



3D Printing: Legal Landscape and Future Challenges Identifying and Clarifying the Uncertain Path Toward Commercialization

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Introduction

Although the future promise of 3D printing, also referred to as additive manufacturing (AM), has been recently promoted for its promise of reduced costs and production times, as well as an increased complexity of integral components, the legal framework is far from clear. It is useful to analyze the challenges of the current intellectual property (IP) regime, i.e., patents, copyrights, and trademarks, that 3D printing will take place within on the path toward widespread commercialization.

Many see the recent innovation in 3D printing as one of the best hopes for finally realizing a future with pervasive 3-dimensional manufacturing capability. But, it is important to consider the oldest principle regarding innovation under U.S. law:

The Congress shall have Power ... To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries. (See United States Constitution, Article I, Section 8).

Accordingly, therein lies the DNA of 3D printing's legal future, which remains as uncertain as any other field of innovation that will provide challenges for both its users and IP owners.

Presently, there are only a limited number of manufacturers who are producing and selling significant quantities of commercial scale equipment. The polymer manufacturing equipment and processes have been garnering the most publicity. There are far fewer metal equipment manufacturers. However, there will be increasing numbers of manufacturers entering the market over the next few years. This will be accompanied by the development of more complex IP portfolios.

Technologically, there are still significant engineering and reliability challenges that must be solved, which vary depending on the different material composition systems involved, e.g., metals versus polymers. These are very different.

The extent of current IP protection varies depending on the type of 3D printing that is being considered. In terms of polymers, there are significant IP positions that have been developed. However, much of this is related to rapid prototyping technology, i.e., non-functional models. Most importantly, there has been notable 3D printing industry reporting on the recent and near term (over the next year) expiry of early critical patents. As a hidden consequence of these patents entering the public domain, the wider commercial world has seen

the recent growth of 3D printing equipment developers. In terms of individual polymer components, the production of commercially functional components has only recently begun to be produced with their associated processes being protected by IP.

Ironically, there has not been as extensive a collection of IP for producing metallic components. However, those existing patents related to metals are foundational and tend to be broader in scope. Many are in the later stages of their terms (17yrs - 20yrs) of protection. Those that have been issued over the past 5-10 years are likely to provide more limited scopes of protection. However, for those that can achieve significant advances in innovation, beyond the incremental improvement, they may well acquire the market exclusivity that can be monetized beyond the existing market participants.

The most novel 3D printing applications have been associated with the onset of tissue, plant and food-based items (and potentially textiles, both organic and synthetic). These are at the early research stage, but foundational IP is likely being presently developed. With respect to patents, and given the 18 months from filing to publication, these will begin to be identifiable over the next few months to years.

Accordingly, there will be increasing amounts of IP protection being sought that should be monitored and identified for those who anticipate their own innovation in these areas. Thus, the various IP regimes present their own technical challenges, referenced above, and legal uncertainties highlighted below.

Patents

It has been reported that more than 6,000 3D Printer-related patent applications have been filed in the United States Patent and Trademark Office (USPTO) over the past 10 years. This volume and pace has already shown signs of accelerating. Accordingly, patents will begin to move en masse from the periphery of industry considerations to the federal courtrooms. As of today, there has been relatively few filed 3D printing cases for patent infringement, while even fewer that have ever been fully litigated to a final judgment. For a burgeoning field having captured an unrivaled amount of recent media coverage, this may seem surprising. But, it also points to the nascent commercial nature of 3D printing. As the actual revenues begin to increase for both patent holder (and market share leaders) and alleged infringers, the present low-level of legal controversy will recede as the creation and investment of economic capital accelerates.

It should be noted that patents are 'exclusionary' rights, in that the owner has the legal authority to prevent anyone from practicing the invention. More specifically, there is liability imposed for one who "[m]akes, uses, offers to sell, or sells *any patented invention*". (See 35 U.S.C. § 271(a)). Therefore, the notion of being able to perform the operation of 3D printing, directly, immediately and, in many cases on an unprecedented scale, personally, raises the heightened potential for patent infringement. Both the act and result of the 3D printing will be subject to enforcement actions.

In addition, there is another type of patent infringement that is also implicated by 3D printing. Contributory infringement occurs when one "[o]ffers to sell or sells . . . a *component* of a patented machine, manufacture, combination or composition, or a material or apparatus for use in practicing a patented process, constituting a material part of the invention". (See 35 U.S.C. § 271(c)). This may, in fact, represent the most significant

source of liability exposure, particularly given that 3D printing's principle promise is to be able to efficiently produce discrete components.

Further, there is another very important consideration that has heretofore not generally been considered regarding design patents. The 'utility' patent covers "[a]ny new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof". (See 35 U.S.C. § 101). In contrast, the 'design' patent covers the aesthetics of an article. This patent regime could take on increased importance in 3D printing commercial activities. The design of a component, even though it may have a principally functional purpose, may be covered by a design patent and subject to the associated enforcement actions.

There is an unintended consequence that results from the potential for patent infringement in 3D printing, when digital instructions and/or downloads are involved. There will likely be a convergence with the copyright law regime. 3D printing inherently involves producing 'copies' of an article or component, as discussed below.

Copyrights

To quote Shakespeare, "...ay, there's the rub..." (See Hamlet, 3:1). U.S. copyright law provides for ownership and registration of "[o]riginal works of authorship fixed in any tangible medium of expression..." (See 17 U.S.C. § 102). This new technology has as its central purpose to 'fix' in a tangible medium! Thus, copyright is inherently implicated from a 'common sense' standpoint. However, the complexity of applying the copyright law regime to 3D printing will likely be the source of legal controversy for years to come, if only from a 'definitional' standpoint of what items and activities are covered.

When blueprints, diagrams, drawings, plans or schematics are involved, copyrights often exist, whose owners will not likely sit idle when faced with what they view as 'market activity'. The economics of pursuing IP litigation has changed within just the past few years, due to pools of capital available through complex financing vehicles and corporate structures. Copyright has been specifically amenable to this form of both widespread and targeted enforcement, particularly related to the unauthorized use of registered images by commercial websites. 3D printing has begun to draw similar actions on the part of copyright holders. This will only accelerate as 10s of new 3D printing companies announce their arrival each month.

Tactically, copyright owners have recently begun to issue takedown notices, mainly to websites and their hosting services under the Digital Millennium Copyright Act (DMCA). This law furthers remedies under the U.S. copyright law regime for accessing protected material, even beyond actual copyright infringement, whose traditional enforcements remain. 3D printing, by the nature of how designs are formatted and sourced, lends itself to the initiation of actions that, although falling short of actual litigation, mobilize a set of business considerations that must now be navigated. It also provides the notice of *caveat emptor* for both enterprises and individuals who seek source designs for their 3D printing.

Of note, 3-dimensional articles have generally been protected, if they were considered artistic 'sculptures'. Many 3D printing components might likely not be considered sculptures, i.e., not artistic. However, the

advent of 3D printing may cause statutory or court interpreted reconsiderations as the components could reasonably be seen as creative expression in fixed form, i.e., the general requirements for copyright registration. The possibility comes into sharper focus when considering jewelry and industrial design, which are driven in large part by the artistic and interpretive creative process.

However, 3-dimensional renderings of originally copyrighted 2-dimensional articles can lead to supportable assertions of infringement. Legal actions involving animated characters, as well as artistic illustrations, from the entertainment industry have a longstanding history of occurring. 3D printing provides the next technological field of play to extend such 'cease and desist' activities. However, the ultimate court controversies involving 2D-to-3D have not been adjudicated with uniform results. Thus, this virtually assures a future of ensuing copyright litigation with the outcomes, as yet uncertain.

Any discussion of under conventional U.S. copyright law would not be complete without addressing the doctrine of 'Fair Use', which allows for various exceptions to what would otherwise be a statutory violation, e.g., educational, limited personal use or copying, etc. It is unclear if this doctrine will apply to 3D printing. There may need to be statutory codification to clarify the metes and bounds of what is permissible in terms of producing a 3D printed copy of a component. In order to bring a level of workable commercial certainty, licensing by contract may provide a means of obviating copyright controversies, by paying for the right to produce a specified number of copies. Presently, this is often done for software operating systems, programs and applications, e.g., number of workplace seat licenses.

Trademarks

An often overlooked area of future concern and certain controversy will involve issues of trademarks. As a review, trademarks are words, phrases, symbols, and/or designs that identifies and distinguishes the source of the goods (or services for a service mark) of one party from those of others. In order to be legally enforced, they must be registered. (15 U.S.C. § 1051). Accordingly, 3D printing will, at times, accompany the representation of a traditional trademark affixed to an object. The value that brand development has imbued to products and services is represented by a fraction of the billions of dollars expended on marketing every year. The impact of 3D printing will not go unnoticed by trademark owners.

An important aspect of maintaining a trademark registration involves the mandatory enforcement efforts that must accompany ownership. If these monitoring activities are not performed, the mark may be lost, particularly if the mark gains a 'generic' status. By statute, registered trademarks must be 'distinctive'. Trademark owners are required to pursue legal (steps) actions against alleged infringers to maintain that distinctiveness. Thus, the 3D printing industry may become the target of significant trademark and anti-competition litigation.

Personal use would seem to obviate the prohibitions of using the trademark of another, as that would not be 'use in commerce'. However, the sale of such items with an affixed mark would be the subject of a prohibitable act. Another exemption generally lies in 'artistic' creations, such as artist Andy Warhol's depiction of Campbell's soup cans containing renderings of the company's trademark being held non-infringing.

Trademarks can also be registered for a product or package configuration, if distinctive and recognizable and generally associated with the manufacturer. Thus, 3D printed articles may fall within the scope of protectable trademark subject matter for registrations and conventional enforcement.

A less discussed aspect of IP law deals with trade-dress and its protection. Trade dress is another 'hybrid' form of protection that can be interrelated and often confused with trademark protection. It covers packaging or appearance of products and is protected under § 43(a) of the Lanham Act. By its nature, it is clear that this may be a central legal regime that is likely to be applied to 3D printing, as packaging, in particular, begins to be formulated for products sold in commerce.

Conclusion

There has not been a widespread generally accepted understanding that 3D printing implicates all of the IP regimes, with significant overlap, in some cases. Irrespective, it is certain to lead to legal controversy, which may in turn impede precisely the type of commercial certainty needed for intensive early stage investment and eventual capital expenditures that will be necessary for the full promise of 3D printing to be achieved. Company, multi-national, industry and country economic growth and competitiveness lies in the balance to the extent that the above-identified legal regimes' impact on 3D printing is not more fully considered.

In the meantime, those entities that actively and strategically consider their own IP positions and actively monitor their competitors, as well as potential collaborators, will be more responsive to the controversy that is sure to come. But, more importantly, they will accelerate their market advancement and longevity. Therefore, it should be more generally understood that 3D printing processes of making or using a component, along with the operation of the associated manufacturing equipment, implicates the conscientious consideration of both currently in-force and newly issued and registered IP.

The uncertainties of the legal landscape only heighten the need to have a knowledgeable and trusted source of technical and IP 3D printing research. Nerac's capabilities and experience in providing 3D printing information solutions make it that ideal resource.

About the Analyst

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Richard Lilley is a former U.S. patent examiner who works with companies to manage their intellectual property portfolios. He also provides prior art, freedom-to-operate and invalidity research. Mr. Lilley has more than 15 years of experience with intellectual property, including three years as president of a firm that specializes in intellectual property acquisition, management, technology transfer, venture capital funding, and acquisition target evaluation consulting. He has worked in large corporate law firms in Washington, D.C., and he was an international technology transfer manager specializing in Japan. He has experience in business and project management, along with venture capital funds and financial services. The former U.S. Air Force officer was a composites and engine research engineer, with optics experience and an extensive understanding of military and military defense. He holds an undergraduate engineering degree in ceramics from Penn State University, a graduate degree in materials science from the University of Dayton, and a law degree from George Mason University.

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