INNOVATIVE MANUFACTURING ACCELERATED

Thursday, 9 June 2022
8:00am-1:00pm
UTS Tech Lab Sydney

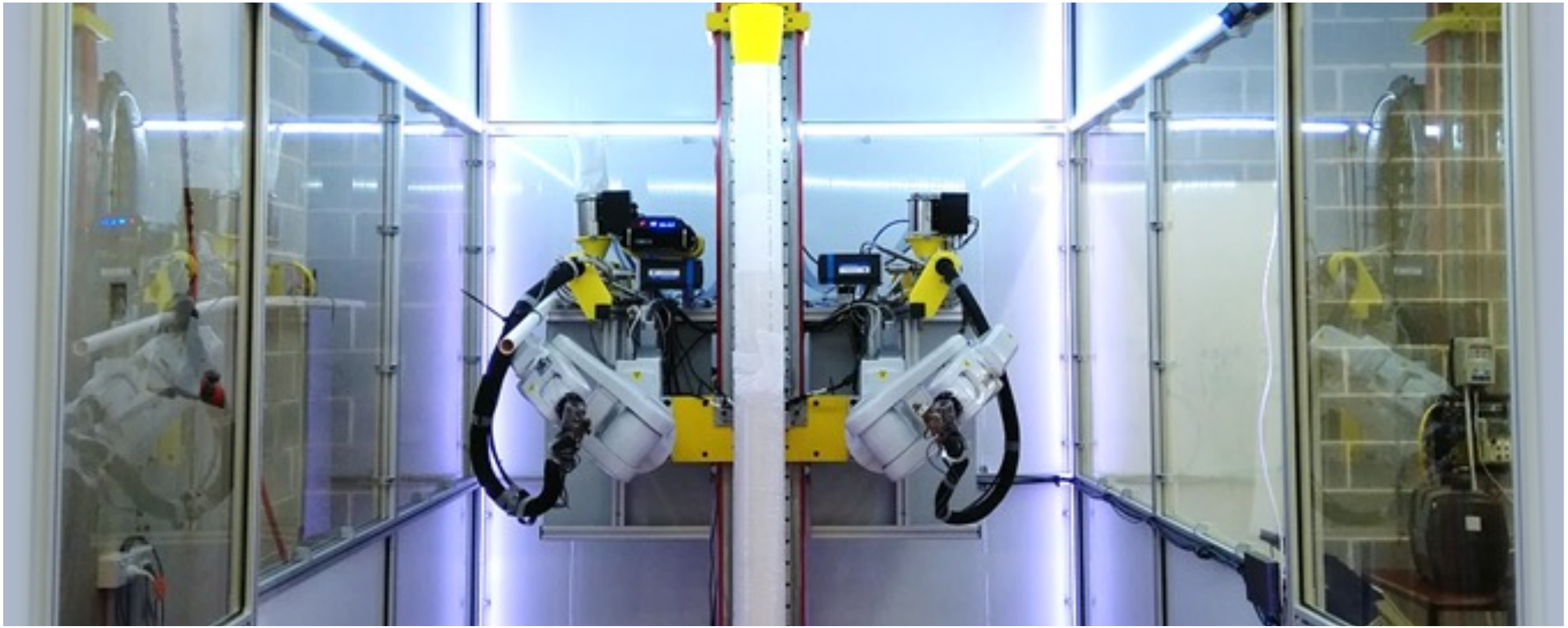
Dr Michael Behrens
UTS

Project Insights

Revolutionising mineral separation: 3D printing precision-engineered mining equipment

imcrc | we champion manufacturing innovation

Australian Government
Department of Industry, Science, Energy and Resources
AusIndustry
Cooperative Research Centres Program



Revolutionising Mineral Separation: 3D Printing Precision-Engineered Mining Equipment

- Dr Michael Behrens

What is UTS Rapido?

- Commercially oriented R&D engineering to create business value.

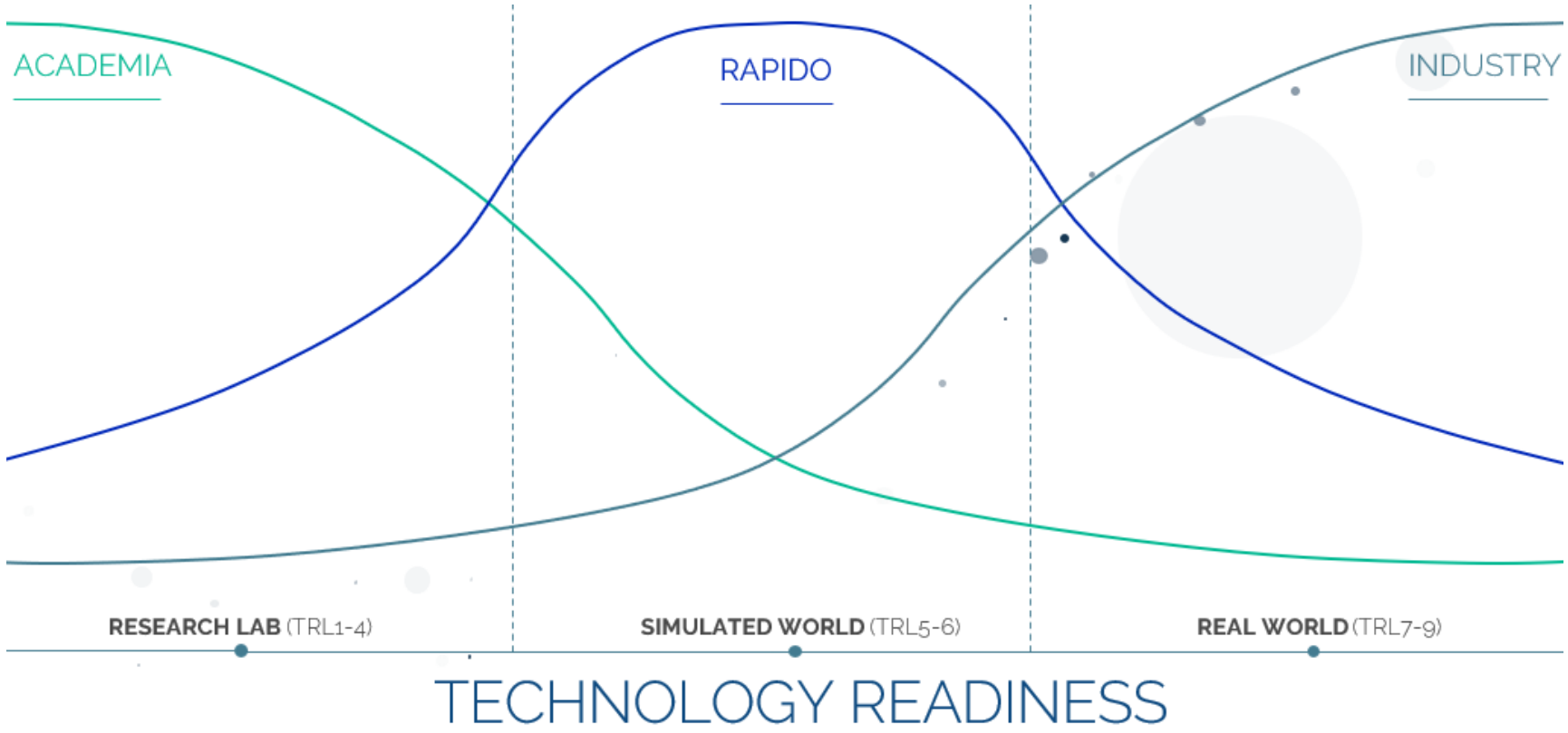
- Key Capabilities

- **Mechatronics Engineering**
  - Bespoke Additive Manufacturing
  - FEA & Generative Design
  - Dynamic Simulation
  - Prototyping
  - Product Testing

- **Software Engineering**
  - Industry 4.0 & IoT
  - Machine learning
  - Geometry Processing
  - Cloud & web app
  - Mobile app development

- **UX Design**
  - User experience
  - Web & Mobile

- **Rapido Social**
  - All of the above
  - Leveraging expertise for social good



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Project objective

- Modernise production methods for GSS
  - Eliminate tooling costs
  - Increase design flexibility
  - Reduces carbon emissions
  - Online monitoring with IoT

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Bespoke Printer Design

- PoC & demonstration prototypes
- Novel rotational printing method
  - Eliminates need for support material
  - Optimises surface finish
  - Dual materials, wear and structural
- Full plastic processing line
  - Pellet feedstock for cost and flexibility
  - Drying & masterbatch mixing
  - Fixed single screw extruders
  - Heated hose to nozzle on robot arms
- Laser scanning
  - Setup and online verification

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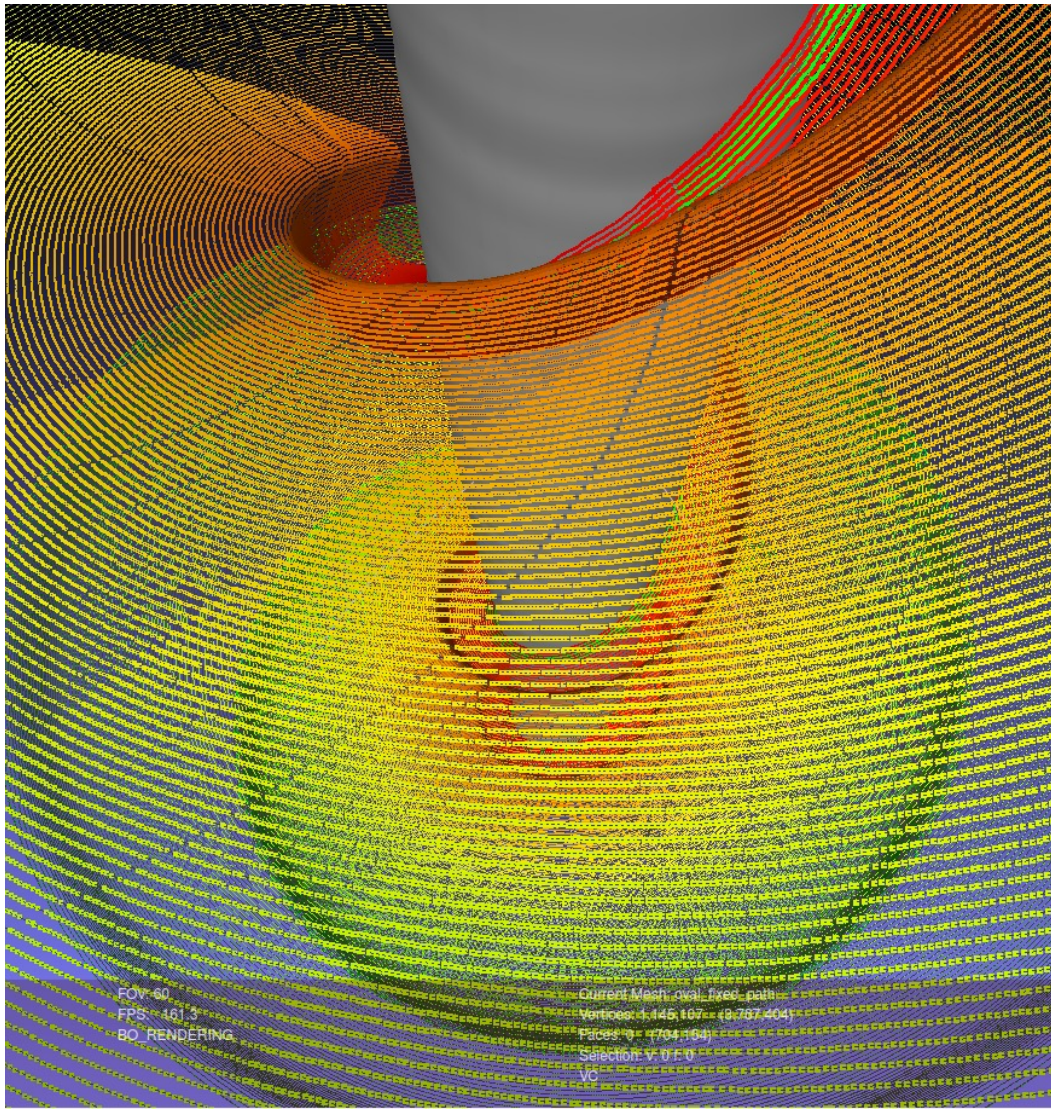
Custom Multi-Axis Slicer

- Custom slicer to exploit high DoF available in the printer
- Optimised for expected geometry & printer capabilities
- Data Workflow
  - Geometry creation in CAD
  - Helical slicing
  - Path sequencing
  - Configuration planning
  - Runtime adjustment



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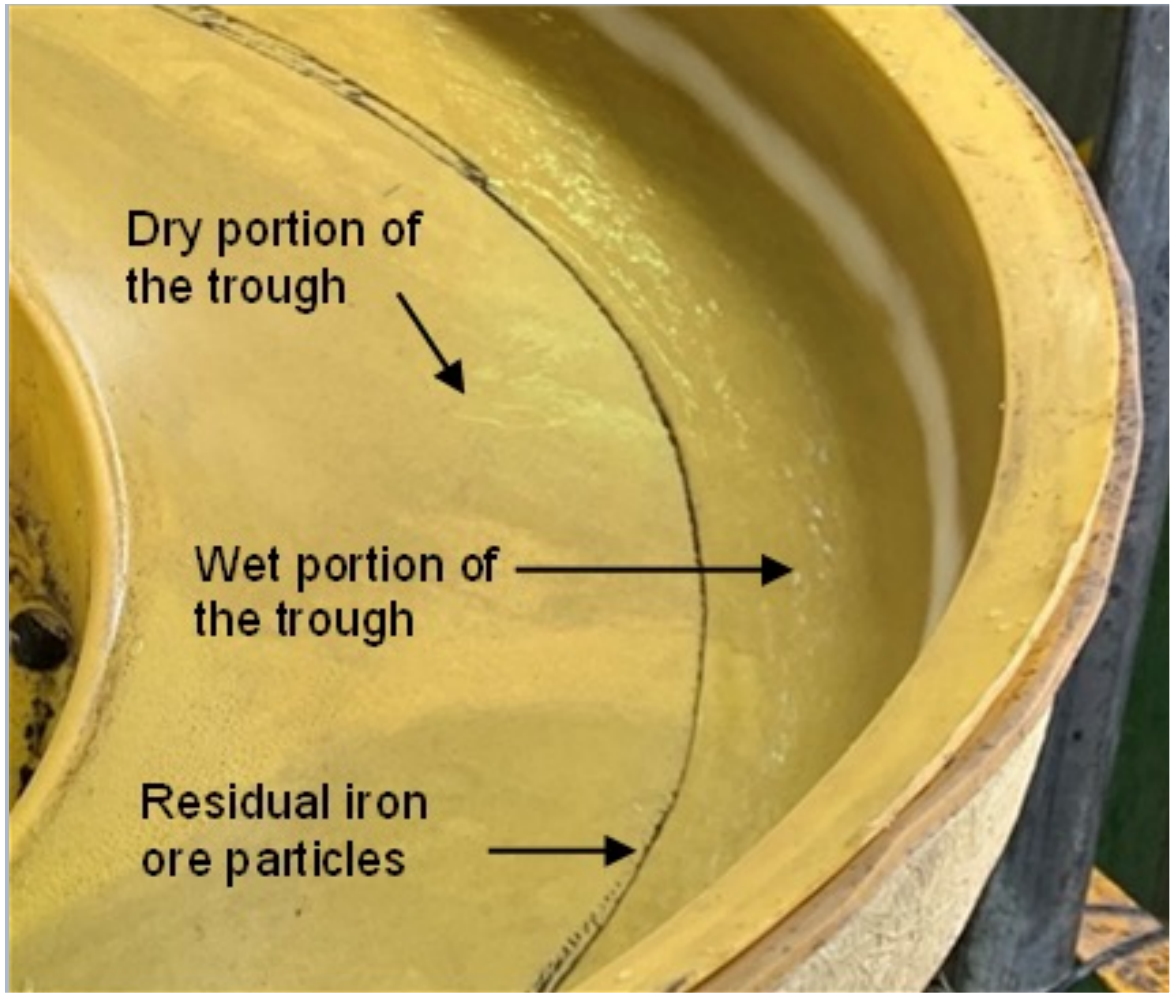
Spiral Design for Additive Manufacture

- PhD project to optimise spiral design for additive manufacturing
- Material characterisation
  - Strength
  - Creep
  - Abrasion resistance
  - Weathering
- CFD tool for operating loads
- Shipment shock tracking
- Lifetime creep prediction



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Current status

- Full sized demo spirals printed
- Working with Mineral Technologies to build pilot commercial machine
- Continuing to explore novel embedded sensors and digital twins

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Questions

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