

WHITE

PAPER

08

## 3D printing in-house vs Outsourcing

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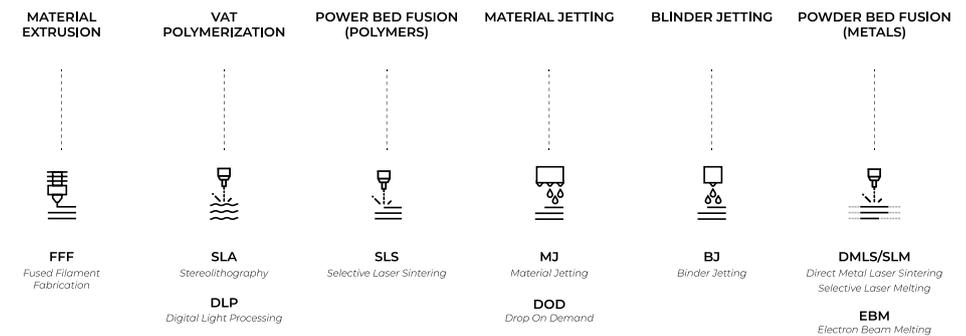
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# 01

## Introduction to FFF: Fused Filament Fabrication

3D Printing Technology, technically acknowledged as Additive Manufacturing (AM) or Rapid Prototyping, is a manufacturing process where layers of material are built up to create a solid object. There are countless 3D printing technologies, each with its own benefits depending on the application, but this report will focus on Fused Filament Fabrication (FFF) for plastics.

### ADDITIVE MANUFACTURING TECHNOLOGIES



FFF is an extrusion process where the object is built by depositing melted material layer-by-layer. The plastics used, corresponds to the same thermoplastics that can be found in conventional manufacturing processes, such as ABS or Nylon.

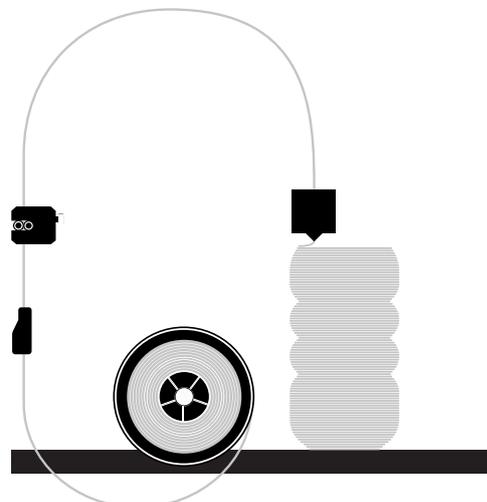


Figure 1. Fused Filament Fabrication basic illustration

## Fused Filament Fabrication

Lately, the introduction of in-house 3D printers has widened access to this technology. FFF led this expansion of desktop 3D printers and nowadays it is the most widespread 3D Printing Technology in the market. This was essentially due to the low initial investment needed, the immense variety of applications offered and the little specific knowledge required to access and use this technology.

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Figure 2. Main advantages FFF Additive Manufacturing technology



**Variety  
Of Applications**



**Low  
Initial Investment**



**No Specific  
Knowledge**

This introduction has widespread in a large diversity of industries, where 3D printing technologies are revolutionising the way things are manufactured. The versatility and ease of in-house printers, has allowed companies to speed up their product development processes and production.

Since FFF technology has been present for almost three decades and the progress experienced has been significant, both businesses and customers demand high-quality end-use outcomes and printer reliability. That is why FFF 3D Printers manufacturers have worked in improving the quality of their final prints and the trend is to produce professional or industrial-grade machines.

If your business is planning to introduce FFF Printers into its workflow, it is crucial to understand how they operate and which printer will better fit your needs. In this article, some fundamental features of FFF are going to be introduced, as well as the several alternatives users have when they need to print their models.

# 02

## Professional desktop 3D printers compared to industrial printers and outsourcing

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### Overview

Within the 3D printing technology market, there are different printer categories based on the relation between price and printing quality.

#### **Service Bureau**

They are better for low volume volumes and small tests that you want to run. They offer several types of 3D printing technologies and a wide range of materials. It is the right choice if you are considering manufacturing less than 10 pieces per month, especially if those parts require non-standard materials or various technologies. In other cases, this is by far the slowest and most expensive option.

#### **Professional desktop printer (in-house)**

Desktop 3D printers are excellent when you need parts quickly at a very low cost. If you print a large batch of parts (more than 200) per week, in some cases, a 3D printing farm is a right choice and at the same cost than an industrial printer. In addition, they offer a wide range of materials with which to print.

#### **Industrial printer (in-house)**

Industrial 3D printers are a solid choice for large batches of parts (200 a week or more) with advanced material and high dimensional requirements ( $\pm 0.127$  mm). In addition, a specialized operator is necessary for its use.

## Professional desktop 3D printers compared to industrial printers and outsourcing

### Pros and Cons

Should the number of parts to produce be low and the usage planned to be sporadic, there is the option to outsource the 3D printing service through a 3D printing service bureau. If the plan is to work in a medium-long term project, the acquisition of 3D printers can reduce costs significantly. This acquisition implies an initial investment, but then the price per part becomes approximately 30 times cheaper.

	 <b>SERVICE BUREAU</b>	 <b>PROFESSIONALS DESKTOP PRINTERS</b>	 <b>INDUSTRIAL FFF PRINTER</b>
<b>Project Lead time</b>	1-2 weeks	<24 hours	<24 hours
<b>Initial Cost</b>	0€	2.500€ - 7.500€	40k€ - 250k€
<b>Material Cost</b>	-	~25€/kg	~125€/kg
<b>Print Cost vs Professional Desktop Printers</b>	20x	1x	5x

Figure 3. Comparison table - Service Bureau vs Professional desktop vs industrial 3D printers

#### • Costs

The initial investment makes the first significant difference between both types of in-house printers, as the price of an Industrial FFF Printer is at least 20 times the price of a Professional Desktop Printer. Material costs are lower in the latter case and maintenance costs evidently lower as the purchase of an industrial FFF printer includes mandatory service contract. In the case of outsourcing, here the initial investment is zero. Outsourcing is a good initial step for companies that are beginning to assess the possibility of incorporating 3D printing in-house to validate if it is really what they need.

#### • Lead Times

The leading times are approximately the same for in-house 3D printers. An Industrial FFF Printer can handle high number of models in a single print job due to its massive printing volume. Some Professional Desktop Printers can reduce lead times using high-productive printing modes. These modes can print two identical parts or one part and its symmetrical simultaneously, doubling the productivity. Regarding lead times for outsourcing, they are much slower than in-house 3D printing and it take several weeks instead of one day.

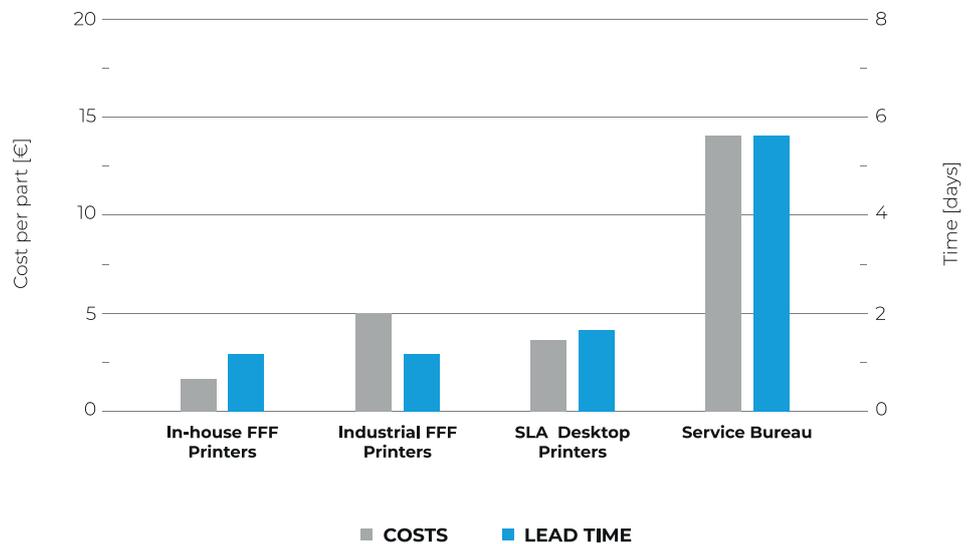
#### • Accessibility

Professional desktop printers can be used by anyone, as their setup and use are intuitive. The interaction with the machine is simple and prepared for non-expert users, including guided and detailed assistants. Since the use of an industrial printer is normally more complex, it requires specialized technicians and dedicated workspaces.

# 03

## Which solution better fits your needs?

As explained before, there are many options when choosing how to print the 3D models. It is important to define all the requirements and select which might be the best option. In the following graphs, the cost per part and the project lead time of a generic part of 50cm<sup>3</sup> has been calculated in different manufacturing processes.



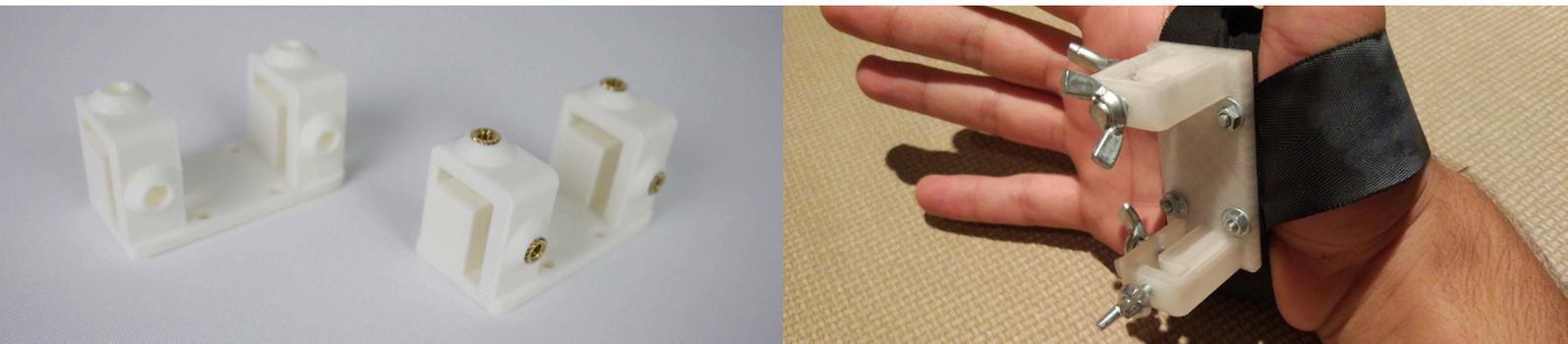
In-house FFF printers offer the best combination of costs and lead times. However, investing in both FFF and SLA printing technologies will give your company full versatility when producing parts. Each technology has its own benefits and applications, so the answer to the following questions about your 3D printing needs will be crucial when choosing the best solution for your company.

- What is my budget?
- Does my company have specialized equipment to support the 3D Printer?
- Do I have a need to print out mechanically demanding parts?
- Will there be designing and application versatility?
- How many printed parts does my company require?
- What is the lead time my company requires?

# 04

## Use case example: uHandle

The uHandle case is a perfect example of which factors to look at when deciding whether it is necessary to outsource 3D printing production. uHandle is a company who focuses on helping leprosy patients on its daily life avoid stigmatization by developing tools and other devices that will assist them in their daily needs. Although leprosy can be cured, this illness affects poor countries with no resources to treat the patients in a proper way. This disease affects the skin and the external nervous system, causing deformation in hands and feet. The production of customized devices for their limbs is making a great difference in the daily life of these patients.



The tool studied as part of this case aims to help the patient to hold cutlery, making them more autonomous to eat and improving their self-esteem. The price of producing this part with a Professional Desktop Printer is 0,50€ while outsourcing it would cost approximately 15€. The following figure compares both options.

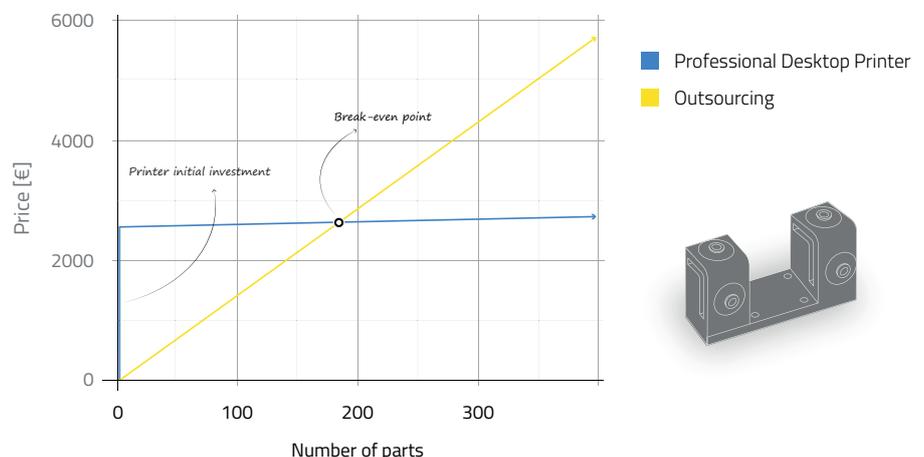


Figure 4. Production parts comparison graph - Professional desktop 3D printer vs Outsourcing

## **Use case example: uHandle**

Should the number of parts to be produced had been under 180, outsourcing the production would have been the best solution in terms of costs. However, the goal was to produce at least 300 units of the device. Based on this, uHandle decided to invest in a Professional Desktop Printer to obtain a long term benefit.

Additionally, by using their own printer, at uHandle they could also develop the product with several iterations in order to fully optimize the design. By purchasing its own in-house Professional Desktop Printer uHandle gained flexibility. The company was able to develop the product observing several iterations and was able to fully optimize and tailor the end design.

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# Maximizing productivity with the most versatile 3D printers

If you are considering implementing 3D printing technologies into your workflow, ask for a BCN3D Sample Part in the following link in order to see the results of a professional FFF 3D Printer [Request a Free sample >](#)

Explore more about 3D printing. [Learn more >](#)

Wondering what's new in the 3D printing world? [Use Cases >](#)

Request a quote for a professional desktop 3D printer. [Request a quote >](#)

