

Questionnaire:

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(A technical article from 2019)

Interview



- When was PROTIQ founded??

PROTIQ has been the Phoenix Contact Group's expertise in the field of additive manufacturing since 2010. In 2016, we spun off PROTIQ GmbH as a 100% subsidiary of Phoenix Contact. Based on this experience, we have also been advising and supporting external customers since then: from the generation of 3D data to additive single piece or series production.

- Which business model do you work with?

We manufacture individual parts, prototypes and small batches and focus on special materials. The ordering process, invoicing and data handling along the AM process chain are fully integrated digitally, both vertically and horizontally. Payment providers and logistics service providers are connected via interfaces and receive all the necessary data fully automatically.

We also cooperate with various partners, such as Conrad Electronic. Customers can upload 3D data via their website and have it produced by us. This is also a completely digital, highly automated process.

We love the fast-paced world of additive manufacturing and know that no service provider is able to offer all technologies and materials at all times.

With this in mind, we are opening up our platform to other 3D printing service providers. Together with 17 service providers who offer their services on the ProtIQ platform, we currently offer all important processes and materials.

Our range of services is rounded off by services relating to the design process, such as simulations of magnetic fields for inductors or for topology optimization of AM components, as well as training and consulting.

Based on this experience, we are working with partners to further develop our platform offerings, for example by optimizing our configurators for inductors and gears. Ultimately, we standardize parameters of completed projects and thus create automated engineering solutions. The configuration of copper inductors becomes a matter of minutes.

Five to eight days later, they reach the customer. Traditionally, this process takes several weeks. Last autumn, we presented an online topology optimizer with partners that guides customers to an optimized component design largely automatically based on the load requirements for their component. We were able to radically speed up the process here: instead of computing times of 20-30 hours, the results are now available in 20-30 minutes.

- [Why it pays to use a service provider instead of carrying out 3D printing in-house](#)

Let's compare additive manufacturing with classic 2D printing: 15 years ago, every household had a full-color inkjet printer. Today, everyone prints their pictures online for a fraction of the cost price and in top quality. We see a similar development in the field of 3D printing. If you want to integrate additive manufacturing in-house, you have to dig deep into your pockets and ultimately limit yourself to just one technology out of many. On the Protiq platform, on the other hand, customers can draw on many years of expertise, almost all 3D printing technologies and over 30 materials.

- [Which materials and manufacturing processes do you use?](#)

In general, components made of plastics, metals, glass or ceramics can be additively manufactured, but the range of materials is still very limited. The special materials represent a unique selling point for us, as we qualify customized materials for our customers not only for prototyping but also for series production.

Technical thermoplastics and standard plastics such as polyethylene or polypropylene, which can be additively processed and then also provide the mechanical properties required for industrial production, are available.

properties required by industry are rare. The same applies in the metal sector for processing high-strength steels, non-ferrous metals or zinc alloys. Materials and the plant technology for this are not regularly available, so we invest in development ourselves. For example, we have qualified our own processes for the processing of highly conductive copper, brass and zinc.

- What requirements do inductor manufacturers have for additively manufactured components?

Inductor manufacturers expect consistently high quality, short delivery times and low costs. Inductors are therefore an ideal field of application for additive manufacturing. The customer receives the ordered inductor within 5-7 days. Printed inductors are also typically cheaper. Accuracy and reproducibility can also be increased. The increased service life is particularly appreciated by many customers, as setup times and maintenance costs in production can be reduced.

However, these high demands on service life and quality require special material properties, which are met by the RS copper material developed by ProtIQ. The material is characterized by low porosity, so that even wall thicknesses of < 1 mm are possible. We test inductors for leak-tightness at up to 20 bar. We ensure the high conductivity of 52 MS/m by means of eddy current testing and 4-point measurement. A very smooth surface is required, especially for the subsequent assembly of concentrator plates.

- How will customer requirements change in the coming years??

The new freedom of geometry has so far been little used. Inductor designers need to think much more freely. Simulation-supported inductor design offers potential savings in production of typically 20-30% cycle time reduction.

We simulate the entire heating process and iteratively improve the design of the induction tool.

These optimized inductors then usually look completely different from conventionally manufactured coils. Free forms, bionic structures or sophisticated internal cooling structures are just a few examples. These high-performance inductors can then only be additively manufactured.



- Which markets are of particular importance to you?

We are generally open to all of our customers' different markets.

As a production service provider, we have the knowledge to produce the desired customer geometries from the optimum combination of process, material and machine in the best quality and in the shortest possible time. The particular strength of additive manufacturing lies in its ability to realize almost any geometry and offers great advantages for almost any industry. This can go so far as to produce personal scans and classic product prototypes at the same time as an architectural model. Of course, the area of individualized products will grow strongly in the future, so that customers can already find the first configurators on the Protiq platform today. Glasses, dental crowns and shoe soles, for example, are already being additively manufactured on a massive scale today.

- What significance does research & development have for your company?

Research and development is a fundamental pillar for us in order to be able to stand out in the fast-moving world of additive manufacturing in the future.

We have been printing highly conductive copper since 2013. Since 2016, we have been processing the plastic polyamide 6, for which we have completely redeveloped our own system technology. In 2018, we went live with the world's first online topology optimizer. And today, in 2019, we have succeeded in processing the zinc material Zamak 5 with our innovative process.