Three-Dimensional Challenges on Patent Law

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## 1. Introduction

### 1.1. Background

The area of intellectual property law is probably the field of law that has been most affected by the ever accelerating progress of modern technology. Just consider the implications copy machines and the Internet have had on the enforceability of copyright law. According to the Copyright Act 17 U.S.C. § 102 copyright protection is granted to original works of authorship fixed in any tangible medium of expression from which they can be perceived, reproduced, or otherwise communicated, either directly or with the aid of a machine or device. Often the copyright protected work can easily be fixed as data in digital form. The easy copying and transmission of such data has in many ways made it hard or even impossible to efficiently enforce copyright protection. More or less anyone with the access to everyday technical appliances such as a computer or a copy machine can take a protected work of authorship, e.g. a book or a song, and distribute copies of the work online immediately reaching a worldwide audience.

### 1.2 Advances of 3D Printing Technology

Technological developments have inevitably brought new challenges on copyright law. Now we stand before yet another major stride in technical development as three-dimensional printing is not just being made possible but also all the more affordable. 3D printing technology has the potential to revolutionize the manufacturing industry. Today’s consumer society is based on mass production and on the fact that most individual consumers lack the financial and the technological capacity to produce goods they desire themselves[[1]](#footnote-1). If the advances of 3D printing enable consumers to affordably print articles they need comfortably in their own home, why would they pay a manufacturer to do the same thing?

For someone non-familiar with the technology of 3D printing, the idea of a printer being able to construct actual physical objects might sound more like science fiction than a realistic process for creating physical objects. However one must keep in mind that only a couple of decades ago the idea of a global interconnected network of computers would have sounded like science fiction to most people – something we nowadays know as the Internet. As mentioned, the development of the Internet undoubtedly has created many unforeseen and previously never considered intellectual property issues. Hence it is of great importance for legal professionals to keep up with developments of modern technology to be able to foresee and facilitate the resolution of potential legal issues that may arise.

This paper discusses the challenges that the expected commercialization of 3D printing technology might bring upon the enforceability of intellectual property law, and more specifically, what the implications might be on patent law. Further this paper will discuss some possible solutions on how protection of patented products can be upheld.

## 2. The Potentials of 3D Printing – Home Manufacturing

### 2.1 3D Printing – the Technology and the Potentials

The technology of 3D printing started developing already in the l980’s[[2]](#footnote-2) and it has been used e.g. in the car and airplane manufacturing industries[[3]](#footnote-3). However, it is not until recent years that the technology of three-dimensional printing of physical objects has developed to a stage, which enables the commercialization of printers that are affordable to consumers.

There are essentially three means of producing a solid object. Firstly, a shape can be cut out of a block of material. The second way is to form liquid or plastic material into the wanted shape and let it set. The third way to produce an object is to bit-by-bit add material to create the wanted shape.[[4]](#footnote-4)

The technology of 3D printing is based on the third mean of production, the additive creation of an object. The principal technology of printing three-dimensional objects is made up of printing two-dimensional slices of the wanted object using instructions or blueprints that are filed in a 3D printable design, or a so-called computer-aided design file (CAD). The very thin slices are then conjoined slice-by-slice, and the object gradually gains volume. Materials generally used include e.g. metal, plastics and ceramics.[[5]](#footnote-5)

The development of and the consumer access to 3D printers are essentially enabling consumers to download printable 3D CAD:s online, and use their home 3D printer to print out the desired object as easily as they would a two-dimensional picture. A potential increase of consumers owning a 3D printer will undoubtedly revolutionize the sales of those consumer goods suitable for being printed. Affected markets would most certainly include for example those of kitchenware, toys, fashion accessories, spare parts for appliances or vehicles etc. For example the last mentioned spare parts are generally of quite simple design and made out of metal or plastic, thus easily printable.[[6]](#footnote-6)

### 2.2 3D Printing and IP Concerns

The introduction of consumer 3D printers will surely raise issues concerning intellectual property rights in the objects printed. The printed object, let’s say a household item, might be protected in various ways. A substantial number of the 3D CAD:s that are currently publicly available are designs for decorations and household items[[7]](#footnote-7), which are mainly protected by copyright and thus may raise concerns of copyright infringement. However, many of the products are also to be considered useful in the sense of 35 U.S.C. § 101 and are thus potentially patentable or might even be covered by patent.[[8]](#footnote-8) What are the challenges brought upon specifically patent law by this new 3D printer technology? Is the consumer 3D printing going to be pose a similar threat on the enforceability of patent laws, as Internet and other modern everyday technology has turned out to be for copyright law?

## 3. Patents and Infringement

### 3.1 General

The U.S. Constitution authorizes Congress to “…promote the Progress of - - - useful Arts, by securing for limited Times to - - - Inventors the exclusive Right to their - - - Discoveries.” Art. I, § 8, cl. 8. The purpose of this provision is to give people the incentive to invest their time and effort in innovative actions by giving them the exclusive right to benefit from their innovation during a fixed period of time.

### 3.2 Infringement of Patent

The inventor’s exclusive right to his invention is secured by patent, and infringement is defined in 35 U.S.C. § 271. By being granted a patent the owner obtains a right to exclude others from making, using, selling or offering to sell, or importing the patented invention within the United States. [[9]](#footnote-9) Any third party who does any of these things without the patent holder’s authorization is directly infringing the patent.

Patent infringement can also be indirect where someone actively induces another to infringement or knowingly contributes to infringement. Induced infringement is the intentional aiding of someone else in direct infringement.[[10]](#footnote-10) Contributory infringement is the knowingly made contribution to infringement where one sells a component of a patented machine, manufacture, combination or composition or sale of a material or apparatus for use in the practicing patented process.[[11]](#footnote-11)

## 4. 3D Printing Challenges and Possible Solutions

### 4.1 3D Printing as an Enabler of Large-Scale Patent Infringement?

3D printers are already used by the manufacturing industry, e.g. in the manufacture of vehicle parts.[[12]](#footnote-12) 3D printing technology creates significant benefits for industrial manufacture. The printing technology brings many cost-efficiencies as e.g. specifically designed “one-off” items can be easily designed and remodified and thus manufactured at a cheaper cost.[[13]](#footnote-13) However, it is not until recent years that the printers have gotten affordable enough for consumers to get widespread access to 3D printing technology. 3D printers enable consumers to print or “make” objects at home. Some of these objects may be covered by patent and thus the making of the object could constitute an infringement of patent.

As opposed to copyright law, patent law does not recognize the fair use doctrine, which would allow replication of a patented innovation for personal use. As consumers get more common access to 3D printers we will encounter concerns of patent infringement, as at least some of the printed-at-home objects may well be covered by valid patent. 3D printers are essentially enabling large-scale patent infringement in a similar way as the Internet has allowed widespread infringement of copyrights. In order to continuously promote innovation and give inventors the incentive to invest their time and effort on inventing activities it is important that the patent laws can be efficiently enforced against infringers. What measures can be taken to facilitate the enforcement of patent law in the era of consumer 3D printing?

### 4.2 3D Printing and Liability for Infringement

There are essentially two main platforms on which legal regulations can play their part in combatting patent infringement in the potential era of 3D mass-home manufacture. The first level is the on the level of the online CAD distributors, or the so-called “CAD banks”. The second level would entail regulations and supervision of the end-users, i.e. the customers of the CAD banks.

#### A) CAD Distributor Liability

Current law is not ideal in the combat against 3D printing, as it does not easily apply to impose liability for infringement on CAD distributors, even though their role in the infringement is significant. CAD:s are the digital blueprints, which are essential for printing a desired object. CAD:s are easily distributed online websites. The making and distribution of CAD:s does not constitute the “making,” “selling,” or “using” of the represented patented product itself, and thus the distributors cannot be held liable for direct patent infringement under 35 U.S.C. § 271 (a).[[14]](#footnote-14) In 3D printing, the potentially patent infringing object does not yet physically exist at the time when the CAD banks distributes the CAD:s to its customers. For example in *Ecodyne Corp. v. Croll-Reynolds Engineering Co* the court held that one cannot “sell” a product that has not yet been created and that any claim of infringement would be speculative.[[15]](#footnote-15) In the context of 3D printing, the direct infringement would be committed by the person who is printing, in other words ”making”, the patented object. However, the enforcement of liability for patent infringement against a single individual will only be at a significant expense to the patent holder as the infringers need first be detected and sued for damages, which the individual might not be able to pay.

As described above in section 3.2, 35 U.S.C. § 271 (b)-(c) also imposes liability on a party for so-called indirect patent infringement, when a party actively induces another to commit direct infringement or knowingly contributes therein. CAD distributors could however only be held liable for such induced or contributory infringement under limited conditions due to the statutory regulations.

A CAD distributor could potentially be held accountable for induced patent infringement under 35 U.S.C §271(b). This requisite requires that the CAD distributor distributes CAD file representations of objects with the knowledge that a) the object is covered by patent, and b) that its customer intends to make the object and thus directly infringe the patent.

In *Global-Tech Appliances, Inc. v. SEB S.A the Supreme Court held that this* requirement of express knowledge will be met if it is found that the indirect infringer was willfully blind.  Willful blindness occurs where the party (1) has a subjective belief that there is a high probability that a fact exists and (2) takes deliberate actions to avoid learning of that fact. The Supreme Court further held that deliberate indifference to a known risk that a patent exists did not satisfy the knowledge required.[[16]](#footnote-16) Under current law a CAD bank is only a passive hosting site for CAD files, and it is not required to investigate into the matter whether a person who uploads a CAD file to the site has the legal right to do so. A patent holder may certainly find it hard to show such subjective state of mind and proof of required knowledge as required by § 271(b) in order to hold the CAD bank liable for induced infringement, and thus it is doubtful whether this provision by itself could prevent CAD banks from distributing blueprints of patent infringing objects.

Contributory infringement as described in 35 U.S.C. § 271(c) does not apply to the distribution of CAD files in the context of 3D printing as the CAD files are not “components” of a patented product.[[17]](#footnote-17) A CAD file is only a digital blueprint of the product, not a physical part of the product. However, in the 3D printing context the CAD distributors are the ones best equipped to restrict the supply of CAD:s for infringing products, and should thus be the ones who should be held accountable.

#### B) Regulations on Individuals Who Make 3D Copies

A second potential way to combat patent infringement via the inevitable increase in 3D printing, would be to impose restrictions and surveillance on the individuals actually making the product using their printers. The current law does impose liability of patent infringement on the direct infringer through 35 U.S.C. § 271(a). In reality it will be hard or at least costly to detect and impose liability on single individuals who print objects in their own homes.

One solution to this might be to insert a technology in all consumer 3D printers that would record any printed products and electronically compare them to a register of valid patents. If the CAD file that is being used were identified as patent-infringing the owner of the patent would be notified. The patentee could then choose whether he or she wishes to take action against the individual infringer or not. This solution does however entail both technical issues and privacy issues, and needs to be further investigated.

### 5. Conclusion

The introduction of 3D printer technology to the masses and the inevitable benefits of customers being able to create their desired objects in their own home, e.g. savings in transportation and other transaction costs, has the potential to revolutionize the whole manufacturing industry. At the same time, it has the potential to pose the biggest threat to owners of intellectual property rights since the Internet allowed individuals to easily share works of art online, significantly making copyright laws more difficult to enforce against infringers. Intellectual property rights can be of great economic value for their owners, and thus the availability of efficient legal protection is vital so the patentees have a chance to combat counterfeiting.

The current legal provisions combatting patent infringement are arguably inefficient to stand the up to challenges posed by the expected implications of widespread access to 3D printing technology. Congress needs to take measures to prepare the legislation for the upcoming challenges by taking the new technological developments into consideration. The infringement provisions are poorly prepared to meet the challenges presented by the 3D printing technology. A solution would be to add a new subsection to address the matter, and impose liability on those distributing the CAD files for the infringing products, giving them the incentive to investigate into the matter of whether their distributed files are contributing to patent infringement or not. The 3D revolution is on its way and legal professionals better be prepared.

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