Healthcare Gateway

Reducing the risk of exploring new technologies

Partners

Dr Martin Highett,
Mercury Centre,
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JRI Orthopaedics
www.jri-ltd.co.uk

Overview

A long-standing relationship has led to a potential new manufacturing process for orthopaedic implants. JRI Orthopaedics is a Sheffield-based company that makes orthopaedic implants and surgical instruments. Based in the University's Department of Materials Science and Engineering and part-financed by the European Regional Development Fund, The Mercury Centre has strengths in materials characterisation as well as the facilities for groundbreaking manufacturing methods. Over several years, the two organisations have cultivated close collaborations that enable them to explore mutually beneficial topics.

The old method

Traditionally, orthopaedic implants are made by forging and machining the material. But this is an expensive process that is only viable with mass production and sufficient demand for off-the-shelf implants. Making custom implants in this traditional way is constrained by high costs, in energy and financially, as well as the timescales of the manufacturing process.

Contact the Healthcare Gateway

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JRI Orthopaedics wanted to investigate whether additive layer manufacturing could be used to make bespoke implants more efficiently, while at the same time enhancing their mechanical performance and increasing their biocompatibility. Using the Mercury Centre's facilities has meant that the company can explore the technology's potential sooner rather than later. It has also reduced the level of risk involved in developing new processes.

New manufacturing technology

Additive layer manufacturing, or 3D printing, is ideal for making small numbers of parts on demand. A CAD (computer-aided design) file of the component is created using digital data, potentially from a scan of a patient. After feeding this data directly into a 3D printer, the part is formed by melting metal powder layer-by-layer, resulting in a custom implant. Ongoing collaborative research is investigating whether the parts produced meet industry standards of performance and patient integration for orthopaedic implants.

Next steps

Although the development of a new product is still in its infancy, the potential of the technology for the flexible and responsive manufacture of orthopaedic implants is promising. JRI Orthopaedics has gained a great deal of knowledge from the collaboration. Testing the materials has given them the confidence to embark on the next phase of development: the repeatability of the process, more mechanical testing, and further benchmarking against standard production routes.

The Mercury Centre Manager Dr Martin I Highett is excited by the possibilities of the partnership: "We're continually looking to the future in working with JRI Orthopaedics as preliminary data prove to be positive. At the moment, our focus is to gain a deeper understanding of the technology, finding out if it provides the manufacturing requirements to produce enhanced medical implants that will improve patient outcomes."

"Applying the research from a different perspective is very valuable to the Centre and JRI. In the long run, as the partnership continues to develop, we'll be looking for a stronger collaboration so we can continue this fruitful relationship."

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