



Manufacturing innovation made reality

# **The Supersonic Opportunity Additive Manufacturing Company**

30 May 2022



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# Titomic Now Positioned To Win

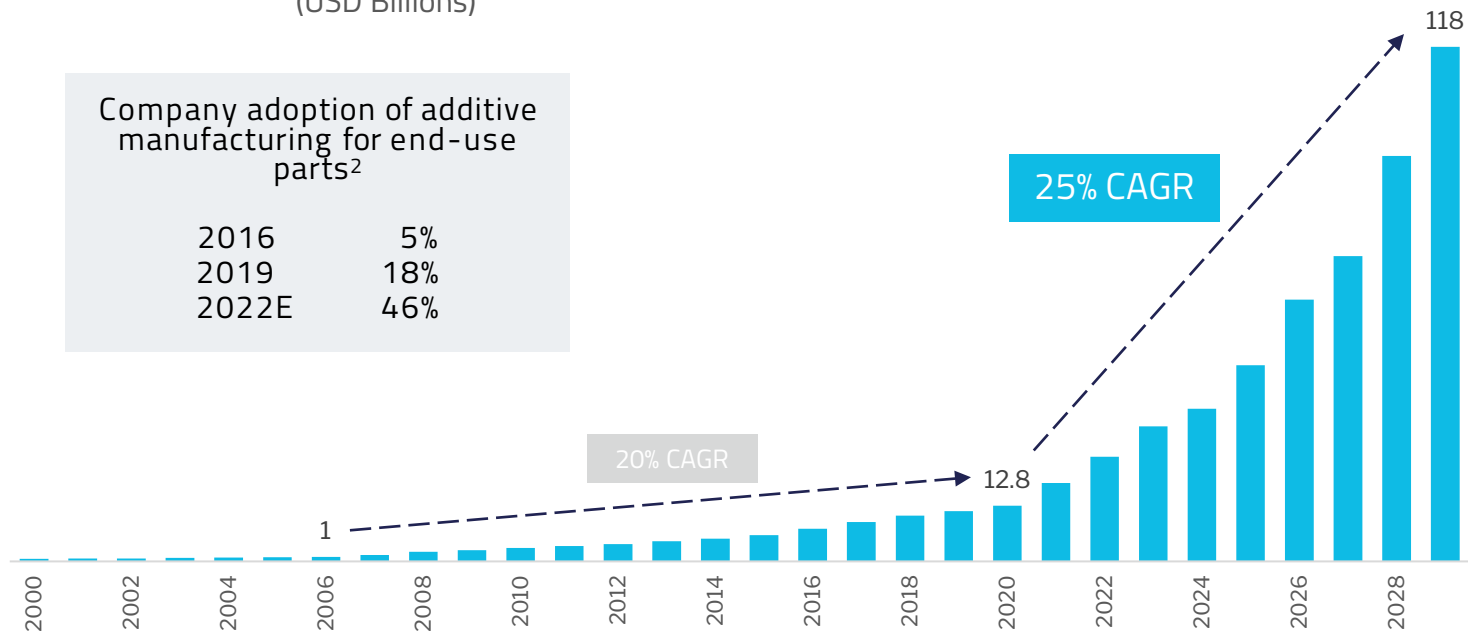
Titomic offers one of the fastest, most scalable, cost competitive and energy efficient additive manufacturing and coating technologies in the world.

1. Large and expanding addressable market	<ul style="list-style-type: none"><li>• Additive market estimated to grow 11x up to \$146B in the next decade</li><li>• Transition from prototyping to mass production</li><li>• Macro-economic challenges in supply-chain and manufacturing provide strong tailwinds</li></ul>
2. World-class leadership team	<ul style="list-style-type: none"><li>• Senior executives in both the management team and the board</li><li>• Extensive scientific and engineering backgrounds</li><li>• Diverse and experienced board across primary target industries</li></ul>
3. Industry-leading innovative technology	<ul style="list-style-type: none"><li>• Superior additive technology for speed, size, sustainability and materials</li><li>• Ability to secure end-to-end supply-chain including metal powders</li><li>• Fast growing technology ready for industrial use in less than two years</li></ul>
4. Fast growing customer interest in key markets	<ul style="list-style-type: none"><li>• Established footholds in key geographic locations (U.S, Europe, Australia)</li><li>• Fast growing customer demand driven by supply-chain and geopolitical needs</li><li>• Distinct product portfolio supporting growth in multiple, adjacent markets</li></ul>
5. Distinct, repetitive revenue streams	<ul style="list-style-type: none"><li>• Joint-venture and subscription models supporting recurring revenue streams</li><li>• Long-term business outlook drives margin improvements as business scales</li><li>• Organic growth funded with capital raise</li></ul>
6. Industry consolidation allowing inorganic growth	<ul style="list-style-type: none"><li>• Ownership of entire solutions stack made possible by consolidating small, existing players</li><li>• \$80m inorganic revenue identified in three countries</li></ul>



# Additive manufacturing to grow over 11x in the next decade

Additive Manufacturing Market Size<sup>1</sup>  
(USD Billions)



## Evolution of the AM Market

### Additive 1.0

- Key players now off-patent, leaving them with minimal differentiation and commoditized technology
- Significant loss in market share to open source and low-cost providers
- Have not participated in market growth due to focus on design and rapid prototyping

### Additive 2.0

- Additive 2.0 innovation is being driven by VC-funded, emerging players across printers, materials and parts businesses
- New players are driving advances in speed, accuracy, material variety and build volume/size
- Focus on mass production and end-use parts is driving market growth (certain industries ahead in maturity curve)

1. Source: Wohlers Report 2020

2. Source: "3D printing: hype or game changer?" Ernst & Young Global Report 2019.



# Metal driving growth above average of Additive Manufacturing

Growth of AM driven by accelerated adoption in key manufacturing industries

Supply chain pressures are increasing the need for manufacturing at point of use

Additive manufacturing can reduce supply chain complexity

The introduction of new materials offers increased part performance

## Cold Spray offers further benefits

High speed manufacturing

Wide range of materials

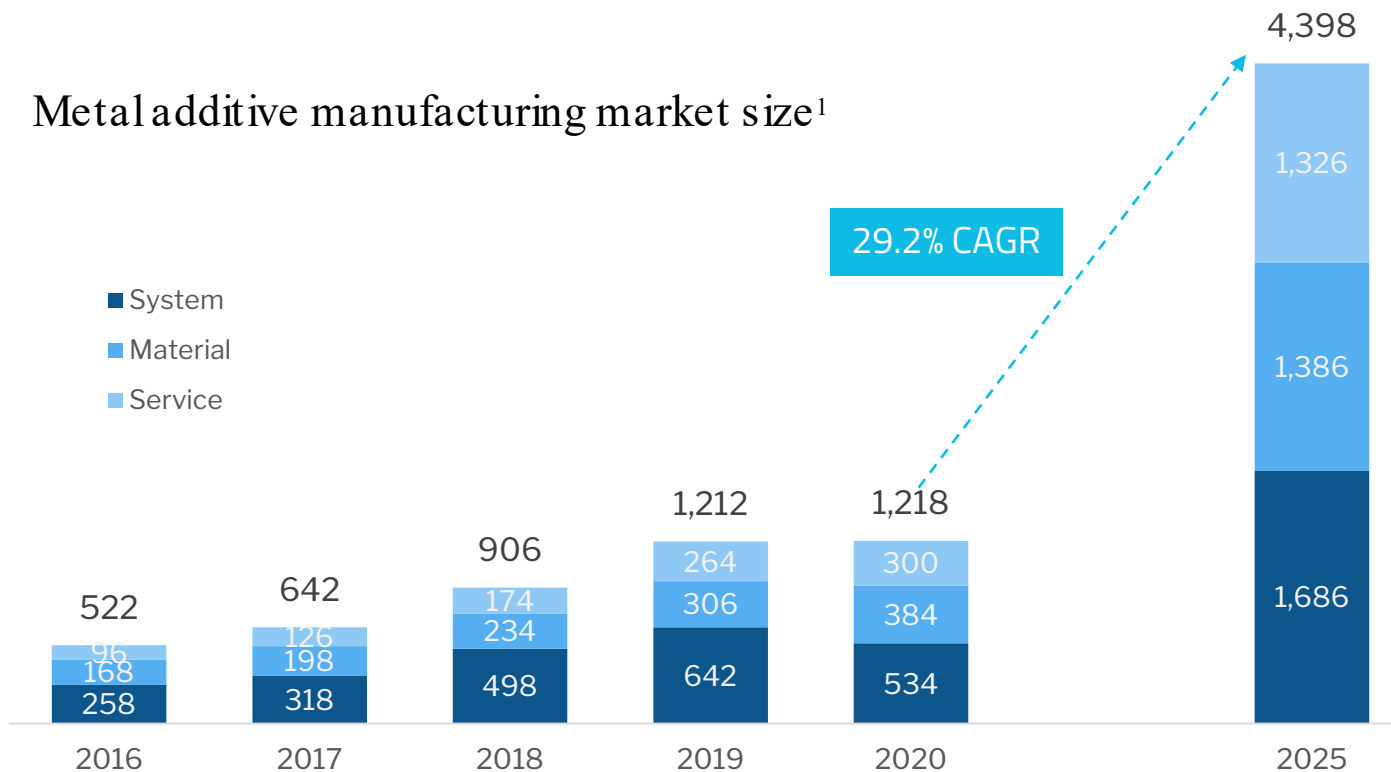
Reduced manufacturing costs

Flexibility of solutions – handheld and portable to robotically operated

Ability to use both spherical and non-spherical powders

Technology maturity approaching industrial use

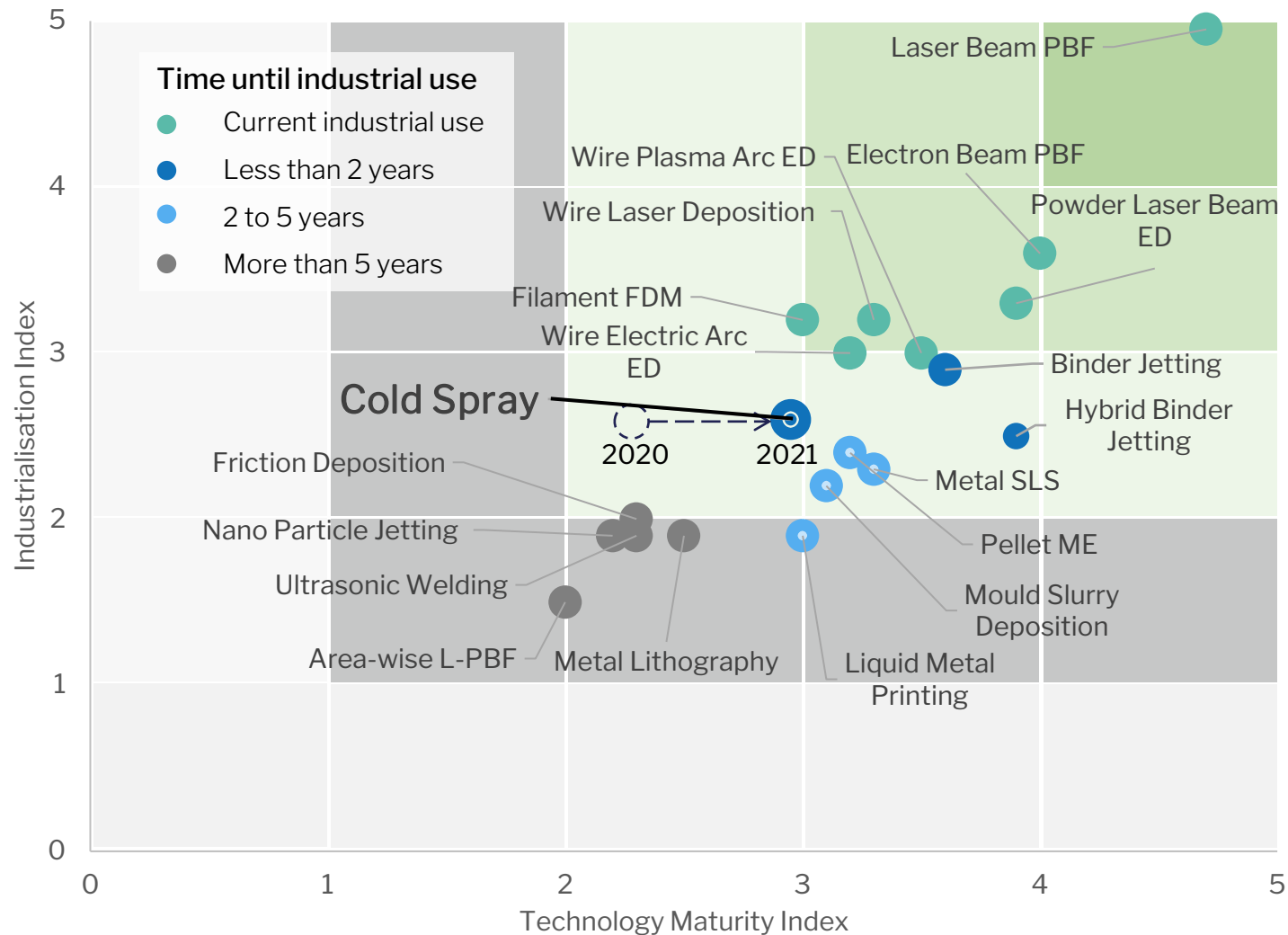
Metal additive manufacturing market size<sup>1</sup>



1. Source: AMPower 2021 Report  
All figures in millions of AUD



# Metal Additive Manufacturing Maturity Index



Source: AMPower 2022 Report

Cold Spray continues to mature towards widespread industrial use in AM

Note that this chart is for AM only and not coatings, where Cold Spray is already experiencing widespread industrial use

PBF: Powder Bed Fusion  
L-PBF: Laser Powder Bed Fusion  
ED: Energy Deposition  
SLS: Selective Laser Sintering  
FDM: Fused Deposition Modelling  
ME: Material Extrusion



# Leadership with proven industry experience



**Herbert Koeck**

Managing Director



**Jon Nield**

Chief Financial Officer



**Colin Horman**

Chief Operating Officer



**Klaas Rozema**

General Manager Titomic Europe



**Bruce Colter**

General Manager Titomic USA



**Max Osborne**

Head of Engineering



**Neil Matthews**

Head of Business Development  
Coating and Repairs



**Dominic Parsonson**

Head of Sales



**Chris Healy**

Legal Counsel  
Company Secretary

BondAdviser



**Michael Rochford**

Head of HR



Titomic holds a combined 165 years of Cold Spray Technology experience in the Staff and Board



# Board directors with global coverage and experience



**Humphrey Nolan**  
Non-Executive Chairman



**Herbert Koeck**  
Managing Director



**Mira Ricardel**  
Non-Executive Director



**Dag Stromme**  
Non-Executive Director



**Jeff Lang**  
Non-Executive Director



**Andreas Schwer**  
Non-Executive Director



**Richard Willson**  
Non-Executive Director





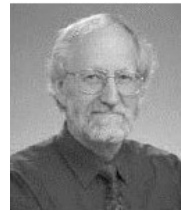


# Technical Advisory Committee facilitating innovative solution development



**Professor Rhys Jones AC**

- Previously Research Leader (Aircraft Structures) in the Australian Defence Science and Technology Organisation
- Former Chair Professor of Mechanical Engineering at Monash University
- Internationally renowned for his pioneering work in extending the operational life of aircraft



**Dr Richard Hannink**

- Honorary Fellow at CSIRO Manufacturing
- Member of the Victorian Committee of the Australian Academy of Technology and Engineering
- Extensive expertise in characterising microstructure-property relationships of metals and their relationship to industrial applications and performance



**Dr Airlie Chapman**

- PhD degree from the William E. Boeing Aeronautics and Astronautics Department at the University of Washington
- Lecturer in the Department of Mechanical Engineering at the University of Melbourne
- Research across multiple disciplines with applications to robotics and aerospace systems



**Steve Georgiadis**

- Aeronautical Engineer with MBA in Technology Entrepreneurship
- Expert in structural analysis methods for aerospace applications
- 34 years experience at Boeing working on new materials architectures and analysis techniques for military and commercial programs



**Prof Ivan Cole**

- Currently Enabling Capability Director for Advanced Manufacturing and Fabrication at RMIT
- Previously Acting Chief CSIRO Manufacturing and Materials Technology
- Internationally recognised leader in the field of life prediction, prognostics and design and fabrication of engineered structures



**Professor Raman Singh**

- Professor at Monash University in the Department of Mechanical and Aerospace Engineering
- Primary research expertise is in corrosion and corrosion mitigation of steels and light alloys



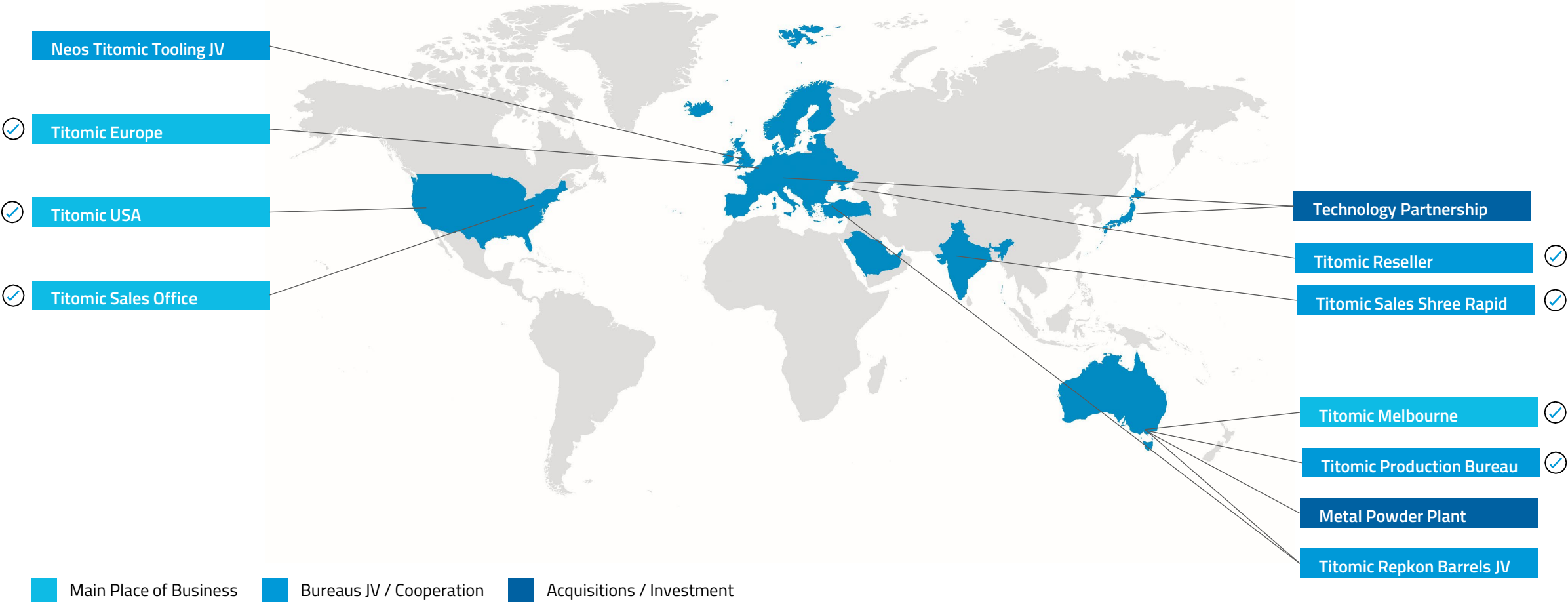
**Professor Emad Gad**

- Dean of Engineering, Swinburne University of Technology
- Extensive experience in structural dynamics, structural connections, experimental techniques and finite element modelling



# Taking our technology to the world – Global footprint

We're on track to expand across Australia, Europe, US and beyond.

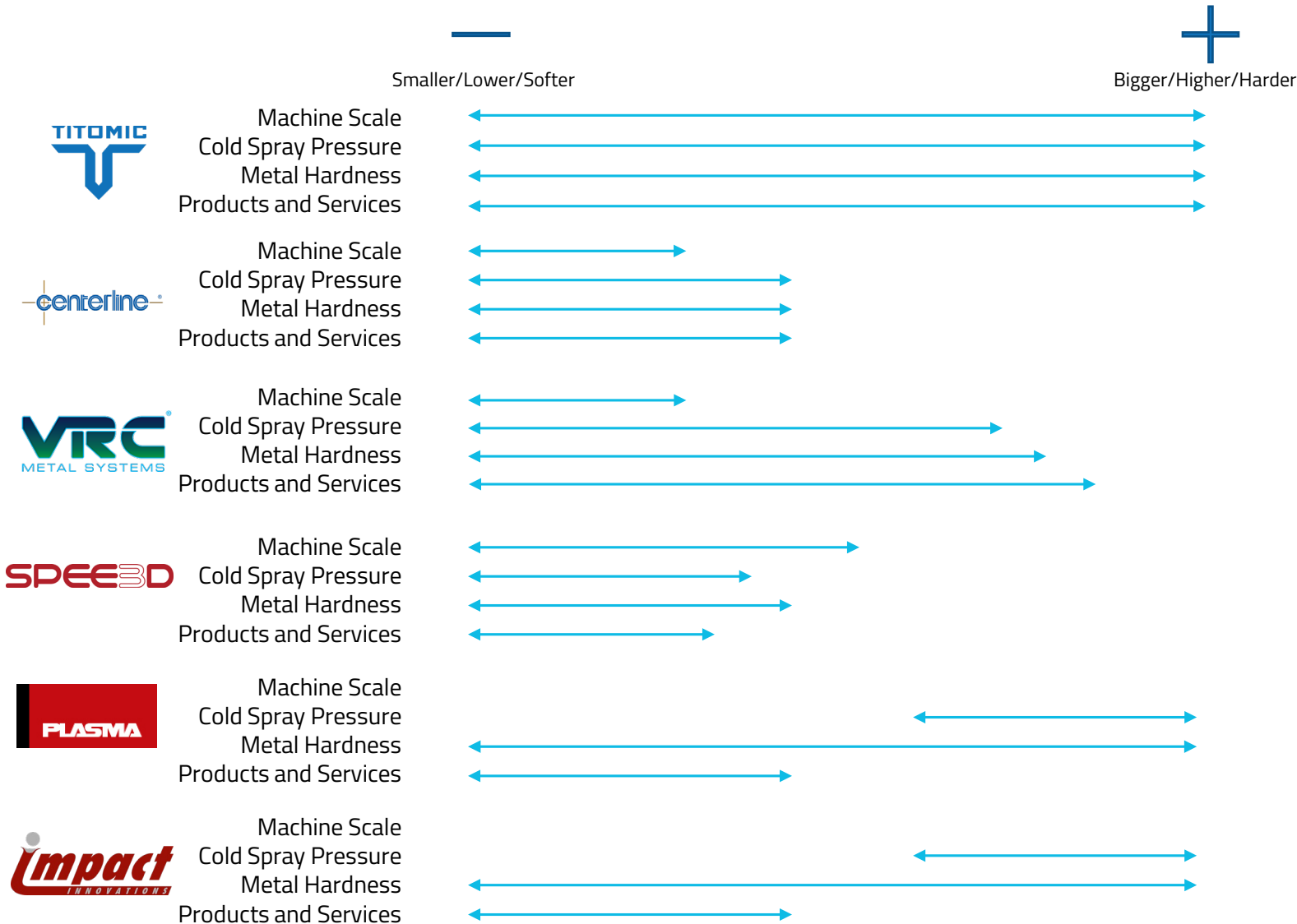


Main Place of Business    Bureaus JV / Cooperation    Acquisitions / Investment

Completed



# Widest Range of Products & Solutions



Titomic is the only Cold Spray company offering:

- Low to high pressure Cold Spray
- Soft to hard metals
- Small to large scale machines
- Products and services
  - Machines
  - Joint Ventures
  - Workflow Solutions
  - Business Development
  - Consumables and Servicing
  - Reseller Network



# Existing diverse and customisable machine portfolio



## TKF 9000

- High pressure Cold Spray additive manufacturing and coating
- Demonstration of Titomic's ability to engineer and construct bespoke AM systems
- Build volume of 40.5m<sup>3</sup>
- Deployed in the Titomic Melbourne Production Bureau



## TKF 1000

- High pressure Cold Spray additive manufacturing and coating
- Designed for prototyping and low volume production tasks
- Build volume of 0.75m<sup>3</sup>
- 1<sup>st</sup> gen system operating at Titomic Melbourne Bureau
- 2<sup>nd</sup> gen system under construction for TWI (UK)



## ISB Series

- Low pressure Cold Spray coating
- Robotic or linear coating system
- Automated loading and unloading of parts
- Utilises D523 core cold spray system
- Ideal for R&D deployment or as a base for customised automated coating systems



## D523

- Low pressure Cold Spray coating
- Modular portable repair system
- Designed for robotic or manual repair and coatings
- Deployable for in-field repairs

# Our rapidly growing trusted global customer base



Mercedes-Benz





# Five distinct fast growing revenue streams

1. Machine Sales	2. Joint Ventures	3. Workflow Solutions	4. Application Development	5. Resellers
<p>Broad range of machine solutions</p> <ul style="list-style-type: none"><li>TKF 1000</li><li>TKF Custom</li><li>ISB Series</li><li>D Series</li></ul>	<ul style="list-style-type: none"><li>Building industry capability for manufacturing</li><li>Fast access to existing markets</li></ul>	<ul style="list-style-type: none"><li>Automated solutions to maximise uptime</li><li>Improved manufacturing productivity and efficiencies</li></ul>	<ul style="list-style-type: none"><li>Development, prototyping and testing for strategic application pillars</li></ul>	<p>Territory Coverage</p> <ul style="list-style-type: none"><li>India</li><li>Middle East</li></ul>
<p>Service, Maintenance, Materials (powders), Consumables, Consulting</p>				
<ul style="list-style-type: none"><li>TWI</li><li>D&amp;C Coating</li><li>Lufthansa</li><li>Flohe</li></ul>	<ul style="list-style-type: none"><li>Repkon JV</li><li>Nèos JV</li></ul>	<ul style="list-style-type: none"><li>Vetropack</li><li>Gallo Glass</li><li>Brauntell</li></ul>	<ul style="list-style-type: none"><li>Boeing</li><li>Fleet Space</li><li>Thales</li><li>Royal Australian Navy</li><li>Airbus</li><li>Inovor</li><li>BAE Systems</li><li>Triton</li><li>...</li></ul>	<ul style="list-style-type: none"><li>Shree Rapid</li></ul>

## ADDITIVE MANUFACTURING

Barrels

Tooling

Ballistics

Structures

Embedded Sensors

## COATINGS & REPAIRS

Wear Resistance

Repairs

Corrosion

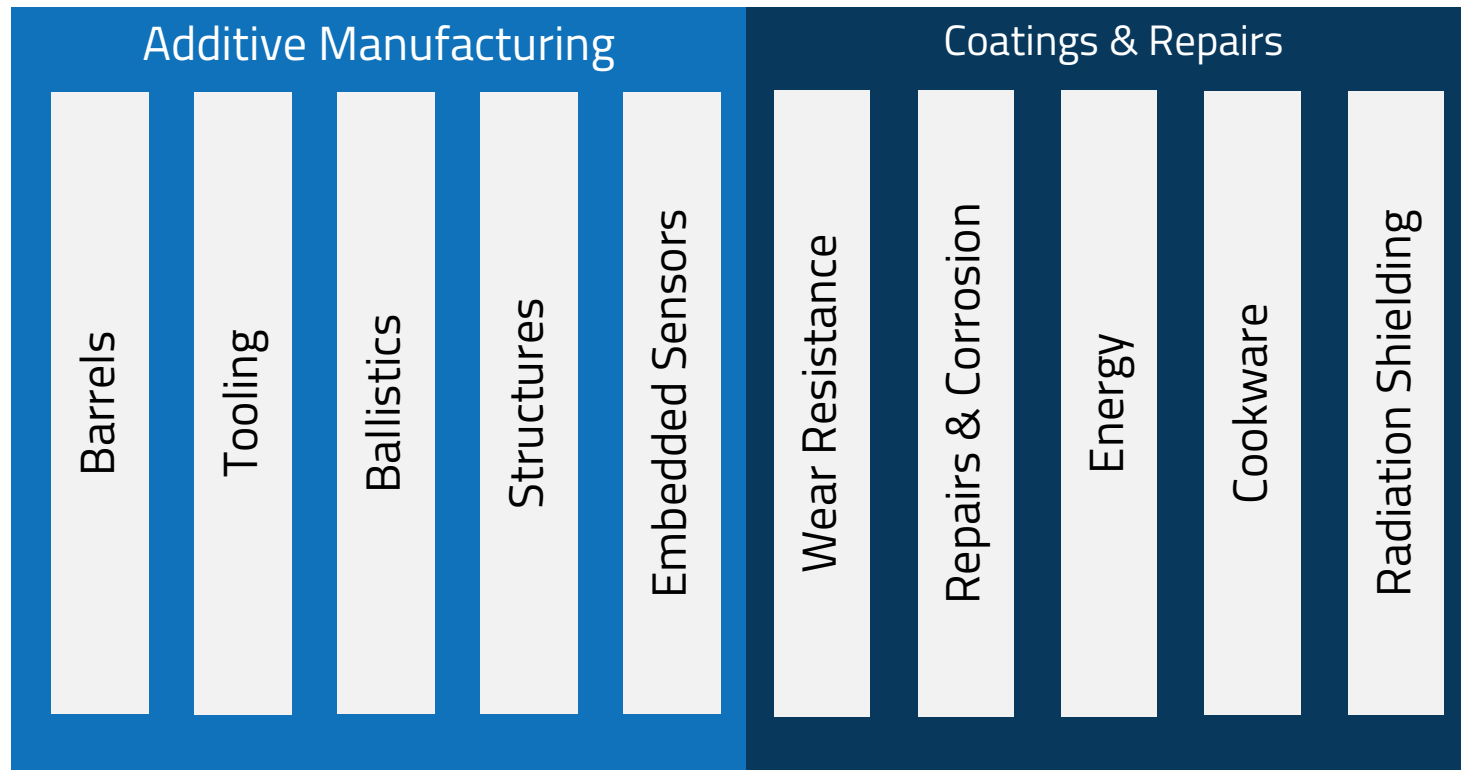
Energy

Cookware

Radiation Shielding

# Strategic Application Pillars

Disciplined and focussed execution













- Narrowed from 167 individual applications
- Focussed on 5 AM and 6 coating application categories



# Targeting growing markets

## Market Sizes and Estimated Revenues

Additive Manufacturing			
	Application	Estimated Market	Target Revenue to FY27
	Barrels	\$16.9b	\$50m*
	Tooling Faceplates	\$700m	\$60m*
	Ballistics	\$24.8b	\$15m
	Structures	\$7.0b	\$49m
	Embedded Sensors	\$1.0b	\$18m

Repair and Coatings			
	Application	Estimated Market	Target Revenue to FY27
	Wear Resistance	\$23.6b	\$36m (glass)
	Repairs & Corrosion	\$15b	\$68m
	Energy	\$14.1b	\$15m
	Cookware	\$2.5b	\$15m
	Radiation Shielding	\$5.0b	\$11m#

\* Revenues in joint ventures. This revenue will not be reported by Titomic, rather dividends will be returned from net profits

# Radiation Shielding may not generate a large amount of revenue, but opens the door to a number of exciting applications in the space industry. Additionally, minimal investment is required to enter the market as technical solution development is completed.





# Titomic now kicking goals

Great progress made in last 12 months

Category	Application	Prior to FY2022	FY2022	FY2023	FY2024	FY2025	FY2026	FY2027
Additive Manufacturing	Barrels	Validate Technology	JV Agreement with Repkon	JV Setup				
	Tooling	Validate Technology	JV Agreement with other partners	JV Agreement with Neos	JV Setup			
	Ballistics	Initial Testing	STANAG Lv3	MIL 46077G	STANAG Lv2			
	Structures	Develop TKF Systems	Sale of TKF 1000 to TWI	Further sales of TKF 1000s				
	Embedded Sensors	Prototype Bytepipe	Test with Industry Partner					
Coating and Repairs	Wear Resistance	Develop Glass Mould Coating System	Installed at Vetropack					
	Repairs & Corrosion		Acquire Dycomet					
			Hire Neil Matthews					
	Energy	Develop Silver coating for busbars						
		Develop copper spray for MWT solar panels						
Cookware			Validate Materials					
			Validate solution efficacy					
Radiation Shielding		Award of Space Grant						
		Demo and test Radiation Shielding						



# Barrels

Titomic enabling high performance barrels

## Value Proposition

- Unique manufacturing solution for high performance barrels
- The process combines the TKF system and Repkon's patented free flowforming technology
- Enabling better material selection for:
  - Improved erosion and corrosion resistance
  - Improved strength to weight ratios
  - Higher velocity rounds



Repkon's flowforming technology

## Progress

- Repkon JV agreement being negotiated
  - Demonstrator barrels supplied
  - Qualification of demonstrators underway
- Further JVs to be explored globally

## Market

- Revenue will be in the JVs (equity accounted)
  - Likely to commence from late 2023
- Revenues of up to \$50m to FY27



Barrels

Targeting the Defence Industry



# Tooling

Titomic enabling a simplified supply chain

## Value Proposition

Offers numerous benefits for our partners and customers

- Improved lead times
- Near net shape – Minimal post-production and machining
- TKF process makes Titanium tooling a viable option (stronger, thinner, lighter, corrosion resistant)
- Reduced welding, assembly and lead times
- Multi-material solutions, for improved heat distribution
- Ability for embedded sensors, heating and cooling

## Progress

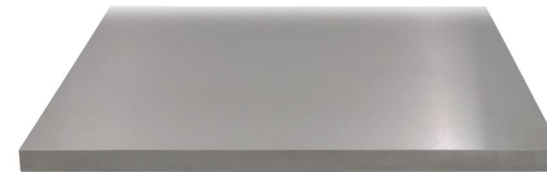
- Neos JV agreement being negotiated
  - Demonstrator faceplates supplied
- Further JVs being explored globally (4 additional players already in pipeline)

## Market

- Revenue will be in the JVs (equity accounted)
  - Likely to commence from mid 2023
- Revenues of up to \$60m to FY27



Invar Face Plates



Invar Repair



Titanium Tooling

Tooling

Targeting the Aerospace & Defence Industries



# Ballistics

Titomic enabling lighter, monolithic protection

## Value Proposition

- Affordable and lightweight titanium armour
- Near net shape manufacturing
- Monolithic structures – weldless assembly
- Tailored performance with multi-material architectures
- Weight reduction enables
  - Increased speed, range and space

## Progress

- STANAG and MIL standard benchmark testing
- Mechanical performance optimisation

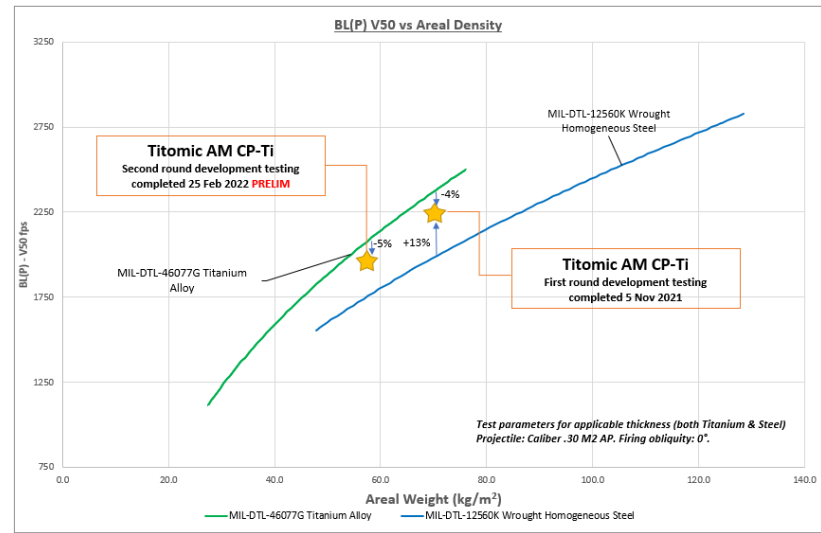
## Market

- New and upgrade of
  - Armoured vehicles
  - Naval vessels
  - Lightly armoured aircraft/helicopters



## Ballistic Protection

Targeting the Defence Industry





# Manufacturing made sustainable



## Structures

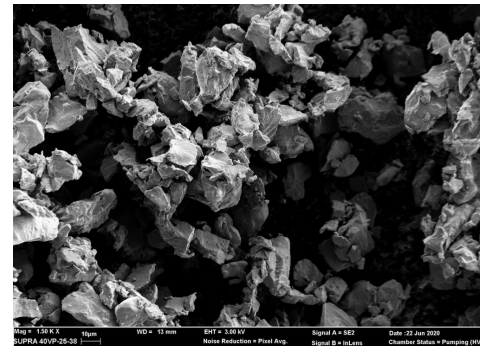
Exploiting Titomic's technology to make titanium manufacturing more widespread

# Structures

Titomic enabling commoditisation of titanium

## Value Proposition

- Affordable titanium structures
- Near net shape manufacturing
- Green Titanium : Mineral to Market
- Low cost HDH titanium powder
- Melt-free manufacturing process
- Energy, Emissions, Environmental benefits

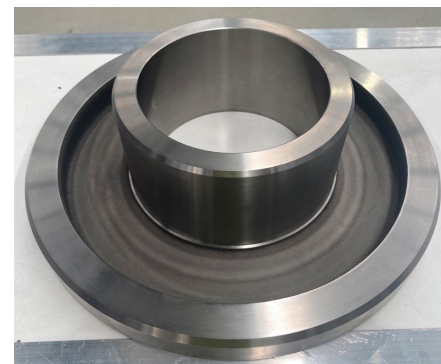


## Progress

- Engineering projects underway for technical validation of material and manufacturing processes
- Material development – executing mechanical properties program
- Manufacturing development – repeatable and robust process
- High value-added applications identified

## Market

- High end steel manufacturing
- Existing Titanium manufacturing





# Wear Resistance – Glass Equipment

Titomic maximising uptime

## Value Proposition

- Unique material solutions for functional coatings
- Improved durability
- Increased uptime
- Sustainable solution through increased lifespan

## Progress

- Installation of first automated commercial production machine
- Extending material portfolio to expand applications to adjacent use cases

## Market

- Glass packaging industry worth \$51b growing at CAGR 4.4%
- Revenue will flow from sales of powder, nozzles, consumables and servicing



Glass Equipment Coatings

Targeting glass manufacturing industries



# Repairs & Corrosion

Titomic extending asset life

## Value Proposition

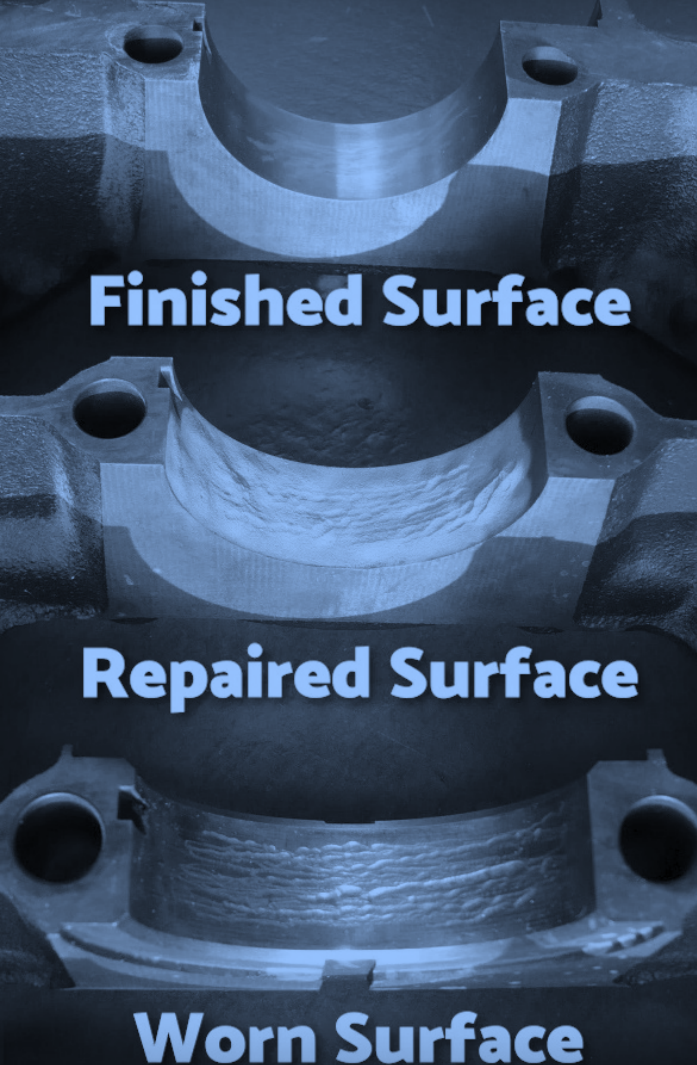
- Unique material solutions for repair
- Ability to restore geometries
- Repair in-situ
- Cold solid state repair process – no hot work
- Increase of functionality

## Progress

- Proven process and materials
- Mature solutions platform
- Global sales network with off-the-shelf solution

## Market

- Corrosion costs the global economy up to an estimated \$2.5 trillion annually<sup>1</sup>
- The cost of corrosion remediation in Australia is estimated at \$78b annually<sup>2</sup>



Coating and Repair

Targeting Mining, Oil & Gas, Transport and Marine Industries





# Radiation Shielding

Titomic creating tailored, cost-effective shielding

## Value Proposition

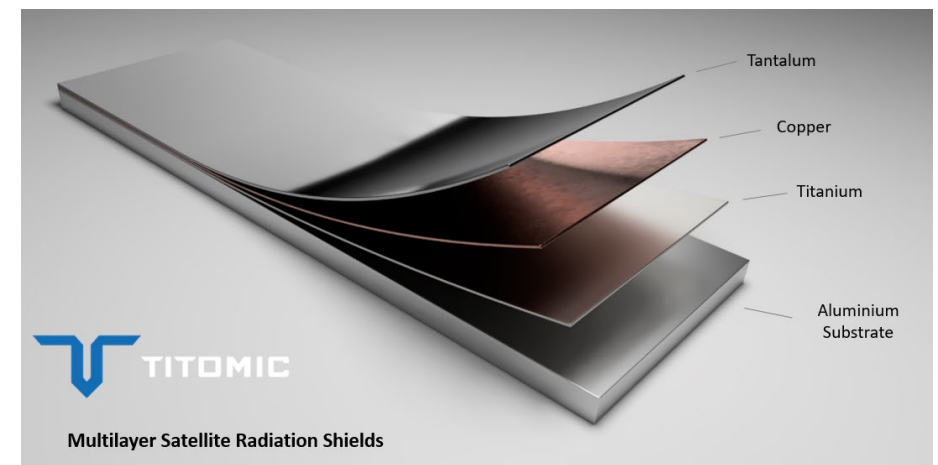
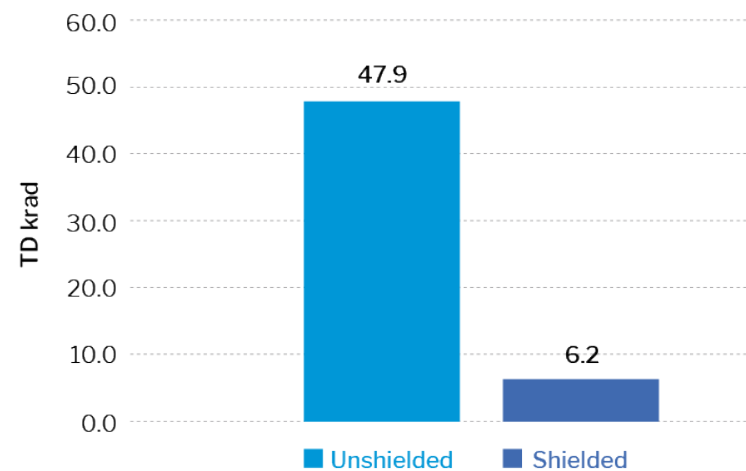
- Extending life of satellites
- Mission specific tailored designs
- Weight efficient shielding
- Cost-effective

## Progress

- Capability to analyse and model missions
- Design shields for corresponding dose requirements
- Proven manufacturing capability

## Market

- Applications across a broad range of satellite platforms
- Medical devices



Radiation Shielding  
Targeting the space industry





# Titomic is setup for growth

Titomic is generating revenue in every selected segment

Category	Estimated Market Size <sup>1</sup>	Expected revenues to 2027 <sup>2</sup>
Additive Manufacturing	\$50.4b	\$192m
Coatings & Repairs	\$60.2b	\$145m
<b>Total</b>	<b>\$110.6b</b>	<b>\$337m *)</b>

\*) Revenues may be reported in joint ventures. This revenue will not be reported by Titomic, rather dividends will be returned from net profits

<sup>1</sup>Market sizes are based on products of which Titomic will manufacture sub-components.

- E.g. for barrels the market size represents the entire weapon/grenade launcher. The barrel and coating makes up only a portion of this.

<sup>2</sup>Some revenues are attributable to JVs

- Barrels (Repkon) and Tooling Faceplates (All)
- In reality these will be reported as a note to the financial statements
- Profits taken as dividends for Titomic (equity accounted)

All figures in AUD



# Other Information

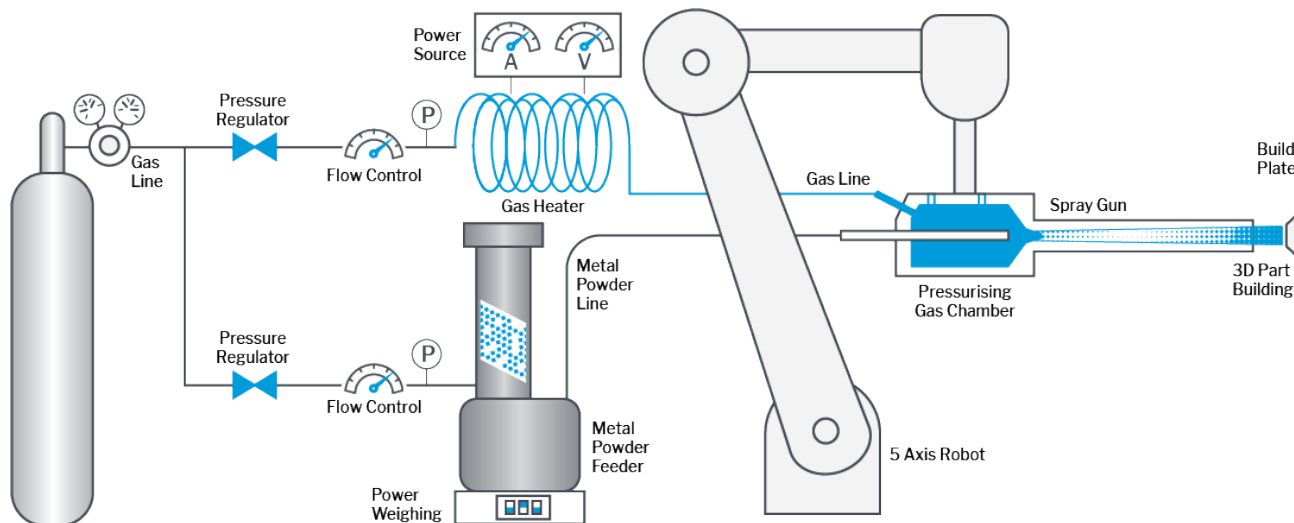


# Superior speed and size

## Titomic Kinetic Fusion (TKF)

- Exclusive rights to commercialise a form of cold spray additive manufacturing developed with CSIRO
- This process, called Titomic Kinetic Fusion (TKF), employs cold spray technology using compressed gas to accelerate metal powder particles at supersonic speed, which bond together to form a layer upon impact

## The TKF process



## Key attributes of the TKF process

### Speed

- Up to 3x faster than other Additive Manufacturing (AM) processes

### Size

- Highly Scalable
- Up to 9m x 3m x 1.5m

### Sustainable

- Less energy use and material waste

### Cost effective

- Ability to use wide range of metal powders
- Cost competitive grade metal powders of dissimilar particle sizes and irregular shapes

### Multiple Metals

- Build with almost any metal in a powder form
- Unique ability to combine different materials in a single part



## Certifications

Over the last two years Titomic has put substantial resources into achieving a variety of key certifications in preparation for supply to the Aerospace sectors and is ISO27001, ISO9001 and AS9100D certified.



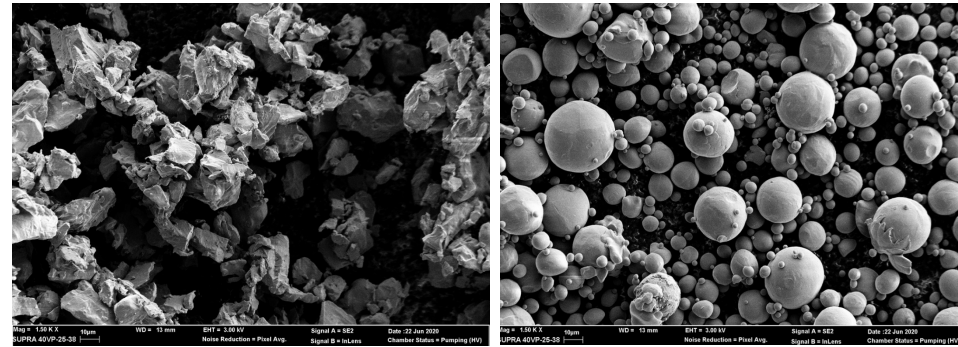


# Unique powder supply for lower cost titanium

## Cost effective and clean

Our TKF process can use hydride-dehydride (HDH) titanium powders to cut the cost and boost the performance of titanium parts.

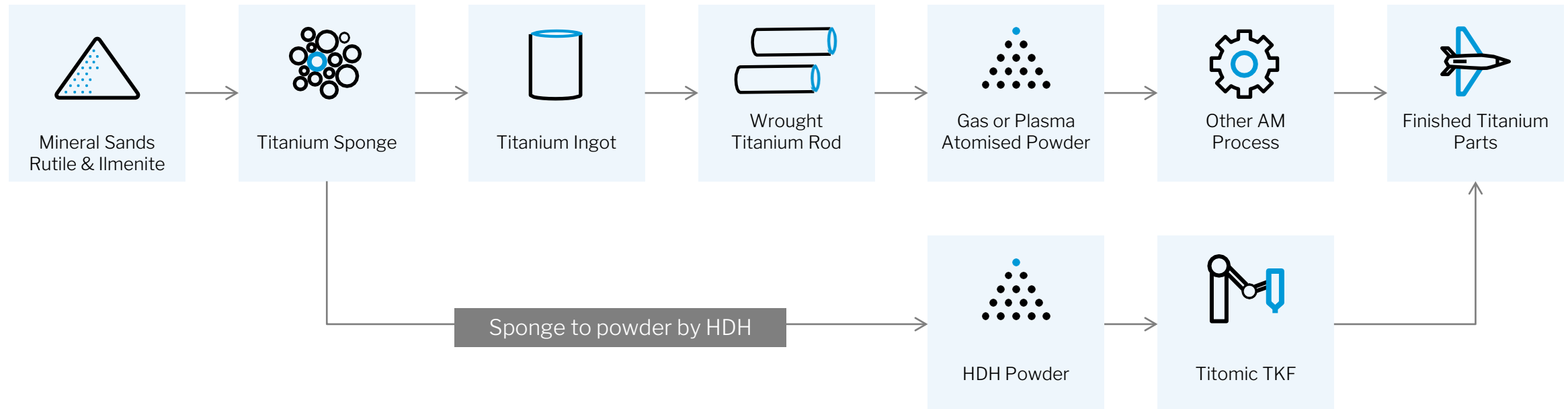
This clean hydrogen technology has low carbon emissions as compared to gas atomised powders and wrought titanium products.



SEM micrographs

Right: Spherical titanium powder

Left: Irregularly shaped HDH titanium powder





# Overview of the Cold Spray Industry



Country	Canada	USA	Australia	Germany	Japan	Germany	Australia	USA
Year Established	1957	1989	2014	1938	1980	2010	2017	2013
Company Type	Private	Private	Private	Public	Private	Private	Public	Private
No. of Employees	1000*	6	34	1225*	27	22	44	54
Revenue	N/A	N/A	\$1.37M	€231.4M*	\$10.2M	\$4M	\$2M	N/A
Funding	-----	-----	\$2.34M	-----	-----	-----	\$48M	-----
System Prices	\$100-140K	\$230K	\$300-700K	N/A	\$365-500K	\$280-346K	\$75K-9M	\$350K
System Components	✓	✓	✗	✗	✓	✓	✓	✗
Turnkey Systems	✓	✓	✓	✓	✗	✗	✓	✓
USP	Low cost systems	Low pressure system with ability to create supersonic gas flow	Low-cost systems. Easy to program. Freeform deposition	CNC machine integration. Steam rather than Nitrogen/Helium	High deposition rates, long experience in industry	Industrial quality cold spray equipment	Huge build volumes, industry leading deposition rates, portable solutions	Portable high-pressure CS systems. Ideal for in-field repair

Business Fundamentals

\* Company's primary business is not cold spray



# TITOMIC

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