

PRINTING THE FUTURE: THE IMPLICATIONS OF 3D PRINTING

Professor Timothy R. Holbrook[†]

UNIDENTIFIED SPEAKER: All right. So, may I have your attention up here. Our next speaker is my good friend Tim Holbrook. Professor Holbrook is a professor of law and the associate dean of faculty at the Emory University School of Law. His diverse research interests include patent law, including international patent law, 3D printing, biosciences, trademarks. As my friends at the USPTO would say, he has both kinds of law: patent and trademark. And he holds a degree in chemical engineering from the North Carolina State University, he has a JD from law—Yale Law School and he clerked for the Honorable Glenn Archer on the U.S. Court of Appeals from the federal circuit. So, Mr. Holbrook.

MR. HOLBROOK: Thank you. And thanks to everybody here. And go ahead applaud. You have no idea what I am about to say, yet you are applauding. So, thanks again for hosting this event. It is great to be here; it is my first time at Texas A&M Law School. It is actually my first time in Fort Worth. I have been on the Dallas side, but not on this side before.

What I am going to talk about today is sort of an aggregation of a lot of things I have already published, or am thinking about, that relates to how 3D printing challenges our patent system and how the patent system could respond doctrinally now and, in other ways, that we could theorize we could do. We should be frightened about some of those steps, however. I will then discuss some of the consequences that flow from these arguments. And so, I will skip through some of the earlier slides as to 3D printing. I think people know what that is. And there are obviously interesting things that can be printed. Speaking of fashion, I like this slide because, on one season of Project Runway, the designer using 3D printing was actually an N.C. State alum and an N.C. State professor, my alma mater. So I had a particularly strong affinity for that one. Of course, there are other challenging things like printing a human ear, and of course, the 3D printing of guns, and what that does for the regulation of guns.

But what I am most interested in, of course, is going to be the CAD files. That is the heart of doing additive manufacturing. You have the digital file that tells the printer what are you going to print. As Professor Osborn knows better than I do, there are different types of CAD files. We use CAD files kind of generically and broadly. For my purposes the key ones are the files that translate and speak directly to a

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printer. For the theories I am about to talk about, these distinctions do not make a difference at all. Some people have pushed back on that and have suggested it does matter. I think in other contexts it might, but, in the context of what I am going to discuss in patent law, I do not think it matters because ultimately what you are doing is either scanning the object in and having the ability to print it, or digitally creating it and have the ability to print it, and the reality is going from digital to print is not all that complicated in many regards. That is the dynamic I am worried about.

In particular, I think that patent law is confronting the *Grokster* problem of copyright law.¹ We are on the cusp of experiencing that dynamic, except I think patent law is less capable of dealing with those concerns than copyright law was. Why?

Let's think about it. Clearly people that are actually printing patented inventions are direct infringers. They have made the patented invention. That is simple enough, except that this activity is dis-bursed. And, just like in copyright law, how do you find those illegal downloaders? How do you find these direct infringers? Plus, it is not a great business model to sue your potential customer. These potential infringers are ultimately who you want to buy your product, so suing them is not a great idea. I think the recording industry started realizing that when they started targeting particular consumers and then nailing them with statutory damages. Bad PR, bad business model. And patent law does not have statutory damages. So, in terms of suing these people, they are not deep pockets. Some might be. There might be some companies involved, but generally they are not going to have deep pockets, and you do not have statutory damages as the backdrop for compensation. So, direct infringement in terms of enforceability is problematic. Is it infringement? Yes. But there are problems with how you would then enforce the patents.

What about indirect infringement? That worked somewhat in copyright to some extent. We had the Supreme Court's *Grokster* decision, which really ratcheted down on some peer-to-peer file sharing. While the knowledge and intent requirements in patent law as a legal matter are the same as copyright law, the nature of knowledge in patent law is dramatically different than copyright. Why? You make something that is original in a fixed tangible medium, and it is copyrighted, and everybody knows it. Everybody knew what was going across the *Grokster* network was copyrighted. They had knowledge. The Supreme Court made that clear. But under patent law, you actually have to know about the patent. You cannot assume that everything is covered by a patent. It may not be. And there is, under *Global-Tech*,² the willful blindness standard, but even under that standard you have to

1. *Metro-Goldwyn-Mayer Studios Inc. v. Grokster, Ltd.*, 545 U.S. 913 (2005).

2. *Glob.-Tech Appliances, Inc. v. SEB S.A.*, 563 U.S. 754 (2011).

take affirmative steps to keep yourself blind, and you have to have a high suspicion that something is patented. That may not be the case, particularly if you are thinking of going after the manufacturers of 3D printers for contributory infringement or induced infringement. Of course, that would be awful. You do not want to shut down the whole industry. Regardless, they are not going to know about all the patents that are potentially out there, and not at the level required for inducement or contributory liability. It suggests that if we take seriously that patents are normatively good—and people can disagree on that—and we think that additive manufacturing creates a significant gap in protection for patent owners, then what can we do? For me the lynchpin becomes the CAD file itself.

Now, again, the situation in patent is different than copyright. The digital file is copyright infringement. So, the question is whether can we envision or theorize ways that the CAD file itself can implicate theories of direct infringement under patent law.

In an article I coauthored with Professor Lucas Osborn, we explore ways, either under current doctrine or by expanding current doctrine, that the CAD file itself constitutes an act of direct infringement.³ Unsurprisingly our answer is yes, at least in one context. In my earlier work, I explored acts of infringement based on selling and offering to sell the claimed invention. In those contexts, what is being appropriated by the infringer is not the physical thing; instead, it is the economic value of the invention. In fact, offering to sell the invention can arise as a form of liability even if the sale is never consummated. The courts have said that what is at stake is sort of the economic appropriate, unlike making, using, or importing the claimed invention, which all suggest a tangible object. I am using the claimed invention, which suggests there is something physical. In that earlier work, I argued that it should be possible to have “paper” infringement, that by merely selling or offering to sell the patented invention based off of some sort of written description can constitute infringement. It can be intangible.

And ultimately, the Federal Circuit agreed. In the *Transocean* case, the court encountered the situation where the accused infringer is selling a drilling rig.⁴ The rig that is delivered is not infringing, but the rig that was the subject of the original sale and offer to sell did infringe based on the design. The Federal Circuit held this to be an act of infringement. Purely intangible. The infringing rig had never been built yet, there was still infringement.

So, let's apply that holding directly to the CAD file situation. In *Transocean*, the underlying purpose of offer to sell infringement, in

3. Timothy. R. Holbrook & Lucas S. Osborn, *Digital Patent Infringement in an Era of 3D Printing*, 48 U.C. DAVIS L. REV. 1319, 1332–33 (2015).

4. *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Contractors USA, Inc.*, 617 F.3d 1296, 1310 (Fed. Cir. 2010).

particular, is to prevent someone from generating interest in a potential infringing product to the commercial detriment to the rightful patentee. The sale is not limited to the transfer of tangible property; a sale may also be the agreement by which such transfer takes place. Compare *Transocean* to a CAD file. Suppose that I have the CAD file that prints a patented invention, and I am selling it or offering to sell it. Isn't that simply generating economic interest in the CAD file, i.e., the patented invention? What you care about when you are buying the CAD file is going to be what the CAD file prints, the patented invention. So, if I am selling that file, I am generating economic and commercial interest in the patented invention. In my view, under *Transocean*, an offer to sell or sale of the CAD file should constitute direct infringement. We have dubbed this digital patent infringement. I do believe that, under current doctrine, courts could take this step. The issue has yet to be presented, though I think it will happen. We are starting to see some of these CAD file cases pop up, such as at the International Trade Commission.⁵ I believe digital patent infringement in this form is a conceivable, legitimate way to combat the use of CAD files and treat CAD files as direct infringement.

But there are some loopholes. The courts have made clear that purely donative transfers do not qualify as sales or offers to sell. That is not an offer to sell. It is not a sale. If someone is just posting the CAD file on-line somewhere without selling it, then there would be no infringement until someone actually printed the invention. So, there will be some gaps. The various CAD file clearinghouses may have widespread liability for patent infringement. Some would believe such an outcome would be bad, though it depends if they are actually selling these CAD files and gaining economic value off of someone's patented invention. If that is the case, then why do we think it is bad that they have this widespread liability exposure? The answer largely depends on what your normative viewpoint is. If you think such exposure is a problem, then perhaps we need some sort of safe harbor, like the Digital Millennium Copyright Act (DMCA) has for copyright.⁶ In my view, this form of digital patent infringement offers a theory of direct infringement that could be used to combat some of these problems faced by patent owners vis-à-vis additive manufacturing.

But why stop there? That is the low hanging fruit in some ways. In our article, Professor Osborn and I went on to explore whether the CAD file itself could be an infringing "making" of the patented invention. If it really is so simple to push the button to make the invention, then the world of the physical and intangible are converging. We have seen this in the computer sciences already. Things that would be done

5. See, e.g., *ClearCorrect Operating, LLC v. Int'l Trade Comm'n*, 810 F.3d 1283, 1290 (Fed. Cir. 2015).

6. See, e.g., Davis Doherty, *Downloading Infringement: Patent Law as a Roadblock to the 3D Printing Revolution*, 26 HARV. J.L. & TECH. 353, 365 (2012).

by hardware can now be done with software. We have already rejected the physical and tangible divide there. Are we at a place where we should simply reject that distinction altogether? We thought of this dynamic in terms of a spectrum.⁷ Clearly the completed item is infringing. A blueprint is not. Where along this spectrum does a CAD file land? At what point on this spectrum should we think we have crossed over from something that is not the claimed invention to something that does constitute the claimed invention? When have you “made” the invention for infringement purposes?

There is case law out there that suggests that CAD files cannot constitute a making of the claimed invention. The International Trade Commission heard a case dealing with the importation of digital files (and, for those who do not know what the ITC is, it is an administrative agency in which intellectual property rights holders can seek to prevent the importation of goods covered by their IP rights in the United States).⁸ The primary remedy available at the ITC is an order excluding the infringing item. In *ClearCorrect*, the accused infringer imported CAD files for printing dental braces.⁹ The question in the case was whether the ITC had jurisdiction over these digital files. The ITC had said yes. Importantly the ITC’s jurisdiction is *in rem*. It is over the “thing” being imported, not over a particular person. So, if the answer is “yes,” then the ITC can regulate the Internet and any digital file that comes over it into the United States. But the statutory term is an “article.” The Federal Circuit held that the ITC did not have jurisdiction because “article” means something tangible. In a somewhat analogous context, the Federal Circuit has maintained the tangible/intangible divide. At one point, it looked like the ITC was going to appeal to the Supreme Court, but they ultimately did not.¹⁰ It is only an analogous argument because the term “article” is different than the term “making” in patent law. It is not the same provision, but you are beginning to see the same policy considerations and concerns at stake.

What would be the consequences of considering the CAD file itself to be a “making” of the patented invention? This is where Professor Osborn and I walk back from that precipice. The incentives provided

7. See Holbrook & Osborn, *supra* note 3, at 1365.

8. *ClearCorrect Operating, LLC v. Int’l Trade Comm’n*, 810 F.3d 1283, 1290 (Fed. Cir. 2015).

9. The term used in the opinion is “aligners.” *ClearCorrect Operating, LLC v. Int’l Trade Comm’n*, 810 F.3d 1283, 1287 (Fed. Cir. 2015) (“The aligners in question ‘are configured to be placed successively on the patient’s teeth and to incrementally reposition the teeth from an initial tooth arrangement, through a plurality of intermediate tooth arrangements, and to a final tooth arrangement.’”).

10. The ITC requested a number of extensions to file a petition for a writ of certiorari but ultimately never filed. SUPREME COURT OF THE UNITED STATES, <https://www.supremecourt.gov/search.aspx?filename=/docketfiles/15a1262.htm> [<https://perma.cc/3PCT-GXAG>] (last visited Sept. 15, 2017) (Docket information for *Int’l Trade Comm’n v. ClearCorrect Operating, LLC*).

by patent law are not only an innovation incentive. There is also the incentive to design around. If the patent system is working properly, people can see what your patent covers and then find ways to avoid it. Designing around is actually a laudable aspect of patent law. What would be the consequence if CAD files alone were making the patented invention? It would be very difficult to design around a patented invention. One way to successfully design around would be to create a digital representation of the patented invention, tweak it, and play with it to try to avoid the patent. If the CAD file itself counts as making it, this creates quite a few difficulties for people trying to design around the patent. Since we ultimately thought that designing around is a laudable policy aspect of patent law, treating a CAD file as an infringing making of the invention would be problematic. While we think it is colorable to consider the CAD file to be the invention itself, we were not ready to make that move, particularly judicially. Congress could decide to take that step, but I think treating the CAD file as a making of the invention creates serious problems in terms of policy.

Another option to consider is use of the doctrine of equivalents. The patent is on the physical item. Could you say that effectively the CAD file is insubstantially different than the patented invention? I am going to go deep into the weeds of patent law here for a second, so those of you who have not had the class can tune out and fall asleep. That is fine. The doctrine of equivalents here would act similarly to the doctrine of inherency found in the law of anticipation, an issue of validity, particularly as stated in the case *Schering*.¹¹ The basic idea is that not everything in your patent claim has to be expressly disclosed in the prior art to knock it out for invalidity purposes. One of ordinary skill in the art would recognize some of these features in the prior art, even if they are not expressly stated. We do not expect everything to be memorialized in the prior art. Then there is the *Schering* case. The patent in *Schering* covered a metabolite of a drug. So, whenever you pop this drug Claritin it automatically created this metabolite. The patent was on the metabolite, not the drug in Claritin. The argument was, well, we had Claritin for a long time, so is the metabolite not inherently disclosed because every time someone took Claritin their body necessarily produced the metabolite? The Federal circuit said, yes, that is an inherent disclosure. The patent is invalid. But inherency up to that point had dealt with a specific claim limitation. The prior art did not disclose the PH range, but everybody knew that is what had to be there. *Schering*, however, holds that you can inherently disclose the *entire* invention. Our argument is basically the infringement side of inherency. In essence, you have claimed this complex device, but the CAD file as a whole, like *Schering* as a whole, is insubstantially differ-

11. *Schering Corp. v. Geneva Pharm.*, 339 F.3d 1373 (Fed. Cir. 2003).

ent because it is so trivial to simply print it. That approach might be another doctrinal angle to deal with digital patent infringement. Of course, there are various limits on the doctrine of equivalency to come into play, but that is another potential theory.

Others, like Professor Daniel Brean, now at the University of Akron, have suggested that we should just start claiming CAD files directly. Then we avoid all of this doctrinal hocus pocus and simply have claims to the CAD files themselves. And so, these claims would be akin to what we have been calling *Beauregard* claims, which are ways to claim certain methods by claiming them on a particular medium, such as a computer-readable medium.¹² *Beauregard* claims are a little suspect right now given the Supreme Court's decision in *Alice v. CLS Bank*, which really has just been close to the death of a lot of computer software and business related patents.¹³

There is also another case out there, *In re Nuijten*,¹⁴ which predated all of the Supreme Court's hyperactivity in Section 101. *Nuijten* also focused on the tangible versus the intangible. In *Nuijten*, the patent applicant attempted to claim a watermarked signal itself, not a method of producing the signal. It was a way to protect the signal, but the Federal Circuit rejected that claim, saying that signals themselves are not things that are patent eligible. If you think about trying to claim a CAD file, in some ways you are trying to claim the tangible in intangible form. I think there is an argument that under *Nuijten*, claiming the CAD file will not work. At a minimum, patent applicants will face challenges regarding whether such claims will be permitted by the Patent Office, under both *Alice* and *Nuijten*.

Suppose, however, that there is a way to cover the CAD file itself with a patent, either through claiming the CAD file directly or our theory of digital patent infringement. A host of other issues then arise once you get past the liability phase. In a forthcoming book chapter,¹⁵ I discuss what the remedies would be for digital patent infringement. Remedies are where the rubber hits the road. Businesses generally care about what they get out of the litigation in terms of damages and an injunction. If I can get infringement liability, how much money do I get, and what about injunctions?

Injunctive relief becomes crucial. Why? Because you are trying to stop the spread of this file, potentially all over the world. Under the *eBay* factors, the equitable balancing generally should lean in favor of granting injunctions in this context almost all of the time because the

12. See *In re Beauregard*, 53 F.3d 1583 (Fed. Cir. 1995).

13. 134 S. Ct. 2347 (2014).

14. *In re Nuijten*, 500 F.3d 1346 (Fed. Cir. 2007).

15. See Timothy R. Holbrook, *Remedies for Digital Patent Infringement*, in 3D PRINTING AND BEYOND: THE INTELLECTUAL PROPERTY AND LEGAL IMPLICATIONS SURROUNDING 3D PRINTING AND EMERGING TECHNOLOGIES (Mendis, D., Lemley, M., Rimmer, M., eds.) (Edward Elgar, forthcoming 2017).

risk of losing control of the CAD file on the Internet.¹⁶ But even if you get the injunction, it will probably be fairly porous. How do you actually control the spread of these sorts of files? Copyright has experienced this dynamic as well. Digital rights management technologies and other measures of technological control are clearly going to be an important backstop in the CAD file context as well.

What about patent damages for digital patent infringement? Unlike copyright, patent law does not have statutory damages. The sale of the CAD file itself could reflect theoretically infinite numbers of copies of the patented invention, so how do you measure those damages? Assume that the patentee herself is selling the CAD file. You could use that price as your metric. Seemingly the price of that CAD file, unless it has DRM, digital rights management, to limit copies, gives you a gauge of the value of the CAD file to the patent owner. But if the patentee is not selling CAD files herself, then how do you calculate a reasonable royalty?

This scenario starts to sound like some genetic technologies cases, where the patented gene can propagate itself. How do you measure damages in that context? Same idea here. Do you consider the number of potential downstream users and how the *Georgia Pacific* factors weigh into those calculations?¹⁷ It is not an easy concept to get your arms around if you accept the digital patent infringement theory.

One of my other academic interests is extraterritoriality: the use of U.S. patents to regulate activities outside of the United States or activities that straddle borders. For example, in the seminal case of *NTP v. Research in Motion*,¹⁸ the accused system—the Blackberry email system—had components both in the United States and in Canada. Nevertheless, the Federal Circuit held there was still infringement of a U.S. patent. Similarly, another aspect of the Federal Circuit’s decision in *Transocean* was the holding that the location of an infringing sale or offer to sell is wherever the contemplated sale is to take place, not the location of the negotiations or offer.

For infringement by offering to sell the invention, this holding becomes important. Suppose all the negotiations take place in Norway, but the contemplated sale will be in the United States. Under *Transocean*, that is a direct infringement in the United States even if the sale is never consummated. There would be liability for infringing a

16. *eBay Inc. v. MercExchange, L.L.C.*, 547 U.S. 388, 391 (2006). According to the Supreme Court, “[a] plaintiff must demonstrate: (1) that it has suffered an irreparable injury; (2) that remedies available at law, such as monetary damages, are inadequate to compensate for that injury; (3) that, considering the balance of hardships between the plaintiff and defendant, a remedy in equity is warranted; and (4) that the public interest would not be disserved by a permanent injunction.” *Id.*

17. *Georgia-Pac. Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970), *modified sub nom.* *Georgia-Pac. Corp. v. U.S. Plywood-Champion Papers, Inc.*, 446 F.2d 295 (2d Cir. 1971).

18. *NTP, Inc. v. Research In Motion, Ltd.*, 418 F.3d 1282, 1289 (Fed. Cir. 2005).

U.S. patent even though no activity took place within the United States. That is extremely sweeping extraterritorial reach. Translate this holding into the digital infringement context, where people are offering to sell CAD files on servers around the world. Is that now exposing them to infringement liability within the United States? Under *Transocean*, the answer is yes. Is that good or bad? In other work, I have offered theories about how to deal with such extraterritoriality.¹⁹ But that is a potential consequence of digital patent infringement.

The other dynamic that is now popping up in the law are different theories of damages where domestic acts of U.S. infringement trigger foreign sales. Imagine this scenario: I give an exhibition of the patented method in the United States. So, I am infringing in the United States. As a result of that demonstration, however, I make sales to a company overseas.

Can the patent owner get damages for those foreign sales? This is the foreseeability principle. Damages in patent law are supposed to be compensatory. There must be both but-for causation and proximate cause, i.e. the acts must actually and foreseeably cause the damages. In the above case, is it foreseeable that those foreign sales would be made? I would say absolutely. So, from a purely compensatory view of the law, the patent owner should be able to get damages for those foreign sales. But the Federal Circuit has gone the other way. They have tacked on a territorial limit to damages and effectively said, “no, sorry, you cannot get damages for that activity because it is against the presumption against extraterritorial application of U.S. law.” The Federal Circuit has made this clear in three cases: *Power Integrations*,²⁰ *Carnegie Mellon*,²¹ and *WesternGeco*. In fact, in *WesternGeco*, the court held that there are no damages under this specific provision, 35 U.S.C. § 271(f), which is actually designed to control foreign markets. It is infringement by exporting aspects of the patented convention.²²

19. See, e.g., Timothy R. Holbrook, *Territoriality and Tangibility After Transocean*, 61 EMORY L.J. 1087, 1119–20 (2012); Timothy R. Holbrook, *Extraterritoriality in U.S. Patent Law*, 49 WM. & MARY L. REV. 2119, 2169 (2008).

20. *Power Integrations, Inc. v. Fairchild Semiconductor Int’l, Inc.*, 711 F.3d 1348 (Fed. Cir. 2013).

21. *Carnegie Mellon Univ. v. Marvell Tech. Grp., Ltd.*, 807 F.3d 1283 (Fed. Cir.), *reh’g en banc denied in part*, 805 F.3d 1382 (Fed. Cir. 2015).

22. *WesternGeco L.L.C. v. ION Geophysical Corp.*, 837 F.3d 1358 (Fed. Cir. 2016). The Supreme Court has asked for the Solicitor General’s views on whether to grant the writ of certiorari in this case. See SUPREME COURT OF THE UNITED STATES, <https://www.supremecourt.gov/docket/docketfiles/html/public/16-1011.html> [<https://perma.cc/H7CH-NZVX>] (last visited Sept. 15, 2017) (Docket information for *WesternGeco L.L.C. v. ION Geophysical Corp.*). For interesting discussions of these cases, see Bernard Chao, *Patent Law’s Domestic Sales Trap*, 93 DENV. L. REV. ONLINE 87 (2016); Bernard Chao, *Patent Imperialism*, 109 NW. U. L. REV. ONLINE 77 (2014); Sapna Kumar, *Patent Damages Without Borders*, 25 TEX. INTELL. PROP. L.J. (forthcoming 2017); Timothy R. Holbrook, *Boundaries, Extraterritoriality, and Patent Infringement Damages*, 92 NOTRE DAME L. REV. 1745, 1794 (2017).

So, what about digital infringement damages, and extraterritoriality. What consequences can flow in these contexts if some sale is within the United States, perhaps the recipient server is in the United States, but the file spreads internationally? These cases at least suggest that, no, you cannot get compensation for those acts of infringement. But again, it is not entirely clear why that should be, particularly with respect to infringement under § 271(f), where the entire purpose of that provision is to allow a U.S. patent owner leverage in foreign markets. Creating this extraterritorial limit seems problematic. I will explore these issues of extraterritoriality more rigorously in a book chapter that will be out in 2018.²³ Undeniably, additive manufacturing technologies pose a challenge to the patent system. Patent law will face more difficulties responding than the copyright system, particularly with respect to the regulation of CAD files. Digital patent infringement offers a way to deal with these issues, but it too has various complications.

Thank you.

23. See Timothy R. Holbrook, *Digital Patent Infringement and Extraterritoriality*, in RESEARCH HANDBOOK ON IP AND DIGITAL TECHNOLOGIES (Aplin, T., ed. forthcoming 2018).