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Innovative Metals Processing Centre IMPC

Advanced Powder Metallurgy and Net Shape Manufacturing



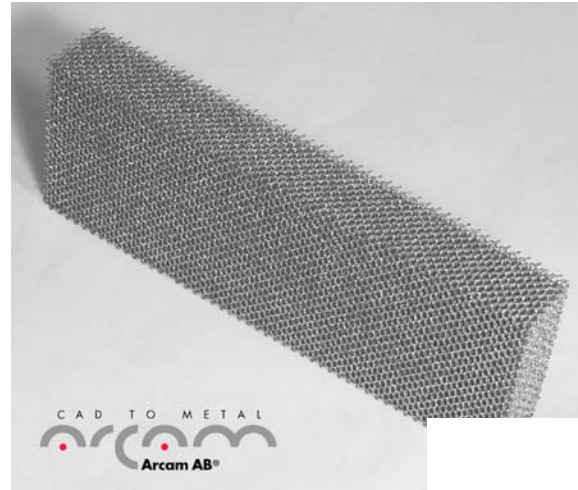
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Net Shape components



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Innovative Metals Processing Centre



The Innovative Metals Processing centre - IMPC - is a part of the AMRC

- Metal Injection Moulding (MIM)
- Net Shape Powder Processing
- Layer Additive Manufacturing
- Specific focus on the development and manufacture of components from titanium and other high value powders.



4 key strands of activity

- Research and Development
- Outreach
- Supply chain development
- Dissemination and Training provision.



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Current research activity at the IMPC includes :

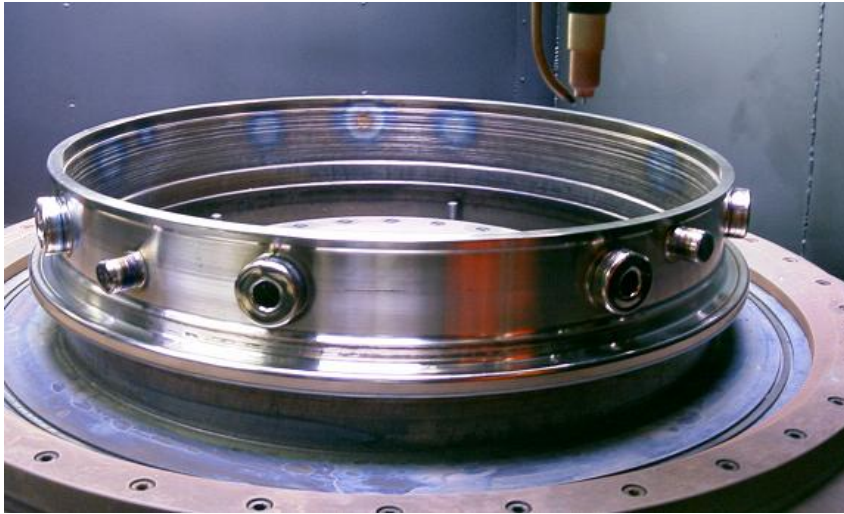
- MIM of Ti for aerospace and biomedical applications
- Large and hollow sectioned MIM components as competitors for castings
- Development of structural superalloy components by PM routes
- Process development of PM Ti - e.g. machining of “green” powder compacts, Net Shape Hot Isostatic Pressing of powders
- Use of “direct write” technologies for the manufacture of structural components and for manufacture of low volume powder-derived components.



Net Shape Technologies



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Shaped Metal Deposition



Arcam

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EOS



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Net Shape Technologies - Direct Write



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Arcam EBMS12 - Ti components



IMPC

Layer Manufacturing Process

1. Generates **fully dense** components
2. Can generate porous and graded structures
3. Electron beam system – high power density

Layer Manufactured Ti components



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Undercarriage component

Gearbox housing

courtesy ARCAM AB

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Layer Manufactured Aerospace components



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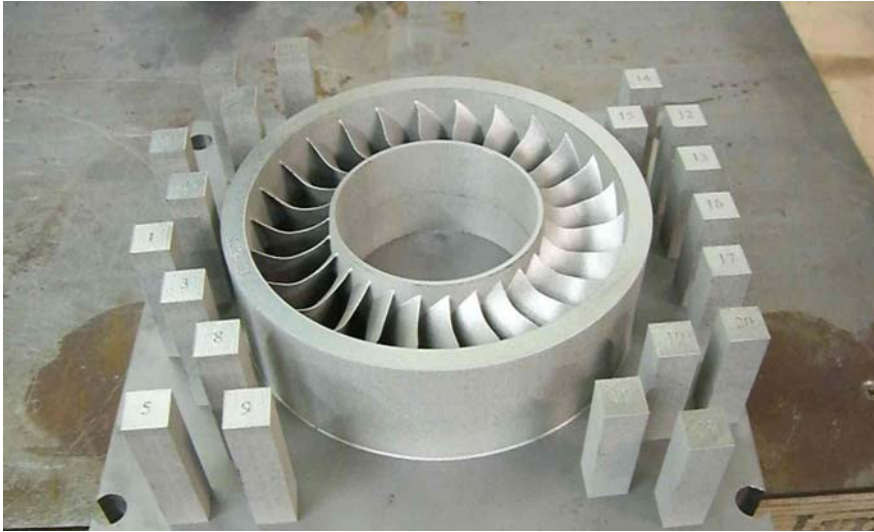


- EOS M270 Laser Powder system
- Aeroengine materials
- Biomedical alloys other than Ti

Layer Manufactured Aerospace components



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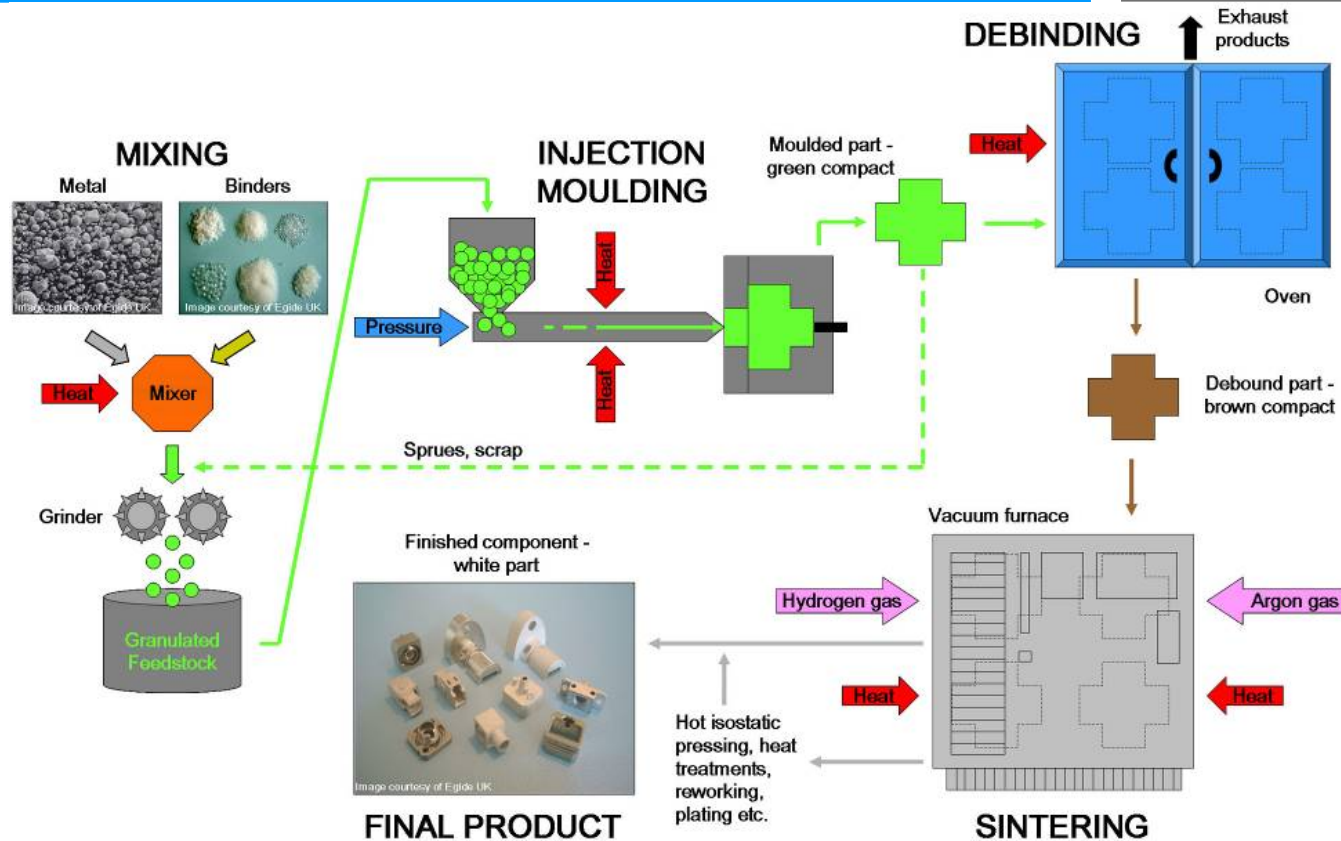
We are undertaking an intensive research and development activity in Direct Write technology for **Metals**



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Powder Injection Moulding



Not a new technology but not widely accepted - titanium especially difficult

- We are the only UK University with such a capacity



Aerospace

Structural light weighting

- Fasteners
- Reduction in costs
- Less waste
- Rapid Prototyping
- Short timescale trails
- Iterative design
- So-Called legacy parts
- Components from older engines
- Too costly to make by other means but essential to business
- need to 3D scan and then “replicate”

Biomedical

Ti for implants is the key “pull” in this sector as is the ability to make specialised tool kits for surgical procedures

- Availability of cheaper Ti powders
- Lower costs than traditional 90% machined 10% use
- Bespoke components
- CAT scan - to CAD file - to component
- Novel solutions to invasive procedures
- Flexibility
- Lower inventory
- Lattice structures – lightweight, variable modulus



- Technology seminars
- Participation in TT activities
- Sector education and training



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