3D printing is exciting technology that enables users to easily create prototypes, intricate designs, customised items and small production runs that would not be possible using traditional manufacturing methods. The current technology relies on blueprints for designs in the form of Computer Aided Design (CAD) files. Computer Aided Design is the use of specialist software to create technical drawings. 3D printers can then be used to print 3D objects in accordance with the CAD file. The printers work by effectively slicing the CAD file into digital cross-sections. The printer prints successive layers of material (typically plastics) until layering is complete and the form of the product has been “printed”.

While high performance industrial systems can cost between £10,000 and £700,000, the technology is now available for us to print simple consumer products in our homes. At the time of writing, home desktop printers cost between £1,000 and £7,000. It is possible to buy a printer that prints in multiple colours using ABS plastic (the material used for lego bricks) for approximately £3,000. At the high end of the scale, the technology has evolved rapidly. From initially only being able to print using plastic-based resins, printers can now use steel dust, welded together with lasers and then heated in a furnace, to create metal products.

From a manufacturing perspective, this technology has the potential to disrupt traditional manufacturing processes, greatly reducing the cost, as well as eliminating or reducing transportation. It also opens up the prospect of manufacturing to anyone who can afford a 3D printer.

While we wait for the home printers to become more sophisticated, the public has increasing access to “copy shops” providing 3D printing services. Equally, there are plenty of online offerings. These services are being used to print a huge array of 3D objects, including: jewellery; gadgets (eg, phone cases); home décor (eg, mugs, vases); art (eg, small-scale sculptures); toys (eg, action figures, chess pieces, toy bricks); and glasses frames. Spare parts for products might be printed eg, a replacement vacuum cleaner nozzle. Equally, consumers could use the technology to replace relatively simple medical devices like shoe orthotics.

With this relatively new form of cheap and accessible manufacturing, come two key threats for rightsholders:

1) The emergence of this ‘organised industry’ (whether legitimate printer companies or counterfeiters) is a real possibility. For counterfeiters, the use of 3D printing on a mass scale will allow them to manufacture the goods in their home market thereby reducing shipping costs and avoiding customs seizures.

2) The ability for the public to produce their own articles, without purchasing them direct from retailers. Increasingly, we are seeing file-sharing sites whereby the public can share CAD files. As the technology becomes more accessible, consumers will use those files to create objects for themselves.

Threats

When objects are copied, there will always be the distinct possibility that third party intellectual property rights are infringed. This has always been the case with any form of manufacturing.

The issue here is that the advent of 3D printers has the potential to significantly reduce the need for traditional manufacturing processes and the overheads that go with those processes eg, factory costs and transportation costs. The current costs of 3D printing are not prohibitive, such that manufacturing is opened up to a large market.

Aside from the economic downsides, there are reputational issues with the second risk. Objects may be produced without consideration of legislation governing standards, such as toy safety regulations. For example, where a lego brick is copied, the ultimate consumer would not have the assurance that the material used to print that brick is suitable for use by children (eg, has it undergone toxicity testing?). Also, the lack of packaging means the consumer would not have instructions. This will concern rightsholders because of the potential safety threat posed to their consumers but also because they may be faced with some form of...
Infringing acts and infringers

Unauthorized commercial production of patented products by 3D printing may constitute an act of patent infringement by the user of the printer. In addition, keeping, using, offering for disposal or disposing of the resulting infringing product may be infringing acts carried out by the manufacturer or other parties in the same way as they would be for infringing products produced by traditional means. As the printer and materials can be used to make a wide range of products, the supplier of the printer and materials is unlikely to be infringing unless it knew that an infringing product would be made or that the printer and materials were only suitable for infringing use. The statutory exemption for private, non-commercial acts that would otherwise constitute patent infringement will apply to many of the patented products that are produced by users at home for personal use. In addition, patentees may be reluctant to sue the end-users of their products.

Copyright: products that may be protected

In some cases, it may be possible to claim that the object which has been copied is protected by copyright (for example jewellery, pottery, sculptures). An article will only be protected by copyright where it can be classed as an artistic work (this discounts many manufactured articles but specifically protects "sculptures" and "works of artistic craftsmanship"). Attempts to rely on copyright to protect functional objects before the UK courts have been largely unsuccessful. The following have been found not to be sculptures: (1) moulds for making cartridges, (2) a model of a dental impression tray, (3) a Stormtrooper helmet. Equally, it is difficult to successfully assert an article is protected as a work of artistic craftsmanship. In the case of George Hensher Ltd v Restawwhile Upholstery (Lancs) Ltd,2 the House of Lords decided a prototype for a sofa was not protected by copyright as a work of artistic craftsmanship. Works found to constitute works of artistic craftsmanship have included hand knitted woollen sweaters and pottery. Original pieces of handcrafted jewellery are also likely to be protected as works of artistic craftsmanship.

Even where the form of an object is not protected by copyright (eg, the shape of a vessel), it may be possible to rely on copyright in the object’s surface design to the extent that surface design is reproduced in the printed copy. For example, in the case of The Flashing Badge Company Ltd v Brian Groves, the High Court found that the graphic design for the surface decoration of a badge was protected by copyright. The design had an existence independent of the badge to which it was applied, ie, the design could be applied to the surface of other articles.

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by these rights, the rights will be infringed where an unauthorised third party makes a copy. Designs rights will often be the most useful form of IP rights for the purposes of challenging 3D printing. They are the right most readily found to subsist in everyday objects.

Commercial reproduction using 3D printers could well amount to design right infringement. However, there will be no infringement where an act is done privately and for purposes which are not commercial. Therefore, if an object is copied by an individual in his home for his own personal use, there will be no infringement, but if the individual then sells the items he has printed, this would constitute infringement.

Where 3D printers are used for commercial purposes to produce spare parts for articles, the position is less favourable for rightsholders. It will not be an infringement for a third party to copy any features of a protected design that enables their own design to be connected to or matched with the protected design. Design features enabling one product to be functionally fitted or aesthetically matched to another are excluded from protection.

**Trademarks**

Where trademarks appear on objects that are then copied, there is a risk that the copier infringes those trademarks. In certain circumstances, trademarks can also be registered for the shape of products although this form of protection is notoriously difficult to obtain. A commercial 3D printing service would be using the trademark in the course of trade when reproducing a rightsholder’s trademark on a printed object. This is likely to amount to infringement. As for design law, where a private individual prints an object that includes a registered trademark, it is unlikely that they will be doing so “in the course of trade” unless they then go on to sell what they have printed.

**CAD files**

Where intellectual property rights are incorporated in CAD files, this could give rightsholders further enforcement options. Where an object protected by artistic work copyright is scanned and a CAD file is created, the file will reproduce that copyright work. If this reproduction is unauthorised, it is likely to be an infringement unless the copier has a defence (such as the proposed private copying defence). It does not matter that the work is in a different form. It will be an infringement to copy from a 3D work to create a 2D work and vice versa. Suppliers of “means relating to essential elements of the invention” may also infringe the patent. A supplier of the CAD file for a patented product could be said to be infringing the patent where it was obvious to a reasonable person that the CAD file would be used to print an infringing product.

These rights could be particularly useful to prevent unauthorised file-sharing. Where unauthorised file-sharing websites offer CAD files embodying protected works, the rightsholders may well be able to argue the website operator authorises and is a joint infringer with its users.

There are issues with using both trademarks and design rights to challenge unauthorised use of CAD files. In 3D printing, the rightsholder would have to show the would-be defendant had “affixed” the trademark to goods (challenging, particularly in the case of a shape mark). It is debatable whether the wording of the legislation catches inclusion of a mark within the CAD file. Equally, design law requires use of the design which covers “making, offering, putting on the market, importing, exporting or using of a product”. The focus is on the use of the product rather than the use of the design.

While we are some way off significant numbers of consumers owning 3D printers, there is increasing access to the technology via 3D printing services. As discussed, the potential for this to harm rightsholders is clear. For example, if consumers are able to print toys easily and cheaply (eg, a Lego man (protected by a registered trade mark)), why would they pay for the genuine article? The existence of private use defences to infringement is a real concern for rightsholders. The technology enables consumers to behave more like manufacturers and if private use defences are here to stay, rightsholders whose products are vulnerable to printing will need to find a way of sharing these new business models.

We have learnt from the digitisation of music that one of the most effective ways to limit piracy is to ensure the public has access to a wide variety of good value-licensed products. To counter piracy, designers may have to embrace the technology and adapt their business models. To counter the loss of sales of physical products, designers may wish to sell CAD files embodying their designs to the public at a reasonable cost.

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**Footnotes**

8. Section 10(2) Trade Marks Act 1994 and Article 19,”Means relating to essential elements of the invention” may also infringe the patent. A supplier of the CAD file for a patented product could be said to be infringing the patent where it was obvious to a reasonable person that the CAD file would be used to print an infringing product.
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18. Section 10(2) Trade Marks Act 1949 and Article 9(1) Community Trade Mark Regulation.

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