

# REGULATING THE FUTURE: THREE DIMENSIONAL PRINTING AND THE LAW

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3D printing—the process of making a three-dimensional solid object from a digital model—holds enormous potential and is an industry that is on rise. There is currently a dearth of policy at the federal level to address many of the concerns that 3D printing raises. This paper discusses three concerns in particular: public safety, quality assurance, and intellectual property protection. The author suggests potential policy alternatives that the federal government could consider in response to each of these concerns. The proposed policies could be effective means of regulating the industry without stifling innovation—a key balance to strike in order to allow society as a whole to benefit from the immense potential that 3D printing holds.

## INTRODUCTION

In his 2013 State of the Union Address, President Barack Obama stated that 3D printing technology “has the potential to revolutionize the way we make almost everything.”<sup>1</sup> The number of people who have purchased 3D printers—although still relatively small—has skyrocketed. Fewer than 4,000 units were sold in 2009 and by 2011 almost 24,000 were sold.<sup>2</sup> 3D printing has the potential to give individuals the ability to quickly and inexpensively manufacture products, but current federal policy in the area is scarce. With some hailing 3D printing as a potential third industrial revolution,<sup>3</sup> the federal government must look to the future and create effective policies to regulate this new technology.

Some of the most pressing issues surrounding 3D printing include the creation of dangerous and illegal items, quality assurance, and intellectual property protection. This paper will outline alternatives that the federal government could utilize to mitigate these issues. First, the government could modify legislation to ban the possession of dangerous objects created by a 3D printer. Second, the Consumer Product Safety Commission could create a set of standards that ensure consumers receive safe, high-quality items, and certify websites according to these standards. Finally, another option is for the federal government to establish an online database of designs to protect intellectual property rights. Effective regulation could mitigate potential issues and solve impending policy problems while still promoting innovation in the advanced manufacturing industry.

## HISTORY OF 3D PRINTING

To 3D printing has enormous potential for consumers and manufacturers. Through a technique called “additive

manufacturing” a printer uses a computer-aided design (CAD) file to add layers of material until it creates the finished product.<sup>4</sup> Presently, printers utilize a wide variety of materials including plastic, metal, and sugar to create finished products including novelty items, cups, and toys. Modern 3D printing technology is also capable of creating more advanced products such as titanium airplane parts, which will greatly impact the advanced manufacturing industry. As manufacturers continue to experiment with products and materials, 3D printing will expand into new realms.<sup>5</sup>

This new technology could initiate a third industrial revolution in the manufacturing industry. It is less wasteful than traditional “subtractive” manufacturing, like sawing or milling, in which material is taken away from a larger piece of material.<sup>6</sup> For instance, printing parts for the aerospace industry saves 90 percent of the titanium that would ordinarily be cut away.<sup>7</sup> 3D printing is also used to create inexpensive, individualized products, enabling inventors to create prototypes cheaply and easily, while allowing for fast, easy changes to the prototype before finishing the design.<sup>8</sup>

The growth of 3D printing raises policy concerns similar to those previously raised by new technologies. Printers, VCRs, and other copying technologies each spurred their own industry and policy concerns. The film industry, for example, speculated that individuals would no longer purchase movies if they could record them at home. The general conclusion at the government level regarding legislation has been to not impede the technology itself.<sup>9</sup> In spite of some concerns, 3D printing can still be enormously useful and innovation should be encouraged.<sup>10</sup>

### PROBLEMS AND POLICY SOLUTIONS

A potential solution to addressing some of the challenges brought about by the rise of 3D printing is to regulate at the item and information levels, which could mitigate some of the above concerns. Government should enact policies now to address these issues rather than wait until 3D printing has become more widespread, when regulating may prove more difficult.

### DANGEROUS MATERIALS

3D printing makes dangerous objects easier to obtain. Recently, the balance between public safety and Second Amendment rights has spurred controversy surrounding the 3D printing of guns. My suggestions on regulating certain items will utilize this issue as a case study of how dangerous items should be regulated. We should remember that laws regarding these items are still in place. For instance, it is still illegal in most places to carry a concealed gun without a license, regardless of whether a 3D printer or a gunsmith created it. The major issues surrounding 3D printing are the barriers that can be evaded in obtaining a dangerous item and the material from which it is made.<sup>11</sup>

The federal government should remain aware of the capabilities of 3D printing and extend current policy to meet this new regulatory need. On December 9, 2013, the U.S. Senate extended the Undetectable Firearms Act for 10 years in order to curb the creation of guns that cannot be traced by an X-ray machine or metal detector.<sup>12</sup> This occurred in response to the rise of 3D printed plastic guns, which are manufactured with an amount of metal small enough that the guns are undetectable. While the Undetectable Firearms Act has existed since 1988, it became necessary to extend the legislation given present-day concerns about terrorism and public safety.<sup>13</sup> Similarly, modification of other existing legislation may prove sufficient in heightening safety regulations around this new technology as opposed to new legislation directed specifically at 3D printing.

If customers can easily manufacture their own dangerous items, other problems may arise. For instance, gun control measures such as serial numbers, licenses, and registration can be evaded through 3D printing.<sup>14</sup> Thus, while adapting current policies to 3D printed objects may be effective in some cases, in other cases, entirely new policies may be necessary to address the new problems. Stricter regulation, rather than a complete ban, is most feasible in the case of potentially dangerous 3D-printed objects. We may not need to completely ban 3D-printed guns as long as gun manufacturers adhere to the industry's existing legal standards. Federal and state governments should consider new standards mandating the registration of weapons created by a 3D printer. Enforcement could still be problematic. Growing small amounts of marijuana at home, for instance, is illegal in most states and

is difficult to enforce. Restricting what people print in their homes may prove just as difficult. Nonetheless, making items like undetectable guns illegal may assist in deterring individuals from experimenting in making or buying these products.<sup>15</sup>

### SOLUTION

The government should require dangerous materials to have a tamper-proof serial number embedded into their CAD files, which would ease the burden of unregistered weapons. The serial number would be a series of digits, with one section programmed to be randomized to ensure the same file does not result in the same serial number printed multiple times. The government could mandate that manufacturers print serial numbers directly onto the guns. 3D-printed gun owners would register guns in the National Firearm Registration, just as with traditionally manufactured firearms. Gun operators could remove the numbers, but just as it is currently illegal to scratch off the serial number on guns, it would be illegal to do so with 3D printed guns.

As technology advances, new objects could threaten society. Policy makers must remain aware of the objects that 3D printing makes available and remain mindful that these new objects may require legislation in order to protect the public. Regulation of individual objects may be an effective way of protecting people without stifling the industry or innovation, but policymakers must handle these products on a case-by-case basis rather than create broad policies that may stifle innovation.

### QUALITY ASSURANCE

Another possible undesired outcome from 3D printing would be consumers printing from files with flawed designs. In a test performed by the Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF) on 3D printed guns, one gun successfully shot while the other immediately exploded.<sup>16</sup> Quality assurance is important for any 3D-printed product. If the product causes injuries, for instance, current laws are unclear on the liabilities of both the file's creator and the person who printed the object.<sup>17</sup>

Regulating CAD files on the information level could ease the issue of product liability if people can determine which products are engineered well and which are not. When consumers receive assurance that they are printing high quality files, liability issues may arise less frequently.

Today, a similar issue already exists. Downloading music from a file-sharing website puts users at risk for downloading viruses or poor quality music. As a result, people are often willing to pay a small fee for quality assurance through iTunes and Amazon. Similarly, people might be willing to pay a low fee for high quality CAD files.<sup>18</sup>

**SOLUTION**

The government could work with leaders from the 3D printing industry to create regulations on CAD files that would ensure the creation of high-quality products. The Consumer Product Safety Commission can post these regulations on the website Regulations.gov to ensure that they are accessible to creators in the 3D printing industry. More than thirty partner agencies, including the Consumer Product Safety Commission, support this website, which encourages transparency by providing easy access to federal regulations. Accessibility on Regulations.gov encourages public participation in shaping these rules to ensure that they are feasible and do not stifle industry growth. The Consumer Product Safety Commission could also create a new division focused exclusively on certifying 3D printing file-sharing websites. The division could review content on file-sharing websites, including CAD files, to determine whether sites maintain quality assurance. Websites will likely attempt to meet government regulations in order to gain credibility and attract business.

A small fee charged by the official websites could fund the division, and the websites themselves could receive a percentage of the profits for the purpose of funding experts to conduct file review. Requiring the websites themselves to review CAD files will distribute responsibility rather than placing a heavy burden on one government organization. The fee could be similar to the price paid for high-quality music files. Reasonable prices would not stifle innovation and would encourage people to purchase high quality product files. This is especially important for potentially hazardous products, such as furniture or firearms.

**INTELLECTUAL PROPERTY**

As people upload and print product design files, the risk of intellectual property infringement may become a major concern. In order to protect intellectual property, we need policies that address both file uploading and downloading.<sup>19</sup> 3D printing file-sharing websites could develop protections similar to the standards that presently exist for file-sharing sites such as YouTube. The 1998 Digital Millennium Copyright Act made illegal technological devices that allowed users to avoid copyright, and increased penalties for copyright infringement. A critical part of the Act is Section 512, which removes the website's infringement liability if it removes the infringing material after being notified, such as through a notice-and-takedown policy.<sup>20</sup> The Digital Millennium Copyright Act provided the framework for such a policy protecting digital content. Most websites that allow users to upload content, like YouTube, have clear takedown policies so users and creators can protect themselves from legal disputes. Copyright holders send cease-and-desist letters, raising awareness about the copyright infringement. Users are then expected to take down the infringing content.<sup>21</sup> Copyright owners have already

successfully and legally forced file-sharing sites such as Thingiverse and Shapeways to remove user content.

Intellectual property protection stands to harm three parties as it relates to 3D printing. First, file-sharing websites may find themselves unable to cope with excessive legal issues. Second, copyright holders might lose revenue or control over their product if it becomes especially popular. Third, people creating CAD files for file-sharing sites might be discouraged to upload their designs for fear of intellectual property infringement.<sup>22</sup>

**SOLUTION**

One possible way of mitigating potential intellectual property infringement would be to create a nonprofit organization that manages the available information through a database. This organization could work in partnership with the United States Patent and Trade Office through a public-private partnership.<sup>23</sup> The database would preserve public information and make it easier to identify which organizations have patented their files. A portion of the revenue from users downloading files from certified websites could go toward funding the nonprofit.

**CONCLUSION**

It is important to create federal policies to prepare for the rise of 3D printing technology before it raises large-scale policy issues. The United States can prepare for this third industrial revolution by tackling the major issues that have already begun to materialize. The federal government needs to take the lead in regulating this industry, as it will likely include cross-state and transnational commerce, and since other governments are likely to follow the precedent set by the United States. Government must protect citizens from dangerous items by updating current legislation and creating new regulations. It should also set standards in order to protect consumers and legitimize websites and design files. Finally, government should create a database to help prevent a potential swarm of intellectual property infringement cases. By preparing suitable policies pertaining to the advanced manufacturing revolution of 3D printing, the United States will prepare itself to capitalize on this new technology and position itself as a leader in the field.

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## THREE DIMENSIONAL PRINTING AND THE LAW

### ENDNOTES

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