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3D Printing and Section 512(c): Safe Harbor Provision of the Digital Millennium Copyright Act

Donald L. Buresh[1,*]

[1]3115 Enoch Avenue, Zion, IL 60099, USA.

Abstract

This paper addresses the topic of whether, and to what extent, copyrights should govern the distribution of 3D printing plans which are used in creating 3D printed, tangible objects. The essay discusses the various 3D printing technologies, describes how 3D printing is accomplished, defines copyright, and then briefly outlines the Digital Millennium Copyright Act ("DMCA") of 1998. In particular, the paper lists the conditions that a firm publishing 3D printing plans must satisfy to invoke Section 512(c) safe harbor provision of the DMCA. Finally, the essay discusses when a distributor of 3D printing plans would be protected under the safe harbor provisions, arguing that when a 3D printing plan is released not-for-profit, the organization is protected under Section 512(c).

Corresponding author: Donald L. Buresh, 3115 Enoch Avenue, Zion, IL 60099, USA, Tele: 847-872-1659, Fax: 847-789-9799.

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Introduction

The purpose of this paper is to discuss whether copyrights should be extended to the use and results of 3D printing, also known as additive manufacturing. Additive manufacturing[1] is a term whereby a process is employed in which layers of materials are formed under the control of a computer to create a tangible object[2]. The objects can be of almost any shape and are produced from either a 3D model or an electronic source of data, such as an Additive Manufacturing File ("AMF")[3]. In contrast to forging or casting, where an object is formed from liquid metal or plastic, 3D printing builds an object layer by layer by successively adding material on top of the previously laid material[4].

The thesis of this comment is to what extent does the Digital Millennium Copyright Act of 1998 governs whether an organization that sells or distributes 3D printed tangible goods is eligible for Section 512(c) Safe Harbor provision of the DMCA. The issue depends on the degree of utilitarian functionality versus artistic content contained in the 3D tangible product[5].

The importance of the thesis centers on the extent to which a tangible good that is produced by a 3D printer is functional or is an expression of an original work of authorship[5]. The portion of a product that is functional cannot be copyrighted, whereas its artistic content can be copyrighted[6]. Typically, useful products that are original are patented, where a patent is a set of exclusive rights that are granted by a sovereign state to an inventor or his or her assignee for a limited period, usually 20 years, in exchange for detailed public disclosure of the invention[7]. If a tangible commodity, or a portion therein, is considered a work of original authorship and is copyrightable, then individual rights are attached to that part of the good[8]. If a company is selling or distributing a copyrighted product, then the question becomes whether the firm is protected under "first-sale doctrine"[9] or Section 512(c) of the Digital Millenium Copyright Act[10].

The social consequences are disturbing. If 3D printed physical objects can be copyrighted, then the production of goods will flow towards the copyright owners, making it difficult for existing companies to remain in the marketplace[11]. For example, fishing hooks are made by a manufacturing process using punch presses and long steel wires that are formed into hooks.

However, if fishing hooks were mass produced using 3D printing techniques, then who would own the copyright for fishing hooks, mainly if the bend of a hook had an artistic flair? Would it be the manufacturer that has been producing fishing hooks for possibly decades, or would it be the copyright owner of the 3D printing process? It is not a big stretch of the imagination to conclude that if the copyright owner has access to greater wealth than the manufacturer, it is the copyright owner that would probably win in court[12].

What Is 3D Printing?

The term "3D-printing" originally referred to a process where a binder material was deposited onto a bed of powder using an inkjet-like head layer on layer. The term currently, encompasses a variety of additive manufacturing techniques. The official term for 3D printing as specified in ISO/ASTM52900-15 is "additive manufacturing." The ISO standard defines seven categories of additive manufacturing, including binder jetting, directed energy deposition, material extrusion, material jetting, powder bed fusion, sheet lamination, and VAT photopolymerization.

Binder jetting is an additive manufacturing process whereby a liquid binding agent is selectively deposited to join powder particles as layers of material are then bonded to form an object[13]. Directed energy deposition is a process enabling the creation of parts by melting material as it is deposited[14]. It is a process commonly used with metals rather than plastic[14]. Material extrusion works much like a hot glue gun, where a plastic filament is heated to a malleable state and then extruded through a nozzle[14]. A computer-aided design ("CAD") model is sliced into layers, and the nozzle draws each layer, one at a time which, over time, becomes solid[14]. Material jetting creates objects like a two-dimensional inkjet printer[15]. The material is jetted onto a building platform by employing a continuous or drop on demand ("DOD") approach[15].

Powder bed fusion ("PBF") uses a laser or an electron beam to melt and then fuse material powder[16]. Electron beam melting ("EBM") occurs in a vacuum but can be employed with metals and alloys to form products[16]. Sheet lamination uses ultrasonics to weld

sheets of metal together[17]. Finally, vat photopolymerization utilizes a vat of liquid photopolymer resin where the object is constructed layer by layer using an ultraviolet ("UV") light to cure or harden the resin[18].

How Is 3D Printing Accomplished?

Together with a computer, with each one of these manufacturing techniques, 3D models are used. One such model is an Additive Manufacturing File Format which is an open standard for describing objects that are manufactured employing additive manufacturing processes[19]. The rule is an ISO/ASTM 52915:2013 standard which is an XML-based format that was designed to permit any computer-aided design software to describe objects to be fabricated by 3D printing processes[19].

What is unique about an AMF is the content of each file. Because physical objects are different, the content of each file is modified to reflect what is being fabricated or manufactured. It is the substance of the computer file that is open to being copyrighted[20]. The question is whether not only should the content of the AMF be copyrightable, but also should the tangible object that is the product of a 3D printing process be copyrightable.

What Is a Copyright?

Copyright is a form of intellectual property protected by the laws of the United States of America[21]. The protection is available by law for original works of authorship that are fixed in a tangible form and can be published or unpublished[21]. Copyright laws can protect software programs. The copyright law only covers the form of the material expression[21]. The law does not include the concepts, ideas, techniques, or facts that are contained in a particular work[21]. This is the reason why work has to be fixed in a tangible form[21]. Traditionally, a physical form consisted of printed books on paper and original paintings.

The primary goal of copyright law is to protect the creativity of a work's creator along with the time and effort expended to create the work[22]. In furtherance of these aims, the Copyright Act of 1976 gives the copyright owner the exclusive rights to: (1) reproduce the work, (2) prepare derivative works, (3) distribute copies of the work by sale, lease, or other transfer of ownership, (4) perform the work publicly, and (5) display the work publicly[23].

Notice that the use of the copyrighted material is not one of the exclusive rights[23]. The copyright owner also has the right to assign these rights to other people or organizations[23]. A contract usually accomplishes the assignment of rights. Although it is not legally mandated to record a transfer of rights, it is a good idea to do so[23].

An author of work can create the work in the course of his or her employment. This is known as "work for hire"[23]. The registration of a copyright is not necessary, but when rights are infringed, the recording of copyright has legal advantages[23]. Consistent with the Berne Convention, work created after 1989 does not need a copyright notice[23]. These are the essential features of copyrights.

What Is the Digital Millennium Copyright Act?

The Digital Millennium Copyright Act ("DMCA") of 1998[24] was signed into law by President William Jefferson Clinton on October 2, 1998[24]. The law made the United States of America a signatory to the two 1996 World Intellectual Property Organization ("WIPO") treaties: (1) the WIPO Copyright Treaty, and (2) the WIPO Performances and Phonograms Treaty[24]. The DMCA is broken up into the following five titles:

- Title I – Implements the two treaties;
- Title II – Creates limitations on the liabilities of online service providers;
- Title III – Creates an exemption for making a copy of a computer program to repair;
- Title IV - contains six miscellaneous provisions that relate to the functions of the Copyright Office; and
- Title V – Creates a new form of protection for the hulls of a ship[24].

Section 512(c) Safe Harbor Provision of the DMCA

The safe harbor provision specified in Title II of the DMCA creates an exemption for Internet and online service providers ("ISP" and "OSP") against infringement liability provided that they meet the following criteria:

- An ISP or OSP must not receive any financial benefit arising from the infringing activity;

- An ISP or OSP must not have actual knowledge, nor be aware of the facts and circumstances surrounding the hosting of the infringing material;
- When given expressed written notice by a copyright holder, an ISP or OSP must expeditiously take down the alleged infringement;

Under the so-called "red-flag" test, if an ISP or ISP has subjective knowledge of infringement, and objectively a reasonably prudent person would consider the activity infringing, then an ISP or OSP must expeditiously take down the alleged violation[25].

The alleged infringer can contest the takedown. Again, the ISP or OSP must also act promptly in addressing the counter allegations of the alleged infringer. If the ISP or OSP complies with all of these rules, it is safe from legal liability[25].

Does the Section 512(c) Safe Harbor Provision Apply?

The only way that Section 512(c) can apply at all is if a copyright infringement occurred and if the company that is producing a tangible object via a 3D printer is sufficiently similar to work from an Internet or online service provider. The first prong is whether copyright infringement occurred when 3D printing a tangible object.

Under 17 U.S.C. §102(a) digital models, physical objects, and the source code that produces them comprise pictorial, graphic, or sculptural works that are copyrightable. A physical object is created for non-utilitarian purposes and incorporates some artistic features is eligible to receive copyright protection even though software that was used to create the object is open sourced[26]. In *Feist Publications, Inc.*, the Supreme Court opined that a low threshold of originality invokes copyright protection[27]. The functional characteristics of an object are not eligible for copyright protection[28]. For example, a coffee cup would typically not warrant copyright protection, but if the coffee cup contained some artistic expression, such as a handle that roughly looks like the wings of a bird, then the coffee cup handle would be copyrightable, but the functional part of the coffee cup would not be copyrightable[28].

The second issue is whether the person or organization that is doing the 3D printing satisfies the elements of Section 512(c). If the design of a tangible object is based on Additive Manufacturing Files whose content has been copyrighted, then the firm may invoke Section 512(c), provided that it was not aware of the copyright infringement, and had taken expeditious steps to eliminate the violation. However, Section 512(c) does not apply if it is the company itself that is infringing on the copyrights of a third party. For Section 512(c) to apply, the ISP or OSP must not receive any financial benefit from the infringement and must not be aware initially that the violation exists. When a for-profit company violates these two elements, the firm must cease production of the product, or face a court suit based on copyright infringement. If the firm itself is the infringer, then there is no reason to engage in a negotiation with some non-existent third party. In this case, there would be two sides (i.e., the infringer and the copyright holder) involved in the offense, rather than three sides (i.e., the infringer, the ISP or OSP, and the copyright holder).

Thus, for companies that manufacture tangible goods using 3D printing, Section 512(c) would not apply. In other words, these organizations would be ineligible for Safe Harbor under the Digital Millennium Copyright Act.

Distributors of 3D Printing Plans

The answer to the question of whether a party that merely distributes infringing 3D printing plans is protected depends on if the elements of Section 512(c) are satisfied. There are several cases to consider in answering this question. If a distributor sells 3D printing plans for a profit, then the organization is violating the first element of Section 512(c), and safe harbor would not apply[29]. If a distributor of 3D printing plans does not realize a profit, then the first element of Section 512(c) is satisfied. However, the assumption is that the company has actual knowledge of the infringement, then the second element of Section 512(c) is again not satisfied, and safe harbor would not apply[30].

The third case is similar to the previous possibility in the sense that the distributor does not realize a profit, thereby ensuring that the first element of Section 512(c) is satisfied. However, like Case 2, the distributor is aware of the infringing circumstances, thereby warranting that the second element of Section 512(c) is violated. Thus, in this situation, safe harbor is

inapplicable[31]. In the fourth situation, a distributor satisfies the first two elements of Section 512(c) but decides to continue to distribute copyright infringing 3D printing plans after the copyright holder has informed the distributor of the violation. In this case, the third element of Section 512(c) is not satisfied, and again the firm is not protected under the 512(c) safe harbor provisions[32].

With the fifth possibility, a distributor satisfies the first two elements of Section 512(c) but decides to continue to distribute copyright infringing 3D printing plans. In this case, the third element of Section 512(c) is not satisfied, and again the firm is not protected under the 512(c) safe harbor provisions. In the next case, the distributor does not profit from the distribution. The distributor does not possess actual knowledge of the infringement, nor is the distributor aware of the circumstances surrounding the violation. When the distributor is made aware of the offense by a written expression of a violation by the copyright holder or becomes aware of the breach, the distributor ceases to distribute the infringing content. The distributor does not give the alleged infringer an opportunity to present his or her case. Thus, as in the previous five instances, the distributor in ineligible to receive safe harbor[33]

The last possibility is the best of all possible worlds, as expressed by Gottfried Leibnitz hundreds of years ago[34]. The distributor does not profit from the distribution. The distributor does not possess actual knowledge of the infringement, nor is the distributor aware of the circumstances surrounding the violation. When the distributor is made aware of the offense by a written expression of the infringement by the copyright holder or becomes aware of a violation through "red flagging," the distributor ceases to distribute the infringing content. Finally, the distributor must give the alleged infringer an opportunity to present his or her case, and then make a final determination. Then, and only then does a distributor satisfy the safe harbor provisions of Section 512(c) of the DMCA[35].

Conclusion

The conclusion is straightforward when deciding whether the distributor of 3D printing plans or #D models is covered by Section 512(c) of the DCMA. If the distributor profits from the distribution, then the safe harbor provision is violated when the purchaser of the plans infringes the copyrights of a third-party. Also, if the distributor of 3D printing plans knows of the infringement, it does not matter whether the distributor is making a profit. The distributor is still not protected by Section 512(c). Only when a distributor supplies 3D printing plans on a non-profit basis and has no knowledge of an infringement, then and only then is the distributor shielded by Section 512(c). If the copyright owner informs a distributor of a violation, the burden is on the distributor to cease distributing the offending 3D printing plans. The effect of this situation is that the DMCA has the potential of stifling the technological development of 3D printing, particularly when the object being printed possesses copyrightable features.

There are three, possibly more, expected results, including:

- Individuals and firms will engage in distributing 3D printing plans regardless of the existence of the infringement. In this situation, the distributors would be flaunting the DMCA, probably claiming First Amendment rights of freedom of expression;
- The distributor can license the copyrighted material in the 3D printing plans that are distributed, perhaps paying the copyright holder a very modest royalty; or
- A distributor could cease distributing the 3D plans, but this option seems to be an act of futility. Once customers have downloaded 3d printing plans, there is nothing but the law to prevent customers from sharing 3D printing plans with other parties, probably claiming fair use.

The first possibility will probably be pervasive unless the copyright holders have substantial financial resources to litigate against infringers. The fact that information has the characteristic that when a person gives information to a second person, both individuals end up with the data. Trading information is not like trading tangible goods where money and items are exchanged. In other words, copyright holders with limited financial resources will be hard pressed to enforce their copyrights. The result will be the dilution of copyrights, probably to the delight of individuals who firmly believe that information should be free, while at

the same time to the detriment of copyright holders. Such is the nature of the information age.

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30. See Section 512(c)(1)(A)(i). Here, the service provider should not have "actual knowledge that the material or an activity using the material on the system or network is infringing."
31. See Section 512(c)(1)(A)(ii). In this case, the service provider should not be "aware of facts or circumstances from which infringing activity is apparent."
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