

INTERVIEW

Questionnaire:

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(A technical article from 2019)



When was PROTIQ founded?

PROTIQ has been the additive manufacturing competence center of the Phoenix Contact Group since as early as 2010. In 2016, we spun off PROTIQ GmbH as a wholly owned subsidiary of Phoenix Contact. Building on this experience, we have since also been advising and supporting external customers: from generating the 3D data to the additive manufacturing of one-off parts or series production.

What business model do you work with?

We manufacture individual parts, prototypes, and small series, with a focus on special materials. The ordering process, invoicing, and data handling along the AM process chain are fully digitally integrated: vertically as well as horizontally. Payment providers and logistics service providers are connected via interfaces and receive all the data they need fully automatically.

We also cooperate with various partners, such as Conrad Electronic. Customers can upload 3D data via their website and have it manufactured by us. This, too, is 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.

Against this background, we are opening our platform to other 3D printing service providers. Together with more than 40 suppliers who offer their services on the ProtIQ platform, we currently offer all the important processes and materials.

Our offering is rounded off by services related to the design process: for example, training and consulting.

Based on this experience, we are further developing our platform offerings together with partners, for instance by optimizing our configurators for inductors and gears. Ultimately, the parameters of completed projects can be standardized, thus creating automated engineering solutions. Configuring copper inductors becomes a matter of minutes.

Five to eight days later, they are with the customer. Conventionally, this process takes several weeks. An online topology optimizer can guide users to an optimized component design in a largely automated way based on the load requirements for their component. Here, the process can be radically accelerated: instead

of after computing times of 20-30 hours, the results are available in 20-30 minutes.

Why is it worth relying on a service provider instead of doing 3D printing in-house?

Let us compare additive manufacturing with classic 2D printing: 15 years ago, every private household had a full-color inkjet printer. Today, everyone prints their pictures online for a fraction of the cost of doing it themselves and in the best quality. We see a similar development in the field of 3D printing. Anyone who wants to integrate additive manufacturing in-house has to dig deep into their pockets and, in the end, has to limit themselves to just one technology out of many. On the ProtIQ platform, on the other hand, customers can draw on many years of know-how, on almost all 3D printing technologies, and on more than 160 materials.

Which materials and manufacturing processes do you use?

In general, components can be additively manufactured from plastics, metals, and also glasses or ceramics, but the range of materials is nevertheless severely limited. Special materials are a unique selling point for us, because we qualify tailor-made materials for our customers not only for prototyping but also for series production.

Engineering thermoplastics and standard plastics such as polyethylene or polypropylene that can be processed additively and then also provide the mechanical properties required in industry are rare. The same applies in the metal sector to the processing of high-strength steels, non-ferrous metals, or zinc alloys. The materials and the machine technology for them are not regularly available, so we invest in development ourselves.

For example, we have qualified our own processes for processing 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. This is why inductors are an ideal field of application for additive manufacturing. The customer receives the ordered inductor within 5-7 days. In addition, printed inductors are typically less expensive. Accuracy and reproducibility can also be increased. Many customers particularly appreciate the

longer service life, as it allows setup times and maintenance effort in production to be reduced.

However, these high requirements for service life and quality call for 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. Inductors can be tested for leak tightness at up to 20 bar. The high conductivity of 52 MS/m can be verified by means of eddy current testing and 4-point measurement. A very smooth surface is required, especially for the subsequent mounting of concentrator laminations.

How will customer requirements change in the coming years?

So far, the new freedom of geometry has been used very little. Inductor designers need to think much more freely. Simulation-based inductor design offers savings potential in production of typically 20-30 % reduction in cycle time. To this end, the entire heating process can be simulated and the design of the induction tool iteratively improved.

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

Which markets are of particular importance to you?

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

As a production service provider, we have the knowledge to manufacture the desired customer geometries in the best quality and in the shortest time from the optimal combination of process, material, and machine. The particular strength of additive manufacturing lies in being able to realize almost any geometry, and it offers great advantages for almost every industry. This can go so far that body scans and classic product prototypes are manufactured at the same time as an architectural model. Of course, the field of customized products will grow strongly in the future, which is why customers can already find the first configurators on the ProtIQ platform today. For example, eyeglasses, dental crowns, and shoe soles are already being additively manufactured in large quantities today.



How important is research & development for your company?

Research and development is a fundamental pillar for us, so that we can continue to stand out in the fast-paced world of additive manufacturing in the future.

We have been printing highly conductive copper since as early as 2013. Since 2016, we have been processing the plastic polyamide 6. For this purpose, we developed our own machine technology completely from scratch. And today, in 2019, we have succeeded in processing the zinc material Zamak 5 with our novel process.