

State of the Industry



by Howard N. Aronson

Printing Toys

As 3-D printers gain traction in households across the country, toy manufacturers must find a way to protect their intellectual property.

From wooden blocks and erector sets to Lincoln Logs and model airplanes, kids love building toys. But now, kids are not only building with toys—they're printing the toys with which to build. The kid next door may be infringing your intellectual property (IP) by printing your copyrighted toy product on a 3-D printer, or he or she could be using your copyrighted design under license. Toy companies will have to decide how to protect their IP rights before 3-D printers become ubiquitous. Recently coming into widespread use, 3-D printers now

print human and animal body parts (bio-printing), replacement mechanical parts, guns, and toys. A 3-D printer will soon orbit the Earth, making parts for the International Space Station.

Large, commercial 3-D printers often produce prototypes. Mattel, for example, which used to sculpt its pro-

types from wax, now uses dozens of printers to manufacture parts not only for prototypes, but also for Barbie and other dolls, according to *The Wall Street Journal*. One toy designer estimates that the transition to 3-D rapid

prototyping has cut development time from a year to just three months. Disney researchers, according to a BBC report, say that creating toys on 3-D printers has allowed them to create a prototype in minutes, instead of the amount of time it takes for a factory to be retooled. The 3-D printers have another huge advantage: They provide a level of accuracy that would be too costly and complicated using traditional manufacturing techniques.

Let There Be Lights

The BBC explains how Disney explores the use of 3-D printers to build new kinds of light features into its toys, including light pipes and tubes of enclosed air that glow. Another Disney design uses hollow tubes at a toy's center. When illuminated, the toy's "heart" appears to be beating. Disney also created a glow-eyed bug figure item, chess pieces that display their position on the board, and plastic blocks in which light is used to make the blocks appear to explode inside.

3-D printers can also make entire toys. A Disney research paper predicted "a future world where interactive devices can be printed rather than assembled [where] ... a device with active components is created as a single object, rather than a case enclosing circuit boards and individual assembled parts." One toy designer has a hybrid manufacturing model for a building set: injection molding for the core chassis parts, and on-demand 3-D printing for accessories.

"Kids are not only building with toys—they're printing the toys with which to build."

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How 3-D Printers Work

Originating with a 1986 patent, Chuck Hull, the founder of 3-D Systems, created 3-D printing, or “stereolithography” that used a beam of ultraviolet light to solidify successive thin layers of liquid plastic—additive manufacturing. The 3-D printer works much like a regular 2-D printer, but while the inkjet printer sprays ink onto the page, the 3-D printer deposits layers of material—usually plastic—atop one another. A printer can deposit a polymer that hardens when it is exposed to ultraviolet light in successive layers with a degree of accuracy equal to a print resolution of 600 dots per inch. The printer builds the succession of layers, the layers are fused, and the fabricated object is treated and hardened

to form objects, such as toys. One computer expert highlighted in a *Forbes* article has built a type of universal connector for plastic building toys, for example.

The blueprint for the toy could be a 3-D design file, which can be independently designed

using a computer-assisted design (CAD) program or scanned from one of the existing toys. The scanner measures the object vertically, with succeeding thin horizontal scans. Computer software then reads the file as cross-sections, which are printed in sequence, creating the product layer by layer. Size and complexity depend only upon the printer. Although plastic is the most common material for 3-D printer output, the printers can be adapted to materials including silicone, cement, stainless steel, glass, metals, ceramics—even cake frosting, cheese, and chocolate. Such printers have also made products ranging from batteries to bicycle and toy parts.

Good News and Bad News

Like most new technologies, 3-D printing presents both an opportunity and a threat for toy manufacturers. Because 3-D printers lower the per-unit cost of manufacturing, this innovation can help manufacturers produce toys for a much lower cost. In addition, 3-D printers allow the manufacture of personalized images as toys, like a 3-D photograph. But since 3-D printers also allow individual consumers to copy and print consumer products, including toys and replacement parts for toys—and with some printers selling for less than \$1,000—3-D scanning and printing offers an easy, though usually unlawful, way to copy patented or copyrighted designs. Responsive manufacturers need to protect themselves against theft of their intellectual property.

The Legal Questions

For toy manufacturers, the 3-D printer can seem like printing money—only in reverse. The toy company’s innovations and investment are incorporated in a scan of the product, which can be printed on a home computer. But unlike counterfeit money—which can be stopped by technology used to trace the counterfeiter—the vast number of product designs for toys alone makes that kind of protection impossible. Even though copyright, design, and/or utility patents generally could cover a scanned design, enforcement would be extremely difficult. (See *Raising the Bar*, “Copyright or Design Patent?” January/February 2010 and “The Courts Toy with Copyrights,” September 2008.) There’s an important lesson to be learned from how the music industry proceeded when music file sharing proliferated. Many copyright holders embarked on a wide campaign of suing end users—customers. And many of these customers were, in fact, children.

Copyright

As with traditionally manufactured infringing goods, toy companies can protect their copyrighted designs by suing infringers. Some toys only have limited copyright protection.

“Manufacturers need to protect themselves against theft of their intellectual property.”

because concepts and ideas are not protectable. But if a toy company can overcome the hurdle always present in toy copyright enforcement—mainly, showing that its copyright covers a separable part or aspect of the toy that is not “useful” and thus protectable—then asserting copyright should be able to stop an infringer, large or small. In fact, bringing actions against commercial parties that use 3-D printers to make infringing toys is no different from suing any infringing competitor. But most toy companies probably would hesitate to target their own customers—the kids who print the toys at home, or their parents.

Toy companies can also protect 3-D printing digital files, bringing actions against producers of a toy design file—which can also be protected by copyright, much like an architectural design—that is used in the printer. However, enforcement may be difficult, because CAD files, like MP3s, can be easily transferred and copied. Individuals can also scan actual toys to make the design files.

Patents

Because patents cover useful articles as well as ornamental designs, many toys can be protected by both utility and design patents. Printing, or scanning and then printing, a toy covered by a patent would be direct infringement. For example, a website such as Shapeways, that will actually fabricate and sell products, could be liable for patent infringement if it made or sold a patented invention. Enforcement is more straightforward because patent infringement does not require knowledge of the existence of the infringed patent. Unlike copyright, patents allow no exception for “fair use” of a protected invention. However, toy companies still face the dilemma of suing individual infringers—their customers.



MakerBot Thing-O-Matic 3-D Printer

The Solutions

Combating commercial counterfeiters—those printing large numbers of toys for sale—will be more difficult than it is today because counterfeiting will be easier, more mobile, cheaper, and stealthier. But for individuals who are 3-D printing toy designs protected by patent or copyright, enforcement will be extremely difficult and unrewarding, as music publishers learned after chasing teenagers who were downloading music. Toy manufacturers would be wise to consider how to protect their products before 3-D printing becomes a household infringing enterprise.

Whether or not products are covered by patents or copyrights, manufacturers could seek enforcement of their rights against hosting sites such as Thingiverse and Shapeways if there is indeed a violation of registered rights, as is the case with copyright infringement of music, films, and other media. Whereas iTunes eventually emerged as a kind of win-win option for the music industry, a similar arrangement for selling licensed printable design files for products on a per-use basis could allow toy manufacturers to retain control over their intellectual property. But, as Mattel told *The Wall Street Journal*, toy manufacturers cannot ensure that toys printed on home 3-D printers will meet safety standards. So toy makers will have to solve that problem before they can sell 3-D software files to consumers. ■

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