

The Impact of 3D Printing

3D printing may seem like a concept out of a science fiction film, but it could change the entire manufacturing industry. An additive manufacturing technique, it is the process of printing layers of material on top of one another to 'grow' a product. Product creation relies on computer-aided design (CAD) files. Stereolithography software reads the CAD file and uses a material such as paper, powder or metal to print the shape. The number of printing materials available is constantly growing and currently includes thermoplastics, edible materials, rubber, clay, porcelain, metal, ceramic powders, plaster, paper and even human tissue.

There are five common printing processes:

1. **Selective laser melting or direct metal laser sintering:** A laser is used to fuse together metallic powder into the desired shape.
2. **Selective laser sintering:** Lasers are used to fuse together small pieces of material like plastic or metal into the desired shape.
3. **Fused deposition modelling:** Plastic or metal wiring is unspun from a coil and printed in layers to create the desired shape.
4. **Stereolithography:** Ultraviolet-curable resin is laid down and built up, layer by layer. Ultraviolet light is shone on each layer after it has been put down to solidify the resin.
5. **Laminated object manufacturing:** Layers of material are laid down and glued to one another and then shaped with a laser or knife.

The technology for 3D printing has been around for nearly 30 years, but it wasn't until recently that printers and printing materials became an affordable option for businesses. Because of the high demand for the technology, the price dropped from about £20,000 in the 1980s to just around £1,000 today, leading to a rise in sales. And as the price dropped, creativity grew.

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Printers that were originally used just for prototyping began to be used to print manufacturing materials, such as moulds. Today, companies in a variety of industries, including architecture, construction, motor, medical, engineering, biotechnology, fashion and education are experimenting with using 3D printing to manufacture end products. This innovative practice comes with its share of benefits and risks.

The Benefits

- **Less waste** – Unlike more traditional subtractive manufacturing techniques that remove material by cutting or sawing to form a product, 3D printing builds the product from the ground up, resulting in significantly less material waste.
- **Reduced overhead** – Printing materials and a CAD file are all that is required to create a product. It's not necessary to purchase moulds, create custom manufacturing materials, hire labourers or even have a designated manufacturing facility.

Provided by **Crendon Insurance Brokers Ltd**

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- **Intricate details** -- Almost any shape imaginable can be printed, including shapes with complex detail that would be costly and difficult (in some cases too difficult) to create with subtractive manufacturing.
- **One-of-a-kind products** – Some products, such as hearing aids and prosthetic limbs, are time-consuming and expensive to create with traditional manufacturing techniques because they must be customised to fit a single end user.
- **Reduced warehousing costs** – Offering long-term warranties for replacement parts is much more efficient for companies that utilise 3D printing. The company can simply save a CAD file for each product part and then print the part on an as-needed basis instead of storing older parts in a warehouse.

The Risks

- **Copyright infringement** – CAD files that infringe on patents and design rights are already beginning to show up on the Internet. The piracy of digital design files will likely be widespread and difficult to police. Companies will need to insure themselves against this risk and find innovative ways to guard intellectual property.
- **Compromised supply chain** – Widely available CAD files means that compromised parts could enter the supply chain. Even if a company is not using 3D printing in its own operations, it is still at risk of manufacturing products with defective or unsafe 3D-printed components, and of being held liable for the resulting damage.
- **Global public safety** – Currently, no legislation exists to regulate 3D printing, so anyone, anywhere can download anything. In 2012, a U.S. company created a CAD file for a 3D-printable working gun. It was downloaded by more than 100,000 people around the world before being taken down. 3D printing offers more opportunities for obtaining banned products.

- **Ultrafine particles (UFPs)** –A study was performed by a group of researchers from the Illinois Institute of Technology and the National Institute of Applied Sciences in Lyon, France, in which it was discovered that 3D printers can potentially release one to four times the number of normal UFPs found in the air before printing begins. Without proper ventilation, these tiny particles can be inhaled by workers and possibly cause a myriad of health issues for them in the future. The amount of risk can depend on what materials are being used to build the 3D-printed objects, but since this is such a new discovery, the extent of damage that these particles can cause is relatively unknown.

The Future

Like any technology, 3D printing is not without risks, many of which are yet to be discovered. Despite these risks, companies are looking to 3D printing technology to rethink processes and improve business operations.

Industry experts predict that 3D printing will transform manufacturing as we know it. Exciting projects like rebuilding coral reefs, growing functioning organs and body parts and replicating priceless artefacts for scientific study will continue to capture the attention of the public and encourage further innovation.

Have you considered the impact of 3D technology on your business? **Crendon Insurance Brokers Ltd** will keep you updated on 3D printing as this innovative concept grows.



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