



Industry Forum

Business Excellence Through Inspired People

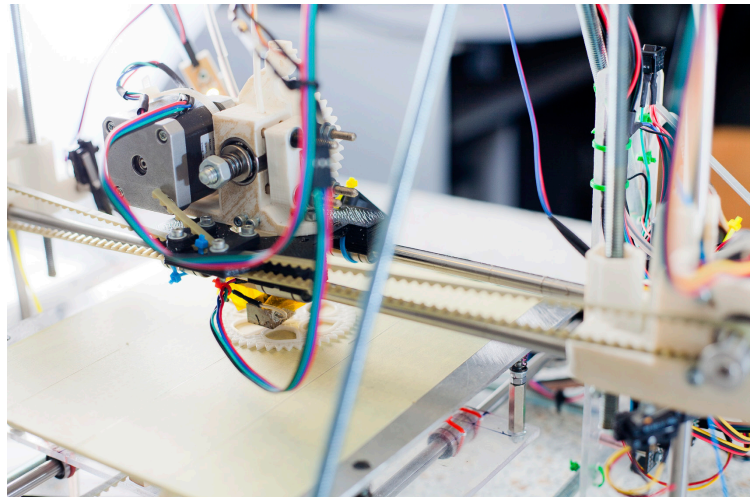
July 2014

Does 3-D Printing Herald Manufacturing Supply Chain Disruption?

The public profile of 3-D printing has reached a new high. On June 19 2014 Geoffrey Fowler had a whole page on the subject in the Wall Street Journal. He was prompted by the US launch of a home use 3-D printer by MakerBot for less than \$1400. MakerBot also offer an online store where you can buy and download printable objects – building on Apple’s appstore business model.

The day before, the Financial Times included a section, Engineering the Future with a piece by Tanya Powley, ‘Now You Can Print Your Own Robot’. She explained that additive manufacturing had been around since the 1980s but that in recent years it has gained a heightened presence in both consumer and industrial markets – in 2013 the total products and services market rose 35% to just over \$3bn.

On 20 June 2014 Michael Sorkin, CEO of iGo3D, a European 3-D printing product and services chain which has recently opened a facility in Moscow, made a presentation in Berlin where he gave an analysis of his latest results which show that in his business, the services market is growing faster than sales of products. Within services the biggest category is professional prototyping work – the classic area where 3-D printing first made an impact. 3-D printing has now become a topic that senior managers need to understand and a blue chip US consultancy has started to run prestige person to person briefing sessions on the subject.



Aerospace and Defence is one area where 3-D printing has made inroads and it is thought that the global market is currently in excess of \$250m. Boeing currently prints 200 parts on 10 aircraft platforms. By 2020 GE expects to have made 100,000 fuel nozzles by 3-D printing. The nature of aerospace demand is well suited to the cost and performance characteristics of 3-D printing.

In automotive, the advanced manufacturing technique that has made greatest progress is probably robotics.

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Premium automotive manufacturing conditions have some similarities with aerospace and so this is the area where progress may well be made. Local Motors in the US has a project to use 3-D to make an electric car. In early June the engine and transmission was installed into their prototype.

Low volume parts for the aftermarket is another area where serious work is under way on 3-D printing currently. In the same pattern as iGo3D, various organisations are working on offering a bureau service to the automotive supply chain.

This bureau concept is similar to an arena where the technique has become very well established – the Fab Lab movement. A Fab Lab is a small-scale workshop offering personal digital fabrication and is equipped with a range of digitally controlled tools. The program began as a collaboration between the Grassroots Invention Group, the Center for Bits and Atoms and the Media Lab at MIT. A related driver was a MIT course called ‘How to Make (Almost) Anything’. According to MIT in 2013 there were around 125 labs in 34 countries. In London about a year ago the arts charity, SPACE, launched a crowdfunding campaign on Kickstarter for a Fab Lab in East London which would contain a range of production facilities. The project had the goal of maximising accessibility and so the annual fee is only £20 but it did not meet its funding goal of £15000.

Deloitte University have concluded that aerospace and defence is the arena where Advanced Manufacturing (AM) – the broader set of techniques which includes 3-D printing – is likely to develop. The reasons are that the AM techniques favour

- Manufacturing parts with complex designs
- Manufacturing parts that require complex machining
- Reducing a part’s weight
- Reducing the complexity of assembly
- Speeding time to market



Firms in the supply chain should consider that the ability to offer AM may increasingly be a requirement for OEMs. There is likely to be a premium to pay when recruiting staff with materials science and design backgrounds. The impact on the IT function is likely to include better integration between R&D and design systems and manufacturing systems.

Major firms are most likely to use AM in a way which secures benefits in product development time scales and costs. But in the medium term AM should come to be used to produce parts with improved functionality.

In June 2013, Vince Cable announced

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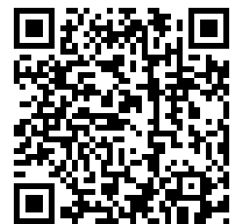
£14.7m to support businesses developing 3-D printing projects via a collaboration between the Technology Strategy Board and Research Councils. The programme is particularly focused on healthcare and energy and projects are expected to take 1-3 years. This programme is part of a total fund of £440m to support new manufacturing techniques.

In May 2014, the new Technology Director at the Institute of Advanced Manufacturing (a collaboration between Coventry University and Unipart), James Simester, announced that he has targeted £5m in funding to explore advanced manufacturing fuel rails and powertrain systems. He explained that 'the initial focus will be on the automotive sector with the intention of applying the cutting edge research and advanced engineering in other sectors including such as aerospace, power generation, oil and gas'.

In June 2013, IBM published an interesting study of the disruptive potential of these technologies on manufacturing supply chains. They concluded that the electronics sector is particularly vulnerable. The average cost of products will fall and scale economies will be less advantageous. On the demand side mass customisation and personalisation will become more important drivers for the profitable introduction of these techniques. Location of production is likely to shift to being closer to the customer. Crowd sourcing is likely to become more important in new product development.

So, we are in a situation where potentially disruptive changes in manufacturing supply chains and business models may be in their initial phases. It isn't likely that they will all get disrupted but it is also unlikely that no supply chain will undergo large scale rapid change.

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