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Darrell G. Mottley*

Intellectual Property Issues in the Network Cloud: Virtual Models and Digital Three-Dimensional Printers

Introduction

This paper presents a discussion on the emerging intellectual property issues concerning the technology of three-dimensional printing and digital definition models in the Internet network cloud. The emerging issues intersect with the three major areas of intellectual property law for intellectual property rights holders: copyright, patent, and trademark law. Part I of this paper is an introduction to three-dimensional printing and virtual model technology. Part II explores the challenges of the copyright eligibility/registrability of digital models. Part III discusses the application of design patent law to digital model protection. Part IV presents the topic of potentially applying trademark law protection to digital models. Part V presents practical concepts for intellectual property rights holders.

I. Three-Dimensional Printing

In the Internet era, the global use of online social media and sharing sites increases the likelihood of receiving digital property across national boundaries. A group called Defense Distributed recently announced and presented the digital prototype of a three-dimensional (3-D) printable firearm on its website.[1] This announcement created a wake of international public exposure, avid interest from the United States government, and widespread public attention to the new legal issues of 3-D printing

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1. Defense Distributed, http://defdist.org/dd-history/ (last visited Feb. 17, 2014).

technology and digital models.[2] Furthermore, *Scientific American* published an article discussing 3-D printing technology used to make a lifesaving implantable windpipe for an infant.[3] The 3-D printing technology is becoming more widespread globally. According to one study, worldwide sales and services pertaining to 3-D printing touched $2.2 billion in 2012 and sales are predicted to increase to about $6.5 billion by 2019.[4]

The goal of the intellectual property system in the United States is to promote progress and innovation in science and technology.[5] Many of the core principles in other countries' intellectual property systems have related provisions.[6] The question of legal protection for 3-D digital models includes the chief challenge of intellectual property in the modern world: the balance between promoting new creative works that create new business and allowing existing works to be in the public domain, available for use by subsequent designers. The complex legal issues dealing with 3-D printing technology are challenging this delicate balance.

A. *What is Three-Dimensional Printing Technology?*

Inspiration for 3-D printing concepts may reach as far as back as early special effects in Hollywood studios. In the early 1970's, the movie *Willy Wonka and the Chocolate Factory* presented a fantasy technology called "Wonka Vision." In the movie, a bright flash picture of a physical object was captured, converted into smaller electronic pieces, sent over the air, and somehow reassembled using movie magic in a television-like box in which the user "tuned" into the product to view its smaller form.[7] Of course, the realities of physical science prevent this fantasy technology.

Some forty years later, however, in the modern world of digital technology, there are scanned or photo-captured 3-D digital models created from existing objects and original 3-D digital models created in electronic workspaces.[8] For ease of explanation, these are referred to as digital virtual models or virtual models. For

2. *That 3-D Printed Gun? It's Just the Start,* BLOOMBERG (May 13, 2013, 6:00 PM), http://www.bloomberg.com/news/2013-05-13/that-3-d-printed-gun-it-s-just-the-start.html.

3. Marissa Fessenden, *3-D Printed Windpipe Gives Infant Breath of Life*, SCI. AM. (May 24, 2013), http://www.scientificamerican.com/article/3-d-printed-windpipe/.

4. *Your Future Will Be Manufactured on a 3-D Printer*, BLOOMBERG (May 12, 2013, 6:00 PM), http://www.bloomberg.com/news/2013-05-12/your-future-will-be-manufactured-on-a-3d-printer.html.

5. *See* U.S. CONST. art. I, § 8, cl. 8 (Congress has power to promote progress of science by securing exclusive rights to authors and inventors).

6. *See generally*, CONVENTION ESTABLISHING THE WORLD INTELLECTUAL PROPERTY ORGANIZATION July 14, 1967 as amended on September 28, 1979, available at http://www.wipo.int/treaties/en/text.jsp?file_Id=283854/.

7. WarnerBrosOnline, *Willy Wonka & The Chocolate Factory 40th Anniversary—Wonka Vision*, YOUTUBE (Sept. 30, 2011), http://www.youtube.com/watch?v=tPi71LSZxT0.

8. *See Research and Markets: Concise Analysis of the International 3D Scanning Market – Forecasts to 2018*, BUS. WIRE (Feb. 3, 2014, 7:42 AM), http://www.businesswire.com/news/home/20140203005631/en/Research-Markets-Concise-Analysis-International-3D-Scanning#.UvB3eShD3ww (stating that 3-D scanning is driven by the fact that it provides information with a three dimensional depth).

scanned or photo-captured 3-D digital models, a physical object can be digitally scanned or photographed to create a digital surface representation.[9] Similar to how a flatbed scanner creates a digital file of a drawing on a sheet of paper, a 3-D scanner can create a digital file of a physical object.[10] The scanned digital model comprises a specialized code definition and digital file that can be simply transferred over the Internet via email or streaming technology to another website or computer system connected to a 3-D printer.[11] The designated 3-D printer processes the scanned digital model to build-up plastic layers of the scanned object to construct the final product.[12] This build-up process is known in the technology art as additive manufacturing.[13]

To produce new complex products, designers can create original 3-D digital models in an electronic workspace or solid modeling program, such as AutoCAD by Autodesk.[14] The new product designs can be printed with a 3-D printer as explained above using the additive manufacturing process. This printing technology has been successfully employed to create shoes, mobile phone components, medical devices, and automobiles.[15]

B. *Three-Dimensional Models*

The digital models either scanned or created from a digital workspace can be widely distributed over the Internet. There are several websites that trade and sell digital virtual models. In another example, the file-sharing company "The Pirate Bay" launched a content category called "Physibles."[16] In the Internet age, digital images,

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9. *See, e.g.*, Brandon Griggs, *Startup Unveils 3-D Scanner at SXSW*, CNN (Mar. 9, 2013, 4:20 PM), http://www.cnn.com/2013/03/08/tech/innovation/makerbot-pettis-sxsw/index.html?iref=allsearch (MarketBot Digitizer allow customers to scan objects using two lasers and a webcam and feed the resulting digital files to a 3-D printer).

10. *Id.*

11. Jennifer Pellet, *How 3D Printing Works*, T. ROWE PRICE (May 2012), http://individual.troweprice.com/public/Retail/Planning-&-Research/Connections/3D-Printing/How-3D-Printing-Works.

12. *Id.*

13. Krishana Davis, *Abingdon Library Offers Free 3D Printer to County Residents*, BALT. SUN (Nov. 6, 2013, 9:04 AM), http://www.baltimoresun.com/news/maryland/harford/abingdon/ph-ag-3d-printer-1106-20131105,0,2607372.story.

14. *See* AUTODESK: AUTOCAD, http://www.autodesk.com/products/autodesk-autocad/overview (last visited Feb. 17, 2014).

15. *See* Sara Boboltz, *11 Amazing Ways People Are Using 3D Printers For Good, Not Guns*, HUFFINGTON POST (Nov. 18, 2013, 5:15 PM), http://www.huffingtonpost.com/2013/11/15/3d-printer-inventions_n_4262091.html (3-D printing has become more advanced, now capable of providing us with other, more widely useful applications, from car parts to body parts); *See also* 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/ (3-D printer devices let consumers print three-dimensional objects at home, from phone cases, jewelry, ceramics and home décor to board game pieces, tools, and even food).

16. Sean Ludwig, *The Pirate Bay Launches Crazy Physibles Category for Printing 3D Objects*, VENTUREBEAT (Jan. 24, 2012, 10:21 AM), http://venturebeat.com/2012/01/24/pirate-bay-physibles-category-3d-printers/.

videos, and digital models of products can be easily streamed to factories and reversed-engineered and produced by third parties. Hence, intellectual property rights are an essential business tool for design-driven product businesses. To deal with these new realities, a trifecta of intellectual property options—copyrights, patents, and trademark rights—are potentially available to owners.

II. Copyright Law

In the United States, the Constitution is the highest authority of law. The goals of American copyright law are reflected in Article I, Section 8, clause 8 of the Constitution, also known as the Constitutional source of the framework for patents and copyright laws. It states:

> *"The Congress shall have Power. . .To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries"*[17]

The Copyright Act includes a two-prong test that grants to authors the ownership of their (1) original works of authorship that are (2) fixed in any tangible medium of expression.[18] The term of a copyright for works created after January 1, 1978 is the life of the author plus 70 years.[19] With respect to works made for hire, the copyright extends for a term of 95 years from the year of its first publication, or 120 years from the years of its creation, whichever expires first.[20]

The Copyright Act provides that "works of authorship" include, but are not limited to, the following categories: "(1) literary works; (2) musical works, including any accompanying words; (3) dramatic works, including any accompanying music; (4) pantomimes and choreographic works; (5) pictorial, graphic, and sculptural works; (6) motion pictures and other audiovisual works; (7) sound recordings; and (8) architectural works."[21] Pictorial, graphic, and sculptural works are defined within the Act under § 101 to include: two-dimensional and 3-D works of fine, graphic, and applied art, photographs, prints and art reproductions, maps, globes, charts, technical drawings, diagrams, and models.[22] Digital virtual models are 3-D representations presented as two-dimensional graphics displayed on a screen of a computer or other electronic device. Thus, it would appear from the plain text of the statute that a virtual model could be protected easily by the Copyright Act.

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17. U.S. Const. art. I, § 8, cl. 8.
18. 17 U.S.C. § 102(a) (2012).
19. 17 U.S.C. § 302(a) (2012).
20. 17 U.S.C. § 302(c) (2012).
21. 17 U.S.C. § 102(a) (2012).
22. 17 U.S.C. § 101 (2012).

In the two-prong test of copyright eligibility, 3-D virtual models can meet the fixation requirement as a digital file if stored in a computer readable format, such as random access memory (RAM), flash memory, a CompactDisk (CD), or a Digital Video Device (DVD). Once the fixation requirement is satisfied, the investigation turns to whether the digital model meets the "original works of authorship" requirement. To be entitled to copyright protection, the legal standard for originality is conceptually low. On the other hand, judicial decisions on the constitutional originality and utilitarian functionality doctrines may present challenges to protection of virtual models under copyright law. As discussed with respect to virtual models, technological innovation enables new techniques for the public to express their creative works. As new expressive mediums evolve, the law should have a trajectory towards providing authors adequate protection for their creative works.

A. *The Originality Test*

In *Feist Publications, Inc. v. Rural Telephone Service, Co.,*[23] the Court settled a dispute between two phone book providers of white pages and clarified the doctrine of originality, creating implications for the copyright protection of virtual models. Rural Telephone Service provided white page phone number listings of residences in alphabetic order and compiled data.[24] Feist Publications, a competing company, desired to use the data from Rural Telephone Service's phone book to create their own phone listing for sale.[25] Rural Telephone Service refused to license the data to Feist Publications.[26] Subsequently, Feist Publications did their own survey to gather the data directly from the residences listed in Rural's phonebook.[27] In the litigation, Feist Publications requested a declaratory judgment of non-infringement of the Rural phonebook.[28]

The Court ruled that the *sine qua non* of copyright is originality.[29] "To qualify for copyright protection, a work must be original to the author. Original, as the term is used in copyright, means only that the work was independently created by the author (as opposed to copied from other works), and that it possesses at least some minimal degree of creativity."[30] The Court stated "To be sure, the requisite level of creativity is extremely low; even a slight amount will suffice."[31] The originality

23. 499 U.S. 340 (1991).
24. *Id.* at 342.
25. *Id.* at 342–43.
26. *Id.* at 343.
27. *Id.* at 343–44.
28. *See id.* at 344.
29. *Id.* at 345.
30. *Id.*
31. *Id.*

doctrine requires "independent creation plus a modicum of creativity."[32] Copyright protection is available even if the quantum of originality is minimal.[33] In evaluating originality, the works must possess some creative spark.[34] The Court rejected the theory that the amount of work, skill, or "sweat of the brow" would grant copyright protection.[35] In this case, the Court held that merely compiling an alphabetic listing of known facts is not original under the Copyright Act or the Constitution.[36]

B. *Originality Test Application - Digital Wireframe Models*

The case of *Meshwerks, Inc. v. Toyota Motor Sales U.S.A., Inc.*,[37] presents a potential hurdle for copyright protection of digital wireframe models based on lack of originality. In *Meshwerks*, Toyota Motor Sales U.S.A. ("Toyota") hired an advertising agency, Saatchi & Saatchi, to create a campaign that would use digital models of Toyota's vehicles displayed on Toyota's website, instead of only photographs.[38] Meshwerks was contracted to create baseline wireframe digital models of Toyota's vehicles for use by Saatchi & Saatchi and Toyota.[39] These wireframe models can be characterized as blueprints of the vehicles.[40] Another company was contracted to take the baseline wireframe models and add surfaces rendering, color, and shadings to create realistic looking digital solid models.[41]

As stated by the Court:

> *[d]igitizing involves collecting physical data points from the object to be portrayed. In the case of Toyota's vehicles, Meshwerks took copious measurements of Toyota's vehicles by covering each car, truck, and van with a grid of tape and running an articulated arm tethered to a computer over the vehicle to measure all points of intersection in the grid.*[42]

And "the vehicles' data points (measurements) were mapped onto a computerized grid and the modeling software connected the dots to create a 'wire frame' of each vehicle."[43] In essence, Meshwerks took Toyota's vehicles from

32. *Id.* at 346.
33. *Id.* at 348.
34. *Id.* at 345.
35. *Id.* at 359–60 (holding that the 1976 revisions to the Copyright Act make clear "that originality, not 'sweat of the brow,' is the touchstone of copyright protection in directories and other fact-based works").
36. *Id.* at 363.
37. Meshwerks, Inc. v. Toyota Motor Sales U.S.A., Inc., 528 F.3d 1258, 1265 (10th Cir. 2008).
38. *Id.* at 1260.
39. *Id.*
40. *Id.*
41. *Id.* at 1261.
42. *Id.* at 1260.
43. *Id.*

physical reality to create realistic-looking authorized digital replicas. However, Meshwerks performed more customized digital modeling to more closely match the actual vehicle dimensions for a better realism experience.

The dispute between Meshwerks and Toyota emanated from an agreement that Meshwerks' digital models would only be used for a single use in a particular media situation.[44] However, Toyota reused and redistributed the digital models in other media.[45] While Meshwerks obtained copyright registrations for the digital models, the District Court held that Meshwerks digital models were not entitled to copyright protection, and the registrations were invalid due to lack of originality.[46] Meshwerks appealed to the Tenth Circuit.[47] Subsequently, the Tenth Circuit affirmed the District Court's decision.[48]

In the analysis, the Tenth Circuit primarily based its decision on the teachings of the Supreme Court's *Feist Publications*.[49] The "unequivocal lesson from *Feist* is that works are not copyrightable to the extent they do not involve any expression apart from the raw facts in the world."[50] The key of the Tenth Circuit's analysis was the actions of Meshwerks to create the wireless digital models.[51] Recalling that Meshwerks was contracted to create digital copies of Toyota's actual vehicles, the Court focused on the evidence that Meshwerks "set out to copy Toyota's vehicles, rather than to create, or even to add, any original expression."[52] The Court noted that the intent of the creator is critical in the analysis of copyrightable subject matter.[53]The Court ruled that Meshwerks' digital wire-frame computer models depicted Toyota's vehicles without any individualizing features.[54] As a result, Meshwerks' models were simply good digital copies of Toyota's vehicles, but not really independent creations under copyright law.[55] The amount of skill, know-how, or creativity that went into creating the models was not relevant in determining whether the models were "original" for the purpose of the Copyright Act.[56]

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44. *Id.* at 1261.
45. *Id.*
46. *Id.*
47. *Id.* at 1261–62.
48. *Id.* at 1270.
49. *Id.* at 1262–63.
50. *Id.* at 1265.
51. *Id.* at 1268 ("[A]uthority intent sometimes can shed light on the question of whether a particular work qualifies as an independent creation or only a copy.").
52. *Id.* at 1268–69.
53. *Id.* at 1268 ("If an artist affirmatively sets out to be unoriginal—to make a copy of someone else's creation, rather than to create an original work—it is far more likely that the resultant product will, in fact, be unoriginal.").
54. *Id.* at 1265.
55. *Id.* at 1268.
56. *See* Feist Publ'ns Inc. v. Rural Tel. Serv. Co. Inc., 499 U.S. 340, 359–60 (1991) (rejecting the "sweat of the brow" theory of copyrightable subject matter).

The *Meshwerks* case is the leading judicial appellate decision evaluating the copyright eligibility of virtual digital models. In *Meshwerks*, the Tenth Circuit may extend copyright protection to virtual digital models, at least on the basis of the incremental contribution made by a designer to the real world objects' appearance, involving "unique shading, lighting, angle, background scene, or other choices."[57] The theoretical basis of the decision looked to analogous judicial decisions springing from the photographic expression of real world objects.[58] Looking to the early Supreme Court decision in *Burrow-Giles Lithographic Co. v. Sarony*,[59] the Court noted that a photograph was a "mere mechanical reproduction" of real-world objects and thus not copyrightable. Nevertheless, the Tenth Circuit citing to *Sarony*, indicated that photographs could be copyrightable, to the extent that their *original* depiction of the subject reflects the photographer's decisions regarding pose, positioning, background, lighting, shading, and the like.[60] Hence, under the reasoning in *Sarony,* the photograph received copyright protection based on the photographer's incremental contribution over the real world objects.[61]

In *Meshwerks*, the Tenth Circuit recognized that its decision should not be read broadly to foreclose *any* copyright protection for digital or virtual models. The court noted that "digital imaging is a relatively new and evolving technology and that Congress extended copyright protection to 'original works of authorship fixed in any tangible medium of expression, *now known or later developed*.' 17 U.S.C. § 102(a)."[62] Finally, the Tenth Circuit stated "[d]igital modeling can be, surely is being, and no doubt increasingly will be used to create copyrightable expressions. Yet, just as photographs *can be,* but are not *per se,* copyrightable, the same holds true for digital models."[63]

While the *Meshwerks* case presents some problems for potentially protecting digital virtual models under U.S. copyright law, the decision can be narrowly interpreted to apply to situations where third parties copy works of other authors or designers. Under the reasoning in *Meshwerks,* third party digital model reproductions of real world objects would most likely not be protectable under copyright law as an independent creation.

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57. *Meshwerks*, 528 F.3d at 1270.

58. *Id.* at 1265 (recounting Judge Paulsey's opinion in SHL Imaging, Inc. v. Artisan House Inc. 117 F. Supp. 2d 301, 307 (S.D.N.Y. 2000), where photography was initially met by critics with skepticism: a photograph, was said to copy everything and explain nothing and it was debated whether a camera could do anything more than merely record the physical world).

59. Burrow-Giles Lithographic Co. v. Sarony, 111 U.S. 53 (1884).

60. *Meshwerks*, 528 F.3d at 1264 ("to the extent a photograph reflects the photographer's decisions regarding pose, positioning, background, lighting, shading, and the like, those elements can be said to 'owe their origins' to the photographer . . . .") (citing *Sarony*, 111 U.S. 53, 60 (1884)).

61. *Id.*

62. *Id.* at 1269 (quoting 17 U.S.C. §102(a) (2012)).

63. *Id.* at 1269–70.

C. *Copyright - The Separability Test*

Despite the fact that useful articles, analyzed as a whole, are not eligible for copyright protection, the individual design elements encompassing a useful article may, when considered separately, meet the Copyright Act's requirements. For virtual models, there is a concern that a court may determine a virtual model to be "a useful article" and thus unprotectable under the Copyright Act. It may be possible that virtual models would be considered to be useful articles because they have an intrinsic utilitarian function that is not merely to portray the appearance of the article or to convey information.[64] The final product produced on the 3-D printer could be a useful article. The virtual models could be argued to be realistic depictions of actual products. As such, virtual models used with 3-D printers show the exact shape, color, and configuration of a final object to be constructed. In this manner, a virtual model may be said to have an intrinsic utilitarian function that is not merely to portray the appearance of the article. Additionally, there is some thought that the photograph of the product should not receive copyright protection because the final product is a useful article.[65] Consequently, by analogy, it may be likely agrued that the same non-copyrightable result holds true with respect to virtual models of useful articles.

Useful articles receive protection under U.S. copyright law only to the extent that "such design incorporates pictorial, graphic, or sculptural features that can be identified separately from, and are capable of existing independently of, the utilitarian aspects of the article."[66] Thus, another potential hurdle for copyright protection of virtual 3-D models as useful articles is passing the so-called "separability" test. The separability test permits copyright protection only if, and to the extent that, the design incorporates graphic, pictorial, or sculptural features that are conceptually or physically separable from the utilitarian aspects of the article.[67] In *Mazer v. Stein*,[68] the Court held that a lamp base shaped like a human figure was protectable as a sculptural work under the Copyright Act. This test was based on physical separability. Further, in *Kieselstein-Cord v. Accessories by Pearl, Inc.*, the Court found that artwork as part of an ornate belt buckle was protectable under copyright law because the buckle design was conceptually separable from the useful

64. 17 U.S.C. § 101 (2012).

65. *See* Custom Dynamics, LLC v. Radiantz LED Lighting, Inc., 535 F. Supp. 2d 542, 548–49 (E.D.N.C. 2008) (holding that pictures of aftermarket motorcycle taillights with a neutral surface in the background that were intended to serve the purely utilitarian purpose of displaying examples of a product to potential consumers were not copyrightable).

66. 17 U.S.C. § 101 (2012).

67. *See* Kieselstein-Cord v. Accessories by Pearl, Inc., 632 F.2d 989, 993 (2d Cir. 1980) (quoting H.R. Rep. No. 94-1476, at 55 (1976)) (stating that separability for a pictorial, graphic or sculptural work from utilitarian aspects can occur either "physically or conceptually").

68. 347 U.S. 201 (1954).

belt function.[69] The ornate design did not enhance the belt's ability to hold up a person's pants garment.[70] Rather, the buckle design could be properly viewed as a sculptural work with independent aesthetic value, and not as an integral element of a belt's functionality.[71] In the context of digital virtual models, the separability test will most likely turn on conceptual separability and rather than physical separability as discussed with regard to *Mazer v. Stein*.[72]

The Supreme Court has not ruled on the definition of conceptual separability such that it would apply across the United States. Conceptual separability has been decided in different ways by U.S. Courts of Appeals and varations of the test are therefore applied based on the law of the appellate court's jurisdiction.[73] Hence, with digital models, the evaluation for protection needs to be evaluated on a case-by-case jurisdictional basis.

D. *Virtual Models as Pictorial or Graphical Works*

In *Meshworks,* the Court noted that digital models are not *per se* non-copyrightable. Section 102(a)(5) extends copyright protection under the statute to "pictorial, graphic, and sculptural works," which is defined in § 101 to include two-dimensional and three-dimensional works of fine, graphic, and applied art, photographs, prints and art reproductions, maps, globes, charts, technical drawings, diagrams, and models.[74] As discussed previously, useful articles are not protectable, unless the design incorporates pictorial, graphic, or sculptural features that can be identified separately from, and are capable of existing independently of, the utilitarian aspects of the article.[75]

Using analogies from judicial decisions pertaining to actual products, it is possible that virtual digital models could be ruled to merely portray the appearance of an article and not fall within the chasm of the useful article definition; thus, making moot the separability analysis. Analogies can be drawn from the case of *Gay Toys, Inc. v. Buddy L Corporation*,[76] in which the Sixth Circuit ruled that a toy

69. *Kieselstein-Cord*, 632 F.2d at 993.
70. *Id.*
71. *Id.*
72. *Id.* at 992.
73. *See, e.g.,* Galiano v. Harrah's Operating Co., 416 F.3d 411, 417–19 (5th Cir. 2005) (adopting Nimmer on Copyright's guidance that artistic qualities must be conceptually separate from the utilitarian use of the item); Brandir Int'l, Inc. v. Cascade Pac. Lumber Co., 834 F.2d 1142, 1144–45 (2d Cir. 1987) (adopting the conceptual separability test that design elements must not reflect a merger of aesthetic and functional considerations); Poe v. Missing Persons, 745 F.2d 1238, 1243 (9th Cir. 1984) (describing the test for copyrightability as whether any apparent functional aspects can be separated from the artistic aspects, where the court may consider whether the utilitarian use would still be marketable to some significant segment of the community solely because of its aesthetic qualities).
74. 17 U.S.C. § 101 (2012); 17 U.S.C. § 102(a)(5) (2012).
75. 17 U.S.C. §101 (2012).
76. 703 F.2d 970 (6th Cir. 1983).

airplane was merely a model which portrayed a real airplane, similar to how a painting portrays an actual airplane. As such, the toy airplane was not a useful article in the meaning of the Copyright Act.[77] In a similar manner, a virtual model of a real product could be considered to be merely a portrayal of a real product that has no intrinsic utilitarian function. The inquiry, however, is fact specific depending on the intent of the author and final uses of the digital model. For example, if the digital model's end-use is for a 3-D printer to create a physical object, then there might be an argument to apply the useful article doctrine against the ability to allow the digital model to be copyrighted. Thus, the evaluation of a virtual model under copyright law is very case specific, and the utlimate end-use of the digital model appears to be an important factor to consider for potential protection.

III. United States Design Patent System

Design patents have been recognized as important tools for companies that invest in product development.[78] U.S. design patent protection is available for new, original, and ornamental designs for articles of manufacture.[79] Unlike utility patents, design patents are directed to the aesthetic appearance of an article of manufacture.[80] Graphics rendered on the display screen is protectable in the United States using design patents.[81] Digital virtual models are 3-D representations presented as 2-D graphics displayed on a screen of a computer or other electronic device. In the United States, the appearance of graphics is considered 2-D electronic surface ornamentation on a display screen. Hence, a design patent can protect the ornamental design of virtual models with or without shading, colors, or contrast in shading.

To obtain a U.S. design patent, the applicant must timely file a design patent application within a year from first publication, public disclosure, or offer for sale anywhere in the world.[82] The commercial realities of the marketplace dictate seeking rapid protection to have effective enforcement.[83] Furthermore, to be entitled to a

77. *Id.* at 974.

78. *See* Egyptian Goddess, Inc. v. Swisa, Inc., 543 F.3d 665 (Fed. Cir. 2008).

79. 35 U.S.C. § 171 (2006).

80. U.S. Patent and Trademark Office, A Guide to Filing a Design Patent Application (2013).

81. *See generally Ex parte* Strijland, No. 1992-0623, 1992 WL 470727 (B.P.A.I. Apr. 2, 1992) (explaining that a design patent requires more than a mere picture, and a computer-generated icon alone is merely surface ornamentation).

82. 35 U.S.C. § 102 (2006).

83. An optional expedited examination process (rocket docket) for U.S. design applications can issue a U.S. design patent in a short period of months from initial filing. *See* 37 C.F.R. § 1.102.

design patent, the design must be new[84] and nonobvious[85] when compared to prior designs, and the design must not be primarily functional.[86]

A. *Enforcement of Design Patents*

A U.S. patent is infringed by the unauthorized making, using, offering to sell, or selling of the patented invention, within the United States, or importing into the United States any patented invention during the term of the patent.[87] In the infringement context for design patents, the "ordinary observer" test was set forth in the precedential case *Gorham Co. v. White*.[88] In *Gorham*, the Court considered whether the patented design and the accused product at issue were substantially the same to the extent that an ordinary observer would be induced to purchase the accused product supposing it to be the patented design.[89] In evaluating this resemblance, the Court counseled that it is not necessary that every aspect of the designs be identical.[90]

B. *The Ordinary Observer Test*

In an important recent design patent case, the Federal Circuit issued an *en banc* decision in *Egyptian Goddess, Inc. v. Swisa, Inc.*,[91] counseling that the ordinary observer test is the proper inquiry for analysis as to whether the accused design has appropriated the claimed design as a whole.[92] The court noted that the prior art gives the hypothetical ordinary observer a frame of reference from which to view the distinctions between the accused product and patented design.[93]

The court provided some guidance to district court judges and litigants on how to apply the ordinary observer test in the context of the prior designs in the infringement analysis.[94] In one case, if the accused design has copied a particular feature of the claimed design that departs conspicuously from the prior art, the accused design is naturally more likely to be regarded as deceptively similar to the claimed design, and thus infringing.[95]

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84. *See* 35 U.S.C. § 102 (2006).
85. *See* 35 U.S.C. § 103 (2006).
86. *See generally* PHG Technologies, L.L.C. v. St. John Companies, Inc., 469 F.3d 1361 (Fed. Cir. 2006).
87. 35 U.S.C. § 271 (2006).
88. 81 U.S. 511, 528 (1871).
89. *Id.* at 528–30.
90. *Id.* at 529–31.
91. 543 F.3d 665 (Fed. Cir. 2008).
92. *Id.* at 678.
93. *Id.* at 676.
94. *Id.* at 678–79.
95. *Id.* at 677.

The Supreme Court has not tested the issue of whether a virtual model of a third party would infringe a design patent directed to the underlying article on which the 3-D model was established.[96] The 3-D modeling technology has advanced such that design drawings can be prepared using a Computer Aided Design program that outputs a virtual model with appropriate surface renderings and line contouring. An argument can be made that the final physical products constructed by a 3-D printer based on a virtual model would be subject to *Gorham* precedent and could be found to infringe a design patent directed to the underlying design to the article of manufacture.

As seen in the recent clash between Apple and Samsung,[97] a screen design patent covering a graphical user interface can be effective to combat piracy. In the *Apple v. Samsung* case, Samsung was found by a jury to infringe U.S. Design Patent No. 604,305, directed to a graphical user interface for a display screen.[98] It would appear by extrapolation that virtual models protected as graphic screen designs in design patents could be effective to combat theft of the model.

Under design patent jurisprudence in *In re Zahn*,[99] the court held that there was no legal authority limiting how a design is to be embodied in an article of manufacture.[100] The court held that the statute of 35 U.S.C. § 171 authorizes a design for an article of manufacture that is inclusive of designs "of *all kinds including surface ornamentation* as well as configuration of goods."[101] Hence, based on the judicial precedent interpreting the statutory language, the patentee may have a plausible argument that the design patent protects the design as the invention rather than only an article of manufacture. As a result, it follows that it is possible that a court may find the unauthorized sale of a virtual model falls within the scope of a design patent. Nevertheless, litigation is inherently speculative, and patent infringement litigation is particularly so, because of the intangible nature of the property involved. However, once a design patent is obtained, the patent holder may attempt to prevent others from making, using, offering to sell, or selling virtual models whose appearance is the same or substantially the same as the patented

96. It is probable that a design patent directed to an article of manufacture created in a digital workspace, but not actually practiced, could be infringed by a third party product.

97. *See generally* Apple Inc. v. Samsung Electronics Co., 888 F. Supp. 2d 976 (N.D. Cal. 2012).

98. *See id.*

99. 617 F.2d 261 (C.C.P.A. 1980).

100. *Id.* at 268. See also 35 U.S.C. § 171 ("Whoever invents any new, original and ornamental design for an article of manufacture may obtain a patent therefore . . . .") (1952).

101. *Id.*

design, as judged from the perspective of an ordinary observer in the context of the prior art.[102]

IV. Trademark Law

Intellectual property rights in a trademark are an important business tool. The owner of the trademark can possibly extend the term of the trademark indefinitely as long as the trademark is in continuous use in commerce.[103] Trade dress refers generally to the total image, design, and appearance of a product and may include features such as size, shape, color, color combinations, texture or graphics.[104] A 3-D physical product design can be protected under Federal trademark law as trade dress. To be entitled to trademark rights, the mark must be capable of functioning as a source identifier and cannot be confusingly similar to existing marks.[105] However, the Court has not been presented with the issue of whether a virtual model itself can be the subject matter for receiving trademark protection.

For a 3-D physical product design to be protectable as a trademark, it must have acquired "secondary meaning," which serves to identify the product with its manufacturer or source.[106] In general, there must be evidence that suggests that consumers viewing the product design can associate the product with its source based on the design.[107] Distinctiveness in this regard is acquired by substantially exclusive and continuous use of the trademark in commerce.[108] The primary

102. *See* 35 U.S.C. § 284 (1952) (If a design patent is found to have been infringed, monetary remedies available for the design patentee include the monetary remedies available). *See also* 35 U.S.C. § 289 (1952) (specific to design patents that enables the award of the infringer's total profit from the sale of the infringing article). *But see* Braun Inc. v. Dynamics Corporation of America, 975 F.2d 815, 824 (Fed. Cir. 1992) n. 16 (availability of monetary remedies of both damages under 35 U.S.C. § 284 and the infringer profits under 35 U.S.C. § 289 from the same design patent infringer's product is limited to either damages or infringer profits).

103. *See* La Societe Anonyme des Parfums Le Galion v. Jean Patou, Inc., 495 F.2d 1265, 1271 (2d Cir. 1974) ("the user who first appropriates the mark obtains an enforceable right to exclude others from using it, as long as the initial appropriation and use are accompanied by an intention to continue exploiting the mark commercially.").

104. *See* Two Pesos, Inc. v. Taco Cabana, Inc., 505 U.S. 763, 764 (1992) n. 1; *See also* L. & J.G. Stickley, Inc. v. Canal Dover Furniture Co., 79 F.3d 258, 262 (2d Cir. 1996) (trade dress includes the design and appearance of the product as well as that of the sales packaging).

105. *See* Two Pesos, 505 U.S. at 768 ("[A] mark must be capable of distinguishing the applicant's goods from those of others.") *See also* MicroStrategy Inc. v. Motorola, Inc., 245 F.3d 335, 341 (4th Cir. 2001) (*quoting* J. Thomas McCarthy, McCarthy on Trademarks and Unfair Competition § 3:3 (4th ed. 2000) ("in order to obtain trademark protection, a designation must be proven to perform the job of identification: to identify one source and distinguish it from the other sources.")).

106. Wal-Mart Stores, Inc. v. Samara Bros., 529 U.S. 205, 211 (2000).

107. *Id.* at 212–13.

108. *See* 15 U.S.C. § 1052 (2006).

significance of the product configuration in the minds of the consumers is its commercial source, not the product.[109]

A product design that produces a benefit other than source identification may be considered functional. In *TrafFix Devices, Inc. v. Marketing Displays, Inc.*,[110] the Court stated that a design is functional when it is "essential to the use or purpose of the device or when it affects the cost or quality of the device."[111] Trademark protection is unavailable to functional designs.[112]

The general test for trademark infringement is whether there is a likelihood of confusion among consumers as to the source, sponsorship, affiliation or endorsement of a product.[113] In each jurisdiction, Courts generally also apply a multi-factor balancing test to determine liability for trademark infringement.[114] Although the components of the test vary by each jurisdiction, the following factors are typical as originally articulated by the Second Circuit: strength or distinctiveness of plaintiff's trademark; similarity of the two marks; similarity of the goods the marks identify; similarity of the trade channels through which the parties' goods travel; similarity of the advertising the two parties use; sophistication of purchasers; and defendant's intent.[115] It also may be possible to enforce anti-dilution provisions of trademark law to prohibit blurring or tarnishing the distinctiveness of a mark if that mark has become famous.[116]

Intellectual property rights holders have attempted to protect real-world trademarks from alleged infringement by virtual models of third parties.[117] These cases center on the Second Life system owned by Linden Research Labs.[118] In one

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109. *See* Carroll Shelby Licensing, Inc. v. Superformance Int'l, Inc., 251 F. Supp. 2d 983, 986 (D. Mass. 2002) ("the central inquiry for secondary meaning is whether, in the minds of the relevant consumers, the primary significance of the design is to identify the source of the product, rather than the product itself."(citation omitted)).

110. 532 U.S. 23 (2001).

111. *Id.* at 32 (*quoting* Inwood Labs, Inc. v. Ives Labs, Inc., 456 U.S. 844, 850, n. 10, 102 S.Ct. 2182, 72 L.Ed.2d 606 (1982)).

112. *Id.* at 26 ("[S]econdary meaning is irrelevant because there can be no trade dress protection in any event."); *See also* TRADEMARK MANUAL OF EXAMINING PROCEDURE (TMEP) § 1202(a), http://tmep.uspto.gov/RDMS/detail/manual/TMEP/Oct2012/TMEP-1200d1e835.xml.

113. *See* 15 U.S.C. §§ 1114, 1125(a)(2012).

114. *See* Barton Beebe, *An Empirical Study of the Multifactor Tests for Trademark Infringement*, 94 CAL. L. REV. 1581 (2006). Available at: http://scholarship.law.berkeley.edu/californialawreview/vol94/iss6/1.

115. Polaroid Corp. v. Polarad Elecs. Corp., 287 F.2d 492, 495 (2d Cir. 1961).

116. *See* 15 U.S.C. § 1125(c) (2012).

117. Richard Acello, *Virtual World, Real Battles: Trademark Holders Take on Use in Games* (Jan. 1, 2011), http://www.abajournal.com/magazine/article/virtual_world_real_battles/.

118. Second Life is a 3-D virtual world platform. Second Life's Terms of Service state that a user may not select an account name that would cause deception or confusion or violate any trademark right, copyright, or other proprietary right. *See* SECOND LIFE, http://www.secondlife.com (last visited Feb. 6, 2014); *See also* LINDEN LAB, http://www.lindenlab.com/tos (Second Life's Terms of Service state that a user may not select an account name that would cause deception or confusion or violate any trademark right, copyright, or other proprietary right) (last visited Feb. 6, 2014).

example, Taser International sued Linden Labs for infringement of their word marks, trade dress in the appearance of their products, unfair competition, and design patents.[119] The case was later settled between the parties. Herman Miller enforced its trademark rights against parties selling virtual models of furniture in the Second Life system.[120] Subsequently, Herman Miller decided to sell its own branded virtual furniture in Second Life.[121] In both these situations, the third parties simulated the real world objects with virtual models.

Using these cases as examples by application to 3-D scanned files, it is likely that a scanned virtual model of a real-world object could infringe a product configuration mark directed to the object. On the other hand, a company selling original 3-D virtual models on the internet would need to acquire trademark rights in the virtual model as a "product configuration" mark itself. In the latter case, one strategy is for virtual model creators to sell their own branded virtual models to enhance the likelihood of showing acquired distinctiveness.[122] Nevertheless, the doctrine of functionality under *TrafFix* may present risks to obtaining trade dress rights as product configuration in a virtual model of an actual product for 3-D printing reconstruction. This is because the virtual model could be argued to be a realistic depiction of actual products and show the exact shape, color, and configuration of a final object to be constructed. As a result, if the original 3-D model's primary use is to create a product on the 3-D printer, then it may be essential to the use or purpose of the model.

V. Conclusion

Three-dimensional printing and digital definition models in the Internet network cloud may be protected by the three major areas of intellectual property law—copyright, patent, and trademark law. However, each area presents its own set of challenges for intellectual property rights holders.

For protecting virtual models under U.S. copyright law, the models should be analyzed on a case-by-case basis to identify the specific incremental expression that is to be protected. To evaluate the doctrine of originality, the analysis should focus on whether the virtual model is created from a scanned facsimile of a physical object or whether the model was originally created by the designer. For both scanned models and original created models, the inquiry should focus on the intent of the designer. It is important to consider whether the designer intended to copy or simulate real-word objects, or intended to have the model simply be an artistic

119. *See* Taser Int'l v. Linden Research Inc., No. 2:09-cv-00811-ROS (D. Ariz. 2009).

120. Benjamin Tyson Duranske, Virtual Law: Navigating the Legal Landscape of Virtual Worlds 152 (American Bar Association ed., 2008).

121. *Id.*

122. *See, e.g.*, Ferrari S.P.A. v. Roberts, 944 F.2d 1235, 1237 (6th Cir. 1991) (unauthorized manufacture of fiberglass kits that replicated the exterior features of Ferrari's Daytona Spyder and Testarossa automobiles infringed Ferrari's product configuration marks directed to the actual vehicles).

work. Furthermore, in the copyright context, the ultimate end-use of the virtual model may be dispositive to a useful article analysis.[123]

Virtual models can be protected by design patents as surface ornamentation or product configuration. Use of design patents can be effective tools in protecting against clone and simulation-type products offered by third parties.[124]

Trademark law can be used to protect actual product designs that may be infringed by third party virtual models. However, for product configuration trademark rights, the product configuration must have acquired secondary meaning and be used in interstate commerce.[125]

As digital modeling is a relatively new and evolving technology, the specific legal contours in copyright, patent, and trademark law will need to evolve over time to allow creators adequate protection for their creative works. These changes, however, should promote the goals of allowing existing works to be in the public domain and available for use by subsequent designers.

123. *See supra,* Part II.
124. *See supra,* Part III.
125. *See supra,* Part IV.