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Rapid Prototyping

At the University of Southampton

UNIVERSITY OF Southampton

What is Rapid Prototyping?

The 3D Printing Revolution

- Rapid prototyping machines are designed to quickly produce a model of a physical part using computer-aided design (CAD) data.
- They provide greater design freedom, fast design process, more efficient materials usage and tool-less manufacturing.
- Designs that have been too complex and expensive to build using modern manufacturing techniques can be revisited.

More Benefits

- Material wastage is minimised.
- Production lead times are decreased to a fraction of their conventional equivalent.
- Costs are dramatically reduced.
- 3D printed products can be compared with other parts for compatibility and performance tests can be conducted.
- Errors can be caught earlier and therefore money can be saved before the product goes into production.

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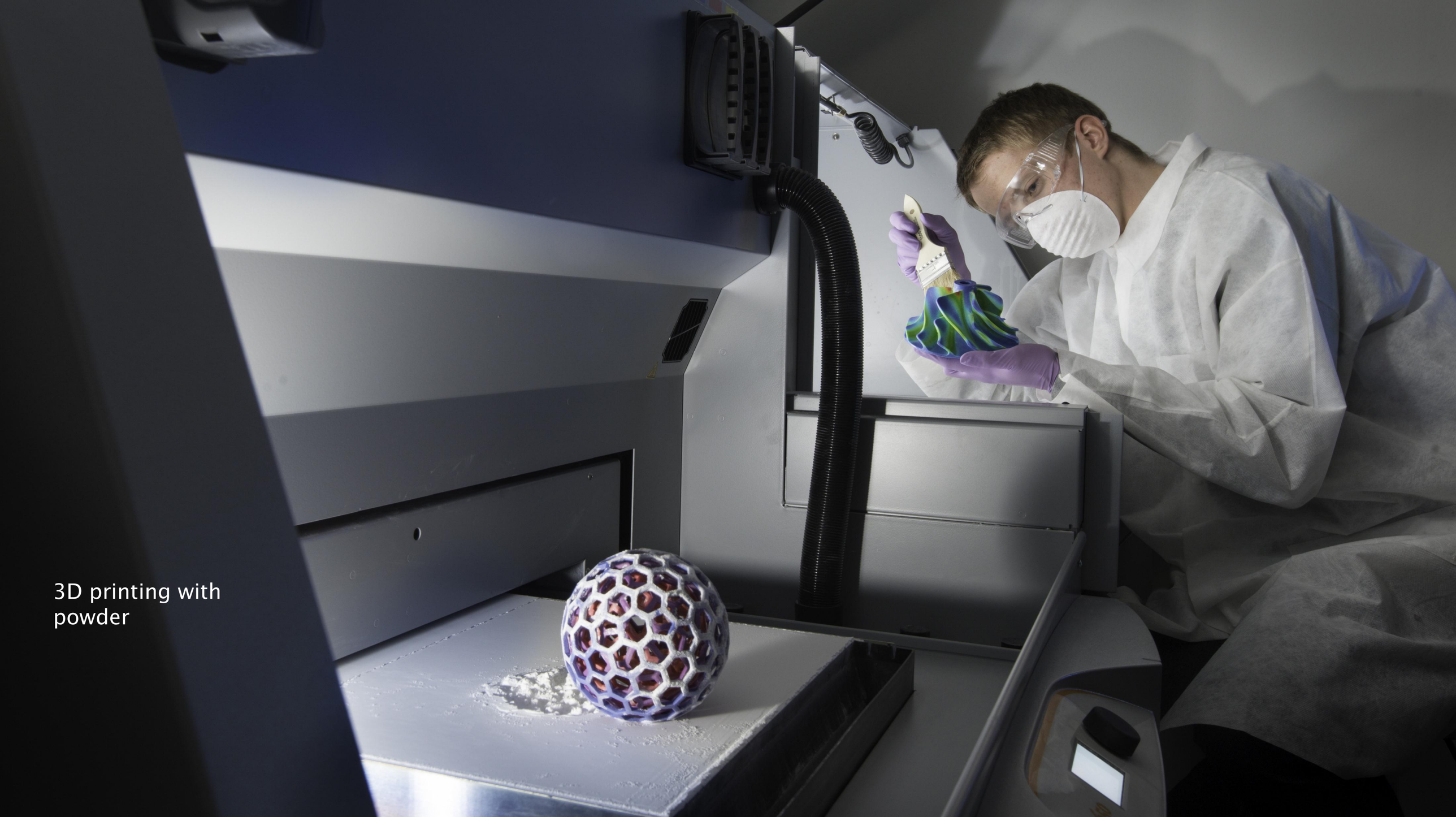
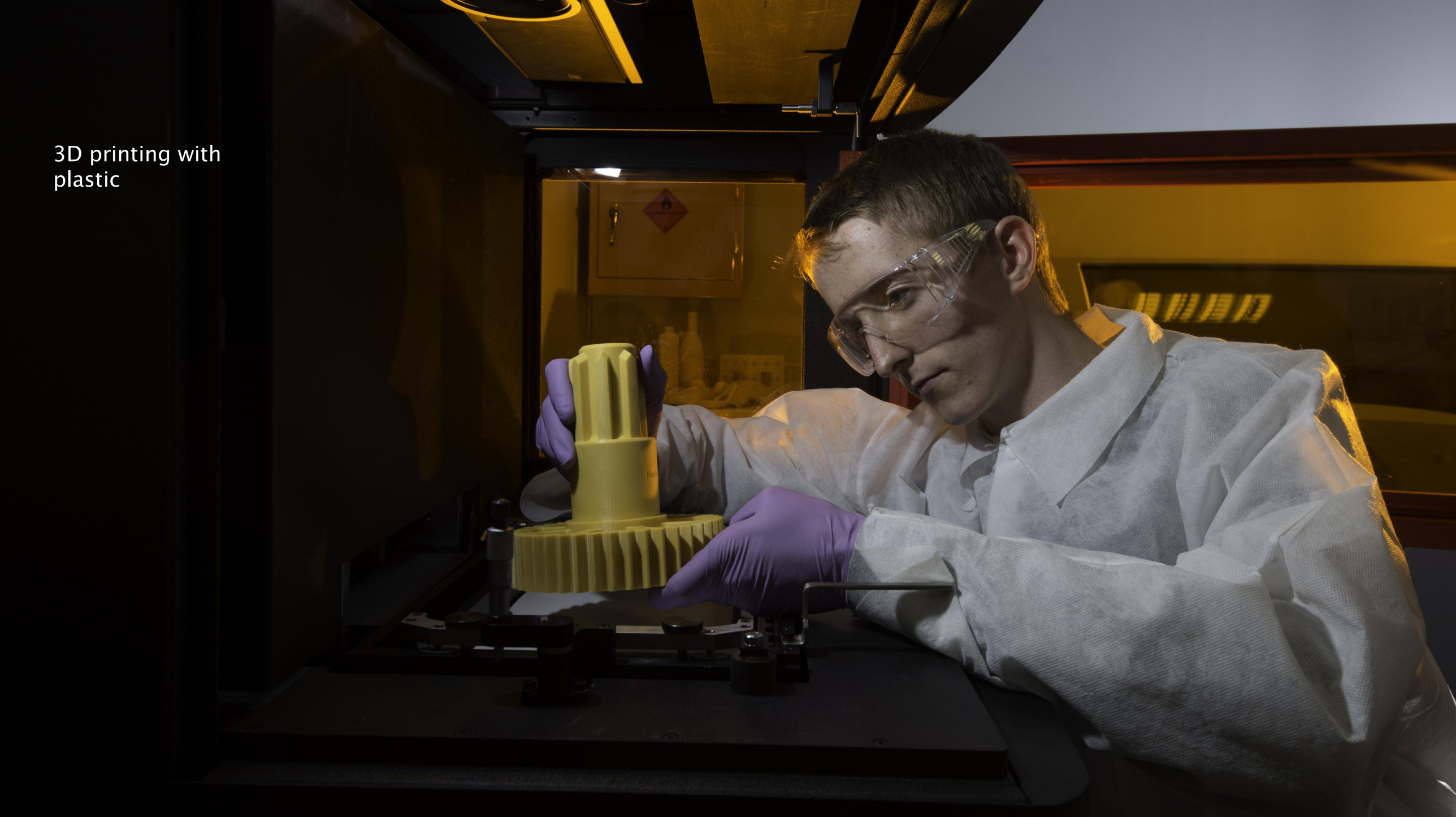
Our Facilities

Our Facilities

- Two new 3D printers worth £300K have been installed within the Engineering and Design Manufacturing Centre.
- Powder printing machine: This prints the 3D part's cross sectional geometry on layers of powder spread on top of each other. Layer by layer these sections are bonded together until the process is complete.
- Plastic material prototyping machine: This prints the 3D parts in a material that is more robust than powder.



3D printing with
powder



3D printing with plastic

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Research-Led Teaching

A Significant Investment

- Installation of the prototyping machines has been a significant investment in the Undergraduate Curriculum within Engineering and Environment.
- Access to these facilities will enhance modules taught on the degree programmes in line with the strategic ‘Transforming Education” goals of the University.
- The facility is flexible and personalised, therefore students will create designs, have them printed off within a few hours and walk out physically holding the 3D printed product.

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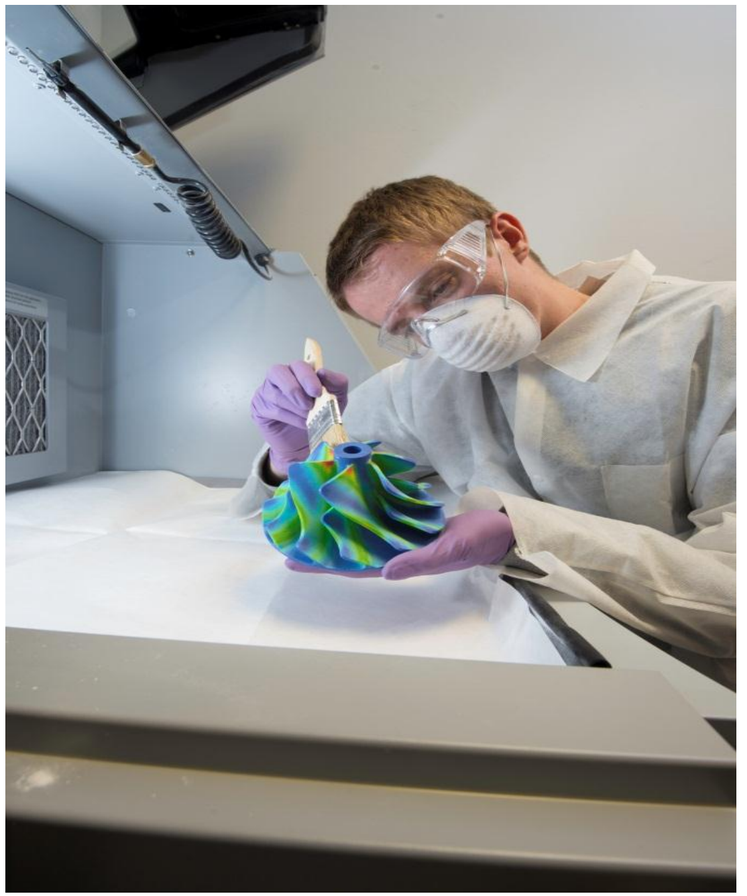

Research student examining a power printed artefact

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Industry and Enterprise

Industry and Enterprise

- The 3D printed plane
- Bike fork testing
- Multidisciplinary collaborations within the University

3D Printed Plane: The SULSA

- The rapid prototyping facility has been embraced aircraft design research and has contributed to the creation of the first 3D printed plane.
- The SULSA (Southampton University Laser Sintered Aircraft) plane is an unmanned air vehicle (UAV) whose entire structure has been printed, including wings, integral control surfaces and access hatches.

3D Printed Plane: The SULSA

- Previously the ‘elliptical wing’ design, which contributed to the success of the Supermarine Spitfire, was too complex and expensive to be built using modern techniques.
- With 3D printing technology, the entire aircraft can be put together without tools in minutes.

Bike Fork Testing

- Through collaboration with the Wind Tunnels and the Rapid Prototyping facility, researchers are producing a set of different bike fork designs and testing each in the Wind Tunnel to determine which is most aerodynamic.

- They want to test the hypothesis that the shape of fork blades may shape the aerodynamics of the bike.

Multidisciplinary Collaborations

- Technicians within the Engineering and Design Manufacture Centre are working with academics from various other disciplines within the University, such as Archaeology, Fine Art and Geography, to produce 3D printed artefacts

Rapid prototype of a statue head design provided by Winchester School of Art

Rapid prototype of a Converse shoe produced by the 3D printing machine using plastic materials

Rapid prototype of landscape terrain provided by the Geography department at the University

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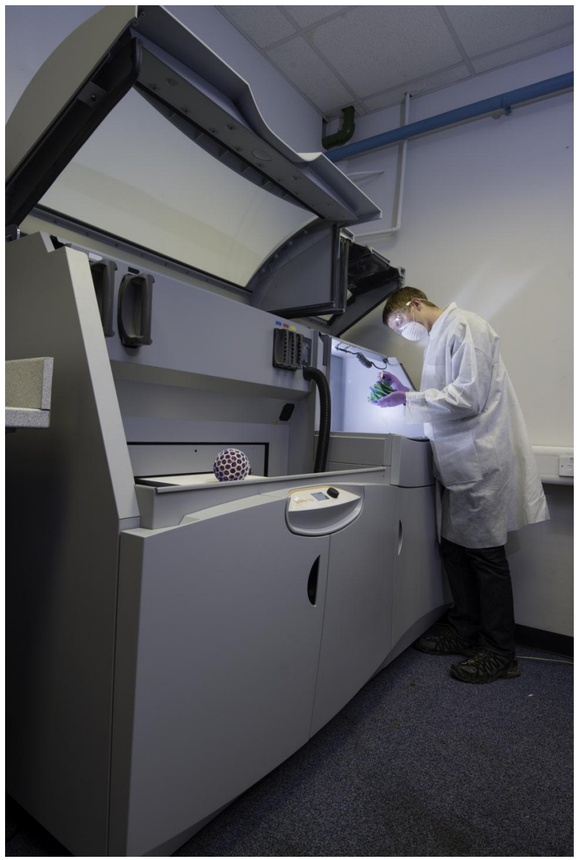
Outreach

Inspiring Future Generations

- The rapid prototyping facility will be critical for inspiring the next generation of engineering students considering University.

- We aim to attract prospective students by showcasing the machines on tours of the facilities.



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