project
- › Eight + positions at Seabin Group when commercial sales begin

### PROJECT PARTICIPANTS



# DEVELOPMENT OF SEGNUT FIRST SYSTEM



Development of an advanced industrial bolting system for improved safety and speed in the resource sector

The Segnut has helped mining and resources companies to improve productivity and safety in their maintenance operations. However, there is now a desire to improve maintenance safety when attaching and removing the cutting edges on the dozers and other mobile plant used in their mining operations. In this case the hazard being addressed is crush injuries incurred using conventional removal methods. This has created the development of Segnut FIRST.

The Segnut FIRST project will bring to the Australian and global markets, a new system for applying and removing heavy duty fasteners with a clear focus on vastly improved safety to the worker tasked with installing and removing such fasteners. The system will comprise:

- ▶ A specialised attachment called a Reaction Socket unit
- ▶ A modified plow bolt design referred to as a “reaction bit plow bolt” or a “Segnut FIRST plow bolt”.

The Segnut FIRST system will allow the use of nutrunners to install AND remove nuts to matching bolts without the need for a reaction bar - thus no finger crush danger is created. The Segnut FIRST system incorporates a Reaction Socket with a dual drive mechanism which attaches to the modified threaded end on the plow bolt, and inner Segnut section for installation. Another larger Reaction Socket with a dual drive mechanism attaches to the inner and outer Segnut sections for removal.

The existing Segnuts and plow bolts are produced in China. This project will increase Australia’s capability in manufacturing fastening products and systems which will provide opportunities for local suppliers.

## MILESTONES

22/06/20	●	AMGC approval
31/10/20	●	Prototype and initial field tests completed
31/11/21	●	Field trials completed and design parameters confirmed
30/04/21	●	Engineering design freeze and QA metrics completed
30/05/21	●	Certifications and initial type testing completed

**CONTRIBUTIONS:** Government – \$252,500 | Industry – \$252,500 | In Kind – \$57,500





Advanced knowledge

Advanced processes

Advanced business models



## IMPACT

- › Increased spending on R&D
- › Increased collaboration with other manufacturers
- › Larger patent portfolio
- › Better qualified employees
- › Newer equipment
- › Greater capital intensity
- › Larger geographical reach



## GROWTH

- › Segnut expect a 10% year on year penetration for the first three years in the market before growing to a 50% adoption rate for the GET applications in Australia. This would represent a retail value of \$1 million – \$2 million in the first full year of market sales growing to \$5 million to \$10 million in the third year for Dozer GET applications



## JOBS

- › During this project Segnut expect to employ an additional five engineering and design staff

### PROJECT PARTICIPANTS



# LASER ETCHING OF INDIVIDUAL OYSTERS



## Automation of Oyster Packaging and Certification of Provenance

The Australian oyster industry suffers from its inability to differentiate its products from imports and compete on cost in both the domestic and export markets. With validation of each state-of-the-art technology component completed in this project, Shellfish Culture is ready to proceed with the development of a prototype hardware system for the automated processing and laser etching of individual oysters through:

- ▶ A vision system for the identification of the unique and variable shape of the oysters,
- ▶ A 'soft-grip' automated robot to correctly orientate and align the oysters for accurate delivery to the laser, and
- ▶ A CO2 laser for etching of symbol(s) on the underside of the oyster to identify the provenance of the oysters.

Shellfish Culture will offer this service to the entire Tasmanian oyster industry to differentiate product, open access to new markets and reduce processing costs with an increased capital intensity. Once the Tasmanian business model is proven, the technology will be opened to other states through licensing agreements where the benefits could be realised in the \$112 million Australian edible oyster market.

The deliverables that will result from this project are:

- ▶ Cromarty will design, engineer and build the prototype system sized to meet predicted daily export demand and ultimately manufacture systems for other States and export customers
- ▶ The University of Tasmania will test and validate the system in place, focusing R&D activities on the machine learning components of the vision system and ensuring provenance through data encryption of etched symbols

- ▶ Full system to be "flight proven" through successful automatic processing, laser etching and sale of final product to market via Tas Prime Oysters, the marketing arm of Shellfish Culture.

Shellfish Culture have prepared long term strategic goals which plan for future applications with other shellfish such as Abalone and Scallops.

### MILESTONES

15/3/20	●	AMGC approval
30/9/20	●	Initial design of the prototype vision, robot and laser etching system
31/12/20	●	Procurement of the state-of-the-art equipment for prototype development
31/3/21	●	Final design and installation of the prototype system
30/6/21	●	Commissioning of the prototype system completed
30/9/21	●	Testing and validation of the prototype to design specifications
31/12/21	●	First product to market & prototype licensing completed

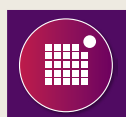
**CONTRIBUTIONS:** Government – \$223,225 | Industry – \$223,225 | In Kind – \$45,000



Advanced  
knowledge

Advanced  
processes

Advanced  
business  
models



## IMPACT

- › Increased collaboration with research institutions
- › Larger patent portfolio
- › Better qualified employees
- › More staff with science, technology, engineering and maths (STEM) skills
- › Newer equipment
- › More automation
- › Greater share of services in total revenue



## GROWTH

- › Shellfish Culture estimates an increase in export sales of 25% or 350 tonnes annually, resulting in an increase in revenue of \$3.5 million



## JOBS

- › This project will generate the following increase in employment
- › Additional two jobs at partner Cromarty for the design and engineering of the system
- › Additional two skilled jobs for the operation and maintenance of the new system in the short term
- › Additional Five to 6 skilled jobs in the medium term as volumes increase from producers
- › Additional 10 – 15 skilled jobs across all project partners resulting from increased production, logistics and licensing of the new technology to Australian businesses

### PROJECT PARTICIPANTS



# MANUFACTURE OF DUAL-LENS FISHING CAMERA



## Design and development of the dual-lens Siren fishing camera

Siren Cameras, in collaboration with its project partners in Australia, has designed and patented a bespoke dual-lens floating action camera to supplement consumer desire for visually documented footage of their fishing experiences. The Siren camera offers a solution while satisfying the deep-rooted anglers desire to visualise trophy fish and themselves throughout their encounters. Once a fish has taken the bait, the angler attaches the Siren camera to the fishing line with a simple clip attachment, where upon the camera slides down the line before settling on the surface due to its buoyancy and deliberately engineered stable design. This offers recreational anglers a radical new perspective of their fishing experiences, with its dual-facing lens views delivering never seen before insights through video content.

Siren Cameras are committed to supporting fishing sustainability throughout the fishing community and have developed an innovative environmental sustainability use for their product in the form of a mobile App which not only transmits the video footage through Wi-Fi, but also collects vital data.

The Wi-Fi connected fishing App being developed by Siren Cameras will provide robust data sets to overcome the inadequate information currently impeding the rational control of marine resources.

Fisheries management decisions are often based on population models, but the models need quality data to be accurate. Scientists and fishery managers would be better served with simpler models and improved data which the Siren camera will deliver.

## MILESTONES

18/05/20	●	AMGC approval
15/12/20	●	Design of electronics and software for operating prototype completed
30/04/21	●	Contractual agreements with Australian plastic injection and PCB production businesses completed
30/05/21	●	Software development kit completed
30/06/21	●	Design aspect of plastic casing completed
30/07/21	●	Siren app completed
30/09/21	●	Robotics and tooling for production line completed
30/11/21	●	Market advertisement and exhibition attendance completed

**CONTRIBUTIONS:** Government – \$178,250 | Industry – \$178,250 | In Kind – \$60,000



Advanced knowledge

Advanced processes

Advanced business models



## IMPACT

- › Increased spending on R&D
- › Increased collaboration with other manufacturers
- › Higher information and communication technology (ICT)
- › Increased levels of automation
- › Greater share of services in total revenue
- › Higher marketing expenditure



## GROWTH

- › Siren Cameras forecast to sell over 2.8 million cameras units cumulatively within the first 10 full financial years of trade, ranging from 1,150 units in Year 1, to 693,000 units by Year 10



## JOBS

- › During the project, Siren Cameras will employ an additional two staff for the Android/iOS Application build
- › It is expected that several additional staff will be employed within local parts suppliers

### PROJECT PARTICIPANTS



Involve Design

Melissa Bruhns



# AUTOMATED CRASH HELMET



## Automated crash helmet manufacturing with ubiquitous data acquisition and management

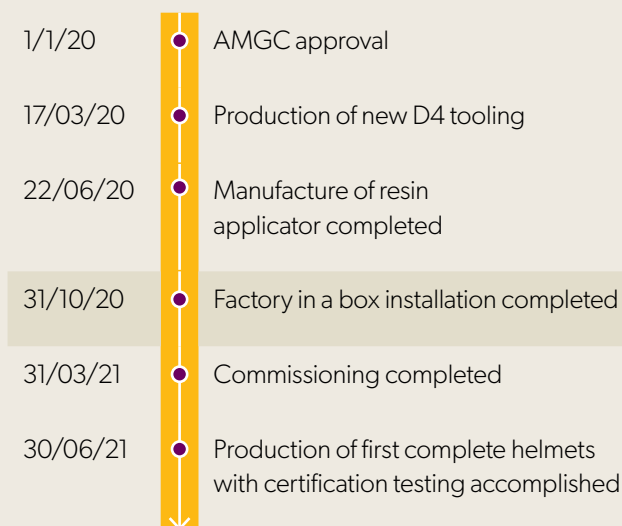
Existing composite motorcycle and motorsport crash helmets have inherent inconsistencies stemming from their manufacturing process. With these inconsistencies, manufacturers rely heavily on the physical inspection of every shell.

This project commenced when the Defence Materials Technology Centre (DMTC), Deakin University and The Smart Think (TST) developed a revolutionary composite forming technology known as 'Double Diaphragm Deep Drawing' (D4). The technology converts a 2-dimensional stack of composite material into a 3-dimensional object in a single step. This technology removes the need for the traditional splicing of materials for the finished products hence significantly reducing weight and producing a higher-performing composite.

TST, in conjunction with their project partners have adapted and advanced DMTC's technology and designed a split tool version. This version is a unique cost-effective method of manufacturing that uses a combination of deep drawing and vacuum forming. The TST D4 machine is currently the world's fastest and most advanced forming machine with an automated lay-up, cure and ejection cycle producing ballistic helmets within 15 minutes. The machine must be heavily redesigned to incorporate the split tool required to form a crash helmet and requires bespoke equipment pre-and post-processing to run effectively.

TST has performed initial validation with small scale prototype equipment, including an automated resin applicator and a robotic controlled laser cutter. This validation also included ubiquitous data collection and a longitudinal Product Lifecycle Management system that will remove the barriers to automation and online compliance checking.

### MILESTONES



**CONTRIBUTIONS:** Government – \$225,000 | Industry – \$225,000 | In Kind – \$55,000



## IMPACT

- › Production of the first spliceless crash helmet shell in the world.
- › Production of the first Australian made crash helmet - demonstrating all seven steps across the 'smiley curve'.
- › Online compliance monitoring of entire production, including supply chain partners.
- › Higher spending on R&D
- › Increased collaboration with research institutions
- › More staff with STEM skills
- › Newer equipment
- › Reshoring of crash helmet manufacturing to Australia



## GROWTH

- › Increase in revenue of \$90 million over five years



## JOBS

- › Twenty additional team members

### PROJECT PARTICIPANTS



# REMOTE MONITORING SOFTWARE



Accelerated development of CleanPath software to provide remote monitoring of Smartline endoscope drying cabinets

Smartline is developing its CleanPath data system which provides digital cleaning validation to help hospitals comply with the new hygiene standards.

The air systems in Smartline’s cabinets use patented technology to ensure that endoscopes used in colonoscopy and gastroscopy hospital operations are dried and stored correctly. These well-designed cabinets are already a proven brand in several markets even with only basic data functions attached.

This project exemplifies how ICT can enable high-quality servitisation of data transmitted by software, allowing Smartline technicians in Australia to provide analysis to remote or overseas clients. The Smartline value proposition provides an aspirational benchmark for other Australian manufacturing entities. When the project is complete, Smartline will share the concept of this servitisation model based on Australia’s cost advantages and high-skilled labour.

This project will demonstrate to the Australian manufacturing sector how to develop and commercialise leading intellectual property. It will enable Smartline and its project partners to transform their technology and businesses into global competitors. The project will take Smartline from being a basic cabinet manufacturer to being at an advanced level of Industry 4.0 integration. Manufacturing digitally enabled equipment for use in hospitals represents a significant shift towards competing on value and at scale.

## MILESTONES



**CONTRIBUTIONS:** Government – \$150,000 | Industry – \$150,000 | In Kind – \$40,000



## IMPACT

- › Creation of a world's-first patented technology that improves sterilisation and storage of endoscopes in hospitals
- › Advanced knowledge achieved through increased ICT intensity, including the ability to remotely monitor the performance of sterilisation equipment
- › An advanced business model achieved through services having a greater share in total revenue, enabled by remote monitoring services and maintenance
- › A greater number of staff members with STEM skills



## GROWTH

- › \$11.5 million (25% in CleanPath software sales) over the next four years
- › \$25 million per year (\$6.25 million from CleanPath software) with a 5% market share in the US



## JOBS

- › 15 high-skilled manufacturing personnel
- › Three software engineers and data analysts

### PROJECT PARTICIPANTS

**Smartline**  
MACHINERY



**HealthTag**

# WORLD LEADING COMPOSITE MANUFACTURING PROCESS



Development of a customised software package that facilitates the design and manufacture of complex components with a reduced occurrence of defects

This project seeks to address a global challenge among composite manufacturers by aiming to reduce the occurrence of defects arising when resin shrinks during composite manufacturing, and improve the quality of the surface finish when composite materials come out of the mould. Successful execution of this project will lower the failure rate of complex components, reduce manufacturing cycle times, and enhance capabilities in modelling and simulating composite materials.

Understanding how to control and eliminate this fundamental problem will create a sustained competitive advantage. The technical leadership will increase international recognition of Australia's composite manufacturing industry.

The project is developing a customised software package that enables complex components to be designed and manufactured without these shrinkage issues. These components will be used in the production of Sykes Boats and Carbon Revolution Wheels.

The project will help ensure Australian composite manufacturers remain globally competitive. The tools, knowledge and protocols developed during this project will improve Australia's composite manufacturing value offering, enabling the design and manufacture of complex composite solutions at a quality and consistency not available elsewhere.

If successful, this project will demonstrate how the Australian manufacturing sector can develop and commercialise a new, world-leading composite manufacturing process using customised software and Australian ingenuity. The industry-wide impact will continue through Deakin University's engagement with project participants and other firms seeking to adopt advanced processes in complex composite manufacturing. The university will provide ongoing education for postgraduate students, covering advanced process for complex composite manufacturing.

## MILESTONES



**CONTRIBUTIONS:** Government – \$80,000 | Industry – \$80,000 | In Kind – \$474,166





## IMPACT

- › Increased spending on R&D to develop software that improves understanding of and reduces the occurrence of resin shrinkage
- › Increased research collaboration with Deakin University, to reduce the occurrence of defects
- › Manufacturing process development with Carbon Revolution which provides specific expertise in composite manufacturing
- › Advanced processes achieved by implementing new manufacturing techniques that reduce defects and the need for repairs
- › Growth in the patent portfolio



## GROWTH

- › \$4–5 million per year in new sales



## JOBS

- › Five to 10 high-skilled jobs

### PROJECT PARTICIPANTS



**Geelong Advanced  
Fibre Cluster**



# FLIGHT SIMULATOR



## Scaling production of flight simulator for the global pilot training market

SynFlyt has developed a patented prototype Category B flight simulator and is aiming to manufacture 250 units over the next three years for the global civil aviation flight training and simulation market. The flight simulator includes remote monitoring capabilities, so performance data from each unit is collected and analysed to enable ongoing improvements and predictive maintenance. Specifically, the simulator collects mechanical data to identify motion control issues, then the SynFlyt software is upgraded remotely to continually improve performance and user experience.

Most flight training schools cannot afford to purchase a flight simulator, which typically costs over \$130,000 plus setup, software and ongoing servicing. SynFlyt has developed a zero-cost placement model for flight training schools. Instead of selling them simulators, SynFlyt charges student pilots directly via debit or credit card at \$65 per hour. The cost to pilots is dramatically reduced, for example, from \$350 per hour in a Cessna, to \$65 per hour in a SynFlyt simulator set up as a Cessna cockpit. The return on investment for each placed simulator is approximately 30 months.

On conclusion of this project, SynFlyt will have a market ready flight simulator for sale to domestic and international customers, and will have validated its manufacturing processes to begin full rate production.

SynFlyt and the project participants will become innovation leaders through collaborative R&D and higher spending on R&D; more collaboration with research institutions and industry; greater intensity of STEM skills; and better-qualified employees.

### MILESTONES

2/4/18	●	AMGC approval
27/4/18	●	Tooling completed
11/6/18	●	Setup of production facility
7/8/18	●	Specification on production processes and operations plans
27/10/19	●	First 10 simulators produced
21/11/19	●	Implementation of ERP/CRM system

**CONTRIBUTIONS:** Government – \$279,550 | Industry – \$279,550 | In Kind – \$25,000



## IMPACT

- › Sustained competitive advantage achieved through increased spending on R&D to manufacture a flight simulator for pilot training
- › Increased ICT intensity achieved through remote monitoring of performance data for ongoing improvements and predictive maintenance
- › Advanced business model achieved through services representing a greater share of total revenue, enabled by SynFlyt's placement model
- › Growth in the patent portfolio
- › Greater number of STEM-qualified employees



## GROWTH

- › \$33 million in revenue per year by the end of year three



## JOBS

- › Twenty high-skilled jobs

### PROJECT PARTICIPANTS



# 3D PRINTING FOR CUSTOMISED CLOTHING



## Validation of 3D-printing technology for mass-customisation of garments in the global clothing manufacturing industry

Tec.Fit's goal is to disrupt the global clothing industry by enabling retail customers to easily purchase customised garments online without the need to visit a retailer or tailor. To achieve this, Tec.Fit has developed a smartphone human-body scanning app that converts 2D smart-phone photos into accurate 3D digital layouts of the customers body and their measurements.

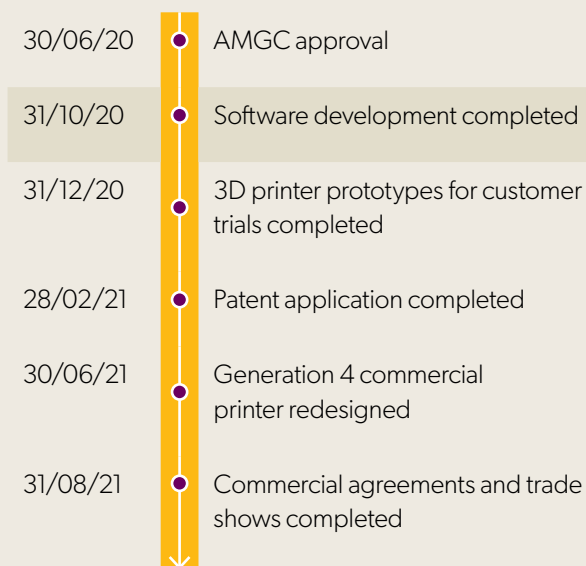
Tec.Fit has also recently completed a 12-month proof-of-concept on a 2nd generation prototype 3D printer. The printer uses the 3D digital layouts of the customers body to produce a life-sized physical mannequin for producing customised clothing. The physical mannequin provides an accurate representation of an individual customer, which is used by the clothing manufacturer to produce tailored garments such as suits, wedding dresses, wetsuits, uniforms, etc.

In collaboration with Bosch and UTS, Tec.Fit is now ready to test a 3rd generation printer and undertake field trials with eight clothing manufacturers. The body scanning technology and 3D printed mannequins will be trialled in an operational environment to produce garments for customers.

The combination of remote measurement, digital modelling and 3D printing technologies eliminates the need for customers to visit a retailer or tailor, thus enabling Australian clothing manufacturers to sell their product globally with

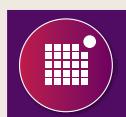
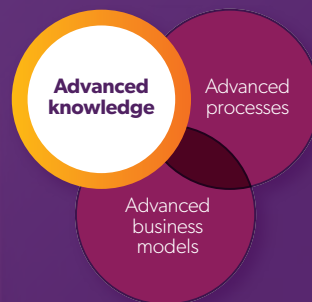
a perfect fit. Australia has many talented designers whose products are in demand, and Tec.Fit's technology will enable retailers and clothing manufacturers to provide valuable new services through a unique global platform.

### MILESTONES



**CONTRIBUTIONS:** Government – \$250,000 | Industry – \$660,000 | In Kind – \$133,000





## IMPACT

- › Increased spending on R&D
- › Increased collaboration with other manufacturers
- › Increased collaboration with research institutions
- › Higher information and communication technology (ICT)
- › Increased levels of automation
- › Greater share of services in total revenue



## GROWTH

Tec.Fit estimated revenue for the three years to 2023:

- › FY2021 \$2.1 million – \$5.2 million
- › FY2022 \$10 million – \$24.3 million
- › FY2023 \$53 million – \$139 million



## JOBS

- › Tec.Fit estimates that this project will generate an increase of more than 15+ skilled jobs within 1–2 years of it being completed

### PROJECT PARTICIPANTS





# AUGMENTED REALITY INSPECTION SYSTEM FOR PRINTED CIRCUIT BOARD MANUFACTURING



## Augmented Reality Automated Optical Inspection (AugmentAOI) for Printed Circuit Board (PCB) Manufacturing

For many SMEs, their current Printed Circuit Board (PCB) manufacturing quality checking method using optical sensing systems has various issues. Tekt Industries and the project participants have identified these issues and will develop an AI Camera based compact vision processing and control module to address these issues. The modules will operate within in-line conveyor system developed by Tekt Industries to be used in conjunction with either a standard 3-axis gantry or alternative can be utilised with an off-the-shelf cobot solution to complete automated scanning and recognition tasks.

By developing the Augmented Reality Automated Optical Inspection (AugmentAOI) system, this module can be placed anywhere in the production line to inspect the quality of the outcome of any stage within electronics manufacture processes. It may also be either utilised off the linear production line or in other product quality control processes in future where Augmented Reality based feedback and operator control are required.

The camera module attached to the 3-axis gantry will provide the real-time video streaming function that can work with the augmented reality application developed in-house. The application uses the 3D model generated from PCB design software such as Altium Designer to match and validate the quality of the assembly by overlaying the 3D model onto the PCB showing different layers of the board.

The project will create a more efficient and cost-effective assembly line. The aim is to create a solution with the ability to inspect printed circuit boards for any faults using Tekt's image recognition and AR technology.

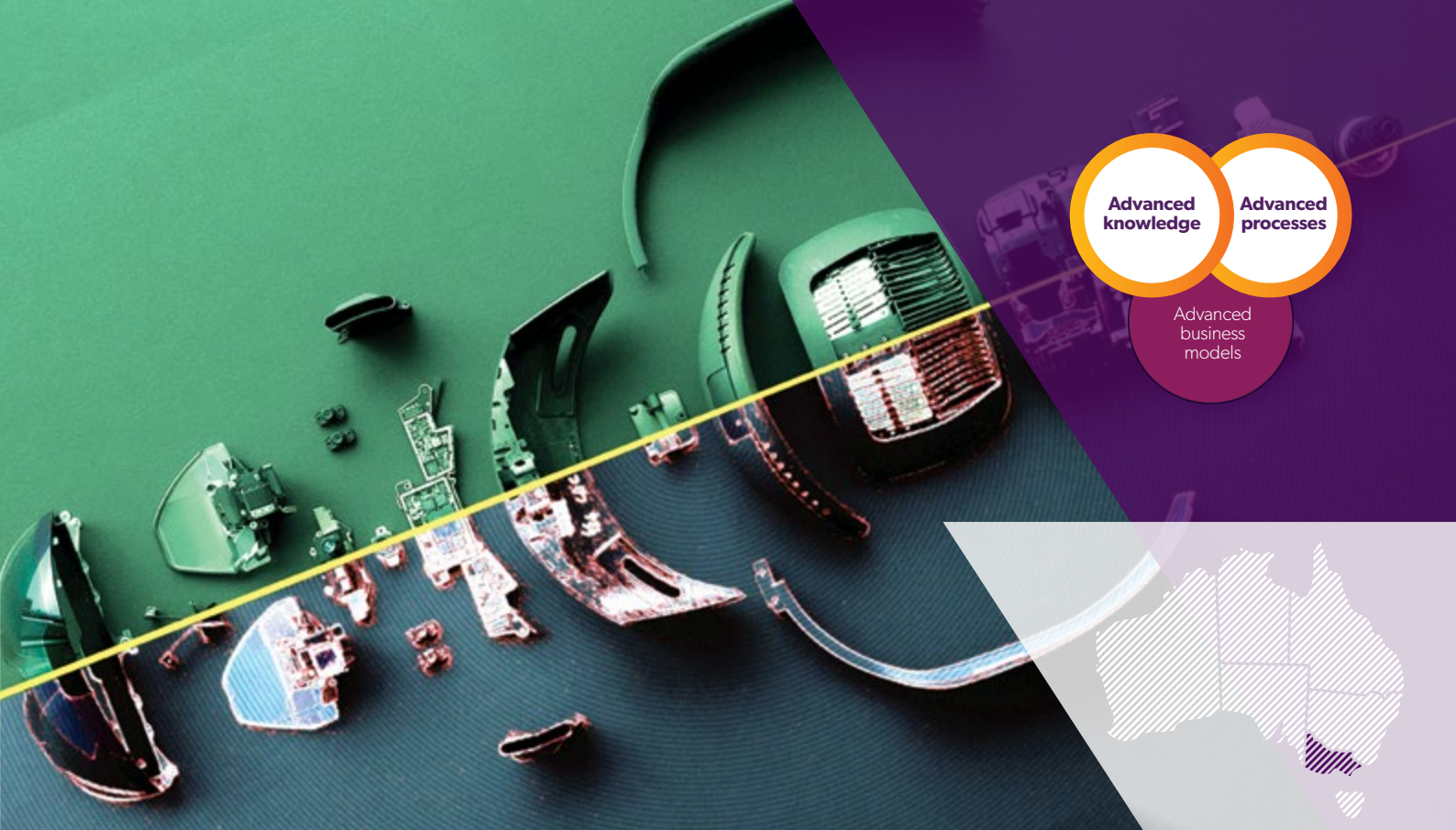
A production line operator with an AR/XR device will be able to stand next to the conveyor belt and assess the production quality while the machine visualises and compares with the "digital twin" (virtual reality 3D model) of the PCB currently being fabricated and the output.

This solution does not exist within other inspection tools and is not currently available as an integrated AR Inspection offering through any other vendor of manufacture inspection equipment currently.

### MILESTONES

01/07/20	●	AMGC approval
31/10/20	●	Innovation or Provisional Patent Filed
31/01/21	●	Concept design of the 6-axis arm robot and engineering documents completed
30/04/21	●	Systems and software architecture completed
30/06/21	●	First prototype unit manufactured
31/08/21	●	Design refinement completed
30/09/21	●	Updating of prototype unit completed
31/10/21	●	Final system with standalone App and hardware system delivered

**CONTRIBUTIONS:** Government – \$250,000 | Industry – \$361,080 | In Kind – \$93,000



## IMPACT

- › Increased spending on R&D
- › Increased collaboration with other manufacturers
- › Higher information and communication technology (ICT)
- › Larger patent profiles
- › Increased number of staff with science, technology, engineering and maths (STEM) skills
- › Increased levels of automation
- › Smarter inventory management
- › Higher quality product fabrication capability
- › Greater share of services in total revenue



## GROWTH

- › Tekt Industries estimates it will be able to generate recurring revenue of approximately \$700,000 annually from the 700 units after the first two years of release
- › Tek Industries expects by the end of 2024, that a subscription model will generate additional annual cash flow of \$2.815 million



## JOBS

- › By the end of 2025, Tekt Industries and its future subsidiary will create at least 29 to 40 new full-time employment opportunities

### PROJECT PARTICIPANTS



# LOAD ORIENTATION SOLUTION



Development and manufacturing of solutions for accurate orientation of wind turbine blades

Verton has developed the world’s first remote control load-control system to help reduce risks and drive productivity in lifting operations. Our solutions enable safe control and rotation of loads to their target destination – no matter the complexity. Workers are often required to be in the proximity to moving loads, putting them at significant risk of injury or fatality.

Drawing on the project participants expertise, they wish to collaborate on development of a Verton load orientation solution (project name Windmaster) for the accurate orientation of wind turbine blades in the difficult windy conditions in which wind turbines are naturally located. This will achieve assembly at height with accurate remote positioning of the root end of blades into the turbine hub in an efficient and controlled movement. Verton will utilise their expertise and IP in novel approaches for the accurate orientation of the suspended wind turbine blades.

The systems envisioned to be developed will be compatible with a range of current Vestas wind turbines and installation methods, with provision for upgrades for larger systems and offshore installations. Provision will also be made for compatibility with a tower climbing crane currently under development by Mammoet to allow control by a single operator.

## MILESTONES



**CONTRIBUTIONS:** Government – \$268,000 | Industry – \$534,000 | In Kind – \$320,000



Advanced knowledge

Advanced processes

Advanced business models



## IMPACT

- › The major technology components of the Windmaster product developed in this project will be designed and manufactured in Australia. Verton have been in contact with a number of Australian companies for supply of various items



## GROWTH

- › Sales of \$15 million per annum



## JOBS

- › Verton would expect at least an extra 10 highly skilled jobs to be created either internally at Verton or via external contract input within 12–18 months post-pilot phase

### PROJECT PARTICIPANTS



# VALUE FROM SOLID WINE WASTE

ADVANCED MANUFACTURING EARLY STAGE RESEARCH FUND



Drawing value from solid wine waste by developing and demonstrating a small-scale pilot plant and designing an industrial-scale production plant

This project seeks to validate a semi-continuous production process for transforming solid wine waste into high-value compounds. Once the process is validated, the project participants will produce plans for an industry-scale production plant.

The Viridi Innovations 'waste to value' technology enables on-site processing of solid wine waste to produce tartaric acid and grape sugar. These are both key ingredients in the global food manufacturing value chain. Applying this technology to large-scale wine production improves production flexibility and generates better environmental outcomes.

Viridi's business model involves partnering with progressive wine producers, such as project participant Accolade Wines, to reduce their key input costs and share the value generated by selling excess product to other customers. The market demand for tartaric acid alone is expected to be US\$3.16 billion by 2022.

On conclusion of the project, the project participants will have validated the 'waste to value' production process and produced designs for an industrial-scale application.

## MILESTONES

7/5/18	●	AMGC approval
2/10/18	●	Design and costing for demonstration plant completed
30/11/18	●	Production of demonstration plant completed
31/7/19	●	Testing of demonstration plant completed
05/05/20	●	Concept design for industrial scale pilot plant completed
07/11/20	●	Cost report of industrial scale pilot completed
31/03/21	●	Detailed design documentation for industrial scale pilot plant completed

**CONTRIBUTIONS:** Government – \$145,000 | Industry – \$145,000 | In Kind – \$48,000





Advanced  
knowledge

Advanced  
processes

Advanced  
business  
models



## IMPACT

- › Higher spending on R&D to design, construct and test a small-scale demonstration plant in collaboration with Swinburne University
- › Larger patent portfolio
- › Collaboration with Austeng to produce plans for an industrial-scale pilot plant
- › Larger geographical reach by offering the Viridi technology to international wine producers



## GROWTH

- › The Viridi process has the potential to unlock more than \$600 of value per tonne of solid wine waste
- › The potential gross value – addressing only the top five wine producers in the top 5 global wine producing regions (less than 4% of global wine waste production) – is more than \$500 million per annum



## JOBS

- › Ten medium to high-skilled jobs

### PROJECT PARTICIPANTS

viridi



Austeng



# HIGH-STRENGTH ALUMINIUM ALLOY

## VOLGREN

A Marcopolo Company

Validation and demonstration of a high-strength aluminum alloy, for future integration into the manufacturing value chain of global bus manufacturers

Volgren and other project participants identified an opportunity to commercialise their research on super high strength aluminium alloys to reduce the weight of bus bodies and chassis.

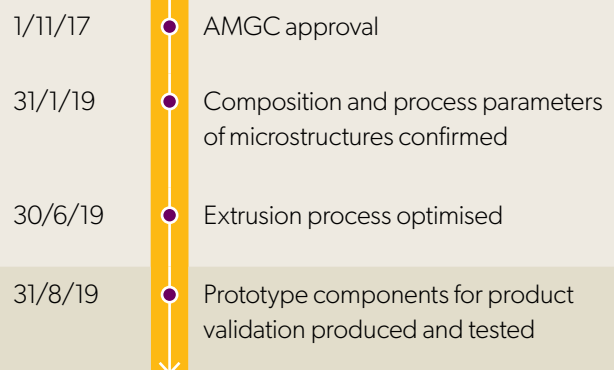
Research undertaken by Deakin University and Clean TeQ has developed high-strength aluminium alloys containing small amounts of scandium, a rare earth metal that has the ability to substantially increase the strength of aluminium and therefore reduce overall vehicle weight. The resulting product is key to the next generation of lightweight aluminium electric vehicles.

This project will allow Volgren to use the patented technology in manufacturing buses. This gives Volgren a competitive advantage both domestically and internationally, and an entry into electric vehicle manufacturing, where weight is a major factor, and many sectors where strength to weight ratios of alloys are critical.

Compared to traditional aluminium alloys, the new product delivers:

- › 20% increase in strength
- › 30% reduction in weight
- › 25% reduction in component cost
- › Enhanced corrosion resistance
- › Reduced fuel and energy costs as a result of reduced vehicle weight
- › Reduced carbon emissions as a result of reduced vehicle weight.

### MILESTONES



1/11/17	AMGC approval
31/1/19	Composition and process parameters of microstructures confirmed
30/6/19	Extrusion process optimised
31/8/19	Prototype components for product validation produced and tested

**CONTRIBUTIONS:** Government – \$150,000 | Industry – \$150,000 | In Kind – \$375,000



## IMPACT

- › Advanced knowledge as a result of high-strength alloy R&D
- › Growth in the patent portfolio
- › Research collaboration with academic and industry partners to develop complex new products
- › An increase in the number of staff members with STEM skills
- › Better energy efficiency due to the reduced weight of bus bodies and chassis
- › Increased trade intensity and more geographically diverse export markets



## GROWTH

- › Potential to generate significant new revenue and skilled employment for Australian manufacturing ahead of global licensing and ongoing R&D opportunities



## JOBS

- › Fifty to 60 new employees expected at Volgren as a result of successfully commercialising the new alloy
- › One hundred and forty jobs expected at Clean TeQ as the mine goes into operational production mode

### PROJECT PARTICIPANTS

**VOLGREN**  
A Marcopolo Company

**CLEAN**  
**TEQ**  
Powering innovation

**HESS**



# LITHIUM IRON PHOSPHATE MANUFACTURING



## Improving the cost of lithium iron phosphate manufacturing

Lithium Iron Phosphate (LFP) batteries are a type of rechargeable battery, specifically a Lithium Ion battery, using LFP powder as the cathode material. These batteries are finding a number of roles in electric vehicle, utility scale stationary applications, and backup power storage. The LFP powders used as the cathode material have the following advantages over other cathode materials such as Cobalt Oxide, Nickel Oxide and Manganese Nickel Oxide:

- ▶ Low cost as compared to other cathode materials
- ▶ Low toxicity
- ▶ Well-defined performance
- ▶ Long-term cycling stability
- ▶ High thermal and chemical stability during operation etc.

The current VSPC Generation 4 LFP powder technology delivers more sustainable and high-performance LFP powder due to its unique uniform carbon coated nanoengineered particle morphology tailored for use as cathode materials in LFP batteries. Although there are substantial advantages to the established VSPC Generation 4 process, the high cost of certain input raw materials is still a major economic impediment to commercialisation in Australia and for global export.

In this project, VSPC and their partners aim to reduce the production cost of VSPC Generation 4 LFP powder by:

- ▶ Integrating “commercial grade” low cost iron sources into the VSPC manufacturing process.
- ▶ Determining the feasibility of alternative lithium sources in the VSPC manufacturing process.

VSPC will continuously explore the prospects of technological integration and R&D partnerships, with its Brisbane facility well positioned to develop other high-performance battery materials.

### MILESTONES

15/12/19	●	AMGC approval
27/04/20	●	Potential low cost materials determined
30/07/20	●	Feasibility of material sources demonstrated
30/11/20	●	Optimisation of the current process completed
30/04/21	●	Validation of the feasibility completed
31/05/21	●	Materials cost model for integration developed

**CONTRIBUTIONS:** Government – \$185,000 | Industry – \$185,000 | In Kind – \$200,000





## IMPACT

- › Increased R&D investment
- › Better qualified employees
- › Recycling of Lithium Ion batteries
- › Increased competitiveness of Australian battery manufacturing towards value added markets
- › Value-adding to minerals including lithium, iron and phosphates that are all mined in Australia



## GROWTH

- › \$50 million per annum in revenue



## JOBS

- › VSPC estimate that two additional skilled jobs will be needed during the project and that 50 additional jobs will be needed when LFP powder is manufactured at their Queensland plant

### PROJECT PARTICIPANTS





# WATER PURIFICATION UNIT



A cloud-connected potable water purification unit for remote communities and disaster relief

Maintaining and servicing water purification units in remote communities is challenging and expensive. The Water Source solution is tackling this issue through collaborative research with Monash University, and product development with Bosch Engineering.

The AMGC project seeks to commercialise a potable water purification unit that is compatible with the Internet of Things (IoT) and does not require consumables, such as chlorine or replacement filters throughout its operating lifespan of more than 10 years.

The unit will be remotely monitored and controlled through a cloud-based, IoT-connected platform with inbuilt artificial intelligence (AI) software. This combination of features establishes a valuable and unique position for Water Source in the global water purification market.

Water Source has developed a diverse business model that aims to deliver multiple benefits to its users. For example, the water purification unit can provide remote Indigenous communities with potable water, while a bottling plan incorporated in the unit establishes a source of income for the community.

On conclusion of this project, Water Source will have a market-ready product. This will provide a reliable potable water supply for domestic and small-scale commercial situations in remote communities, developing nations, defence settings and other challenging environments.

The impact of this project is significant. Potential mid-term export value has been estimate at \$20 million in new revenue and it could lead to the creation of 15 high-skilled jobs.

## MILESTONES



**CONTRIBUTIONS:** Government – \$250,000 | Industry – \$516,150



## IMPACT

- › Increased ICT intensity by remotely monitoring and controlling the unit via a cloud-based, IoT-connected platform
- › Advanced knowledge development through increased research collaboration with Monash University and product development with Bosch Engineering
- › A complex new product that provides potable water for domestic and small-scale commercial situations, and does not require consumables
- › Increased trade intensity and access to geographically diverse export markets, including remote communities, developing nations and other challenging environments



## GROWTH

- › \$20 million (medium term)
- › \$100 million (long term)



## JOBS

- › 15 high-skilled jobs (medium term)
- › 150 high-skilled jobs (long term)

### PROJECT PARTICIPANTS



**BOSCH**



**MONASH**  
University

# MANUFACTURE OF GREEN SUSTAINABLE CONCRETE



## Deployment of sustainable substitutes for cement and sand in concrete manufacturing using recycled waste glass

This project aims to develop sustainable partial substitutes for cement and construction sand using recycled glass waste, which would normally end up in landfill. The technology, while having been internationally validated, is currently being studied further by the University of New South Wales, School of Civil and Environmental Engineering and XL Precast. The collaboration seeks to develop a glass-impregnated concrete for various structural and non-structural applications.

In this project, XL Precast proposes to use recycled glass from kerbside collections to:

- ▶ Replace up to 50% of cement in a concrete mix by using a glass powder
- ▶ Replace up to 40% of sand in a concrete mix by using glass fines

This project intends to provide an environmentally more sustainable solution to construction materials in the form of concrete manufactured from glass waste material. By processing, washing, refining, and pulverising glass particles the project ensures that the product derived from glass waste recycling is suitable to be used in the production of concrete. By alleviating/minimising the consumption of finite and environmentally degrading resources such as sand and cement, the construction industry will advance by the production and supply of construction materials which not only meet Australian Standard specifications but also offer a more sustainable solution to an environmental challenge.

The solution proposed by XL Concrete is superior to other green concrete alternatives due to XL's plan to address the issue of surplus glass waste, which would typically end up in land fill, and repurpose this into sand and cement used in concrete production both on a commercial and residential scale. By setting a precedent within the Australian market and implementing this recycled material into the construction industry, XL Concrete would obtain a high Green Star rated product due to aiding the environment.

### MILESTONES



**CONTRIBUTIONS:** Government – \$192,000 | Industry – \$192,000 | In Kind – \$150,000





## IMPACT

- › Increased spending on R&D
- › Increased collaboration with research institutions
- › Larger patent portfolio
- › Increased number of staff with science, technology, engineering, and maths (STEM) skills
- › Newer equipment
- › More extensive backward links



## GROWTH

- › XL Precast expect sales will build on average at 5% Y.O.Y (year over year), with 20% anticipated growth as soon as 2025



## JOBS

- › XL Precast estimate they will require an additional 10–20 FTE's, including Civil Engineers, Quality Assurance staff and skilled labour

### PROJECT PARTICIPANTS



# OUR PUBLICATIONS

## INDUSTRY-LED RESEARCH



Industry Knowledge Priorities



Sector Competitiveness Plan



Advanced Manufacturing, a new definition for a new era



Building Resilience in Australian Manufacturing



Ten Ways to Succeed in Australian Manufacturing



AMGC Impact – 2015 to Present



## PROJECTS REPORT



Project Report 2018



Project Report 2019



Project Report 2020

## POLICY SUBMISSIONS



Submission to Innovation and Science Australia



Industry 4.0: The Australian Way



Prefab Innovation Hub: Feasibility Study



COVID-19 Manufacturer Response Register Progress Report



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