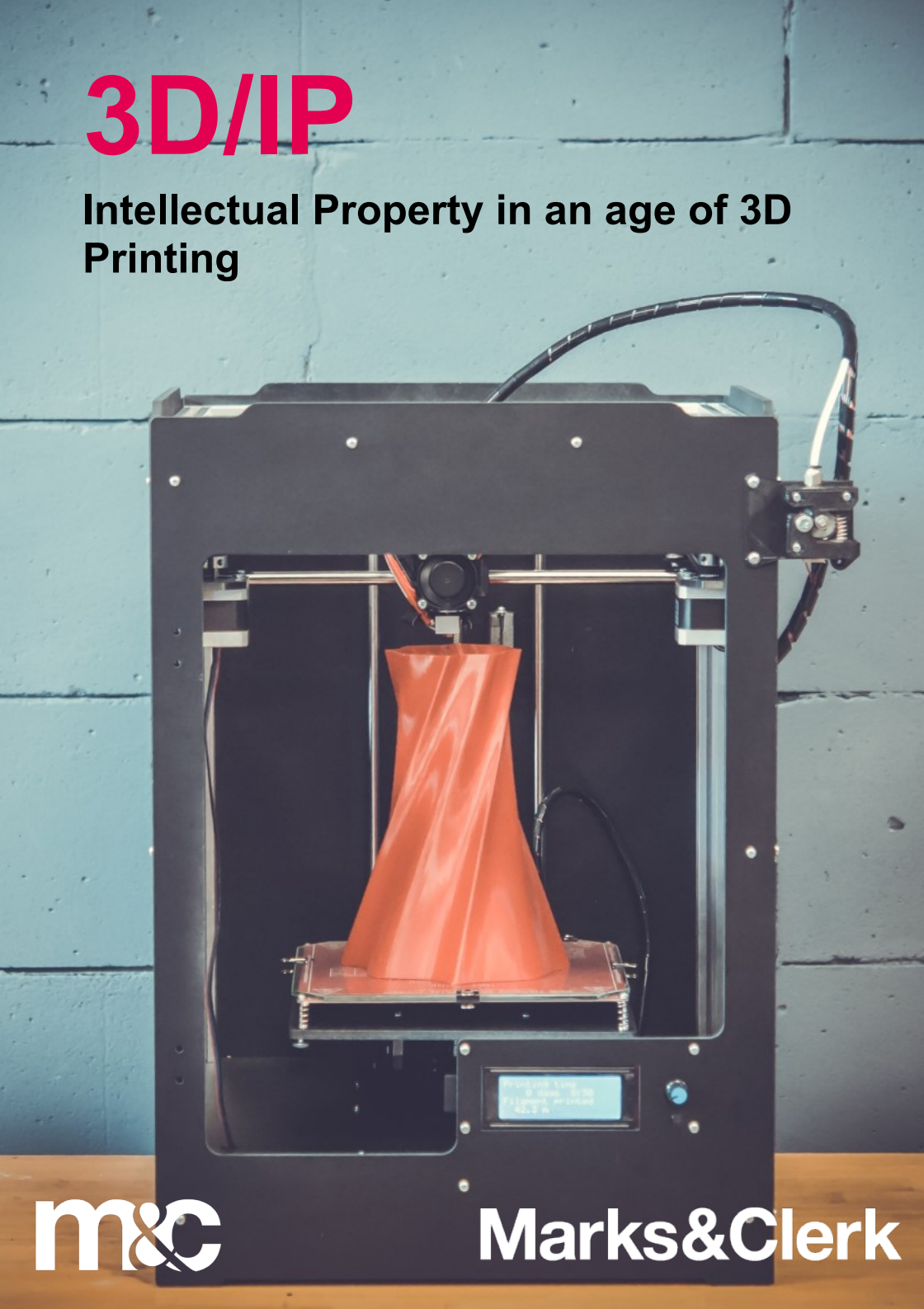
3D/IP

Intellectual Property in an age of 3D Printing



Marks&Clerk

Intellectual Property in 3 Dimensions – innovation and technological disruption

Since being proposed as a concept in the late 1970's, additive manufacturing, or 3D printing, has grown quickly from niche technology into an industry projected to be worth $3.1 billion in 2020.

While this figure remains a fraction of the value of global manufacturing as a whole, the 3D printing industry's consistent double digit growth indicates that 3D printing has an increasingly important role to play both in the production of goods for the mass market, and for individual consumers in their homes.

Any industry producing tangible, structured goods can benefit from advances being made in the 3D printing field. As with disruptive technologies in the last century it is clear that even if at the moment the application of 3D printing to your industry feels like a matter for the distant future, it is likely to happen sooner than you think. This is reflected in the projected size of the global 3D printing market, which is expected to reach almost US$50 billion by 2050.

As with any emerging market, innovation is key to staying ahead in 3D printing. Analysis of global patent filing indicates that the market still has relatively low barriers to entry, and has yet to be consolidated into the hands of any key players. Innovative start-ups and larger corporates are finding novel applications for 3D printing in a wide range of industries, with the automotive, energy, healthcare and medical devices industries having thus far been early adopters.

Disruptor or disrupted?

The opportunities presented by 3D printing are immense. By allowing for the rapid electronic distribution of design files and templates, 3D printing has the potential to allow for ever more distributed manufacture – saving businesses both expense and CO2. Even the final frontier is no barrier to the potential of 3D printing with objects having recently been printed on the International Space Station.

As the technology grows more sophisticated, the range of potential applications is also growing. Recent years have seen metal begin to replace plastics, as the primary material used in 3D printing. While plastic remains the most prevalent material in 3D printing, metal is rapidly catching up and the point where metal becomes the most popular material for 3D printing is likely to come in the next few years.

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The increasing ability to print using metal has served to open up a whole new world of possibilities in 3D printing, with metal printing lending itself especially well to printing ever more complex components.

3D printing markets

There are three primary user groups for 3D printed goods. These are;

1. Individual consumers printing products at home based on design files that they have created themselves or downloaded from the internet

2. Local print shops which print products for individual consumers or companies based on downloaded design files or designs provided by the consumer – this route may well become a new way for manufacturers to deliver goods to customers.

3. Industrial printing centres which print components/products for further assembly or sale.

The first two scenarios are predominantly applicable to consumer products. The third scenario is more applicable to industrial parts.

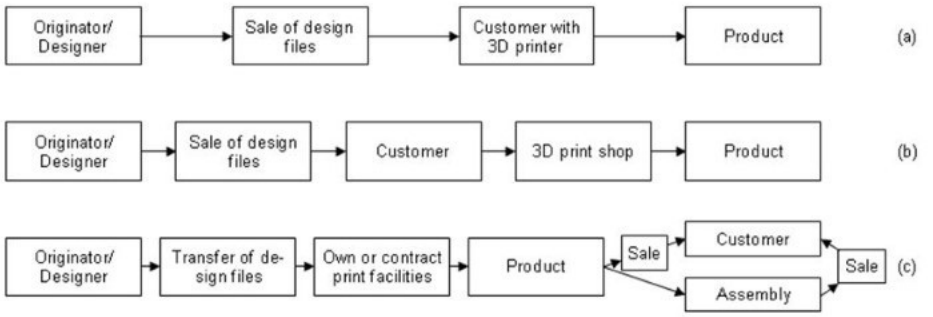
All three of these scenarios benefit from the fact that 3D printers can be operated anywhere, so that manufacturing can take place in any desired location, largely independent of labour costs and the relevant country's manufacturing skill base. All of the above scenarios are likely to change the location in which manufacturing takes place.

The benefits of additive manufacturing are well documented by now and the possibilities of producing hitherto impossible designs, reducing the need for stock keeping, eliminating transportation and assembly costs and delays have already completely transformed some industries such as those of dental aligners and fitted hearing aids and have made a significant impact in many others.

As 3D printing technology continues to develop and advance, so too will the range of industries it is applicable to.

Opportunities to disrupt: unlocking value in the 3D printing chain

The 3D market presents numerous opportunities for innovators to find new ways of creating, distributing and reaching customers



The challenge

Alongside the opportunities for business to harness the power of 3D printing to disrupt existing markets, there is also the risk of being disrupted and falling behind the curve of innovation and regulation. In particular we have identified a challenge to intellectual property owners, whose existing intellectual property protection has not kept pace with technological development and may not offer protection against the possibility of 3D printed counterfeit goods.

Whilst the ease of distributing a digital design file (the digital twin of the product) to be printed has clear attractions it also raises some serious, and in some cases prohibitive, concerns. If an unscrupulous third party has obtained the design file of your product - your products 'digital twin' - then it can easily print the associated product or distribute the file.

Third parties may obtain a copy of a design file from the rightful owner and in this case digital countermeasures may provide a degree of protection. However, 3D scanning technology has developed at pace and is actively marketed as being particularly suitable for “reverse engineering”. Using a 3D scanner, parties intent on copying can, with little effort, generate a printable digital twin of the product simply by scanning it.

"3D printing threatens to do to manufacturers of tangible goods, what illegal streaming did to the music industry. Manufacturers need to mitigate this risk now, and future-proof their IP.”

It is not uncommon that the law trails developments in society and, as such, it is unsurprising that, at times, IP law is found to lag behind technological developments. IP laws were drafted when manufacturing was largely based on physical blueprints and was exclusively undertaken by specialist companies with a high level of technical skill and sophisticated tooling. Whilst the area of physical blueprints has long since come to an end, replaced by electronically transmittable design files, until now parties that wanted to reproduce a protected tangible product still required considerable technical skill to so do.

Additive manufacturing changes this fundamentally, with anybody with access to a 3D printer being able to print a relevant product from a digital file, even in the absence of traditional manufacturing skill.

Future proofed IP

Traditionally crafted IP portfolios are less likely to effectively defend against this threat. So what can IP rights holders do to mitigate the risk?

Firstly companies need to think about the territorial coverage of their IP portfolio. With 3D printing technology, copying can take place anywhere in the world and is likely to take place in destination markets. Focusing your IP portfolio within traditionally strong manufacturing countries may thus turn out to be a weaker strategy than focusing more on potential markets.

Furthermore, it will become difficult to police infringing activities in cases of small scale but widely practiced infringing activity. Even if such infringement can be detected, full scale enforcement quickly becomes economically infeasible (not to speak of the possible negative PR associated with heavy handed enforcement strategies against very small players). The holy grail of patent enforcement therefore is likely to involve strategies that prevent the distribution of the digital twin of the product to be protected. Because IP laws as originally drafted focus on protecting tangible goods, the digital twin of a product is **NOT** automatically protected by IP rights.

A brief history of 3D printing

1981 A prototype system using photopolymers to build a physical model layer by layer is developed at the Nagoya Municipal Industrial Research Institute, Japan

1986 Chuck Hall patents stereolithography (SLA) and co-founds *3D Systems* which soon releases the first commercial 3D printer - the SLA-1

1988 Carl Deckard of the University of Texas patents selective laser sintering (SLS)

1989 S. Scott and Lisa Crump patent Fused Deposition Modeling (FDM) and found *Stratasys*

1999 the Wake Forest Institute for Regenerative Medicine 3D prints the structure of a human bladder

2004 an open-source 3D printing project, the RepRap project - a desktop 3D printer that can self-replicate by printing its own parts - brings 3D printing to a wider audience

2008 First usable 3D printed prosthetic leg

2010 Bioprinting company Organovo creates the first 3D printed blood vessel

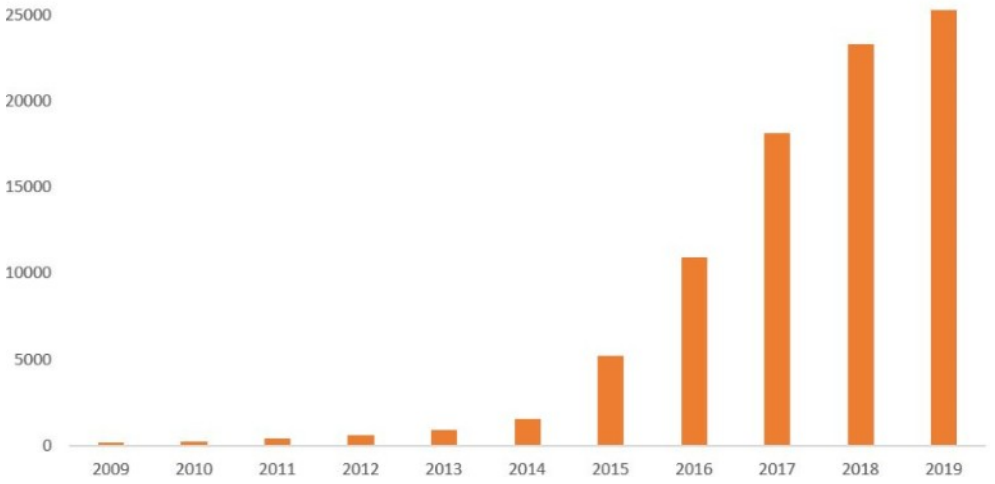
2014 The first 3D printed car, the Strati, is created

2016 The Chinese National High Tech Research and Development Program creates 3D printed vein-tissue

2018 MIT discovers a way to 3D print glass

2020 3D printed houses, steaks and medicine?

Worldwide 3D printing patents 2009 - 2019



There is a solution however and although not originally designed for this purpose, the IP system can be used to provide adequate protection to innovators.

Obtaining this protection however, is not straightforward. This is particularly so as, certainly for inventions made with only traditional manufacturing techniques in mind, the inventor may not even be aware of the urgent need to protect the digital twin of the product. Whilst this lack of protection may not cause concern at present, it seems unlikely for this to remain the case over the lifetime of the acquired IP right in light of the rapid adoption of 3D printing methods.

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The difficulty in gaining protection is further exacerbated by the fact that three different types of digital design files are involved in the 3D printing value chain, a volume file (often the CAD file created by the designer), a surface render file and a machine code file (which includes instructions of the actions a specific printer must perform to generate the product). Availability of protection for different files varies between jurisdictions – complicating the creation of effective, global IP strategies. The danger of opportunities being missed or even mistakes being made is therefore high.

It is of course always possible to argue that, even if a party providing a digital twin of a product does not directly infringe IP protection for the product, this party would in any case be guilty of indirect infringement.

Whether or not this is so will undoubtedly be determined by new case law in the medium term.

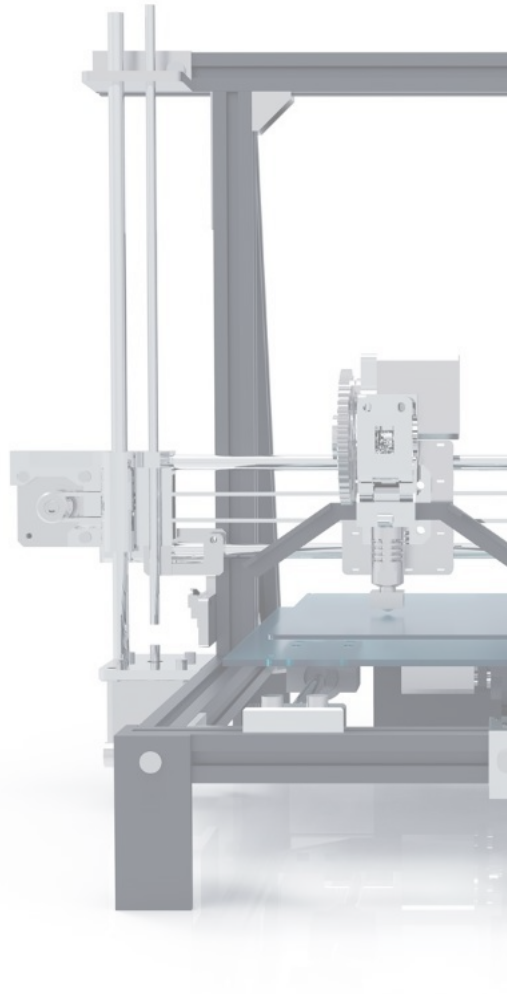
However, even if such case law is created in some jurisdictions, significant differences exist in the approaches various IP systems take when it comes to determining indirect infringement so that an approach suitable in one jurisdiction may well falter in another. It is in any case preferable not to have to consult the courts to gain a decision and aiming to make the supply of a digital twin an act of direct IP right infringement is by far the more preferable route. Canny patent drafting will play a major role in this, combined with new trademark filing strategies as well as the use of design protection targeted at the realities of a market in which products can easily be altered a with simple click of a mouse.

For patents it is indispensable to ensure that the monopoly pursued is not coloured by features of traditional manufacturing processes, be they "traditional" structural product features or assembly steps rendered obsolete by 3D printing.

Marks & Clerk's professionals are not just experts in this field, but are also shaping the agenda on how to address these issues. We are working with intellectual property arbitrators such as the European Patent Office, to help them understand the challenge posed by 3D printing, and to devise long-term solutions. Our team work with companies both using 3D printing to deliver ever more innovative products, and companies who rely upon manufacturing innovation and who can't afford to see their products infringed.

Are you ready for 3D printing?

Contact our team today for an informal discussion.



Thomas Prock
London
tprock@marks-clerk.com

Matthew Jefferies
London
mjefferies@marks-clerk.com

Peter Roberts
Manchester
proberts@marks-clerk.com

Daniel Sizer
London
dsizer@marks-clerk.com

Email newsletter@marks-clerk.com to subscribe and recieve future editions of Marks & Clerk news direct to your inbox.

Marks&Clerk

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