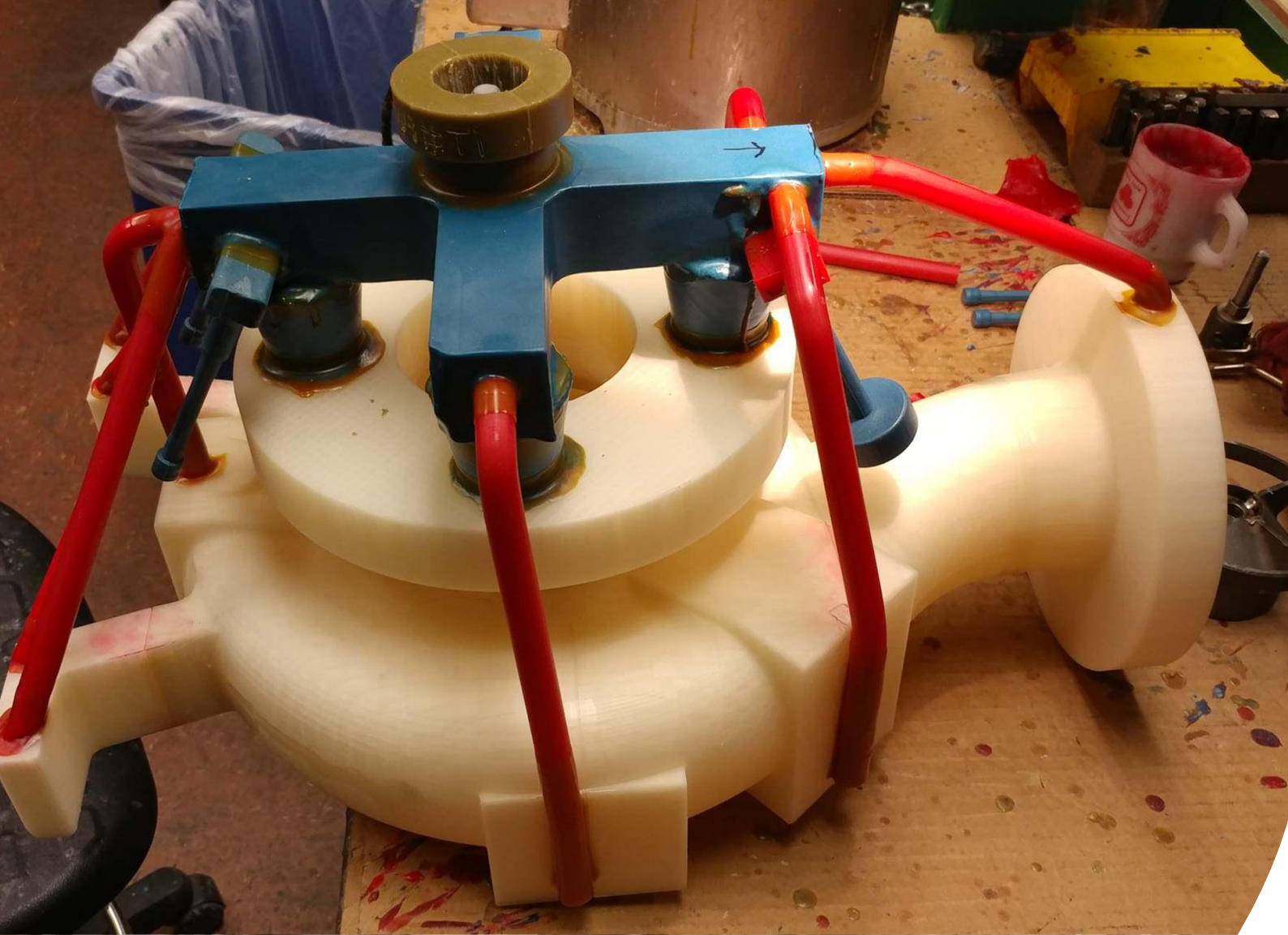colorFabb

3D printed patterns for investment casting

Spectra3D Technologies.

Leading the Way in 3D Printed Casting Patterns is Spectra3D Technologies. They specialize in the creation of highly accurate 3d printed investment casting patterns. Spectra 3D uses colorFabb PLA/PHA in combination with the Stacker 3D printers.

For more information visit **spectra3d.com**

INVESTMENT CASTING

This brochure will present a case study how 3D printing can improve the process of making metal parts using investment casting, by reducing cost & time-to-part. We partnered with Cirex B.V. to explore the use of PLA/PHA as material for patterns.

Traditionally investment casting uses wax patterns. These patterns are made using metal molds, making the tooling is an expensive process and can take several weeks.

For small series, or one off products creating a mold is not a cost effective solution for foundry companies. 3D printing on the other hand presents numerous advantages enabling foundries to make single parts or even small series.
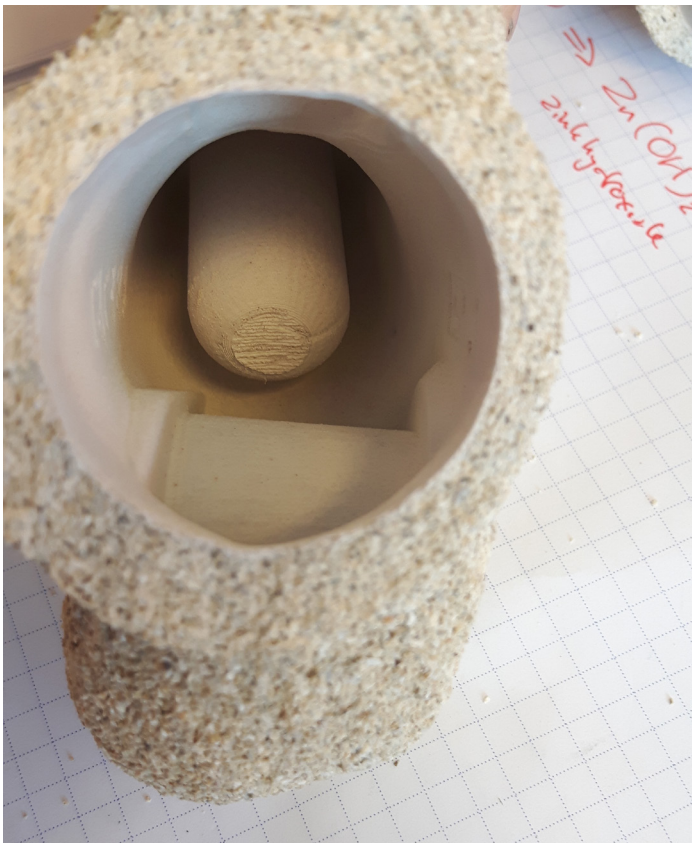
3D PRINTED PATTERNS

Instead of investing in tooling, foundry companies can choose to 3D print their patterns in a material suited for investment casting. ColorFabb PLA/PHA Natural is a material uniquily suited for investment casting. It's an easy printing material capable of creating complex shapes with great smooth surface finish and will work with most desktop and industrial type FFF 3D printing machines. The material decomposes at XXXC and ensures a clean burnout leaving behind a clean mold ready for casting.
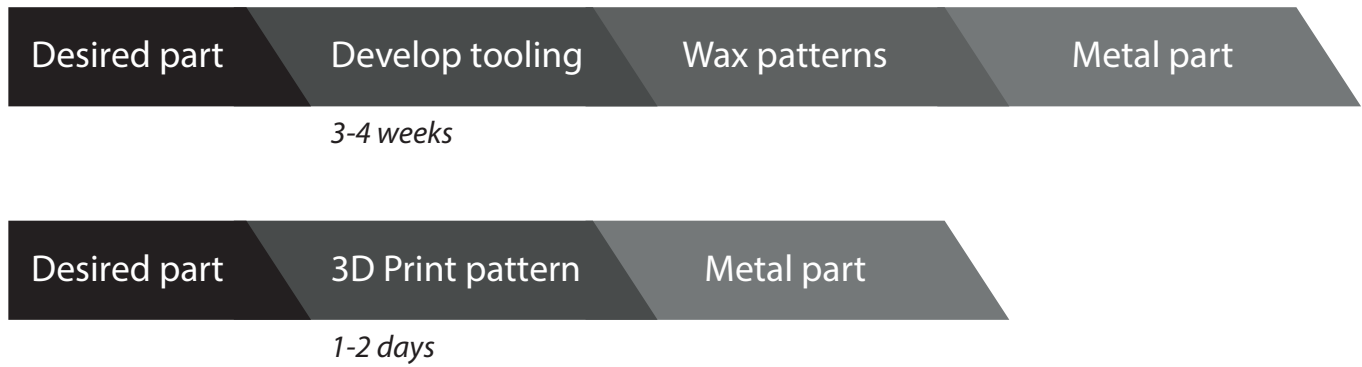
Checking the burnout of PLA/PHA Natural, breaking the mold to inspect pattern for residue. Patterns printed on the Stacker S4, 0.2mm layerheight at 20% infill.

Image by Cirex B.V.

CUT DOWN ON DEVELOPMENT TIME

Desired part	Develop tooling	Wax patterns	Metal part

3-4 weeks

| Desired part	3D Print pattern	Metal part

1-2 days

Skipping the tooling development step saves a huge amount of time. Typically this could shorten the time to a first metal casted part by 3-4 weeks. Not being dependent on a third party mold supplier also reduces risk in time sensitive projects.

3D printing also allows for faster design iterations, a first printed pattern could already be made in several hours depending on the size of the part. This makes it possible to iterate on the design multiple times even within a single day.

The material cost of printed patterns is around €30,- p/kg. Parts are generally printed with the least amount of material needed, which saves print time and material.
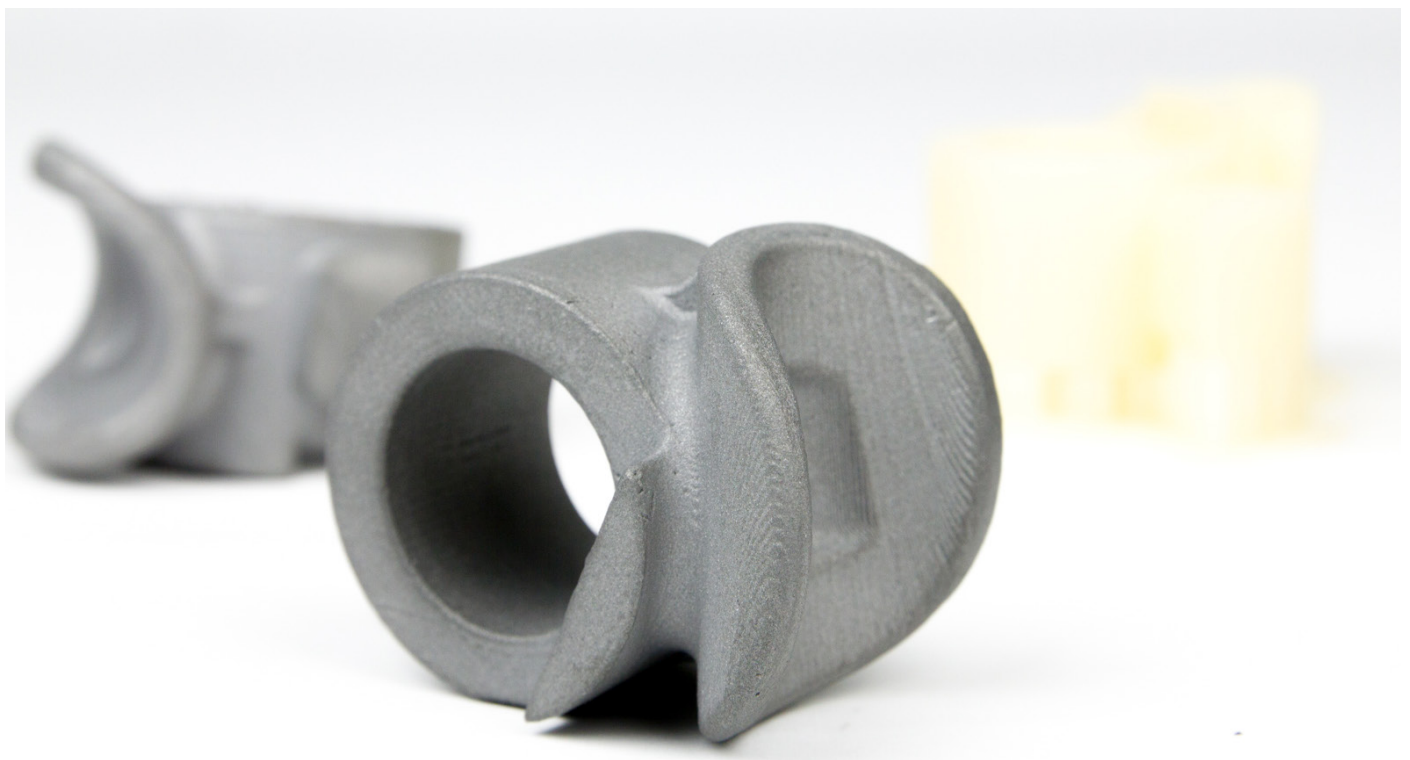
3D PRINTER & MATERIAL COMBINATION

The Stacker 3D printer was used for this test case. It prints incredibly reliable with PLA/PHA and is able to print parts accurate and consistent. Printing with multiple nozzles cuts down on series produciton time, 2x faster for the Stacker S2 and 4x faster for the Stacker S4 compared to a single nozzle FFF 3D printer.

The Stacker S2 and S4 can be set-up for small series production, or single large part printing. Mounting up to 4 toolheads on the x-carriage gives the user higher output, but reduces the build volume. The alternative is to mount only a single toolhead and take advantage of the entire buildvolume of the S2 or S4.

Products larger then the build volume of the Stacker can be split into multple parts and assembled after printing. Using pins align the parts is a good method to ensure the assembled model is accurate.

PLA/PHA

750 g   2200 g   2.85 mm   ● 1.75 mm

STACKER

STACKER S^2
Industrial Grade 3D Printers

The Stacker S2 is the smaller brother of Stacker's range of industrial grade 3D printers. Featuring a large build volume, configurable dual printheads and first class engineering components to provide an industrial grade 3D printing quality to a wide range of customers looking to 3D print from Prototype to Production™.

2X Faster Print Speeds or multi-material mode
STACKER's multi-part printing technology allows you to print two copies of the same part, at the same time, in different materials or colors. The same two heads can also be used for multi-material printing, combining a semi-flex with a stiff material for example.

Superior Positional Accuracy
The S2 uses top quality linear motion components and a precision acme screw to achieve superior positional accuracy and repeatability.

Superdrive feeder system
Designed to especially with softer or more specialty materials in mind, the superdrive's custom design features additional gripping and guiding of the filament all the way to the hotend to maximize reliability for specialty filaments.

Build Volume
390mm (X), 315mm (Y), 525mm (Z)

X/Y Movement Speed
0 to 250mm/sec

Positional Accuracy X/Y
6 microns

Positional Accuracy Z
4 microns

Layer Resolution
0.1mm to 1.00mm

Number of Extruders
2

Extruder Temperature
Up to 300°C

Heated Bed Temperature
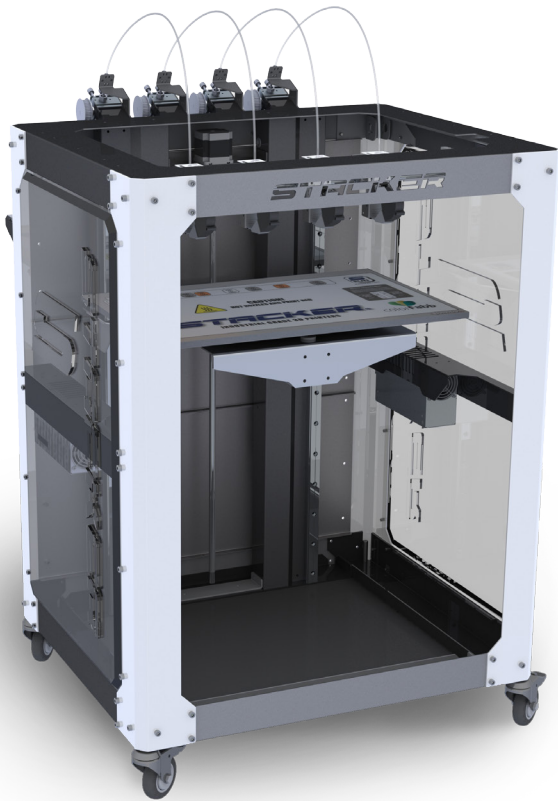Up to 115°C

Various Nozzle Diameters available
0.25mm, 0.40mm, 0.50mm, 0.60mm, 0.80mm, 1.00mm

Filament Size
1.75mm

Software Licenses Included
Simplify3D and StackerRUN

STACKER S4
Industrial Grade 3D Printers

The Stacker S4 fully embodies its motto: from Prototype to Production. Whether you are in need of fast multi-part production runs or large and/or complex protoypes, the S4 has you covered. It's 4 flexible printheads can be grouped together for multi-material printing, spaced apart for 4x print speed or stored outside the printer to allow the use of the S4's massive build volume of more than 116 liters.

4X Faster Print Speeds or multi-material mode
STACKER's multi-part printing technology allows you to print four copies of the same part, at the same time, in different materials or colors. These same heads can also be used for multi-material printing, combining a semi-flex with a stiff material for example.

Massive Build Volume.
With a single head, S4 can print parts up to 365mm x 510mm x 655mm, this is a printing volume of over 116 liters.

Upgrades & accessories
Available upgrades and accessories include: a nozzle cleaning brush, Superdrive feeder system and various bed options.

Build Volume
520mm (X), 345mm (Y), 650mm (Z)

X/Y Movement Speed
0 to 250mm/sec

Positional Accuracy X/Y
6 microns

Positional Accuracy Z
4 microns

Layer Resolution
0.1mm to 1.00mm

Number of Extruders
4

Extruder Temperature
Up to 300°C

Heated Bed Temperature
Up to 115°C

Various Nozzle Diameters available
0.25mm, 0.40mm, 0.50mm, 0.60mm, 0.80mm, 1.00mm

Filament Size
1.75mm

Software Licenses Included
Simplify3D and StackerRUN