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Doctrinal Quandaries with 3D Printing and Intellectual Property

By Lucas S. Osborn – June 29, 2016

Three-dimensional (3D) printing technology will challenge how we think about tangible and digital objects. Objects that can be printed in three dimensions exist in a world where the difference between the tangible item and its digital representation is greatly diminished. As 3D printing technology matures, intellectual property (IP) law will increasingly need to respond to a universe in which the digital and tangible worlds move closer together.

This article highlights some doctrinal difficulties with 3D printing and IP. It does not attempt to solve the dilemmas, only to catalogue them and create a framework for analyzing them. For the most part, it leaves policy questions of what should happen aside.

Many aspects of 3D printing technology fit comfortably within traditional IP doctrine. For example, innovators have obtained patents on 3D printers, scanners, and “inks.” But the law will encounter difficulty with digital files that contain instructions to print a physical object. Like MP3 files, these files can be shared on the Internet and hosted on peer-to-peer networks. Moreover, 3D scanners allow users easily to create and disseminate copies of tangible objects. All of this will make protecting tangible objects more difficult for IP owners.

Patent Law Has Many Unanswered Questions

Perhaps the area least ready for the 3D printing revolution is patent law. We are not talking about predictions in the far-off future. Already companies use 3D printing to manufacture finished products that could potentially be covered by patents, such as the National Aeronautics and Space Administration’s various rocket parts. In addition, 3D printing allows individuals to engage in infringing activities that would have been unthinkable just a few years ago. Recently, a young design student arguably committed infringement when he scanned his own teeth and printed in three dimensions a series of Invisalign-like teeth trays to straighten his teeth. *See* Hope King, “[College Student 3D Prints His Own Braces](#),” *CNN*, Mar. 16, 2016.

With 3D printing technology, infringement will be decentralized because end users will print the infringing device. The act of printing the digital file clearly constitutes infringement but is incredibly difficult to detect. Even if the patent owner detects the infringement, enforcing a patent against multiple end users is slow and inefficient. Thus, patent owners will want to control the digital files, and that is where the doctrinal difficulties begin.

Patentable Subject Matter

To control digital files, a patent owner would do best to have patent claims directed to the digital file itself. But can the inventor of a new and nonobvious (physical) widget obtain claims directed to a digital file containing instructions to print the widget in three dimensions? Five years ago,

the answer would have been a clear “yes.” But recent Supreme Court decisions have thrown a large and confounding wrench into patentable subject matter analysis. Most particularly, *Alice Corp. Pty. Ltd. v. CLS Bank International*, 134 S. Ct. 2347 (2014), has greatly narrowed what constitutes patentable subject matter in computer-related inventions. No reported cases have analyzed the patentability of digital files of otherwise patentable objects, but one commentator has suggested such claims should constitute patentable subject matter. Daniel Harris Brean, “Patenting Physibles: A Fresh Perspective for Claiming 3D-Printable Products,” 55 *Santa Clara L. Rev.* 837 (2015). Only time will tell.

Direct, Literal Patent Infringement

Given the potential difficulties of claiming a digital file directly, instead assume the patent includes claims directed only to the tangible device. Will the making, using, selling, etc., of a digital file of the device constitute direct infringement? Current doctrine suggests not. Patent claims generally exclude only what they specify. Thus, infringement for “making” and “using” would require a tangible object. Because this doctrinal position gives patent owners relatively weak protection, they will seek ways to augment protection.

One avenue for protection could follow recent case law, which, if extended, would make “selling” and “offering to sell” a digital file an act infringement even where the claim is directed to a tangible object. See Timothy R. Holbrook & Lucas S. Osborn, “Digital Patent Infringement in an Era of 3D Printing,” 48 *U.C. Davis L. Rev.* 1319 (2015). Specifically, in *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Contractors USA, Inc.*, 617 F.3d 1296 (Fed. Cir. 2010), the defendant offered to sell and sold an offshore drilling rig, which, as described in the offer and paper sale, infringed. *Id.* at 1307. The rig ultimately delivered, however, differed from the one described in the offer and sale and did not infringe. Despite the non-infringing delivered object, the court imposed liability for the offer and sale because the “underlying purpose of holding someone who offers to sell liable for infringement is to prevent ‘generating interest in a potential infringing product to the commercial detriment of the rightful patentee.’” *Id.* at 1309 (quoting *3D Sys., Inc. v. Aarotech Labs., Inc.*, 160 F.3d 1373, 1379 (Fed. Cir. 1998)).

Courts might extend *Transocean*’s focus on the commercial impact of sales and offers to sell and apply it to offers to sell digital files. Just as offering to sell an un-built, infringing drilling rig harms the patentee’s commercial interests, so too does offering to sell a digital file that would print an infringing device. In each case, the infringing offer to sell may cause the patentee to lose a sale or to lower its price in the face of competition. Of course, the analogy is not on all fours with *Transocean*: In *Transocean*, the thing described in the offer to sell and sale was a physical item, whereas with digital files, the subject of the sale is a digital representation of the physical item. On the other hand, rarely would someone buy a 3D-printable digital file simply to own it; rather, the person buys it to print it.

An important limitation to the *Transocean* analysis is that it requires sales or offers to sell. In a 3D-printing universe, many people will disseminate digital files for free without permission from

the patent owner, much as they do with music and movies today. Such transactions are likely beyond the reach of infringement for selling or offering to sell.

In summary, with direct, literal infringement, a court must decide how to treat the rapidly converging physical and digital worlds. If the court treats them as interchangeable, then offers to sell (and sales of and perhaps even making) digital files should constitute infringement of a claim to a tangible object. If not, the patent owners must look to other doctrines, including the doctrine of equivalents and indirect infringement.

Patent Infringement under the Doctrine of Equivalents

Things that differ only insubstantially from that which the patent claims should not escape infringement, or else the patent incentive would be too weak. *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 39–40 (1997). Arguably, digital files differ from the tangible objects they print essentially only in the press of a button, and thus “making” digital files differs insubstantially from making tangible objects. See Lucas S. Osborn, “Regulating Three-Dimensional Printing: The Converging Worlds of Bits and Atoms,” 51 *San Diego L. Rev.* 553, 587 (2014).

To apply the doctrine of equivalents in a limitation-by-limitation manner as required by case law, a court would ask whether the digital version of each claim limitation differs insubstantially from the physical version. As with literal infringement, whether one finds this application of the doctrine of equivalents comfortable or absurd depends on one’s impression of the digital and physical worlds’ proximity in a 3D-printing universe.

Indirect Patent Infringement

If direct infringement doctrines do not sufficiently help the patent owner protect its invention, indirect infringement doctrines may help take up the slack. Primarily, inducement, 35 U.S.C. § 271(b), will help patent owners capture actors who disseminate digital files to others who print them. (Contributory infringement is not helpful when the digital file contains instructions for printing the entire tangible device because contributory infringement applies only to *components* of the entire device. 35 U.S.C. § 271(c).) Inducement theories can make someone liable for creating, disseminating, or hosting the digital file.

Active inducement requires (1) underlying direct infringement, (2) specific intent to induce a third party to infringe, and (3) an affirmative act by the inducer. Collectively, these elements present a formidable hurdle for the patent owner seeking recovery in a 3D-printing world. First, detecting and proving the underlying direct infringement is difficult and costly, though it may be somewhat easier if courts allow circumstantial evidence of direct infringement. See, e.g., *Linear Tech. Corp. v. Impala Linear Corp.*, 379 F.3d 1311, 1326–27 (Fed. Cir. 2004) (vacating summary judgment in part based on circumstantial evidence of direct infringement).

Second, proving specific intent to infringe is laborious, requiring actual knowledge or willful blindness of the patent. *Global-Tech Appliances, Inc. v. SEB S.A.*, 131 S. Ct. 2060, 2068 (2011). Constructive notice, such as by patent marking, is insufficient if unnoticed by the accused party. See *Mendenhall v. Astec Indus., Inc.*, 14 U.S.P.Q.2d 1134, 1137 (E.D. Tenn. 1988), *aff'd per curiam*, 891 F.2d 299 (Fed. Cir. 1989). Adding to the burden, the patentee must prove the accused infringer had a specific intent to infringe the patent. Thus, an accused infringer could escape liability if it could convince a jury that, although it created or transferred the digital file, it never intended for the file to be printed. In addition, the accused infringer could escape liability if it had a good-faith belief that its actions did not constitute infringement. *Global-Tech*, 131 S. Ct. at 2068. (In contrast, a defendant's belief regarding patent invalidity is a not defense to a claim of induced infringement. *Commil USA, LLC v. Cisco Sys., Inc.*, 135 S. Ct. 1920, 1928 (2015).)

A largely untested question regarding a defendant's good-faith belief of noninfringement is what standard a court will apply when the accused infringer is legally unsophisticated. For example, suppose an 18-year-old wants to create or disseminate a digital file and actually becomes aware of a patent that might pose an infringement risk. After spending 15 minutes on the Internet reading a few articles about what patent infringement is, the individual reads the patent and decides—in good faith but completely unreasonably—that the file would not print an infringing device. Should such an “infringement analysis” protect that individual?

Intermediaries

Although not exactly a *doctrinal* quandary, IP law's treatment of 3D-printing intermediaries deserves brief discussion. First, intermediaries that host digital files on behalf of users, such as thingiverse.com, might face liability for indirect infringement. Given indirect infringement's intent requirement, however, such intermediaries can probably avoid patent infringement liability by acting on direct notices from patent owners.

A second group of intermediaries, those who actually print files on behalf of users, face a much tougher task to avoid liability. For a fee, these companies allow users to upload their own digital files, which the companies print and mail to the user. Because printing an infringing device constitutes direct infringement for “making” the device, these intermediaries will be liable for any infringement regardless of their knowledge or intent.

Unfortunately for their business model, these companies do not have a clear way around the legal exposure. Theoretically, they could police all orders by checking each one against the universe of existing patents, but that is practically impossible. Unlike with MP3 files of copyrighted music, it is extremely difficult to know whether a patent covers a given device. And even if a company identifies a potentially relevant patent, the time, expertise, and expense needed to study it would cripple the business model. Companies that print in three dimensions can (and do) require users to indemnify them against infringement claims, but that will not likely solve the problem in light of litigation costs and many users' limited financial means.

Given the potential legal exposure and the astronomical costs of patent litigation, even a single infringement claim could be enough to sink a company. While the law likely should have little patience for purposeful infringers, it might find a solution for companies acting in good faith. The solution might look something like the Digital Millennium Copyright Act, only for patents. *See* Davis Doherty, Note, “Downloading Infringement: Patent Law as a Roadblock to the 3D Printing Revolution,” 26 *Harv. J. Law & Tech.* 353, 368–69 (2012).

Copyright Law

Copyright law is comfortable dealing with infringement in different media (e.g., analog to digital, canvas to photograph). The conceptual difficulties with copyright law concern the doctrines of originality, useful articles, and functionality. Copyright law protects creative works, not functional works. I talk about these issues in depth in Lucas S. Osborn, “Of PhDs, Pirates, and the Public: Three-Dimensional Printing Technology and the Arts,” 1 *Tex. A&M L. Rev.* 811 (2014), and briefly introduce them here. First, depending on how a digital file is created, it may not contain the requisite originality. For example, if a user scans an existing object with a 3D scanner, the user may impart no originality to the file. *See Meshwerks, Inc. v. Toyota Motor Sales U.S.A., Inc.*, 528 F.3d 1258 (10th Cir. 2008). Even a file made manually in a computer-aided design program might lack originality, for example if the creator intended only to “draw” a utilitarian article to required dimensions.

In addition, because digital files fall into the pictorial, graphic, and sculptural works category, 17 U.S.C. § 102(a) (2012), they are not copyrightable if they are “useful articles.” Useful articles do not contain copyrightable features that can be identified separately from useful features. *Id.* at § 101. Whether digital files constitute “useful articles” is not clear, though, because the definition excludes articles that merely “convey information.” *Id.* Courts might hold that digital files merely convey information about the articles’ appearance and how a 3D printer should work. On the other hand, courts may conceive of digital files as a method by which tangible objects are made, in which case their copyrightability may be lost. It will be interesting to see if the Supreme Court offers guidance on this issue when it decides *Star Athletica, L.L.C. v. Varsity Brands, Inc.*, *cert. granted* (U.S. May 2, 2016) (No. 15-866) (copyrightability of cheerleading outfit patterns).

Trademark and Trade Dress Infringement

Trademark law raises conceptual questions because the Lanham Act is directed to “goods” and services, with “goods” historically connoting tangible goods. The law has evolved to protect intangible things such as Internet domain names. But there is growing confusion about what actions constitute infringement when the thing being sold or transferred is a digital file.

With a 3D-printable file, the end product is the physical good, not the file itself. Selling (or giving away) blueprints or instructions for how to make a trademarked good would not constitute direct infringement, so why should the same be true of digital files that are analogous to blueprints? Again, the answer depends in large part on how one views the relationship between

the digital and physical worlds in a 3D-printing era and on the policy objectives of a particular area of law.

In addition, recent case law evidences an upheaval in how courts treat the *content* of the digital files, as opposed to the external description of the file. For example, suppose someone posts a 3D-printable file of a BMW model car and labels it “BMW car.” The external description of the file might cause confusion as to the source or sponsorship of the file, although this is arguable and dependent on context. The file name might merely describe the file’s content. Suppose instead that the file description reads, “unauthorized and unsponsored model of a BMW car.” At that point, there is clearly no point of sale confusion based on the description. Further, because the digital file is not carried around in public like a handbag or hat, there is arguably no post-sale confusion as to the file either.

Could BMW nevertheless argue that the file’s *content*, such as the BMW logo on the digital car, causes confusion? This argument will run into problems with the Supreme Court’s decision in *Dastar Corp. v. Twentieth Century Fox Film Corp.*, 539 U.S. 23 (2003). The *Dastar* decision has been read broadly to preclude Lanham Act claims from resting on the intangible content of creative works. In effect, *Dastar* channels claims based on the content of creative works to copyright law. Extending *Dastar* from creative works to potentially patentable works would severely limit trademark and trade dress claims based on the content of digital files. Given that virtually anything worthy of a digital model is eligible for either copyright or patent protection, *Dastar* would channel all trademark claims based on a file’s content to those areas of the law. Notice also that the physical embodiment of the digital file need not actually be patentable (in the sense of nonobvious, etc.); it need only be patent eligible.

Design Patents

A design patent protects a “new, original, and ornamental design for an article of manufacture.” 35 U.S.C. § 171. The biggest hurdle for 3D-printable digital files (assuming they are new, original, and ornamental) will be whether they are applied to an “article of manufacture.”

The U.S. Patent and Trademark Office has a long history of granting design patents for computer-generated icons depicted on a computer screen. U.S. Patent & Trademark Off., *Manual of Patent Examining Procedure* § 1504.01(a)(I)(A) (9th ed., Rev. 07.2015, Nov. 2015). While the patent office’s practice suggests 3D files might obtain protection, no court has vetted design patent eligibility for icons (3D printable or otherwise). Given the Supreme Court’s treatment of abstract inventions in the utility patent arena, a cautious observer would recognize the risk that the Patent Office’s practices do not guarantee protection for digital icons.

Further, 3D-printable files are conceptually different from icons that appear on software or on phones. The icons covered by many design patents were created in part to signify a functional component (e.g., a smartphone icon) or to make an existing program more ornate. Files that can be printed in three dimensions exist, however, for the inherent purpose of being printed. While a

computer can display the file, that is not the file's purpose. In this sense at least, design patents represent a strange fit for 3D-printable files.

Further, the scope of protection for use on articles other than those shown in the design patent is not entirely clear, as noted by two recent commentators. *See* Sarah Burstein, "The Patented Design," 83 *Tenn. L. Rev.* 161 (2016); Jason J. Du Mont & Mark D. Janis, "Virtual Designs," 17 *Stan. Tech. L. Rev.* 107 (2013). Therefore, owners of existing design patents based on *physical* goods may have trouble enforcing their patents against digital files.

Conclusion

Technology for printing in three dimensions raises a host of legal issues, both doctrinal and theoretical. Lawyers should enjoy watching the issues unfold in the coming years. In the meantime, content creators and inventors can best protect themselves if they can control the digital files directly. That, of course, is easier said than done.

Keywords: litigation, intellectual property, three-dimensional printing, 3D printing, patent, copyright, trademark

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