



# Titomic Investor Day

22 March 2022



# Agenda

|                                  |          |
|----------------------------------|----------|
| Registration                     | 9.45 am  |
| Overview & Strategy Presentation | 10.00 am |
| Application Development          | 10.30 am |
| Break                            | 11.30 am |
| Safety Briefing & Factory Tours  | 11.45 am |
| Regroup                          | 12.15 am |
| Lunch                            | 12.30 pm |



## Speakers



**Herbert Koeck**  
Managing Director



**Colin Horman**  
Head of Strategy Execution



**Max Osborne**  
Head of Engineering



**Dominic Parsonson**  
Head of Sales



**Klaas Rozema**  
General Manager Titomic Europe



# Titomic Overview

Herbert Koeck    Managing Director

Klaas Rozema    General Manager Titomic Europe



# Titomic

- Founded in 2014 to optimise and commercialise a new type of additive manufacturing process, developed with the CSIRO, using cold-gas spraying of metal particles to produce 3D structures
- This patented process is known as Titomic Kinetic Fusion (TKF), which Titomic has exclusive rights to commercialise
- Providing cutting-edge cold spray technology and solutions for our customers, changing the way manufacturing is done
- Scaling globally through joint venture partnerships with Tier 1 suppliers to the defence and aerospace industries
- Seamlessly integrating TKF technology into partner supply chains, enabling customers to improve build quality and speed, while minimising environmental footprint
- Titomic now has a global footprint with offices in Europe and the USA, staffed with experts in Cold Spray technology



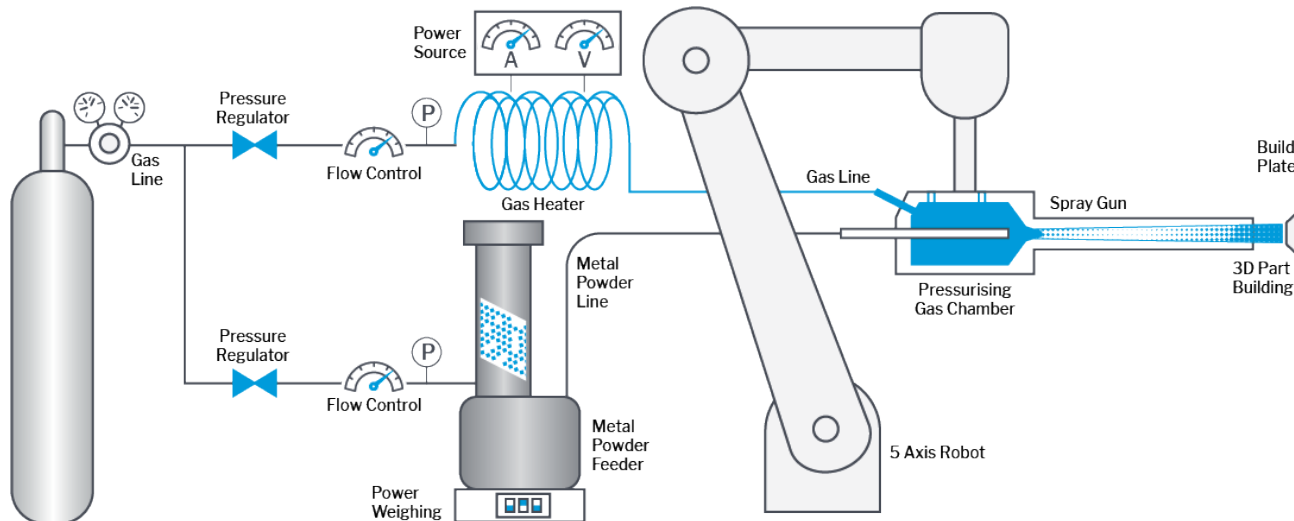


# Superior speed and size

## Titomic Kinetic Fusion (TKF)

- Exclusive rights to commercialise a new 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

- 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.





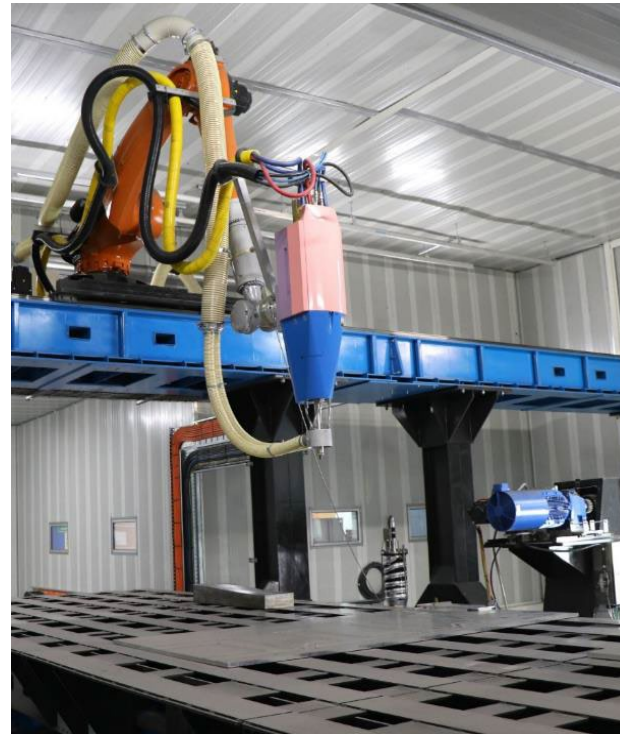
# Titomic Kinetic Fusion (TKF) Systems

## TKF1000



- Modular industrial-scale AM and coating system
- Designed for prototyping and low volume production tasks
- Build volume of 0.75m<sup>3</sup>

## TKF9000



- Located in Titomic's Melbourne Bureau
- Demonstration of Titomic's ability to engineer and construct bespoke AM systems
- Build volume of 40.5m<sup>3</sup>

Unmatched value, certainty and confidence

### Aerospace



Less welding and forming



Less material than billet



Better buy-to-fly ratio



Minimal machining

### Defence



Lighter and faster manufacturing



Large single piece geometries



Minimal fabrication



For multiple threat levels

### Oil and Gas



Faster manufacturing



Less machining than stock bars and rods



Better performance than castings



High strength at high temperatures



# Titomic Europe

- Titomic acquired Dycomet in December 2021
- European OEM of Cold-Spray Equipment
- Industry leader, established in 2006
- Services 10+ industries (Rail, Mining, Automotive, Transport, Off-shore, Defence, Aerospace, Energy...)
- Over 70 machines sold in the last 5 years to customers including -







# Low Pressure Cold Spray (LPCS) Systems

D523



- Modular portable repair system
- Designed for robotic or manual repair and coatings
- In-field repairs possible

ISB Series



- Robotic or Linear Systems
- Automated loading and unloading of parts
- Low Pressure D523

Unmatched value, certainty  
and confidence

## Repairs and Coatings



No welding



Minimal  
machining



Geometry Repair



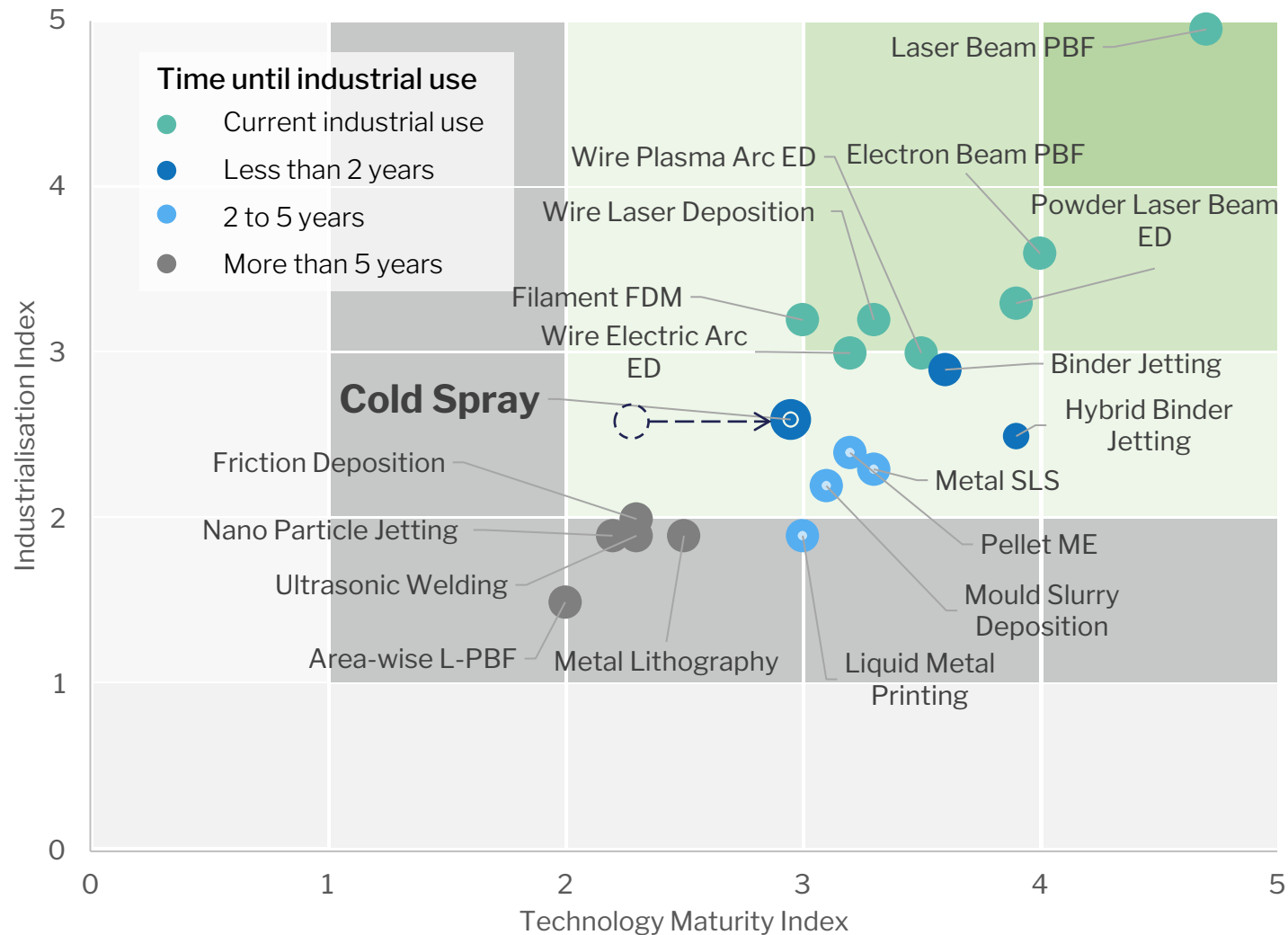
Fast



Minimal  
fabrication



# 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



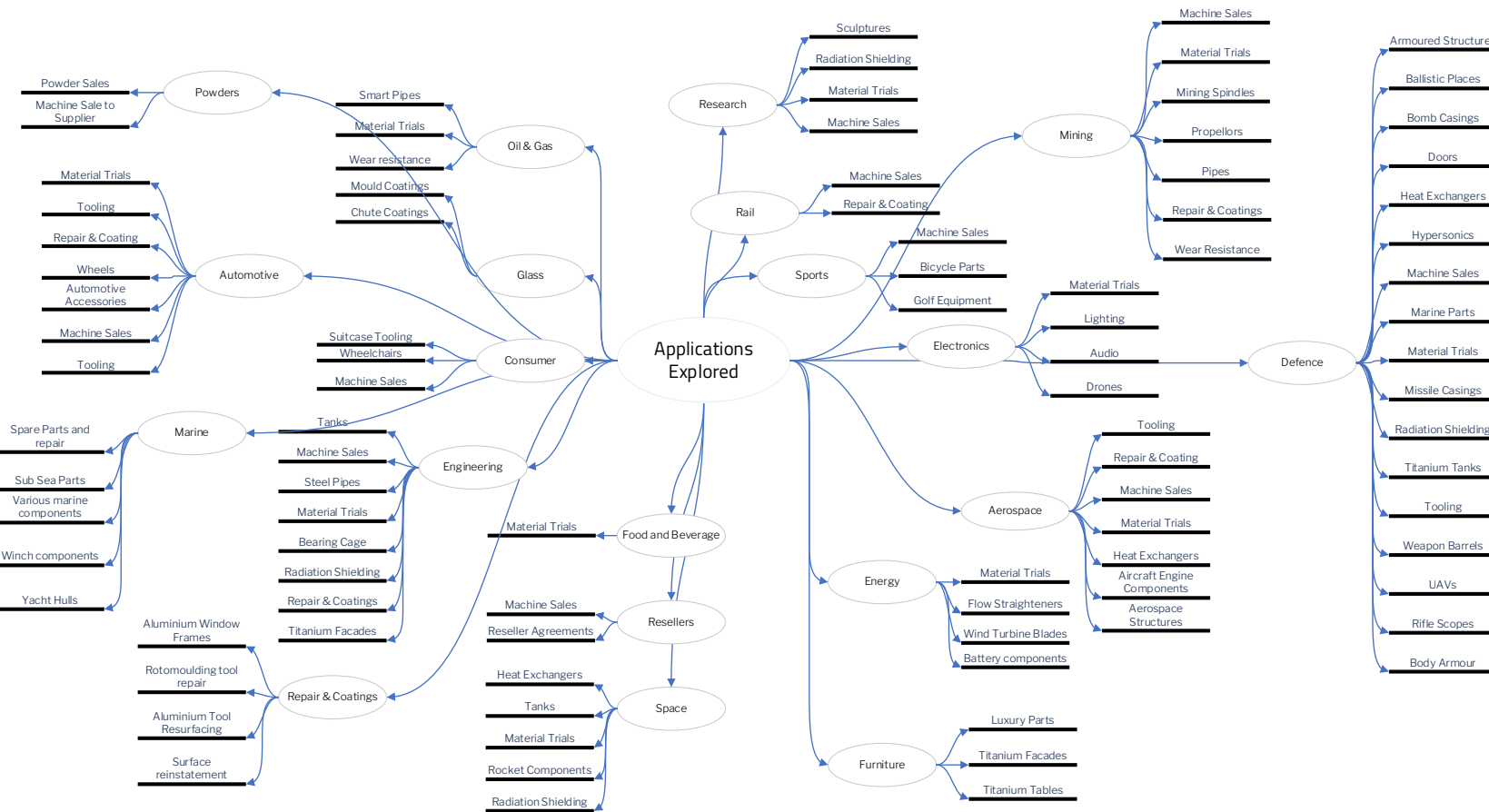
# Strategic Assessment

Colin Horman – Head of Strategy Execution



# Past Application Candidates

A mile wide and an inch deep... but great learnings



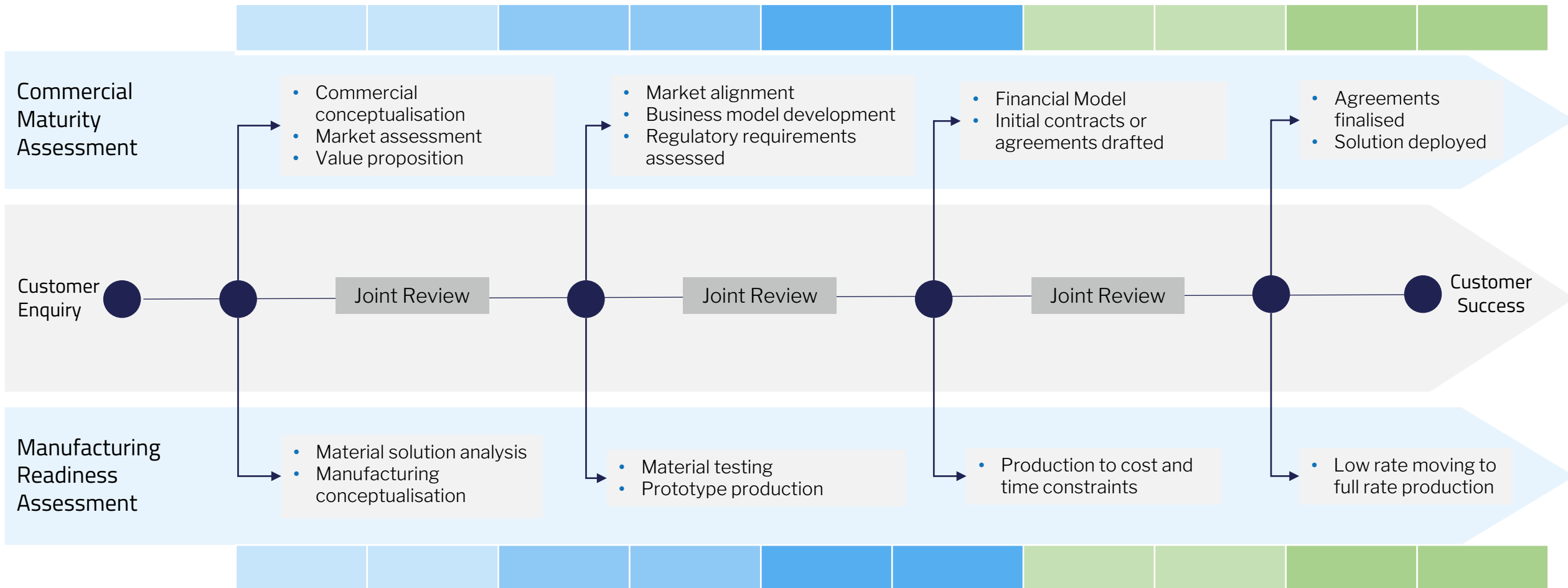
## Applications explored

- Since foundation, Titomic has explored hundreds of application possibilities across a number of industries
- With so much experience, we are able to narrow our focus and apply our learnings to commercialise the most promising applications



# Journey from concept to production

Our methodology for providing solutions to our customers





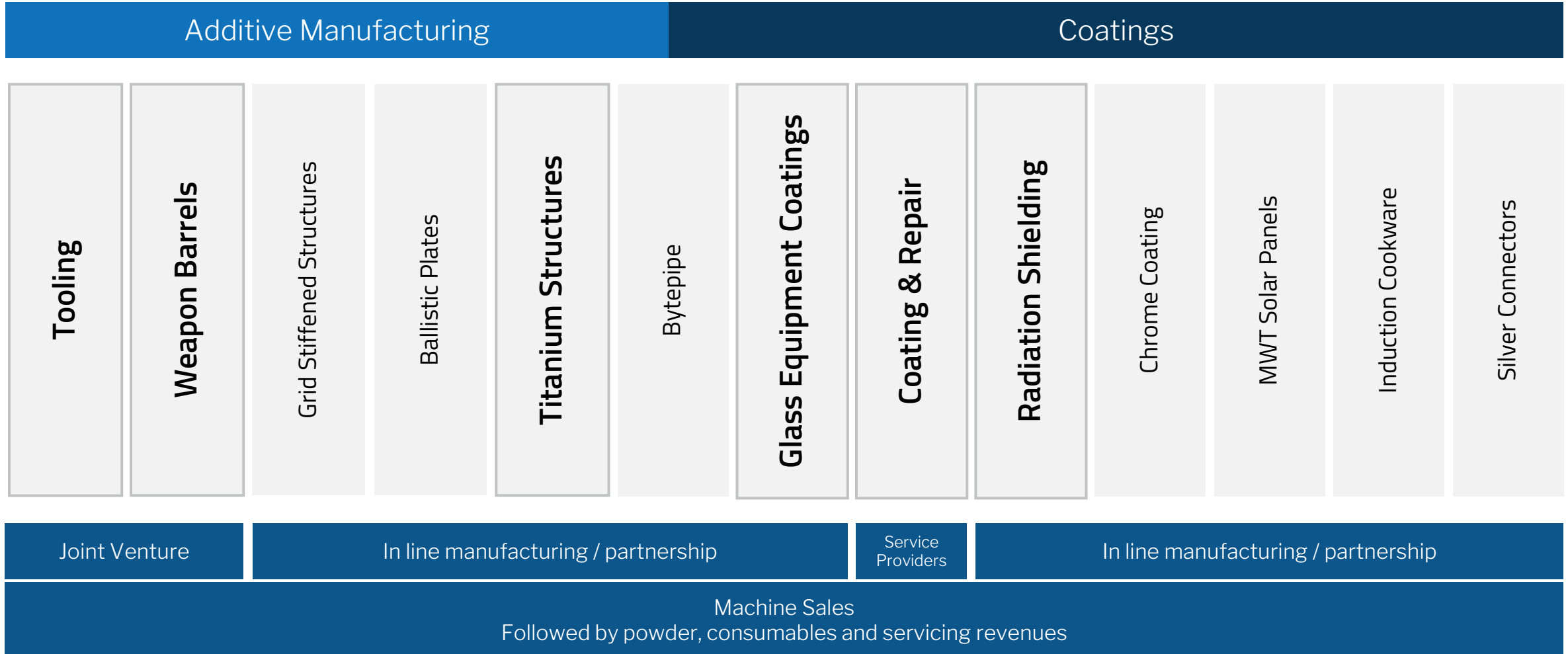
# Framework for manufacturing & commercial assessments

| Manufacturing Readiness Level<br><i>(based on US DoD MRL Deskbook)</i> | Level | Commercial Maturity Scale<br><i>(in-house measure)</i> |
|--|-------|--|
| Manufacturing Implications   | 1     | Basic commercial concept identified.                   |
| Manufacturing concepts   | 2     | Market Awareness                                       |
| Proof of concept   | 3     | Technology Application                                 |
| Laboratory production (e.g. material trial)                            | 4     | Value proposition                                      |
| Produce prototype components in production relevant environment        | 5     | Market Alignment                                       |
| Produce prototype system in production relevant environment            | 6     | Solution Optimisation                                  |
| Productions of sub-components in rep. environment                      | 7     | Financial model validation                             |
| Pilot line capability demonstrated                                     | 8     | Market introduction                                    |
| Low rate production  | 9     | Production & Deployment                                |
| Operation and support  | 10    | Fully Deployed and Accepted                            |



# Strategic Application Pillars

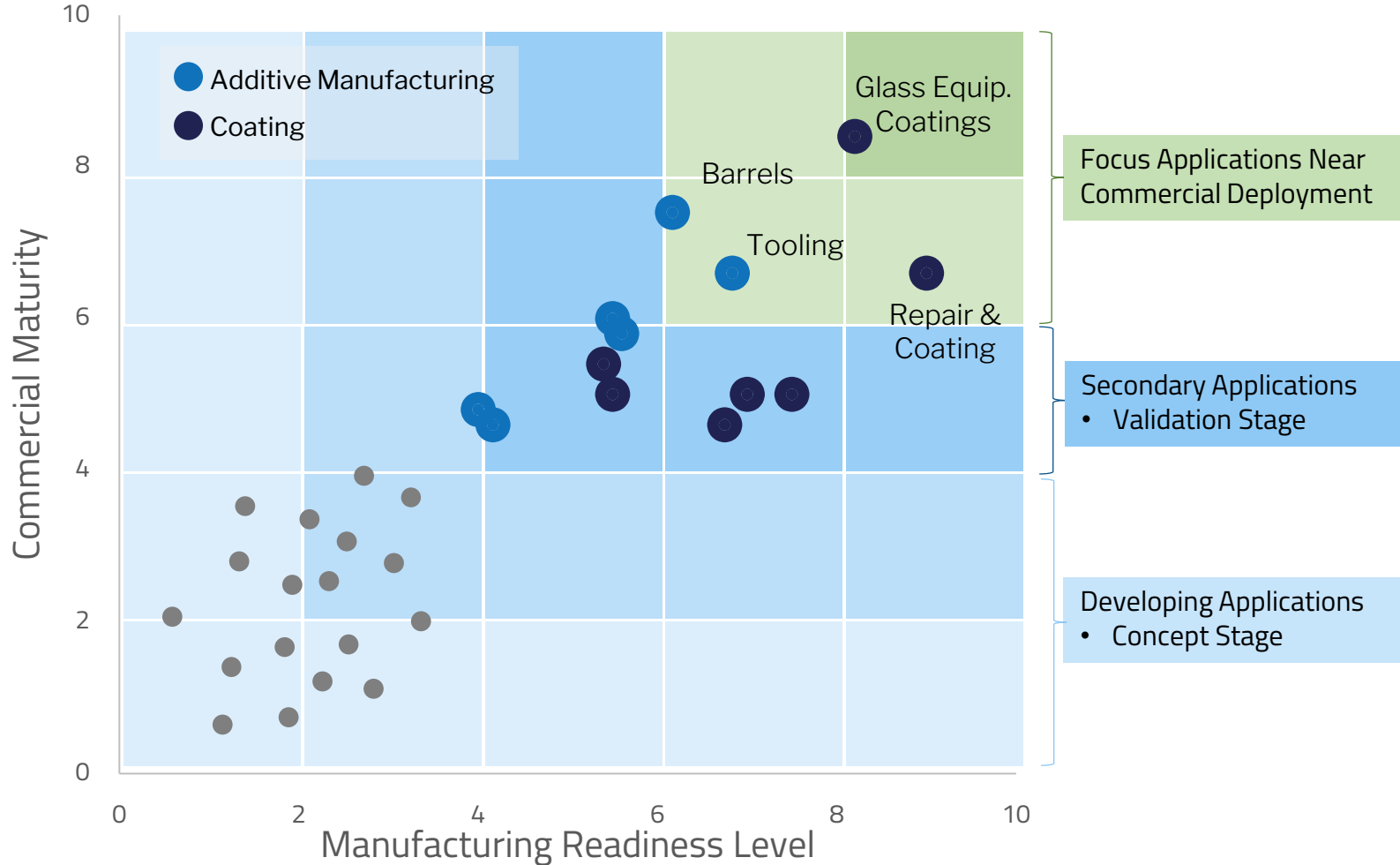
Results of the assessment lead to these focus areas





# Commercial Maturity and Manufacturing Readiness

Illustrating the readiness of Titomic's strategic application pillars



## Overall Readiness

Once an application is approaching a score of approximately 6 on each scale, Titomic is in a position to move to commercialisation.





# Selected Focus Applications

Max Osborne

Head of Engineering

Klaas Rozema

General Manager Titomic Europe

Dominic Parsonson

Head of Sales



# Barrels

## Technology

- Repkon and Titomic are working together to manufacture barrels
- The process combines the TKF system and Repkon's patented free flowforming technology
- TKF process allows the use of new alloys and the combination of metals in a single barrel
- Benefits include reduced weights, increased performance under thermal stress and increased lifespans, depending on material



Repkon's flowforming technology

## Progress

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

## Market

- Revenue will be in the JVs (equity accounted)
  - Likely to commence from late 2023
- Once established, JVs are collectively expected to generate over \$15m per annum



Barrels

Targeting the Defence Industry



# Glass Equipment Coatings

## Technology

Titomic Europe has developed a system to coat glass mould equipment. The system can automatically recognise mould shapes and produces a robot path for coating the mould, a significant breakthrough in the Cold Spray space.

Subsequent generations of system will introduce automated loading, unloading and polishing of moulds.

### The system enables:

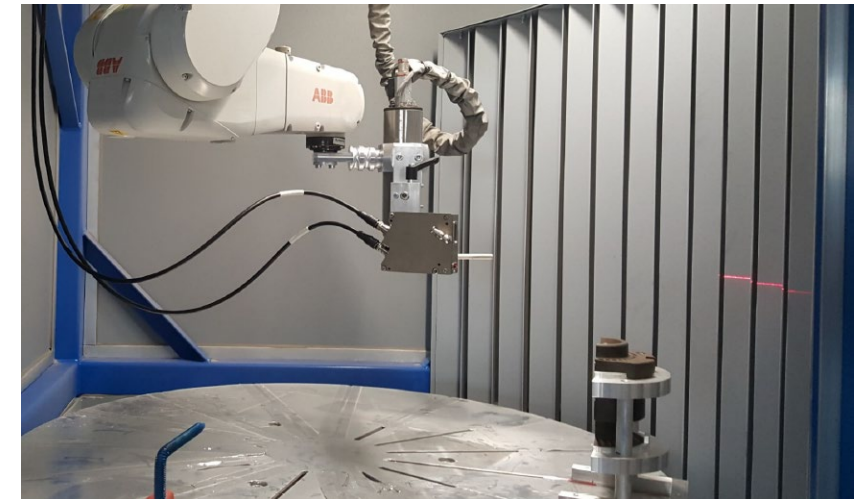
- Increased lifespan of glass moulds
- Reduced manual input and increased safety
- Maximised uptime of glass bottle production plants
- Reduced use of dirty grease traditionally used to lubricate moulds

## Progress

- R&D System has been trialed in multiple locations
- First production system to be delivered in 2022

## Market

- Initial industry partner represents 44 manufacturing locations
- Revenue will flow from sales of powder, nozzles, consumables and servicing



## Glass Equipment Coatings

Targeting glass manufacturing industries



# Tooling

## Technology

- Titomic AM Face plates offer numerous benefits including
- Improved lead time
- Near net shape – Minimal post-production and machining
- Lower porosity than castings
- Invar meets technical requirements for CTE for large parts
- Titanium tooling is stronger, thinner, lighter and be produced at equivalent cost
- 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

## Market

- Revenue will be in the JVs (equity accounted)
  - Likely to commence from mid 2023
- Once established, JVs are collectively estimated to generate over \$30m in combined revenues



## Tooling

Targeting the Aerospace & Defence Industries



Invar Face Plates



Invar Repair



Titanium Tooling



# Coating and Repair

## Technology

Cold spray technology is being used to repair corroded metal components or replace damaged geometries

Titomic Europe has developed the cost effective and robust D523 system for these applications.

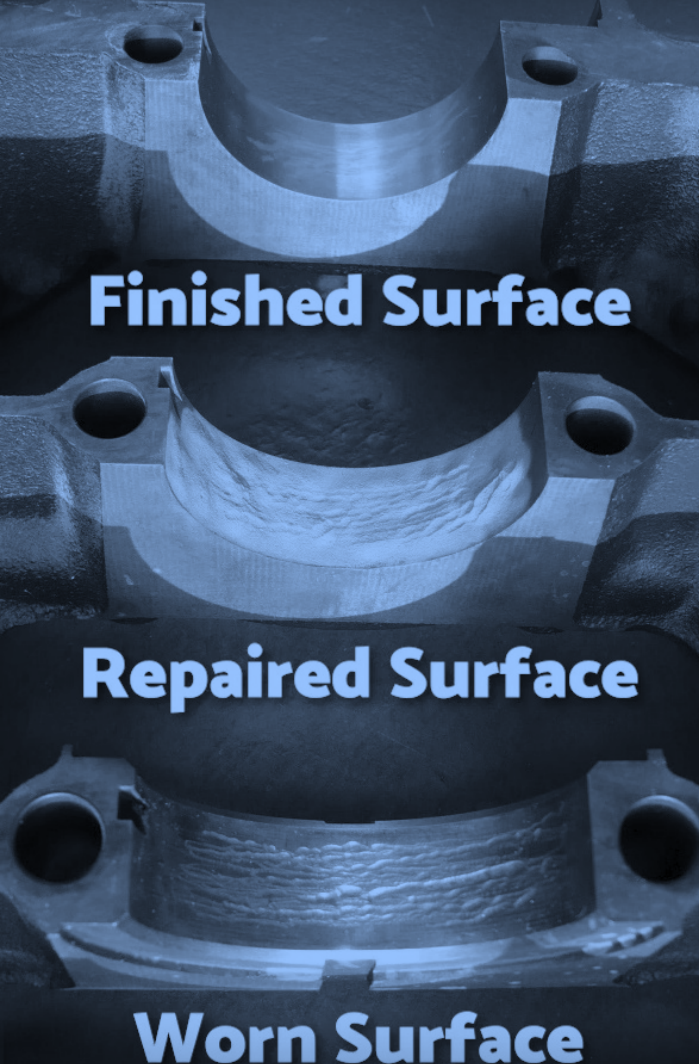
- Extending the life of equipment
- Restoring damaged parts to original
- Replacing worn-out or corroded metal parts
- Portable in-field repairs

## Progress

- Titomic Europe has a range of products available
- Titomic Australia is deploying systems and services regionally

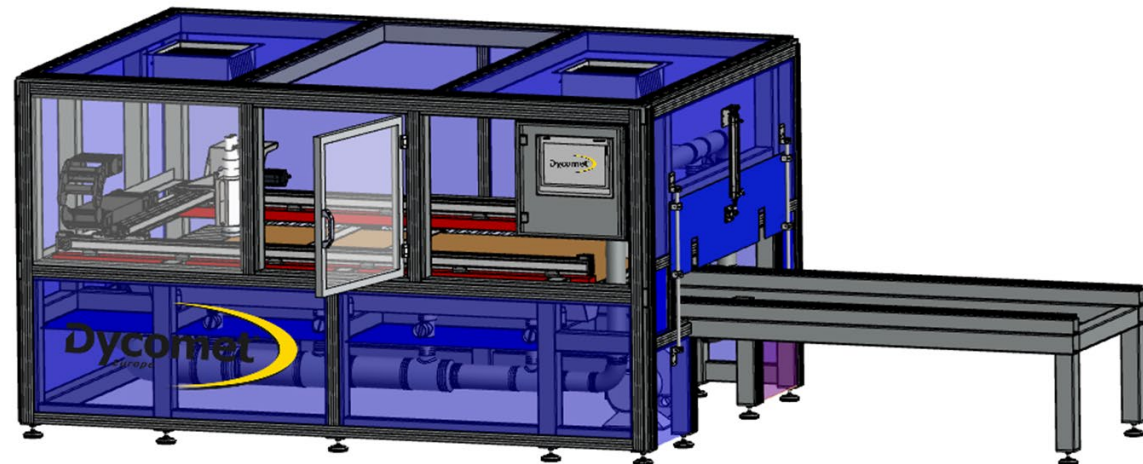
## Market

- Revenues through machine sales, services and authorised service providers



## Coating and Repair

Targeting Mining, Oil & Gas, Transport, and Marine Industries





# Radiation Shielding

## Technology

Satellites and Spacecraft are exposed to large doses of radiation which can destroy sensitive electronics and components.

Titomic is commercialising the fabrication of multilayer radiation using Cold Spray, with the technology offering largely unlimited designs and customisation, using a range of metals at significantly lower manufacturing cost compared with other methods of production.

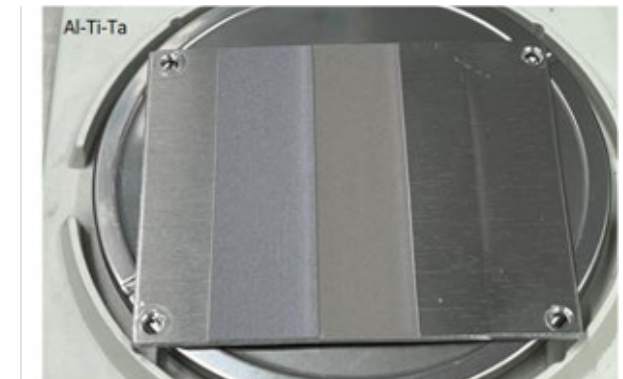
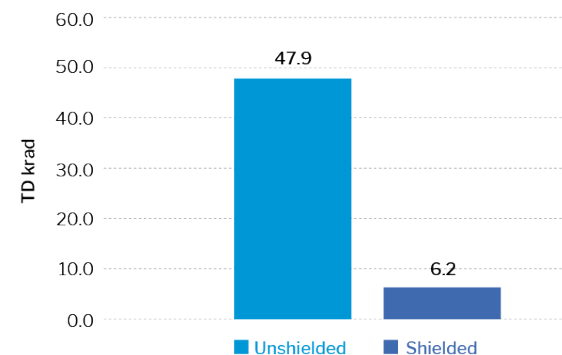
Titomic is working with the Australian Nuclear Science and Technology Organisation (ANSTO) to design and analyse shielding, validate the manufacturing technology, radiation test the designs, and bring a product to market in 2022.

## Progress

- Application developed through the MMI Space Grant with design and analysis capability now developed to go-to-market with product and service
- Collaborating with Inovor Technologies, Australia's only sovereign commercial satellite manufacturer

## Market

- Satellite launches increasing each year, significant growth in CubeSat and SmallSat market seeking improved reliability
- Shielding offers an alternative to expensive radiation-hardened electronics
- Light-weight radiation shielding is applicable to other industries including medical



Radiation Shielding

Targeting the space industry



# Titanium Structures

## Technology

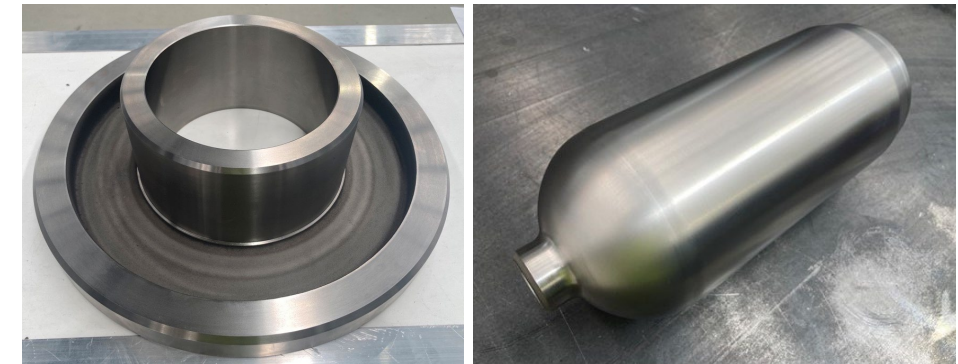
- Rapid manufacturing of parts with significantly less material and process steps utilising Green Titanium
- Key opportunities include:
  - Thin-walled pressure vessels (propellant tanks and chemical processing)
  - Large rings and flanges (rockets and satellite assemblies)
- Key advantages include one-piece construction, weight reduction by reduction of complex welding and assembly steps
- Wide range of customised shapes, sizes, thicknesses
- Fewer process steps, utilising less material and equipment
- Near net shape builds, reducing material waste

## Progress

- Commercial applications using Green Titanium underway with major manufacturers to explore commercial applications
- Mechanical test program progressing under the MMI Space Grant

## Market

- “New space race” with increasing levels of private sector participation and commercialization of space
- Operators seeking new and cost-effective solutions, actively evaluating AM technologies



Manufacturing  
made sustainable



Titanium Structures  
Targeting the space and defence industries



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