

Application report | Best practice



Heicks industrial electronics and Ersaprint

Years of trusting cooperation: Rudolf Heicks (right) and Ersaprint Sales Engineering Stefan Wurster in front of a VERSAPRINT stencil printer.

Parylene: the bearable lightness of space

There are numerous EMS service providers in Germany. To guarantee continuous capacity utilization and further growth, many electronics manufacturers are concentrating on specific areas in order to survive in the face of global competition. One such company is Heicks Industrie-elektronik GmbH, which not only develops, designs and manufactures electronic

components, but also has rare expertise in the field of parylene coating. Heicks and its 130-strong team are top players in Europe with this technological know-how and a recognized partner for the aviation sector. In LP production, system supplier Ersaprint provides support with soldering technologies from selective through wave to printer.

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Years of trusting cooperation: Rudolf Heicks (right) and Ersa Sales Engineering Stefan Wurster in conversation at the POWERFLOW E.

The story of Heicks Industrieelektronik did not quite begin in a garage in Ge-seke, North Rhine-Westphalia, where the company is based. But the start of the company was inspired by an incredible spirit of entrepreneurship: following a degree in electrical engineering and five years working for a large automotive supplier in Lippstadt, Rudolf Heicks decided to start up his own 1-man business – that was back in 1986. The original 3 x 3 m floor space quickly became 80 m² and five employees when the basement in his house was extended. This didn't last for long, however, since contacts to his old employer resulted in orders from the aviation sector, where requirements are extremely high, in particular on the assemblies to be produced. An unused farmhouse belonging to the family was converted into a production facility, resulting in a useful floor space of more than 680 m² and enabling 25 employees to work there. Enough to deliver the outstanding orders on time and in the required quality. In 2005, the company faced a landmark decision: to start from scratch again or stay at the level achieved? As a real entrepreneur, Rudolf Heicks took the leap – a former truck workshop on a plot 20.000-m² in size was just the property he needed. The new location „Am Schwarzen Weg 25–31“ was built up gradually – today Heicks has a production area of more than 5,500 m² there, where 130 employees generated total revenue of 10 million euros in 2017.

At about the same time as this decision was made, Rudolf Heicks came into contact with parylene for the

first time. Upon customer request, the EMS service provider had to answer the following questions: Assembly production? Yes. Assembly varnishing? Yes. Assembly casting? Yes. Parylene coating? Question mark! Without delay, the Heicks boss and a team of experts started researching to find out what they could do about parylene. After a good four years, Rudolf Heicks and his team were able to report that they had solved the mystery and now mastered the process. This makes Heicks Industrieelektronik the only company in Germany that is in a position to produce assemblies in accordance with aviation standard DIN EN ISO 9001/EN/AS 9100, coat these with parylene and remove this selectively again by means of laser. The IHK (German Chamber of Industry and Commerce) honored the company as the European market leader for this.

What is parylene exactly? It is a polymer granulate that becomes gaseous at 700 °C and condenses into a polymer film similar to Teflon. It is mainly used for high-quality assemblies in mining, railway technology, e-bikes, electro-mobility – and aviation. Remember: an assembly installed in a modern transatlantic plane is up in the air 18 hours a day for 30 years. Every gram counts, including the coating! Printed board assemblies are usually protected against influences of the environment by different varnishes (epoxy resin, urethane, silicone or acrylic paint), which is not always sufficient under high loads. The problem with the varnishes: standard surface coatings are heavy and cannot be applied completely covering or fault-free.

Automated reworking with
Ersa HR 600/2.



Parylene coatings, on the other hand, weigh hardly anything, form a homogeneous layer thickness and are extremely resistant to harsh environmental conditions despite their extremely high bio-compatibility (no solvents, no plasticizers). The coating even withstands salt water, which is usually where conventionally coated printed circuit boards fail.

What makes parylene better than varnishing? Example: BGAs cannot be wetted completely with varnishes. „With the polymer gas parylene, a BGA can be coated completely and reliably – even from below. Even robots are not able to apply varnishes with exactly the same layer thickness and avoid thinning at the edges,“ explains Rudolf Heicks. The parylene coating – usually between 5 and 25 µm thick – is applied after cleaning and drying using the vacuum method at room temperature over 12 to 20 hours, is then pore-free and structure-retaining, which Heicks calls „real conformal coating“.

Materials suitable for vacuum processing such as rubber, glass, metals, ceramic, polymers and silicone are used for parylene coating. After the coating process, the parts are removed from the vacuum chamber and masked areas are removed with the aid of a special laser – the Heicks specialists are even able to expose coated areas on the printed circuit boards reliably and without damage. The assemblies coated this way are extremely resistant to aggressive environments or liquid hydrocarbons (petrol, diesel, glycol) and act as a diffusion barrier against gases as well as keeping metal dusts, insects and condensation away.

PERFECT FINISH FOR ASSEMBLIES

When so much care is taken to give the printed circuit board a perfect finish, it goes without saying that attention is paid to every detail during production as well, in order to guarantee the best possible product and process quality. Which is why Heicks Industrieelektronik has been relying on soldering systems from Ersa GmbH for a good 30 years now. The first new machine bought by the young company was an ETS 330 wave soldering machine in the 1980s. „I will remember Bernd Schenker*, who was here well into the night with his sleeves rolled up, helping us get the machine up and running – that was great commitment to the customer and led to several further purchases from Ersa,“ Rudolf Heicks recalls.

Heicks industrial electronics

facts and figures

Founded 1886

10 million euros turnover (2017)

130 employees

Range of performance: development, design and production of electronic assemblies and parylene coatings

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Heicks
Industrieelektronik GmbH





Years of trusting cooperation: Rudolf Heicks (right) and Ersa Sales Engineering Stefan Wurster in conversation at the POWERFLOW E.

As a complete EMS service provider, Heicks has a relevant machine fleet – Ersa has contributed numerous systems for this: two ECOSELECT 350 selective soldering systems, two VER-SAPRINT stencil printers, one HOT-FLOW 2/12 reflow soldering system, one POWERFLOW E wave soldering system. An additional system of the same type was added in 2018, as well as a HR 600/2 rework system for the automatic desoldering, placing and soldering of SMT components. Initially Heicks manufactured completely containing lead, until the requirement for lead-free came up – which was the reason for purchasing an ECOSELECT 350 in May 2006, the first selective soldering system that mastered both methods. The demand for lead-free production increased so much after this that selective soldering technology could no longer cope with this volume – the solution for Heicks came in August 2014 with the POWERFLOW E wave soldering system. This means Heicks can now cover small batch sizes using both selective systems – if larger, more complex assemblies are required, the two POWERFLOW E systems can be used. With the newly purchased HR 600/2, Heicks can repair even parylene assemblies in the standard process in such a way that they are released for aviation applications – the worker exposes the soldering spots mechanically, desolders the component and cleans the soldering spot, then the new component is soldered in place, the soldering spot is cleaned again and sealed with a special casting compound. Companies that work for such sensitive

sectors as aviation, mining and railway technology must practice comprehensive traceability – to this end, Heicks invested a great deal of energy in an ERP system (Enterprise Resource Planning) which has also been customized to the company's individual requirements. Now the Heicks team has access to sophisticated capacity scheduling modules which include definitions of which process takes how long and when the next order is to be processed. The result: reliable planning – important for Heicks' customer orders with production facilities in Mexico, Sri Lanka or Singapore and headquarters in Germany. More and more often, Heicks also produces prototypes for German development departments for products which then go into series production in South America or Asia. Even deliveries to India and the USA are no problem for Heicks, since the company has its own customs department and can thus process world-wide shipments.



Reliable operation over many years and still perfect for small batch sizes: the first Ersa ECOSELECT 350 has been in use at Heicks since 2006.



COMPREHENSIVE SET-UP AS SYSTEM AND SERVICE PARTNER

When new investments are to be made, the Heicks team relies on brainstorming, compares suppliers in terms of price and performance – always with the aim of keeping to one supplier whenever possible. „The supplier knows us, we have one direct contact for everything – from our point of view there is little sense in mixing too much, that would result in disadvantages in terms of spare parts supplies, programming, applications. And Ersa has a comprehensive set-up with service and systems, so that we can confirm again and again that we feel comfortable and well looked after here, remain compatible from one system to the next and are thus more flexible,“ says Rudolf Heicks, who greatly values long-term business relationships. Even if the decision phase sometimes takes a long time – once the decision has been made, the machine has to be installed and ready for use as quickly as possible. Rudolf Heicks puts the following on record: „Our new purchases were often linked to orders that we could never have completed without these systems.

For this reason, it was always crucial that the machine could be powered up within the shortest time possible – which was always the case with Ersa.“ Heicks Industrieelektronik is extremely well equipped when it comes to soldering technology, although Rudolf Heicks is already thinking forward. Currently he thinks about who is going to succeed him in the company – both sons have completed their engineering degrees, one of them is currently doing his pilot's licence. Good preconditions for a company that makes 70 percent of its turnover in the aerospace and aviation industries! ■

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