



THERMAL SYSTEMS

# review

Customer Magazine, Issue 02 | 2019

**06** "Look further, go beyond"  
Rehm exhibits at productronica  
in Munich

**10** Secure Identification  
With contactless 3D finger scanner  
from Switzerland

**18** 30 Years of Rehm Thermal Systems:  
Next year we mark our company  
anniversary – celebrate with us!



# LOOK FURTHER

## GO BEYOND



Fast and efficient for  
the perfect result.



Condenso  
XC



## Dear readers,

"Look further, go beyond" is our trade-fair motto for 2019. And what started with the presentation of our new developments at SMTconnect will be continued at productronica under the same motto.

The latest of our innovations is TripleX – a multifunctional reflow soldering system for which a patent is pending, that offers both convection and condensation soldering processes with or without vacuum within the same system, which is a milestone in terms of flexibility.

We have also updated our systems to suit market requirements in the area of conformal coating. The new ViCON Protecto operating software allows flexibility in lacquering and optimal integration



into production lines. In combination with our new UV drying system, this equips you ideally for your lacquer coating applications.

Innovative thinking and action, and our focus always on the future – these have always defined Rehm. In 2020 we will celebrate our 30th anniversary and are already looking forward to sharing a short retrospective with you, but most of all also a fascinating outlook on the exciting future of electronics manufacturing on the occasion of our Technology Day.

So as you see, the theme remains: "Look further, go beyond" – not just a motto for trade fairs, more a statement of innovation and global outlook!

A stylized, handwritten signature in black ink that reads "Rehm J.".

**Johannes Rehm**  
General Manager

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## Imprint

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# "LOOK FURTHER, GO BEYOND" REHM AT PRODUCTRONICA

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**At productronica in Munich, we'll be presenting the latest systems engineering and user-friendly software**

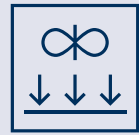
**The processing of the smallest building components, the highest demands on the lowest possible void rate of soldering points, quality intensification due to protective coating or safe functioning under extreme temperatures – the electronics industry is constantly meeting new challenges in the processing of sensitive electronic components. We offer suitable solutions and systems for these requirements.**

With our trade fair motto "Look further, go beyond" we joined you at the SMTconnect trade fair in May of this year, and now we will be embarking with you on a journey at

productronica characterised by networked production, the further development of existing technologies and creative new developments.

In addition to our proven soldering systems with the help of convection, condensation or contact heat, coating systems and dryers, we are now presenting the TripleX vision, a new development that combines convection and vapour phase soldering – for even more flexible production.

We look forward to speaking with you!



### Reflow soldering by convection

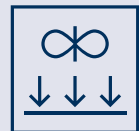
Best quality and highest flexibility



Efficient reflow soldering with the innovative VisionXP+.

The convection soldering systems of the Vision series stand for the best quality and maximum flexibility. Our innovative system, the VisionXP+, now makes convection soldering with or without vacuum even more efficient!

In addition to the already proven EC fan motors, the use of which makes the system both quieter and more sustainable, the combined new development of the VisionXP+ also includes reduced N2 consumption thanks to a new chamber design as well as a newly developed cooling zone and several software analysis tools.



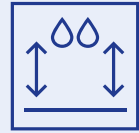
### Convection and vapour phase

Flexible options for your manufacturing



The Vision TripleX has been used to develop a soldering system that is unique in the world. It's based on the reflow convection soldering systems of the Vision series and combines the convection soldering process with the proven vapour phase soldering process of the Condenso series.

Thus, three different processes can be driven in the new Vision TripleX: Reflow convection soldering with and without vacuum, and vapour phase soldering using Galden®. This offers customers both flexible production options, and also shorter cycle times and thus higher throughput, thanks to an integrated dual lane.



## Efficient vapour phase soldering

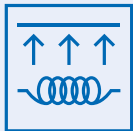
Highest process reliability with a small footprint

During the design and development of the Condenso smart systems, the main focus was placed on the process chamber – with a priority on the highest process reliability with a continued small footprint.

The new chamber design with a vertically opening and closing chamber ensures optimum hermetic sealing and thus reliable and reproducible results. The modified opening mechanism improves the reliability and durability of the system many times over.



The CondensoXS smart enables reliable and reproducible results.



## Contact soldering with or without vacuum

Perfect for diverse applications

The Nexus vacuum soldering system is ideal for pore-free and flux-free soldering at up to 450 °C with a variety of process gases. The wet-chemical activation with formic acid is available as an option. It is possible to use lead-free or lead-containing preforms and pastes.

Contact soldering is used in advanced packaging and power electronics. The optional vacuum function helps, among other things, to minimise oxidation on the components and at the connections themselves.



The Nexus enables void-free soldering, thanks to the vacuum option.



**RDS UV**

## Compact dryer for UV materials



Declining cycle times during the coating process today require faster hardening times, which can be optimally implemented with the help of UV drying systems. Rehm Thermal Systems is responding to this trend by developing the new RDS UV, a compact dryer, especially for hardening UV coatings and UV adhesives.

UV coatings are solvent-free, and therefore particularly easy to process and environmentally friendly. They are increasingly used as corrosion protection for electronic components in the automotive industry. They are also used in the cosmetics and household appliance industries, and also for musical instruments.



The RDS UV: A compact dryer, especially for hardening UV materials

**ProtectoXP/XC**

## Reliable protective coating for sensitive assemblies



Protecto protects sensitive electronic assemblies from damage by corrosion or other environmental influences such as humidity, chemicals or dust. The core is its coating management in conjunction with nozzle technology. The highly flexible system structure lets you operate two processes with the ProtectoXC – or up to four with the ProtectoXP.

New: The Protecto systems are now equipped with the innovative ViCON system software. The main feature of ViCON Protecto is the option of importing ECAD data and image files directly and optimising ECAD data for the coating process by cutting.



Assemblies can be protected safely and reliably with the Protecto systems.



# RELIABLE IDENTIFICATION THANKS TO SWISS QUALITY

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elfab produces high-quality electronics for different sectors

A person's fingerprint is totally unique. It has been indispensable as an identification option for many decades. Yet the reliability of fingerprint scanners is increasingly being called into question as concerns about falsified fingerprints grow. Technology is forging ahead all the same, however, and a 3D fingerprint scanner that can scan a finger without touching it is now on the market. Such a device is produced by the Swiss company elfab, for one of its customers, using a convection soldering system from Rehm Thermal Systems.





Whether luxury hotels, authorities, airlines or the International Space Station (ISS): The Swiss company elfab from Mellingen in the Aargau produces high-quality electronic components for very different customers that make greatly varied end products – but they all have one thing in common: They satisfy the highest requirements for quality, reliability and safety – for instance, a 3D fingerprint scanner manufactured by elfab on behalf of a Swiss company. With its three cameras, the 3D scanner is regarded as a highly accurate identification system that is very hard to outsmart. The integrated cameras scan the finger, without the finger having to be pressed against a scanner or similar device. The scan technology in the 3D scanner functions even if the hand is concealed inside a glove.

The 3D scanner manufactured by elfab – around 1,000 of them a year – is used wherever special access controls are desired or required or where people need to be identified clearly and without doubt; for example, in government offices, airlines, and even in luxury hotels in the United Arab Emirates. “Even the Oman Ministry of Education has paid us a visit and is interested in this scanner” states Erich Meier, Managing Director of elfab and son of the company’s founder. The 3D scanner is really popular among end customers: Forgery-proof and reliable identification is paramount, and even the housing almost tamper-proof, thanks to elaborate protection measures. Elfab is responsible for manufacturing the entire device.

#### **High-quality electronics manufacturing for more than 40 years**

Founded in 1976 by Heidi and Max Meier at another location, elfab currently employs around 100 staff in administration and production. Elfab began life as a manufacturer of soldering machines, but soon devoted itself to electronics manufacturing. 1987 was a dramatic year in the company’s history. The company, which employed just under 25 staff at the time, burnt down. Shortly afterwards, in 1991/1992, elfab moved to its new and current company location in Mellingen. At the beginning of the 1990s, the foundations were laid for SMT, and the first machines were purchased in 1993/1994. Soon afterwards, in 1996, Erich Meier, son of the company’s founder, joined the company and continues to shape its destiny to the present day.

#### **Flexibility as a hallmark**

Right from the start, elfab set out to react swiftly and flexibly to opportunities and challenges and has since made these two features a hallmark of the company – without sacrificing the subsequent quality and reliability of the components to be manufactured. “This makes us stand out from our competitors,” Erich Meier explains. “We produce flexibly and we do it quickly, which allows us to work with customers that predominantly need smaller batch sizes.” Small batch sizes are not usually of much interest to the large competitors. “And yet small batch sizes often entail something quite unique, not a mass-produced product,” declares Meier.

The company's enormous flexibility can also be seen in a few figures. Each year, elfab orders around 500 templates, which are required to assemble the circuit boards. This means that over a year at least one new product is processed each day. Each year, elfab makes around 5,000 deliveries to about 180 different customers. Most of these are in Switzerland, but many are in Germany, Italy or Great Britain. Around 30,000 different articles are in stock. Elfab usually makes only purchases related to projects, however. "Our buyers all have their own permanent customer base that they serve," stresses Meier.

#### From the ISS, through the air and around the world

There are some products that elfab simply does not have. As a service provider, the Swiss company produces exclusively for customers without engaging in development and research itself. Elfab is supported here by its affiliate comtac AG, which offers development and engineering services. The end products produced at elfab originate from very different sectors: from measuring and safety control technology through to telecommunications and the machinery industry.

A showcase project from elfab: The High Energy Physics in Zurich needed electronics for a particle measurement of natural antimatter on the ISS, which had to be especially stable and reliably soldered – and the date for the space shuttle's departure was already fixed. "This was an enormous challenge. But we were able to supply the customer with the electronics within the shortest time," reflects Antonio Rizzo, Production Manager at elfab. Elfab's customers also come from the area of water and air: Elfab has consequently

supplied electronics for the fastest sailing boat in the world – the trimaran "Hydroptère" – and electronics for the solar aircraft "Solar Impulse", which managed to fly round the world powered solely by the sun.

#### Contact established via distributor

The collaboration between elfab and Rehm Thermal Systems started at the SMTconnect in Nuremberg, one of the leading trade fairs for electronics manufacturing. Neutec electronic ag has been the Swiss distributor for Rehm Thermal Systems for many years, ensuring not only sales in Switzerland, but also dealing with Rehm's customers when service is needed. "Rehm was already well-known to us before the SMTconnect. Neutec and its Managing Director Gianni Affinito then convinced us at the trade fair in Nuremberg that Rehm Thermal Systems had just the right system for what we needed and wanted. The representatives demonstrated the convection soldering system VisionXC to us at the trade fair – and its innovative technology totally won us over," declares Meier.

The advantages of the VisionXC from Rehm convinced elfab to opt for this convection soldering system. Thanks to its compact size, it is above all suitable for smaller and medium batch sizes, which makes it ideally suitable for application at elfab. "It was important to us to have a system that helps us to remain flexible," says Meier. "With the VisionXC, this is a dream come true." The Swiss company gained even more flexibility for the manufacturing process with a meshed conveyor, which is integrated in the VisionXC. This allows different widths of component to be soldered quickly and easily, primarily to realise small batch sizes.



**elfab ag**  
Elektronik-Fabrikation

**neutec**  
electronic ag

The solar airplane "Solar Impulse" contains electronics from elfab.



The 3D fingerprint can scan fingers without touching them.

Most of the manufacturing at elfab is based on the principle of standalone production. An area covering around 2,500 square metres contains five production islands and one in-line SMT line. Four of the production islands use VisionXC. Through this convection soldering system pass 90 percent of the manufactured product groups.

#### Impressive soldering results from the use of nitrogen

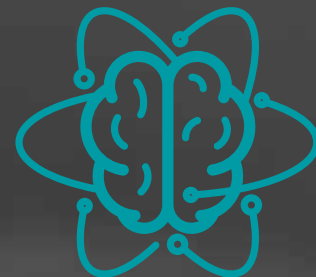
The soldering results are much better with the new soldering system – thanks as well to the nitrogen-soldering option. “We’re on the safe side there. The VisionXC provides us with consistent quality and tremendous process reliability, which is something we expect,” continues Erich Meier. When procuring the new reflow soldering system, elfab regarded it as particularly important to be able to solder with nitrogen. “Soldering using nitrogen has so far impressed us more than we thought at first,” states Rizzo. The Swiss company can now rest assured it made the right choice, as the nitrogen option was integrated in the system right from the start. The VisionXC is also impressive on account of its ease of maintenance. This conversely leads to shorter downtimes. The operability of the software is also very user-friendly: “Retraining was no real obstacle. Our operator at the VisionXC became familiar with the system very quickly and so was able to integrate it rapidly in the production workflows. Another thing about the VisionXC that impressed elfab is its bandwidth of up to 600 mm: “The competitors were left far behind here,” sums up Rizzo. The reflow system has been in use at elfab since November 2018. “Until now neutec had to intervene only once in the form of a service,” says Meier. “But the VisionXC comes as a sophisticated system, and Rehm is a strong partner.”



1. With the convection soldering system from Rehm, elfab can optimally fulfil its claims to flexible and rapid production, even for small batch sizes.
2. The VisionXC is ideally suited to elfab's requirements thanks to its compact size and the nitrogen-soldering option.
3. from left: Gianni Affinito (neutec electronic ag), Erich Meier, Antonio Rizzo (elfab) plus Michael Hanke from Rehm Thermal Systems.



# INVESTIGATIONS ON PORE FORMATION



... in lead-free solder joints and their influence on reliability under alternating loads



**The dissertation of Dr.-Ing. Paul Wild deals with void formation and the influence of voids on the reliability of SMD solder joints on MID and FR.4 substrates, as well as MID bump soldering on FR4.**

In the first step of this thesis, experimental investigations of void formation in the solder deposits, SMD and MID bumping solder joints were carried out. The results obtained of solder deposits from SAC305 show that void formation significantly depends on the nature of the surface, rather than on the roughness of the surfaces. A model was derived from analysis of the void content and the geometry of CR0805, MLF20 and switch solder joints after convection soldering. This model describes the dependence of the void content on the aspect ratio of the standoff height to the standoff area. Thereafter, the void content, especially in the solder joints with a large area, can be reduced by increasing the standoff height. In the next step, the influence of SMD

alignment on void formation during the soldering process was investigated. The results of these investigations show that, for CR0805 solder joints, the vertical alignment of the package reveals a significantly lower void level than in the case of horizontal alignment. For the MLF20 solder joints, no effect of the component alignment on the void content could be determined.

Different void contents in CR0805, MLF20, SOIC08 and switch solder joints were generated by using convection, condensation and vacuum condensation soldering. The measurement results for CR0805 solder joints reveal that Vectra and Vestamid can be assumed to have a void formation comparable to FR4. The average void content of the CR0805, MLF20 and switch solder joints on all substrate types and for all soldering processes, ranges from 0% to a maximum of 15%. An accelerated thermal cycling test of these components according to JESD22-A104D with

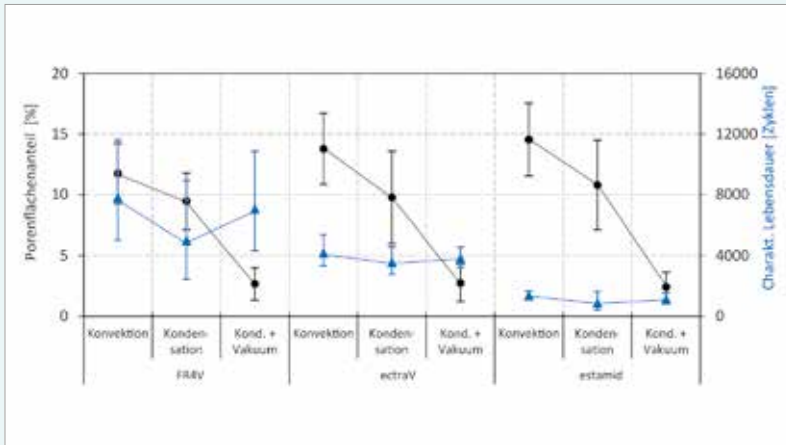


Fig.1: Comparison of the characteristic lifetime with the 95 % confidence range and the pore area proportions for CR0805 solder joints.

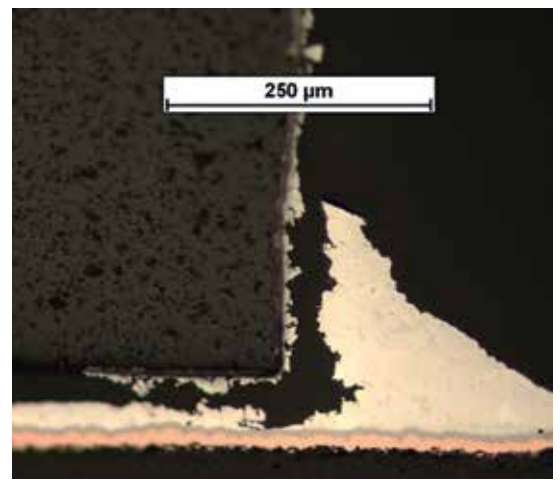
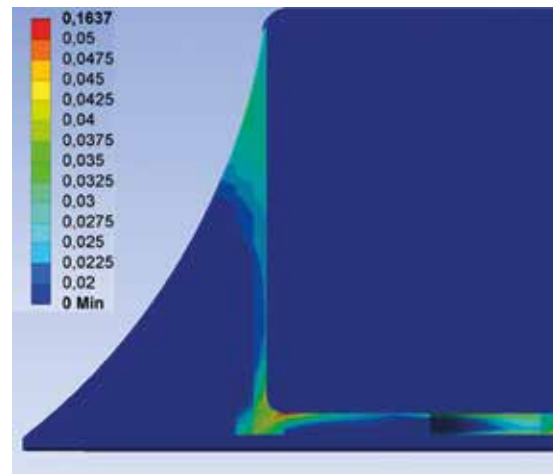


Fig.3: Comparison of the simulated crack course on the basis of the accumulated creep strain with the real crack course of a CR0805 solder joint.

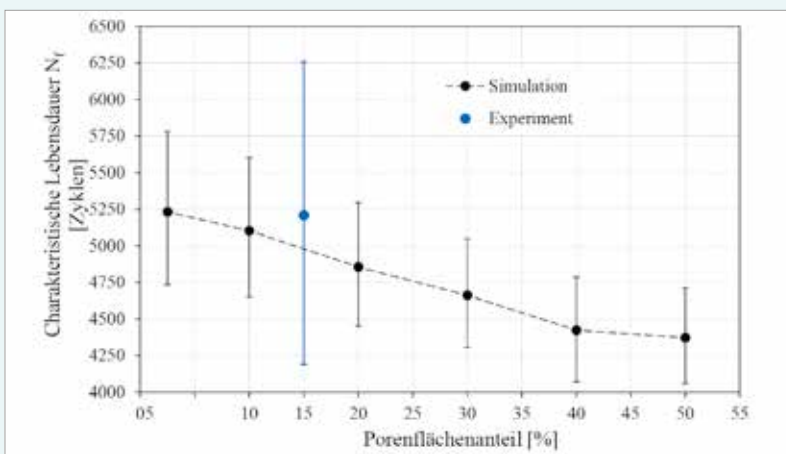


Fig.2: Comparison of the characteristic lifetime from the experiment and the probabilistic model as a function of the pore content.

–45°C/+125°C holding temperature demonstrates no significant effect of the averaged void content of <15% on the solder joints' characteristic lifetime.

In order to be able to verify the detectable degree of void content in CR0805 solder joints, FEM simulations were performed based on experimental investigations. In the course of the development of FEM model, two modelling approaches were investigated for modelling of the solder shape considering the void content: firstly, modelling with coupled parameters, used in order to maintain a constant standoff volume (Model 1); and secondly, modelling with a random combination of the parameters (Model 2). When modelling under the idealized assumption (Model 1) that the volume of voids can be added to the solder alloy volume, voids can increase the reliability of the solder joints. With the Model 2 approach and an evaluation of the accumulated creep strain in the standoff volume,

the conditions and trends found in the experiment could be qualitatively well reproduced. A model extended to 50% void content demonstrates a trend towards lower reliability of the solder joints with increasing void content. However, this trend is only significant for void fractions  $\geq 40\%$ , accounting for the confidence intervals.

In the case of MID on FR4 assemblies, solder joints with an average void content of between 0% and 15.3% were produced by applying various soldering techniques and bump geometry: standard, blind holes and Via. It was observable that the change in the geometry of the contact bumps can reduce void formation both in the standoff and in the meniscus of the solder joints. The contact bump variant Via already allowed outgassing of the volatile components through the integrated output duct when using convection soldering. The results of the accelerated temperature-cycling test on these assemblies from –45°C to +125°C shows

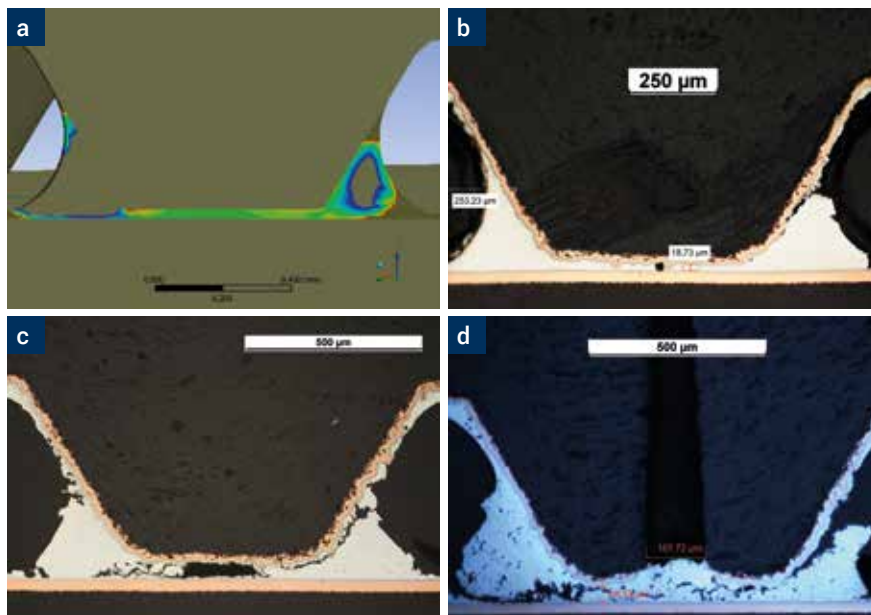


Fig.4: (a) Comparison of the simulated crack course of the accumulated creep strain with the real crack course in the cross section of the bump variant standard (b), blind hole (c) and via (d)



Dr.-Ing. Paul Wild

Paul Wild studied aerospace engineering at the University of Stuttgart. Until late 2014 he was a research associate at the Hahn Schickard Institute for Microassembly Technology (HSG-IMAT), Stuttgart. His specialisation was the reliability analysis of mechatronic systems, based in particular on MID technology.

Since February 2019 he has been head of the research and development division of Rehm Thermal Systems. Areas of specialisation have included the development and enhancement of thermal systems and technological cooperation with institutes and businesses. He has held seminars and training events, particularly in relation to convection soldering. In 2018 he received his doctorate from the Hahn Schickard Institute on the subject of the reliability and life-cycle modelling of soldered joints.

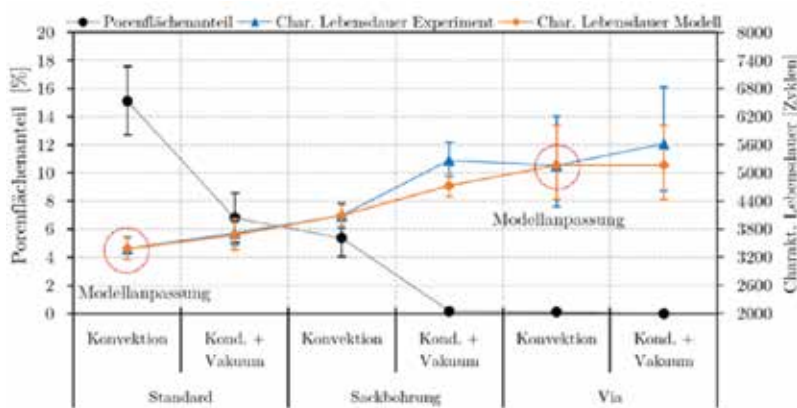


Fig.5: Comparison of the probabilistic and experimentally determined characteristic lifetime for the bump variants standard, blind hole and via for convection and condensation soldering with vacuum.

a significant correlation between the void content and the characteristic lifetime for the blind holes variant after convection and condensation soldering with vacuum.

As part of a sensitivity analysis to develop a probabilistic model for MID on FR4 assemblies, three significant parameters were determined from 12 geometry and material parameters. The following DoE proves that the voids in the meniscus area have a great influence on the characteristic lifetime, as the highest degree of stress and crack initiation occurs in the meniscus area. A void content of about 6% in the meniscus already showed a significant effect on the characteristic lifetime. The probabilistic lifetime modelling can reproduce the experimentally proven influence of the voids on the reliability of bump solder joints very well.

In this work, systematic and extensive investigations significantly improved understanding of void formation and its effect on reliability. The results show that void formation can be controlled by material-, process- and geometry-specific factors on both FR4 and MID substrates. From the combination of experimental and numerical results, it follows that not only a marginal void content but also the scattering of material and geometry parameters are responsible for a significant impact on solder joints' reliability.

# FOUNDATIONS LAID FOR THE FUTURE

Rehm expands its Blaubeuren site – new administrative and development building under construction



**An ongoing healthy order sheet and positive future prospects have made it possible for Rehm Thermal Systems to further expand its headquarters and invest in a new building. This will provide more space for both employees and innovation, and so form the ideal basis for continued growth. Completion and inauguration of the new building are planned to take place during 2020, the company's anniversary year.**

The new administrative and development centre, which will be located right next to the existing buildings, will be spread over four storeys and be roughly as tall as the existing office building. It will provide more than 1500 square metres of office space plus a development centre. And this new space is urgently needed: at present a total of 360 people are

employed at the company's headquarters at Blaubeuren-Seisen, thanks to a good order book together with positive future prospects and a growth trend.

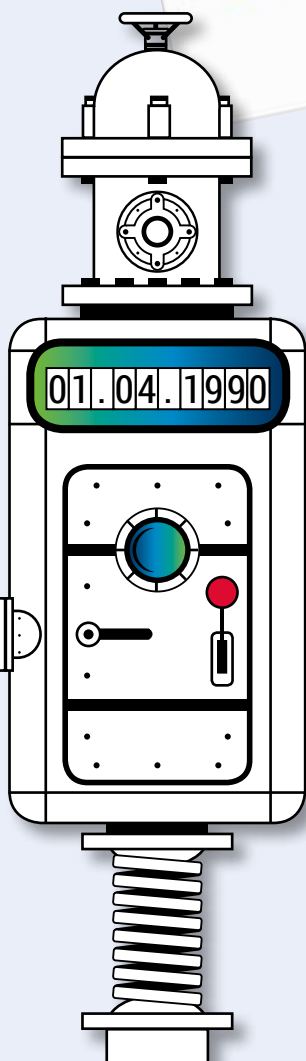
Construction of the new building began in the middle of this year, and the shell is already erected. Over the winter months the building will be brought to completion both externally and internally. The move by employees into the new building, along with its inauguration, are planned for next year, when the company celebrates its 30th anniversary. With the addition of the 1500 square metres of new space, the floor area of the Rehm Group headquarters will increase to almost 15,000 square metres in total. The last expansion took place in 2012-2103, when the Technology Centre and other facilities were added.



# IT'S OUR ANNIVERSARY!

## 30 YEARS OF REHM

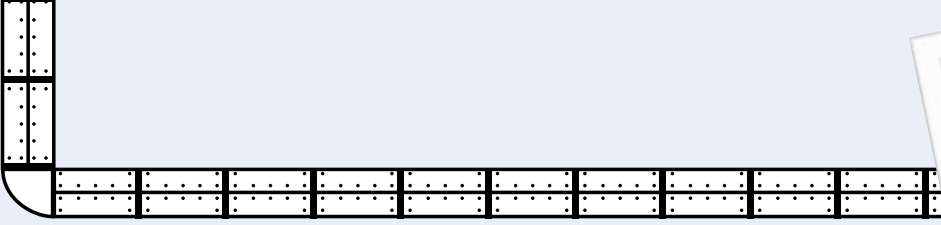
Take a look back with us at the beginnings of our company and start the future together with us



1 April 1990: An innovative idea, welding equipment and 45 m<sup>2</sup> of production space – when CEO Johannes Rehm looks back on the beginnings of his company, he is enthusiastic about the way the company has developed since then. Almost 30 years ago, he and Wolfgang Zeifang, the current technical operations manager, were the first to take the step into self-employment, and founded Rehm Anlagenbau, now called Rehm Thermal Systems.

At the beginning of the 1990s, reflow soldering technology was still in its infancy. The winning concept of Managing Director Johannes Rehm gave the industry a decisive boost in 1990. He designed small reflow soldering systems which make especially stable soldering processes possible with easily accessible, openable and gas-tight process chambers. This innovation quickly aroused the interest of some renowned companies; the young company founder was able to quickly benefit from profitable co-operations. Rehm has been on an expansion course ever since.





The company's developments have always been geared to technological progress, and the company always has its finger on the pulse of the times, responding to customer requirements and market developments.

Advancing globalisation has led to worldwide expansions of sales activities and the establishment of another production facility in Dongguan, China. In addition to Rehm Thermal Systems, the Rehm Group also includes the subsidiaries Rehm BlechTec, which specialises in processing stainless steel, aluminium and steel plate, and H+R Personaldienste.

We're continuously expanding our product portfolio and workforce: Today, more than 600 creative minds worldwide are working for Rehm on the latest innovations. Sustainable drive options, resource efficiency, the continuous miniaturisation of components and the increasing use of electronics in almost all areas of life open the way to new, interesting business areas. For example, Rehm is investing in the development of solar cell manufacturing systems, working on projects for the production of battery packs, and taking care of the protective coats of sensitive electronic assemblies. The focus is also on innovative functional test systems or new special solutions such as the reel-to-reel process for the production of LEDs and wearables.

The new product areas ensure further growth in all directions – also in terms of space: While the first soldering system was manufactured in a tiny space in 1990, today, our headquarters in Blaubeuren feature a company complex with generous production and development areas, plus offices and social rooms. In our existing in-house Technology Centre customers can test systems, get to know the technology behind them and carry out extensive soldering tests. Our application specialists are available for this purpose.

Active co-operation and dialogue with customers and partners, participation in research projects, co-operation with universities and institutes, and the principle of jointly developing technologically sophisticated products at the highest quality standards are today's trademark of the Rehm brand – and our incentive day after day.

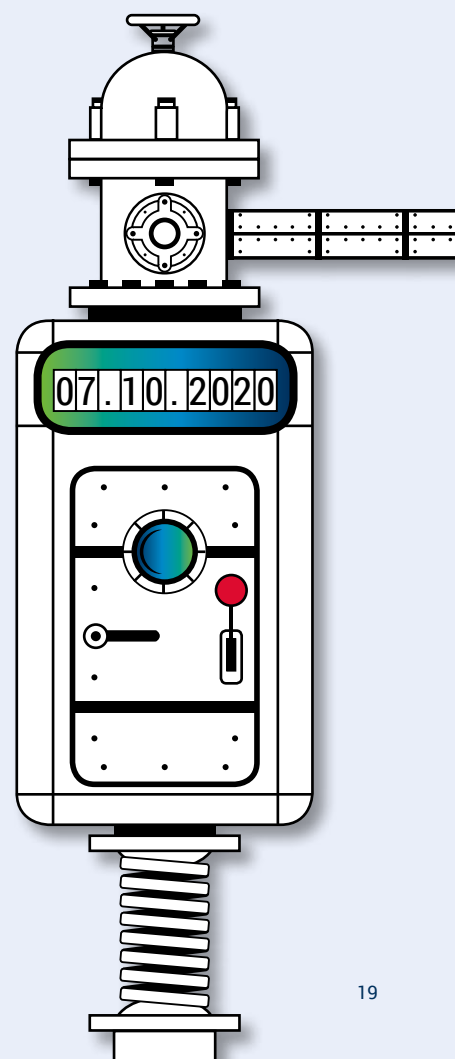
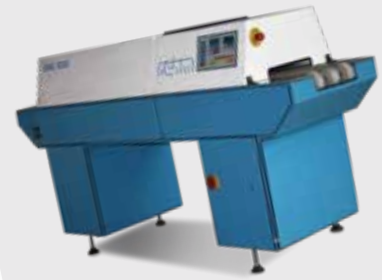
## 30 years of Rehm Thermal Systems

**When:** 7 to 9 October 2020

**Where:** Leinenstraße 7, 89143 Blaubeuren, Germany

It's our anniversary – come and celebrate with us!

All invitations including further information will be available shortly.



# FLEXIBLE COOLING OPTIONS FOR THE BEST SOLDERING RESULTS



Rehm offers different types of cooling for the VisionXP+ convection soldering system



The VisionXP+ convection soldering system from Rehm Thermal Systems.

**In the convection soldering system VisionXP+ from Rehm Thermal Systems, the soldering process does not end with the melting of the solder. A stable and reliable cooling process is particularly important for an optimal soldering result. This can be flexibly designed in this kind of system. In addition to standard cooling with up to four cooling modules, customers can also choose an extended cooling section ("Power Cooling Unit"), underside cooling or an energy-saving cooling variant. With Rehm CoolFlow, Rehm also offers an innovative cooling system using liquid nitrogen.**

The standard cooling system installed in all VisionX convection soldering systems consists of up to four individual cooling modules. These allow a precisely controlled cooling process as well as individual adjustment of the cooling gradient. In the cooling process, the air produced by the soldering process, which is very warm, is first sucked into the lower part of the system. It is then cleaned over several cooling modules and cooled to the desired temperature (usually below 20°C). The air is then blown back from above onto the assembly, which results in the cooling. The "closed loop principle" guarantees a closed atmosphere cycle. The standard cooling section



consists of active and passive cooling modules. The active cooling modules are supplied with water via a heat exchanger. The cooling filters can be easily cleaned and serviced at the rear of the system: the process chamber does not need to be opened to do this.

#### **Gentle cooling with Power Cooling Unit**

For gentle cooling, especially for complex assemblies, an extended cooling section ("Power Cooling Unit") can be connected to the VisionXP+. This can be implemented as an extension to standard cooling zones under a nitrogen atmosphere or as a separate, downstream module in an air atmosphere for a higher cooling performance in sensitive materials. Advantage of the air-cooled variant: while nitrogen is needed in the process section of the convection unit to prevent oxidation, the extended cooling section no longer needs to be flooded with nitrogen, resulting in nitrogen savings.

#### **Underside cooling for uniform cooling from above and below**

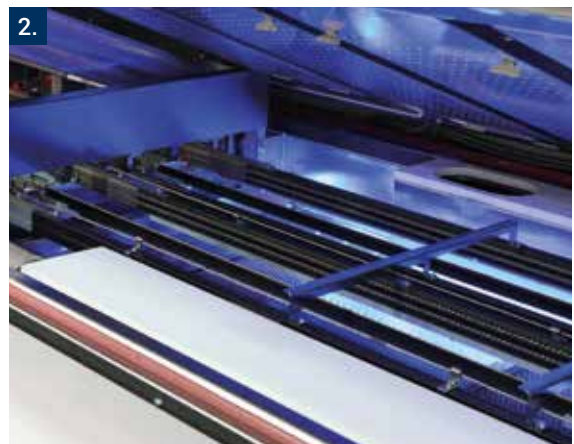
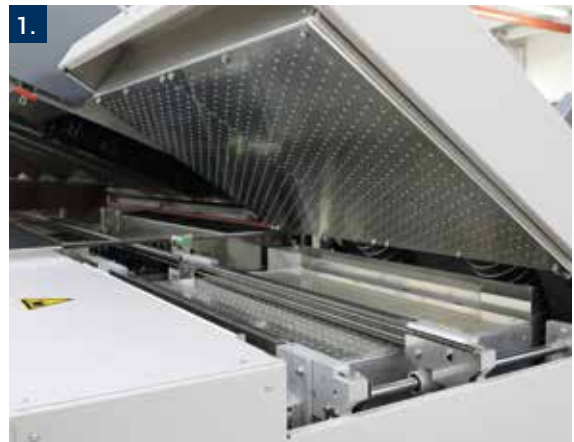
For particularly solid, large assemblies or boards with product carriers, the VisionXP+ can also be equipped with underside cooling. The actual cooling process is identical to that of the standard cooling section, but the extracted, cleaned and cooled air flows not only from above onto the module, but also from below.

#### **Gradual cooling for energy saving**

Rehm also offers an energy-saving cooling variant for the VisionXP+ convection soldering system, saving you >1kW: the air is extracted at several points rather than just one. This results in gradual cooling and offers significant energy saving potential.

#### **Rehm CoolFlow: Reduced energy usage with liquid nitrogen**

Along with their partner Air Liquide, Rehm has developed a cooling system ("Rehm CoolFlow"), which deploys the nitrogen used for inertia even more efficiently. The  $-196^{\circ}\text{C}$  liquid nitrogen releases its energy in the cooling section, then evaporates and can then be used in its gaseous state for inerting the process atmosphere. The cooling water, which previously required high energy use for cooling, including cooling unit and refrigerant, is completely eliminated.



1. Power Cooling Unit  
2. Underside cooling  
3. Rehm CoolFlow







# SUCCESSFUL TRADE FAIR PRESENCE AT SMTCONNECT

New innovations and equipment presented at SMTconnect in Nuremberg



**With over 400 exhibitors, SMTconnect (formerly SMT Hybrid Packaging) counts as one of the largest and most important trade events in the electronics industry. Once again it offered space for over 13,000 visitors for innovations, technological know-how, specialist knowledge exchange and networking. Among the exhibitors was Rehm Thermal Systems.**

At our stand in Hall 4A we presented the latest systems engineering related to convection and condensation soldering, coating, curing and electronic module testing. For us the Nuremberg fair was entirely a success, and the conclusion remains positive even with hindsight. "We can look back on a very successful trade fair presence at SMTconnect. With our new developments in systems and process engineering we struck a nerve among the trade visitors to the fair. Interest in our systems and solutions was high, which pleases us. Even our software solutions for direct global networking of machines within a production line provoked great interest", says Michael Hanke, chief sales officer for Rehm Thermal Systems.

Of particular interest for the visitors to our stand were the two coating systems on demonstration, ProtectoXP and ProtectoXC, which both offer optimal and dependable results

in the dispensing and conformal coating fields. Rehm also presented the ProtectoXC with a camera solution for the first time, an approach that enables still more accurate coating outcomes to be obtained. Further highlights of the fair included the VisionXP+ Vac convection soldering system and the systems involving vapour phase soldering and contact soldering.

In the software field we presented the integration of the Hermes and CFX standards into Rehm systems. The networking of systems is growing in importance in the era of Industry 4.0 and smart factories. The interest shown by the industry visitors in such smart solutions was correspondingly high.

## Focus on mutual exchange

Many visitors to the fair also used the occasion to approach employees from Rehm's research and development, applications, software and sales departments for direct advice or to discuss the latest developments in electronics manufacturing.



## New publication: "Reflow technology: the foundations of reflow soldering"

Following four successful titles, the fifth has now appeared and forms the final part of the Rehm bookshelf. Its subject is "Possibilities and limits of analysis at soldered joints". The authors, together with Dr. Hans Bell, presented the new volume during SMTconnect. Copies of the book can be ordered from [sales@rehm-group.com](mailto:sales@rehm-group.com).



# AROUND THE WORLD

## OUR TRADE FAIR REPRESENTATIONS

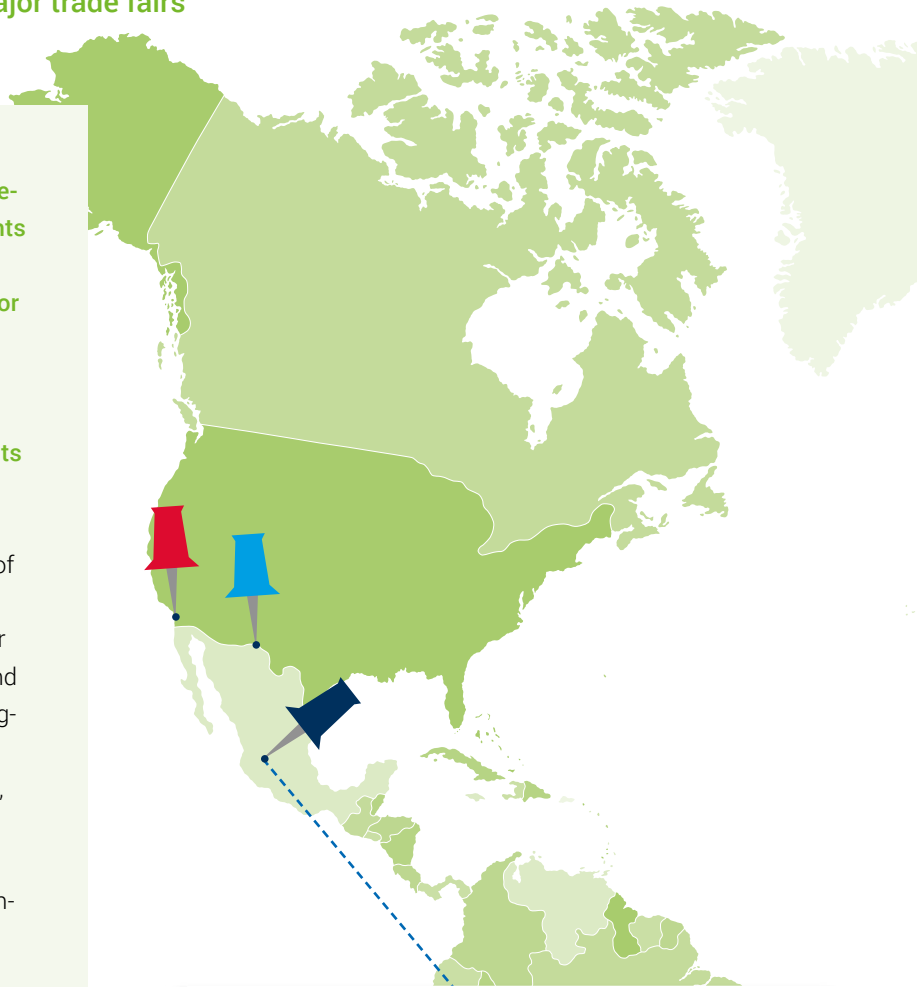
In 2019 we were represented at many major trade fairs

Budapest, China, Nuremberg, Thailand, Seoul: in recent months we appeared at numerous trade events around the world. Proximity to our customers is our highest priority, and for us it forms the basis for long-term cooperation in the manner of a partnership. We are always delighted to meet customers and partners at the fairs and to swap news and information about current trends and developments in the industry.

With productronica in Munich we reached the end of a year full of trade fairs and other events. We were represented on almost every continent, in particular in the fairs in North and Central America, Europe and East Asia. The Nepcon series of trade fairs in Shanghai, Bangkok, Shenzhen and Hanoi have grown in recent years to the most important industry events, though the events in Europe and the Americas are also very important to us; examples of these were Electrosub in Budapest, Amper in Brno and SMTconnect in Nuremberg (on the latter see the previous two-page spread).

For our teams on the ground, all these fairs have one thing in common: contact with our partners and customers, which always comes first. We value these opportunities for exchanging ideas and experience highly and are already looking forward to the opportunity to welcome you to our stand at one of the forthcoming trade fairs.

**See page 35 for where we will be appearing in 2020.**

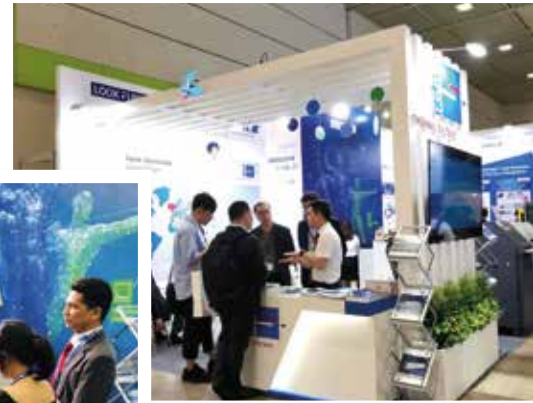


Reflow seminar Mexico

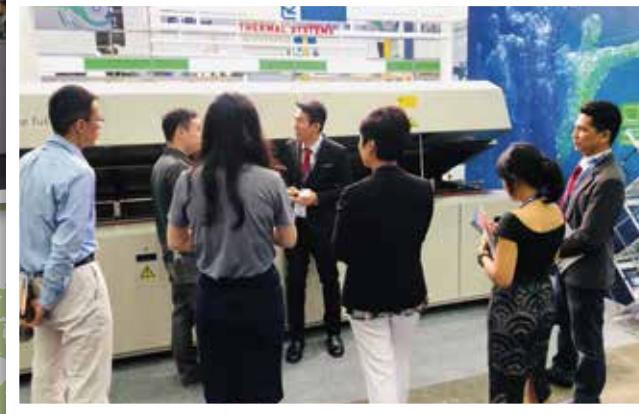
SMTconnect Nuremberg



Nepcon Korea



Nepcon Thailand



ELECTROsub Budapest



Productronica China

# GOOD PROSPECTS FOR THE FUTURE

## The optimal foundation for the professional future of our apprentices

The new training year has begun, bringing with it a new stage of life for nine apprentices and two dual-curriculum students in our team. We are now supporting more than 25 apprentices in the commercial and technical fields. A good level of camaraderie, a manner of co-operation based on trust and the opportunity to gain permanent employment all offer Rehm trainees excellent prospects for their professional future. One of the most popular events for our apprentices and dual-curriculum students, and now well established, is the trainees' excursion. On this day the apprentices and their trainers have the chance to visit some of Rehm's customers.



"We're delighted and also very proud to have filled all our training positions", says Rehm's HR manager Joachim Erhard. This is not necessarily to be expected: in fact it is becoming more and more difficult to attract motivated young people to take up an apprenticeship. Yet with Rehm, trainees can work in an industry that continues to offer bright future prospects while still enjoying many other benefits. During their apprenticeship the trainees not only learn the ins and outs of their future profession; they also learn to take on responsibility, to play an active role in the team and to successfully implement their own first projects.



For prospective mechatronics engineers, for example, a separate area has been created in which they can design and implement their own small systems using a modular mechatronics system. Here they learn about the interaction between sensors, axis systems, controllers and software. Meanwhile the commercial apprentices have the opportunity of experiencing all the commercial departments during their training period, both with Rehm Thermal Systems and at Rehm BlechTec. They also have the opportunity of improving their linguistic skills and thus preparing themselves for entry into a globally active company by spending a brief period abroad in an English-speaking country.

Prospective mechatronics engineers with a system designed and implemented by them (top) and the warehouse training station (bottom).





Once each training year, the apprentices and dual-curriculum students participate in a trainees' excursion. In most cases this involves a visit to a Rehm Thermal Systems customer.

Co-operation among the apprentices is also encouraged. For many years now, a joint trainee excursion has been organised in the first weeks of the new training year. In most cases this involves a visit to a Rehm Thermal Systems customer. "It's important that our apprentices feel at home with us right from the start", says Natalie Werner, the personnel officer responsible for traineeships at Rehm. With the new apprentices and dual-curriculum students, Rehm employs a total of more than 25 trainees – a significant number within the 360 employees based at the company headquarters in Blaubeuren-Seissen. Thorough training and support for committed young people have been firmly anchored in the corporate philosophy of Rehm Thermal Systems for many years. This is also reflected in the fact that apprentices who have successfully completed their training have the opportunity of a permanent position. "We take on our apprentices in almost 100 per cent of cases – on a permanent basis. This is our contribution towards the best possible start for their careers", says Joachim Erhard.

The application season for apprenticeship year 2020 has now begun. Young people interested in one of the seven apprenticeships and two dual-curriculum places are invited to visit the Rehm Group website [www.rehm-group.com](http://www.rehm-group.com) for further information.

## The following apprenticeship professions are offered by the Rehm Group

### Rehm Thermal Systems

- › Mechatronics engineer (m/f/d)
- › Warehouse logistics technician (m/f/d)
- › IT specialist specialising in systems integration (m/f/d)
- › IT specialist specialising in applications development (m/f/d)
- › Industrial clerks (m/f/d)
- › DHBW dual-curriculum studies in business administration with industry specialisation (m/f/d)
- › DHBW dual-curriculum studies in engineering, specialising in design and development (m/f/d)

### Rehm BlechTec

- › Metalworker specialising in design technology (m/f/d)
- › Office management clerks (m/f/d)

# SMART SOFTWARE FOR EFFICIENT PROCESSES

With ViCON, Rehm offers the optimal software solution for its systems – ECAD data import possible with ProtectoXP and ProtectoXC

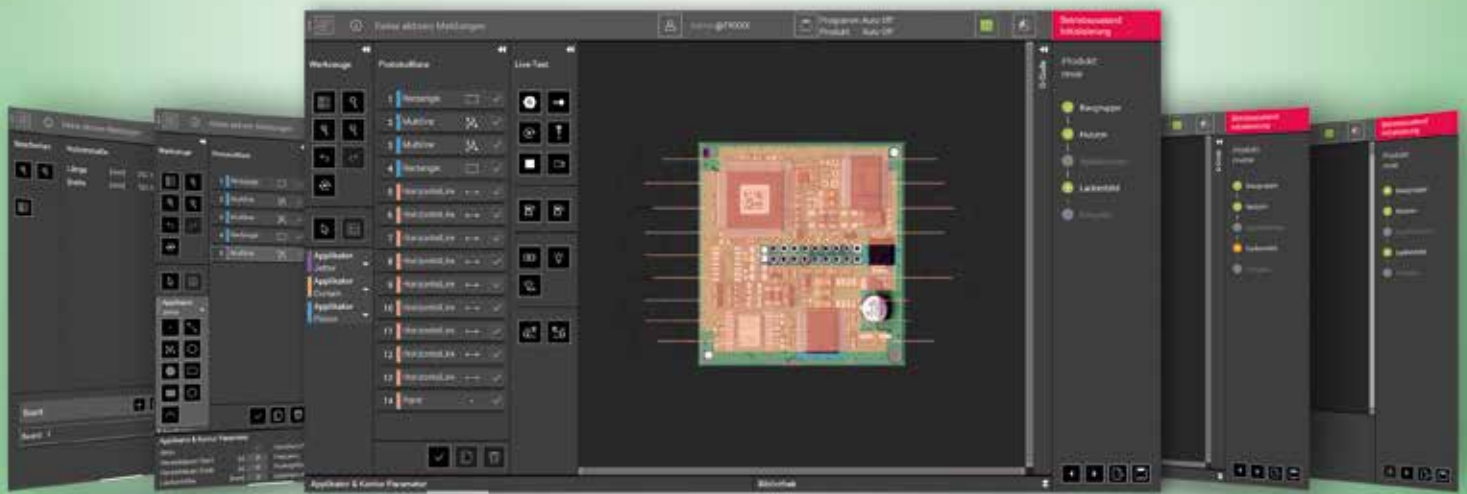
A variety of analysis tools, more productivity, efficiency, flexible working and the highest quality: With ViCON, Rehm Thermal Systems has designed and created software that meets all the requirements of modern, networked, and above all, future-orientated electronics manufacturing. Alongside the use of touch operating elements and gestures, the new organisation of menu options and control

panels, the core feature of ViCON software's development lies in the option of accessing the software from a variety of devices. Following the reflow convection soldering systems of the Vision series, Rehm will also be presenting the ProtectoXP and ProtectoXC dispensing systems with the ViCON system software at productronica.



Intuitive and easy-to-use controls make the ViCON Protecto the ideal software solution.





The ViCON Protecto enables guided coating program creation by using a wizard.

Following the successful introduction of ViCON for Rehm's reflow convection soldering systems, the software has now been specially adapted to the requirements of the ProtectoXP and ProtectoXC dispensing systems. The main feature of ViCON Protecto is the option of importing ECAD data and image files directly and optimising ECAD data for the coating process by cutting. The integrated camera also enables stitching: A complete image of the printed circuit board can be created and further processed from several individual images. While the program is being created, the user is supported by a wizard that shows the user all current progress by means of colour-coded pointers, and thus easily facilitates usability.

After selecting an applicator, users can access a coating database via ViCON Protecto that has been filled by the application specialists of Rehm Thermal Systems and contains all the important coatings with their parameters. ViCON Protecto enables programs to be created offline, which can be used simultaneously with the current production process. With the camera integrated into the Protecto coating systems, ViCON software can be used to read both fiducials as well as (data matrix) codes (DMC).

The objective of ViCON Protecto is to configure the system's current operating status clearly. The operator can react quickly and intuitively to status and alarm messages. At the same time, access rights, views and favourites are tailored to each user. The specifications of ViCON Protecto are based on the basic elements of ViCON, which have already performed impressively in the convection soldering systems of the Vision series. Thanks to colour coding, the operator can also easily identify and assign the status of the display from a greater distance. ViCON software is also consistently designed to accommodate multiple languages. The simplicity with which you can switch "on the fly" to the preferred language simplifies worldwide remote access to other Rehm systems and operating in an international environment. Alarm messages can be clearly viewed, interpreted, edited and processed at the top of the screen – the relevance of the alarms is displayed in different colours. To control the system individually, the operator can individually create a favourites bar, that includes relevant and necessary parameters and control elements. These then appear on the main screen and at a definite point on each page.



# INTERVIEW

A conversation with Dr. Hans Bell

**Dr. Hans Bell is retiring in early 2020. We met him for an interview.**

He is considered a luminary in the world of reflow soldering. His seminars and training courses have impressed many customers and the EE lecture series he set up and continues to present in Colònia de Sant Jordi, Spain has progressed in recent years to become one of the most popular technical events in the field. From February 2020 Dr. Hans Bell will step back from active professional activity, but this is unlikely to constitute "retirement" as such. He still has plenty to do.



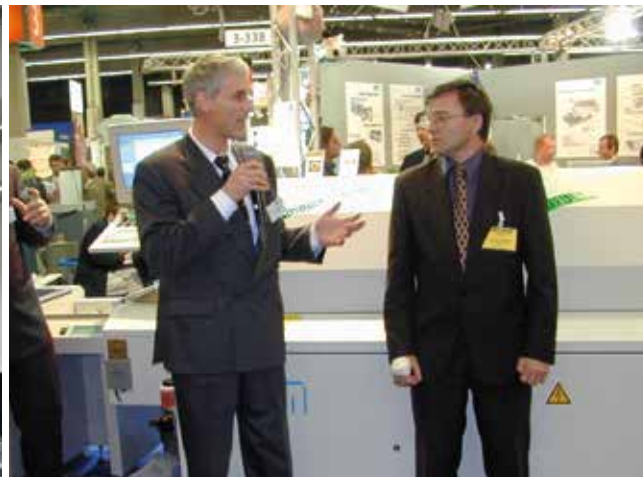
Dr. Hans Bell and his research and development team.

**You have been working for Rehm Thermal Systems for over 20 years now. How did you first come to Rehm? How did you make your initial contact?**

**Dr. Hans Bell:** Johannes Rehm and I met through my previous employer. One of our potential customers was DeTeWe in Kreuzberg, Berlin, and this is how our first contact was made. Ultimately he talked me, a Berliner, into coming to the Swabian Mountains. But I wasn't afraid of catching anything (*laughs*): my mother was Swabian and so this region – and its dialect – are familiar to me. And to this day I have never regretted it.

**Why did you opt for Rehm back then?**

**H.B.:** I was looking for a new challenge, and I wanted ideally to combine that with a creative and multifaceted job. That aside, the position at Rehm offered me an exciting change of perspective. Before that I was always responsible for technological processes, chip assembly, wire bonding, soldering and system qualification. But at Rehm it was possible for me to 'change sides' and devote myself completely to research and development for production machines and everything related to this.



Dr. Hans Bell at SMT 2001 (top) and at the 2001 EE lecture series (bottom) and in conversation with Johannes Rehm (right).

**In your view, what factors are significant for Rehm's success?**

**H.B.:** Definitely the creativity that can be seen reflected in the company's innovative systems and machines. Another significant factor is Johannes Rehm himself, who had the courage from the outset to risk something and to put his own ideas into practice – even when they met with resistance. What he did amazes me – making things simple and not having to ask too many awkward questions.

**Are there any particular moments or events that have remained in your memory?**

**H.B.:** There are many. Surely, first, the many customers and colleagues with whom I was privileged to spend some truly wonderful working years. But I can recall one particularly vivid memory. This was when Johannes Rehm and Ernst Hohnerlein [then CEO of Intertec, ed.] asked me whether I would like to take on the designing of the EE lecture series. I had been a speaker at the first EE series, and the question came as a real surprise. It was a real honour for me, as it indicated that they valued my previous work in the technology industry highly.

**On the other hand, have you ever made a decision in your professional life that you would have preferred in retrospect to have made differently?**

**H.B.:** I don't think so. Things have always been fun for me and I have an upbeat nature. When I come across a grumpy colleague, I don't get worked up about it; instead, I try to inspire him (*laughs*). The one thing that is sometimes really exhausting is: the endless commuting. The amount of time spent at stations and airports. And the waiting in hope at the baggage carousel that my own case will really appear (*grins*).

**Which do you feel stronger, happiness or wistfulness, in regard to your forthcoming retirement?**

**H.B.:** Neither, because, to be honest, I don't think about it much. I am absolutely not the type who installs an app on their phone to count the days until they retire. Life contains many chapters and in my view we should accept each chapter as it comes. At the moment I am still as busy every day as I was at the start of my working life – and it continues to give me much enjoyment, as it always did.





Dr. Hans Bell at Environment Week (left), at the 2017 EE lecture series (top right) and at the temperature profiling seminar at Blaubeuren (bottom right).

### What will you miss the most?

**H.B.:** The answer to this one is clear: the many forms of contact with a wide variety of people. I have always found this highly enriching and I have been very lucky to be able to get to know all these people. And our interactions are not only on work-related subjects; sometimes I also ask them: 'What do you do apart from soldering?'

### What tasks or objectives have you put aside for the future?

**H.B.:** To stay healthy and not to lose my optimism. For somebody with both of these, the world exhibits a wondrous order.

### What will you do in your first week of retirement? Do you have a dream that you now wish to fulfil in retirement?

**H.B.:** In my first week of retirement I'll be busy preparing the 23rd EE lecture series (*laughs*). And this will keep me occupied for the following weeks as well. Otherwise it remains a dream for me to visit the two continents that I have never been to: Africa and Australia. And I look forward to being able to spend plenty of time with my large family, including my six grandchildren.

### What would you wish Rehm for its future?

**H.B.:** That it continues to be creative. And that there are more innovative ideas that enable new products to emerge. Time and time again in business life it has been proven that the companies that thrive are the ones that go on bringing innovations to the market. And I'm certain that this will be the case for Rehm – not least because the whole of the 'Rehm team' is superb.

At this point I would like to thank my colleagues for our inspiring years together, for the dependable but creative collaboration, and for the possibility of working together with you.

Now the Berliner has gone – and you must SOLDER ON alone. Or I could say it in my best Swabian: Dr Berlinr isch dann mol weg – jetzt missad ihr alloi LÖDA.

The interview was conducted by Anna-Lena Kast.



# FINISH LINE IN SIGHT

## RUNNING EVENTS



Teams of runners from the Rehm Group have taken part in the DEE-AOK Company Run, the X-treme Battle and the Einstein Marathon

Some Rehm employees took the opportunity this summer of leaving their working day to participate in some major sports events. It is a major goal of the management at Rehm Thermal Systems to promote the health of its employees, so once again this summer a number of our staff were on the starting line in Rehm shirts at several sports and outdoor events – including at the Neu-Ulm ratiopharm arena, a cross-country event at Heroldstatt and on one occasion right across the city of Ulm.

The starting shot for the summer's sports events took place in early June with the fully sold-out 5th DEE-AOK Companies' Run. Among the 3000 runners to complete the 7-kilometre course were eight participants from the Rehm Group. The course began alongside the Iller towards Ludwigsfeld until the turning point just before Silberwald, before returning along the opposite bank of the Iller Canal and Europastrasse towards the ratiopharm arena. On their return, the participants were cheered by the public.

Then in mid-July, a key event for lovers of running and the outdoors: time for the Heroldstatt X-treme Battle! Over 500 participants, including ten from the Rehm Group, took on a course of 17 kilometres around Heroldstatt, peppered with some 21 obstacles, some of them quite spectacular. The X-treme contestants had to make it through mud, climb wooden walls and under barbed wire, and pass through containers filled with water, among other things.

But the high point for all running enthusiasts of the region was surely the Einstein Marathon at Ulm. Here again a number of Rehm Group employees showed the motivation to take on the various routes, from 5 km and 10 km to half-marathon and full marathon, which began from the Ulmer Messe trade fair site and returned to Ulm through the suburbs of Neu-Ulm. Competitors were enthusiastically greeted by the spectators on the Münsterplatz, where they crossed the finishing line under the tallest church tower in the world. We were particularly delighted to see a Rehm marathon relay on the starting line this year for the first time.



Rehm Group employees took part in various running events of the region during the summer: the DEE-AOK Company Run in Neu-Ulm (top left), the X-treme Battle at Heroldstatt (bottom left, centre) and the Einstein Marathon (right).



# FROM BARBECUE TO TABLE FOOTBALL AND BUNGEE RUN

High spirits at the Rehm Thermal Systems and Rehm BlechTec Summer Festival



Glorious summer weather, a delicious barbecue buffet and a warm and cheerful atmosphere were all part of the summer festival held by the employees of both Rehm Thermal Systems and Rehm BlechTec on a Friday afternoon in late July on the company's premises in Blaubeuren-Seissen. Much fun was had by all, and most were able to keep pleasantly cool.

Beer garden tables set up in the loading yard in front of the company grounds, a cosy lounge area and attractions for testing their strength – this was the summer festival held by Rehm Thermal Systems and Rehm BlechTec employees that left nothing to be desired. And there was even a small gift on top: a drinks bottle decorated in cheerful colours.

Exciting duels in table football plus a bungee run gave the employees plenty of opportunity to compete both with one another and in a duel with the rubber bungee cord. As in previous years, the barbecue buffet was provided by the local Albhof tavern, with something for everyone – delicious summer salads, grilled beef, pork and chicken and fresh salmon cooked over an open fire, plus waffles or ice cream for dessert. A measure of cooling was provided during the warm afternoon by a bar that offered the employees refreshing cocktails and summer drinks. The festival was enjoyed by the employees of both Rehm Thermal Systems and Rehm BlechTec, who made the most of the occasion to chat with their colleagues in a high-spirited summer atmosphere.

# SAVE THE DATE

## SHOWS & EVENTS 2019/2020

**Rehm will be present at the most important electronics industry events**

Whether at a trade fair, technology event, seminar, training event or workshop, take the opportunity to learn about our systems engineering and receive advice from Rehm experts. Further information on events can be found at [www.rehm-group.com](http://www.rehm-group.com).

DATE	EVENT
05.12.2019	<b>Seminar Temperaturprofilierung*</b> , Blaubeuren, Germany
11.12.2019	<b>Seminar Kalt- &amp; Warmfunktionstest*</b> , Blaubeuren, Germany
04.–06.02.2020	<b>IPC APEX EXPO</b> , San Diego, USA
06.–08.02.2020	<b>Bildungsmesse</b> , Ulm, Germany
05.03.2020	<b>EPP InnovationsFORUM</b> , Böblingen, Germany
17.–20.03.2020	<b>AMPER</b> , Brno, Czech Republik
18.–20.03.2020	<b>Productronica Shanghai</b> , China
25.–29.03.2020	<b>EE-Kolleg</b> , Colònia de Sant Jordi, Spain
14.–16.04.2020	<b>electrontech Expo</b> , Moscow, Russia
22.–24.04.2020	<b>NEPCON Shanghai</b> , China
05.–07.05.2020	<b>SMTconnect</b> , Nuremberg, Germany

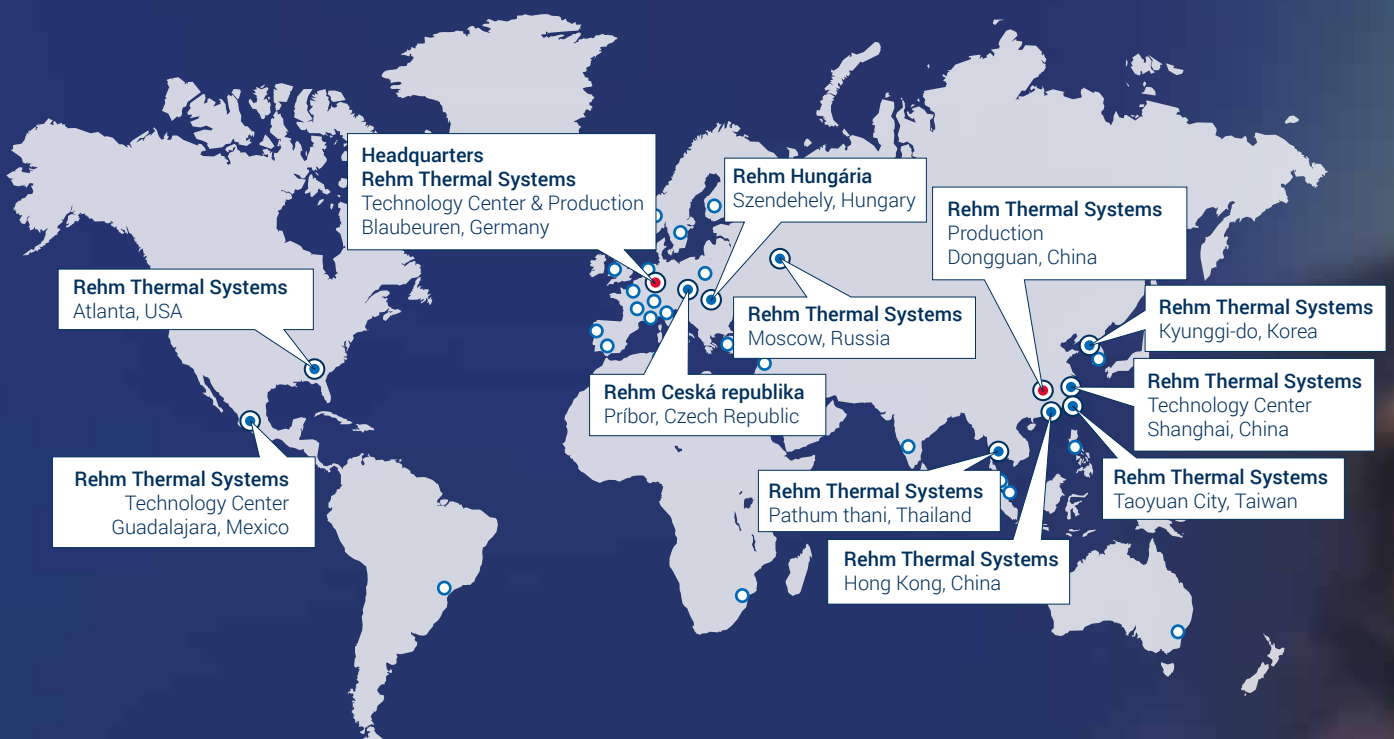
\* Presentation in German language

**We look forward to welcoming you at one of our upcoming events!**

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## Rehm Worldwide

As a leading manufacturer of innovative thermal system solutions we have customers on every continent. With our own locations in Europe, America and Asia as well as 27 agencies in 24 countries we are able to serve the international markets quickly and to offer outstanding on-site service – worldwide and round the clock!

- Location
- Production facility
- Representation

