

## Long Comment Regarding a Proposed Exemption Under 17 U.S.C. 1201

Check here if multimedia evidence is being provided in connection with this comment

### Item 1. Commenter Information

This proposal is respectfully submitted by Public Knowledge and the Library Copyright Alliance. Public Knowledge is a nonprofit organization dedicated to representing the public interest in digital policy debates. Public Knowledge promotes freedom of expression, an open internet, and access to affordable communications tools and creative works.

The Library Copyright Alliance (LCA) consists of three major library associations—the American Library Association, the Association of College and Research Libraries, and the Association of Research Libraries—that collectively represent over 100,000 libraries in the United States employing over 350,000 librarians and other personnel. An estimated 200 million Americans use these libraries more than two billion times each year.

Interested parties are encouraged to contact Michael Weinberg ([mweinberg@PublicKnowledge.org](mailto:mweinberg@PublicKnowledge.org)) or Sherwin Siy ([ssiy@PublicKnowledge.org](mailto:ssiy@PublicKnowledge.org)) as Public Knowledge's authorized representatives in this matter. Public Knowledge's contact information is as follows:

Public Knowledge  
1818 N St. NW  
Suite 410  
Washington, DC 20036  
(202) 861-0020

LCA is represented by:

Jonathan Band  
policybandwidth  
21 Dupont Circle NW, 8<sup>th</sup> floor  
Washington DC 20036  
[jband@policybandwidth.com](mailto:jband@policybandwidth.com)  
(202) 296-5675

## Item 2. Proposed Class Addressed

This comment addresses Proposed Class 26: Software – 3D Printers

## Item 3. Overview

Copyright law and the DMCA should not prevent users of 3D printers from utilizing the consumables<sup>1</sup> of their choice. The choice of consumables used in 3D printers is remote from the purposes of copyright law and the DMCA, and should not be made with fear of copyright or DMCA-based liability. Unfortunately, the fact that some printers use software-based verifications to limit the use of third party consumables makes that fear real and present for 3D printer operators. This fear is based on a concern that these types of consumable-source verification tools could be conceived as TPMs that also protect the software that operate the printers themselves. In that light, circumventing the TPM could potentially result in DMCA-based liability.

While existing legal precedent and other statutory elements may ultimately help an accused violator prevail in court, the cloud of uncertainty discourages perfectly reasonable and legal

---

<sup>1</sup> “Consumables” is an umbrella term for materials used by 3D printers in order to create physical objects. It encompasses various types of filaments, powders, filings, and resins, among other materials. These materials are “consumed” by the 3D printing process and must be replenished on a regular basis.

activity. In light of this uncertainty, the Librarian should take this opportunity to make it clear that 3D printer operators are free to use the consumable of their choice without fear of receiving a DMCA complaint from the printer manufacturer.

#### Item 4. Technological Protection Measure(s) and Method(s) of Circumvention

##### Background

3D printing, also known as additive manufacturing, is the generic name for a collection of technologies that can turn digital files into physical objects. Unlike more traditional forms of computer-controlled manufacturing that operates by removing material from a workpiece in order to create an object, 3D printing operates by adding material until an object is created in physical space. While this technology has existed for well over two decades in industrial and commercial settings, the recent expiration of foundational patents has given rise to a new generation of low cost printers targeted at home users, small firms, “prosumers,” and institutions of research and learning. Libraries, for example, are adopting 3D printers to provide opportunities for library patrons to engage in creative learning, solve community health problems, and launch new products.<sup>2</sup> This rapid expansion of access to printers has fostered an explosion in applications and increase in printer quality, while at the same time driving down costs to own and operate the printers themselves.

---

<sup>2</sup> See Charlie Wapner, *Progress in the Making: 3D Printing Policy Considerations Through the Library Lens* (Jan. 2015), available at [http://www.ala.org/offices/sites/ala.org.offices/files/content/3D\\_Library\\_Policy-ALA\\_OITP\\_Perspectives-2015Jan06.pdf](http://www.ala.org/offices/sites/ala.org.offices/files/content/3D_Library_Policy-ALA_OITP_Perspectives-2015Jan06.pdf).

While there are a handful of different technologies relied upon by 3D printers, all of those technologies rely on some sort of feedstock or consumable element in order to operate. These consumables can be thought of as the 3D printer equivalent of ink or toner in 2D printers. Today the most popular consumer-oriented printing technology relies on a spindle of plastic filament, although printers that rely on liquid resins are becoming increasingly popular.

For printers that rely on plastic filaments, the filaments are often made up of colored commodity plastics (mostly commonly polylactic acid (PLA) or acrylonitrile butadiene styrene (ABS)) formed into strands standardized at either 1.75mm or 3mm in diameter and coiled onto a spool. Both printer manufacturers and third party vendors sell these spools to the public. While PLA and ABS are the most popular filaments, many enthusiasts have branched out into exotic wood, metal, and flexible filaments as well.

### The Exemption

This exemption focuses on TPMs that restrict the types of filament that can be used in 3D printers. At least one printer manufacturer, 3D Systems, offers a printer line designed to only accept filament from that manufacturer. The Cube line of printers only accepts cartridges purchased from 3D Systems, although these cartridges contain spools of PLA, ABS, or Nylon filament similar to what is available from third party vendors.<sup>3</sup> 3D Systems advertises these

---

<sup>3</sup> See, e.g. <http://cubify.com/en/Cube/Supplies>.

cartridges as offering increased ease of loading and calibration, as well as reduced clogging and exposure to moisture that could negatively impact print reliability.<sup>4</sup>

Public Knowledge and the LCA understand that 3D Systems relies on a chip verification system in order to force the Cube line printers to only accept filament purchased from 3D Systems. This verification system, believed to be based on a proprietary “1-Wire” protocol, allows the printer to verify the provenance of a cartridge before using it. Unmodified, the printer will not accept filament obtained from any source besides 3D Systems.

Public Knowledge and the LCA request this exemption to allow owners of 3D printers to bypass these types of restrictions without worrying about 1201-based liability. Public Knowledge and LCA believe that there are both hardware- and software-based circumvention methods for these restrictions, but will avoid highlighting either until an exemption protecting them from DMCA liability is granted by the Librarian.

#### Item 5. Asserted Noninfringing Use(s)

Public Knowledge and the LCA do not believe that circumventing a chip-based verification system on a 3D printer in order to use a third party consumable is a violation of copyright law. The purpose of the verification system is not to protect the copyright-protected software that operates the printer (although that might be an incidental result of the system). That software has no market value independent of the printer itself, and is not marketed independently of the

---

<sup>4</sup> See, e.g. <http://cubify.com/en/Cube>.

printer. It is highly unlikely that a printer manufacturer is concerned about unauthorized reproduction and distribution of the software independent of the printer it is embedded within.

This should come as no surprise. While software embedded in durable goods is eligible for copyright protection, its place in the economic universe is significantly different from other freestanding types of software. Unlike more traditional works protected by copyright (such as novels, films, and photographs), embedded code is not purchased or advertised independently of the durable good in which it is embedded. Since it is only useful when paired with the durable good itself, the unauthorized distribution of embedded software alone is much less important to its rightsholder than unauthorized distribution of a novel, film, or photograph.

In light of this, it is not surprising that Congress has treated machine-embedded software differently than other protected works. Congress excluded “a computer program which is embodied in a machine or product and which cannot be copied during the ordinary operation or use of the machine or product” from the general prohibition against renting, leasing, or lending computer programs because embedded software is different from other computer programs.<sup>5</sup>

Recognizing this distinction, leading copyright scholar Professor Jane Ginsburg also noted how remote concerns about limiting third party consumables were from the scope of copyright.

During hearings considering to an exemption request related to 2D printer cartridges, Professor Ginsburg opened her remarks by stating “I’ll say at the outset that the remarks that follow are all based on the premise that the Copyright Act was not intended to be used and should not be used

---

<sup>5</sup> See 17 U.S.C. § 109(b)(a)(B)(i).

to secure the after-market for replacement parts and other noncopyrightable goods.”<sup>6</sup> Public Knowledge could not agree more.

Notwithstanding the consensus that the choice of replacement consumables *should* be beyond the scope of DMCA liability, Public Knowledge and the LCA believe that there is value in the Librarian granting the requested exemptions. Over fifteen years since the passage of the DMCA, there is still significant uncertainty around what types of restrictions qualify for protection and how courts might view attempts to limit the use of durable goods with replaceable parts. Users are anxious that even something as innocuous as using the consumable of one’s choice in a 3D printer could violate the law. For example, shortly after one workaround was posted on the enthusiast website Hackaday, commenters speculated that it would be crushed by “the DMCA banhammer for reverse engineering the hack.”<sup>7</sup>

As discussed below, this uncertainty can have a chilling effect on perfectly lawful activity and perpetuate public anxiety about the proper role of copyright. This exemption request provides the Librarian with an opportunity to make it clear that, to the extent such activity could be argued to violate the DMCA, it is exempted from liability.

#### Item 6. Asserted Adverse Effects

---

<sup>6</sup> Transcript of the testimony of Professor Jane Ginsburg before the Copyright Office Anti-Circumvention Rulemaking Hearing at 44-45 (May 9, 2003), available at <http://copyright.gov/1201/2003/hearings/transcript-may9.pdf>.

<sup>7</sup> [URL redacted, see last paragraph in the answer to Item 4].

As noted above, Public Knowledge and the LCA believe that copyright law and the DMCA does not restrict the use of third party consumables in 3D printers. Allowing them to do so would have a significant negative impact on innovation in the 3D printing field, drive up costs for consumers, and undermine expectations of ownership around 3D printers.

## Fuel Innovation

3D printing is in the middle of an innovative explosion. Increased attention and accessibility is fueling the development of improvements and innovations in all aspects of the technology. One of the most innovative areas of 3D printing has been in filament development. While desktop printers once focused on ABS plastic, printers can now make use of translucent filaments, extra flexible filaments, composite filaments that integrate metals such as bronze, copper, and stainless steel, and conductive filaments that can be used to print circuits. Independently developed consumables have also been used in the emerging field of bioprinting, where 3D printers are used to print living tissue.<sup>8</sup>

In addition to new types of filaments, innovators have been hard at work finding new ways to create filament. Some desktop-sized extruders to allow users to create their own custom or exotic filament.<sup>9</sup> Researchers have developed a “Recyclebot” to help turn waste plastic into new filament.<sup>10</sup> These initiatives are viable because developers can test new filaments on printers

---

<sup>8</sup> See, e.g. <http://amrinstitute.org>.

<sup>9</sup> See, e.g. The Filabot, <http://www.filabot.com/collections/filabot-core/products/filabot-original?variant=570433109>.

<sup>10</sup> <http://www.appropedia.org/Recyclebot>.

they already own, and are successful because they can potentially serve a market consisting of every printer on the planet.

It should come as no surprise that a vibrant market for third party filament drives down consumer costs. 1 KG of ABS filament can be purchased from third party vendors for \$46, or about \$0.05 per gram. 3D Systems sells a cartridge of filament for its Cubify printer for \$48. However, 3D Systems does not disclose how much filament is inside a single cartridge. By calculating the difference between a full and empty cartridge, one user has estimated that the cartridge contained approximately 320 grams of filament (even full, the cartridge weighed 687 grams, smaller by a third than the third party filament).<sup>11</sup> If this number is correct, the 3D Systems filament costs \$0.15 per gram, or three times as much as its third party competitor. While 3D printer users may well decide that the 3D Systems cartridge process is worth the premium, copyright law should not prevent them from deciding otherwise.

#### Avoid Uncertainty

Although it was ultimately largely resolved in a landmark court ruling, for years the 2D printing industry muddled through uncertainty surrounding consumers' ability to use ink from third parties. These years of uncertainty prevented the development of a robust third party option that both drove down prices and forced manufacturers to innovate faster. By granting this exemption, the Copyright Office would clarify that the DMCA does not prevent third party filament, thus allowing the 3D printing industry to avoid those wasted years.

---

<sup>11</sup> Comment of user "Mike" (July 15, 2012 at 5:01 PM) on post *Some DON'Ts With the Cube*, Cubify 3D Printing Fans & Fun (July 9, 2012), <http://cubifyfans.blogspot.com/2012/07/some-donts-with-cube.html?showComment=1342396909516-c8188506374696522452>.

## Reaffirm Public Confidence in Ownership

Users are surprised that copyright law and the DMCA could prevent them from using a consumable of their choice in a 3D printer. The incidental presence of copyright-protected software in noncopyrightable goods should not give manufacturers control over how those goods are used. Blessing such an arrangement would be precisely the type of manufacturer control that courts have strived to avoid in interpreting the DMCA.<sup>12</sup>

The existence of printers that do not contain these restrictions does nothing to diminish the importance of this exemption. Users should not have to trade their right to operate their printer as they see fit because of a threat of DMCA liability. When a person possesses a 3D printer, the fact that there are other 3D printers in the world does not diminish the importance of being able to use their printer in the manner they see fit. Allowing manufacturers to distort the aftermarket for filament simply because there are other manufacturers in the market would be a misuse of copyright law.

### Item 7. Statutory Factors

As the circumvention of technological measures designed to prevent the use of third party consumables in 3D printers is not the type of harm that Congress was considering when it passed the DMCA, it is not surprising that the first three factors do not directly apply to this exemption.

---

<sup>12</sup> *Chamberlain Group, Inc. v. Skylink Techs., Inc.*, 381 F.3d 1178, 1201 (Fed.Cir. 2004). The court dismissed Plaintiff Chamberlain's argument with the following unwelcome example: "Chamberlain's proposed construction would allow any manufacturer of any product to add a single copyrighted sentence or software fragment to its product, wrap the copyrighted material in a trivial "encryption" scheme, and thereby gain the right to restrict consumers' rights to use its products in conjunction with competing products."

As noted above, the copyrighted work in question – the embedded software operating the printer itself – does not exist as an independent economic entity. As a result, the existence or nonexistence of this exemption will likely have no impact on the availability of the work itself, its availability for use by nonprofit archival, preservation, and educational purposes, or on the ability of others to criticize, comment on, report on, teach, study, or research.

Similarly, it is unlikely that allowing circumvention of the technological measure that prevents operators from using third party consumables will impact the market or value of the software that operates protected 3D printers. The TPM in question is not primarily designed to protect the work itself, and the work itself is not offered independently of the printer it is embedded within. The value of the work is tied to the value of the printer, and the value of the printer is not connected to the existence or nonexistence of the exemption.

For this exemption, the fifth factor is the most significant factor. Important public policy considerations support the granting of this exemption. Users would be surprised – rightly so – if copyright law prevented them from replacing parts of their noncopyrightable devices simply because the manufacturer included a digital verification chip in its design. Ownership is an important property right, and this exemption would strengthen that right by removing uncertainty surrounding what can and cannot be done with printers.

The value of eliminating public doubt surrounding the status of third party filament should not be overlooked. The 2D printer industry was saddled with years of legal maneuvering and uncertainty where users and third parties were unsure of their rights regarding printers and ink. This uncertainty only benefitted manufacturers looking to enrich themselves unjustly on the back of fear of liability. Regardless of the actual threat of DMCA violation related to the

circumvention considered in this exemption request, the Librarian has an opportunity to remove it from the list of potential barriers to the use of third party consumables.

In doing so, this exemption would encourage innovation by protecting and growing the market for innovation in consumables. Development in this space is moving quickly, and should be encouraged. Giving users the knowledge that they can use the consumable of their choice with the printer of their choice encourages them to experiment with new options. Knowledge that an innovative new consumable will be compatible with a large range of printers offers successful consumable innovators the opportunity of widespread adoption. This virtuous relationship succeeds when users are free to use the consumables of their choice without fear of DMCA violation.

Finally, removing barriers to the development of an independent third party market increases consumer welfare by driving down costs. The TPMs in question allow manufacturers to artificially inflate the cost of consumables and reduce their incentive to provide value to consumers. Opening up this market increases competition, drives down costs, and incentivizes innovation.

For all of these reasons, the Librarian should grant the proposed exemption.

Respectfully Submitted,

Michael Weinberg  
Vice President  
Public Knowledge  
1818 N St. NW  
Suite 410  
Washington, DC 20036  
(202) 861 - 0020

February 6, 2015