micro manufacturing

The term Micro Manufacturing has arrived at the forefront of the design industry because of the recent developments in small-scale manufacturing, when consumers step into the role of producers and 'print' objects at home. The questions, doubts and potential of this discussion seem to echo that of those that arose in the 1980s when desktop publishing meant we could easily 'design' documents and print them from the comforts of our home. {February 2012}

In theory, the possibilities and potential of micro manufacturing in the home seem bountiful, however, so far the valuable achievements in 3D printing have been at an industry-based level only. These include the making of prosthetic limbs, artificial blood vessels, architecture models, as well as personalised 3D chocolate and animation characters by companies such as Inition.[i] These show the advantages that 3D printing has in making one-off pieces at low costs. The outcomes of 3D printers in the home are less exciting, for example, the basic repairing of household objects and the creation of small toys that if made by mass production, would end up as landfill.[ii]

For micro manufacturing to take off as successfully as desktop publishing did in the 1980s, there are practical limitations that will need to be resolved. For example, the purchase price of the 3D printer is significantly higher than a domestic paper printer.[iii] Not only is there the initial cost involved in purchasing the 3D printer but also the cost of materials used to print the objects.[iv]

In the wider picture, micro manufacturing has the potential to really shake up the design industry. If 3D printing encourages ordinary people to design and make things that would otherwise be designed and mass-produced, what will the role of designers and manufacturers be?[v] Will the influx of untrained people with the technology to design and produce their own things lead to a growth in poorly designed objects, failure and ultimately waste?[vi] Or will our needs as consumers be more accurately met when we are shaping our own material worlds?

{i} In January 2012, The Aram Gallery hosted an exhibition titled, 'Send to Print/Print to Send' which featured a variety of 3D printed work by established and upcoming designers, such as, the 'Endless Rocking Chair' by Dirk Vander Kooij and 'Lox Stool' by Pearson Lloyd.

{ii} Due to the aesthetic of the cheaper materials that can be used for home 3D printers, the reproduction of plastic toys, such as Lego is an uninspiring use for the small and expensive manufacturing machine.

{iii} The August 2011 issue of *Icon Magazine's* indicated that the Makerbot kit can be purchased for around £800 and the largest object that the owner can make is a modest 12.7cm³. This making tool takes approximately 12 hours to build, a contrast to the quick set up time of a paper printer.

{iv} There are various materials that can be used in 3D printing, such as polyamide, nylon, plastic, resin and some metals. The chosen material is fed through a nozzle and is instructed by 3D computer programming to form layers to create the shape of a computer drawn image. It seems that because of the manufacturing process and/or the materials used, a certain level of hand finishing at the end of the printing process is necessary to fully complete the object.

{v} Designer, Tim Parsons suggested in a blog entry article titled, 'Tooling Up the Layman' [2009] that as with the development of desktop publishing, the role of the graphic designer has not been made redundant but has perhaps changed the designer's role into one of responsibility to use their position to create something that is highly skilled, specialist and considers more simply just the consumers' demands.

{vi} Addressing the issue of waste and unsustainable design is a vital factor that will deem micro manufacturing a success. With the current focus in society towards sustainable living, producing objects that have not had much expert input could be a problem. Whilst designers, manufacturers and retailers are constantly being asked to justify and show awareness to creating responsibly, surely some form of moderation will have to be rolled out to track what consumers can produce.

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Another key issue in this area is intellectual property.[vii] If product designs were shared online and printed at home, manufacturers of copyrighted products would be subject to the same unsolved problems of piracy as those facing the music and film industries.[viii]

Perhaps 3D printing in the home will lead consumers away from the brand-obsessed society we have become. By putting more effort into designing, modifying and customizing objects at home, consumers may return to valuing the making process and having greater respect and sentiments towards the object and its materiality.

In the greater picture, it might be beneficial that whilst developers resolve the problems surrounding micro manufacturing and decide on a sustainable future for this production process in the domestic environment, user-friendly 3D programmes could be developed as the current options, such as Rhino, AutoCad and Google SketchUp often require someone to teach the basics before they can be used. [ix] It seems that with the growing focus on sustainability, until micro manufacturing can be justified for home use, it is acceptable that consumers become acquainted with 3D modelling and gain CAD skills, so long as the creations remain on the consumers' screen rather than turning them into tangible objects and ultimately more waste. There is no doubt that 3D printing has great potential but at the moment it seems that developers are guilty of focusing more on what is possible than on the consequences of what happens whilst and after they achieve their creations.

{vii} A technical term that seems to be mentioned repeatedly in the conversation about 3D printing is the DMCA, the Digital Millennium Copyright Act. With the technology to create and design objects at home being developed into something affordable and usable by the mass market, the ownership of the initial designs being scanned, copied or manipulated is blurred.

{viii} The licensing of product designs in the form of code is limited when following the purchase of a 3D printer consumers are encouraged to purchase a 3D scanner. 3D scanners operate by using a laser to measure and record dimensions and textures of an object. With the right skills and technology, an object could be scanned and printed or even scanned, modified and printed.

{ix} In a scenario where affordable 3D printers were in homes just as printers are now and where the appropriate materials were in cartridge like format, there could be a time where an individual designs an object on an easy to use 3D programme, that is the equivalent of Garage Band, iBook or Microsoft Word. The person could then print it and perhaps return to the computer to modify it and then email it to the other side of the world as a gift that its recipient can print off and use.

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