

# Business Case

ENGINEERING



Leapfrog™



## INTRODUCTION ENGINEERS:

Innovation does not stop and more and more companies will experience this. The procurement of a 3D printer is no longer an experimental venture for engineers. The 3D printer is slowly but firmly integrating in the business culture and seems to be a serious addition to the development of products. In this Business Case you will read the experiences of three companies: TU Delft, AV Flexologic and Lumicks.

## PROCESS AND TYPE OF PRINTER:

The print process of the TU Delft, AV Flexologic and Lumicks includes more or less the same steps:

**Designing or scanning > slicing > 3D printing > Approve the result or go through the process again.**

### Designing or scanning

Samir den Haan, a student at the TU Delft and employed within Project March, scans limbs with the purpose to create an exo-skeleton. Subsequently den Haan will adjust the scan in the Solidworks program in order for the designs to be a close match with the body of the person involved.

Machine manufacturer AV Flexologic and Lumicks, a spin-off from the Vrije Universiteit Amsterdam, use 3D CAD software to design completely new parts, or to adjust existing parts in the software.

### Slicing

After the virtual design has been created through scanning or designing in the 3D CAD software the files are loaded into the slicing software of Leapfrog, also called Creatr software. This will indicate the quality (smoothness) and strength (density) of the design but the material and the printing speed can also be adjusted.

### Printing and type of printer

Depending on the purpose and the quality requirements and the sizes of the product each customer will select his own type of Leapfrog 3D printer.

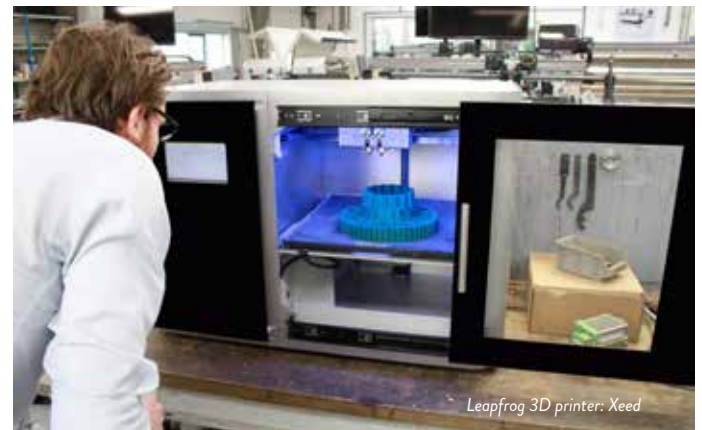
Lumicks uses a Creatr HS to quickly print small parts. Team Project March uses a HS XL to print large prototypes up to 59 cm. AV Flexologic has a Xeed and an XceL to print extreme sturdy parts in all imaginable sizes from a few millimetres up to 2,3 metres long!

## AV Flexologic

Loek Eg: “We from AV Flexologic produce machines with many moving parts, so there are many specific parts such as air links and distribution blocks. Some of these parts are not available on the market. When you are an engineer you should be equipped with the correct parts, often this means that you have to arrange for this specific part to be made. This process involves:

- High costs
- A lot of time
- The necessary internal and external communication
- Extra high risk; if the parts are not correct the whole procedure has to be done again.

With the procurement of a Leapfrog Xeed 3D Printer all these previous points are solved. A big advantage of the Leapfrog Xeed is that the part can be completely printed at the precise size. It is also a lot cheaper than casting as we do not deal in mass production. The costs to produce a mould are no longer applicable and this will easily save us thousands of euros. Plus, we can easily adjust the part on our own PC and reprint it again in no time.



Leapfrog 3D printer: Xeed



3D printed Hook for AV Flexologic

The parts that we print in 3D for our machines vary, think of hooks, cylinders and blow heads. We print with ABS as this material is strong enough to fulfil a dynamic function. We use the Leapfrog Xeed 3D printer as normal desktop printers already struggle to print a single small model in ABS without it warping (bending of the plastic).

The Leapfrog Xeed 3d printer prevents this problem. Due to the advanced heating technology of the printer we can ensure the correct print quality and it is ideally suitable for prototyping or even for the production of end products.

As we are completely satisfied with the Xeed we co-developed the Xcel printer some time ago, together with our sister company Tech Sleeves. This printer is based on the Xeed but has much larger sizes and it can print up to almost two and a half metres high and sixty centimetres wide and deep. We use the Xcel's to replace a manufacturing step of our sleeves and bridges for the flexographic printing industry. Each order is customer specific, making 3D printing the perfect fit. We save up to 60% in man-hours and 50% in waist material. An interesting business model that you could not imagine a few years ago".



Martijn Otten,  
General Manager from AV Flexologic  
Leapfrog 3D Printer: Xcel Beta



Willem Peutz & Michiel van Heiningen: Lumicks is a spin-off from the Vrije Universiteit van Amsterdam and brings a revolutionary technology to the market that enables scientists to observe real-time the interactions of some molecules. The product "C-trap" is largely built from special designed aluminium parts with an accuracy of less than 4 microns. The LUMICKS team is continuously busy to develop new functionalities for the C-Trap and

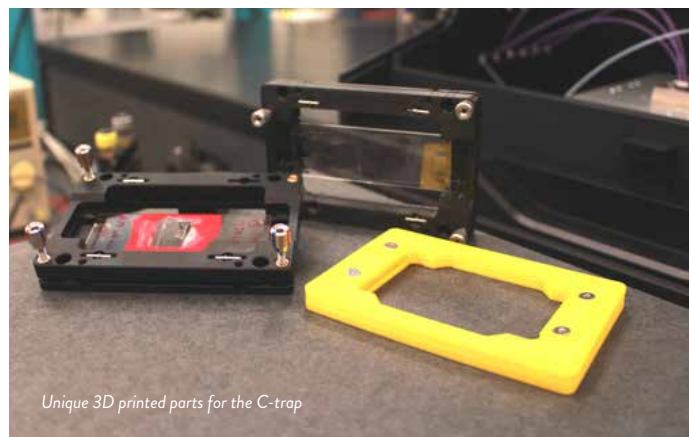
to improve the performance.

The Leapfrog Creatr HS is used for the prototypes of the parts for the C-Trap. The device contains more than 100 unique parts that eventually all should be machined. What Lumicks has experienced is that the direct machining of concepts and prototypes costs a considerable amount of money and can take quite some time: "the prototype parts are normally between €200,- and €600,- and take 2-4 weeks to manufacture. In addition, often several iterations are necessary to make the part perfect and to make sure it complies with the high standards and requirements that are applicable for high resolution optics."



The C-trap  
from Lumicks

The Leapfrog Creatr HS offers support hereby. An object can be printed within a few hours and compared to machining it only seems a matter of seconds. Therefore, it is very suitable for Rapid-prototyping. The engineer can further develop the part by using the prints. It is easy to test variations and new iterations of the part. Plus, failures or new possibilities are quickly identified. The 3D printer also replaces several machining parts and this shortens the assembly time. With the help of the Leapfrog 3D printer the engineer is able to work a lot more efficient and the time for a result is drastically reduced. "The main profit is the quicker development of the correct solution against lower costs."



Unique 3D printed parts for the C-trap



*The exo-skeleton from the TU-Delft*

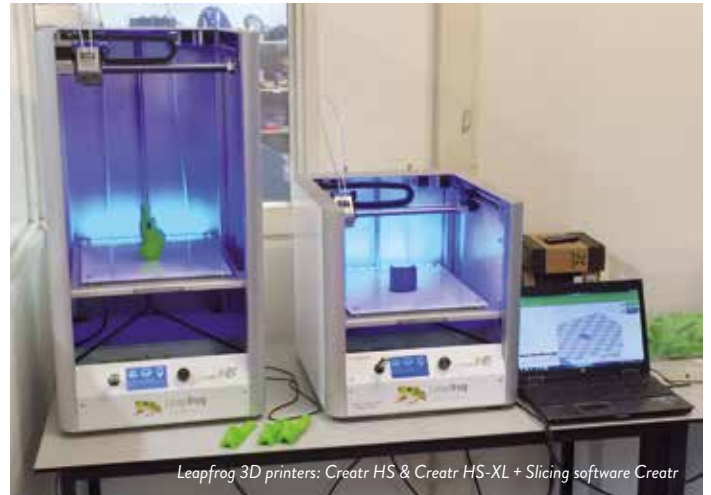
In October 2016, students of the TU Delft want to test their exo-skeleton during the cybathlon in Zurich. Project March is run by a young multidisciplinary team of engineering students, who all share the same target, to return (social) mobility to people with a physical limitation. Simple every day activities are often a challenge or impossible. Project March will return the freedom of movement by using an exo-skeleton. Here, their pilot Claudia, who suffered a spinal cord injury, will use the exo-skeleton to complete the circuit.

“with the help of the Leapfrog Creatr HS 3D printer we are able to prototype parts that are applicable for the exo-skeleton. We are looking for new ways of control, where the control used to be attached to the wrist we now want to attach it to the handles of the

crutches. This is associated with new techniques and this will raise questions such as: where will the trigger, scroll wheel and the selection button be? By printing the handle, we get a perfect image of the functionality of the handle. Apart from handles we also print protection covers for our equipment. If the design does not comply with our quality requirements we can easily adjust the design in the 3D CAD software.”

“Before we would have to make a prototype with a CNC Mill and foam, or make it with clay. These techniques are now only used at a later stage when you want to produce several parts. Vacuum casting is also a very expensive way for prototyping plus it consumes a lot of time. The Leapfrog HS can print up to 300 mm/s and has a large print bed where several models can be printed in one printing session. So it saves costs and you gain a lot of time.”

“Apart from the Leapfrog HS, where the handles and protection covers are printed we also have a Leapfrog HS-XL. This one is used to print the legs of the exo-skeleton. Firstly, Claudia’s legs will be 3D scanned. Based on the 3D scan we will 3D print a leg of the exo-skeleton that closely matches the shape or size of Claudia’s leg as the exo-skeleton should be made to fit. After several prints we will find the ultimate shape and then we will machine the part for definitely.”



*Leapfrog 3D printers: Creatr HS & Creatr HS-XL + Slicing software Creatr*

## CONTACT

For more information on the Leapfrog 3D printers and the performances please feel free to contact our customers. They will be glad to speak with you about their experiences with Leapfrog.

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Project March Sjoerd Butter: [sjoerd@projectmarch.nl](mailto:sjoerd@projectmarch.nl)

If you are interested in the costs and specifications of the Leapfrog printers, or you would like to see or operate the printers yourself? Please do not hesitate to contact us via [sales@lpfgr.com](mailto:sales@lpfgr.com) or on +31 (0) 172 503 624.



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