3D PRINTING CLOSER TO COMMERCIAL REALITY

3D CHOCOLATE HEAVEN

3D printing technology that can create full-scale consumer products - even in chocolate - is one step closer to commercial reality thanks to research sponsored by the Engineering and Physical Sciences Research Council (EPSRC).

The project team, led by the University of Exeter in collaboration with the University of Brunel and software developer Delcam, has succeeded in physically reproducing 3D chocolate products using technology similar in concept to that used by domestic inkjet printers.

Research leader, Exeter’s Dr Liang Hao, says: “What makes 3D printing technology special is that in the long term consumers will be able to design and make their own products - tailor-made to their needs and preferences. The possibilities are endless, and could open up new opportunities in the manufacturing and retail sectors.”

3D printing is a technology where a three-dimensional object is created by building up successive layers of material. The printer reads the computer-assisted design, sprays an ultra-thin layer of molten material onto a surface, allows it to solidify, then sprays another layer on top, and so on, until the three-dimensional product is finished.

Build a chocolate printer

The technology is already used in industry to produce plastic and metal products but this is the first time the principles have been applied to chocolate.

Dr Hao says: “We built a chocolate ‘printer’ to demonstrate the technology in a way that everyone can relate to – and because the raw material is readily available, low-cost and non-hazardous. What’s more, there’s no wastage as any unused chocolate can be used again – or eaten!”

The research presented many challenges. Chocolate isn’t easy to work with as it requires accurate heating and cooling cycles. These variables have to be integrated with the correct flow rates for the 3D printing process. The researchers overcame these difficulties by developing new temperature and heating control systems.

A consumer-friendly interface to design the chocolate objects is also in development. Researchers hope that an online retail business will host a web site for users to upload their chocolate designs for 3D printing and delivery.

“What makes 3D printing technology special is that in the long term consumers will be able to design and make their own products”

Dr Liang Hao
“THE POSSIBILITIES ARE ENDLESS, AND COULD OPEN UP NEW OPPORTUNITIES IN THE MANUFACTURING AND RETAIL SECTORS”

Dr Liang Hao

Designs need not start from scratch, the web-based utility will also allow users to see designs created by others to modify for their own use.

Dr Hao adds: “In future this kind of technology will allow people to produce and design many other products such as jewellery or household goods. Eventually we may see many mass-produced products replaced by unique designs created by the customer.”

By combining developments in engineering with the commercial potential of the digital economy, the research could open up new markets – creating new jobs and, in the case of chocolate printing, sweet business opportunities.

The project is funded as part of the Research Council UK Digital Economy programme - and is managed by the EPSRC on behalf of Economic and Social Research Council (ESRC), Arts and Humanities Research Council (AHRC) and Medical Research Council (MRC).