



OWNERSHIP IN THE AGE OF PRINTABLE GOODS : THE COLLISION BETWEEN 3D PRINTING AND INTELLECTUAL PROPERTY LOUIS-PIERRE GRAVELLE*

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Just 10 years ago, the semantic web changed how we collected, connected and interpreted data to add layers of context to our lives. It added context to and changed everything about how we customized the world of information.

Now 3D printing has the potential to eclipse this shift with tangible object creation, iteration, and réplication. Imagine downloading and printing a pair of eyeglasses that are an exact fit for your face. With this massive disruption, we have tremendous opportunities, and potentially problematic IP issues.

3D Printing: Things on Demand

3D printing (or additive manufacturing) is an old method of manufacturing powered by a new way of acquiring and assembling manufacturing instructions.

If you have an object you'd like to replicate, you scan it with a 3D scanner. The resulting image is then "sliced" to digitally create a schematic for a 3D printer to replicate those slices in a medium (usually molten plastic or a plastic-like product, but other materials can be used, including metals and even food ingredients) by building successive layers of that medium until a replica is achieved.

This means you can create a tool, upload the schematic to the web, and people anywhere in the world with access to 3D printers can replicate your product quickly and accurately.

While this holds unlimited potential for sharing engineering and manufacturing ideas, much like the media industries of the early 2000s, this poses deep and sometimes troubling questions about ownership and IP.

What Happens When You Can Download Any Item You Want?

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Additive manufacturing is an idea moving too quickly for IP law to catch up to. IP law historically has been anchored on the idea that if an idea is “protectable”, it has to actually have a physical manifestation. You can’t protect the idea of a story about a man who can fly. You have to create the comic book for that idea and name it to be protected.

3D printing instructions subvert this understood method of protecting intellectual property.

It follows that electronic files that contain instructions to make an object are at the very least protectable under prevailing copyright regimes. It also follows that unauthorized printing of an object that is protected by a patent, a trademark, or an industrial design, would trigger infringement under the prevailing IP regime. So why are manufacturers and retailers so worried? Control.

Consumer goods are subject to market forces and the way for everyone in the supply chain to make money is to exert control over every link in the chain to maximize profit. Manufacturers must invest in factories, expensive tooling, and engineers upfront. They need control to ensure that they can recoup their investment and take home profits. This is why consumer goods are mass produced in a finite collection of colours, sizes and other options. Limiting choice helps reduce production costs and edge out more profit.

3D Printing Threatens the Manufacturing Industrial Complex

3D printing is the antithesis of mass production. Foot orthoses, eyewear frames, clothes, figurines can all be customized to meet the end client’s needs. The only investment required is time to manipulate the electronic file. 3D printing does not require massive investment in manufacturing capabilities. 3D printers have been coming down in price steadily and consumer models are getting better. Even the most expensive 3D printer, adapted to print metal is still cheaper than the cost to build manufacturing tools. All you need to produce custom eyeglass frames is a 3D printer, a good computer to handle the electronic file and the raw material. No need to ship containers full of things halfway around the world: have a few printers handy, access to the raw material, and voilà! You have your own factory.

This decentralization of fabrication is where IP collides with 3D printing. If you’re Apple, and a company starts making an identical product to yours on a large scale, it’s easy to mount a case of IP infringement against them. If someone made a pink version of your red eyeglass frames somewhere in the world, how would you know, and how could you effectively assert a claim of IP infringement against them? Does this set up a precedent that if small individual cases like those eyeglasses happen in a decentralized way, do IP rights holders have a losing battle on their hands?

The owner would not be able to assert its right against the manufacturer of the printer itself, as there likely is no direct or indirect infringement. You then have to assert your right against individuals, and the music industry is a poster child for what not to do in that case.

Like the music industry, IP owners are investing in digital protection measures (DRM, or digital rights management) to insure that only authorized or licensed individuals are able to print from the instructions. Regardless of where a file was obtained, only rights holders will be able to manufacture. Other methods, such as encoding a unique marker in the object as it is being printed, would result in objects that can be authenticated; objects not including the marker would thus not be “authentic”.

A 3D Printer in Every Garage?

Fears of massive infringement rest on the expectation that everyone will possess a 3D printer at home. 3D printers have disadvantages that for many outweigh the possible benefits. Not everyone wants a 3D printer, has the skill to operate it, or wants the relatively low quality objects that affordable machines produce. There is time for the law to catch up to the adoption of these devices. IP will still be alive and kicking for a few decades still. Manufacturing objects with traditional methods or with 3D printing doesn't, in the short term, change very much when it comes to IP.

The Upside of 3D Printing: Rapid Engineering Iteration and Medical Breakthroughs

Recently, major aerospace manufacturers have announced that 3D printing has moved beyond rapid prototyping into production. For example, Airbus has over 1000 parts that are 3D printed in the A350XWB. Mass customization is one area that is rapidly developing. Sols, a New York-based company, offers custom orthotics customized to the user's feet. Eyewear is being fitted and styled to the individual. Shoes, dresses and other wearables have been commercially printed using 3D printers. Houses made of concrete can be built in 24 hours, with the conduits for electricity, plumbing and HVAC embedded at the time of manufacture.

In the medical field, 3D printed titanium implants are routinely being implanted in patients. Dentistry is one field in particular that makes extensive use of 3D printers. Although we are not yet able to print a fully functioning organ, 3D printers have been used to print skin in situ in the operating room, to help burn patients. 3D printers are also used to create models of internal structures, allowing the surgeon to better prepare for surgery.

Mathematical modelling of objects, “slicing” of the object, and all of the components of 3D printers are undergoing constant innovation. Much research is being conducted now on the raw materials used in 3D printing – metal powders, filaments,

nanostructures, and even food. Everything we use could eventually be refined using these discoveries.

Canada Could Harness this New Manufacturing Paradigm

Canada's history of natural resources mining and production and its brain trust of engineers and tech innovators can help make Canada become a leader in the development of metal powders, ceramics and other materials used in 3D printers. Canada has the building blocks to encourage students and researchers to develop more efficient models for analyzing 3D structures, and printing them. Both initiatives would also enable Canadian entrepreneurs to build valuable IP portfolios.

3D printing provides undeniable advantages and features that cannot be easily achieved with traditional manufacturing methods. There are downsides, notably when it comes to product liability for an object printed outside of the controlled supply chain. The technology is here to stay, and is becoming mainstream. We have the runway to make the necessary adjustments to existing frameworks, particularly IP. The world changing potential of 3D printing far outweighs potential legal hurdles on the horizon.



