



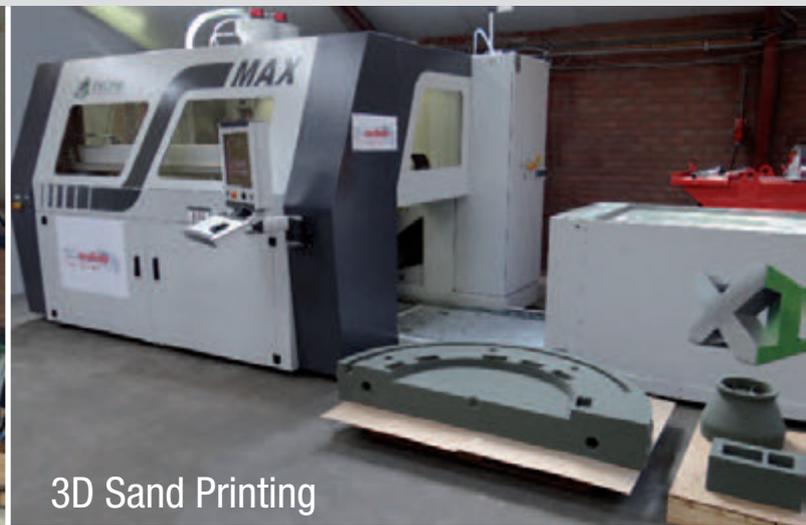
3DEALISE

3D SCANNING AND ENGINEERING
3D SAND PRINTING
RAPID MANUFACTURING

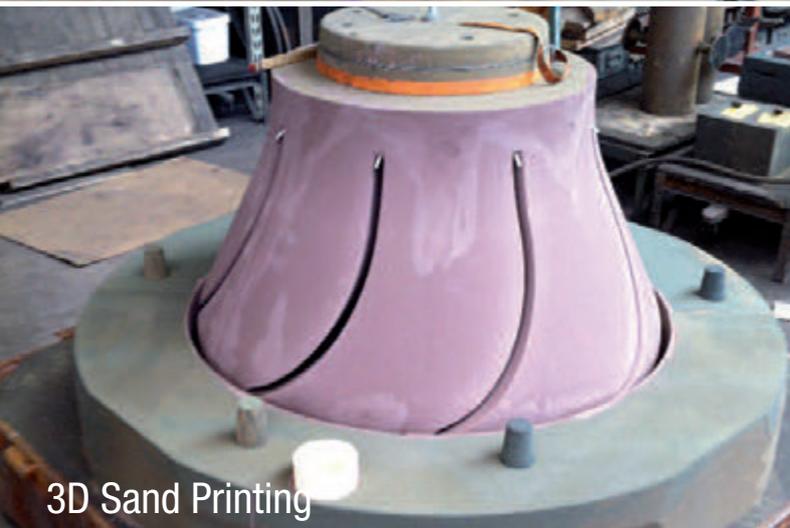
REVOLUTION IN PRODUCT AND SPEED



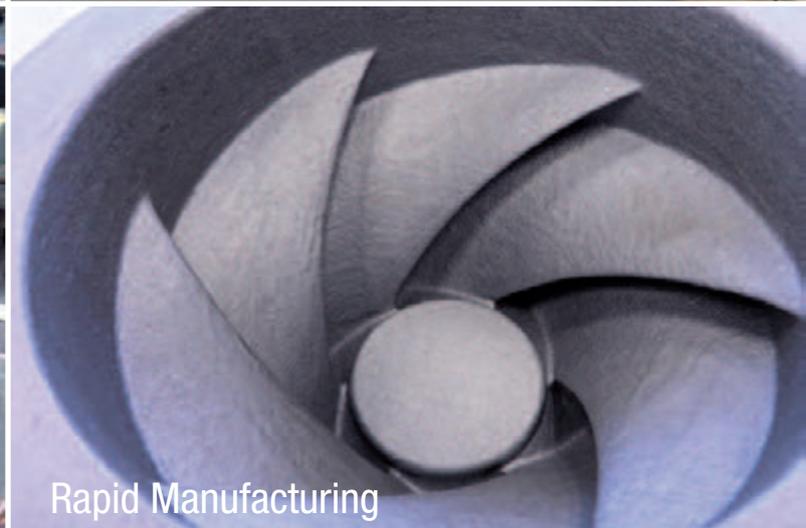
3D Scanning and Engineering



3D Sand Printing



3D Sand Printing



Rapid Manufacturing

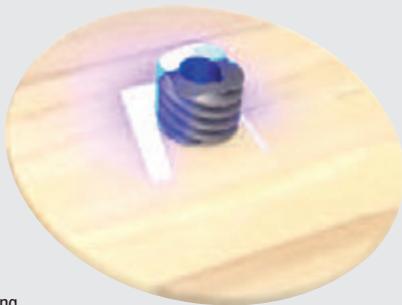


3Dealise is a 3D engineering, 3D printing and rapid manufacturing service for industrial applications, in sectors such as aerospace, automotive, pump and machinery manufacturing. We deliver products from 0.5 to 5000 kg in a very short timeframe. Our capabilities include 3D scanning, 3D engineering, reverse engineering, casting mould design, 3D printing, and managed production and casting. We have amongst other things the largest 3D sand printing capability for casting moulds in northern Europe.

Clients can select a single service such as 3D printing, but our full-service concept can develop a product idea all the way to a physical product, which means that our clients don't have to become manufacturing engineers if they don't want to. Our



orders range from 3D printing a sand mould for a foundry in 24 hours, to complete engineering of a pump or engine followed by 3D printing and managed production in a few weeks.



3D scanning

Our facilities in the Netherlands and in the UK are located strategically close to the industrial heartlands of northern Europe, and our unique capabilities have global appeal with deliveries as far as North America and Asia.

3D SCANNING AND ENGINEERING

In a world of digital information and digital production such as 3D printing, a high quality 3D product design is a necessity. Most new products these days will originate as a 3D CAD model. However, products that descend from older designs or that are based on a physical object such as a sculpture, often require a 3D model to be prepared. In addition, production tools such as a casting mould need to be prepared as a 3D CAD model. 3Dealise offers a range of specialised engineering services for these complex tasks.

SAND MOULD ENGINEERING

Direct 3D sand mould printing jumps an entire step in the casting process that has existed since time immemorial: pattern making. Pattern design is therefore also obsolete. Instead, 3D sand mould engineering has emerged, covering items such as mould partitioning, contraction and machining allowance, gating system design, chills, vents and manipulators. Some organisations have chosen to develop this relatively new expertise in-house, whereas others view it as non-core. 3Dealise supports the latter group with sand mould engineering services, and our team is arguably one of the most experienced and advanced in the world when it comes to sand mould engineering.



Weight reduction project

REVERSE ENGINEERING

When a spare part is needed and drawings are not available or incomplete, reverse engineering the original part is required.

This often involves much more than 3D scanning the original part. Design features such as planes and cylinders are not all recognised by software, and need to be reconstructed. The original part is usually worn or damaged, so the 3D model needs to be digitally repaired to represent the original design. Internal channels and chambers do not show up on an optical 3D scan, in which case we use

technologies such as a probe or X-ray scanning to reconstruct the internal geometry. Reverse engineering requires in-depth understanding of the application of the part and is therefore done by our most senior engineers.

3D SCANNING

We use the most advanced and precise 3D scanners from GOM and Faro to 3D scan physical objects with very high accuracy. Some of the equipment is portable to enable scanning on client-site. Optical scanning is the first step of the process, followed by data import with specialised software and several data cleaning and enhancement steps. The output is a high resolution solid surface model of the object, including details such as serial numbers.

CAD COMPARISON

A CAD comparison between a CAD model and 3D scan of a product can be applied in several ways. One application is for product quality control, in which case a graphical report of the comparison is generated for the client. Another option is to use the comparison as input for further work on the product such as machining, so that the best alignment can be found for instance. The third possibility is to use the comparison as a measure for accuracy of production machinery, and to calibrate as required.

2D TO 3D CONVERSION

Older 2D drawings may need to be converted to a 3D model, for instance when a spare part is needed. This can be a complex task, because older drawings are often incomplete and ambiguous, particularly with respect to complex curved surfaces such as a flow pattern. Our conversion service provides high quality 3D models, as required for digital production methods, in a timeframe suitable for rapid manufacturing.

REDESIGN AND WEIGHT REDUCTION

Digital production methods and particularly sand mould printing enable a universe of new design possibilities. Because complexity is no longer a cost factor, draft angles are no longer relevant and digital precision is now a given, complex and lightweight structures can be produced that were previously unimaginable. However, because all the design rules have changed and continue to change, the new challenge for organisations is to understand what is and isn't possible, and what is and isn't affordable. We offer engineering services to redesign parts and take advantage of the new possibilities. In particular, we can use specialised techniques and Finite Element (FEA or FEM) software for weight reduction, and can achieve as much as 60% material and energy savings.

PRODUCTION METHOD SUBSTITUTION

Another way to take advantage of the new possibilities of digital production, is to change the production method. Some parts that could only be produced with investment casting, can now be cast in a 3D printed sand mould, which is faster, cheaper and more flexible. Similarly, some welded parts can now be cast in a 3D printed sand mould, which can produce stronger and more durable parts, and removes restrictions that force weldments to be rather angular and clunky. Our team can redesign parts to fit the production method.

3D SAND PRINTING

3D sand printing is a true revolution in the foundry industry. For the first time in thousands of years, we can go directly from design to sand mould, jumping the entire pattern making process step. Omitting one step of a three step process is significant in itself, but even more significant is the geometric 'freedom of design' enabled by the new technology. Draft angles are no longer relevant, unlocking a whole universe of new design possibilities.

3D SAND PRINTING SERVICE

3Dealise is the largest and fastest 3D sand printing service in northern Europe. We use one of the largest and fastest printers currently available, which prints the size of a phone box (1800 x 1000 x 700 mm) every 24 hours. Mould parts can be stacked like Lego to create larger items, and we have produced moulds for impellers of Ø2800 x 600mm and weighing 3 tons. The lead time for a sand print is typically a few days, and can be as little as 24 hours.

PATTERNLESS PROCESS

The process works as follows:

- On the basis of a 3D CAD file, a casting mould is printed directly, with 0.1 mm accuracy.
- Very fine sand of 140 microns is applied to the print bed in a thin layer of 2 grains.
- The digitally controlled print head injects binder in exactly the right positions, so that the sand becomes solid there.
- These steps are repeated layer by layer until the products are finished.
- The job box then contains loose sand and solid moulds and cores, and the loose sand is removed and stored for reuse.
- The solid moulds and cores are then cleaned for use in the casting process.

By working this way, casting patterns become obsolete. This saves enormously in time, cost and materials during production as well as transport and storage.

We recommend watching our 3-minute video for a brief overview of the process:

<http://www.3dealise.com/en/3d-printing.html>



Integrated complex core

ADVANCED PROCESS, TRADITIONAL MATERIAL QUALITY

3D printing is the most advanced mould preparation technology available. The casting process itself did not change, however, meaning that the resulting products have traditional material qualities and can be issued with a certificate such as Lloyds 3.1. The advantages of that are evident, particularly in regulated industries with lengthy and costly product approval procedures.

LEAD TIME REDUCTION

Patternless production jumps the pattern making step, and can slash lead time by 6 weeks or more. The lead time for a sand print is typically a few days, and can be as little as 24 hours.

PROTOTYPES AND SMALL SERIES

Patternless casting is ideal for prototypes and small series, as the pattern cost and lead time can be saved. In addition, physical storage of a pattern that may never be used again is not required. Finally, it is very easy to change the design after a product is made, because only digital files need to be changed and sent to the sand printer again. In this way, prototype cycles can be accelerated from months to weeks.

THE IMPOSSIBLE BECOMES POSSIBLE

3D printing lifts traditional design restrictions, because draft angles are no longer relevant. Right angles, complex integrated cores and lightweight bionic structures are all possible now. Designers are only limited by their own power of imagination. Companies are now free to re-imagine what products they would like to make, free from the restrictions of the past.

Complex mould pack



RAPID MANUFACTURING

3Dealise uses the fastest and most flexible manufacturing technologies available, such as 3D printing. Our approach is eminently suitable for rapid prototyping, and indeed many of our orders are in that field. But actually, our processes don't distinguish prototypes and other products: rapid prototyping becomes rapid manufacturing.

3Dealise focuses on 3D printing as a manufacturing technology, and works with other companies (primarily foundries) to create products quickly and flexibly. Our capabilities fit into the rapid processes of our clients, whether they be a foundry, a manufacturing company or an artist.

RAPID CASTING

3D printed sand moulds can be prepared super-fast, generally between 24 hours and a week. Many foundries that use our moulds, are able to cast between 24 hours and a week after delivery of the mould pack. As such, lead time for a casting can be reduced by weeks or even months. 3Dealise generates 'plug & play' moulds with studs that fit together like Lego bricks and can be assembled in minutes. Moulds are 'free standing' whenever possible, meaning that they can be placed on the casting floor without a casting box. That way, our moulds are self-sufficient and can even be used by foundries with a very different technology such as investment casting.

NEAR NET SHAPE

3D printed casting moulds are highly accurate, because they are digitally produced direct from CAD with a highly accurate printer. In contrast, the traditional process has several manual interventions causing variations, such as pattern making and hand moulding. We use the finest sand available for the best accuracy and superb surface finish. Consequently, castings from our moulds have small tolerances and are 'near net shape'. This saves significantly on required machining and surface finishing.

MACHINING AND FINISHING

Clients may already have a machining and finishing solution in place, and others do not. For clients that want a complete solution, we work with selected flexible and high quality partners that suit rapid manufacturing criteria. Our partners are equipped with state-of-the-art and versatile equipment to meet diverse manufacturing needs, such as 5-axis CNC machines up to $\varnothing 5000$ mm.

QUALITY CERTIFICATES

A casting from a 3D printed sand mould is cast the same way as traditional castings, only the mould preparation is different. Therefore, the same quality certificates can be issued, such as Lloyds 3.1.

MATERIALS

Printed moulds can be used for the following materials:

ALUMINIUM, CAST IRON, STEEL, BRONZE, BRASS, ETC.

CONCRETE

CARBON, FIBREGLASS, PLASTICS, RUBBERS
(under development)



Multiple cores for complex products



'Impossible' core in one piece



'Freedom of design' – work of art



4 iterations of a prototype

REVOLUTIONISE YOUR BUSINESS

Strategic application of 3D printing in the product strategy of a company enables completely new business models, that were not possible before. Below are a few examples of how companies can change the way they do business.

DIGITISING THE PATTERN STORE

Industrial companies and foundries have storehouses full of casting patterns, built up over decades. Many of those patterns are rarely if ever used, and they often turn out to be incomplete or damaged when needed. The pattern store costs a small fortune every year to maintain. A cost effective option is to 3D scan and digitise the patterns that are used rarely, and then to scrap those patterns. When the pattern is needed, a 3D sand print can be made on demand.

STORAGE-FREE SUPPLY CHAIN

Digital production and particularly 3D printing turns traditional supply chain theory completely on its head. Companies used to produce in bulk in an offshore location, ship products halfway around the world to regional and local warehouses, and then the products would sit there until they were sold. Huge sums of capital were tied up in stock and warehouses for months or even years, and inevitably some of the stock would never be sold and end as scrap.

3D printing enables production on-demand. Comparing production cost between traditional production and 3D printing may work in favour of traditional production, but when tooling, supply chain overhead and capital investment are taken into account, 3D printing will be more economical for lower volume products. This enables companies to have a huge catalogue of (spare) parts for sale, without investing a penny in stock. Some companies take it yet a step further and reverse the cash flow: they sell a product and receive payment before production starts.

ENDLESS CUSTOMISATION

There is a powerful global trend towards customisation, because people and businesses want products that fit their needs exactly. For some products, customisation is already the norm. When buying a high-end car for instance, a list of options are selected (customised) before production starts, and practically no two cars are exactly the same. 3D printing enables customisation for many more types of product. It is now feasible to scale every industrial pump to its application, to adapt every propeller to its ship, to fit every forklift truck to its warehouse.

The opportunity for companies to add customisation as a premium option to their existing range of products is huge.

SUSTAINABILITY: NO WASTE AND LESS CO2

3D printing is an additive technology and produces no waste material, in contrast to subtractive technologies such as machining. In addition, material and energy use across the supply chain is reduced, because of near net shape production and less transportation movements. Most importantly, though, products made with 3D printing technology can be lighter and more energy efficient, potentially saving tons of CO2 throughout their lifetime.



Freeform concrete

CONTACT

Interested in the possibilities of 3D printing and engineering for your company? We will gladly think with you to find innovative solutions. Please contact us via the details below, or continue reading on our website www.3dealise.com.

EXONE COOPERATION PARTNER

We cooperate with ExOne and can always count on ExOne's expertise and backup printing capacity, so that we can offer additional assurance to our clients.



UK: 4 Acol Court, Acol Road, London NW6 3AE | T +44 20 3417 2121 NL: Wheeweg 20, 7471 EW Goor | T +31 547 702038
salesinfo@3dealise.com | www.3dealise.com