Under its Cotton Futures program, CRDC is investing in long-term innovations to help the Australian cotton industry remain profitable, sustainable and competitive into the future.

This program ambitiously seeks to transform the industry through blue-sky research projects. One such project is the Cotton rapid customisation feasibility study, conducted by QUT’s Dr Jared Donovan and Dr Rafael Gomez, through support from CRDC.

In this fact sheet, Jared and Rafael explain the project and its findings.

What was the aim of your research?
The aim of our research was to explore the feasibility of using cotton-derived materials as feedstocks for rapid-customisation.

Rapid customisation is a term that describes a wide range of technologies, which enable manufacture of products using computer-controlled processes so that goods can be produced in an automated way but also highly customised. One of the most prominent technologies in this area is additive manufacturing, where objects are printed out by machines that build up layers of material one-by-one to create 3D shapes, often called ‘3D printing’.

What we wanted to find out is whether materials derived from cotton could be used for processes such as 3D printing and if so, what would be the best combination of 3D printing technology and cotton-derived material to use.

What did you find?
We found that there are actually many different ways that we could employ cotton-derived materials for 3D-printing. So technically, the approach seems very feasible. We realised that the more difficult question was to figure out why cotton would make a compelling choice over other materials, either through cotton’s inherent material properties or through customer perceptions of cotton. To address this, we developed five ‘design visions’ of products that would employ cotton-derived feedstocks in new and novel ways and where if there would be a clear advantage and market opportunity for cotton derived feedstocks.

The five ‘design visions’ are:
- **On-site fabrication**: the on-site fabrication of cotton-based filtration products;
- **Rapid bespoke**: the on-demand manufacture of bespoke furniture using cotton-derived feedstocks and rapid customisation;
- **Senseable style**: next generation lifestyle garments and accessories that utilise cotton-derived material, smart sensing material and rapid customisation;
- **My toy lab**: the 3D printing of children’s toys utilising cotton-derived feedstocks; and
- **Regenerative skin**: patient-specific smart wound dressings using cotton-derived cellulose and rapid customisation.
Why is it important?
Rapid customisation technologies have only really started to enter into public awareness in the past few years, but they have actually been around for much longer and have already had a very large impact in the manufacturing industry. Additive manufacturing is itself already a multibillion dollar industry and continues to grow rapidly.

Due to this continuing growth, rapid customisation is identified to have large potential impact on the textiles and cotton industries. It is therefore important that the cotton industry prepare for possible disruptions and opportunities arising from this technology.

What will it mean for the cotton industry and/or cotton growers?
This project forms a vital first step in exploring rapid customisation as an area of potential for the Australian cotton industry. It aims to establish the technical and economic feasibility of using cotton-derived feedstock in rapid customisation processes. If we can find ways of using cotton in new and novel ways then it can expand the market for cotton products, and allow for innovations in supply-chain and business models.

Where to go for more information?
We would love to talk to you if you have any questions or ideas for further research in this area. Please contact us by email us at:
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