



A sticky subject

Kari Barnes and J Rick Taché explain why 3D printing will need new strategies to protect innovation

Additive manufacturing, along with artificial intelligence, is anticipated to be the next industrial revolution. As with previous industrial revolutions, the transition to additive manufacturing may impact every aspect of daily life. However, unlike previous industrial revolutions, additive manufacturing includes the real possibility of fundamental changes to key legal precepts, necessitated by major disruptions to and the refinement of the existing manufacturing and distribution chain.

Industry experts use the term additive manufacturing for any manufacturing method in which an object is created through the addition of material as opposed to the removal or cutting away of excess material. Three-dimensional (3D) printing is a form of additive manufacturing and can include any one of seven different layered manufacturing methods including binder jetting, directed energy deposition, material jetting, material extrusion, powder bed fusion, sheet lamination, and vat polymerisation. Although additive manufacturing encompasses a variety of manufacturing methods, some of which have been used for many years, the control and intricate detail provided by 3D printing is the most revolutionary and disruptive of the additive manufacturing methods.

Because of the ever-decreasing costs and the recent availability of home printing machines, 3D printing allows the general public to produce products directly at home, thereby merging the manufacturer, distributor, and customer together into the same entity. This transition redefines not only the products being sold, but also how they are manufactured and distributed. In addition enabling end-users to manufacture the desired product at home, 3D printing empowers third parties not affiliated to the creator of the product to sell software files capable of being printed by customers at home. In addition, it allows a company to form a “printing as a service” business where customers and/or the creator of the product can forward software for the product to be printed and then either have the customer pick up the product in-store or have it subsequently shipped to the customer. The advent of sophisticated 3D scanners and higher resolution cameras, simplifies the manufacturing of unauthorised products, both from a cost and time to market perspective. The consequence is that a would-be consumer need not pay for or illegally download the product software, but rather allow the 3D scanner and/or camera to simply upload the image to enable the associated 3D printer to print the subject product. This concern applies not just to initial products but also replacement parts.

To survive this anticipated industrial revolution, companies involved in the design and manufacturing of such products, components, or replacement parts must employ new strategies to protect their innovation, ensure quality, anticipate and respond to regulations on companies and products, and protect their consumers.

Conventional manufacturing includes a well-established process, from making the component parts of a product, to assembling a product, to distributing the product, to consuming the product. If a company wants to protect its innovation, a company files for the appropriate intellectual property protection and enforces their rights against one or more entities in the distribution chain. However, if the consumer, because of 3D printing, becomes their own manufacturer, how does a company protect their products from competitors? The only recourse may be for the company to sue its own would-be consumer – a move conventionally thought to be counter to all prudent business practices. Even if a company elects to sue its own consumer, any recovery would not merit the associated costs and risks. As with current infringement at the consumer level, the associated litigation costs make filing and pursuing an infringement suit against a single individual strategically impractical. This is also likely true of any lawsuit filed against an aggregator of product source code sold on one or more websites. The not too recent legislative move to counteract patent trolls by limiting consolidated infringement suits will also interfere with consolidating suits against any large number of individual consumers to justify the cost of large-scale litigation.

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One strategy for a company to employ is to change its focus of protection. In addition to protecting the product itself, a company may elect instead to protect its software or the production through the additive manufacturing process. This alternative is rife with its own host of issues. For example, the US Patent and Trademark Office subjects software-based patent applications to additional scrutiny, potentially making the cost of protection not only more expensive, but the scope

of any resultant patent more limited. The duplication in protection for the product and the software to produce a product through additive manufacturing also increases the cost of managing the enlarged patent portfolio.

Companies will also have to re-evaluate the identity of inventors contributing to their inventions. Incorporating aspects of both the software for creating an object and the object itself will likely include previously separated engineering personnel. This separation may fall over employee to consulting lines and therefore may introduce more third-party vendors into the invention process and claiming – another move previously disfavoured by a conventional intellectual property strategy. Also, patent exhaustion generally permits any user to do whatever they wish with an invention after it is legitimately purchased. Therefore, once a consumer purchases patented software for producing a product, does the consumer then have unlimited rights to print any number of products and resell or give away those products to others? Such an outcome is likely to destroy a manufacturing-based company's existing revenue model.

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The move to consumer manufacturing also increases the opportunity for counterfeiting, currently protected under well-established trademark law. Conventional manufacturing permits companies to maintain control of their product and build brand value through product recognition and acceptance. Companies also have means for determining if a product originated from its manufacturing chain or elsewhere. For example, a product is marketed and sold under a company's name. The brand name and/or trade dress can be incorporated into the product. The quality of the product is assured through quality assurance protocols at the manufacturer or along the distribution chain. The quantity and location of a product can be controlled and tracked.

Other identification features may also be incorporated into a product, such as identification means, or specific component parts to identify and authenticate a product. However, if a consumer is merely provided with software code to create a specific product, how is the code or the resultant product recognised as being counterfeit? How does the company protect its reputation? Is the reputation then in the sale of the software code or in the product produced from the code? If in the product itself, how can a company ensure a level of quality in a product, when it does not have access to the manufacturing materials or environment?

Even if a company does not endeavour to venture into this new world of customer manufacturing, instead favouring the conventional product manufacturing and distribution chain, 3D printing can still impact the protection strategy of a company. For example, as additive

manufacturing becomes more assessable, 3D scanning will similarly become better and more readily available. As 3D scanners and cameras improve, any number of products will become susceptible to 3D copying by 3D printing.

Many aspects facing the legal arena in the wake of 3D printing are similar to those seen when peer-to-peer file sharing disrupted the distribution of copyrighted material including songs and movies. Copyright protection is not available to functional objects, and therefore, may not provide an immediate solution. However, changes to the intellectual property landscape may be necessary such as those that led to the creation of the Digital Millennium Copyright Act (DMCA) in the US. Therefore, just as the DMCA criminalised persons that circumvented measures that control access to copyrighted works, new measures may be required to protect the production and dissemination of technology, devices, or services intended to circumvent other intellectual property measures. Companies may employ other strategies as used in the wave of the peer-to-peer file sharing, such as software features employed to limit copying, limit use, and other measures so that the production and distribution of protected works is limited technologically.

The regulatory path for additive manufacturing faces some of the same hurdles as that of intellectual property. For example, how does a regulator ensure a quality product when the manufacturing is distributed in different environments and any number of individual customers?

To date, most of these complex legal issues have been ignored in favour of maintaining the *status quo*. The legal community has focused solely on the products liability aspects of additive manufacturing. However, this legal issue is probably the least effected by the change to the distribution chain. There are a number of issues that can cause a product defect in a 3D printed object. The questions will likely come down to where the defect originated, such as in the materials used, the printer itself, the code used in creating the defective product, or elsewhere. Fault may then be apportioned according to the source or level of contribution to the harm that occurred. Other liability may be found in renting printers, and properly up keeping or caring for printers. The difficulty with this area is not in defining the legal standards, but instead in investigating and proving where the liability is within an already well developed legal hierarchy.

Given the projected size of the additive manufacturing market over the next few years, the associated risks to conventional design and manufacturing companies with respect to not only their intellectual property rights, but potentially the survival of their economic model and well-being, it is incumbent of such companies to evaluate their business plan and determine how best to address these inevitable issues as quickly as possible.

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