The Legality of 3D Printing: How Technology Is Moving Faster than the Law

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I. INTRODUCTION

This Comment is a survey of the legal issues surrounding the rapidly evolving technology of 3D printing. After a brief overview of 3D printing mechanics, it will examine the controversial leader behind the 3D plastic gun movement and how lawmakers have responded to his crusade. Next, there will be an analysis of how 3D printing could easily enable patent infringement in a similar vein to what Napster did to music and how patent law would resolve this issue. Lastly, there will be a discussion of how 3D printing has impacted the art world and if this technology will pose a threat to existing copyright policy. It will conclude by reviewing recently expired 3D printing process patents and their impact on the market. Within the last few years alone, 3D printing has already transformed many industries and the law has begun to evolve along with it.

II. BACKGROUND ON 3D PRINTING TECHNOLOGY

3D printing, also known as additive manufacturing, is a quickly evolving technology that is beginning to create legal issues in several

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industries.[1] Charles Hull first invented the machine in 1986, but it did not gain momentum until a couple of decades later.[2] In 2012, President Barack Obama granted $30 million to the National Additive Manufacturing Innovation Institute in Ohio in hopes of "strengthen[ing] American manufacturing" and ensuring that the "manufacturing jobs of tomorrow take root not in places like China or India, but right here in the United States of America."[3] Aside from federal grants, the technology has also been advanced by small start-up companies that sell printers for several hundred dollars versus several thousand dollars.[4] 3D printing builds upon the technology of computer-aided design programs (CADs), which have been in use for several decades.[5] Essentially, the printer reads the 3D CAD and squeezes out a polymer-like substance to create the designed plastic object.[6]

As of September 2013, the *New York Times* estimated that while 68,000 consumer printers had been sold, the majority of the $2.2 billion 3D printing industry is dedicated to industrial use.[7] The creative-minded hobbyists use the printers to make shoes, replicas of fetuses, camera lenses, flutes, or a favorite musician's guitar.[8] Those in the culinary arts are now printing chocolate, pasta, and other edible items.[9] Some even foresee 3D printing ending world hunger.[10] Most printers are about the size of a refrigerator, but predictions suggest that they will be built to accommodate objects as big as a house.[11] NASA has sent 3D printers into orbit with its spaceships in case a part breaks and needs to be replicated quickly.[12] The positive and negative implications of 3D printing have been widely noted.[13] It has the potential to change industry, end world hunger, and provide a new platform for creativity. On the

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1. Jeremy Hsu, *3D Printing: What a 3D Printer Is and How It Works*, LIVESCIENCE (May 21, 2013, 12:57 PM), http://www.livescience.com/34551-3d-printing.html.

2. *Id.*

3. *New 3D Printing Center Aims To Boost US Manufacturing*, LIVESCIENCE (Aug. 16, 2012, 03:05 PM), http://www.livescience.com/22443-3d-printing-boost-manufacturing.html.

4. Hsu, *supra* note 1.

5. Daniel Harris Brean, *Asserting Patents To Combat Infringement via 3D Printing: It's No "Use,"* 23 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 771, 773 (2013).

6. *Id.*

7. A.J. Jacobs, *Dinner Is Printed*, N.Y. TIMES (Sept. 21, 2013), http://www.nytimes.com/2013/09/22/opinion/sunday/dinner-is-printed.html?pagewanted=all.

8. Brian Voo, *20 Amazing Creations You Can Make with 3D Printing*, HONGKIAT, http://www.hongkiat.com/blog/3d-printings (last visited Mar. 20, 2014).

9. Jacobs, *supra* note 7.

10. *Id.*

11. Hsu, *supra* note 1.

12. *Id.*

13. *Id.*

other hand, it could be seen as a Pandora's box, unleashing unregulated deadly weapons.

III. PLASTIC GUNS AND THE CURRENT LEGISLATIVE BATTLES

Defense Distributed, a nonprofit that advocates anti-monopolistic digital publishing, was formed in 2012.[14] Its founder, Cody Wilson, is a twenty-five-year-old University of Texas law student set on making the world's first 3D-printable handgun.[15] This mission has been controversial since its inception. In the early stages, Wilson solicited donations from the public to lease a 3D printer from Stratasys and to begin an open-source sharing platform for twenty-three weapons blueprints.[16] Defense Distributed makes no secret of its goal to skirt governmental regulations and actually "fights for freedom primarily outside of court and government, [by] writing and releasing software to aid in the disintermediation of state governments and large, collusive corporations."[17] In September 2012, Stratasys discovered Wilson's intentions and e-mailed Wilson, stating that it wanted to revoke the lease due to fears of violating federal at-home weapons manufacturing laws.[18] Wilson responded by saying that even though at this time he did not have a license to manufacture weapons, he had no intention of selling the gun, thereby complying with the law.[19] Stratasys's legal counsel subsequently sent a formal letter, and the company seized the printer.[20]

Initial fundraising attempts through a site called Indiegogo were stymied when the site booted Defense Distributed, citing company policy rejecting projects fundraising for weapons manufacturing.[21] Wilson took the $2,000 he raised on the site and achieved his goal of $20,000 by using Bitcoin electronic currency.[22] In the wake of the Sandy Hook massacre, and an entire year of public gun violence including the

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14. *About Defense Distributed*, DEFENSE DISTRIBUTED, http://defdist.org/about/# (last visited Mar. 25, 2014).

15. Andy Greenberg, *This Is the World's First Entirely 3D-Printed Gun (Photos)*, FORBES (May 3, 2013, 7:00 AM), http://www.forbes.com/sites/andygreenberg/2013/05/03/this-is-the-worlds-first-entirely-3d-printed-gun-photos/.

16. Robert Beckhusen, *3-D Printer Company Seizes Machine from Desktop Gunsmith*, WIRED (Oct. 1, 2012, 2:06 PM), http://www.wired.com/dangerroom/2012/10/3d-gun-blocked/.

17. Stuart Percle, *3D Printing: Diabolical, Devastating and Deadly*, STUART PERCLE (Feb. 10, 2014), http://stuartpercle.wordpress.com/2014/02/10/3d-printing-diabolical-devastating-and-deadly/ (quoting DEFENSE DISTRIBUTED, *supra* note 14).

18. Beckhusen, *supra* note 16.

19. *Id.*; 18 U.S.C. § 922(o)-(r) (2012).

20. Beckhusen, *supra* note 16.

21. Vice, *3D Printed Guns (Documentary)*, YOUTUBE (Mar. 25, 2013), http://www.youtube.com/watch?v=DconsfGsXyA.

22. *Id.*

shooting in Aurora, Colorado, Wilson proceeded with working on printing the same type of gun Adam Lanza used during his attack in Connecticut (an AR-15).[23] Wilson makes a Second Amendment argument, but primarily believes that everyone "just should" have access to CAD files for printable guns and is thrilled that people all over the world are downloading them.[24] Gun CAD files were hosted at this time on a site called Thingiverse, but after the Sandy Hook shooting, the company removed them for internal policy reasons.[25] This prompted Wilson to launch DefCad, his own site to share the files.[26] While the site offers all types of model files (from shoes to salt and pepper shakers), the top several dozen of the most downloaded items are gun models.[27]

Wilson does not claim to have grown up a gun enthusiast; instead, he claims that his motives are more libertarian by nature.[28] He admits he bought his first gun in 2011 and spent the majority of his childhood with his nose in a book.[29] He appears to take pride in testing the limits of governmental regulations and freely admits he is taking on this project to "prove [a] political point": anyone can print a gun in their bedroom.[30] According to Nick Bilton, a reporter with the *New York Times* who follows the 3D printing movement closely, gun manufacturing is Wilson's personal "cause" and simply the thing for which he has chosen to fight in his early twenties.[31] Bilton wrote one of the first exposés on Wilson and says that his readers criticized him for giving Wilson the attention that he so clearly wants.[32]

Is Wilson just an egomaniacal young man seeking attention? Or, does his project warrant serious consideration from lawmakers? His actions certainly prompted a national (if not international) dialogue about gun rights in the wake of new technology, and even if Wilson does not deserve the media frenzy, his project certainly does. Bilton notes teenagers are the demographic most interested in 3D-printed guns, and

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23. *Id.*
24. *Id.*
25. *Id.*
26. *Id.*
27. Andy Greenberg, *3D-Printed Gun's Blueprints Downloaded 100,000 Times in Two Days (with Some Help from Kim Dotcom)*, FORBES (May 8, 2013, 5:12 PM), http://www.forbes.com/sites/andygreenberg/2013/05/08/3d-printed-guns-blueprints-downloaded-100000-times-in-two-days-with-some-help-from-kim-dotcom/.
28. Alexander Hotz, *Download, Print, Fire: Gun Rights Initiative Harnesses 3D Technology*, GUARDIAN (Sept. 26, 2012, 8:37 EDT), http://www.theguardian.com/world/2012/sep/26/3d-printing-guns-legal-issues-us-law?newsfeed=true.
29. *Id.*
30. Vice, *supra* note 21.
31. *Id.*
32. *Id.*

regarding Wilson he admits, "The reality is he could be the canary in the coalmine that is showing us what the future may be."[33] Wilson dances around the lines between antagonistic youth, technological innovator, and libertarian advocate.

With or without Wilson's activity, Bilton predicts that within the next decade most American households will own a 3D printer,[34] mostly used to print cups, plates, and other unassuming goods; however, some will likely be printing guns. Therefore, it is better to have the conversation about policy and regulation now rather than ten years from now when it becomes a widespread problem.[35] Bilton points out that "technology moves faster than the law" and cites Facebook's FCC privacy infringement and subsequent policy change as an example.[36]

Is 3D printing, particularly 3D gun printing, the technological development that will prompt the next great legislative policy debate? After presenting his constitutional right-to-bear-arms argument in an interview with *Forbes*, Wilson said: "You can print a lethal device. It's kind of scary, but that's what we're aiming to show."[37] While Wilson's perseverance is admirable on one hand, he is failing to consider the potential harmful consequences of Defense Distributed. He exhibits a certain reckless disregard of the broader ramifications of this technology by diving head first into developing prototypes.

In March 2013, the Bureau of Alcohol, Tobacco, and Firearms approved Wilson for a Type 7 federal firearms license.[38] With this license he can manufacture the plastic guns for sale. Although he says he plans to sell the models for the sake of covering the cost of prototype printing, he still seeks a class 2 Special Operational Taxpayer license that would allow him to deal in a broader range of weapons, including a fully automatic rifle.[39] Again, he has never stated any violent or malicious intentions while pursuing the sale of 3D-printed guns; rather, he seeks to find the boundary of the law.

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33. *Id.*
34. *Id.*
35. *Id.*
36. *Id.*
37. Andy Greenberg, *'Wiki Weapon Project' Aims To Create a Gun Anyone Can 3D-Print at Home*, FORBES (Aug. 23, 2012, 9:00 AM), http://www.forbes.com/sites/andygreenberg/2012/08/23/wiki-weapon-project-aims-to-create-a-gun-anyone-can-3d-print-at-home/.
38. Cyrus Farivar, *3d-Printed Gun Maker Now Has Federal Firearms License To Manufacture, Deal Guns*, ARS TECHNICA (Mar. 17, 2013, 8:00 AM), http://arstechnica.com/tech-policy/2013/03/3d-printed-gunmaker-now-has-federal-firearms-license-to-manufacture-deal-guns/.
39. *Id.*

In May 2013, Defense Distributed unveiled the first functioning 3D-printed plastic gun.[40] Wilson printed fifteen of the sixteen parts, and the last piece, a metal firing pin, can be easily purchased at any hardware store.[41] Wilson named the gun the "Liberator" as a nod to the one-shot pistols the Allies air-dropped over France during World War II.[42] This tongue-in-cheek name is an obvious reference to Wilson's overarching mission of the liberty that 3D printing now affords to anyone who can gain access.[43] With the Liberator, he is distributing a "symbolic blow against governments around the world."[44] This announcement came immediately after the Boston Marathon bombings, which involved homemade explosives, not guns. However, Wilson's antigovernmental attitude has sparked concern that he is operating in a similar vein to that of the bombers.[45] *Wired* listed him as one of the fifteen most dangerous people in the world, and the Coalition To Stop Gun Violence voiced its concern that Wilson is advocating a deadly revolt, not just an ideological one.[46] Still, Wilson insists that his goal is to "demonstrate how technology can circumvent laws until governments simply become irrelevant."[47]

Immediately following the Liberator's debut, lawmakers started to take a stance. Legislators in New York, Washington D.C., and some Californian cities began proposing a change, and by November 2013 the City Council of Philadelphia became the first city council to limit what 3D printers can be used to produce, enacting the following ordinance: "No person shall use a three-dimensional printer to create any firearm, or any piece or part thereof, unless such person possesses a license to manufacture firearms under Federal law, 18 U.S.C. § 923(a)."[48]

One councilman admits, "[I]t's all pre-emptive," while another notes, "As technology progresses, three-dimensional printers will become more advanced, less expensive and more commonplace."[49] In one of the most violent cities in America, this type of legislation is an

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40. Andy Greenberg, *Meet the 'Liberator': Test-Firing the World's First Fully 3D-Printed Gun*, FORBES (May 5, 2013, 5:30 PM), http://www.forbes.com/sites/andygreenberg/2013/05/05/meet-the-liberator-test-firing-the-worlds-first-fully-3d-printed-gun/.

41. *Id.*

42. *Id.*

43. *Id.*

44. *Id.*

45. *Id.*

46. *Id.*

47. *Id.*

48. *First Ban in the Country: 3D-Printed Guns Now Illegal in Philadelphia*, RT (Nov. 25, 2013, 7:22 PM), http://www.rt.com/usa/philly-gun-ban-johnson-280/.

49. *Id.*

honorable step by the City Council to reduce potential homegrown crime. On the other hand, this law does not prevent the possession of 3D-printed guns in the city.[50] It seems that much of the fear behind 3D-printed guns comes from the shock that technology has advanced to the level one would only previously imagine possible in a science fiction novel. Preparing for the worst-case scenario may sensationalize the issue, but no one can predict how quickly this technology will take hold.

On a national scale, the main legislation at issue is the 1998 Undetectable Firearms Act, which states, "It shall be unlawful for any person to manufacture, import, sell, ship, deliver, possess, transfer, or receive any firearm—that, after removal of grips, stocks, and magazines is not as detectable as the Security Exemplar, by walk-through metal detectors calibrated and operated to detect the Security Exemplar."[51]

The obvious loophole here allows 3D-printed plastic guns with a tiny metal firing pin to be legally carried. It also permits someone to go undetected by removing the pin and carrying it separately from the gun. Israeli journalists downloaded the Liberator files from Defense Distributed in July 2013 and brought it into the Kuesset (Israeli Parliament) during Prime Minister Benjamin Netanyahu's address.[52] The journalists left the metal firing pin in the gun, and it managed to go undetected by security sensors.[53] This naturally creates cause for concern on an international level. While local governments worry about the widespread use of 3D-printed guns, the immediate concern should be the easy concealment of this new type of weapon. A more realistic scenario on the horizon is an assassination attempt or flight hijacking with the use of a 3D-printed gun, versus a mass army of 3D-printed plastic gun users.

The Undetectable Firearms Act was set to expire on December 9, 2013, but the United States House of Representatives renewed it with overwhelming support for another ten years on December 3, 2013.[54] New York Congressman Steve Israel has been one of the most vocal about closing the loophole in this act and proposed the Undetectable Firearms Modernization Act that would require several nonremovable

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50. PHILADELPHIA, PA., PHILA. CODE ch. 10-2000 (2013).

51. 18 U.S.C. § 922(p) (2012).

52. Sean Captain, *Journalists Smuggle 3-D Printed Gun into Israeli Parliament*, TECHNEWSDAILY (July 8, 2013, 1:49 PM), http://www.technewsdaily.com/18500-3d-printed-gun-israel-parliament.html.

53. *Id.*

54. Jeremy Peters, *House Votes To Extend Gun Law Without New Provisions for 3-D Printed Firearms*, N.Y. TIMES (Dec. 3, 2013), http://www.nytimes.com/2013/12/04/us/politics/house-votes-to-extend-gun-law-without-new-provisions.html.

components of handguns and rifles to be made out of metal.[55] The National Rifle Association has yet to publicly disapprove of the Undetected Firearms Act, but it has stated that it will not support any additions to the law.[56] The bill has seven cosponsors and is currently in the House Subcommittee on Crime, Terrorism, Homeland Security, and Investigations.[57]

The legal community is now starting to sort out its sentiments on 3D-printed guns. Michael Weinberg, a staff attorney at Public Knowledge said, "When you have a general purpose technology, it will be used for things you don't want people to use it for."[58] He goes on to say: "That doesn't mean it's wrong or illegal. I won't use my 3D printer to make a weapon, but I'm not going to crusade against people who would do that."[59] Conversation quieted after the renewal in the House, and it will likely remain quiet until a catalytic event creates new dialogue and causes Americans to take a stand on this controversial issue.

IV. PATENT INFRINGEMENT

Because the heart of 3D printing involves creating a unique object from a computer file, it opens the doors for new ways to infringe on patent rights. Some legal scholars predict that 3D printing will effect patents the same way that Napster effected copyrighted music files.[60] For example, in an article published in the *Georgetown Law Journal*, law professors Deven Desai and Gerard Magliocca argue that 3D printing "will do for physical objects what MP3 files did for music."[61]

Article I, Section 8 of the United States Constitution permits the United States Congress "[t]o 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."[62] When discussing the importance of open sharing CAD files, a 3D printing company founder referenced Isaac Newton's famous quote regarding

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55. Undetectable Firearms Modernization Act (UFMA), H.R. 1474, 113th Cong. (1st Sess. 2013).

56. Michael del Castillo, *House Bans 3D Printed Guns Another 10 Years*, UPSTART (Dec. 4, 2013, 8:21 AM), http://upstart.bizjournals.com/news/technology/2013/12/03/house-bans-3-d-printed-guns.html?page=all.

57. H.R. 1474.

58. Greenberg, *supra* note 37.

59. *Id.*

60. Deven R. Desai & Gerard N. Magliocca, *Patents, Meet Napster: 3D Printing and the Digitization of Things*, 102 GEO. L.J. 1691 (2013).

61. *Id.*

62. U.S. CONST. art. I, § 8, cl. 8.

innovation.[63] His technology is used for the 3D printing of guns, and while he didn't reference Newton directly, he did say, "[O]ther people can stand on our shoulders, and learn from what we've done, and take it farther."[64] This concept of standing on the shoulders of giants and continuing creative inventing goes to the heart of patent law. While the Patent Act of 1952 primarily governed patent law for nearly half a decade, the America Invents Act of 2011 (AIA) modified patent requirements primarily by changing the first-to-invent system to a first-to-file one.[65] This new regime gives the inventor who files his or her patent with the U.S. Patent and Trademark Office (PTO) priority for the invention.[66] The AIA perhaps creates more breathing room for inventors to experiment with 3D-printed prototypes before a piece of art is legally deemed "invented."

In the article by Desai and Magliocca, the authors discuss the inherent "paradox" of the patent system: the balance of full disclosure of a patent with exclusive rights granted to the owner.[67] The temptation to infringe on a patent right is high when all of the information is available to do so.[68] Threat of a lawsuit is the most obvious deterrent for infringers, but the authors also point out that some inventions are too difficult for the average person to reproduce.[69] They argue that developments in reproductive technologies like the printing press broke down the "physical shield" that prevented others from copying works.[70] A similar barrier was in place for music until the creation of MP3 files that could be shared digitally.[71] Copyright policy changed and adapted to the new technology, yet the authors claim there is no need for patent law to go through a similar uphill battle to reach a new "equilibrium."[72]

Instead of lobbying Congress and moving cases through the judicial system, businesses should "embrace" the change.[73] The authors cite iTunes and Amazon as corporations that embraced the changing digitization of music and books by offering single items online.[74] Sales surged with the availability of safe files versus malware-infested pirated

63. Vice, *supra* note 21.
64. *Id.*
65. 35 U.S.C. § 111 (2012).
66. *Id.*
67. Desai & Magliocca, *supra* note 60, at 1703-05.
68. *Id.*
69. *Id.* at 1704-05.
70. *Id.*
71. *Id.*
72. *Id.* at 1705.
73. *Id.*
74. *Id.*

copies.[75] The authors suggest that a similar market could develop, driven by people using 3D printers at home who seek to produce patented objects.[76] A pirated CAD file could have errors and could pose security problems to the home-computing system.[77] Also, those reproducing patented objects at home may not have the proper materials to make the objects truly safe via their experimentation, thus opening the market for brands to compete.[78]

In a spring 2013 article published in the *Fordham Intellectual Property, Media and Entertainment Law Journal*, author Daniel Harris Brean delves into the potential infringement cases that can arise from 3D printing.[79] A "patent infringer" is defined by federal law as "whoever without authority makes, uses, offers to sell, or sells any patented invention, within the United States or imports into the United States any patented invention during the term of the patent."[80] Contributory infringement provision (b) supplements this protection, stating, "[W]hoever actively induces infringement of a patent shall be liable as an infringer."[81] Additionally, subsection (c) indicates:

> Whoever offers to sell or sells within the United States or imports into the United States 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, knowing the same to be especially made or especially adapted for use in an infringement of such patent, and not a staple article or commodity of commerce suitable for substantial noninfringing use, shall be liable as a contributory infringer.[82]

It is possible that the makers of 3D printers could be found responsible for contributory liability under subsections (b) and (c). In his article, Brean notes that instead of going after individual direct infringers, it makes more sense for a party to attack the "big fish" for an injunction: the printer manufacturer.[83] Brean says, "Cutting off an upstream supplier prevents further distribution to downstream customers, and preventing customers' downstream use of a machine diminishes the market for

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75. *Id.*
76. *Id.*
77. *Id.*
78. *Id.*
79. Brean, *supra* note 5.
80. 35 U.S.C. § 271(a) (2012).
81. *Id.* § 271(b).
82. *Id.* § 271(a).
83. Brean, *supra* note 5, at 786.

purchasing the machine in the first place."[84] This follows the United States Supreme Court's declaration that the purpose of contributory infringement is to protect the rights of patent holders where "enforcement against direct infringers is impracticable."[85]

Companies that sell CAD files of patented objects are likely culprits here as well.[86] To qualify for direct infringement, however, the party held liable may "make" the product.[87] The CAD distributors do not make the machine, nor does a sale of a CAD file qualify as a sale of a product under this section.[88] Brean cites several cases from the United States Court of Appeals for the Federal Circuit that define a sale to be of the physical product or apparatus itself.[89] Additionally, in looking at subsection (a), Brean argues that "using" an invention would not rope in those who create or distribute CAD files.[90] Because direct infringement is unlikely, Brean's analysis then turns to the possibility of contributory liability under subsections (b) and (c).[91]

Under subsection (b), a person can be held for contributory liability if she actively induces infringement.[92] In *Global-Tech Appliances Inc. v. SEB S.A.*, the Supreme Court created a knowledge requirement for this type of infringement, involving a two-pronged willful blindness test providing that "(1) the defendant must subjectively believe that there is a high probability that a fact [i.e., infringement] exists and (2) the defendant must take deliberate actions to avoid learning of that fact."[93] Brean argues that this rule will "ensnare the most egregious and deliberate infringing activity" by those who distribute patented CAD files with the intent that they get printed.[94]

It remains to be seen how technologies involving contributory copyright infringers will shape this parallel area of patent law. The United States Court of Appeals for the Ninth Circuit recently held the founder of a BitTorrent file-sharing site, Gary Fung, liable for contributory liability for inducing users to infringe on copyrights.[95] The

84. *Id.*
85. *Id.* at 787.
86. *Id.* at 789.
87. *Id.*
88. *Id.* at 790.
89. *Id.*
90. *Id.* at 800.
91. *Id.*
92. 35 U.S.C. § 271(b) (2012).
93. Brean, *supra* note 5, at 794 (citing Global-Tech Appliances, Inc. v. SEB S.A., 131 S. Ct. 2060, 2068 (2011)).
94. *Id.* at 794-96.
95. *See* Columbia Pictures Indus., Inc. v. Fung, 710 F.3d 1020, 1031 (9th Cir. 2013).

BitTorrent client program is a peer-to-peer file sharing technology that permits users who have downloaded a BitTorrent client program to upload a link to a general website and make it available for other users with the same software.[96] The actual file is never available on the website; instead, the BitTorrent software from the downloader's computer seeks out the file's original source on the owner's computer and copies it directly.[97] The Court focused on Fung's personal involvement with the site because he encouraged users to upload torrents for the most popular movies and television shows and was an active participant on the site's message board, where he offered advice to those having trouble with the technology.[98]

While sites like Thingiverse publicly offer CAD files on unpatented objects, as 3D printing becomes increasingly common, the temptation will be high for BitTorrent sites like Fung's to start offering CAD files on patented subject matter.[99] Given the holding from the Ninth Circuit in *Columbia Pictures Industries Inc. v. Fung*, web developers should be wary of this type of use; however, as Brean points out, the "knowing" element can be a tricky one to prove, and will apply only to the most offensive infringement cases.[100] Fung's case was distinctive in that he was clearly the man behind the site, helping the illegal downloading along and happily taking credit for his actions.[101] Some speculated the court was eager to incriminate someone like him as an example to others in the same business.[102]

The popular BitTorrent file sharing site, Pirate Bay, added a "Physibles" category to its site containing specific CAD files for 3D printers.[103] Currently, the top items listed for download on the Physibles section are gun parts, specifically Wilson's Liberator from DefCad.[104] Other noteworthy files available for download include ones for Nerf guns, various types of sex toys, iPhone docks, lawn darts, rape whistles, and light switch plates.[105] It will be interesting to see how law enforcers

96. *Id.* at 1028.
97. *Id.*
98. *See id.* at 1036.
99. THINGIVERSE, http://www.thingiverse.com/ (last visited Mar. 23, 2014).
100. Brean, *supra* note 5, at 794.
101. *See Fung*, 710 F.3d at 1035-37.
102. *Id.*
103. Darren Quick, *The Pirate Bay Launches "Physibles" Category for 3D Printable Objects*, GIZMAG (Jan. 24, 2012), http://www.gizmag.com/the-pirate-bay-physibles-3d-printing/21208/.
104. *Physibles*, THE PIRATE BAY, https://thepiratebay.se/browse/605 (last visited Mar. 24, 2014).
105. *Id.*

will monitor these types of file sharing sites, and if patent infringement will run rampant as copyrighted media files did.

Section 271 is also unlikely to catch distributors of CADs because these files do not meet the Supreme Court's restrictive view of a "component" of the invention.[106] A physical apparatus generally satisfies this component requirement of the code.[107] Brean cites *Microsoft Corp. v. AT&T Corp.* for support of this theory. The issue before the Supreme Court in that case was whether software files should be considered as a patent "component," with Microsoft contending that only a physical hard copy qualifies, and AT&T asserting software in the abstract is allowed.[108] That case looks at the meaning of the word component under § 271(f), but Brean contends that there is no reason why a court would read the meaning of "component" here differently from in the preceding subsection (c).[109] Brean concludes, "This state of the law leaves patentees virtually helpless to combat a large class of infringement of their product claims."[110] This Comment will now look at another area of intellectual property rights that are affected by 3D printing technology: copyright.

V. COPYRIGHTS AND THE ART WORLD

As 3D printing revolutionizes science and industry, the art world is using the printers to reach new creative heights.[111] Artists are creating one-of-a-kind objects that push the boundary of multimedia art, employing the technology to directly reproduce their visions.[112] World class museums such as the Metropolitan Museum of Art and the Museum of Modern Art in New York City have hosted exhibitions on technology and art, and the Museum of Arts and Design (MAD) is the most recent institution to mount an exhibition featuring mostly 3D-printed art.[113] The MAD even offered a free workshop about

106. Brean, *supra* note 5, at 796.
107. *Id.* at 797.
108. *Id.* at 796 (citing Microsoft Corp. v. AT&T Corp., 550 U.S. 457 (2007)).
109. *Id.* at 800.
110. *Id.* at 804.
111. *See Arts and Sculpture*, 3D PRINTING INDUSTRY, http://3dprintingindustry.com/art-sculpture/ (last visited Mar. 24, 2014).
112. Evan Chavez, *NK Gallery Exhibit GNI-RI by Nick Ervinck Twists Minds with Distorted 3D Printed Forms*, 3D PRINTING INDUSTRY (Mar. 25, 2014), http://3dprintingindustry.com/2014/03/25/nk-gallery-exhibit-gni-ri-nick-ervinck-twists-minds-distorted-3d-printed-forms/.
113. Ariella Brown, *Getting Out of Hand at First Hand—Ariella Brown Review's MAD's Latest Exhibition*, 3D PRINTING INDUSTRY (Mar. 17, 2014), http://3dprintingindustry.com/2014/03/17/3d-printing-review-mad-exhibition/.

"demystifying the process" behind 3D printing.[114] As this technology gains popularity in the art world, 3D printing enthusiasts could face potential copyright liability.

In a Public Broadcasting Service (PBS) documentary, attorney Michael Weinberg notes the lack of case law on 3D printing leaving artists and innovators in the dark about how to protect their copyrights.[115] He criticizes the way the music industry handled file sharing sites like Napster with endless lawsuits.[116] Instead, industries affected by 3D printing should embrace the new technology instead of inhibiting it.[117] In a *Forbes* article by Gary Shapiro, president and CEO of Consumer Electronics Association, the title says it all: "3D Printers Will Soon Change the World, If It's Not Strangled in a Lawyered Up World."[118]

Weinberg discussed a more popular nongun CAD file available on Thingiverse: a bust of Yoda.[119] "Yoda is not just something we can copy and duplicate—Yoda is protected by copyright."[120] The 3D printing world seems to be waiting for the reaction of industry giants like Disney and Lucasfilms that have yet to comment on what could be infringement.[121] It seems like the legal industry will start to sift through these issues in the coming years. One production house, Moulinsart, sent Thingiverse a takedown notice under the Digital Millennium Copyright Act (DMCA).[122] Moulinsart owns the right to the cartoon *Tintin* and directed Thingiverse to remove the CAD files of Tintin's cartoon moon rocket.[123] Weinberg notes that Moulinsart certainly had the right to post the takedown; however, he discourages companies from suing "the genie back into the bottle" and vehemently supports the use of 3D printing to expand upon creativity.[124] He suggests, for example, that publishing

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114. *Everything You Wanted To Know About 3D Printing but Didn't Know Who To Ask*, MUSEUM OF ARTS & DESIGN, http://madmuseum.org/events/everything-you-wanted-know-about-3d-printing-didn%E2%80%99t-know-who-ask-0 (last visited Mar. 24, 2014).

115. *Will 3D Printing Change the World?*, PBS: OFF BOOK (2013), http://www.pbs.org/arts/gallery/off-book-|-season-two/offbook-3d-printing/ (last visited Oct. 9, 2014).

116. *Id.*

117. *Id.*

118. Gary Shapiro, *3D Printers Will Soon Change the World, If It's Not Strangled in a Lawyered Up World*, FORBES (Jan. 17, 2014, 8:00 AM), http://www.forbes.com/sites/realspin/2014/01/17/3d-printers-will-soon-change-the-world-if-its-not-strangled-in-a-lawyered-up-world/.

119. Steve Henn, *As 3-D Printing Becomes More Accessible, Copyright Questions Arise*, NPR: ALL TECH CONSIDERED (Feb. 19, 2013, 3:01 AM), http://www.npr.org/blogs/alltechconsidered/2013/02/19/171912826/as-3-d-printing-become-more-accessible-copyright-questions-arise.

120. *Id.*

121. *Id.*

122. *Id.*

123. *Id.*

124. *Id.*

houses like Moulinsart and Disney sell the CAD files for these objects, allowing the technology to flourish and develop in a legal manner.[125]

VI. CONCLUSION

The future of 3D printing is directly impacted by patents on the technology itself.[126] On January 28, 2014, a patent on a major component of 3D printing expired, leading some to think 2014 will bring a new wave of developments in this industry.[127] Expired Patent 5,597,589 covers the apparatus for producing parts by selective sintering.[128] While it is not used on consumer-level printers, it is applied to industrial use, and is the process by which a laser heats powder and fuses it into the desired shape.[129] 3D printing giant, 3D Systems, acquired this patent after it was originally filed by a small company called Desktop Manufacturing.[130]

Industry experts question why 3D Systems has not chosen to apply the selective sintering technology to its very popular consumer-level products like the Cube, which comes in several bright colors and is sold at office supply stores like Staples.[131] Perhaps 3D Systems chose to hold the technology for the high-end industrial printers to keep the price up in that market alone, or maybe it did not think developing a more affordable selective sintering system was worth the research and development.[132]

The most popular patented form of 3D printing by which products are made is through layering solidifying material until an object is formed (fuse deposition modeling) and the patent expired in 2009.[133] It is estimated that this type of printer would cost $25,000 prior to the expiration of the patent,[134] but a major company, Stratasys, now sells a model for $1,375.[135]

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125. *Id.*

126. Eddie Krassenstein, *Laser Sintering 3D Printing May Now Take Off with a Very Important Patent Expiring Today*, 3D PRINT (Jan. 28, 2014), http://3dprint.com/387/laser-sintering-3d-printing-may-now-take-off-with-a-very-important-patent-expiring-today/.

127. *Id.*

128. U.S. Patent No. 5,597,589 (filed May 31, 1994).

129. Krassenstein, *supra* note 126.

130. *Id.*

131. *Id.*; *3D Printers: Cube® 3D Printers*, STAPLES, http://www.staples.com/Cube-3D-Printers/product_SS2044291, (last visited Mar. 23, 2014).

132. Krassenstein, *supra* note 126; *3D Printers: Cube® 3D Printers*, *supra* note 131.

133. U.S. Patent No. 5,121,329 (filed Oct. 30, 1989).

134. *Id.*

135. Krassenstein, *supra* note 126.

A price drop along these lines is predicted with the expiration of the selective sintering patent and may lead to a 3D printing revolution.[136] This system runs at around $250,000 and can be used with fiberglass, ceramics, and carbon fiber in addition to plastic compounds; however, there are dozens of other patents that revolve around this specific type of printer, and could inhibit outside developers from gaining ground in the market.[137] This makes working around this akin to walking on eggshells, and potential legal issues may not be worth the risk. The 3D printing industry will continue to change the way innovators approach the world. As this technology continues to develop, legislators and advocates in the realms of patent, copyright, and firearm law will need to keep pace to ensure 3D printing brings more good than harm.

136. Graham Templeton, *Major Patent Expiration Could Spark a Second 3D Printing Revolution*, EXTREMETECH (Jan. 29, 2014, 3:00 PM), http://www.extremetech.com/extreme/175562-major-patent-expiration-could-spark-a-second-3d-printing-revolution.

137. *Id.*