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AM structures for advanced heat exchange

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Who are Conflux

We are

- AM applications company $\rightarrow$ heat transfer

- Australian based, global outlook

- Vertically integrated operations:

  - DfAM

  - Multi-physics simulation

  - AM parameter development

  - Prototype production and post processing

Company history

2015 – Filed first patent

2017 – Funding round closed with AM Ventures lead investor

2018 – Launch of Conflux team and AM engineering centre

2019 – Global enterprise customer projects in Automotive, Aerospace, Defence, Oil & Gas and Industrial sectors.
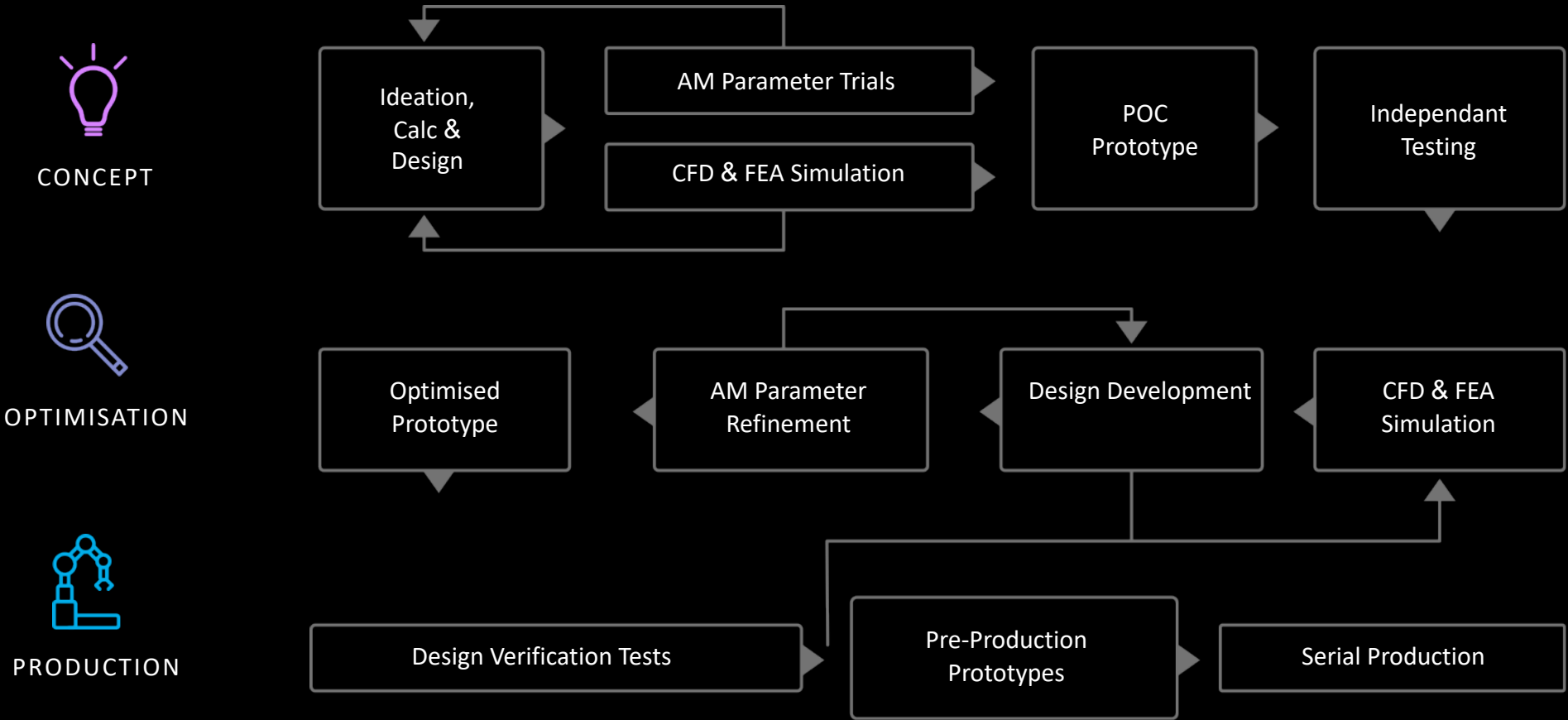
Global enterprise customers

HQ - Geelong, Australia

AM application development

CONCEPT

- Ideation, Calc & Design
- AM Parameter Trials
- CFD & FEA Simulation
- POC Prototype
- Independant Testing

OPTIMISATION

- Optimised Prototype
- AM Parameter Refinement
- Design Development
- CFD & FEA Simulation

PRODUCTION

- Design Verification Tests
- Pre-Production Prototypes
- Serial Production

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INCREASE THE SWEET SPOT

AM PROCESS PRODUCTIVITY 10X	AM PRINT RESOLUTION 2.5X	STANDARDS & CERTIFICATION	MATERIALS DEVELOPMENT	COMPETITION	EDUCATION
EOS — GE	EOS — GE	ISO — EASA	EOS	Honeywell Aerospace	All universities with AM courses + private
VELO 3D	VELO 3D	Federal Aviation Administration — DNV·GL	LPW	GE — HiETA technologies	ADDITIVEMINDS EXCELLENCE IN INDUSTRIAL 3D PRINTING
RENISHAW apply innovation™	RENISHAW apply innovation™	SAE INTERNATIONAL — Lloyd's Register	oerlikon	PWR ADVANCED COOLING TECHNOLOGY — DENSO Crafting the Core	DEAKIN UNIVERSITY
SLM SOLUTIONS	SLM SOLUTIONS		ELEMENTUM	Collins Aerospace	MIT Massachusetts Institute of Technology
TRUMPF — 3D SYSTEMS	TRUMPF — 3D SYSTEMS		SANDVIK	MEGGITT — MAHLE	

R&D Ongoing Roadmap

- **Material characterisation**
  - High specific strength & thermal conductivity

- **EOS M290 parameter development**
  - Wall thickness and feature distance optimisation

- **Post processing**
  - Powder removal
  - Surface finish optimisation

- **Simulation**
  - Surface area density, fluid volume optimisation
  - Phase change
  - Multi-fluid domain modelling

- **Design**
  - DfAM – CHT automation
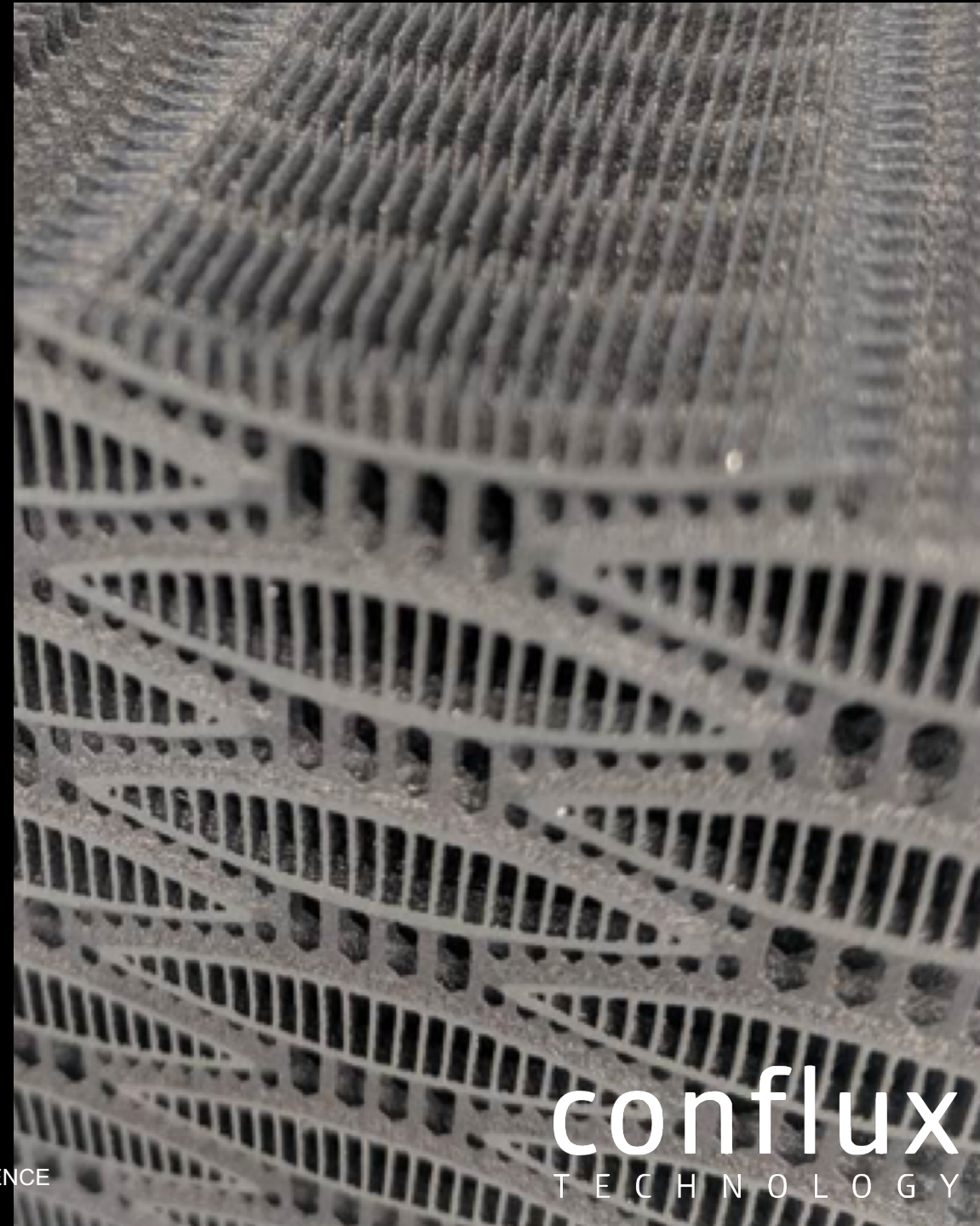
- **Quality Assurance**
  - Automated CT data analysis

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Wall thickness matters

AM does not defy laws of physics.

Surface area = 1st Order Performance for Gas : Gas HX

eg. 8m2 surface area X wall thickness = weight!

AM geometry can improve flux/m2 but is it enough?... It's a case-by-case situation.
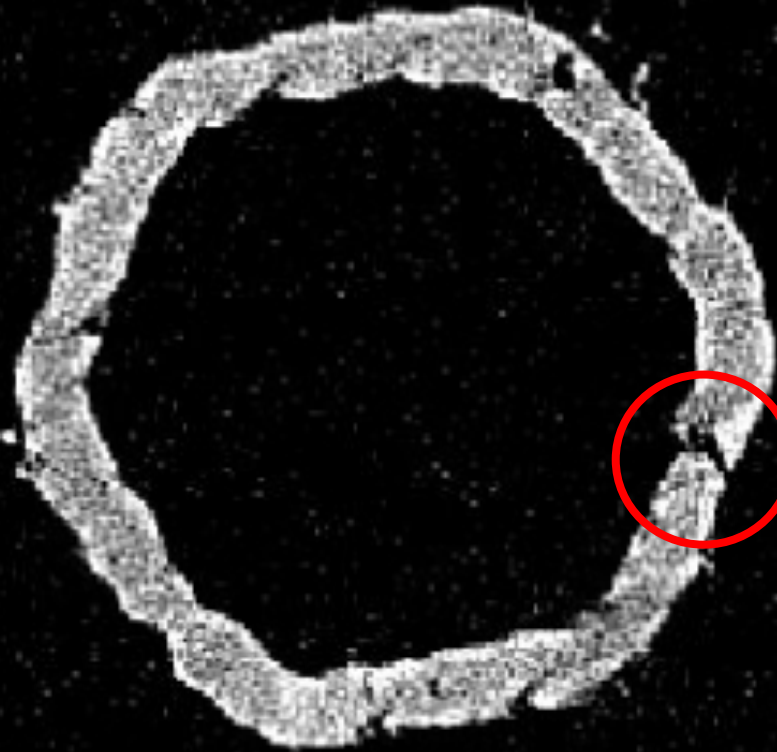
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R&D – Micro CT

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T E C H N O L O G Y

Beam accelerator tests

- Energy: 60 keV (120 kV lab scale)

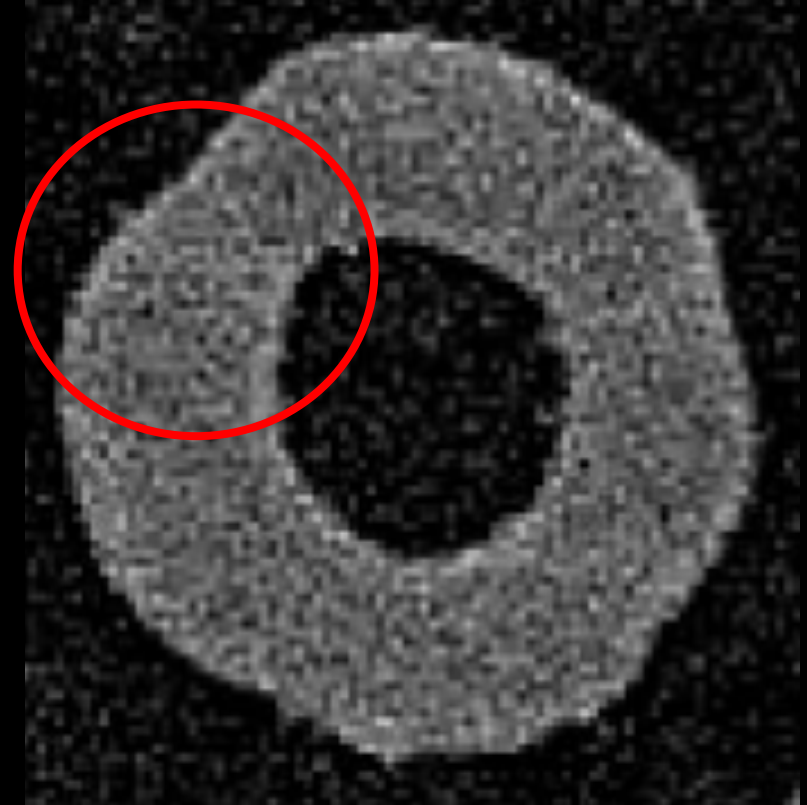- Voxel size: 18.58 μm^3

- Scanning time: 40 min – 2 hours per part

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T E C H N O L O G Y
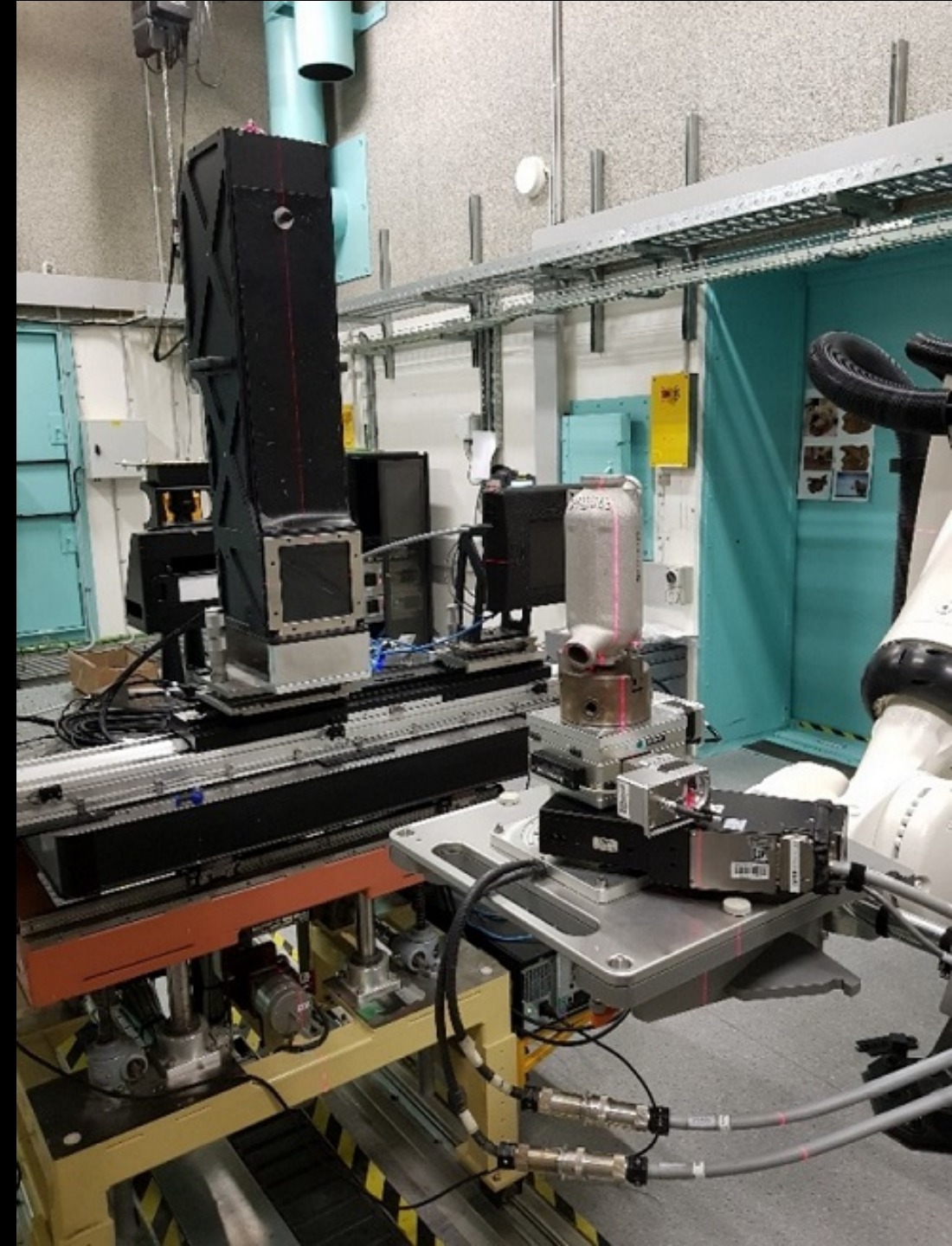
AM PARAMETERS MATTER

Failure point
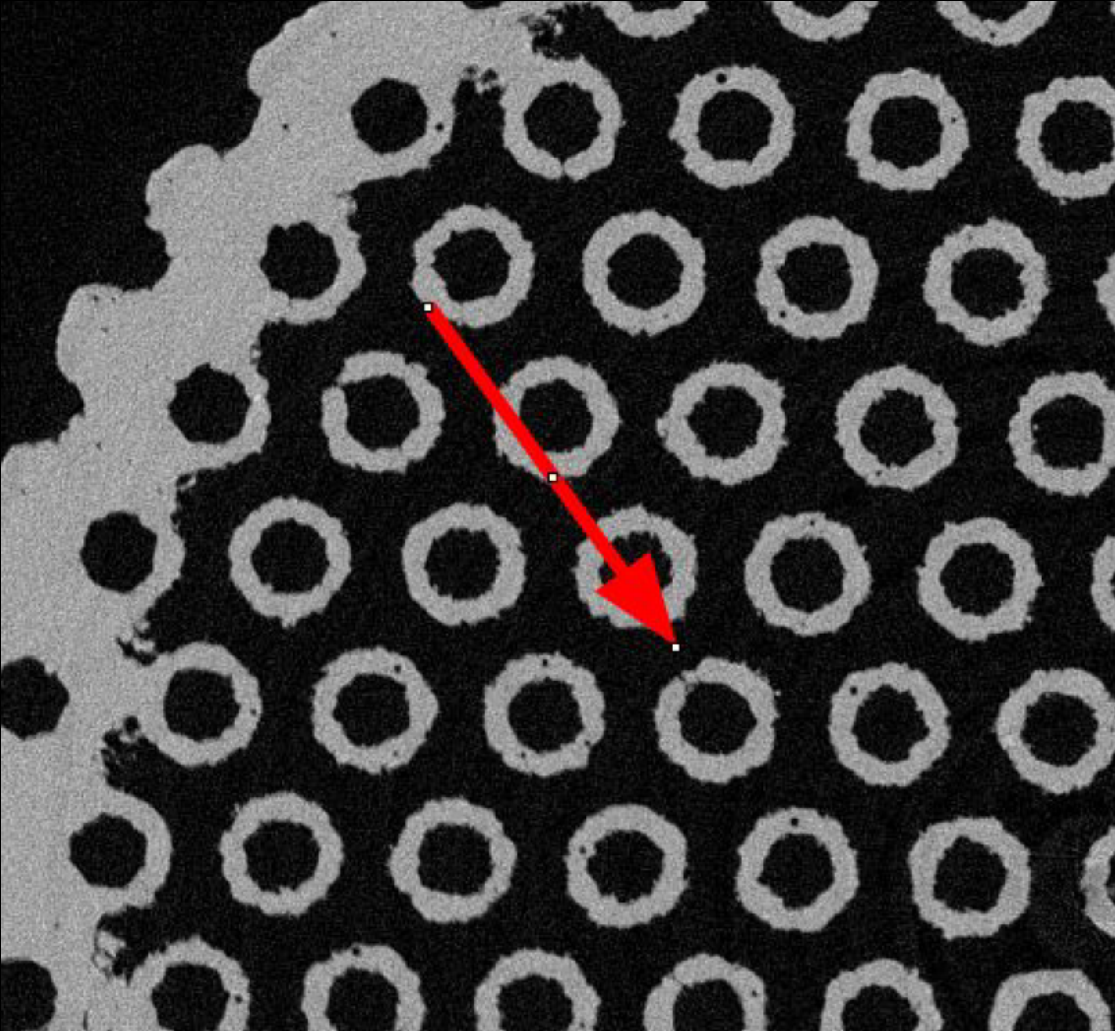rectified

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T E C H N O L O G Y
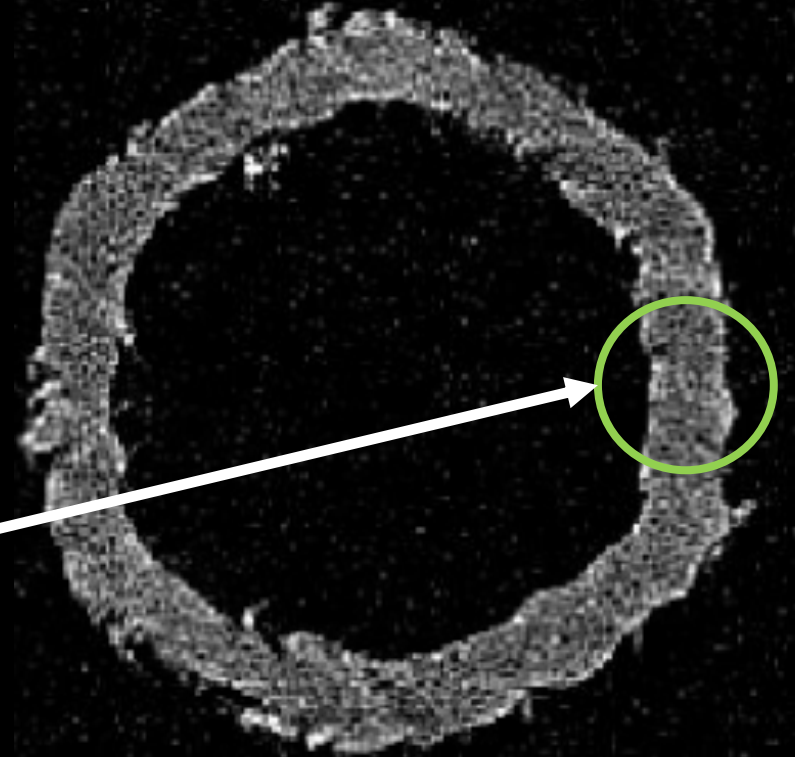
AM SCAN STRATEGIES MATTER
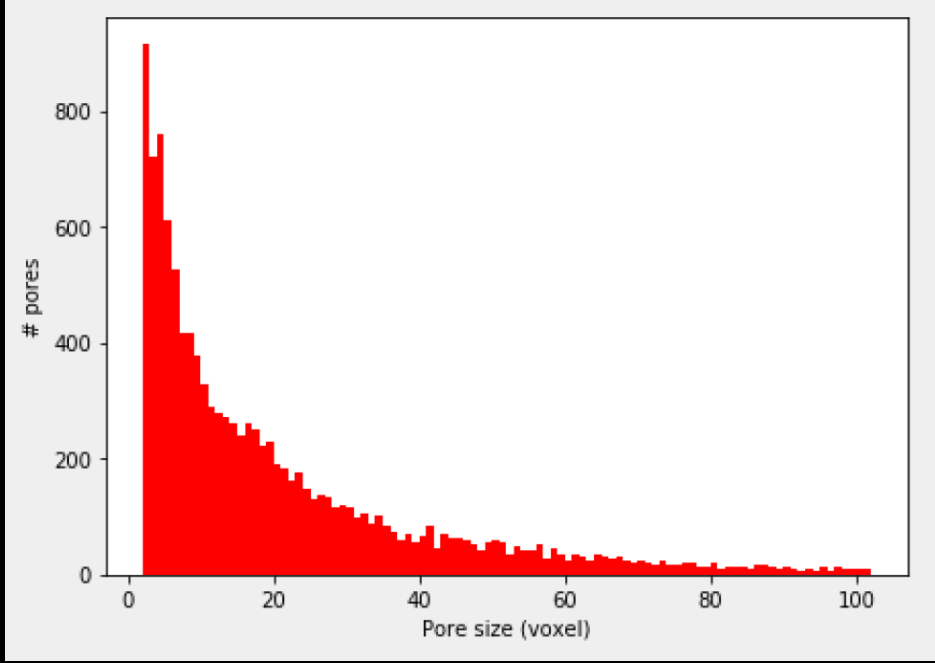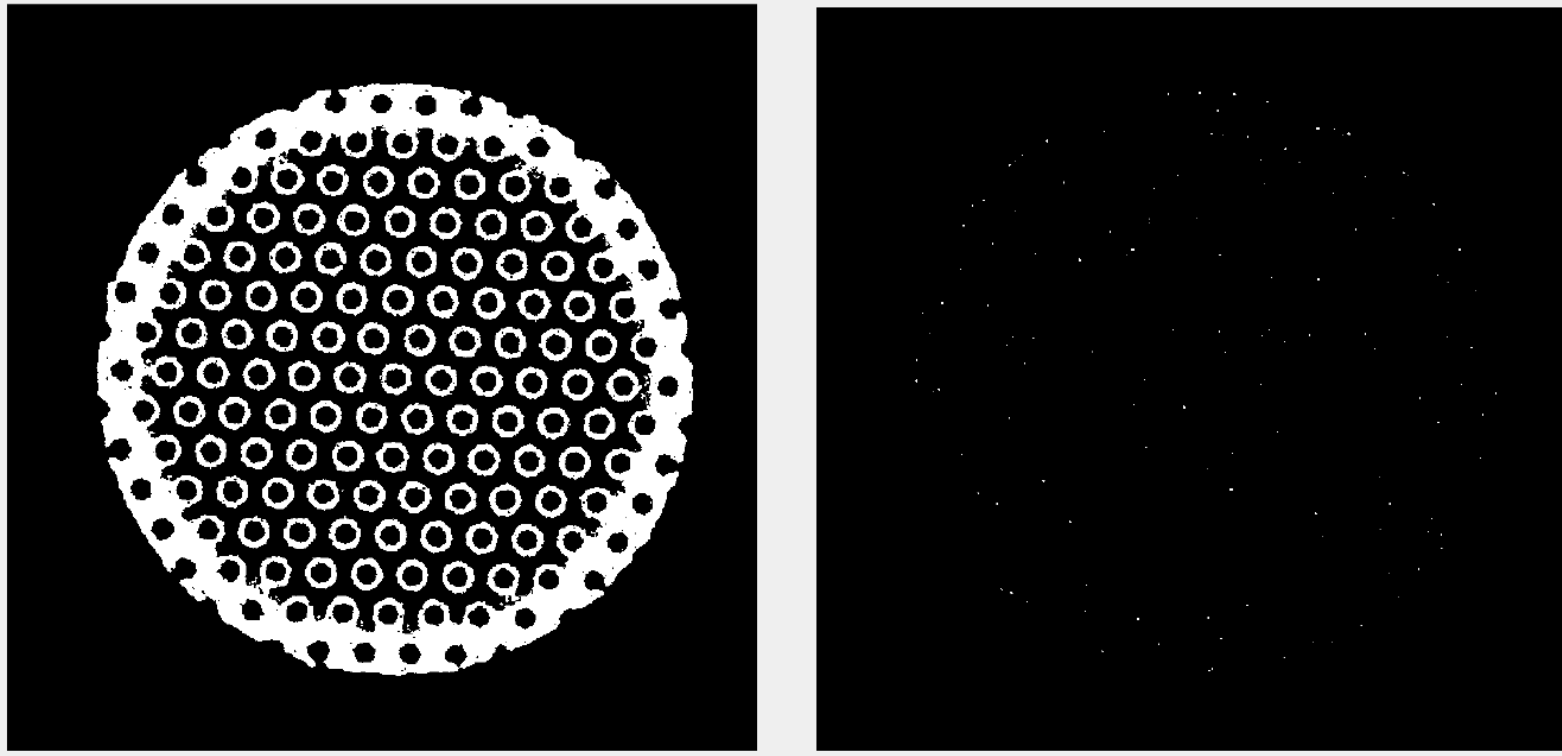
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CT data analysis automation

High res CT = a LOT of data!   Structural fault analysis
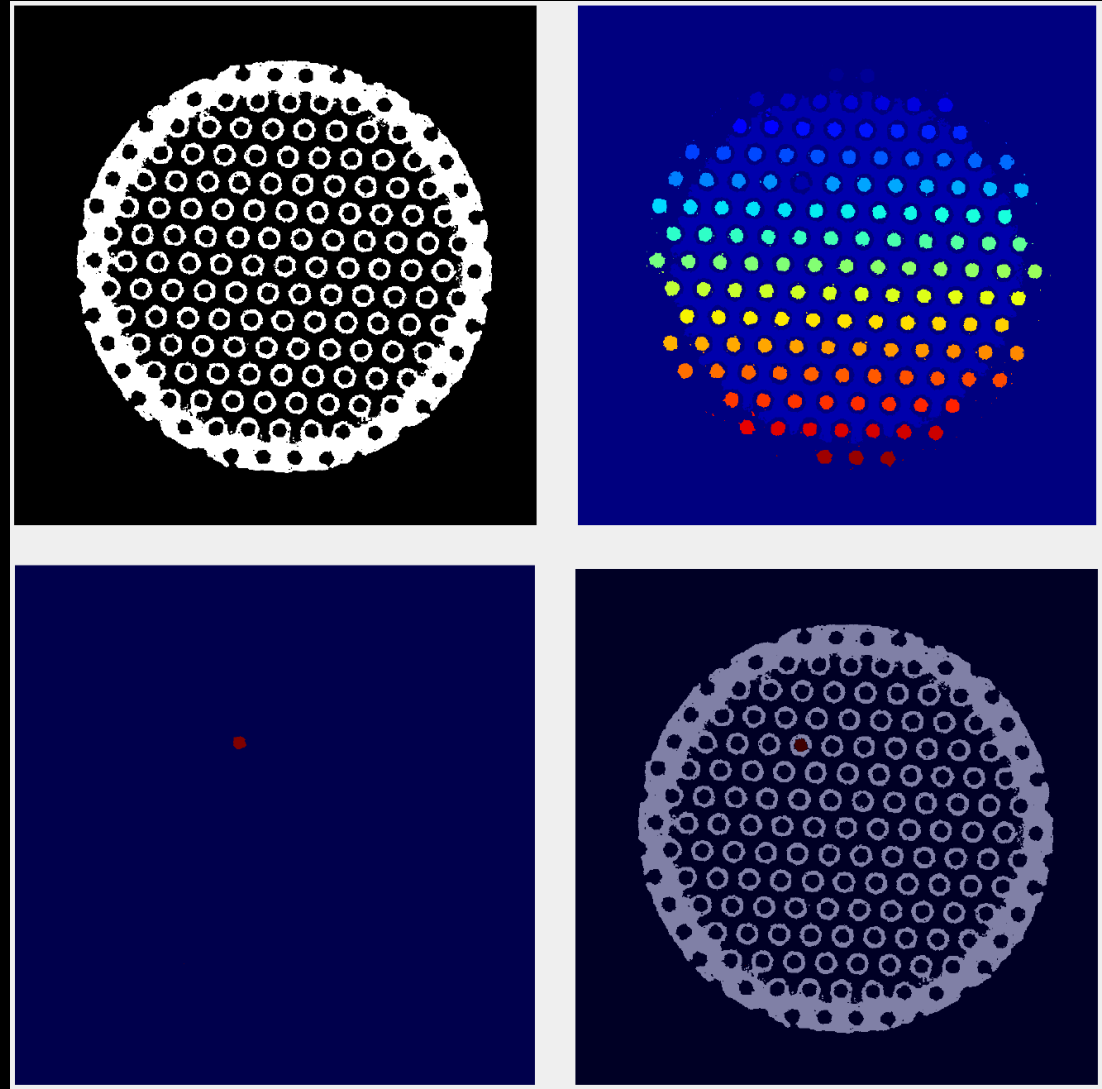
CT data analysis automation

Pore density distribution analysis

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