

2014

## Virtual Designs

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### Recommended Citation

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# VIRTUAL DESIGNS

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CITE AS: 17 STAN. TECH. L. REV. 107 (2013)  
[http://stlr.stanford.edu/virtualdesigns\\_color.pdf](http://stlr.stanford.edu/virtualdesigns_color.pdf)\*\*\*

## ABSTRACT

*Industrial design is migrating to the virtual world, and the design patent system is migrating with it. The U.S. Patent and Trademark Office (USPTO) has already granted several thousand design patents on virtual designs, patents that cover the designs of graphical user interfaces for smartphones, tablets, and other products, as well as the designs of icons or other artifacts of various virtual environments. Many more such design patent applications are pending; in fact, U.S. design patent applications for virtual designs represent one of the fastest growing forms of design subject matter at the USPTO.*

*Our project is the first comprehensive analysis of design patent protection for virtual designs. We first take up the question of virtual designs as design patent-eligible subject matter, a question that has not yet been tested in the courts. We show that longstanding principles of design patent jurisprudence supply an answer to the question, with surprisingly little need for adaptation. We then present the results of an empirical study analyzing all issued U.S. design patents*

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\*\*\* See [http://stlr.stanford.edu/virtualdesigns\\_bw.pdf](http://stlr.stanford.edu/virtualdesigns_bw.pdf) for a version of the Article with black and white prints of the included graphs.

*on virtual designs and their prosecution histories. Here we show how utility patent metrics for quality and value can be extended to design patents. Using these metrics, we show that design patents on virtual designs fare at least as well in quality and value as do design patents on other types of designs. In fact, design patents on virtual designs fare better in some respects. And, finally, we conclude by identifying issues that are likely to arise in anticipated future litigation over patents on virtual designs.*

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## INTRODUCTION

The latest and newest thing in design patents isn't really all that new.<sup>1</sup> Since the 1980s, designers have sought out the design patent system to protect the visual qualities of individual software-generated icons, the imagery associated with various graphical user interfaces, and other visual elements of the virtual environment—collectively, “virtual” designs, as we will call them for purposes of this Article. In the mid-1990s, the United States Patent and Trademark Office issued guidelines for its examiners on the subject,<sup>2</sup> and the USPTO has issued a few thousand such design patents since then,<sup>3</sup> with many more to come. Even the research project that generated the empirical results for this Article commenced nearly two years ago.<sup>4</sup>

What is new—and newly intriguing for design patent law—is that the era of virtual designs has fully arrived. Ubiquitous consumer products such as the iPhone reflect design genius as it has been understood traditionally: the overall appearance of the iPhone case is aesthetically innovative.<sup>5</sup> But the iPhone and its kindred products rely increasingly on their respective screen displays as the chief source of visual appeal and distinction—and, in particular, the particular visual indicia generated by those screen displays.<sup>6</sup> Consider the examples below: Apple's slide-to-unlock design,<sup>7</sup> Microsoft's tiles design for its WINDOWS 8 home screen,<sup>8</sup> and Google's pin locator icon.<sup>9</sup>

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1. Design patents as a form of protection are certainly not new, although they are newly prominent. See JASON J. DU MONT & MARK D. JANIS, *AMERICAN DESIGN PATENT LAW: A COMPARATIVE LEGAL HISTORY* (forthcoming 2015).

2. See *infra* text accompanying notes 79-85.

3. See *infra* Part III.

4. It also served as the stimulus for a design protection conference held at Oxford University in November 2012. See *The Future of Design Protection—1/2 & 11/3/2012*, CENTER FOR INTELL. PROP. RES. (July 23, 2012), <http://web.archive.org/web/20130615033418/http://ip.law.indiana.edu/?p=484> (accessed by browsing history for <http://ip.law.indiana.edu/?p=484> in the Internet Archive) (collecting presentations from that conference).

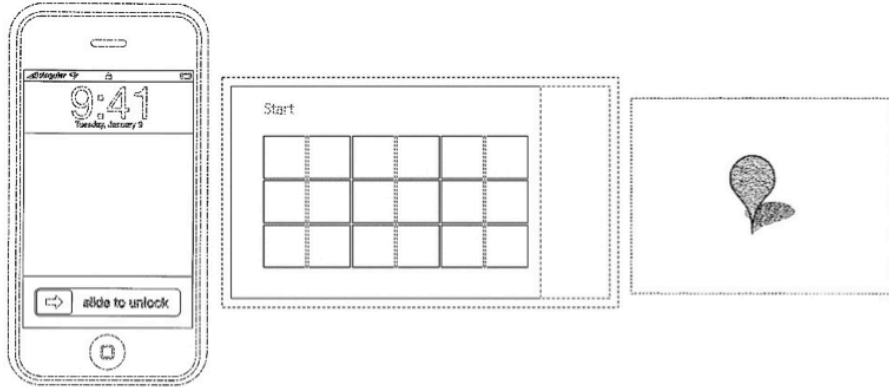
5. Well, some say it reflects innovative genius. See, e.g., WALTER ISAACSON, STEVE JOBS (2011). Others scoff. See, e.g., *The Colbert Report: Apple-Samsung Lawsuit* (Comedy Central television broadcast Sept. 18, 2012), available at <http://www.colbertnation.com/the-colbert-report-videos/419187/september-18-2012/tip-wag---apple-samsung-lawsuit---tabloid-clash> (mocking Apple for allegedly patenting “a rectangle with rounded corners”).

6. See, e.g., Horacio E. Gutiérrez, *Advancing with the Times: Industrial Design Protection in the Era of Virtual Migration*, 3 IP THEORY 1 (2012).

7. Animated Graphical User Interfaces for a Display Screen or Portion Thereof, U.S. Patent No. D621,849 (filed July 30, 2007) (issued Aug. 17, 2010).

8. Display Screen with User Interface, U.S. Patent No. D658,672 (filed May 27, 2011) (issued May 1, 2012).

9. Display Screen of a Comm'n's Terminal with Teardrop-Shaped Marker Icon, U.S. Patent No. D620,950 (filed Sept. 28, 2002) (issued Aug. 3, 2010).



Virtual designs will only become more prominent as all of us become increasingly enmeshed in virtual environments. And the future law of design patents will need to innovate as well.

In this Article, we assess the law and landscape of design patents for virtual designs as they have developed over the past two-plus decades. In Part II, we review the law on the question of subject matter eligibility for virtual designs, and we find it to be notably mundane. The USPTO's approach to subject matter eligibility derives from long-established principles of design law that the USPTO reads rather conservatively.<sup>10</sup>

In Part III, we look back at nearly twenty years of design patent prosecution in the area of virtual designs. We present the results to date of an ongoing, comprehensive empirical study on design patents on virtual designs and their file histories. Among other things, we find that design patent applications that claim virtual designs appear to receive a more rigorous examination than do applications claiming other types of designs. Even so, our data suggests a level of rigor that is unlikely to satisfy critics of the design patent system generally.

In Part IV we look to the future, considering some doctrinal issues that are likely to emerge as design patents for virtual designs are tested in the courts.

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10. However, the USPTO's position has not yet been ratified by any definitive judicial decision.

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## I. VIRTUAL DESIGNS AS DESIGN PATENT SUBJECT MATTER

A. *Antecedents: Four Historical/Legal Propositions*1. *Design patent protection originated as a by-product of technological innovation*

Neither the emergence of virtual designs, nor the deployment of design patent protection for those designs, is an anomaly, nor even very much of a surprise. Rather, it is a familiar story of a field of industrial design opening as a by-product of technological innovation, and the intellectual property law remaking itself to address the requirements of the new field.

The foundational debate in the United States about whether to enact a system of intellectual property protection for designs originated from just such an innovation scenario. In the U.S. economy of the early nineteenth century, the cast-iron goods industry occupied a role much like that of the modern consumer electronics industry: its products were ubiquitous in society (including in the home), produced on a large scale, and heavily advertised. Advances in casting technology made it possible for manufacturers to enhance the visual appeal of their cast-iron products by experimenting with new shapes or adding decorative embellishments.<sup>11</sup> These design innovations proved to be of considerable value to consumers, but designers were without any straightforward recourse in the American intellectual property law. Copyright protection was not available for industrial design (particularly designs for three-dimensional articles); no federal trademark regime existed; and it was not clear that industrial design constituted an invention that could be claimed within the utility patent system.<sup>12</sup> One prominent manufacturer, Jordan L. Mott, petitioned Congress to create a form of design protection that was patterned after design legislation that had recently been enacted in England. Mott's petition triggered a debate that eventually resulted in the inclusion of design patent provisions in the 1842 Patent Act, the foundation for the modern design patent provisions.<sup>13</sup>

The story of the adaptation of the design patent system to accommodate virtual designs is analogous. Advances in computer graphics technology in the 1970s and 1980s opened up new possibilities for software developers to use sophisticated visual elements in computer user interfaces, quickly creating a new field of graphical user interface design (GUI).<sup>14</sup> As computers came into

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11. Jason J. Du Mont & Mark D. Janis, *The Origins of the American Design Patent System*, 88 IND. L.J. 837, 850 (2013) [hereinafter Du Mont & Janis, *Origins*].

12. *Id.* at 851-52.

13. *Id.* at 868.

14. See, e.g., Jeremy Reiner, *A History of the GUI*, ARS TECHNICA (May 5, 2005), <http://www.arstechnica.com/features/2005/05/gui>.

use by the general public in virtually all settings, it became self-evident that the visual aesthetics of a GUI—its overall combination of visual elements, its use of individual icons and other visual cues—was a matter of immense value. However, litigation in the 1980s and 1990s demonstrated that the traditional trademark and copyright paradigms might not provide a good fit for GUI designs. Copyright protection is available for GUI designs, but an early case concerning the WINDOWS operating system interface, *Apple Computer, Inc. v. Microsoft Corp.*,<sup>15</sup> seemed to demonstrate that copyright protection for GUIs (and perhaps for other types of virtual designs) was likely to be thin.<sup>16</sup> Similarly, trade dress protection is an alternative for GUIs (and for other types of virtual designs), but after a period of uncertainty over the requirements for trade dress distinctiveness, the U.S. Supreme Court settled on a test that demands a showing of secondary meaning for the protection of product design trade dress.<sup>17</sup> Moreover, subsequent cases have called for extensive evidentiary support for assertions that visual indicia are recognized by consumers as source-indicating and thus have secondary meaning.<sup>18</sup>

Here again, as it did in the early nineteenth century, the design patent system fills a perceived gap in intellectual property protection. Indeed, design patent protection is a relatively good fit for virtual designs compared to copyright or trademark, as we explore below.

## 2. *Design protection systems have historically protected “surface treatments” for articles of manufacture*

Many debates about design protection, whether under the design patent regime or elsewhere, have involved product shapes.<sup>19</sup> But although product shapes have garnered most of the attention, they have never constituted the sole focus of design protection regimes. The British Calico Printers’ Act,<sup>20</sup> the precursor to modern Anglo-American design protection statutes, was directed to the patterns printed on cloth—in other words, to “surface treatments” rather than to product shapes. Likewise, the subsequent iteration of British

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15. 35 F.3d 1435 (9th Cir. 1994).

16. *Id.* at 1445 (approving of the lower court’s analytical dissection approach to determining infringement while rejecting an argument to protect “total concept and feel”).

17. *Wal-Mart Stores, Inc. v. Samara Bros., Inc.*, 529 U.S. 205 (2000) (concluding that product design trade dress cannot qualify as inherently distinctive as a matter of law).

18. *See, e.g.*, *Yankee Candle Co. v. Bridgewater Candle Co.*, 259 F.3d 25, 43-45 (1st Cir. 2001) (criticizing Yankee’s circumstantial evidence of secondary meaning and concluding that Yankee had presented no direct evidence).

19. Also frequently referred to in the literature as “product configurations.”

20. Calico Printers’ Act, 1787, 27 Geo. 3, c. 38, § 1 (Eng.) (repealed 1839) (granting protection to “every Person who shall invent, design and print, or cause to be invented, designed, and printed, and become the Proprietor of any new and original Pattern or Patterns for printing Linens, Cottons, Calicoes [sic], or Muslins”).

lawmaking, the dual system of copyright and design protection adopted in 1839, reflected the view that the scope of subject matter eligible for design protection extended beyond three-dimensional forms.<sup>21</sup>

As we have described in detail elsewhere,<sup>22</sup> the U.S. borrowed significantly from the 1839 British legislation to formulate the first U.S. design patent provisions in 1842. Those provisions laid out a list of categories of subject matter that was eligible for potential design patent protection, including not only the “shape or configuration of any article of manufacture” but also two-dimensional designs, such as a “pattern” to be “printed” or otherwise fixed on an article of manufacture.<sup>23</sup>

Although Congress amended the design patent provisions in 1902 to replace the subject matter categories with the current formulation “design for an article of manufacture,” it was understood that that the modern formulation was meant as an umbrella term encompassing the previously existing categories. The Court of Customs and Patent Appeals (CCPA) so ruled in *In re Schnell*.<sup>24</sup> As the CCPA saw it, “Congress did not, in amending the act in 1902, intend to omit as proper subjects for a design patent—any new and original impression, ornament, [pattern], print, or picture to be printed, painted, cast, or otherwise placed on or worked into any article of manufacture.”<sup>25</sup> Instead, the CCPA discerned three categories of design subject matter:

- (1) “a design for an ornament, impression, print, or picture to be *applied to* an article of manufacture”
- (2) “the design for a shape or configuration of an article of manufacture”

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21. See Act for Extending the Copyright of Designs for Calico Printing to Designs for Printing Other Woven Fabrics, 1839, 2 Vict., c. 13 (Eng.) (copyright protection for new and original patterns for printing “linens, cottons, calicoes, or muslins”); An Act to Secure to Proprietors of Designs for Articles of Manufacture the Copyright of Such Designs for a Limited Time, 1839, 2 Vict., c. 17 (Eng.) (design protection for (1) any “[p]attern or [p]rint, to be either worked into or worked on, or painted on, any [a]rticle of [m]anufacture”; (2) designs for the modeling, casting, embossment, chasing, engraving, or “any other [k]ind of [i]mpression or [o]rnement, on any [a]rticle of [m]anufacture”; and lastly (3) “the [s]hape or [c]onfiguration of any [a]rticle of [m]anufacture”).

22. Du Mont & Janis, *Origins*, *supra* note 11, at 864-88.

23. The statute provided that the following subject matter would be eligible for design patent protection: a “design for a manufacture, whether of metal or other material or materials,” or a “design for the printing of woollen [sic], silk, cotton, or other fabrics,” or a “design for a bust, statue, or bas relief or composition in alto or basso rilievo,” or an “original impression or ornament, or to be placed on any article of manufacture, the same being formed in marble or other material,” or a “pattern, or print, or picture, to be either worked into or worked on, or printed or painted or cast or otherwise fixed on, any article of manufacture,” or a “shape or configuration of any article of manufacture.” Design Patent Act of 1842, ch. 263, § 3, 5 Stat. 543, 544.

24. 46 F.2d 203 (C.C.P.A. 1931).

25. *Id.* at 205 (quoting *Ex parte Fulda*, 1913 Dec. Comm’r Pat. 206, 207 (Commissioner Moore)).



(3) “a combination of the first two.”<sup>26</sup>

The USPTO has not varied from this approach over the several decades since *Schnell* was decided. The Manual of Patent Examining Procedure (MPEP) expressly adopts this interpretation of § 171,<sup>27</sup> and the USPTO has issued many design patents on surface treatments over the years,<sup>28</sup> although it has always insisted that design in the sense of § 171 “cannot exist alone merely as a scheme of surface ornamentation” and must be deemed “inseparable from the article to which it is applied.”<sup>29</sup> Thus, to the extent that a virtual design may be characterized as (and claimed as) a surface treatment associated with a computer, virtual design fits easily alongside designs for wallpaper, carpet, paper products, and the like which have long been understood to lie within the scope of subject matter eligible for design patent protection.

3. *Design patent law does not require the underlying article of manufacture to be depicted as part of the claim*

The most difficult conceptual question about subject matter eligibility for virtual designs concerns the extent to which the appearance of the article of manufacture that is associated with a virtual design must be included as part of the design claim. Virtual designs undoubtedly have a life independent of the devices on which they may be displayed, as anyone who owns an IPHONE and an IPAD or a WINDOWS phone and a SURFACE tablet can attest—the familiar user interface appears on both, and, increasingly, is the dominant visual element of both. Yet design patent protection extends to any “design for an article of manufacture,”<sup>30</sup> so any claim to a virtual design, like any claim to any design, must account for the article of manufacture associated with the design. The conundrum is that accounting for the article of manufacture might mean including the visual features of the article of manufacture, in its entirety, as part of the claim to the virtual design.

The design patent law as developed before the era of virtual designs did not require design patent claims to incorporate the appearance of all features of the associated article of manufacture. A leading example is *In re Zahn*,<sup>31</sup> which involved a claim to the shank of a drill bit. The drawings depicted the shank of

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26. *Id.* at 209.

27. See U.S. PATENT AND TRADEMARK OFFICE, MANUAL OF PATENT EXAMINING PROCEDURE § 1504.01 (8th ed. Rev. 5, Aug. 2006) [hereinafter MPEP] (interpreting Patents for Designs, 35 U.S.C. § 171 (2011)), available at <http://www.uspto.gov/web/offices/pac/mpep/s1504.html#d0e152237>.

28. For one recent example, see Paper Product, U.S. Patent No. D677,472 (filed Apr. 24, 2012) (issued Mar. 12, 2013).

29. MPEP, *supra* note 27, § 1502.

30. 35 U.S.C. § 171 (2011).

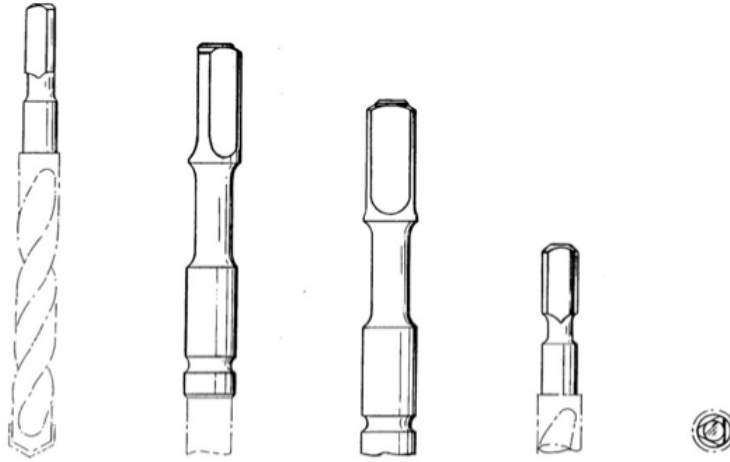
31. 617 F.2d 261 (C.C.P.A. 1980).

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the drill in solid lines and the cutting portion of the drill in broken lines (as shown below<sup>32</sup>). The specification as originally filed explained that the representation of the cutting portion was made “merely for the purpose of illustrating the type of cutting portion that may be formed integral with the shank portion to form the drill bit.”<sup>33</sup>



The examiner rejected the claim, inter alia, on the ground that because the claim was directed to less than all of an article of manufacture, it could not fall within the scope of eligible subject matter as defined by 35 U.S.C. § 171.<sup>34</sup> The Board affirmed.<sup>35</sup>

In an opinion by Judge Rich, the CCPA reversed. For Judge Rich, the critical point was that the statute authorized the protection of designs “for” articles of manufacture; it was not limited to designs “of” articles of manufacture.<sup>36</sup> While the latter formulation might hint at a requirement for including the article in the design claim, the former, according to Judge Rich, supported the view that the claimed design need not be for a design for an entire article.<sup>37</sup> “While the design must be *embodied* in some article, the statute is not limited to designs for complete articles, or ‘discrete’ articles, and

32. *Id.* at 252 figs. 1, 2, 3 & 4.

33. *Id.* at 263 (quoting specification). The applicant subsequently amended the specification in an attempt to overcome the examiner’s rejections. *Id.* at 263-64.

34. *Id.* at 264.

35. *Id.*

36. *Id.* at 268 (noting that § 171 “refers, not to the design *of* an article, but to a design *for* an article, and is inclusive of ornamental designs of *all* kinds including surface ornamentation as well as configuration of goods” (emphasis added)).

37. *Id.*

certainly not to articles separately sold,”<sup>38</sup> Judge Rich opined, and he asserted that “[n]o sound authority ha[d] been cited for any limitation on *how* a design is to be embodied in an article of manufacture.”<sup>39</sup> Indeed, there was good authority in the other direction, namely the Supreme Court’s famous *Gorham Co. v. White* decision.<sup>40</sup> It had involved a design patent on a “new design for the handles of table-spoons and forks,” and the drawings showed the handle portion but not the spoon or fork portion.<sup>41</sup>

Judges Baldwin and Watson, in dissent, would have drawn the line differently. They would have permitted a design to be embodied in less than all of an article of manufacture, but they would have required the disclosure (in solid lines) of sufficient detail to allow the observer to perceive the overall visual impression of the article.<sup>42</sup> Otherwise, Judge Baldwin asserted, designers could secure design patents that effectively claimed “abstract designs.”<sup>43</sup>

*Zahn* can be read as standing for the narrow—and perhaps unremarkable—proposition that it is acceptable to use broken lines to designate “the environment in which the design is associated.”<sup>44</sup> But the implications of *Zahn*’s reasoning are potentially much broader. If the appearance of the associated article of manufacture can be omitted from the scope of the claim by the broken-line representation, it might seem to be a relatively small conceptual step to assert that the broken-line representation of the associated article can be omitted, as long as it is otherwise clear from the text of the specification that the claimed design is in fact associated with some article of manufacture.

The design patent law has come to the cusp of this proposition without quite accepting it. The USPTO still directs its examiners to reject design applications that claim pictures *per se*,<sup>45</sup> even while following *Zahn*’s

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38. *Id.* (emphasis added).

39. *Id.* (emphasis added).

40. 81 U.S. (14 Wall.) 511 (1871).

41. *In re Zahn*, 617 F.2d at 267-68 (citing *Gorham*, 81 U.S. (14 Wall.) at 521). Of course, as Judge Rich acknowledged, the eligibility issue was not before the Court in *Gorham*.

42. *Id.* at 272 (Baldwin, J., dissenting). According to Judge Baldwin, *Gorham* supported his position, because the drawings in *Gorham* were sufficient to permit an observer to perceive the overall visual impression of the utensils.

43. *Id.* at 269. The reference to abstractness conjures up the inscrutable jurisprudence of utility patent eligibility for cases involving software-related inventions. *See, e.g.*, *Bilski v. Kappos*, 130 S. Ct. 3218 (2010). It strikes us as a very bad idea to interject the abstractness analysis into design patent eligibility analysis given the experience to date in the utility patent area.

44. MPEP, *supra* note 27, § 1503.02.

45. *Id.* § 1504.01 (“A picture standing alone is not patentable under 35 U.S.C. § 171.”). The rejection is to be based on the article of manufacture requirement. *See id.* (“The factor which distinguishes statutory design subject matter from mere picture or ornamentation, *per se* (i.e., abstract design), is the embodiment of the design in an article of manufacture.”).

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reasoning that the associated article may be depicted generically in broken lines. The cases have discussed this dilemma for many decades. In *Ex parte Cady*, the applicant sought to claim a picture of “Peter Rabbit,” apparently without limiting the claim to any article of manufacture.<sup>46</sup> According to Assistant Commissioner Clay,

A disembodied design or mere picture is not the subject of patent, and it follows that the specification must not so indicate.

It appears to be very difficult to steer a middle course between the extreme views of those who consider that a disembodied design is patentable and the Examiner’s sometimes too strict interpretation that the design patent is for the article itself to which the design is applied. . . . The invention is not the article and is not the design *per se*, but is the design *applied*.<sup>47</sup>

To the Assistant Commissioner, the phrase “design for an article” in the statute “cannot necessarily mean a singular and particular article, but must in many cases refer to a generic article—as, for example, a design for a dish would cover not only the particular dish shown, but all dishes to which the design is obviously applicable with the same effect as in the specific case shown.”<sup>48</sup> On this reasoning, the Assistant Commissioner remanded the case to the examiner, with a recommendation to permit the applicant to state that the design was applicable to other articles to the extent that it was clear how the articles would look with the design applied to it.<sup>49</sup>

The USPTO appears to have adhered to this middle ground approach, although its rules and pronouncements still reflect some ambiguity about the limits of an applicant’s discretion to depict a generic article of manufacture. The MPEP specifies that in order to satisfy eligibility requirements, “the design must be *shown* as applied to or embodied in an article of manufacture.”<sup>50</sup> That language does not answer the question in any specific case as to what exactly must be “shown,” and the USPTO’s own regulations have shifted on the matter. Until 1997, Rule 152, dealing with permissible drawings in design patent matters, formerly specified that the design must be represented by a drawing, including a sufficient number of views “to constitute a complete disclosure of the appearance of the article.”<sup>51</sup> Currently, the regulation states (more correctly

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46. The application as originally filed indicated that the design “was adapted to be embodied in various articles of manufacture, such as toys, composition figures, etc., or as an ornamentation for any article of manufacture.” *Ex parte Cady*, 1916 Dec. Comm’r Pat. 57, 58. The applicant later amended the specification, although it apparently still included an open-ended list of articles, stating that the rabbit design “may be applied to a bed quilt, handkerchief,” and other items. *In re Schnell*, 46 F.2d 203, 207 (C.C.P.A. 1931) (quoting *Ex parte Cady*, 1916 Dec. Comm’r Pat. at 62).

47. *Cady*, 1916 Dec. Comm’r Pat. at 63 (remanding to the examiner).

48. *Id.*

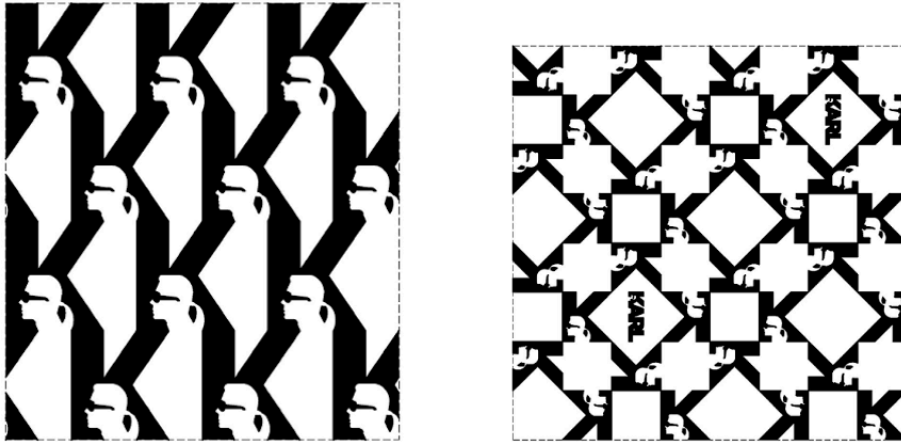
49. *Id.*

50. MPEP, *supra* note 27, § 1504.01 (emphasis added).

51. Design Drawings, 37 C.F.R. § 1.152 (1996).

in our view) that the drawings must include a sufficient number of views “to constitute a complete disclosure of the appearance of the *design*.”<sup>52</sup>

Notwithstanding these variations, the practice at the USPTO has been relatively consistent in permitting design drawings in a number of areas with only the barest generic representation of the associated article of manufacture. For example, design patent drawings for textile prints are permitted in the form shown below, where the broken-line representation is barely visible around the periphery of the two Karl Lagerfeld designs.<sup>53</sup>



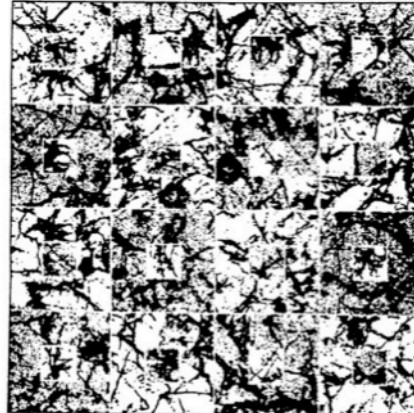
In the following examples for tile designs,<sup>54</sup> the USPTO apparently takes it as self-evident that the design is physically applied to an underlying product (the tile), obviating the need for any broken-line representation indicating a generic tile product. This practice does not strike us as being particularly radical.

52. 37 C.F.R. § 1.152 (2013) (emphasis added). As the USPTO explained the change: The term “article” of § 1.152(a) is replaced by the term “design” as 35 U.S.C. 171 requires that the claim be directed to the “design for an article” not the article, *per se*. Therefore, to comply with the requirements of 35 U.S.C. 112, ¶ 1, it is only necessary that the design as embodied in the article be fully disclosed and not the article itself.

Changes to Patent Practice and Procedure, 62 Fed. Reg. 53,132, 53,164 (Oct. 10, 1997).

53. Textile Fabric, U.S. Patent No. D672,969 fig.2 (filed Nov. 30, 2011) (issued Dec. 25, 2012) (pictured on the left); Textile Fabric, U.S. Patent No. D672,970 fig.2 (filed Nov. 30, 2011) (issued Dec. 25, 2012) (pictured on right).

54. Floor Tile, U.S. Patent No. D653,459 (filed Nov. 18, 2010) (issued Feb. 7, 2012) (pictured on left); Ceramic Flooring Tile, U.S. Patent No. D353,459 (filed Nov. 10, 1993) (issued Dec. 13, 1994) (pictured on right).



Yet another example, and one that is perhaps most closely analogous to virtual designs, is the USPTO's treatment of type font designs. These designs were long accepted in many courts as a subject of design patent protection with little question about whether they complied with the article of manufacture requirement.<sup>55</sup> Of course, in the era of traditional printing, type font designs were applied to three-dimensional blocks of presumably standard appearance, so there may have been little concern about depictions of the article of manufacture.

In the 1970s, when designers began to apply type font designs to celluloid film rather than to printing blocks, one court commented in dicta that design patents would not be available for type fonts applied to film.<sup>56</sup> The court's comments rested on the dubious rationale that prior type font designs had been

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55. For example, in one early case, the court analyzed a type font design patent application without any mention of the article of manufacture requirement, although the court upheld the rejection of the application on other grounds. *In re Cooper*, 23 F.2d 774, 775 (D.C. Cir. 1927) (upholding rejection of a design patent claiming an "ornamental design for a font of type," but on grounds that it lacked aesthetic appeal—since it was designed for mere advertising purposes rather than as a thing of beauty—and because it was not sufficiently different from the prior art); *see also* *Robertson v. Cooper*, 46 F.2d 766, 768-69 (4th Cir. 1931) (denying the same applicant relief against the Patent Office for its refusal to grant the design patent; citing prior art as the basis for the refusal); *In re Schraubstadter*, 26 App. D.C. 331 (1905) (upholding rejection of design patent application for type font on prior art grounds; no mention of article of manufacture issue); *Am. Type Founders' Co. v. Damon & Peets*, 140 F. 715, 716 (C.C.S.D.N.Y. 1905) (invalidating type font design patent for lack of ornamental qualities without further explanation). On the other hand, in *Goudy v. Hansen*, 247 F. 782 (1st Cir. 1917), the court seemed to declare categorically that type fonts, even applied to printing blocks, could never qualify as ornamental. *Id.* at 784-85. *But see id.* at 786-89 (Brown, J., dissenting) (taking issue with the court's opinion on this issue).

56. *See Leonard Storch Enters., Inc. v. Mergenthaler Linotype Co.*, No. 78-C-238, 1979 WL 1067, at \*5 (E.D.N.Y. Apr. 5, 1979). For a general discussion, see Jacqueline D. Lipton, *To © Or Not To ©? Copyright and Innovation in the Digital Typeface Industry*, 43 U.C. DAVIS L. REV. 143, 179-80 (2009).

patent-eligible only because those designs were applied to three-dimensional print blocks.<sup>57</sup> In addition, in *Ex parte Tayama*,<sup>58</sup> the Board took the view that type font designs were not comparable to surface treatments. Rather, the Board considered the design to reside in the “shape or configuration of the letter blocks.”<sup>59</sup> This fact distinguished type fonts from virtual designs, according to the Board, leading it to conclude that computer-generated icons were not eligible for design patent protection.<sup>60</sup>

In the mid-1990s, the USPTO broke with the views on type fonts expressed in *Tayama*. In the context of its new guidelines on computer-generated icons (discussed in more detail in Subpart II.B), the USPTO rather tersely endorsed its “historical” practice of granting design patents for type font designs:

Traditionally, type fonts have been generated by solid blocks from which each letter or symbol was produced. Consequently, the PTO has historically granted design patents drawn to type fonts. PTO personnel should not reject claims for type fonts under Section 171 for failure to comply with the “article of manufacture” requirement on the basis that more modern methods of typesetting, including computer-generation, do not require solid printing blocks.<sup>61</sup>

Of greatest relevance here is the USPTO’s reference to computer-generated type fonts. On the USPTO’s reasoning, it would seem to be permissible to claim a computer-generated type font design without depicting (in broken lines or otherwise) the associated computer display on which those designs are generated. The following example from a design patent owned by Adobe seems to bear this prediction out.<sup>62</sup>

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57. *Id.*

58. 24 U.S.P.Q.2d (BNA) 1614 (B.P.A.I. 1992).

59. *Id.* at 1618.

60. *Id.* For commentary from the early 1990s arguing that design patents provided an unreliable form of protection for type font designs, see Phillip W. Snyder, *Typeface Design After the Desktop Revolution: A New Case for Legal Protection*, 16 COLUM.-VLA J.L. & ARTS 97, 137 n.238 (1991) (making the case for protecting type fonts under design protection legislation).

61. *Guidelines for Examination of Design Patent Applications for Computer-Generated Icons*, 61 Fed. Reg. 11,380, 11,382 (Mar. 20, 1996), now incorporated into the MPEP, *supra* note 27, § 1504.01(a).

62. Type Font, U.S. Patent No. D407,431 (filed Jan. 6, 1998) (issued Mar. 30, 1999).

A B C D E F G H I  
 J K L M N O P Q R  
 S T U V W X Y Z &  
 a b c d e f g h i j k l m  
 n o p q r s t u v w x y z  
 1 2 3 4 5 6 7 8 9 0  
 \$ % & ' ( ) \* + , - . : ;  
 ! " # \$ % & ' ( ) \* + , - . : ;

Indeed, Adobe has enforced similar design patents successfully in litigation. In *Adobe Systems Inc. v. Southern Software, Inc.*, the defendant had argued that Adobe's design patent claims in several patents (which claimed "the ornamental design of a type font, as shown and described") violated the article of manufacture requirement.<sup>63</sup> Adobe argued that the software served as the article of manufacture in that it permitted the typeface to be rendered. The court accepted Adobe's argument, invoking the USPTO's guidelines.<sup>64</sup>

The story of the treatment of type font designs strikes us as instructive, although we caution against making too much of it. It does illustrate that, in some instances, the USPTO is willing to dispense even with the requirement for a broken-line representation of the article of manufacture in design patent drawings. However, the USPTO has not gone quite that far in its approach to virtual designs, as we discuss in Subpart II.B.

#### 4. *Design patent law has afforded protection to transient designs*

Another conceivable objection to the patenting of virtual designs is that they may seem more ephemeral than other types of designs. This objection may appear to have particular force when applied to animated virtual designs.

In part, the concern here is about notice, and the solution lies in the

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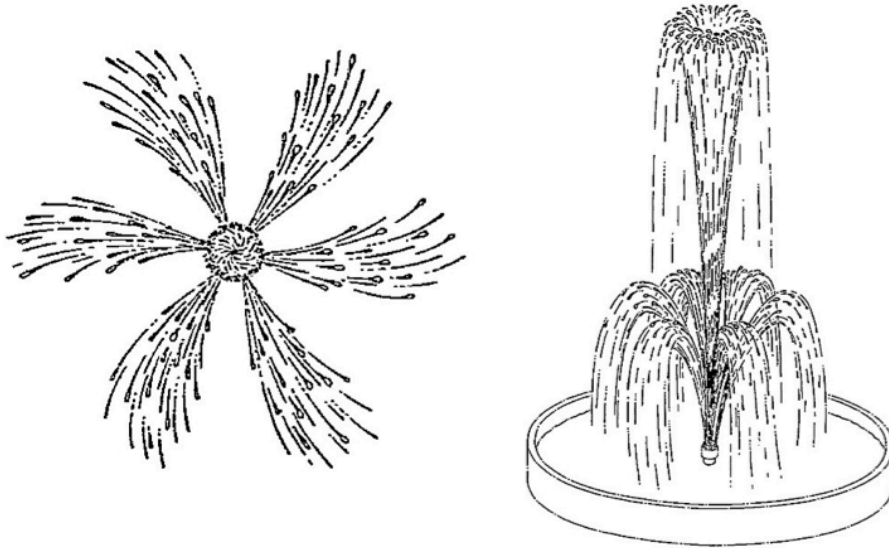
63. 45 U.S.P.Q.2d (BNA) 1827, 1833 (N.D. Cal. 1998).

64. *Id.* at 1833 n.12. Curiously, the court also invoked the passage from *Tamaya* and purported to be relying on its reasoning, although it seems that *Tamaya* points against the court's conclusion. *Id.*



development and enforcement of a reasonable standard of indefiniteness,<sup>65</sup> along with reliance on conventions for claiming, particularly with regards to animated subject matter.

A deeper concern is that the subject matter is so variable in its visual appearance that a claim encompassing all of the variations should be deemed to be a claim to a mere abstraction, rather than to a patent-eligible design. However, this problem is not unique to virtual designs. Judges have endorsed the protection of transient subject matter in other design contexts. The leading example is *In re Hruby*, claiming an “ornamental design for a water fountain” as shown below.<sup>66</sup> The USPTO had rejected Hruby’s application on the ground that the claimed water display was not an “article of manufacture” and thus fell outside the confines of eligible subject matter as defined in § 171.<sup>67</sup>



In an opinion by Judge Rich, the CCPA reversed the rejection. According to Judge Rich, the “precise question” before the CCPA was “whether that portion of a water fountain which is composed entirely of water in motion is within the statutory term ‘article of manufacture.’”<sup>68</sup> We might have framed the question somewhat differently. We would take it as self-evident that the applicant’s claimed design was “for an article of manufacture” as the statute

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65. See 35 U.S.C. § 112(b) (2011) (requiring patentees to “conclude with one or more claims particularly pointing out and distinctly claiming the subject matter . . . regard[ed] as the invention”).

66. 373 F.2d 997, 998 (C.C.P.A. 1967).

67. *Id.* at 999.

68. *Id.* at 998.

requires; the design is plainly for use in a water fountain. To us, the precise question is whether the depicted water in motion properly constitutes a “design.”

Nonetheless, Judge Rich’s answers are pertinent for our purposes. Responding to the objection that the appearance of the water display is “fleeting” and thus not appropriate for design patent subject matter, Judge Rich observed that “the permanence of *any* design is a function of the materials in which it is embodied and the effects of the environment thereon.”<sup>69</sup> On the related point that water sprays cannot exist of themselves, but rather are dependent upon the existence of nozzles of a particular configuration and water subjected to a particular pressure, Judge Rich argued that many designs “depend upon outside factors for the production of the appearance which the beholder observes.”<sup>70</sup> He cited a number of examples: the design of a lampshade (whose appearance is not evident until the lamp is lit); the design of inflatable toys (which require compressed air before their appearance can be discerned); the design of wallpaper (not evident until hung by a competent paperhanger).<sup>71</sup>

The subject matter in *Hruby* remains a bit of an oddity; the decision does not seem to have spawned any great rush to patent transient designs. But the decision stands for the simple proposition that the design patent system is capable of absorbing at least some types of transient designs without causing systemic disruptions.

### B. Contemporary Design Patent Rules for Virtual Designs

The USPTO’s approach to design patent eligibility for virtual designs reflects a fairly straightforward application of the established principles discussed above. Adapting the design patent laws to accommodate virtual designs is not a simple matter conceptually, but, at least insofar as the eligibility issue is concerned, it is a surprisingly small step doctrinally.

The *Strijland* case is the starting point. In *Ex parte Strijland*,<sup>72</sup> the applicant had originally claimed the “ornamental design for an icon for information or the like, as shown and described,”<sup>73</sup> and had included drawings including views of the icon alone, including the drawing below.

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69. *Id.* at 999 (emphasis added).

70. *Id.* at 1001.

71. *Id.*

72. 26 U.S.P.Q.2d (BNA) 1259 (B.P.A.I. 1992).

73. *Id.* at 1263.



Subsequently, Strijland amended the claim to recite the “ornamental design for an information icon for display screen of a programmed computer system or the like, as shown and described.”<sup>74</sup> The examiner rejected the amended claim as failing to define a design for an article of manufacture and thus failing to satisfy the requirement for eligible subject matter under § 171.<sup>75</sup> The Board affirmed the § 171 rejection and added new grounds of rejection under § 112—notably, a new matter rejection based on the rationale that there had been no basis in the specification for the recitation of a “display screen of a programmed computer system,” because the word “icon” alone did not limit the design to use with a display screen of a programmed computer.<sup>76</sup>

In analyzing the § 171 rejection, the Board acknowledged that surface ornamentation was one of the categories of eligible design subject matter, citing *Schnell*. But the Board also found in *Schnell* and *Zahn* a distinction between surface ornamentation per se and surface ornamentation embodied in an article of manufacture. The Board recited the proposition a mere picture standing alone—surface ornamentation per se—could not be eligible subject matter.<sup>77</sup> Furthermore, the Board opined that this deficiency would not be overcome by merely illustrating a picture displayed on the screen of a computer unless it could be shown that the picture was actually an icon that was “an integral part of the operation of a programmed computer.”<sup>78</sup>

Having upheld the rejection, the Board then indulged in some crucial dicta.

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74. *Id.* at 1260.

75. *Id.* at 1261.

76. *Id.* at 1262-63.

77. *Id.* at 1262 (calling a mere picture standing alone an ineligible “abstract design”).

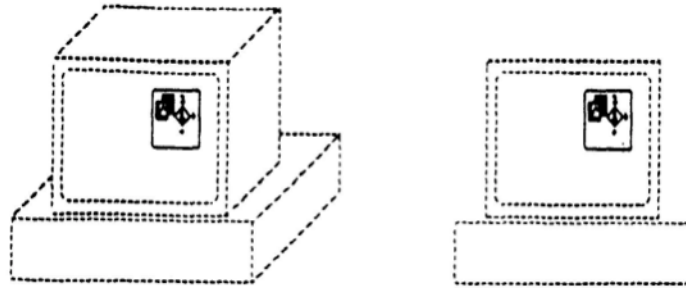
78. *Id.* The Board also invoked 37 C.F.R. § 1.152 as it then stood, with its reference to the requirement that the drawings show views sufficient to constitute a complete disclosure of the appearance “of the article.” *Id.* That language has since been amended to require a disclosure of the appearance “of the design.” See *supra* note 52 and accompanying text. On the same day, the Board decided *Ex parte Donaldson*, 26 U.S.P.Q.2d (BNA) 1250, 1258 (B.P.A.I. 1992) (applying the same reasoning to find that a claim to an icon per se, without any broken-line representation of the associated computer display, failed to define eligible subject matter).

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The Board suggested that had Strijland included drawings as shown below (which the Board rendered in an appendix to the opinion), the claimed design (as expressed in the amended claim) would have been held to define eligible subject matter.



The Board's suggested broken-line rendition of a computer looks quaint by current standards, and perhaps the Board's dicta seemed exotic at the time. But it should not have then, and should not now. Cases like *Zahn* and *Schnell*, and their predecessors, had already gravitated to the proposition that a design for an article of manufacture could be claimed by depicting the design associated with a generic representation of an article in broken lines, as long as the text of the specification that the design was applied to an article of manufacture. The *Strijland* dictum was not new law.

In 1996, the USPTO adopted the *Strijland* dicta as the governing approach for subject matter eligibility for virtual designs. Consistent with *Strijland*, the USPTO's guidelines identify the article of manufacture requirement as the key element of contention, and assert that a virtual design must be embodied in a means of display in order to satisfy that requirement.<sup>79</sup> The guidelines also invoke *Hruby* for the proposition that a design might depend on external factors for its existence without giving offense to the article of manufacture requirement. Applied here, "[t]he dependence of a computer-generated icon on a central processing unit and computer program for its existence itself is not a reason for holding that the design is not for an article of manufacture."<sup>80</sup>

The guidelines also decline to step beyond *Strijland* and *Schnell* in that they maintain that examiners should reject claims to virtual designs per se, ones that are not accompanied by at least a broken-line representation of a computer display or the like.<sup>81</sup> If anything, this is a conservative approach in light of the

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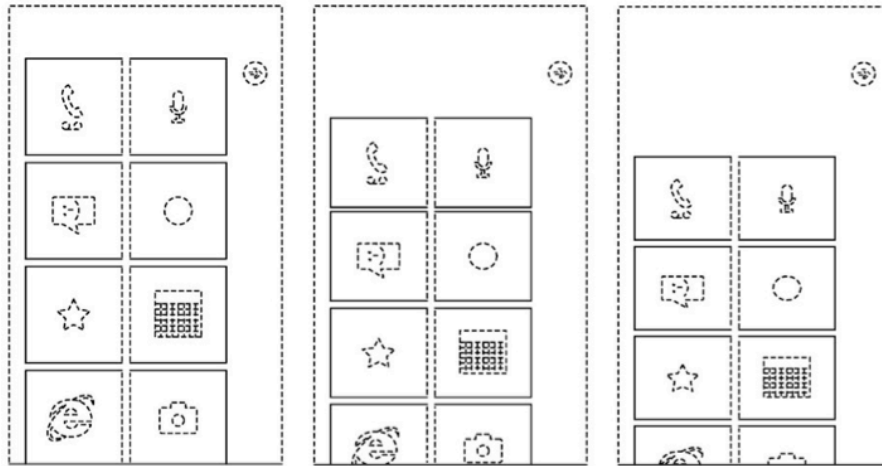
79. MPEP, *supra* note 27, § 1504.01(a) ("Since a patentable design is inseparable from the object to which it is applied and cannot exist alone merely as a scheme of surface ornamentation, a computer-generated icon must be embodied in a computer screen, monitor, other display panel, or portion thereof, to satisfy 35 U.S.C. 171.").

80. *Id.*

81. *Id.* ("If the drawing does not depict a computer-generated icon embodied in a

existing USPTO practice for subject matter such as computer-generated type fonts, where no such representation appears to be required.<sup>82</sup>

Finally, as amended in 2005, the guidelines confirm that animated virtual designs can constitute eligible subject matter.<sup>83</sup> Recognizing that claim definiteness is likely to be an issue in respect to this subject matter, the guidelines offer some suggestions for depicting animated designs in design patent drawings.<sup>84</sup> The examples below (depicting Microsoft's Windows 8 tile design and Apple's keyboard design<sup>85</sup>) are illustrative.



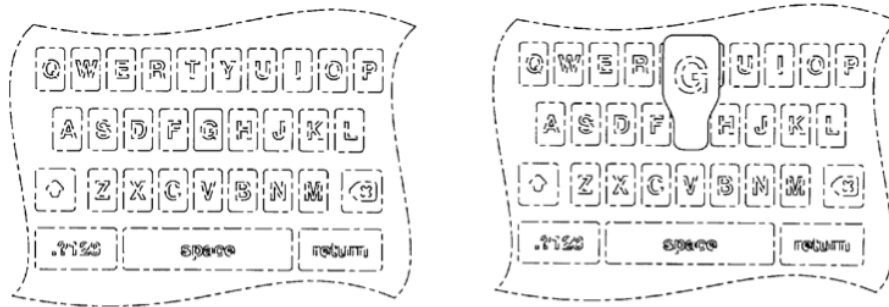
computer screen, monitor, other display panel, or a portion thereof, in either solid or broken lines, reject the claimed design under 35 U.S.C. 171 for failing to comply with the article of manufacture requirement.”).

82. Indeed, the guidelines have not been updated to reflect the language of the current drawings regulations, which now refer to drawings that depict the appearance of the “design” rather than the “article.” See *supra* note 52 and accompanying text.

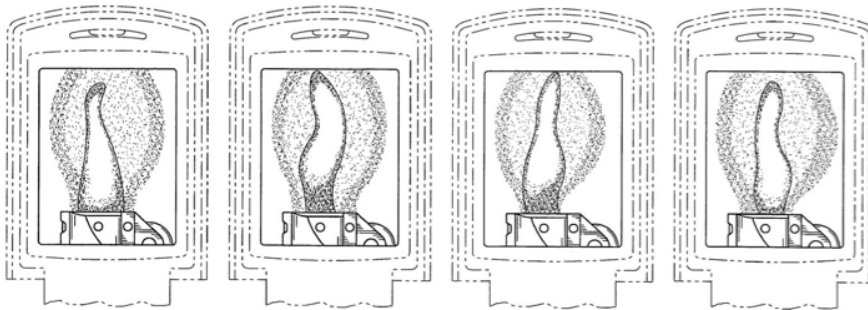
83. The guidelines seem to see this topic as without controversy, and do not even bother to cite *Hruby* as the foundation for this rule.

84. MPEP, *supra* note 27, § 1504.01(a) (“Such a claim may be shown in two or more views. The images are understood as viewed sequentially, no ornamental aspects are attributed to the process or period in which one image changes into another. A descriptive statement must be included in the specification describing the transitional nature of the design and making it clear that the scope of the claim does not include anything that is not shown.”).

85. Display Screen with Animated User Interface, U.S. Patent No. D643,851 (filed Jun. 25, 2010) (issued Aug. 23, 2011) (from the WINDOWS 8 operating system, showing how a block of tiles move in response to a user input conveyed through a touchscreen, leaving the bottom row of tiles partially visible); Animated Graphical User Interface for a Display Screen or Portion Thereof, U.S. Patent No. D621,848 (filed Jul. 30, 2007) (issued Aug. 17, 2010). Apple’s slide-to-unlock design is another well-known example. Animated Graphical User Interfaces for a Display Screen or Portion Thereof, U.S. Patent No. D621,849 (filed Jul. 30, 2007) (issued Aug. 17, 2010).



Other examples are slightly more amusing—such as Alltel’s flickering mobile phone (concert) lighter.<sup>86</sup>



In sum, the USPTO practice has equilibrated around a concept that we regard as relatively conservative: an embedded virtual design constitutes eligible subject matter because it is self-evident that such a design is associated with a computer display and integral with the operation of that display. As the examples depicted above illustrate, the representation of the computer display is now typically rendered as a stylized square or rectangle in broken lines; it conveys no information other than the fact that the virtual design is indeed applied to an article of manufacture. We regard this as sufficient to comply with the mandate of the statute and the rules developed over many decades of design patent jurisprudence, although there can be little doubt that this approach is the type of lawyer’s trick that tends to raise eyebrows among those unfamiliar with the progression of the jurisprudence. However, it raises further

86. Moving Image for the Display Screen of a Wireless Communication Device, U.S. Patent No. D549,715 (filed Jul. 10, 2006) (issued Aug. 28, 2007) (pictured above); Moving Image for the Display Screen of a Wireless Communication Device, U.S. Patent No. D577,035 (filed Jul. 10, 2006) (issued Sept. 16, 2008); Moving Image for the Display Screen of a Wireless Communication Device, U.S. Patent No. D589,520 (filed Feb. 28, 2008) (issued Mar. 31, 2009).

questions about whether this doctrine can be stretched to cover the next generation of virtual designs that extend beyond graphical interfaces and into real space, such as holograms. Courts have not yet confronted the article of manufacture requirement in a case on virtual designs, although it seems likely that they will.<sup>87</sup>

## II. VIRTUAL DESIGNS AT THE USPTO: AN EMPIRICAL ANALYSIS

In order to learn more about how design patents for virtual designs are used and how they might differ from other design patents, we constructed a dataset with every virtual design patent granted by the USPTO for a virtual design (i.e., classes D14/485-495).<sup>88</sup> For comparison, we also randomly sampled design patents from alternative classes during the same time period until we had an equal number of observations in both samples.<sup>89</sup> Both were generated directly from the USPTO's website or from the bulk downloads it makes available through Google.<sup>90</sup>

While we are confident that our dataset includes all issued design patents on virtual designs through November 2012,<sup>91</sup> it is not possible for us to verify that we have captured all the data from filed applications in this sector. Design patent applications are not subject to any publication requirement,<sup>92</sup> so it is conceivable that any number of design patent applications were filed and abandoned prior to issuance. The prosecution files of such applications are not accessible to the public, so our dataset does not include them. Of course, it is thought that the USPTO issues about 90% of the design patent applications it receives, and if this estimate holds true for virtual design patent applications, we can be assured that the problem of inaccessible filings is a relatively minor one.<sup>93</sup>

In this Part, we provide a basic overview of patenting in the generated

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87. Insofar as we can tell, the article of manufacture issue was not raised in the *Apple v. Samsung* litigation, although the case did involve one design patent claiming a virtual design. See *infra* note 97 and accompanying text.

88. The USPTO classification scheme uses the phrase "generated images." We prefer "virtual designs," but, where useful for clarity in this Part, we have adopted the USPTO's usage.

89. Both samples contain 3546 observations.

90. See *Press Release 10-22: USPTO Teams with Google to Provide Bulk Patent and Trademark Data to the Public*, U.S. PAT. & TRADEMARK OFF. (June 2, 2010), [http://www.uspto.gov/news/pr/2010/10\\_22.jsp](http://www.uspto.gov/news/pr/2010/10_22.jsp).

91. This dataset was first collected in March 2012 and updated in November 2012.

92. 35 U.S.C. § 122 (2011) (authorizing the publication of utility patent applications 18 months from their earliest filing date under specified circumstances).

93. Dennis D. Crouch, *A Trademark Justification for Design Patent Rights* 18 (Univ. of Mo. Sch. of Law Legal Studies, Research Paper No. 2010-17, 2010), available at <http://ssrn.com/abstract=1656590>.

image design classes at the USPTO. Then, we turn to backward citation and rejection data to draw insights on patent quality. And, finally, we conclude with a brief survey of comparative patent value based on forward citation data.

### A. Overview

Virtual designs are among the fastest growing segments of design patent filings at the USPTO.<sup>94</sup> While they are predominantly owned by a small segment of software and consumer electronics producers, over the last five years these companies' share of annually granted patents has generally decreased as patenting has become more diverse in other business segments.<sup>95</sup> Despite their popularity, relatively little is known about the characteristics of the design patents they are acquiring. Indeed, virtual designs run the gamut of styles—from skeuomorphic designs relying on metaphors to real-world tasks, to minimalistic flat designs divorced from reality—and yet, almost no attention has been paid to how these practices have translated into design patents. In the following section, we begin by surveying the different forms of virtual designs that are recognized by the USPTO's classification system and we conclude by inspecting their grant and pendency rates.

#### 1. Types of protectable virtual designs by design patent class

The USPTO classifies all virtual designs in this sector under its generic generated image parent class (D14/485).<sup>96</sup> Within generated images, the principal subclasses include menus (D14/486), button bars (D14/487), plural images (D14/488), and icons (D14/489). Some popular examples of each respective subclass include: Apple's iOS menu,<sup>97</sup> which played a central role in its litigation with Samsung; Xerox's button bar,<sup>98</sup> which was pivotal to the patenting of button and menu bars; RIM's set of mobile operating system icons,<sup>99</sup> which is still one of the most cited generated image patents ever

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94. David R. Gerk, Office of Policy & External Affairs, USPTO, Address at The Future of Design Protection Conference (Nov. 2, 2012), *available at* <http://ip.indiana.edu/the-future-of-design-protection>.

95. *See infra* Subpart III.A.2.

96. *See infra* Appendix A Table 1. These calculations necessitate two important caveats. First, the computer icon subclasses were incorporated with their parent class (i.e., D14/489 includes D14/490-495). Second, class calculations inevitably include some double counting. In our sample of 3546 generated image patents, 410 listed more than one generated image class. These percentages were calculated by using the inflated number ( $n = 3956$ ).

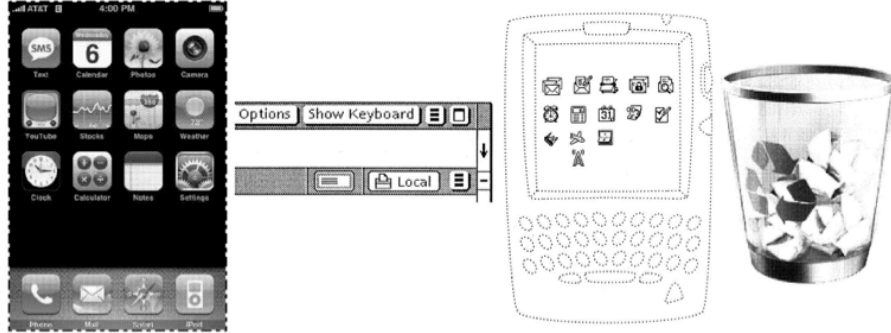
97. Graphical User Interface for A Display Screen or Portion Thereof, U.S. Patent No. D604,305 fig.1 (filed Jun. 23, 2007) (issued Nov. 17, 2009) (pictured left).

98. Icon for PC Emulation Window or the Like, U.S. Patent No. D296,114 (filed Dec. 9, 1985) fig.2 (issued Jun 7, 1988) (pictured center left).

99. Set of Icons for Mobile Communication Device Display, U.S. Patent No.

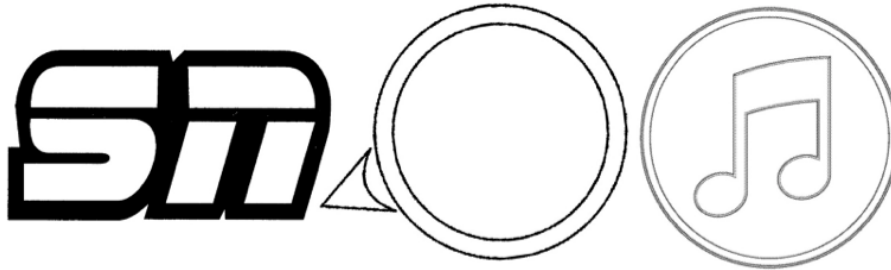


granted; and lastly Microsoft's trash can icon, which is one of the most widely recognized icons in the world.<sup>100</sup>



Of these subclasses, menus and icons are the most popular—comprising about 27% and 41% of all generated images.<sup>101</sup>

The icons subclass also contains subordinate classes for (1) letters, numbers, or words (D14/490), (2) arrows (D14/491), and (3) simulative icons (D14/492). Well-known examples of each respective class include Disney's Sports Nation icon,<sup>102</sup> Google's map arrow,<sup>103</sup> and Apple's iTunes icon.<sup>104</sup>



D445,428 (filed Apr. 5, 2000) (issued Jul. 24, 2001) (pictured center right).

100. Icon for a Portion of a Display Screen, U.S. Patent No. D536,002 (filed Apr. 22, 2005) (issued Jan. 30, 2007) (pictured right).

101. See *infra* Appendix A Table 1 (partially full trash can); see also Icon for a Portion of a Display Screen, U.S. Patent No. D536,000 (filed Feb. 8, 2006) (issued Jan. 30, 2007) (full trash can); Icon for a Portion of a Display Screen, U.S. Patent No. D535,662 (filed Apr. 22, 2005) (issued Jan. 23, 2007) (empty trash can).

102. Portion of a Computer Screen with an Icon Image, U.S. Patent No. D561,194 fig.1 (filed Mar. 8, 2006) (issued Feb. 5, 2008) (left).

103. Electronic Device With a Graphical Display Element, U.S. Patent No. D651,613 fig.2 (filed May 10, 2010) (issued Jan. 3, 2012) (center).

104. Display Screen or portion thereof with Icon, U.S. Patent No. D668,263 (filed Oct. 8, 2010) (issued Oct. 2, 2012) (right).

Within these icon subclasses, simulative icons make up 75% of the grants.<sup>105</sup> Because of their popularity, they include subclasses for documents (D14/493) and animal or human forms (D14/494-495). Sony's playlist document,<sup>106</sup> Microsoft's fish screensaver,<sup>107</sup> and Sega's (Virtua Fighter) video game character are popular examples of these three classes.<sup>108</sup>



Between documents and the two living form subclasses, they are granted in roughly equal quantities.<sup>109</sup>

The USPTO does not separately classify animated virtual designs. In order to identify them in our dataset, we performed keyword searches using the unique terms recommended by the MPEP.<sup>110</sup> Next, we manually read through each patent's claims and drawings to filter out false positives.<sup>111</sup> Of the 3,546

105. See *infra* Appendix A Table 1; *supra* text accompanying note 96 (explaining the potential for double counting).

106. Computer Generated Image For a Display Panel or Screen, U.S. Patent No. D552,123 (filed Nov. 10, 2005) (issued Oct. 2, 2007) (left).

107. Graphical User Interface for a Portion of a Display Screen, U.S. Patent No. D629,006 (filed May 22, 2009) (issued Dec. 14, 2010) (center).

108. Portion of an Electronic Display with a Computer Generated Image, U.S. Patent No. D503,407 (filed Sep. 6, 2001) (issued Mar. 29, 2005) (right). Special thanks to Sebastian Napoli, Engin Inci, Marian Stoll, and Matt Machczynski for helping us identify this character.

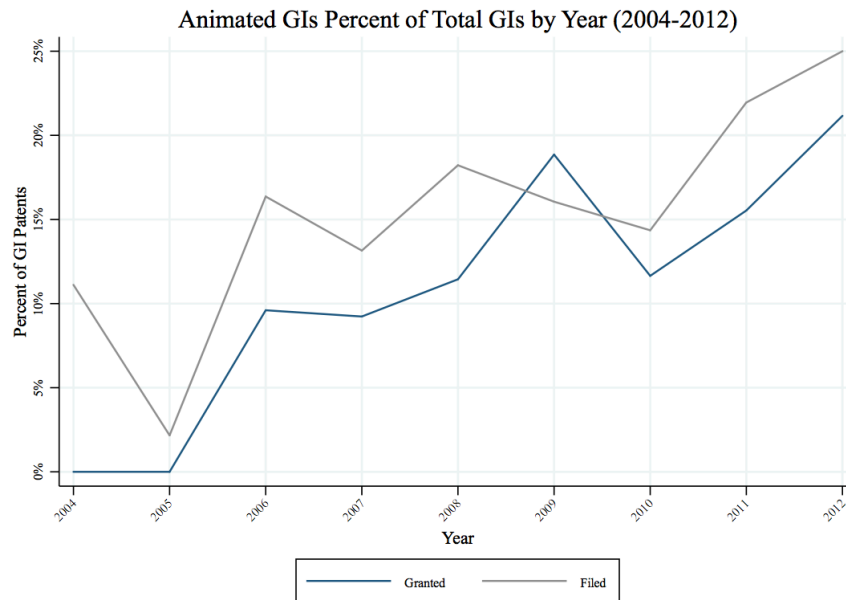
109. See *infra* Appendix A Table 1 (46% and 54%, respectively); *supra* text accompanying note 96 (explaining the potential for double counting).

110. The MPEP mandates that a descriptive statement be included in the specification indicating that the design is animated and that the scope of the patent is limited to the sequence of images disclosed in the patent. MPEP, *supra* note 27, § 1504.01(a)(IV). In the examples provided by the MPEP, some unique terms—such as “transitional,” “process,” “sequence,” and “change”—occur several times. We performed keyword searches for these terms in each patent's title, description, and claims (e.g., sequence, sequential, process, transition, change, or “animat”). If one or more of the keywords were found, the patent was flagged as a potential animated virtual design.

111. Our keyword searches initially identified 433 animated generated image patents. Most of the false positives related to the use of the term “process” by Xerox. See, e.g., Touch Base User Interface Serv. Selection Icon for a Portion of an Image Processing Mach., U.S.

patents for virtual designs in our sample, 393 or about 11% are animated. Since 2006,<sup>112</sup> when the USPTO granted the first design patent for an animated virtual design,<sup>113</sup> design patents of that type have made up almost 14% of the total number of design patents granted on virtual designs (referred to as generated images or “GIs” below) each year, and this share continues to grow.<sup>114</sup>

GRAPH 1



Patent No. D498,763 (filed May 3, 2004) (issued Nov. 23, 2004).

112. The MPEP was updated in August 2006 to reflect the USPTO’s allowance of animated generated images and guidelines were included for noting the design’s transitional nature. David Leason, *Design Patent Protection for Animated Computer-Generated Icons*, 91 J. PAT. & TRADEMARK OFF. SOC’Y 580, 590 (2009).

113. See *Animated Image for a Portion of a Display Screen*, U.S. Patent No. D522,016 (filed Aug. 3, 2004) (issued May 30, 2006). Microsoft was the first to file an animated generated image patent application in February 2004. See, e.g., *Animated Image for a Portion of a Display Screen*, U.S. Patent No. D527,010 (filed Feb. 20, 2004) (issued Aug. 22, 2006); *Animated Image for a Portion of a Display Screen*, U.S. Patent No. D528,123 (filed Feb. 20, 2004) (issued Sept. 12, 2006); *Animated Image for a Portion of a Display Screen*, U.S. Patent No. D528,554 (filed Feb. 20, 2004) (issued Sept. 19, 2006). However, Verizon is commonly cited as the first because of the publicity that its *Ex parte Quayle* action received. See Leason, *supra* note 112, at 586-90 (noting its importance and coincidental timing with Microsoft’s applications).

114. See *infra* Appendix A Table 2 (providing annual totals and the percent of total generated images and design patents).

In the five major generated image subclasses (i.e., menus D14/486, button bars D14/487, plural images D14/488, and icons D14/489) animated designs respectively comprise 17.4%, 11.9%, 38.2%, and 16.5%.<sup>115</sup>

## 2. Patenting and pendency

At the time of this study, the USPTO had granted 3,546 design patents for virtual designs.<sup>116</sup> By most accounts,<sup>117</sup> the first patent applications were simultaneously filed in 1985 and granted in 1988 to Xerox for four different computer icon designs.<sup>118</sup> These included classic designs for a wastebasket,<sup>119</sup> PC emulator,<sup>120</sup> and folders.<sup>121</sup>

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115. See *infra* Appendix A Table 1. In our sample of 393 animated generated image patents, 62 listed more than one generated image class. These percentages were calculated by using the inflated number ( $n = 455$ ).

116. The oldest design patent in our study, directed to a series of illustrations for children's stories, was filed earlier (in 1977), granted in 1980, and later reclassified as a virtual design. Font of Illustration Figures for Children's Stories & Cards, U.S. Patent No. D254,379 (filed Apr. 18, 1977) (issued Mar. 4, 1980).

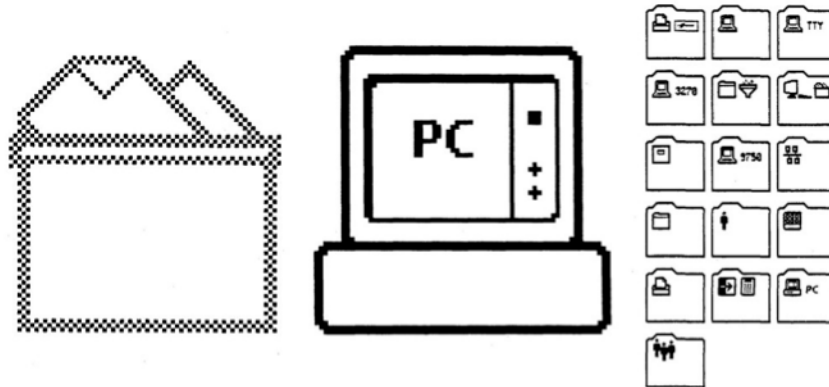
117. See, e.g., David A. Einhorn, *Copyright and Patent Protection for Computer Software: Are They Mutually Exclusive?*, 30 IDEA 265, 269 (1990).

118. Xerox actually filed six design patents on October 28, 1985, but only four of these were granted during this first USPTO wave on May 10, 1988. *Compare* Icon for Dividers or the Like, U.S. Patent No. D295,631 (filed Oct. 28, 1985) (issued May 10, 1988), *and* Icon for Wastebasket or the Like, U.S. Patent No. D295,632 (filed Oct. 28, 1985) (issued May 10, 1988), *and* Icon for PC Emulation or the Like, U.S. Patent No. D295,633 (filed Oct. 28, 1985) (issued May 10, 1988), *and* Icon for Application Program or the Like, U.S. Patent No. D295,634 (filed Oct. 28, 1985) (issued May 10, 1988), *with* Icon for Local Directory or the Like, U.S. Patent No. D296,705 (filed Oct. 28, 1985) (issued July 12, 1988), *and* Icon for a Prop. Sheet or the Like, U.S. Patent No. D297,243 (filed Oct. 28, 1985) (issued Aug. 6, 1988). However, Xerox was granted four additional design patents for computer icons on the same date (May 10, 1988) for applications it had filed a few months later in December. See Icon for User Profile or the Like, U.S. Patent No. D295,630 (filed Dec. 9, 1985) (issued May 10, 1988); Icon for Icon Editor or the Like, U.S. Patent No. D295,635 (filed Dec. 9, 1985) (issued May 10, 1988); Icon for Loader or the Like, U.S. Patent No. D295,636 (filed Dec. 9, 1985) (issued May 10, 1988); Icon for Broken Document or the Like, U.S. Patent No. D295,637 (filed Dec. 9, 1985) (issued May 10, 1988).

119. Icon for Wastebasket or the Like, U.S. Patent No. D295,632 (filed Oct. 28, 1985) (issued May 10, 1988) (left).

120. Icon for PC Emulation or the Like, U.S. Patent No. D295,633 (filed Oct. 28, 1985) (issued May 10, 1988) (center).

121. Icon for Dividers or the Like, U.S. Patent No. D295,631 (filed Oct. 28, 1985) (issued May 10, 1988) (right).



That year Xerox was granted twenty-one design patents but was not granted another until the USPTO issued its interim MPEP guidelines in 1995.<sup>122</sup>

Within a year after the MPEP guidelines were finalized, more design patents were granted for virtual designs than in the previous twenty years combined.<sup>123</sup>

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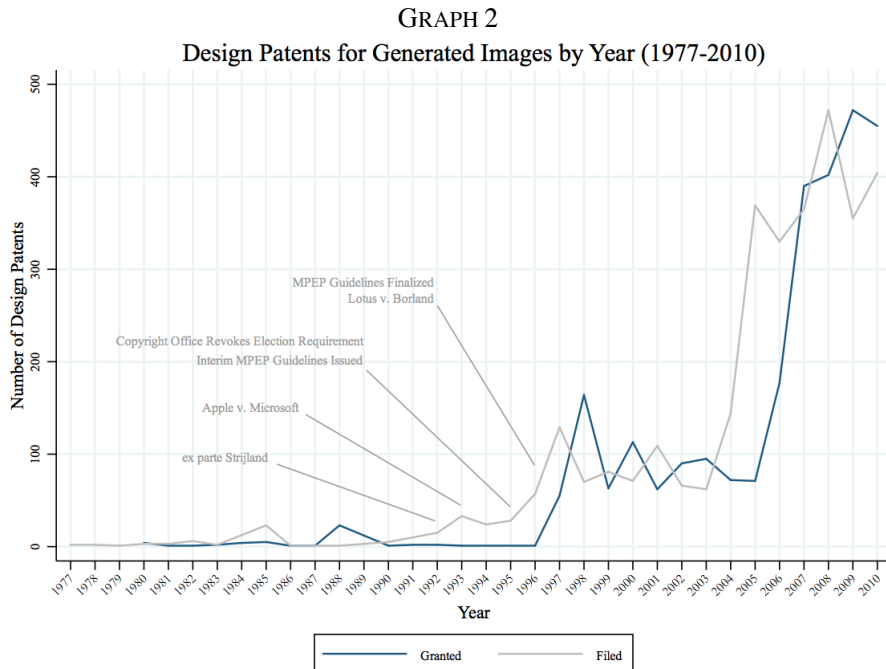
122. MPEP, *supra* note 27, § 1504.01(a); *see supra* Subpart I.B.

123. In 1997, 55 design patents for virtual designs were granted but only 49 were granted during the previous twenty years. *See infra* Appendix A Table 1. Many of these early design patents include reclassified virtual designs. In other words, the rise was even more acute.

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After the initial influx, the number of filings and grants remained relatively stable through the early 2000s.<sup>124</sup> Before this period, even at its height in 1998, virtual designs never comprised more than 1.11% of the total design patents granted.<sup>125</sup> However, in 2004 and 2005 that number increased abruptly. Before this period, institutional and judicial decisions largely explained filing fluctuations, but these internal events do not explain what caused the dramatic increases in 2003 and 2004. Instead, inspection of individual application filings, and the identities of the filers, is illuminating.

One manufacturer is primarily responsible for the increase in design patent application filings for virtual designs in 2003-04: Microsoft. In 2003, it filed only four design patents for virtual designs,<sup>126</sup> but the following two years it dramatically increased its filings to 54 and 211 applications respectively (or 37.5% and 57.18% of the total generated images filed).<sup>127</sup> Though Microsoft has remained a dominant filer in this area, its annual percentage of total patents

124. Because design patents are not subject to a publication requirement, these filing counts are tied to applications that were eventually granted. *See supra* text accompanying note 92. They do not reflect applications that were abandoned. *See infra* Appendix A Table 11 (providing filings with abandonments for 2000 to 2010).

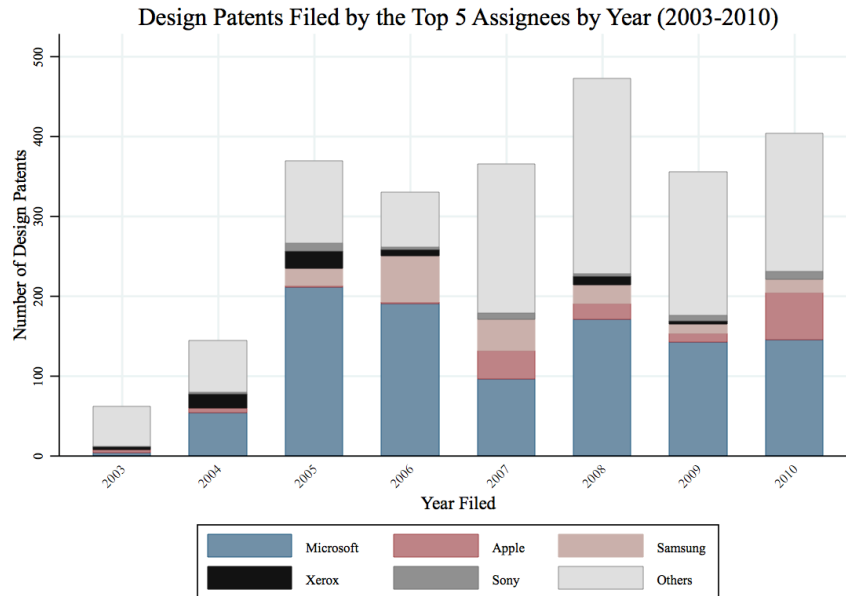
125. *See infra* Appendix A Table 3; *infra* Appendix B Graph 1.

126. *See infra* Appendix A Table 4.

127. *Id.*

for virtual designs has declined in most years since the initial influx.<sup>128</sup>

GRAPH 3



The top filers<sup>129</sup> today include: Microsoft, Apple, Samsung, Xerox and Sony.<sup>130</sup> From 2006 to November 2012, they were granted between 50 and 78.20% of the total virtual design patents annually (or almost 60% on average). In total, they own 51.14% of all virtual design patents ever granted, but Microsoft still owns the lion's share at 34.52%.<sup>131</sup>

128. For a closer look at design patents *granted* to the top five assignees, see *infra* Appendix B Graph 2.

129. This information is based on the (initial) recorded assignee listed on the face of the patent and does not reflect whether the patent subsequently changed hands. While cleaning the data, we also consolidated known subsidiaries.

130. This list reflects the top five virtual design filers since the regime's inception, so it may not necessarily reflect the top five filers from 2003 to 2010. Respectively, these companies own 34.52%, 6.49%, 4.88%, 2.99%, and 2.26% of the total design patents for virtual designs granted. See *infra* Appendix A Table 5.

131. We also separately studied the pattern of ownership for animated virtual designs, finding a pattern similar to that for virtual designs generally. In particular, design patents on animated virtual designs follow a similarly top-heavy ownership trend. Microsoft currently leads the way with 58.78% of the total animated generated image patents. Rounding out the top five are Samsung (3.82%), Dassault Systèmes (3.31%), Apple (3.05%), and Adobe/HTC (2.80%).

As Graph 3 reflects, large firms dominate the virtual design patent landscape. Despite the unique advantages over other forms of intellectual property rights detailed in previous sections, small companies are either not relying on intellectual property protection for generated images or they are more heavily relying on copyright or trademark. This is somewhat curious because the low barrier to entry in this sector should drive filing diversity. Moreover, the ubiquitous nature of LCDs in today's consumer electronics and general web presence of most firms would all seem to predict heterogeneity and less concentrated firm-level patenting. Yet the data does not support this prediction.

While the top five patentees are all software and consumer electronics producers, firms from other sectors are beginning to develop design patent portfolios featuring virtual designs. Today, the quickest expanding sector is internet or web-based companies.<sup>132</sup> Yahoo owns the sixth highest share of generated image patents (1.64%),<sup>133</sup> and companies like Google, AOL, Facebook, and Amazon are starting to play catch up.<sup>134</sup> Although design patents would appear to help these companies protect aspects of the user's experience that are critical to their business models, the pace of innovation in these sectors is likely to limit patenting because by the time the patent is granted, the design feature or user experience may be outdated. That is, the private cost of patenting in this sector may outweigh its lottery effect. Additionally, producers may have recourse in copyright or trademark, at least as a fallback or safety net, although the limitations of those forms of protection, particularly trademark, may be substantial.

In addition, a number of firms having no apparent tie to consumer electronics or online business appear to be securing design patents on virtual designs as part of a general branding strategy. While trademark protection surely remains the chief vehicle for establishing intellectual property rights in logos and the like, design patents have also been playing a role. Pepsi Co. is the largest patentee employing this strategy—making it the seventh largest virtual design patentee (1.61%).<sup>135</sup> Instead of merely seeking Lanham Act registration for various marks (especially logo marks), Pepsi Co. has also filed applications for design patents, claiming the logos as surface ornamentation for a beverage and as embedded in a display screen.<sup>136</sup> This practice presumably reflects the

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132. To be clear, we are not referring to any company with a web presence.

133. See *infra* Appendix A Table 5.

134. Google owns 29 generated image design patents and AOL owns 25. Facebook and Amazon are just getting started (with a mere 3 and 8 patents, respectively).

135. See *infra* Appendix A Table 5.

136. See, e.g., Container with Surface Ornamentation, U.S. Patent No. D614,485 (filed Oct. 3, 2008) (issued Apr. 27, 2010) (classified in D9/434 as an element or attachment of a bottle, container, or can, and D14/490 as a generated image letter, number, or word); Display Screen with Icon or Packaging with Surface Ornamentation, U.S. Patent No. D613,304 (filed



firm's intention to use these slogans online or in marketing materials that utilize digital displays (e.g., digital billboards, soda machines, etc.).<sup>137</sup>

Although the number of virtual design patents continues to rise as its firm concentration diffuses, this data does not tell us anything about how these applications are being treated by the USPTO. For this, we turn to pendency rates.<sup>138</sup> Depicted below with reference points for MPEP changes is the average annual pendency of design patents that did not file for accelerated examination.<sup>139</sup>

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Nov. 7, 2008) (issued Apr. 6, 2010) (classified in D9/434 as an element or attachment of a bottle, container, or can, and D14/490 as a generated image letter, number, or word).

137. For example, Pepsi Co.'s rotating globular design is commonly featured online and in its television advertisements. *See* Display Screen with an Animated Color Image, U.S. Patent No. D601,573 (filed Oct. 3, 2008) (issued Oct. 6, 2009).

138. Using the two samples detailed above, we linked our dataset with the USPTO's PAIR system in order to identify whether the applicant filed for accelerated examination (i.e., rocket docket).

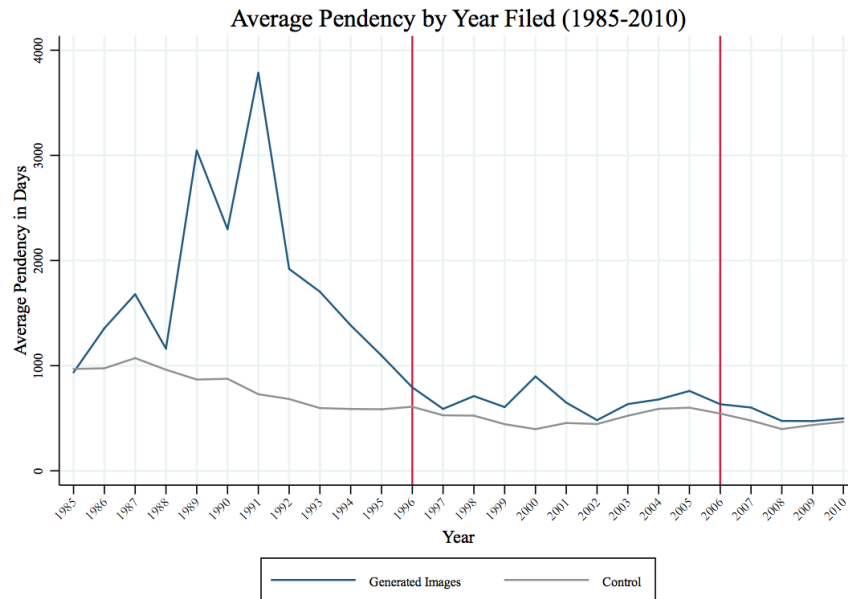
139. The graph begins in 1985 in order to match the filing date of the first (non-reclassified) Xerox patents and ends in 2010 to avoid distorting the means with newly filed and quickly granted patents. The mean pendency for patents granted over the last three years from our entire dataset—excluding those filing for accelerated examination—was about 491 days or a little over one year and four months, and had a standard deviation of almost 310 days. If we included pendency rates from observations that were filed less than two years from the end of our dataset in November 2012, then our calculations would be skewed by a much higher concentration of short pendency patents. As a result, all of the graphs in this paper that are tied to filing dates stop at 2010. While we could have used grant dates here instead, they would not adequately reflect changing applicant behavior after the MPEP amendments.

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GRAPH 4



Virtual design patents granted in 2012 had an average pendency of about 562 days and our control had an average pendency of about 408 days (median of 558 and 368 days, respectively).<sup>140</sup> Overall, pendency rates are generally decreasing over time for both the virtual design patent applications and the control group. Applications for virtual designs appear to have longer pendency times than do applications in the control group, on average.<sup>141</sup> This seems to be true even if one discards the pre-1996 observations as outliers (on the ground that they pre-date the USPTO's adoption of the MPEP section on virtual designs).<sup>142</sup>

To test the hypothesis that patent application pendency times for virtual designs were longer on average than those of the control group, bivariate comparisons were made between these samples.<sup>143</sup> Before we began, however, we removed the animated virtual designs to ensure that any potential variation

140. The average pendency rate for virtual design patents granted in 2012 requesting expedited prosecution was 338 days ( $n = 112$ ) and it was an even faster 191 days ( $n = 12$ ) for our control (medians of 330 and 134, respectively).

141. The pre-1996 observations are highly outlier driven due, in part, to the limited number of filings before the MPEP changes.

142. See *infra* Appendix A Table 3 (detailing annual filings counts).

143. In this case, an independent two-sample Student's  $t$ -test was utilized to test for significance. We also conducted Bartlett's tests for homogeneity of variances beforehand.

between our populations was not driven by differences between animated and static virtual designs.<sup>144</sup> To account for uncertainty before the USPTO's official MPEP changes in 1996, which might have positively skewed our pendency rate's distribution, we conducted the analysis twice: once for the dataset as a whole and once for patents filed after the MPEP's publication. The descriptive statistics are reported in days below.<sup>145</sup>

TABLE 1: PATENT PENDENCY FOR STATIC VIRTUAL DESIGNS

	Full Dataset		Filed 1997-2012	
	<i>GIs</i>	<i>Control</i>	<i>GIs</i>	<i>Control</i>
Mean	636.19	576.76	578.86	466.96
Median	552	505	529	418
Stand. Dev.	401.86	295.97	270.01	230.88
Min	76	74	76	83
Max	7270	2560	4004	2344
<i>n</i>	2991	3524	2771	2357
<i>p</i> -value		0***		0***
Significant		Yes		Yes

The average pendency of applications for virtual designs was about 636 days—that is, 59 days longer than our control.<sup>146</sup> Even after excluding applications filed before 1997 the gap actually grew—increasing from 59 to 112 days. And, both differences were statistically significant.<sup>147</sup> When compared to the annual

144. We also tested them separately to look for potential differences between the normal pendency rates of animated and static virtual designs. Similar to above, in order to control for the USPTO's changes, we conducted our analysis twice (i.e., full dataset and post-MPEP change). While our analysis on the entire dataset indicates significant differences between animated and static virtual designs, the post-2006 results tell a different story. For design patents applications filed after the MPEP's change to animated virtual designs in 2006, the pendency rate of animated virtual designs was about 499 days and the rate of static virtual designs was about 497 days. These results were not significant, meaning that we cannot rule out that our two-day variation was caused by chance or random sampling error. The most salient interpretation of our data is that after the MPEP changes for animated virtual designs became effective, the USPTO began treating animated and static virtual designs similarly. *See infra* Appendix A Table 6.

145. Significance denoted by: \* *p*-value < 0.10, \*\* *p*-value < 0.05, and \*\*\* *p*-value < 0.01. We use this notation throughout this paper and the appendices.

146. In the 2012 fiscal year, the average pendency rate for utility patents was 32.4 months or about 972 days. U.S. PATENT & TRADEMARK OFFICE, PERFORMANCE AND ACCOUNTABILITY REPORT: FISCAL YEAR 2012 2 (2012), available at <http://www.uspto.gov/about/stratplan/ar/USPTOFY2012PAR.pdf>. The average time to first office action was a similarly pedestrian 21.9 months or about 657 days. *Id.* In other words, if filed on the same date, the average design patent application will be granted before the average utility patent will even begin its examination.

147. When testing the full dataset for significance an unequal *t*-test was used (Bartlett  $\chi^2(1) = 17.09***$ ). However, our post-1996 observations necessitated utilizing an equal *t*-test

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trends, our data indicates that pendency rates for applications on other forms of protectable subject matter are dropping at a faster rate than for virtual designs.

We also were curious to see whether the special expedited<sup>148</sup> application procedures available to design patent applicants had any differential effect on the pendencies of static<sup>149</sup> virtual design patent applications as compared to the control group.<sup>150</sup> This procedure has become popular with virtual designs<sup>151</sup> and is reflective of their comparatively short development cycles and shelf lives. The descriptive statistics and bivariate comparisons are reported in Table 2 below.<sup>152</sup>

TABLE 2: EXPEDITED PATENT PENDENCY FOR STATIC VIRTUAL DESIGNS

All (1st filed in 2004)		
	<i>GIs</i>	<i>Control</i>
Mean	348.95	200.41
Median	318.5	143
Stand. Dev.	135.72	133.28
Min	95	77
Max	928	627
<i>n</i>	162	22
<i>p</i> -value		0***
Significant		Yes

The average pendency of virtual design filings for accelerated examination was

(Bartlett  $\chi^2(1) = 1.27$ ). All test statistics reported in log.

148. Our data does not distinguish between expedited and accelerated examination. In this section, we will refer to them both collectively as expedited review.

149. We also tested to see if there were distinctions in expedited pendency rates between animated and static virtual designs. In order to avoid skewing means with pre-MPEP observations, we focused on expedited filings made after 2006 (i.e., 2007 forward). The descriptive statistics and bivariate comparisons are reported below in Appendix A at Table 7. On average, expedited pendency rates for animated virtual designs were about 341 days and static virtual designs were about 316 days. However, these results were not significant. Like normal pendency rates, we could not rule out whether this variation was caused by chance. *Infra* Appendix A Table 6.

150. Similar to above, first, we excluded animated virtual designs. However, because our first observation was filed after the 1997 MPEP changes, we did not need to test twice.

151. In our dataset, of the 450 virtual design patents granted in 2012, 112 of the applicants requested expedited treatment (about 25%). By comparison, in our control only about 12 of 423 applicants (about 3%) requested expedited treatment.

152. A nonparametric test was utilized because the data was not normally distributed and standard transformation techniques were not appropriate. Additionally, the large difference in sample sizes, one of which was very small ( $n = 22$ ), and standard deviations in both populations by comparison to their means all pointed to using a Wilcoxon-Z test. For the sake of completeness, however, we also conducted an unequal ( $\chi^2(1) = 7.18^{***}$ ) *t*-test after transforming the data with log. The results from the *t*-test confirm the Wilcoxon-Z test's above (*p*-value = 0\*\*\*).

just under a year at 349 days.<sup>153</sup> On the other hand, the average pendency rate of our control was even more expedient at 200 days,<sup>154</sup> decreasing the number of days by almost 43% over virtual designs that filed for accelerated examination. And, these results were again statistically significant.<sup>155</sup> By comparison to design patent applications not filing for expedited review during the same time period, on average virtual designs shaved off about 205 days and our control saved about 248 days.<sup>156</sup>

In summary, though steadily increasing patent grants for virtual designs indicates that applicants see design patents as a viable mechanism for protecting innovation in this area, greater pendency rates for virtual designs hint at a deeper fissure—reflecting distinct applicant behavior or treatment by the USPTO of this new subject matter.

### B. *Patent Quality: A Prosecution Narrative*

Critiques of patent quality have become a familiar motif in the utility patent literature, and we are beginning to see similar rumblings about design patents,<sup>157</sup> including design patents for virtual designs. Some such critiques are directed at perceived quality problems with individual design patents, such as Apple's page-turn design.<sup>158</sup> Others have suggested that quality concerns surrounding these types of design patents indicate deeper problems with the system as a whole.<sup>159</sup> We sought to address the quality claims empirically, using techniques that have been used commonly to assess the quality of utility

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153. For comparison, virtual design patents granted in 2012 under the expedited procedures were granted on average in about 338 days ( $n = 112$ ; median = 330; standard deviation = 82).

154. For comparison, design patents in our control group granted in 2012 under the expedited procedures were granted on average in about 191 days ( $n = 12$ ; median = 134; standard deviation = 155).

155. Wilcoxon- $Z = 4.88$ .

156. The average pendency for design patent applications filed from 2005 forward was 553.88 days for virtual designs and 448.01 days for our control.

157. We have contributed to this genre, although our focus was not on design patent quality per se but on larger systemic and institutional concerns. See Du Mont & Janis, *Origins*, *supra* note 11, at 874-79 (questioning the wisdom of the wholesale incorporation of utility patent concepts into design patent law, and offering a historical analysis in support); see also Jason J. Du Mont, *A Non-Obvious Design: Reexamining the Origins of the Design Patent Standard*, 45 GONZ. L. REV. 531 (2010).

158. See, e.g., Nick Bilton, *Apple Now Owns the Page Turn*, N.Y. TIMES (Nov. 16, 2012), <http://bits.blogs.nytimes.com/2012/11/16/apple-now-owns-the-page-turn>; see also Display Screen Portion with Animated Graphical User Interface, U.S. Patent No. D669,906 (filed May 5, 2011) (issued Oct. 30, 2012).

159. See, e.g., Charles Babcock, *Apple Worked a Broken Patent System*, INFORMATIONWEEK (Aug. 31, 2012), <http://www.informationweek.com/mobility/smart-phones/apple-worked-a-broken-patent-system/240006568>.

patents. In particular, we have analyzed backward citations and direct evidence from USPTO rejections in both our sample and our control as the basis for some conclusions about design patent quality for virtual designs.<sup>160</sup> As we detail below, our empirical analysis shows that the USPTO scrutinizes applications for virtual designs at least as strictly as it does other subject matter, and, by several measures, more strictly.

1. *Backward citations: applicant and examiner submitted*

Like utility patents, design patents generally cite to a diverse array of prior art, including U.S. patents (i.e., utility patents, design patents, and applications), documents that reflect the grant of foreign intellectual property rights, and other forms of prior art, like printed publications and websites.<sup>161</sup> A look at the average number of backward citations by prior art category reveals how they have changed over time for virtual designs.

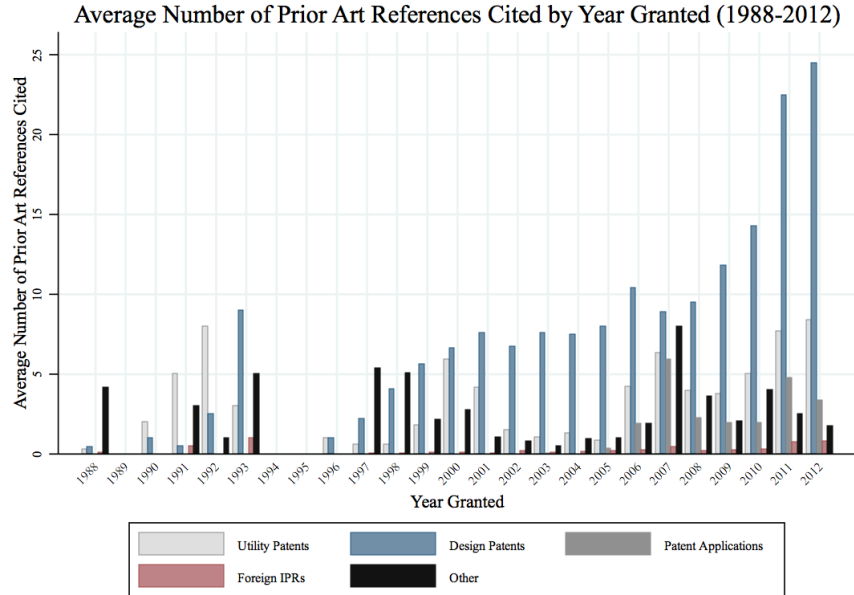
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160. The most commonly utilized indicators of *utility* patent quality include the number of claims, forward citations, backward citations, and family size. *See, e.g.*, Jean O. Lanjouw & Mark Schankerman, *Patent Quality and Research Productivity: Managing Innovation with Multiple Indicators*, 114 *ECON. J.* 441, 448 (2004). Similarly, economists use these quality indicators as proxies for patent value too. We utilize forward citations in our discussion of design patent value. *See infra* Part III.C.

We did not examine the number of claims or family size because these metrics did not seem applicable to design patents. In the U.S., design patents only have one claim. 37 C.F.R. § 1.153(a) (2013) (“More than one claim is neither required nor permitted.”). We did not use family size because it is comparatively rare for U.S. design patents to be filed in more than one country. Although this may change now that the U.S. has finally implemented the Hague Convention, the lack of international harmonization in the area of design also makes the aggregation of this data nearly impossible. A majority of countries do not follow a strict patent approach to design protection where this information can be gathered from the face of any resulting IPR.

161. In addition to examining the total annual counts, descriptive statistics and significance testing was conducted for each category of prior art to look for distinctions between virtual designs and our control. *Infra* Appendix A Table 8. Our results indicate that patents on virtual designs cite on average more design patents, more patent applications, less foreign intellectual property rights, and more non-patent literature than other forms of protectable subject matter.

GRAPH 5



As might be expected, patents for virtual designs cite more design patent references than any other type of prior art,<sup>162</sup> and the differential between citation to design patents and other reference types appears to be growing. This trend can be explained, in part, by the lack of citable design patents for virtual designs granted prior to 1988. Over time, as the volume increased, one would expect greater citation to virtual designs and therefore to design patents. Additionally, the increased availability of published utility patent applications<sup>163</sup> resulting from the (utility patent publication) requirement implemented in November 2000 and the increased popularity of international filings, might also explain the increasing citation to patent applications and foreign intellectual property rights.<sup>164</sup> Despite the big difference between citations to design and utility patents, it was still surprising to see such a large

162. See *infra* Appendix A Table 8 (finding virtual designs cite on average almost three more design patents per patent than our control).

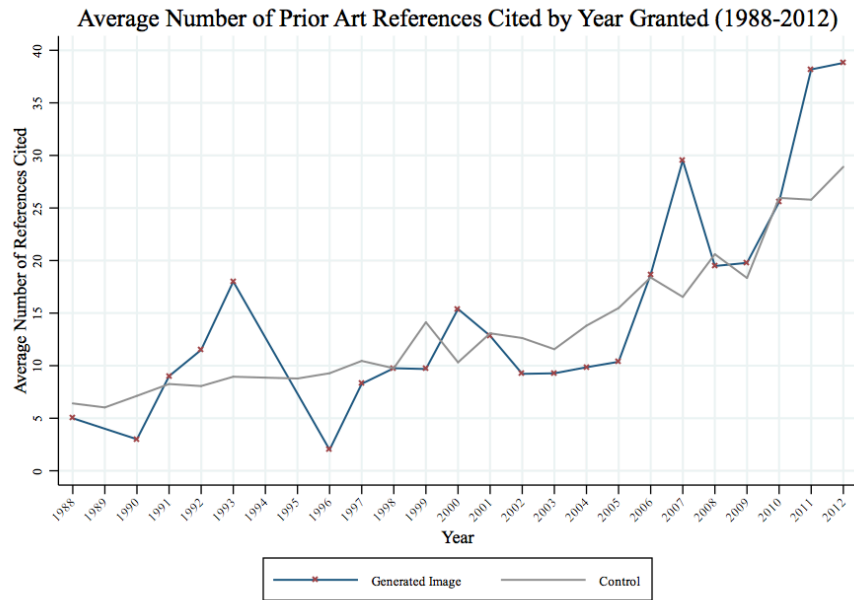
163. On average, patents for virtual designs cite to 2.51 applications, while patents in our control cite to only 0.46 applications. *Infra* Appendix A Table 8. Application citation is more driven by self-citation in design than utility patents. See 35 U.S.C. § 122 (2011) (lacking a publication requirement for design patents that would make these applications public). Hence, the significant distinction between virtual designs and our control is largely explainable by patentee concentration in this sector.

164. These increases are also both likely affected by the high concentration of large multinational patent assignees in the virtual design classes.

number of utility patents cited by patents for virtual designs.<sup>165</sup> Upon closer inspection, these utility patent citations often come from software patents that either implement the virtual designs or include similar diagrams (i.e., because they operate similarly).<sup>166</sup> Perhaps the most striking trend from the table, however, is the general increase in references cited over time, a reflection of the maturation of virtual designs as a field of design patenting activity.<sup>167</sup>

A closer look at the annual average citations in patents within our virtual design dataset and those in our control group shows a similar trend.<sup>168</sup>

GRAPH 6



165. See *infra* Appendix A Table 8 (calculating that virtual designs cite to 4.93 utility patents on average and that other forms of protectable subject matter cite to 5.53 utility patents but not finding this difference significant).

166. See, e.g., Display Screen with Graphical User Interface, U.S. Patent No. D669,907 (filed Nov. 30, 2009) (issued Oct. 30, 2012) (citing Multi-Planar Three-Dimensional User Interface, U.S. Patent No. 7,178,111 (filed Feb. 9, 2006) (issued Feb. 13, 2007)).

167. It might also reflect a general increase in backward citations in both utility and design patents over time. See Brown Hall, Adam Jaffe & Manuel Trajtenberg, *The NBER Patent-Citations Data File: Lessons, Insights, and Methodological Tools*, in PATENTS, CITATIONS & INNOVATIONS: A WINDOW ON THE KNOWLEDGE ECONOMY 403, 434-37 (Adam Jaffe & Manuel Trajtenberg eds., 2002) [hereinafter *The NBER Patent-Citations Data File*] (analyzing utility patent data).

168. Markers were added to the graph to indicate when no patents were granted (e.g., virtual designs in 1994 and 1995).



However, it is not clear from the graph whether there is a difference between our virtual design dataset and our control group, especially after accounting for the limited number of observations before the USPTO openly started granting patents for virtual designs.

Accordingly, we tested whether the distinctions between the number of references cited in our virtual designs dataset and our control, respectively, were significant.<sup>169</sup> To guard against any potential effects from the MPEP changes, we focused on patents granted after 1996.<sup>170</sup> The results are reported in Table 3 below.<sup>171</sup>

TABLE 3: TOTAL REFERENCES CITED IN PATENTS ON VIRTUAL DESIGNS

Filed 1997-2012		
	<i>GIs</i>	<i>Control</i>
Mean	24.60	18.71
Median	16	11
Stand. Dev.	33.78	32.08
Min	0	1
Max	406	672
<i>n</i>	3326	2379
<i>p</i> -value		0***
Significant		Yes

The average number of references cited during this period was 24.60 for virtual designs and 18.71 for other design patents. In other words, patents on virtual designs cite about 31% more references than design patents on other protectable subject matter. This difference was also statistically significant.<sup>172</sup>

Of course, it is well-understood that citation counts can be a problematic metric for patent quality because they include both applicant-submitted and examiner-discovered prior art, and the correlation between the number of applicant-submitted references and patent quality is ambiguous. References may be submitted in large numbers and may be of marginal relevance.<sup>173</sup> More

169. In addition to examining the total counts, we also tested each individual category of prior art described above—finding significant differences in every category except utility patent references. *Infra* Appendix A Table 8.

170. We also conducted the tests for the entire dataset, without removing patents filed before 1997. *Infra* Appendix A Table 8.

171. Nonparametric Wilcoxon-Z tests were utilized because the data was not normally distributed and standard transformation techniques failed to produce a normal distribution. For completeness, however, we also conducted an equal ( $\chi^2(1) = 0.02$ ) *t*-test after transforming the data (square root). The results confirm the Wilcoxon-Z test's above (*p*-value = 0\*\*\*).

172. Wilcoxon-Z = 19.55.

173. For example, applicants might submit large numbers of references for strategic

importantly, the mere fact that an applicant submits references does not tell us that the examiner reviewed or understood them.<sup>174</sup>

A better, although not perfect, metric for examination quality is the number of examiner-cited references.<sup>175</sup> Professors Mark Lemley, Christopher Cotropia, and Bhaven Sampat recently reported that examiners in utility patent cases rely on their own references 87.2% of the time when rejecting utility patent claims on novelty or obviousness grounds.<sup>176</sup> One plausible extension of this finding is that larger numbers of examiner citations may lead to a greater chance of receiving a rejection, and may therefore serve as a better proxy for examination quality. Accordingly, we separately analyzed applicant-submitted and examiner-discovered prior art citations in our study.

Although the USPTO just began publishing this notation about ten years ago, we were able to gather it for almost 73% of our total observations.<sup>177</sup> Next, we tested to see if references cited by examiners followed the same trends as the total citations discussed above. In order to guard against any distortions caused by patents in our dataset that were granted before the USPTO started tracking this notation, we tested design patents granted from 2001 to 2012.<sup>178</sup> For comparison, we also tested the total citations from this period. The descriptive and inferential statistics are reported below.<sup>179</sup>

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reasons, to divert attention away from the most relevant references. Or, a large number of submitted references may reflect uncertainty about how to comply with disclosure requirements against a shifting backdrop of inequitable conduct jurisprudence.

174. Christopher A. Cotropia, Mark Lemley & Bhaven Sampat, *Do Applicant Citations Matter?*, 42 RES. POL'Y 844, 846-47 (2013).

175. We recognize that measuring examiner-cited references also presents some problems. There may be class-specific examiner citation practices, for example. There may also be effects that derive from the quality of the applicant-submitted prior art. If it were of systematically high quality, a low number of examiner-cited references would not necessarily give rise to the inference of low quality examination. For that matter, any measure of the number of citations may overlook the quality level of individual cited references.

176. This share could be even higher because the examiner citation notation on the patent does not indicate whether the examiner also found the (applicant disclosed) reference during their search. Cotropia et al., *supra* note 174, at 846-47.

177. Because our dataset is relatively concentrated during these years, we were able to obtain this notation for 5,160 of 7,092 total patents.

178. The first observation in our sample with this notation issued in January 2001.

179. We used a nonparametric Wilcoxon-Z test again. However, transforming by square root left the data much closer to normalcy than above. Starting with total citations, the results of an equal ( $\chi^2(1) = 0.59$ ) *t*-test confirms the Wilcoxon-Z test ( $p$ -value = 0\*\*\*). Additionally, an unequal ( $\chi^2(1) = 71.55$ \*\*\*) *t*-test confirms the Wilcoxon-Z test for citations by examiner too ( $p$ -value = 0\*\*\*).

TABLE 4: CITATIONS BY EXAMINER ON PATENTS ISSUED 2001-2012

	Total Citations		Citations by Examiner	
	<i>GIs</i>	<i>Control</i>	<i>GIs</i>	<i>Control</i>
Mean	25.46	19.80	16.67	9.97
Median	16	11	13	8
Stand. Dev.	34.71	33.72	11.90	7.61
Min	0	1	0	0
Max	406	672	136	59
<i>n</i>	3103	2056	3102	2056
<i>p</i> -value		0***		0***
Significant		Yes		Yes

On average, examiners in virtual design cases cited to almost 17 different references, but in our control group they only cited about 10 references. In other words, examiners of patent applications directed to virtual designs cited to about 67% more references. Additionally, these differences were statistically significant.<sup>180</sup> On average, about 17 of 25 (65%) of the total citations in virtual design patents come from the examiner. And, about 10 of 20 (50%) come from the examiner in alternative sectors.<sup>181</sup> This strikes us as surprising; it may merely reflect the proclivities of selected examiners who are assigned to the virtual designs art unit, but it is nonetheless important. If citation counts are good measure of patent quality, then virtual designs are likely being more closely scrutinized by the USPTO than are design patent applications in our control group.

## 2. Rejections

We also sought to assess examination stringency in the area of virtual designs by studying prosecution data from the USPTO's PAIR system. In this section, we begin with some background on abandonments, we provide an overview of the quantity and type of the rejections (e.g., final or non-final), and we conclude by examining the doctrinal grounds for the rejections.

As we discussed at the outset, because design patent applications are not published under current law, applications that are eventually abandoned do not become public, so any standard prosecution study reports statistics only for granted applications. The USPTO does release aggregate filing data on design patent applications in its annual reports, so it is possible to estimate their grant rates—typically hovering around 90%. However, the USPTO has not, to date,

180. Wilcoxon- $Z = -27.20$ .

181. By comparison to utility patents, Lemley, Sampat, and Cotropia found that only 34% of the total citations in their sample came from the examiner. Cotropia et al., *supra* note 174, at 846.

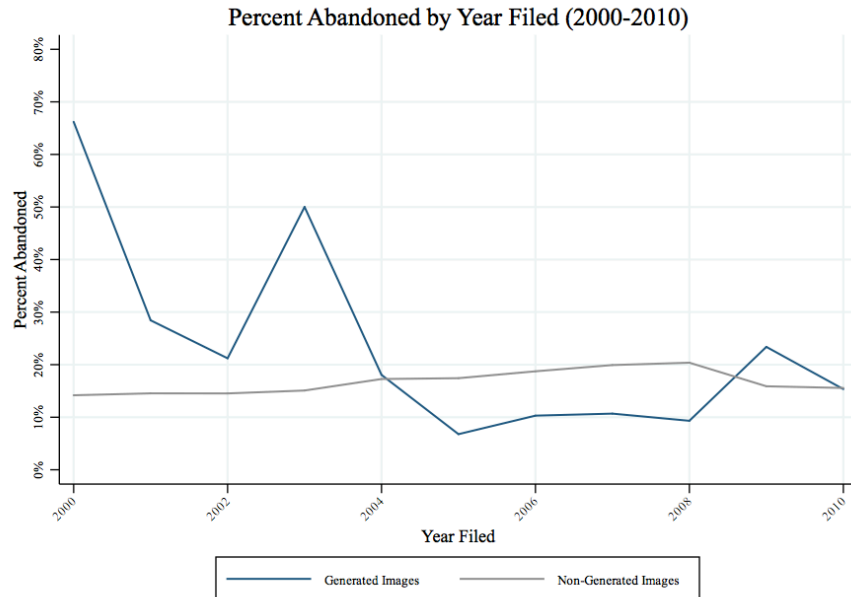
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released filing rates broken down by subclass. To address this lacuna in the data, we filed a series of Freedom of Information Act requests, eventually obtaining data that allowed us to assess abandonment rates in a variety of USPTO design classes, including that for virtual designs.<sup>182</sup>

GRAPH 7



Starting in 2000, when the current class structure for virtual designs was finalized,<sup>183</sup> the rate of abandonment for virtual designs has fluctuated greatly, while the rates for other classes have remained relatively stable.<sup>184</sup> From 2000 to 2004, applications for virtual designs were abandoned at a much higher rate than other classes of design patent applications (averaging about 36.8% for virtual design and 15.2% for other classes). From 2005 to 2008, however, virtual designs' abandonment rate dipped below other classes (averaging about 9.3% for virtual design and 18.9% for other classes). And, yet, from 2009 to 2010, virtual designs rebounded to levels at or above other classes of designs.

182. *Infra* Appendix A Table 11.

183. Getting reliable filing figures from the USPTO before this date proved difficult because they are tied to the application's initial class designation. Before the class structure was finalized, applicant class designations varied widely.

184. Similar to above, the graph ends at 2010 because it is tied to the application's filing date—becoming more distorted the closer it gets to present date. *See supra* text accompanying note 139.

We are left to speculate about what may have caused these fluctuations in abandonment rates for applications claiming virtual designs. One mundane explanation is that our sample size is relatively small. Prior to 2005, fewer than 150 virtual design patent applications for virtual designs were filed each year, so relatively small fluctuations in abandonments would have a relatively large effect on the rate.<sup>185</sup> Another explanation is that drops in abandonment rates could simply be the result of a concentrated group of filings by repeat players who are particularly adept at prosecuting applications to successful issuance. Perhaps this explains the drop in abandonment rates between 2004 and 2008. Yet another explanation is that abandonment rates may vary with the identity of the examiner.<sup>186</sup> Unfortunately, we are unable to confirm these suppositions because assignee information from the abandoned applications is unavailable to the public.<sup>187</sup>

Despite the annual fluctuations between virtual designs and other classes, the average rate of abandonment over the entire period was remarkably similar. From 2000 to 2010, the rate of abandonment for virtual designs was 14.4%<sup>188</sup> and for other classes it was a little higher at 16.9%.<sup>189</sup> While it is possible that this 2.5% difference reflects a larger share of non-traversable rejections, we are hesitant to jump to such a conclusion. First, our abandonment counts provided by the USPTO depend on the applicant's initial class designation. While it is reasonable to assume that applicants got better at classifying their virtual designs with time, these classes were just finalized in 2000. This leads us to believe that some of the abandonments coded as non-GIs—especially those in the initial years after classification scheme was cemented—are actually virtual designs that were misclassified by the applicant. Given the comparatively small sample size of virtual designs, these rates are likely much closer. And, second, we should reiterate, that applications are abandoned for a host of different reasons that are unrelated to whether it actually received a rejection.<sup>190</sup> For

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185. Compare *infra* Appendix A Table 11 (number of abandonments), with *infra* Appendix A Table 3 (number of design patents filed).

186. The group of examiners responsible for design patent applications for virtual designs is very small, suggesting that individual examiner behavior could have a substantial impact on our results. See *infra* Appendix A Table 10.

187. As we have already shown, in 2005, the number of filings skyrocketed as companies such as Microsoft, Apple, Xerox, Sony and Samsung began to file many more design patent applications claiming virtual designs.

188. 436 abandonments of 3,034 *actual* filings. The actual filings were calculated by adding our filing counts, based on patent grants, to the abandonment counts provided by the USPTO.

189. 44,327 abandonments of 262,337 *non-GI* filings. The non-GI filings were calculated by subtracting the actual GI filings. See *supra* text accompanying note 188 (explaining actual GI filings).

190. Indeed, it might be just as reasonable to speculate that these differences reflect nothing more than these groups' willingness to pay USPTO fees.

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privacy reasons, the data released by the USPTO does not include any information about these applicants' case histories that might provide us with clues.

In light of these trends and the limited amount of observations, it is difficult to provide much framing for our results on rejection rates. There are two distinct time periods where virtual designs' abandonment rates appear to be higher or lower than other sectors, and yet their current trajectory indicates they may now be abandoned at roughly similar rates. Moreover, their aggregate rates of rejection over this period are remarkably similar. Gross disparities in abandonment rates would make us cautious when interpreting rejection rates—potentially cloaking which group was receiving more rejections. Currently, there is no such disparity,<sup>191</sup> but, of course, we have no way of saying whether this will remain the case in subsequent years. In any event, the remainder of our analysis must, of necessity, revert to the more conventional approach of assessing data from issued design patents.

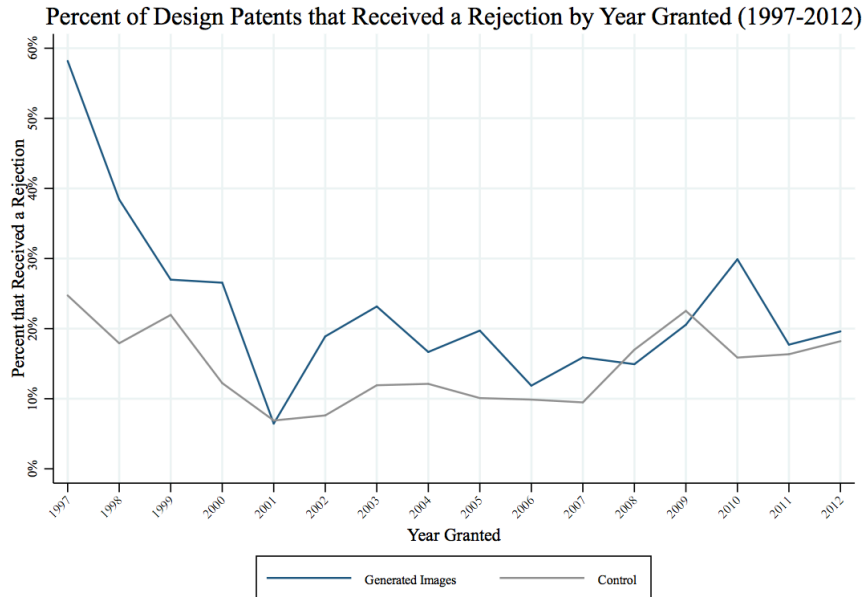
In our two samples, we were able to obtain rejection data for most of the observations.<sup>192</sup> In aggregate (i.e., without accounting for any potential differences between animated and static virtual designs), applications for virtual designs had a greater chance of receiving a rejection than our control.

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191. *See infra* Appendix A Table 11.

192. We obtained rejection data for 3543 of the virtual designs and 3536 of the control's observations (each  $n = 3546$ ).

GRAPH 8



Many of the design patents that issued in 1997-1998 received rejections because they were drafted or examined prior to the USPTO's adoption of the Examination Guidelines for virtual designs (in 1996).<sup>193</sup> Although it seems apparent that applicants soon learned how to draft their applications so as to comply with the Guidelines, applications claiming virtual designs continued to receive higher rates of rejection than applications on other types of protectable subject matter.<sup>194</sup>

With a view towards carving out the pre-Guidelines behavior of applicants, we analyzed rejection rates by application filing date rather than issue date, and assessed applications filed after 1996 and therefore presumptively filed with the benefit of the Guidelines.<sup>195</sup> Likewise, we wondered whether applications for

193. See *supra* Part I (noting the adoption of the Guidelines in 1996 and summarizing their content).

194. One important caveat: some of the fluctuations in filings from 2004 to 2006 were caused by animated virtual design filings (i.e., after the first filing and before the USPTO issued its MPEP rule changes). However, the number of filings during this period was relatively small (e.g., 3 in 2004, 0 in 2005, and 10 in 2006) and the MPEP changes were published with four months left in 2006 (3 of the 10 in 2006 were made in August). Additionally, although it was not published in the MPEP yet, the USPTO adopted this position towards animated virtual designs in September 2005. Leason, *supra* note 112, at 593.

195. We compared these applications against a subset of applications from our control

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animated virtual designs filed prior to their pertinent Guideline amendments had been subject to an unusual rate of rejection simply due to confusion over how to render animation in their drawings. Accordingly, we analyzed applications for animated virtual designs filed after 2006. Below in Table 5, we compare our static and animated virtual design rejections to the control during these periods.<sup>196</sup>

TABLE 5: TOTAL REJECTIONS BY FILING DATE

		GIs	Non-GIs	GIs	Non-GIs
		<i>Static Filed</i>	<i>Control Filed</i>	<i>Anim Filed</i>	<i>Control Filed</i>
		<i>&gt; 1996</i>	<i>&gt; 1996</i>	<i>&gt; 2006</i>	<i>&gt; 2006</i>
		<i>(n = 2933)</i>	<i>(n = 2379)</i>	<i>(n = 315)</i>	<i>(n = 955)</i>
<b>Total</b>	# Patents	559	329	62	157
<b>Rejections</b>	% of Total Patents	19.06%	13.83%	19.68%	16.44%
<b>Non-final</b>	# Patents	541	322	62	156
<b>Rejections</b>	% of Total Patents	18.45%	13.54%	19.68%	16.34%
<b>Final</b>	# Patents	72	58	13	30
<b>Rejections</b>	% of Total Patents	2.45%	2.44%	4.13%	3.14%

Applications for virtual designs had a greater chance of receiving both non-final and final rejections than our control. About 19% of the applications for static virtual designs in our sample filed after 1996 received a rejection. By comparison, during the same period only about 14% of the applications in the control group received a rejection. This variation between virtual designs and our control is primarily driven by non-final rejections because both received similar shares of final rejections. Turning to the applications for animated virtual designs filed after 2006, approximately 20% received a rejection, compared to only 16% of our control. In other words, whether it was animated or not, applications for virtual designs had a greater chance of receiving non-final and final rejections than applications in the control group.

We hasten to add that based on this data, it is apparent that few design patents are receiving rejections of any kind. While it is important to remember that our dataset only captures applications that eventually matured into issued design patents, only between about 14% and 20% of issuing patents received a rejection of any kind.<sup>197</sup> By contrast, in a utility patent study conducted by Professors Mark Lemley and Bhaven Sampat, about 86.5% of granted utility patents received a rejection.<sup>198</sup>

group originating from the same time frame.

196. The unqualified (by time) results are reported in Appendix A, Table 9.

197. Additionally, only about 2% to 4% of those were final rejections.

198. Mark A. Lemley & Bhaven Sampat, *Examining Patent Examination*, 2010 STAN. TECH. L. REV. 2, 2 (2010) (using a dataset constructed from utility patents filed in 2001 and



In order to analyze the doctrinal grounds for these rejections, we examined each office action within the available file wrappers from our dataset. Of those patents that received a rejection,<sup>199</sup> file wrappers were available for about 72% of our virtual designs and 34% of our control.<sup>200</sup> Next, we reviewed the file wrappers and developed a coding technique that fit the rejections that design patents most commonly received. Our group<sup>201</sup> coded the data for the following rejections: § 112 (i.e., indefinite, enablement, written description, and new matter), article of manufacture (i.e., subject matter), anticipation, obviousness, functionality, same invention-type double patenting, obviousness-type double patenting, § 121 restrictions, and copyright or trademark notices.<sup>202</sup> We consolidated indefiniteness, enablement, written description, and new matter rejections under a catchall § 112 category because examiners were not always clear which § 112 grounds they were invoking. In non-final rejections, especially, it is common for examiners to make objections to the form of the drawings, description, or claims without explaining the specific doctrinal

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published by 2006).

199. We did not code *Ex parte Quayle* actions as “rejections” in our dataset.

200. File wrappers were available for 544 of 752 patents for virtual designs and 245 of 723 in our control that received at least one rejection. In total, our coders assessed 956 different office actions for the 789 patents. The earliest patent granted in our sample is from 2004, which coincides with PAIR’s availability to the public. *See Press Release 04-13: Internet Access to Patent Application Files Now Available*, U.S. PAT. & TRADEMARK OFF. (Aug. 2, 2004), <http://www.uspto.gov/news/pr/2004/04-13.jsp>.

201. The coding was initially conducted by a group of research assistants that were second and third year law school students at Indiana University Maurer School of Law with an interest in patent law during the spring of 2012 and again by another group in the winter when the dataset was updated. The students updating the dataset were selected from the first set of coders, and the same codebook was provided to each student. Coders met regularly to ensure uniformity. However, the data was only double coded when students were unsure of how to code a given office action. We included an “unsure” category for our coders to use if the examiner was not clear in their response and they were unsure of how to code it. In these cases, we asked another student to review the office action. After being reviewed twice, if there was still confusion one of us reviewed the office action. Lastly, coders were not informed about our research hypotheses before or after this task.

Due to the risk of low inter-rater reliability caused by bifurcating the coding, we had the full dataset recoded by a new group of research assistants in the fall of 2013. In addition, we randomly selected 10% of the office actions for double coding (96 of 956). This group achieved 95.83% coding reliability, perfectly matching each doctrinal ground in 92 of 96 office actions.

202. These copyright and trademark notices are a separate form of objection that requires applicants to include language in the specification and drawings indicating they are claiming copyright or trademark protection in the design. *See, e.g.*, Display Screen of a Commc’ns Device with Graphical User Interface, U.S. Patent No. D659,156 (filed Nov 4, 2010) (issued May 8, 2012) (Office Action, Nov. 4, 2011). When included with the rejection types listed above, we also coded for oath or declaration and IDS-based rejections but ultimately decided not to include them in our figures because they have nothing to do with potential differences between design patents for generated and non-generated images. They were observed in 3.97% of the office actions in our dataset (38 of 956).

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grounds for the objection. Since these formal objections will mature into indefiniteness or enablement rejections if they are not fixed, we coded them under our catchall § 112 category.<sup>203</sup>

Once the data was coded, we began our analysis with the rejections that were made after the MPEP changes were finalized in 1996. In order to rule out the potential impact of animated virtual design rejections before its corollary MPEP change in 2006, we dealt with them separately. In our dataset, 712 patents met these criteria (416 virtual designs and 296 Control). These patents received 852 office actions with at least one type of substantive rejection (556 GI and 296 Control). We break them down by type of rejection below.

TABLE 6: REJECTIONS FOR PATENTS FILED AFTER 1996

		Total Rejections		Non-final Rejections		Final Rejections	
		<i>n</i> = 556		<i>n</i> = 496		<i>n</i> = 60	
		<i>Number</i>	<i>Percent</i>	<i>Number</i>	<i>Percent</i>	<i>Number</i>	<i>Percent</i>
Generated Images (Static)	§ 112	494	88.85%	443	89.31%	51	85.00%
	Article of Manufacture	120	21.58%	118	23.79%	2	3.33%
	Novelty	12	2.16%	11	2.22%	1	1.67%
	Obviousness	69	12.41%	60	12.10%	9	15.00%
	Functionality	0	0%	0	0%	0	0%
	DPat: Same Invention	22	3.96%	22	4.44%	0	0%
	DPat: Obviousness	140	25.18%	139	28.02%	1	1.67%
	Restriction	23	4.14%	22	4.44%	1	1.67%
	C/TM Notice	33	5.94%	32	6.45%	1	1.67%
		<i>n</i> = 296		<i>n</i> = 244		<i>n</i> = 52	
		<i>Number</i>	<i>Percent</i>	<i>Number</i>	<i>Percent</i>	<i>Number</i>	<i>Percent</i>
Control	§ 112	271	91.55%	224	91.80%	47	90.38%
	Article of Manufacture	0	0%	0	0%	0	0%
	Novelty	4	1.35%	4	1.64%	0	0%
	Obviousness	7	2.36%	7	2.87%	0	0%
	Functionality	1	0.34%	1	0.41%	1	0.41%
	DPat: Same Invention	9	3.04%	6	2.46%	3	5.77%
	DPat: Obviousness	56	18.92%	53	21.72%	3	5.77%
	Restriction	4	1.35%	4	1.64%	0	0%
C/TM Notice	2	0.68%	2	0.82%	0	0%	

The results are intriguing. In almost every category, applications for virtual designs had a greater chance of being rejected than our control.<sup>204</sup> While we expected to see more article of manufacture (i.e., protectable subject matter) rejections in the file histories of applications for virtual designs (respectively 21.58% to 0% of total rejections) and perhaps more objections relating to

203. Instead of counting the number of rejections under each category, the rejections were coded nominally—losing specificity but gaining inter-rater reliability. This approach was necessary to avoid problems caused by inarticulate office actions.

204. Means tests were not performed for these categories of rejections because of the limited number of observations in our dataset.

copyright or trademark notices (respectively 5.94% to 0.68%),<sup>205</sup> we did not expect increases in almost every category. These results are especially notable in the prior art categories (i.e., novelty and obviousness) because the USPTO has a very limited patent record to search for virtual designs.

Next, we examined the available file wrappers for the subset of animated virtual design patents that were rejected after 2006. In our dataset, 218 patents met these criteria (29 animated virtual designs and 189 control). These patents received 268 office actions with at least one type of substantive rejection (79 animated virtual designs and 189 control). We break them down by type of rejection below.

TABLE 7: REJECTIONS FOR PATENTS FILED AFTER 2006

	Total Rejections		Non-final Rejections		Final Rejections		
	n = 79		n = 65		n = 14		
	Number	Percent	Number	Percent	Number	Percent	
Generated Images (Animated)	§ 112	76	96.20%	62	95.38%	14	100%
	Article of Manufacture	26	32.91%	25	38.46%	1	7.14%
	Novelty	0	0%	0	0%	0	0%
	Obviousness	0	0%	0	0%	0	0%
	Functionality	0	0%	0	0%	0	0%
	DPat: Same Invention	1	1.27%	1	1.54%	0	0%
	DPat: Obviousness	7	8.86%	7	10.77%	0	0%
	Restriction	1	1.27%	0	0%	1	7.14%
	C/TM Notice	7	8.86%	7	10.77%	0	0%
Control		n = 189		n = 157		n = 32	
		Number	Percent	Number	Percent	Number	Percent
	§ 112	173	91.53%	224	92.36%	28	87.50%
	Article of Manufacture	0	0%	0	0%	0	0%
	Novelty	4	2.12%	4	2.55%	0	0%
	Obviousness	3	1.59%	7	1.91%	0	0%
	Functionality	0	0%	1	0%	0	0%
	DPat: Same Invention	6	3.17%	6	2.55%	2	6.25%
	DPat: Obviousness	32	16.93%	53	19.11%	2	6.25%
Restriction	4	2.12%	4	2.55%	0	0%	
C/TM Notice	2	0.53%	2	0.64%	0	0%	

Unfortunately, the limited number of animated virtual design applications makes us hesitant to draw any strong conclusions from these comparisons (i.e., 29 animated virtual design applications with 79 total rejections). In the eight total rejection categories with observations, animated virtual designs only had a greater chance of rejection than our control in three. Indeed, none of the

205. These notices are a separate form of objection that requires applicants to include language in the specification and drawings indicating they are claiming copyright or trademark protection in the design. *See, e.g.*, Display Screen of a Commc'ns Device with Graphical User Interface, U.S. Patent No. D659,156 (filed Nov. 4, 2010) (issued May 8, 2012) (Office Action, Nov. 4, 2011).

animated virtual designs received a single novelty or obviousness rejection. However, like static virtual designs, animated virtual designs also had a much greater chance of receiving an article of manufacture rejection. And, likely due to the added claiming and drawing complications for animated design elements, they also had a greater chance of being rejected on § 112 grounds than our control.

Stepping beyond our immediate comparative analysis for a moment, several things strike us about the overall state of examination for design patents across all classes. First, we expected to see more prior art rejections. Only about 8.24% of our total dataset of issued design patents received an anticipation or obviousness rejection.<sup>206</sup> Additionally, there was only one design patent in our entire sample that received a functionality rejection.<sup>207</sup> Relatedly, and consistent with anecdotal feedback from patent lawyers familiar with design patent prosecution, our empirical work suggests design patent prosecution may be primarily an exercise in wrestling with the form of the claims—which, in the design patent arena, means arguing over the form of the drawings.<sup>208</sup>

Our conclusions about the system as a whole are tentative and require more research. What we can say is that there is no support for the position that design patents on virtual designs are of dubious quality compared to other classes of design patents. Every objective metric we explored indicates that virtual designs may in fact be examined more stringently than other forms of design patent subject matter.<sup>209</sup>

It is natural to wonder why applications for virtual designs are examined more rigorously. While the answer is ultimately a matter of speculation, it is surely relevant that the examination of virtual designs has been carried out by a very small group of examiners. Our study shows that almost 85% of all patents for virtual designs that were issued from 1977 until today were examined by

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206. Only 65 of 789 total patents with file wrappers received prior art rejections, regardless of type or filing date. Based on his 2009 dataset of randomly selected design patents from all categories of protectable subject matter, Professor Dennis Crouch found an even lower prior-art rejection rate of 1.2%. Crouch, *supra* note 93, at 19. Of course, neither we nor Professor Crouch can rule out the possibility that examiners are carefully comparing the claimed designs to the pertinent prior art and routinely finding that the claims distinguish over that art, an eventuality more likely to occur if examiners routinely construe designs as extraordinarily narrow in scope.

207. Entm't Unit, U.S. Patent No. D572,370 (filed Jun. 12, 2006) (issued Jul. 1, 2008) (Office Action, Mar. 20, 2007) (non-GI).

208. In the area of virtual designs, such a dispute might take the form of an article-of-manufacture rejection that is overcome by the addition of a broken-line representation of the associated display. *See, e.g.*, Minimized Graphical Timeline for a Display, U.S. Patent No. D499,740 (filed Oct. 17, 2002) (issued Dec. 14, 2004) (Office Action, Oct. 27, 2003).

209. The only exceptions arose from comparisons between animated virtual designs and our control, and these distinctions are most likely attributable to the limited number of animated virtual design observations in our dataset.

only five lead examiners at the USPTO.<sup>210</sup> Indeed, two examiners stand out amongst the rest with 47% and 22% of the total granted virtual design patents.<sup>211</sup> The results of our prosecution study undoubtedly have been influenced by the individual proclivities of this small group of examiners, and even routine personnel changes or workload reassignments could change the empirical results.

### C. Patent Value: Forward Citations

Finally, we close this Part by looking at forward citations—that is, citations to a given patent that appear in later-issued patents.<sup>212</sup> Economists have long used this metric—in conjunction with others, like backward citations,<sup>213</sup> numbers of patent claims,<sup>214</sup> the incidence of oppositions,<sup>215</sup> and application family size<sup>216</sup>—as a proxy for social and private value.<sup>217</sup> While these studies were all based on utility patents, we extend some of their logic to design patents below.<sup>218</sup>

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210. *Infra* Appendix A Table 10. This figure was calculated based on the primary examiner listed on the face of the granted patent.

211. *Id.*

212. Forward citations are also commonly used as indicators in patent quality studies too. *See, e.g.*, Alan C. Marco, *The Dynamics of Patent Citations*, 94 *ECON. LETTERS* 290 (2007). In other words, distinctions between the forward citations of virtual designs and our control may be further evidence of disparate treatment by the USPTO. We chose to discuss them in the context of value because we are most interested in what they may indicate about private value.

213. *See, e.g.*, Dietmar Harhoff, Fredric Scherer & Katrin Vopel, *Citations, Family Size, Opposition and the Value of Patent Rights*, 32 *RES. POL'Y* 1343, 1358 (2003). *But see* Jean O. Lanjouw & Mark Schankerman, *Stylized Facts of Patent Litigation: Value, Scope, Ownership* 22 (Nat'l Bureau of Econ. Research, Working Paper No. 6297, 1997) [hereinafter Lanjouw & Schankerman, *Stylized Facts of Patent Litigation*].

214. *See, e.g.*, Jean O. Lanjouw & Mark Schankerman, *Characteristics of Patent Litigation: A Window on Competition*, 32 *RAND J. ECON.* 129, 140 (2001) [hereinafter Lanjouw & Schankerman, *Characteristics of Patent Litigation*].

215. *See, e.g.*, Harhoff, Scherer & Vopel, *supra* note 213, at 1358.

216. *See, e.g.*, Jonathan Douglas Putnam, *The Value of International Patent Rights* (1996) (unpublished Ph.D. dissertation, Yale University) (on file with authors).

217. *See, e.g.*, Dietmar Harhoff, Francis Narin, F.M. Scherer & Katrin Vopel, *Citation Frequency and the Value of Patented Inventions*, 81 *REV. ECON. & STAT.* 511 (1999); Manuel Trajtenberg, *A Penny for Your Quotes: Patent Citations and the Value of Innovations*, 21 *RAND J. ECON.* 172 (1990). Allison, Lemley, Moore and Trunkey have also shown that litigated patents receive higher frequencies of forward citations than patents that have not been litigated. John R. Allison et al., *Valuable Patents*, 92 *GEO. L.J.* 435, 453 (2004).

218. To our knowledge, we are first to extend these metrics to design patents.

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1. *Social value*

The idea that forward citations reflect a patent's social value is based on the assumption that when one patent cites another it is building or drawing upon its teachings—resulting in knowledge flows or spillovers.<sup>219</sup> According to this rationale, patents with higher numbers of forward citations represent greater spillovers and are therefore more economically valuable.<sup>220</sup> Although distinctions in applicant behavior, examiner idiosyncrasies, and art unit practices create a lot of noise in forward citation counts, they are still one of the most heavily utilized indicators for evaluating the importance of an invention or its social value.<sup>221</sup>

We tested for distinctions between virtual designs and our control, and the results were dramatic.

TABLE 8: FORWARD CITATIONS &amp; REMOVED SELF-CITATIONS

	Total Forward Citations				Forward Citations w/out Self-Citations			
	Unadjusted		Adjusted		Unadjusted		Adjusted	
	GIs	Control	GIs	Control	GIs	Control	GIs	Control
Mean	12.101	6.476	1.358	0.642	9.700	5.087	1.362	0.638
Median	6	3	0.70	0.32	4	2	0.55	0.26
Stand. Dev.	16.26	9.82	2.51	1.01	15.06	8.52	4.03	1.24
Min	0	0	0	0	0	0	0	0
Max	258	148	89.29	16.64	160	148	185.95	34.67
<i>n</i>	3546	3546	3546	3546	3546	3546	3546	3546
<i>p</i> -value	0***		0***		0***		0***	
Significant	Yes		Yes		Yes		Yes	

On average, patents for virtual designs were cited almost 87% more than other forms of protectable subject matter and this distinction was statistically significant.<sup>222</sup> Even after adjusting<sup>223</sup> for the age of the patents—which will

219. See, e.g., Adam Jaffe et al., *The Meaning of Patent Citations: Report on the NBER/Case-Western Reserve Survey of Patentees* (Nat'l Bureau of Econ. Research, Working Paper No. 7631, 2000).

220. Bhaven N. Sampat & Arvids A. Ziedonis, *Patent Citations and the Economic Value of Patents*, in HANDBOOK OF QUANTITATIVE SCIENCE AND TECHNOLOGY RESEARCH 277, 279 (Henk F. Moed, Wolfgang Glänzel & Ulrich Schmoch eds., 2004) (“Based on the rationale that inventions that generate a higher level of spillovers are more economically or technologically important, a significant stream of research has used counts of citations to patents to assess social value (or ‘importance’) of patented inventions.”).

221. See *id.* at 277-78.

222. We utilized a nonparametric, Wilcoxon-Z test here because standard transformation techniques still left our dataset far short of a normal distribution. The Wilcoxon-Z value for unadjusted total forward citations was -16.17 and -19.28 for adjusted forward citations.

affect the patent's ability to be cited<sup>224</sup>—we found an even stronger trend. Indeed, the average number of adjusted forward citations for virtual designs was 112% greater than our control.<sup>225</sup>

After finding that five firms control about 51% of all the design patents granted in this sector,<sup>226</sup> we also tested for distinctions in forward citations after removing self-citations<sup>227</sup> (i.e., patents with the same owner).<sup>228</sup> The results followed the same trend. On average, unadjusted virtual design counts were about 91% higher and adjusted citation counts were an almost identical 113% greater than patents in our control.

Despite the stark differences in forward citation counts between patents for virtual designs and our controls, we are hesitant to conclude that these patents have greater social welfare implications. Indeed, this distinction might simply reflect differences between the applicants of virtual design patents and other sectors, irrespective of whether this is also driven by subject matter.<sup>229</sup> And for many of the reasons described above, more recent empirical work has shed doubt on their use as a proxy for spillovers altogether.<sup>230</sup> Forward citation counts are also notoriously skewed. For example, in a typical dataset, a few patents will have disproportionately high citation counts and most patents will have no citations. This presents statistical problems and suggests that we should

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223. We follow the same method that Professors Allison, Lemley & Walker applied in their study on the characteristics of highly litigated patents. John R. Allison et al., *Extreme Value or Trolls on Top? The Characteristics of the Most-Litigated Patents*, 158 U. PA. L. REV. 1, 13-14 (2009) (adopting the method applied by Professors Hall, Jaffe, and Trajtenberg in *The NBER Patent-Citations Data File*, *supra* note 167, at 434-37). Under this approach, we divided each patent into a cohort based on the year that it was granted. Then, we divided the total number of forward citations for each patent by the mean number of forward citations for its cohort. This process was repeated for each patent in the dataset.

224. For example, newer patents will not have the same opportunity to be cited as older patents simply because they were not invented yet.

225. These differences were also significant. The Wilcoxon-Z value for unadjusted forward citations without self-citations was -12.20 and the adjusted value was -15.05.

226. *See supra* Part II.A.2; *infra* Appendix A Table 5.

227. Professors Allison, Lemley and Walker describe self-citations as a subset of forward citations. Allison, et al., *supra* note 223, at 14. Unlike their study, which used self-citations as an indicator of private value, in this section we are subtracting them from our total forward citation counts in order to focus on the potential social value of our design patents. *Id.*

228. By omitting citations to the same inventor, we define self-citations more narrowly than Professors Allison, Lemley and Walker. *Id.* We did this for pragmatic reasons but also because a vast majority of virtual design patents have a recorded assignee upon grant. In our data set of 3,546 virtual design patents, only 2.65% were unassigned (94 of 3,546). By comparison, about 29.16% design patents in our control were unassigned (1,034 of 3,546).

229. For example, virtual design patent applicants might use more sophisticated visual searching technologies when doing prior art searches.

230. *See, e.g.*, Alfonso Gamardella et al., *The Value of European Patents*, 5 EUR. MGMT. REV. 69 (2008).

be cautious about the inferences we draw from our samples.<sup>231</sup> More importantly, we are also hesitant to conclude that design patents even have the same capacity for knowledge sharing as utility patents. Though claiming requirements necessitate uniformity in disclosure, one might surmise that any catalog picture or image on a website could convey all of the technical knowledge necessary to make and use a generated image—leading us to conclude that almost any disclosure could convey most of the same information and that design patents are a poor indicator of spillovers. Compounding things, the use of design patents in this sector is still in its infancy and we have no data indicating that its inventors actually turn to design patents for ideas or whether it's even necessary (i.e., percent of virtual design patents commercialized or disclosed by alternative means).<sup>232</sup>

## 2. *Private value*

While forward citation counts may not be a good proxy for social value, most agree they are a better indicator of private value. Private value only reflects whether the owner finds the patent valuable, and not whether the patent has any greater value to society.<sup>233</sup> Empirical studies have not only found direct correlations between self-reported patent values and forward citation counts<sup>234</sup> but they have also tied citation counts to the likelihood a patent will be litigated.<sup>235</sup>

Unfortunately, the underlying causal link between total forward citations and private value is still murky. Most are based on the assumption that social and private value are linked, but few scholars have tried to explain why.<sup>236</sup> Professors John Allison, Mark Lemley and Joshua Walker describe self-citations as “provid[ing] evidence that the patent owner is building a portfolio of patented technologies, and that a portfolio of patents often has a value that is

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231. See Bronwyn H. Hall et al., *Market Value and Patent Citations*, 36 RAND J. ECON. 16, 23 (2005) (finding 25% of the utility patents in their study had no citations, 15% had only one, 12.5% had two, and four patents received more than 200 citations).

232. See Jaffe et al., *supra* note 219, at 17 (using direct survey evidence from inventors to conclude that citations in *utility* patents act as a noisy signal for spillovers).

233. See generally Allison et al., *Valuable Patents*, *supra* note 217, at 440.

234. Harhoff et al., *supra* note 213, at 1358.

235. See, e.g., Allison et al., *Valuable Patents*, *supra* note 217, at 455; Lanjouw & Schankerman, *Characteristics of Patent Litigation*, *supra* note 214, at 144.

236. One notable exception is Professor Sampat's project exploring four separate theories for this link. Sampat & Ziedonis, *supra* note 220, at 5. Utilizing licensing data from universities, he tested whether citations reflected: (1) the portion of social return appropriated, (2) entry into profitable areas of research, (3) technological opportunities or market interest in a technological area, and lastly (4) public disclosure. *Id.* However, he was only able to conclusively eliminate the first theory. *Id.* at 20-21.



greater than the sum of its parts.”<sup>237</sup> While innovation in this sector is not only channeled into design patents, the same logic should apply. Indeed, their relative ease of acquisition and narrow scope might actually point to a greater portfolio-effect in the area of design.<sup>238</sup>

To test for distinctions between generated images and our control, we compared both unadjusted and adjusted self-citations. The results are almost as stark as those reported on social value.

TABLE 9: FORWARD CITATIONS AND SELF-CITATIONS

	Total Forward Citations				Forward Self-Citations Only			
	Unadjusted		Adjusted		Unadjusted		Adjusted	
	GIs	Control	GIs	Control	GIs	Control	GIs	Control
Mean	12.101	6.476	1.358	0.642	2.404	1.389	1.199	0.801
Median	6	3	0.70	0.32	0	0	0	0
Stand. Dev.	16.26	9.82	2.51	1.01	5.58	4.17	3.25	2.24
Min	0	0	0	0	0	0	0	0
Max	258	148	89.29	16.64	98	80	46.27	41.14
<i>n</i>	3546	3546	3546	3546	3546	3546	3546	3546
<i>p</i> -value	0***		0***		0***		0***	
Significant	Yes		Yes		Yes		Yes	

On average, patents on virtual designs cite to themselves about 73% more than do patents on other forms of protectable subject matter.<sup>239</sup> And after adjusting for the age of the patents, patents on virtual designs still self-cited almost 50% more than other design patents.<sup>240</sup> Nevertheless, the highly skewed nature of forward citation counts, which is similarly reflected here, makes us hesitant to infer much from these results. When taken in conjunction with our data on firm concentrations,<sup>241</sup> however, it is apparent that some firms in this sector are amassing sizable portfolios of design patents for virtual designs.<sup>242</sup> We find

237. Allison, et al., *supra* note 223, at 14 (citing Gideon Parchomovsky & R. Polk Wagner, *Patent Portfolios*, 154 U. PA. L. REV. 1, 5-6 (2005)).

238. While aggregate patent counts by class might also provide a rough indicator of a firm's portfolio, self-citations should be better proxy for the firm's concentration in a given technology sector because self-citations (in theory) only occur when the cited design is material to patentability. *See also* Trajtenberg, *supra* note 217, at 173 (asserting that simple patent counts are a noisy indicator of value). However, this depends in large part on the class's breadth.

239. These differences were also significant with a Wilcoxon-Z value of -7.59.

240. The adjusted self-citations were similarly significant with a Wilcoxon-Z value of -6.30.

241. *See supra* Subpart II.A.2; *infra* Appendix A Table 5.

242. However, the small amount of litigation in this area leads us to believe that their private value may be limited. *But see* Amended Verdict Form at 7, *Apple Inc. v. Samsung Elecs. Co.*, 909 F. Supp. 2d 1147 (N.D. Cal. 2012) (No. 11-CV-01846-LHK).

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this interesting as an early indication of perceptions of private value in design patent portfolios on virtual designs.

### III. EMERGING ISSUES

As we have discussed, design patents for virtual designs have been assessed chiefly in the context of patent prosecution. Early board decisions focused on the eligibility question, as we have shown. Many other issues remain to be explored. We identify three categories of emerging issues: validity, infringement and other issues (including remedies and boundary issues). We discuss each briefly below.

#### A. *Validity Issues*

Design patents on virtual designs present some interesting challenges for patentability analysis. Below we deal with doctrines of patentability over the prior art—anticipation and obviousness—and offer some suggestions about applying those doctrines to claims for virtual designs.<sup>243</sup>

##### 1. *Anticipation*

Under the Federal Circuit's current design patent case law, the ordinary observer test is the governing standard for anticipation.<sup>244</sup> That is, if, in the eye of the ordinary observer, the claimed design is substantially the same as the design disclosed in a single prior art reference, the prior art reference anticipates the claimed design. In applying this standard to virtual designs, the USPTO and the courts will need to undertake a comparison that may not be straightforward. The virtual design is likely to be claimed using the standard broken-lines rectangle to designate a generic screen display. The alleged anticipatory reference might not use that drafting convention; indeed, it might not be a patent document. The comparison exposes an important question: what *is* the effect of the broken-line representation on the scope of a design patent claim for anticipation purposes?

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243. We expect that many courts will follow the guidance of *Egyptian Goddess* and dispense with any efforts to render verbal claim constructions in design patent cases. *See Egyptian Goddess, Inc. v. Swisa, Inc.*, 543 F.3d 665, 679-80 (Fed. Cir. 2008) (en banc). This suggests to us that questions surrounding claim scope in cases involving virtual designs (like other types of designs) will be addressed within the framework of particular substantive inquiries, such as those for patentability over the prior art, functionality, and infringement.

244. *Int'l Seaway v. Walgreen's, Corp.*, 589 F.3d 1233, 1240 (Fed. Cir. 2009). Prior to its decision in *International Seaway*, the Federal Circuit had held that an additional point-of-novelty test was to be included as part of the anticipation analysis. *See, e.g., Bernhardt, LLC v. Collezione Europa USA, Inc.*, 386 F.3d 1371, 1383 (Fed. Cir. 2004).

The symmetry principle supplies the answer to this question. According to that principle, claims are to be construed the same way for infringement and validity.<sup>245</sup> Design patentees should have to abide by that principle. If they choose to claim design subject matter broadly to achieve an expansive exclusionary right, they should be prepared to show how those broad claims avoid the prior art.

Putting this principle into operation in the context of virtual designs requires a bit of subtlety. When a design patentee claims a virtual design by depicting an icon in solid lines and an associated screen display as mere environment in broken lines, the result is an artificial construct. The relevant observer must first decode it, and then compare it to a prior art reference that will not necessarily delineate what is design and what is mere environment. The subtlety here is that the relevant observer is not a design patent expert who can readily engage in the mental exercise of ignoring the appearance of the associated environment, but rather he is the hypothetical ordinary observer who visually processes the world as it is. The potential problem is this: if the ordinary observer always views the prior art reference in its entirety, then mere environmental features disclosed in the prior art reference might be used as a basis for distinguishing the prior art reference from the claimed design. This would violate the symmetry principle.

To avoid this problem, the Federal Circuit should supply guidance to ensure that patent examiners and trial court judges apply the ordinary observer test correctly to virtual designs that are claimed using the standard broken-line convention. In particular, the Federal Circuit should rule that in comparing such claims to a prior art reference for anticipation purposes, the ordinary observer should be presumed to be capable of differentiating visually between design and environment even where the prior art reference itself does not explicitly delineate one from the other. Put another way, when a patentee uses the broken-line designation to define the claimed design independent of the visual aspects of its environment, the ordinary observer should (presumptively) be entitled to ignore environmental aspects disclosed in the prior art reference.<sup>246</sup>

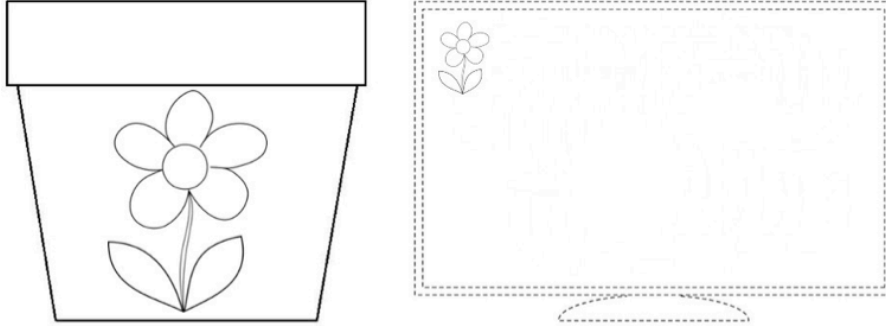
The following three examples illustrate how our proposed approach would

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245. *Int'l Seaway*, 589 F.3d at 1239 (“[I]t has been well established for over a century that the same test must be used for both infringement and anticipation.”). The court invoked the symmetry principle in *International Seaway* to support its conclusion that the ordinary observer test should be the test for anticipation, because that test is also the test for infringement. *Id.* at 1240 (“In light of [precedent] holding that the same tests must be applied to infringement and anticipation, and our holding in *Egyptian Goddess* that the ordinary observer test is the sole test for infringement, we now conclude that the ordinary observer test must logically be the sole test for anticipation as well.”).

246. We distinguish between this exercise of ignoring visual features that the patentee chooses not to claim (which is proper), and the exercise of dissecting a design into its individual features (which is improper). A design is to be viewed as a whole, but the whole of the design is that which is shown in solid lines.

apply. First, suppose that a prior art reference discloses a planter that is adorned with the depiction of a daisy. If a graphic designer claims a computer icon of the same or a substantially similar design for a daisy, does the prior art anticipate the claim?



We think that it presumptively does. If the patentee has taken advantage of the broken-lines drafting convention—blotting out any visual representation of the associated article of manufacturer for scope purposes—then the patentee should not be permitted to rely on aspects of the associated article to distinguish the claimed design over the prior art.

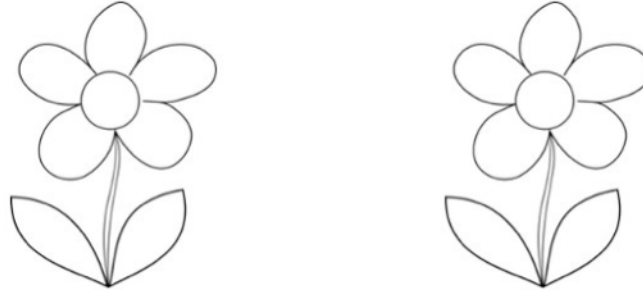
There are two steps to the analysis. First, the claim must be construed to cover the daisy design as applied to any article of manufacture, without any limitations as to the appearance of that article of manufacture.<sup>247</sup> Second, the claim, so construed, must be compared to the prior art planter under the ordinary observer test. Under our analysis, the existence of the daisy design in a single qualifying prior art reference should create a presumption of anticipation even though the prior art design element is shown applied to a planter. That is, since the scope of the patentee's daisy design for infringement purposes would not be limited to computer generated images—potentially covering the daisy's application to wallpaper, carpets, t-shirts, etc.—the scope for anticipation purposes should be analogous.

It would fall to the designer to rebut the presumption by attempting to show that the appearance of the underlying article of manufacture so profoundly affects the ordinary observer's overall impression of the prior art

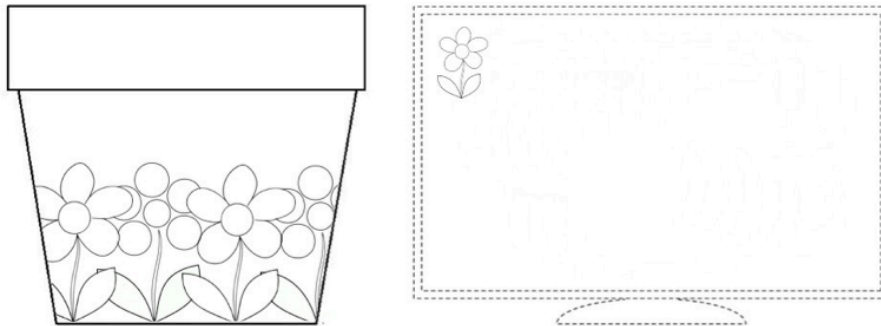
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247. See *Ex parte Cady*, 1916 Dec. Comm'r Pat. 57, 61 (“While the statute requires the applicant to specify some one particular article of manufacture to which he *has* applied the design, it seemingly cannot be required that his patent be limited to any one article. It is for the court to decide what other articles, having this figure embodied in them, infringe the patent.”). This is not to say that a *verbal* construction of the claim should be rendered. *Egyptian Goddess*, 543 F.3d at 679-80 (indicating that verbal claim constructions are not necessary in design patent cases).

design that the element of interest cannot be perceived separately. Where the element of interest in the prior art is surface ornamentation, as it is here, we expect that the presumption will be particularly hard to rebut, because we expect that under these circumstances, the hypothetical ordinary observer is likely to ignore the appearance of the underlying article. Accordingly, we expect that the anticipation analysis in our example would involve a comparison between the respective daisy designs in isolation.<sup>248</sup>



We expect that the analysis would yield a similar outcome even if the prior art planter were adorned with additional graphical elements. In the example depicted below, we would apply a presumption of anticipation.



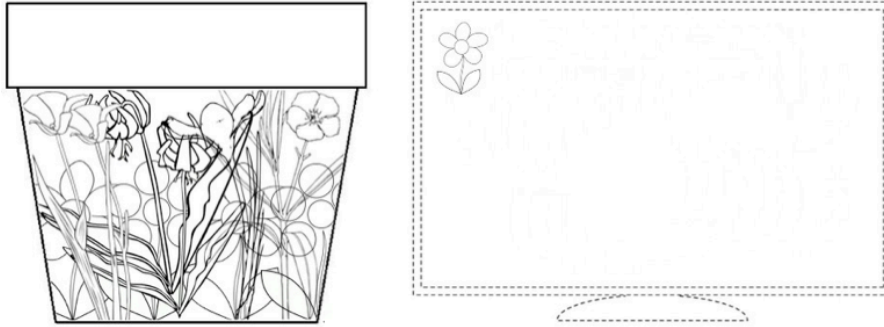
Again, we think that the presumption should be difficult to rebut. The argument that the daisy depicted on the prior art product is not visually dominant should not alone be sufficient to rebut the presumption, in our view.

Of course, there may be extreme cases in which isolating an element of a prior art product might do violence to the basic notion of analyzing the ordinary observer's overall impression of the prior art design. In the example given

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248. This process is akin to the way infringement might operate if the patentee were claiming copyright protection in the daisy design.

below, the daisy element in the prior art reference is so obscured by the foreground flowers that even if the presumption of anticipation applies, we think that it can be overcome with evidence that the prior art daisy is visually indistinguishable from the foreground flowers.



## 2. Obviousness

We also think it likely that the Federal Circuit's obviousness analysis needs to be modified to ensure that patentees claiming virtual designs do not get a broader scope for infringement purposes than they get for validity purposes.<sup>249</sup> The Federal Circuit's analysis for design patent obviousness has roots in cases decided long before the Supreme Court's *KSR* decision on utility patent obviousness.<sup>250</sup> While *KSR* does not speak directly to the design patent obviousness jurisprudence, the Court in *KSR* displayed evident discomfort with rigidity in the obviousness analysis.<sup>251</sup> The Federal Circuit has not yet modified its design patent obviousness rules in view of *KSR* and the challenges presented by virtual designs highlight the need for such modifications.<sup>252</sup>

To date, the Federal Circuit has said that obviousness for design patent purposes requires one first to find a primary prior art reference "the design characteristics of which are basically the same as the claimed design"<sup>253</sup> and

249. While we are limiting our comments to virtual designs, our reservations about the Federal Circuit's current obviousness analysis extend to designs of all types, at least to some degree.

250. *KSR Int'l Corp. v. Teleflex Inc.*, 550 U.S. 398 (2007).

251. *Id.* at 419-22.

252. *Titan Tire Corp. v. Case New Holland, Inc.*, 566 F.3d 1372, 1384 (Fed. Cir. 2009) (acknowledging that *KSR* may have implications for design patent obviousness but declining to address the issue).

253. *Durling v. Spectrum Furniture Corp.*, 101 F.3d 100, 103 (Fed. Cir. 1996) (quoting *In re Rosen*, 673 F.2d 388, 390 (C.C.P.A. 1982)). In *High Point Design LLC v. Buyers Direct, Inc.*, 730 F.3d 1301 (Fed. Cir. 2013), the Federal Circuit declared that when carrying

then to analyze whether a hypothetical designer of ordinary skill “who designs articles of the type involved” would have combined the primary reference with other teachings in the prior art “to create a design that has the same overall visual appearance as the claimed design.”<sup>254</sup> Once a primary reference has been identified, other (secondary) references can be used in combination with the primary reference to establish a case of obviousness only if they are “so related [to the primary reference] that the appearance of certain ornamental features in one would suggest the application of those features to the other.”<sup>255</sup>

Setting aside the question of whether this analysis aligns with the preferences that the Supreme Court expressed for utility patent obviousness analysis in *KSR*,<sup>256</sup> the *Durling* test could easily be misapplied in the context of virtual designs in the absence of sufficient guidance from the Federal Circuit. First, in regards to the identification of a primary reference, the court should make clear that if a virtual design uses the broken-line convention to avoid claiming the appearance of the associated article, the appearance of the article presumptively is not part of the claim for purposes of comparison to identify an appropriate primary reference under the first step of the *Durling* test. The proponent of an obviousness theory presumptively should be able to use as a primary reference any reference that shows the claimed design element *in any context*. For the same reasons that we have already asserted, this is no departure from the command to focus on the design as a whole (to the extent that it applies to the first step of the *Durling* test in any event).

Similarly, the second step of the analysis should be refined to permit the teachings from secondary prior art references to be combined with those from the primary reference as long as the case can be made that an ordinary designer would have combined them, even if the designs disclosed in the secondary references do not resemble the overall appearance of the design disclosed in the

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out this initial step of the *Durling* test, the trial court should first translate the claimed design into a verbal description. *Id.* at 1314. While the *Durling* court indeed called for such a translation, we think that such an analysis is in considerable tension with the Federal Circuit’s pronouncements that discourage courts from undertaking a verbal claim construction in design patent cases. *Egyptian Goddess*, 543 F.3d at 679-80.

254. *Durling*, 101 F.3d at 103. In *International Seaway*, the court had appeared to place a further gloss on the analysis, confining the role of the hypothetical ordinary designer to the initial step of identifying the primary reference. *International Seaway*, 589 F.3d at 1240. More recently, the Federal Circuit reiterated that the entire obviousness analysis should be undertaken from the perspective of the ordinary observer, rejecting the comments from *International Seaway*. *High Point Design*, 730 F.3d at 1313 n.2.

255. *Durling*, 101 F.3d at 103 (alteration in original) (quoting *In re Borden*, 90 F.3d 1570, 1574 (Fed. Cir. 1996)).

256. We doubt that it does comport with *KSR*. The utility patent obviousness analysis that the Supreme Court criticized as too rigid in *KSR* was considerably more flexible than the two-part *Durling* standard. We think that the *Durling* standard encourages an obviousness analysis that gives too little credence to the abilities of the hypothetical ordinary designer to exercise imagination and creativity.

primary reference. Here again, this change is justified when the design patentee has made the choice to use the broken-line designation to represent the article of manufacture.

The second step of the *Durling* test (in particular, the requirement that the subject matter of the secondary references be “so related” to that of the primary reference to suggest applying design features from one to the other) originates from the CCPA’s decision in *Glavas*.<sup>257</sup> The *Glavas* rhetoric, as incorporated in *Durling*, is susceptible to an overly zealous reading that could distort the obviousness analysis for virtual designs.

The main question that the CCPA faced in *Glavas* was whether prior art references in a design patent case were properly combinable where the articles of manufacture associated with the prior art designs were different. *Glavas* had sought design patent protection on a design for a flotation device, and the USPTO had cited a combination of references that included a primary reference disclosing a design for a float and secondary references disclosing designs for a pillow, a bottle, a razor blade sharpener, and a bar of soap.<sup>258</sup>

The CCPA seemed to be troubled by the fact that the references came from such apparently disparate fields of endeavor. In utility patent law, this problem is sometimes expressed formally in terms of the concept of non-analogous art: art that is non-analogous cannot properly be part of an obviousness combination. If a reference is either (1) from the same field of endeavor as the claimed invention, regardless of the problem addressed or, (2) still is reasonably pertinent to the particular problem with which the inventor is involved even if the reference is not within the field of the inventor’s endeavor, then the reference is analogous and can form part of a combination for obviousness analysis.<sup>259</sup>

The CCPA recognized that the concept of non-analogous art does not translate straightforwardly to design patent obviousness, given that the problem of combining references for purposes of design patent obviousness is a problem of “combining appearances rather than uses.”<sup>260</sup> Had it extended this reasoning, the court could have decided that all references are combinable for design patent obviousness—i.e., that all references are analogous.<sup>261</sup> Instead, the

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257. *In re Glavas*, 230 F.2d 447 (C.C.P.A. 1956).

258. *Id.* at 449.

259. *In re Klein*, 647 F.3d 1343, 1348 (Fed. Cir. 2011). It is relatively rare for prior art references to be excluded as non-analogous in the utility patent context, although *Klein* itself provides an example.

260. *Glavas*, 230 F.2d at 450 (observing that the non-analogous art concept “cannot be applied to design cases in exactly the same manner as to mechanical cases”).

261. The Board had essentially taken this position. The CCPA rejected the Board’s approach for obviousness, although the court commented that such an approach was proper for anticipation:

It is true that the use to which an article is to be put has no bearing on its patentability as a



CCPA adopted a more moderate approach that relied on a distinction between designs for product shapes and designs in the form of surface ornamentation. As for product shapes, the court reasoned, “the proposed combination of references involves material modifications of the basic form of one article in view of another,” so therefore “the nature of the articles involved is a definite factor in determining whether the proposed change involves invention.”<sup>262</sup> As for surface ornamentation, the nature of the article of manufacture was irrelevant to the question of obviousness: because “the problem is merely one of giving an attractive appearance to a surface, it is immaterial whether the surface in question is that of wall paper, an oven door, or a piece of crockery.”<sup>263</sup> The MPEP still adheres to this distinction.<sup>264</sup>

The implications for virtual designs are clear. Virtual designs are akin to surface ornamentation, so, under the *Glavas* approach, the nature of the underlying article of manufacture should be irrelevant to the obviousness analysis.<sup>265</sup> That is, under the second step of the *Durling* analysis (the “so related” step from *Glavas*), the designer of a virtual design should be precluded from disabling a secondary reference merely on the ground that the secondary reference discloses an associated article of manufacture that is not related to software or screen displays.<sup>266</sup> This outcome, reached by applying current

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design and that if the prior art discloses any article of substantially the same appearance as that of an applicant, it is immaterial what the use of such article is. Accordingly, so far as anticipation by a single prior art disclosure is concerned, there can be no question as to nonanalogous art in design cases.

*Glavas*, 230 F.2d at 450 (citations omitted).

262. *Id.*

263. *Id.* The court invoked the Commissioner’s dictum from *Northrup v. Adams*, 18 F. Cas. 374 (C.C.E.D. Mich. 1877) (No. 10,328), that adorning a vase with “a copy of Stuart’s portrait of Washington” would not be sufficiently inventive to warrant design patent protection even if the portrait had not previously appeared on that particular article. *Glavas*, 230 F.2d at 450 (quoting *Northrup*, 18 F. Cas. at 375). The court also relied on *In re Jabour*, 182 F.2d 213 (C.C.P.A. 1950), declining patentability of certain surface ornamentation applied to a cylindrical tank, where the surface ornamentation had previously been applied to a microphone. *Glavas*, 230 F.2d at 450. In a utility patent setting, one would expect that a microphone and a tank would have been deemed non-analogous subject matter.

264. MPEP, *supra* note 27, § 1504.03 (“When modifying the surface of a primary reference so as to provide it with an attractive appearance, it is immaterial whether the secondary reference is analogous art, since the modification does not involve a change in configuration or structure and would not have destroyed the characteristics (appearance and function) of the primary reference.”).

265. Indeed, this should arguably be so irrespective of whether the article of manufacture is represented in solid lines or by the broken-lines convention.

266. If we were elaborating the design patent obviousness law from scratch, we might suggest peeling away additional layers of the obviousness analysis. For example, we think that designs for product shapes should be evaluated on a case by case basis, taking into account the ordinary designer’s creativity and adaptability, rather than suggesting that the available scope of prior art for adjudicating the obviousness of those designs should be limited by a stringent rule of non-analogous art. We also would deemphasize the rhetoric of

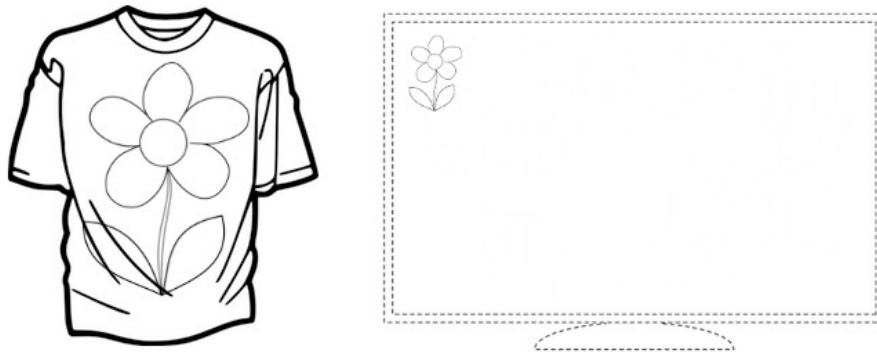
standards of design patent obviousness jurisprudence, mirrors the outcome that we would endorse anyway based on the application of claim construction principles to design patent subject matter that is claimed using the broken-lines convention. The Federal Circuit needs to make clear that for claims to virtual designs, the nature of the associated article does not intrude upon either step of the obviousness analysis, whether this is a rule of claim construction, obviousness law, or both.

### B. *Infringement Issues*

Our focus in this paper has been on patentability issues relating to virtual designs. Of course, these issues are necessarily intertwined with issues of enforceable scope. We expect that design patents for virtual designs will present some intriguing conceptual issues of scope. We leave a full analysis of those issues for forthcoming work. We will simply flag a few of the issues here.

We anticipate that design patents on virtual designs are likely to be used primarily as tools to combat counterfeiting. We are referring to cases in which the accused design is identical to the patented design, and where the accused design is used in connection with a screen display. In such cases, there is not likely to be any legitimate dispute over enforceable scope. Validity, and perhaps damages, will be the chief areas of conflict.

Other cases at the margins, however, may present difficult scope issues. For example, suppose that the hypothetical patented daisy icon design depicted below is replicated on a t-shirt without the design patent owner's authorization.



An ordinary infringement analysis might be expected to lead to a finding of

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non-analogous art, since it is probably gratuitous in many cases. Further, in view of these observations, we would excise the “so related” rhetoric in the second step of the *Durling* analysis on the rationale that it seems to discourage the case-by-case analysis that we have endorsed. And, finally, we would favor revisiting the two-part *Durling* standard altogether, as we have noted. *See supra* note 256.

liability in such a case. First, as a matter of claim construction, the appearance of the associated screen display is not part of the claimed design, as the broken-line designation indicates. The use of the design on *anything* falls within the scope of the claim. Second, the t-shirt maker's activities are likely to constitute prima facie acts of infringement (assuming that they are carried out within the U.S. and during the term of the patent). The general infringement provision, 35 U.S.C. § 271(a), proscribes, inter alia, unauthorized acts of making, using, and selling,<sup>267</sup> categories that have been construed liberally in the utility patent context. Moreover, the additional remedies provision applicable to design patents, 35 U.S.C. § 289, imposes liability upon anyone who, without the design patent owner's authorization, "(1) applies the patented design, or any colorable imitation thereof, to any article of manufacture for the purpose of sale, or (2) sells or exposes for sale any article of manufacture to which such design or colorable imitation has been applied."<sup>268</sup> This provision refers to the application of the design to *any* article of manufacture; it clearly extends to the t-shirt.

Such a result may prove worrisome to the extent that the alleged infringer's use of the design may be deemed expressive and thus deserving of special solicitude to avoid a chilling effect on speech interests or artistic endeavors.<sup>269</sup> This is familiar ground for copyright and trademark jurisprudence, although in neither area have produced predictable outcomes.

We expect to see a variety of arguments emerge in response to concerns about the impact of virtual design claims on expressive uses. First, we expect that some will argue for a cramped construction of the terms "applies" and "sells" in § 289 (and, correspondingly, a limited construction of the acts delineated in § 271(a)). We are not sanguine about the desirability of such an approach. The tradition in utility patent law has been to construe the categories broadly, forcing the infringement analysis towards a careful comparison of the elements of the claimed invention and those of the accused devices. In our view, this is where the emphasis properly belongs, for utility patents and design patents alike.

Second, we expect that some will argue for the recognition of a fair use defense to offset the threat of design patents towards expressive activities. This has been a longstanding and mainly fruitless debate in utility patent law.<sup>270</sup> In our view, fair use legislation directed towards design patents would be likely to confront the challenges endemic to the fair use endeavor: it is notoriously

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267. 35 U.S.C. § 271(a) (2011).

268. § 289.

269. See Lionel Bently, *Designs Untethered (?): The Future of Design Protection*, THE FUTURE OF DESIGN LAW (Conference Proceedings, Nov. 2012), available at <http://www.civil.law.cam.ac.uk/activities/DesignsUntethered.pdf>.

270. See, e.g., Maureen A. O'Rourke, *Toward a Doctrine of Fair Use in Patent Law*, 100 COLUM. L. REV. 1177 (2000).

difficult to capture the diversity of likely expressive uses in any way that imparts sufficient clarity to minimize chilling effects.

Other approaches are likely to be more promising, in our view, although they would require further development. Courts deciding whether to grant injunctions against infringement in virtual design cases can (and should) exercise their ordinary equitable discretion to protect against threats to expressive uses. The *eBay* factors already provide courts with the requisite flexibility.<sup>271</sup> Whether this approach provides a sufficient signal to minimize chilling effects is a debate worth exploring.

Another approach is to consider the potential for adaptations to the ordinary observer standard that would incorporate fair use considerations. We consider this approach intriguing, but a great deal more work would need to be done to flesh it out.

### C. Other Issues: Damages, Functionality and Cumulation

Three other issues warrant more attention than we can give them here. First, calculating a damages remedy for design patent infringement in virtual design patents will present some challenges. This is not a particularly new issue, however. Controversy over the proper measure of compensation where the patented design is a surface treatment traces back to the late 1800s.<sup>272</sup> That controversy prompted Congress to enact the special damages provision now codified in § 289, which makes a design patent infringer liable to the design patent owner “to the extent of his total profit.”<sup>273</sup> The policy issue regarding virtual designs is the same one that Congress faced in the late 1800s: whether an award of the infringer’s total profit on sales of the infringer’s product is appropriate compensation where the infringement resides in the use of an infringing surface ornamentation in connection with the product. The more fundamental policy issue is whether § 289 is properly understood as a compensation provision. It is worth asking whether § 289 also expresses a deterrence rationale, especially when deployed against counterfeiting activities.<sup>274</sup>

Second, virtual designs may pose unique functionality concerns too. The paradox of working in a digital ecosystem is that liberation from physical interaction can be alienating for users, often forcing designers to tie virtual

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271. See *eBay Inc. v. MercExchange, LLC*, 547 U.S. 388 (2006).

272. See *Nike, Inc. v. Wal-Mart Stores, Inc.*, 138 F.3d 1437 (Fed. Cir. 1998) (summarizing the relevant cases); Mark Lemley, *A Rational System of Design Patent Remedies*, 17 STAN. TECH. L. REV. 219, 224 (2013).

273. 35 U.S.C. § 289 (2011).

274. See Lemley, *supra* note 272, at 223 (noting the inclusion of a willfulness requirement in previous statutes).

designs to their real-world analogs.<sup>275</sup> Strongly rooted in semiotics, this form of skeuomorphic design can improve the virtual design's usability by relying on metaphors to physical objects or operations.<sup>276</sup> Popular examples of designs employing this technique range from static icons, like Microsoft's recycling bin, to dynamic user interfaces, like Apple's page turn. While this design approach has its critics—especially when the metaphors are applied too literally—its popularity demonstrates why virtual ecosystems are not as limitless as they might seem.<sup>277</sup> In addition to usability constraints, virtual designs are also limited by their hardware. These constraints range from the universal, like screen resolution, to the more specific, like the type of user interface that works best with touch screens. Collectively, where these (and other) constraints necessitate particular design features, questions of functionality arise. In past work we've detailed how courts have dealt with functionality in the context of scope and validity,<sup>278</sup> and we won't reopen that debate here. We will, however, point out that the Federal Circuit's recent case law on both issues arguably has continued to expand the reach of these doctrines.<sup>279</sup> Although their impact is likely to be more sweeping in the analog world, virtual design patentees can also expect to confront these issues.

Third, virtual designs present issues concerning the boundary between design patent protection and other forms of intellectual property protection for designs, particularly copyright. The boundary issue is, of course, prominent in most debates about design protection.<sup>280</sup> With regards to virtual designs, where the connection between the design and the associated article of manufacture may seem tenuous, we expect to see arguments that design patent protection too closely resembles copyright protection. We presume that some will call for a reconsideration of case law establishing that concurrent protection of a design under copyright and design patent is permissible.<sup>281</sup> We think that there are a number of plausible approaches to resolving this issue. The matter deserves a

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275. See RAJESH LAL, *DIGITAL DESIGN ESSENTIALS* 46 (2013).

276. See *id.*

277. See CARLA WHITE, *IDEA TO IPHONE* 121 (2013) (noting that the key “is to simply make a *reference*, not slather it on”).

278. See Jason J. Du Mont & Mark D. Janis, *Functionality in Design Protection Systems*, 19 *J. INTELL. PROP. L.* 261 (2012).

279. See, e.g., *High Point Design, LLC v. Buyers Direct, Inc.*, 730 F.3d 1301, 1319 (Fed. Cir. 2013) (reciting both an alternative designs test and a broader multi-factor test reminiscent of trade dress functionality); *Richardson v. Stanley Works, Inc.*, 597 F.3d 1288 (Fed. Cir. 2010) (embracing a copyright-like approach to infringement where “functional” features are factored out of the comparison).

280. See, e.g., GRAEME B. DINWOODIE & MARK D. JANIS, *TRADE DRESS AND DESIGN LAW* 24-37 (2010) (providing an overview of the “cumulation/preemption” problem in design protection).

281. *In re Yardley*, 493 F.2d 1389 (C.C.P.A. 1974).

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much fuller analysis than we can provide here.<sup>282</sup>

## CONCLUSION

Design patent protection is a growth area, and, as we have shown here, design patent protection for virtual designs is already beginning to drive this growth. We have shown that the question of virtual designs as eligible subject matter for design patent protection is closely linked to historical debates over design patent protection for surface ornamentation. We have also provided a first glimpse into the empirics of patent prosecution for virtual designs, demonstrating the extent to which virtual designs have trended toward the norm in design patent prosecution, and the extent to which virtual design patent prosecution remains different. Finally, we have offered prescriptions for adapting patentability doctrines (anticipation and obviousness) as they apply to virtual designs, and we have identified other doctrinal issues that warrant further study.

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282. Some elements of our prior work are relevant to that analysis. *See* Du Mont & Janis, *Origins*, *supra* note 11 (pointing out the presence of copyright concepts in the original proposals for U.S. design patent protection); Du Mont & Janis, *supra* note 278, at 302-03 (arguing that channeling doctrines that address the boundary problem in design protection law should generally channel innovation towards specialized design protection schemes, not towards copyright or trademark schemes).

## APPENDIX A: TABLES

TABLE 1: USPTO CLASS STRUCTURE AND TOTAL GRANTS

Description	Class	Parent Classes	Total Granted
Generated Image	D14/485	D14	488
Drop Down Menu or Full Screen Menu Type	D14/486	485	1049
Button Bar or Scroll Type	D14/487	485	407
Plural Image or Array – distinct, plural images or symbols	D14/488	485	392
Icon – single electronic generated symbol	D14/489	485	447
Letter, Number or Word	D14/490	489/485	133
Arrow – pointing type directional indicator	D14/491	489/485	156
Simulative	D14/492	489/485	498
Document – simulating a sheet of paper	D14/493	492/489/485	179
Animate – simulating animal life	D14/494	492/489/485	46
Humanoid – simulating human form	D14/495	494/492/489/485	161

**Note:** The grants include some double counting because about 10% of generated images (371 of 3546) are classified in more than one generated image category.

TABLE 2: ANIMATED PATENTS FOR VIRTUAL DESIGNS BY YEAR (2004-2012)

	Animated GIs Filed	% GI DPs Filed	% Total DPs Filed	Animated GIs Granted	% GI DPs Granted	% Total DPs Granted
2004	16	11.11%	0.07%	0	0%	0%
2005	8	2.17%	0.03%	0	0%	0%
2006	54	16.36%	0.21%	17	9.60%	0.08%
2007	48	13.15%	0.17%	36	9.23%	0.15%
2008	86	18.22%	0.31%	46	11.44%	0.18%
2009	57	16.06%	0.22%	89	18.86%	0.39%
2010	58	14.36%	0.20%	53	11.65%	0.23%
2011	63	21.95%	0.21%	57	15.53%	0.27%
2012	3	25%	0%	95	21.16%	0%

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TABLE 3: VIRTUAL DESIGN PATENTING ANNUAL DATA

Year	Total GIs Filed	% Total DPs Filed	Total GIs Granted	% Total DPs Granted
1977	2	0.03%	0	0%
1978	2	0.03%	0	0%
1979	1	0.01%	0	0%
1980	3	0.04%	4	0.10%
1981	3	0.04%	1	0.02%
1982	6	0.07%	1	0.02%
1983	2	0.02%	2	0.04%
1984	0	0%	4	0.08%
1985	23	0.24%	5	0.10%
1986	1	0.01%	1	0.02%
1987	1	0.01%	1	0.02%
1988	1	0.01%	23	0.41%
1989	3	0.02%	0	0%
1990	5	0.04%	1	0.01%
1991	10	0.08%	2	0.02%
1992	15	0.11%	2	0.02%
1993	33	0.24%	1	0.01%
1994	24	0.15%	0	0%
1995	28	0.18%	0	0%
1996	57	0.38%	1	0.01%
1997	129	0.78%	55	0.48%
1998	70	0.41%	164	1.11%
1999	81	0.46%	63	0.43%
2000	71	0.39%	113	0.65%
2001	109	0.60%	62	0.37%
2002	66	0.32%	90	0.58%
2003	62	0.27%	95	0.57%
2004	144	0.60%	72	0.46%
2005	369	1.44%	71	0.55%
2006	330	1.29%	177	0.84%
2007	365	1.32%	390	1.62%
2008	472	1.70%	402	1.57%
2009	355	1.38%	472	2.04%
2010	404	1.39%	455	2.00%
2011	287	0.94%	367	1.72%
2012	12		449	

**Note:** At the time of this study, the USPTO's annual 2012 data was not available.



TABLE 4: TOP 5 PATENT OWNERS BY YEAR (2003-2012)

	Microsoft		Apple		Samsung		Xerox		Sony	
	<i>Filed</i>	<i>Granted</i>	<i>Filed</i>	<i>Granted</i>	<i>Filed</i>	<i>Granted</i>	<i>Filed</i>	<i>Granted</i>	<i>Filed</i>	<i>Granted</i>
2003	4	0	4	7	0	0	4	5	0	9
2004	54	4	6	7	0	0	17	2	2	0
2005	211	15	2	6	22	0	21	12	10	0
2006	190	96	2	3	58	1	8	8	3	3
2007	96	237	35	1	40	34	0	25	8	8
2008	171	170	19	3	24	76	11	2	3	3
2009	142	185	11	11	12	26	4	3	7	11
2010	145	161	59	46	17	15	0	12	10	7
2011	203	137	3	41	0	3	0	3	0	4
2012	3	214	3	36	0	18	0	0	0	8

TABLE 5: TOP 10 PATENT ASSIGNEES

	Number of GIs Granted	% Total GIs Granted
Microsoft	1224	34.52%
Apple	230	6.49%
Samsung	173	4.88%
Xerox	106	2.99%
Sony	80	2.26%
Yahoo!	58	1.64%
PepsiCo	57	1.61%
Siemens	53	1.49%
Fujitsu	45	1.27%
HTC	31	0.87%

TABLE 6: PATENT PENDENCY FOR VIRTUAL DESIGNS

	Full Dataset		Filed 2007-2012	
	<i>Animated</i>	<i>Static GIs</i>	<i>Animated</i>	<i>Static GIs</i>
Mean	534.83	636.19	498.90	496.39
Median	515	552	468	452
Stand. Dev.	198.77	401.86	189.98	204.12
Min	144	76	144	76
Max	1406	7270	1406	1569
<i>n</i>	335	2991	274	1496
<i>p</i> -value		0***		0.55
Significant		Yes		No

**Note:** When testing the full dataset for significance an unequal *t*-test was used (Bartlett  $\chi^2(1) = 29.85^{***}$ ). However, our post-2006 necessitated utilizing an equal *t*-test (Bartlett  $\chi^2(1) = 2.18$ ). Test statistics reported in log.

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TABLE 7: EXPEDITED PATENT PENDENCY FOR VIRTUAL DESIGNS

Filed 2007-2012		
	<i>Animated</i>	<i>Static GIs</i>
Mean	340.51	315.87
Median	333	309.5
Stand. Dev.	66.20	102.20
Min	130	95
Max	501	895
<i>n</i>	41	84
<i>p</i> -value		0.87
Significant		No

**Note:** When testing for significance an unequal two-sample *t*-test was used (Bartlett  $\chi^2(1) = 8.58^{***}$ ). Test statistics reported in log.

TABLE 8: CITATION-TYPE BIVARIATE COMPARISONS

	Utility Patent	Design Patent	Application	Foreign	Other	Total	
<b>GIs</b>	Mean	4.93	13.10	2.51	0.37	3.19	24.10
	Median	2	9	0	0	0	15
	Stand. Dev.	11.14	15.00	8.44	2.30	11.79	33.33
	Min	0	0	0	0	0	0
	Max	226	170	141	36	152	406
	<i>n</i>	3442	3442	3442	3442	3442	3442
<b>Control</b>	Mean	5.53	10.30	0.46	0.82	1.32	18.43
	Median	2	6	0	0	0	10
	Stand. Dev.	13.38	17.66	2.55	5.74	7.10	31.67
	Min	0	0	0	0	0	0
	Max	171	433	84	173	252	672
	<i>n</i>	2452	2452	2452	2452	2452	2452
Wilcoxon-Z	0.46	15.28	22.79	5.22	16.95	19.38	
<i>p</i> -value	0.64	0***	0***	0***	0***	0***	
Significant	No	Yes	Yes	Yes	Yes	Yes	
$\chi^2(1)$	18.22***	2.43	1300***	448.11***	344.20***	0	
<i>p</i> -value	0.24	0***	0***	0***	0***	0***	
Significant	No	Yes	Yes	Yes	Yes	Yes	

**Sampling Note:** Because the MPEP changes should not have an effect on the references cited, these results reflect our entire dataset. We have also left animated generated images in with non-generated images because there is no reason why their citation patterns should differ.

**Inferential Statistics Note:** A nonparametric Wilcoxon-Z test was preferred over a Student's *t*-test in most cases because the data was not normally distributed even after transformation. While each of these reference categories is continuous, many of them have large standard deviations and medians of 0, which makes transformation into a normal distribution inadvisable. However, the Student's *t*-test was appropriate for some categories (e.g., total citations). We report both Wilcoxon-Z and Student's *t*-test

results above. The Student's *t*-test values are reported in square root. We tested for homogeneity of variance first. The Bartlett's test results ( $\chi^2(1)$ ) for homogeneity of variance are included above Student's *t*-test results and separately noted for significance.

TABLE 9: TOTAL REJECTIONS UNQUALIFIED BY DATE

		GIs			Non-GIs
		Total (n=3543)	Non-Animated (n=3150)	Animated (n=393)	Control (n=3536)
<b>Total</b>	# Patents	752	677	75	723
<b>Rejections</b>	% of Total Patents	21.22%	21.49%	19.08%	20.45%
<b>Non-final</b>	# Patents	734	659	75	716
<b>Rejections</b>	% of Total Patents	20.72%	20.92%	19.08%	20.25%
<b>Final</b>	# Patents	98	84	14	115
<b>Rejections</b>	% of Total Patents	2.77%	2.67%	3.56%	15.91%

TABLE 10: TOP 5 EXAMINERS

Top 5 Examiners	Number GIs Granted	% Total GIs Granted
M.T.	1660	46.81%
C.B.	791	22.31%
S.L.	222	6.26%
K.K.	174	4.91%
R.W.	151	4.26%
Total	2998	84.54%

TABLE 11: ABANDONMENTS

Year Filed	GIs Filed (our Dataset)	GIs Abandoned (USPTO)	Actual GIs Filed	% Error Dataset & Actual	% GIs Abandoned	% Other Classes Abandoned (USPTO)
2000	71	47	118	39.83%	66.20%	14.17%
2001	109	31	140	22.14%	28.44%	14.54%
2002	66	14	80	17.50%	21.21%	14.52%
2003	62	31	93	33.33%	50.00%	15.07%
2004	144	26	170	15.29%	18.06%	17.27%
2005	369	25	394	6.35%	6.78%	17.43%
2006	330	34	364	9.34%	10.30%	18.73%
2007	365	39	404	9.65%	10.68%	19.92%
2008	472	44	516	8.52%	9.32%	20.38%
2009	355	83	438	18.95%	23.38%	15.89%
2010	404	62	466	13.30%	15.35%	15.57%

**Note:** When calculating the percent of all of other classes abandoned, we removed GIs by using the actual GI filing counts (filings from grants + abandonments).

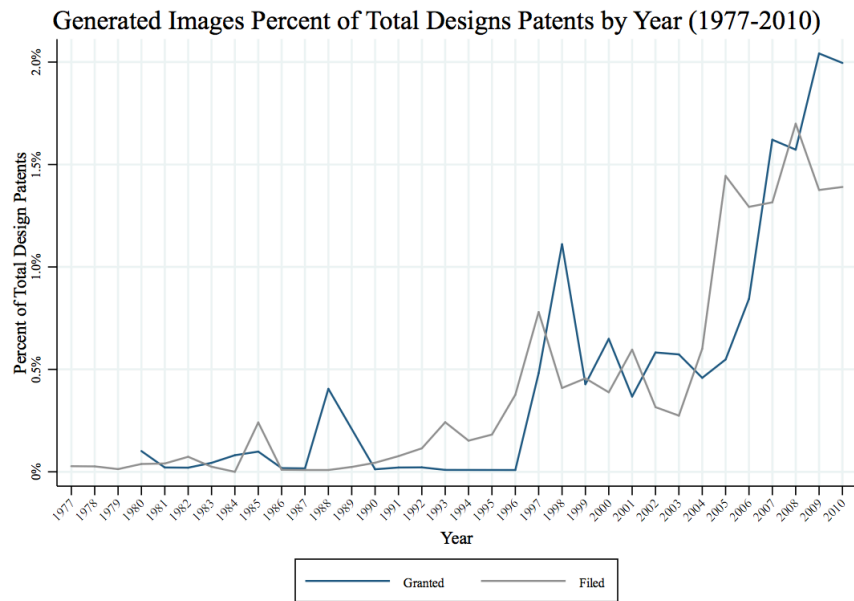
Fall 2013]

VIRTUAL DESIGNS

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## APPENDIX B: GRAPHS

GRAPH 1



**Note:** Connected markers are used above to notate when patents were filed or granted. In other words, the absence of a marker in 1994 and 1995 indicates that no generated image patents were granted.

GRAPH 2

Design Patents Granted to the Top 5 Assignees by Year (2003-2012)

