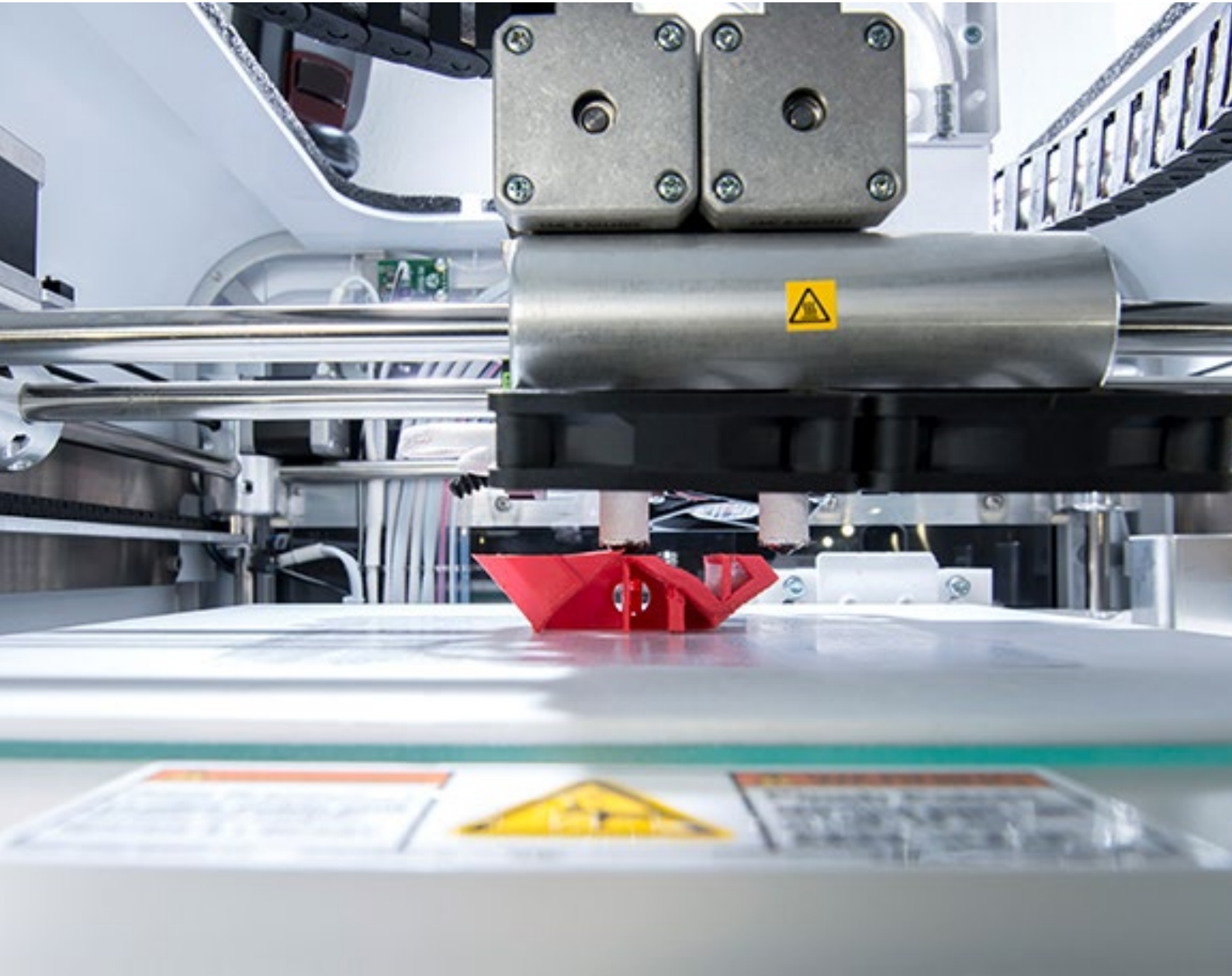


Interviewer: Ulrich Grunewald, Grunewald GmbH & Co. KG

3D sand printing: a challenge worth taking on



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The 3D sand printing

Before deciding to invest in 3D sand printing, the Bocholt-based company had looked out more closely at printer technology and in particular at the choice of a suitable binder system. The research led the team of the Bocholt family business to Japan and Sweden and finally to the conclusion that a cold-curing phenolic resin system is the binder system of choice. Ulrich Grunewald, Managing Director of Grunewald GmbH & Co.KG, talks to the editors about the potential of the new process and the valuable experience Grunewald has had with the new technology in its first year.

The subject of 3D sand printing is much discussed in the foundry industry. You have already decided to include this new technology in your portfolio. Why?

We have been dealing with 3D printing in our company for 25 years. We started with plastic and polystyrene patterns. We have also been using printed sand molds - and cores for a long time, but in the past we had to buy them. A new wind came into play when one of the leading printer manufacturers began to offer solutions tailored to the needs of foundries. That was when we decided that our own 3D sand printing would complement our portfolio well.

What will be your target group for this new technology?

The business with polystyrene pattern was no longer up to date. It was single individual production with relatively long lead times in our production. Unfortunately, we could no longer adequately serve our customers we had served with polystyrene products with this technology as before. Nevertheless, we knew that there was a demand. With the 3D sand technology, the opportunity arose to serve this need again. For example, we were able to win back a well-known engine manufacturer as a customer. We manufacture small series of aluminium and iron components for this customer.

The target group that we address with this technology usually asks for individual parts and small series of 1 to 50 parts - sometimes 1500 parts, but we usually talk about batch sizes of around 10-50 parts.

Fig 1: When one of the leading printer manufacturers began to offer solutions tailored to the needs of foundries, a new approach to the topic of 3D sand printing was introduced for Grunewald.

(Picture: Grunewald GmbH&Co.KG))



How do you explain this?

Thanks to the 3D sand printing process we can offer a process that is fast and produces high quality products. Customers send us their data and we deliver the desired results within a few days. This is a huge step forward! In this way, it means that our clients shorten their time-to-market considerably. This is particularly crucial for the technology industry. Of course, we must not forget that the production costs for tooling are also eliminated.

How do you proceed with customer projects - do you develop them together?

Our customers present us with components they want to implement and we design the cores and sand molds as economically as possible. What is happening more and more often is that customers ask for our know-how especially when the conventional process reaches its limits. For example, when the internal geometry of the component has areas that are too complex. This is where we print the cores, which are then subsequently placed in the mold, as the core.

Based on our know-how, we support our customers in implementing their plans as efficiently as possible. In the interest of a good result, this sometimes involves design changes. But we can only implement these changes as we have the requested know-how and experience in-house. This would not be possible with an external partner who would print the cores, as communication and agility would probably never be possible in this way.

How many people do you currently employ in 3D printing?

Our printer is currently operating five days a week. We employ two designers who are qualified and specialised. In addition, there are the machine operators who provide further support. Meanwhile we also have a trainee foundry mechanic who is very interested in the subject and is already actively supporting the 3D team.

What experience have you had in using the technology so far?

We are still learning. During ongoing operations we are constantly confronted with new questions that we did not thought about during the planning phase. It is important to work very precisely and to carefully coordinate all processes in the environment. That starts with thinking carefully about the sand supply. There are companies that work with big bags and then refill them. We have decided to install a silo. It's simply more economical and above all cleaner - an important aspect of 3D printing! This is another reason why we installed the printer separately from the other equipment in a separate room, where humidity and temperature is constantly monitored and controlled. Furthermore, the machine has no contact with dust or emissions from the conventional foundry operations.

Our staff already had a lot of know-how and experience with 3D printing and has been specially trained for sand printing. However, in everyday operations the designers are constantly faced with new tasks for which they develop new possibilities and solutions. One thing should never be underestimated: The design of these components is a tough job and requires a targeted and continuous build-up of know-how. There are only a few parallels to conventional model making, but we have significantly more degrees of freedom.

Fig. 2: The illustrated longitudinal carrier impressively demonstrates the possibilities of 3D printing.
(Picture: Grunewald GmbH&Co.KG)

X:	1222.530	mm
Y:	314.200	mm
Z:	446.072	mm
Weight:	7031.807	g
Volume:	2.6044E006	mm ³
Surface:	1.2929E006	mm ²

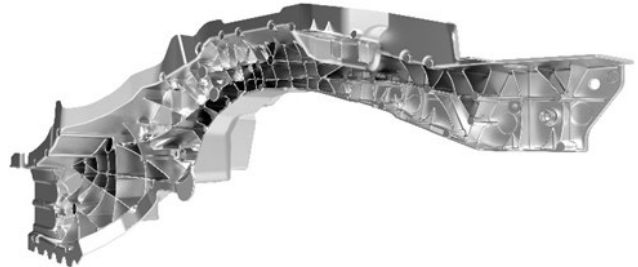


Fig 3: Ulrich Grunewald, Managing Director of Grunewald GmbH&Co.KG, in a conversation with Philipp Grunewald, also Managing Director of the Bocholt company. He is pleased about the great degrees of freedom 3D printing offers for design.
(Picture: Grunewald GmbH&Co.KG))

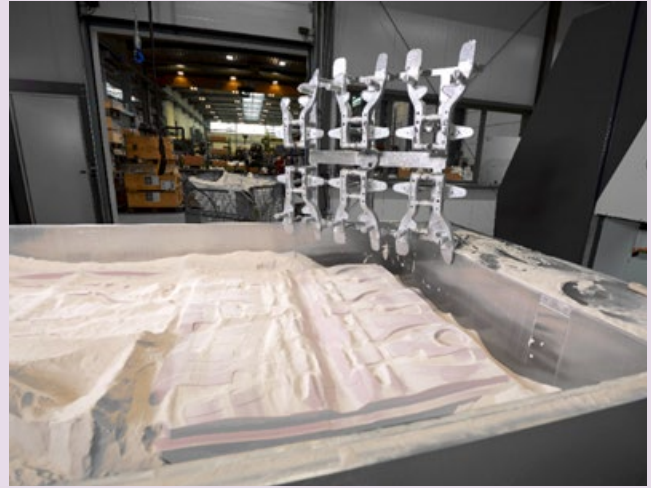


When it comes to binders, you have finally decided on a cold-curing phenolic resin system, also known as NOVASET system. How did this decision mature?

The following aspects were decisive for our decision: The cold-curing phenolic resin systems are still in their infancy and we see great potential for development in them. In addition, the printed furan resin cores cannot meet our requirements for quality and productivity. Cold-hardening phenolic resin cores convince by their high precision and surface quality. Their finishing is - in contrast to furan resin cores - much easier. With cold-curing phenolic resin systems, hardly any sand sticks to the cores. The cores can be cleaned in just a few steps when they come out of production. The finishing effort is certainly about 60% less than with furan resin cores.

Fig. 4: The finishing effort of NOVASET cores is much lower than for furan resin cores.

(Picture: Grunewald GmbH&Co.KG)



Are there also negative or dark sides of 3D sand printing?

One topic that really concerns us is recycling. We cannot (yet) recycle the sand from this process, but have to dispose of it. In terms of the tonnages involved in 3D printing, this is already an economic and ecological disadvantage. Here we hope for improvement.

How do you evaluate your investment after the first year?

Internally, we have already improved because the new business has changed the way we think. Our design engineers use the possibilities of 3D technology in the creative design of geometries. At a time when the geometries of components are becoming more and more complex, this ability is a decisive competitive factor for us.

The business with 3D sand printing also opens up a lot of economic opportunities for us, we can already say that after the first year. I am convinced that this decision has brought our company forward. We are now perceived more than before as a technology company - an important factor in competition.