

GERMANY

Growth through Innovations: ALUMINA SYSTEMS – Winner of the Best COMPONENT AWARD Technical Ceramics 2018

In January 2018, LAPP Insulators Alumina was renamed to ALUMINA SYSTEMS GmbH. The core business of customized ceramic-metal composite components remains unchanged. Market leadership in semiconductor packaging up to 6 inch diameter, where the company controls 60 % of the world market, is the historical basis for the day-to-day operations, but for around the last ten years new highly complex products for applications in a wide range of technologies have been added. By winning the Best Component Award Technical Ceramics, awarded for the 1st time by CERAMIC APPLICATIONS/Göller Verlag at ceramitec, the company has proven its innovation. Managing Director Dr Holger Wampers (HW) explained the company's philosophy to us.



Fig. 1
Dr Holger Wampers giving an interview
for CERAMIC APPLICATIONS

CA: What motivated you to change the company name?

HW: LAPP Insulators GmbH was acquired by Quadriga Capital in 2011. Back in 2012, we integrated the Czech company Technicka Keramika a.s. as a low-cost production site for the thyristor business.

As part of a carve-out process, founding of Alumina Redwitz Holding/DE was initiated and the Alumina Group with the two subsidiaries LAPP Insulators Alumina GmbH and LAPP Insulators Alumina s.r.o. were spun off from LAPP Insulators GmbH. Changing the name to ALUMINA SYSTEMS became necessary to rule out any confusion with LAPP Insulators GmbH on the market. Ultimately, the roots and experience of ALUMINA SYSTEMS GmbH go back to the ceramics division of the world-famous company Siemens.

This former company headquarters was taken over by Johnson Matthey Ltd./GB. We have leased this base in Redwitz long-term and have options to extend our production facilities.

CA: With HVDC systems – thyristors and diodes up to six inches – you're world market leader, especially from 2010 you have initiated many new developments for other applications. What strategies are you pursuing here?

HW: The HVDC business is very volatile, so it is not wise to rely on it as a mainstay – 90 % share of the whole business. Since I joined the company in 2010, we have had to move fast as on account of filled warehouses at the customers from 2009, the sale of thyristors and diodes had already slumped sharply in 2010.

In just 3 years, with new products we were able to improve this situation substantially because we gained over 100 new customers and in the meantime almost half of our turnover is now generated in new sales areas. The goal is to increase this share to around two thirds.

CA: That means extremely short development times for highly complex products. How do you manage that?

HW: With our specialist know-how in ceramic-metal composites, a large range of electronics can be covered: from bondable substrate through laser beam generator tubes to electron beam manipulators. Such sophisticated components are designed at ALUMINA SYSTEMS GmbH with FEA-assisted component calculations for determination of mechanical-thermal stresses. This enables selection of design alternatives prior to actual design and therefore to avoid trial and error before the prototype goes into production.

CA: How does it look in concrete terms for potential customers when it comes to processing a new request?

HW: We try to find out what the customer's problem really is. Often in ignorance of the possibilities of joining technology, the thinking is too simple. Please replace this metal component with a ceramic component, here we start in a team with engineers to advise the customer and only to use ceramic in the component where it is used, e.g. for electric insulation, but not for the clamping ("using ceramics in the right place"). Especially for the design of ceramic components, a fracture statistical post-processor is available for calculation of the component fracture probability according to the state-of-the-art.

Different component designs can be compared with each other very quickly. A voltage-optimised design variant can already be selected before the first prototype is built. The number of prototypes is minimised. From this results the cost saving and shortening of construction times by several weeks. This compares to around 1–2 weeks for the simulation.

CA: With which applications are you predominantly involved?

HW: We have now structured our much wider portfolio and established the divisions Vacuum Systems, Sensor Systems, X-Ray Systems, Laser Systems, Plasma Systems, Battery Systems and 3D-Systems. As the names suggest, we attach importance to a system approach. We supply 95 % metal-ceramic composite components and use our specialist know-how in joining systems to be able to offer the customers ready-to-use systems.

CA: For the "Best Component Award Technical Ceramics", with the gas injector ring for Plasway, you have presented a hybrid component that combines conventional slip casting, 3D-printing and soldering with speciality glasses. How was this development initiated?



*Fig. 2
Karin Scharrer handing over the 1st "Best Component Award Technical Ceramics" to Dr Holger Wampers*

HW: Plasway (see company profile in the text box) needs this ring for etching and coating semi-conductor components for a new, higher capacity process (around 30 % higher coating rate).

As a high-precision nozzle contour is important, but the issue could not be resolved in titanium, we suggested to the customer that we resolve the issue with ceramic 3D-printing. The component size of the ring (diameter 380 mm) precludes, however, cost-efficient 3D-printing from the outset. We fabricated the ring in conventional slip casting. As internal channels are needed, these had to be cut in. Our production know-how enables sintering of components of this size with useable distortion and to join these by means of glass soldering to one component with the required precision. Moreover, 24 nozzles fabricated by means of 3D-printing were staggered in position and the metallic connections made of stainless steel and titanium fixed to the inlets of the ring. The first rings have already been installed in June 2018. So with the performance confirmed from the preliminary tests, we can expect interesting follow-on orders.

CA: In ceramic 3D-printing, you now have great expertise as you are one of the pioneers to realise this process in production. Do you intend to further expand this area?

HW: This will take different directions. First, we want to continue with the already installed stereolithography process. Goals here are further improved precision and larger components, which we want to achieve with different processes and equipment. Important is the widening of the material range – currently with us it is high-purity alumina. In addition, we have acquired the patent for laser-induced slip casting from amongst others the BAM/DE, which, in cooperation with a new specialist integrated in the team, we want to advance to series maturity in the next 3 years. I can al-

Company Profile of plasway-Technologies GmbH

Since 2009, the Saxony-based company plasway-Technologies GmbH/DE (near Dresden) has been engaged in consulting for national and international customers in plasma etching and plasma-assisted CVD in microelectronics and adjacent fields.

With the very large international network and cooperation, the company can offer customer-oriented and focussed problem solutions both in “leading edge” as well as in standard production. Insofar projects can be realised fast and efficiently for the customers.

The company’s founder, Stephan Wege, a graduate physicist, has been working 25 years in plasma processing and processing equipment and has authored or co-authored more than 70 patents and around 30 publications in this field.

The new wider focus of the company is the development of highly innovative key components and integrated processing chambers particularly in the ALE (Atomic Layer Etch) and PEALD (Plasma Enhanced Atomic Layer Deposition) sector.

For the realisation of these new technologies, uniform gas injection at very short pulse duration and very quick gas changes are extremely important. This novel gas injector ring was developed in theory by plasway-Technologies GmbH with the aid of simulation. Only with the specialist know-how of the company ALUMINA SYSTEMS GmbH could this project now be realised successfully.

Together with the Fraunhofer Institute for Ceramic Technologies and Systems – IKTS in Dresden under the direction of Dr Jonas Sundqvist, Head of the Department for Thin Film Technologies, this ring is currently being tested as a key innovation in a 300-mm test reactor from plasway-Technologies GmbH installed in the facility.

The innovative sector (ALE, PEALD) shows very strong growth in technology for semi-conductor production and accordingly considerable economic potential for partners as well as existing and new customers of plasway-Technologies GmbH.

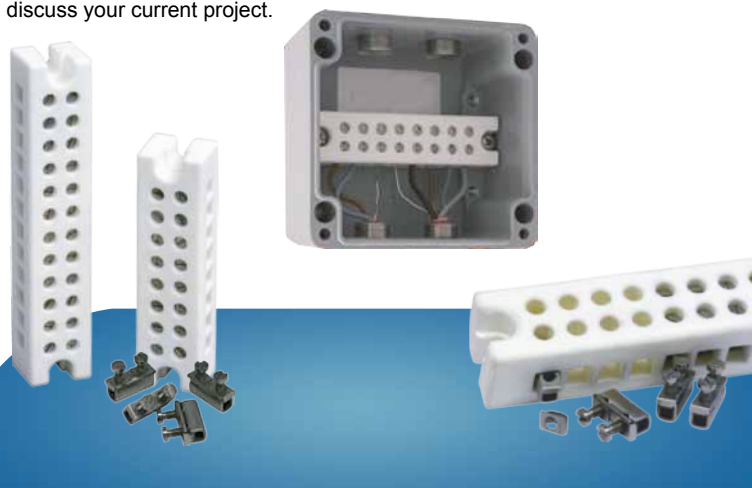


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ready say now in the middle of the year, sales of 3D-printed components have doubled compared to last year.

CA: Do you focus therefore your research activities on this new production process?

HM: Not just on that, for me personally, the NaNiCl battery project is also very important, which we want to get on track with partners from 2019. Here we’re talking about battery cells to be used in stationary applications, on the basis of very low-cost materials (sodium chloride and nickel). Applications are feasible, for example, in households – intermediate storage of power generated by solar cells for charging an electric car at a specific point in time.

CA: How do you generate your ideas for new products?

HM: With active presence on the market. That is so important to me personally that besides the management, I head sales in personal union. We have to be able to bring in our know-how (ceramic components plus joining techniques with passive and active soldering for vacuum-tight components) already in an early phase of talks. This results in exciting requests.

A year ago, I myself didn’t know that we would be making speciality components for MRT analyses in the dental sector and with a contactless “camera” generating 3D-pictures. Important areas of business are in any case vacuum, laser, X-ray, plasma, energy, medical, accelerator and measurement technology.

CA: Thank you for talking to us.

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