

THERMAL SYSTEMS

review

The customer magazine, issue 02 | 2023

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Be pART of automation, digitalisation
and transformation

Rehm at the productronica

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VisionXP+ – The next Generation

Convection Soldering even more
energy-efficient

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Awarded

Rehm receives award
as "Employer of the future"

be pART
of connectivity



Equipment for Thermal Solutions

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Condensation Soldering

JBC Convection Soldering

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THERMAL SYSTEMS
8 processes with infinite possibilities!

THERMAL SYSTEMS

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Dear readers,

After our successful Technology Days celebrating our 33rd company anniversary, we are now delighted to experience another industry highlight with you.

"Our theme for this year's trade show at production in Munich is 'Be pART of automation, digitalisation, and transformation.' Learn about the latest developments in resource conservation, automation, and digitalisation, and become a part of the transformation towards a sustainable future.

We make the invisible visible: Experience in an AR showcase the new gas management system of the VisionXP+ and let our team of experts explain how this can lead to energy-efficient and process-secure soldering results for you. Innovative vapour phase soldering with the Condenso



and contact soldering with the Nexus are other focal points, not to forget Conformal Coating and Dispensing with the Protecto series. New features like the 3D height sensor and automatic programming make the coating and dispensing process easier than ever.

Get excited and become part of the community. Our international team, with some new faces, is available on-site to answer all your questions about our product portfolio.

We also warmly invite you to our trade show party on Tuesday, November 14, 2023, starting at 6 PM at our booth A4.335. There, you can conclude the first day of the trade show with cocktails, live music, and delicious food in a cozy atmosphere. I look forward to seeing you there!

Johannes Rehm
General Manager

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VisionXP+ in a new design with optimised features for reduced energy and nitrogen consumption

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AUTOMATION, DIGITALISATION AND TRANSFORMATION

Rehm at the productronica 2023 in Munich, November 14– 17, 2023

smART
automation



The new generation of equipment for energy-optimised soldering



Redesign of the VisionXP+: Numerous optimised features result in reduced power and nitrogen consumption.

An important energy factor of the VisionXP+ series is the EC fan motors that have been integrated for some time. Their use not only makes the system noticeably quieter but also more sustainable. This enables an energetically optimal state and optimal zone separation.

In addition, Rehm has developed ProMetrics, a tool that not only ensures process stability but also allows for efficient profiling with a focus on reducing resource consumption. Another highlight is the new 3-stage Eco-Mode, which allows you to save energy and nitrogen individually based on the idle state of the system. However, it's not just software-based solutions that contribute to energy-efficient soldering processes.

Optimised system technology plays another part: Improved residue management, a new cooling design, optimised gas flow, and the new mechatronic curtain at the system's entrance and exit, which virtually eliminates the escape of nitrogen into the environment, are groundbreaking for sustainable electronics manufacturing. The nitrogen savings when using the mechatronic curtain alone can reach up to 20%.

The new cooling design, with a 30% larger separation area for residues, extends the service life of filters and agglomerators. By separately adjusting each zone through direct control of the EC motors, more flexible cooling gradients are also achieved.



Patented mechatronic curtain, intake suction, ergonomic screen – resource-efficient redesign.

Condenso-Series



Resource-efficient Vapour Phase Soldering

In the world of vacuum soldering, vapour phase soldering systems have been a proven technique for decades to significantly reduce air inclusions in solder joints. From the start, Rehm integrated a closed-loop system for the injected Galden® medium into the Condenso series of vapour phase soldering systems, making it a sustainable solution for the future.

The principle is equally efficient and resource-friendly. After soldering, the vacuum and/or cooling process starts. Simultaneously, the process gas is extracted and cleaned. The extraction creates a vacuum, which also guarantees rapid drying of the solder and the process chamber, minimising losses when ejecting products.

The extracted Galden® is filtered and cleaned of impurities using a granulate. Approximately 99.9% of the medium can be recovered in this way. The cleaned fluid is stored at room temperature and made available for further processes. This eliminates evaporation losses and energy losses. The

hermetic isolation of the process chamber (simultaneously a vacuum chamber) also eliminates “evaporation losses” during soldering. In addition to minimal maintenance, lower operating costs are achieved through reduced medium consumption.

When developing the CondensoXS smart condensation soldering system, the primary focus was on the process chamber, ensuring the highest process security while maintaining a compact footprint. It impresses with a new chamber design and flexibility throughout. The new vertically opening and closing chamber ensures optimal hermetic sealing, ensuring reliable and reproducible results. Flexible cooling options, vacuum, and injection principles also guarantee reliable processes in a semi-automated production environment with medium production volumes.

At our booth, you can see both the CondensoXS smart and the smaller batch solution, CondensoXC, equipped with the intuitive ViCON Condenso system software.

Nexus

Contact soldering for power electronics



The Nexus soldering system guarantees the best results through reflow soldering processes with contact heat under vacuum, meeting the highest requirements in the field of advanced packaging and power electronics.

The Nexus has been optimised through the selection of new materials and years of market experience. It is ideal for void-free soldering of various components (e.g., IGBT) on DCB substrates. The assembly of materials from different substances mostly takes place under vacuum at temperatures up

to 400°C (optionally 450°C). The activation of the component surface is achieved through various process gases, including hydrogen combinations. An integrated bubbler system, mainly using formic acid, ensures optimal doping and is implemented close to the process in the system. The components remain in a fixed position throughout the soldering process in the Nexus, ensuring they are not in motion. Furthermore, the Nexus boasts the largest working area on the market, meeting the most economic and flexible requirements.

the ART of sustainable electronics

review 02 | 2023 Shows & Events

Protecto-Series

Innovative line concepts with the Protecto-Series



Smart factory concepts and line integration are other key focuses that are shaping the industry. The demands on the new generation of manufacturing systems have constantly grown. Today, it's no longer just about individual machines, but about line solutions, with "turnkey" being the keyword. Setting up a completely new line requires appropriate technological process understanding to coordinate and implement the necessary tests and evaluations. When the complete coating process is still uncharted territory in manufacturing, this becomes even more complex.

For Rehm Thermal Systems, the concept of a turnkey solution not only focuses on equipment but, more importantly, on the complete dispensing process. This involves the consideration of whether in addition to the pure coating process, sealing, bonding, and dispensing applications should also be provided. Visit our on-site experts to see

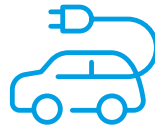
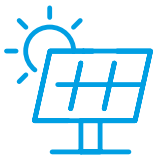
the diverse possibilities of our portfolio in the Conformal Coating and Dispensing sector. These systems come with numerous features that simplify the coating process and ensure process reliability. A height sensor with Z-positioning ensures optimal compensation when dispensing assemblies that are not planar due to their characteristics. Since the height must remain constant, automatic height adjustment is essential for a safe process. Another advantage is the 2D programming on 3D objects. Programming is done in 2D, the height sensor scans the adhesive path of the component being dispensed and automatically generates the height contour. This automatically creates the appropriate program for this component. With the ViCON Protecto system software, only a few steps are needed between the assembly layout and the final coating. Meet our on-site experts and also see the new integrated 3D height sensor of this coating and dispensing system.

ENERGY THAT CHANGES SMA TAKES THIS PHRASE LITERALLY

For over 40 years, the company from Niestetal, near Kassel in Hessen, has been setting technological trends, driving the development of renewable energy.



Recognised with awards such as "Entrepreneur of the Year," the "European Solar Award," and multiple "Intersolar Awards" – most recently being a finalist for the German Sustainability Award in 2022 – the solar specialist, SMA, emphasises innovation, quality, and a lasting commitment to sustainability.



This specialist in solar and energy storage applications not only realises sophisticated system solutions for the energy industry of today and tomorrow but is also a sought-after partner beyond its own industry thanks to its expertise. SMA is vigorously supported by the high-performance dispensing and coating systems from Rehm Thermal Systems.

Founded in 1981, SMA Solar Technology AG now employs over 3,600 people, with around 2,600 at its headquarters in Niestetal and another 1,000 spread across sales and service companies in more than 20 countries. Due to its very broad product portfolio and numerous services, the company presents itself as a complete provider in the market. SMA has received several awards, including the “Entrepreneur of the Year,” the “European Solar Prize,” and multiple “Intersolar AWARDS.” Recently, SMA was even a finalist for the German Sustainability Award 2022. The solar specialist focuses on innovation, quality, and a lasting commitment to sustainability. This includes offsetting all emissions by generating renewable energy. Since 2020, SMA has been manufacturing completely carbon-neutral at its main site.

Shaping the Future with Quality and Innovation

As a global leading manufacturer and complete provider of solar system technology, SMA Solar Technology AG covers all stages of energy integration. Whether it's energy monitoring, solar power generation, energy storage, energy management, or integration into the energy market, each stage has its own solution, from the internet portal to solar inverters, battery inverters, an in-house Internet of Things platform, to digital energy services. Lothar Weix, Head of Team Technology Experts, emphasises the importance of grid stability: “With our products, we create the conditions for decentralised, digital, and, above all, renewable energy supply for today and the future. We also give energy providers the opportunity to do everything to ensure permanent grid stability. Energy policy aspects and independent energy supply are also increasingly coming into focus. To reduce

one-sided dependencies, we need to make the energy supply as flexible as possible. After all, the sun shines everywhere and is free,” Weix summarises his mission.

To succeed on this path, continuous availability, the highest quality of products and systems, certified carbon neutrality, and sustainable manufacturing processes are essential, according to Lothar Weix. As these end products are used globally, they are exposed to harsh environmental conditions such as extreme temperatures or high humidity and must withstand them. Nonetheless, SMA qualifies its products for a 20-year lifecycle. Lothar Weix emphasises, “Thanks to our comprehensive in-house testing capabilities – we have our own electromagnetic compatibility (EMC) testing laboratory and a thermal cycling test laboratory where we can simulate any temperature change cycle – we have all the tools at hand to perform product qualification ourselves and meet the highest standards.” All of this is aimed at ensuring the best possible performance and sustainable efficiency of photovoltaic systems of all applications and sises over many years.

Reliable Protection Against Aggressive Environmental Influences: ProtectoXP from Rehm Thermal Systems

This ambition is not achievable without an effective protective coating for sensitive printed circuit boards. In addition to manufacturing lines for surface mount device (SMD) and through-hole technology (THT), SMA Solar operates a 21-meter Protecto line from Rehm, consisting of a double system of two ProtectoXP coating systems and an RDS drying system for drying and curing varnishes, adhesives, and encapsulation compounds. The line was conceived and designed as a turnkey solution with Rehm's software and hardware solutions.

With the ProtectoXP from Rehm Thermal Systems, SMA has two systems for high-precision dispensing and conformal coating at its disposal, a key to the sustained performance of electronic components. Powerful dispensing and

coating systems are indispensable to protect components from aggressive environmental influences such as moisture, corrosion, chemicals, or dust. Coating printed circuit boards after the soldering process ensures the functionality of PCBs in vital technical end products for the automotive, aviation, or medical technology industries, as well as offshore wind turbines, telecommunications, consumer electronics, and SMA Solar Technology AG's photovoltaic solutions. Thanks to its camera correction, the system stands out not only for absolute process reliability but also focuses on line integration and multifunctional solutions. Equipped with up to four applicators that can be used simultaneously for jetting, dispensing, spraying, dosing, and curtain coating, the ProtectoXP offers the right tool for individual applications and processes, from 3D application, dam & fill, sealing processes, glob top, flip-chip underfill, and 2K encapsulation to heat dissipation. Ronny Witzgall, Technology Professional at SMA, is particularly fond of the Variojetter applicator, a development by Rehm: "As electronic manufacturing continues to miniaturise, components, whether in THT or SMD, are getting closer together. We still need to access these components. Rehm's Variojetter is the only solution that optimally addresses this challenge."

Moreover, the powerful coating system impresses with intuitive and user-friendly software. The ViCON system software of Protecto allows for fast, efficient, and precise creation of the coating pattern, easy image and ECAD data import, 3D views of the respective assembly, and automatically generates coating proposals for the user.

Automated System Networking: SMA, Rehm, and Industry 4.0

When it comes to integrating Industry 4.0 into manufacturing, SMA Solar can draw upon several years of experience. For the past 11 years, the Hessian photovoltaics specialist



ProtectoXP: Integrated into the Turnkey Solution at SMA Solar

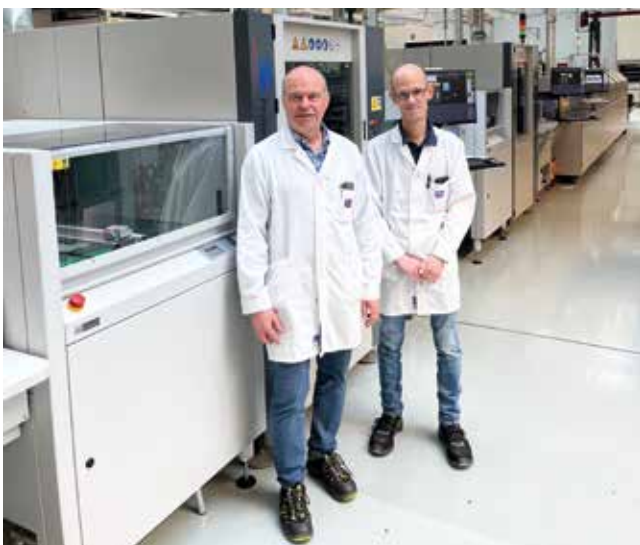


Energy that changes – SMA Solar Technology AG site in Niesetal

has been driving the networking of automated systems. Ronny Witzgall emphasises how crucial Rehm's solutions are for SMA: "Until now, all systems were customised for us, meaning each manufacturer had to offer software products tailored to SMA. With the introduction of Rehm's Protecto line, we have broken with this and introduced an internationally standardised solution with IPC/CFX." Lothar Weix adds: "In addition to line communication at the horizontal level through the Hermes interface, CFX now provides a standardised interface into the vertical plane of the factory environment or MES system. We are gradually transitioning all existing systems to this. We are taking this step together with Rehm." In line with a seamlessly networked environment, communication between Rehm's Protecto systems and SMA's Manufacturing Execution System takes place. The Device Manager records the assemblies that need coating, along with all necessary accessories, and then, via the CFX interface, requests from the MES how and whether they can be manufactured. Once the MES provides this information, such as the choice of the coating program, transport width, or the height of the assemblies, the Device Manager processes the data and feeds it as a Hermes package into the first digital module. Finally, the line only needs to set the track width, and the Device Manager communicates with the robot feeding system on when the assembly can be placed.



From this networking, according to Ronny Witzgall, extensive traceability possibilities also emerge. This concerns product traceability in two ways: Firstly, a life history is created for each product, providing information on when, with which materials, in which production batch, and in which revision it is located. Secondly, manufacturing processes are locked in such a way that subsequent processes can only proceed once the previous testing step has given the green light. Lothar Weix emphasises SMA Solar's high quality standards: "To ensure that all manufacturing steps have been



Lothar Weix and Ronny Witzgall from SMA Solar are convinced of the coating line.

completed in the required quality, all mandatory testing steps are queried again before we deliver a product." And Ronny Witzgall adds, "This only works because we always know exactly where each product is, thanks to the Hermes and CFX interfaces."

Many reasons support the choice of Rehm

In conversation with Ronny Witzgall and Lothar Weix, it quickly becomes clear that standardizing interfaces was not the only reason for choosing Rehm's Conformal Coating line. Another key factor was the oversized component formats. As you grow, the pool of available suppliers becomes more limited. Rehm quickly stood out by providing an excellent solution. Ultimately, Rehm was able to offer the technical feasibility needed for this project, as Lothar Weix explains. Ronny Witzgall adds, "Rehm's overall offering was the most convincing. This applies to flexibility in the applicator area, which allows me to cover all possible use cases and requirements. It also pertains to the quality of the coating results, the intuitive yet complex software, and, last but not least, the clear and honest communication." SMA expects this level of communication and collaborative partnership from a strong partner. Lothar Weix emphasises, "No matter where you are in the value chain, we all share a common goal – to satisfy our customers around the world. That's our approach. When I look at our collaboration, especially with Rehm's service, I can say that we feel our decision to choose Rehm is validated."

The partnership between SMA and Rehm Thermal Systems is a successful and promising one, and the photovoltaics specialist is currently considering the use of additional systems from Rehm in the future.

About SMA Solar

As a globally leading specialist in photovoltaic and energy storage system technology, SMA Solar is creating the conditions for decentralised, digital, and renewable energy supply for the future. SMA inverters, with a total capacity of more than 125 GW, have been installed worldwide in over 190 countries. Over the past 20 years, solar inverters sold by SMA have helped avoid around 63 million tons of CO₂ emissions. SMA's technology, which has received multiple awards, is protected by over 1,700 patents and registered utility models.

GALDEN® CARRYOVER IN THE VAPOUR PHASE SOLDERING PROCESS

Galden® Carryover in the Vapour Phase Soldering Process for Plug Connectors

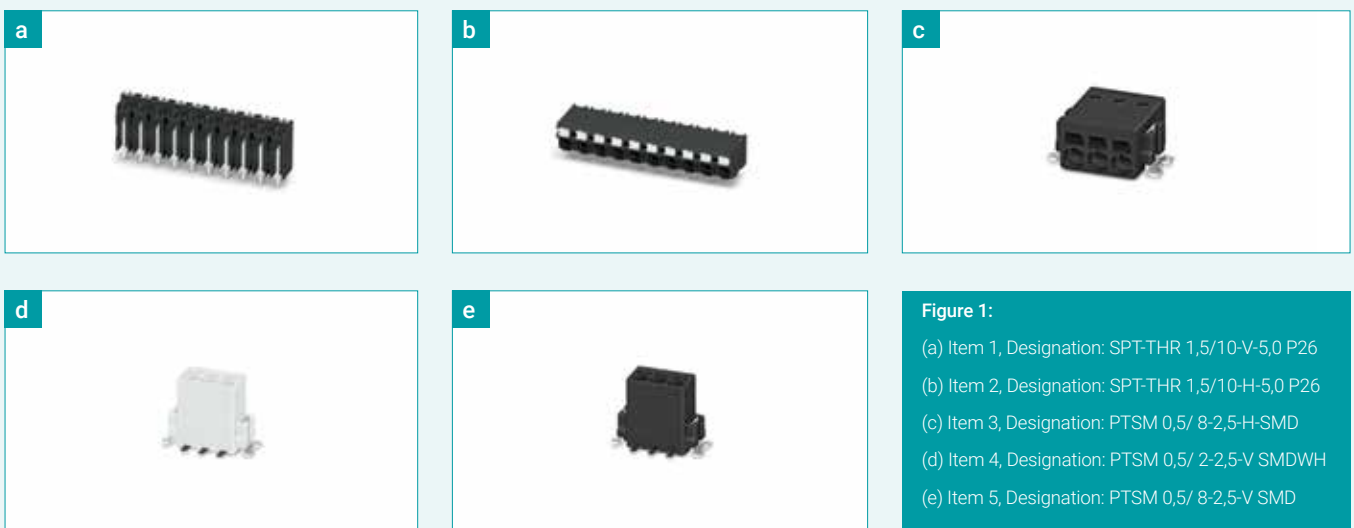


Figure 1:

- (a) Item 1, Designation: SPT-THR 1,5/10-V-5,0 P26
- (b) Item 2, Designation: SPT-THR 1,5/10-H-5,0 P26
- (c) Item 3, Designation: PTSM 0,5/ 8-2,5-H-SMD
- (d) Item 4, Designation: PTSM 0,5/ 2-2,5-V SMDWH
- (e) Item 5, Designation: PTSM 0,5/ 8-2,5-V SMD

Not only the ongoing trend towards miniaturization, but rather increasing use of power electronics too, are leading to new challenges for the processing of electronic PCBs – ranging from PCB design and the selection of an appropriate solder as well as a suitable printing process, right on up to the soldering process itself. On the one hand, overheating of ever smaller components must be avoided and, on the other hand, high thermal masses such as those found in power electronics must also be heated efficiently.

Vapor phase soldering offers great advantages, especially for PCBs with components of greatly differing thermal mass, and is being used more and more frequently as a consequence. Whereas air or nitrogen serves as the heat transfer medium in convection soldering, vapor phase soldering uses a perfluoropolyether (PFPE), mostly from the Galden® product range, with a fixed boiling point above the solder's liquidus temperature.

The suitability of vapor phase soldering processes for plug connectors is investigated within the scope of this study. On the one hand, emphasis is placed on functional testing of the plug connectors after processing in order to detect possible degradation and, on the other hand, carryover of the heat transfer medium is examined as well. Galden® from Solvay GmbH was used as the heat transfer medium. Galden® is an inert medium which doesn't combine with other substances and therefore can't be dyed, for example. Galden® evaporates without residue, even at room temperature, and is electrically non-conductive. Correspondingly, Galden® carryover doesn't pose any major problems for PCBs. Nevertheless, Galden® carryover should be avoided as far as possible because the Galden® doesn't have to be replenished as frequently in this case. Beyond this, the conservation of resources should always be targeted as well. Accordingly, recommendations concerning which components and processes need to be

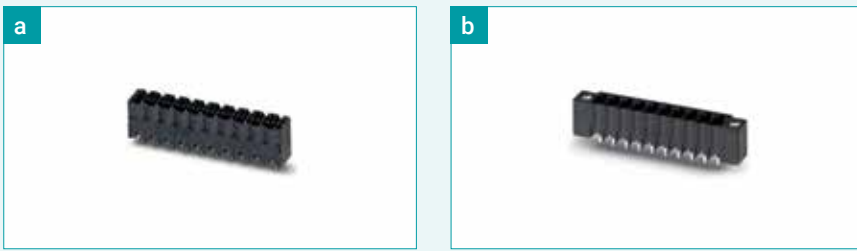


Figure 2:

- (a) Item 6, Designation: CCVA 2,5/ 5-G-5,08 P26THR
- (a) Item 7, Designation: PTSM 0,5/ 8-2,5-V SMD

monitored for possible Galden® carryover and which process optimizations are possible will be deduced on the basis of the results of these investigations.

2 Description of the Test Setup

2.1 Component Geometries of the Examined Plug Connectors

The aim of the investigation is to compare different soldering processes and components in order to gain knowledge about the performance characteristics of different component geometries in the condensation soldering process. The trend towards increased processing of components with through-hole connections using the reflow soldering process (THR) has also led to the processing of more and more complex component geometries by customers. Reflow soldered PCB terminals and circular connectors in SMD or THR design have established themselves in today's markets.

Articles 1 through 5 (see figure 1) are PCB terminal blocks with spring pockets and moving parts in the interior such as springs and spring openers. The components are open in the downward direction towards the PCB, and the horizontal variants are open to the back.

Items 6 and 7 (see figure 2) are PCB base strips. Item 6 is closed off in the downward direction towards the PCB and thus has cups in which Galden® could accumulate. In contrast, item 7 is open at the bottom.

Figure 3 shows the latest generation of board-to-board plug connectors from Phoenix Contact with pitch dimensions of 0.8 and 0.635 mm. These components have a delicate internal structure, but are open in the downward direction towards the PCB. All items, except for the horizontal variants in figures 1 through 3, have a pick & place pad.



Figure 3:

- (a) Item 8.: FP 0,8/ 32-MV-SH 2,65,
- (b) Item 8a.: FP 0,8/ 80-FV-SH 7,85,
- (c) Item 9.: FS 0,635/ 60-FV-R-10,0
- (d) Item 9a.: FS 0,635/ 60-MV-R- 9,0

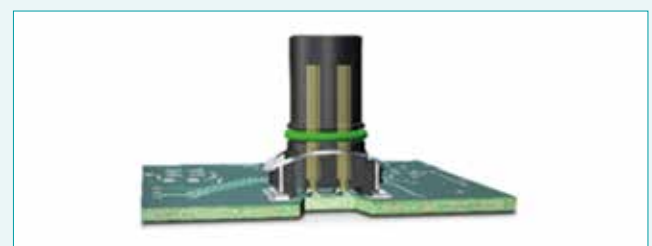


Figure 4:

Basic Layout of the Circular Connectors

Figure 6 shows product implementations in accordance with IEC61076-2-101 ff., which can thus be assigned to the circular connectors category. As a special feature, which is also the case with items 6 and 7, the plug-in area is closed off in the direction towards the PCB. The medium, in this case Galden®, can thus flow into the plug-in area, but flow within the contact chambers is prevented by the plug contacts. This layout (see figure 4) results in a cup-shaped structure with very small gaps into which the Galden® can flow by means of capillary forces.

As shown representatively in figure 5, items 10 and 11 were equipped with a pick & place pad in order to facilitate processing during placement. In the case of item 10, the pad is in contact with the circumference of the cup-shaped plug-in area, which means that this area can only be filled with Galden® via extremely small gaps. In the case of item 11, the pick & place pad is positioned slightly above the mating face, thus providing sufficient opportunity for circulation of the medium.



Figure 5: Example of Product Implementation Using Simplified Placement with Pick & Place Pad

Item 12 is a 90° angled plug connector, i.e. the plug-in area is parallel to the surface of the PCB. A large metal enclosure is attached to the inside of the component which supports the inflow and outflow of the medium by means of openings at specific points. But in this case as well, no flow takes place between the plug-in area and the inside of the component.

2.2 Description of the Vapor Phase Soldering Processes

Vapor Phase Soldering According to the Lift-Dip Method

The lift-dip method is used in conventional vapor phase soldering. The heat transfer medium is heated in a container, thus creating a so-called vapor blanket above the liquid. The product is immersed into the vapor blanket and the vapor from the heat transfer medium condenses onto the colder product. This continues until the product has reached the condensation or boiling temperature of the heat transfer medium.

The procedure used in the study includes preheating under infrared radiators for 60 seconds, the soldering process which was implemented by gradually immersing the product into the vapor blanket for a total duration of 210 seconds, subsequent evaporation for 20 seconds and finally cooling of the product. The selected time-temperature profile has a total duration similar to that of the profile implemented by means of the injection method and a peak temperature of 240° C. Minor deviations in the temperature profile, such as different heating gradients or durations above liquidus, shouldn't have any effect on potential Galden® carryover.



Figure 6:
 (a) Item 10, Designation.: SACC-CI-M12MSL-4FE-L180 THR,
 (b) Item 11, Designation SACC-CIP-M8FS-3P SMD SH
 (c) Item 12, Designation SACC-CI-M12FSR-5CON-L90 THR

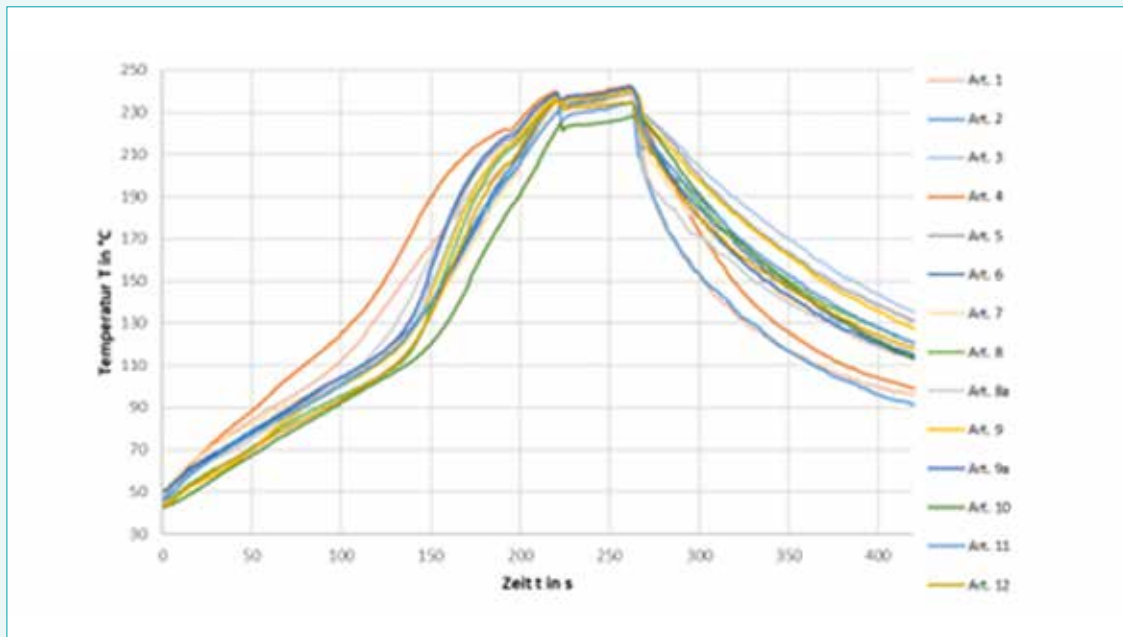


Figure 7: Combined Temperature-Time and Pressure-Time Profiles for the Vapor Phase Soldering Process Investigated by means of the Injection Method Including a 10-Second Vacuum Step at 10 mbar in the Peak Range of the Temperature-Time Profile

Vapor Phase Soldering According to the Injection Method

In the case of vapor phase soldering using the injection method, the process takes place in a hermetically sealed chamber. The product to be soldered is placed in the chamber. A defined volume of Galden® is then injected into the chamber during the course of up to six injection steps, where it is vaporized. The resulting vapor condenses onto the product. This continues until the product has reached the condensation or boiling temperature of the Galden®, or until all of the vapor has condensed. In contrast to the lift-dip method, only enough Galden® is heated as required to achieve the desired temperature change. The required amount of Galden® depends on the product's thermal mass. The injected Galden® is exhausted at the end of the process. The Galden® is exhausted by means of vacuum or by purging the chamber with nitrogen under negative pressure. The hermetically sealed chamber makes it possible to regulate pressure in the chamber at any time, so

that the condensation or boiling point of the Galden® can also be reduced by adjusting pressure, for example. Furthermore, the use of vacuum is possible at any time during the process. Typical processes include a 10-second vacuum step with a residual pressure of approximately 10 mbar in the peak range in order to reduce voids in the solder joint. This process is represented by process 2 within the context of the study. Process 3 is a doesn't include a vacuum step, but uses an exhaust step implemented by means of purging under negative pressure. Pre-vacuum was used for process 2, as well as for process 3. The selected time-temperature profile has a total duration similar to that of the profile implemented by means of the lift-dip method and a peak temperature of 240° C as well. Minor deviations in the temperature profile, such as different heating gradients or durations above liquidus, shouldn't have any effect on potential Galden® carryover.

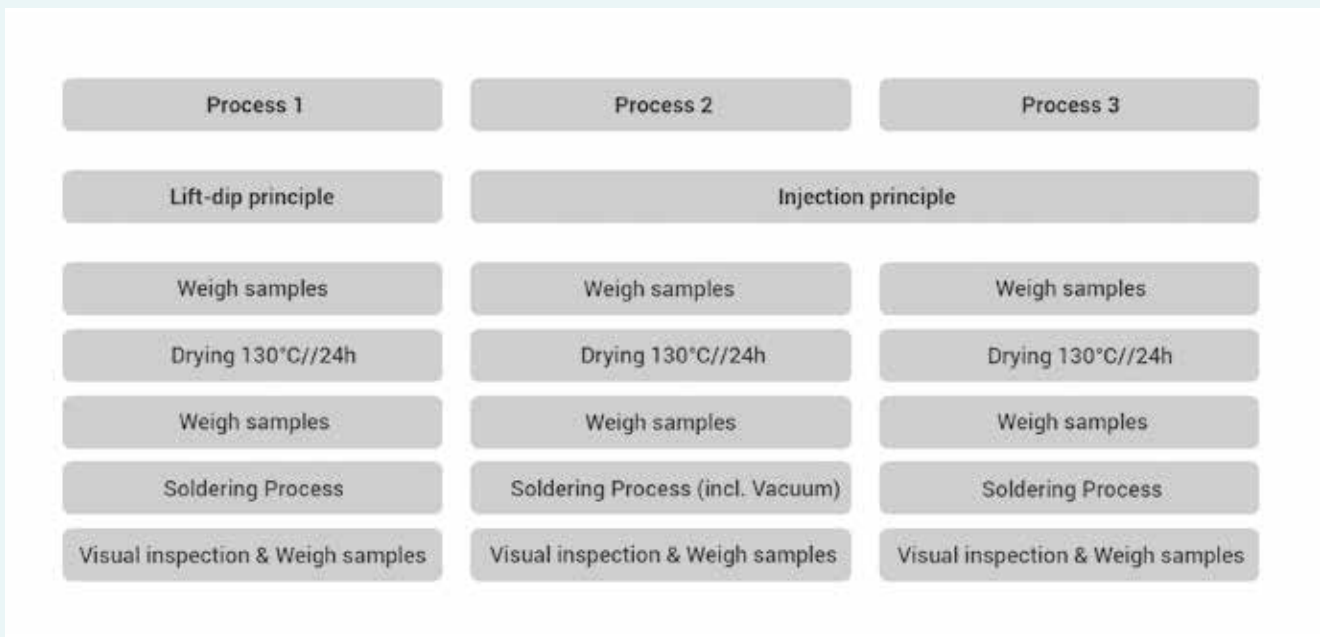


Figure 8: Test Plan for the Assessment of Galden® Carryover in Various Processes

2.3 Procedural Description

The processes described in the previous section are used for all examined items. The evaluation of Galden® carryover is conducted on the one hand in terms of quality by means of a visual inspection after processing, and on the other hand in terms of quantity by determining the change in mass resulting from the process. Due to the fact that some of the plugs are moisture sensitive, all samples are dried for 24 hours at 130° C immediately prior to processing. All of the samples are thus essentially dry. All samples are weighed both before and after drying, as well as directly after processing. Maximum possible Galden® carryover is calculated from the mass of the samples before and after processing. Any additional increase in mass due to absorption of moisture from the environment is considered insignificant by virtue of the procedure and the short lapse of time between both drying and processing, and weighing of the samples. In order to arrive at a statistically valid statement, the investigation was carried out with 15 components of each type for processes 1 and 2, and with 5 components of each type for process 3. Figure 8 presents an overview of the test plan.

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To be continued ...

Look forward to the next issue of our customer magazine "review". And find out more about the galden entrainment in the vapor phase soldering process for connectors



CAREER DAY

CAREER DAY AT REHM OUR TEAM IS GETTING BIGGER

We look forward to seeing many new faces

By now, it has become a regular event in our calendar: the Career Day. At the end of October, it was that time of year again. On Sunday, October 29, 2023, interested applicants had the opportunity to see for themselves that in our globally operating company specialising in thermal systems, they will find a stable and sustainable workplace.

Many visitors from the local area took advantage of the opportunity to explore Rehm as an attractive regional employer of the future during our Career Day, which took place between 10 AM and 3 PM. Starting your career on the right foot, finding an exciting future perspective, or taking a step up the career ladder – there are several reasons to set your professional course anew. Our on-site team provided

information about job and career opportunities, offering insights into the company, its products, and the manufacturing landscape – perhaps even into their potential new workplace.

“Above all, the combination of introducing the company followed by a company tour and direct contact with the various departments makes the Career Day so attractive for all involved,” emphasises Joachim Erhard, HR Manager at Rehm. “We can inspire applicants for career prospects in mechanical engineering for the electronics industry, a thriving, versatile, and innovative sector, through individual discussions and, in return, easily address any questions they may have,” Erhard adds.



CONVECTION SOLDERING EVEN MORE ENERGY-EFFICIENT

The innovations of the VisionXP+

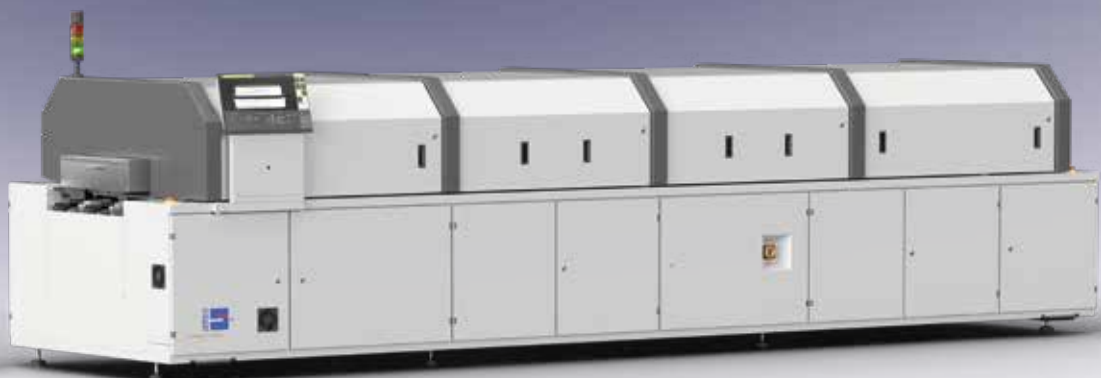
An important energy factor of the VisionXP+ series is the EC fan motors that have been integrated for some time. Their use not only makes the system noticeably quieter but also more sustainable. This enables an energetically optimal state and optimal zone separation.

In addition, Rehm has developed ProMetrics, a tool that not only ensures process stability but also allows for efficient profiling with a focus on reducing resource consumption. Another highlight is the new 3-stage Eco-Mode, which allows you to save energy and nitrogen individually based on the idle state of the system. However, it's not just software-based solutions that contribute to energy-efficient soldering pro-

cesses. Optimised system technology plays another part: Improved residue management, a new cooling design, optimised gas flow, and the new mechatronic curtain at the system's entrance and exit, which virtually eliminates the escape of nitrogen into the environment, are groundbreaking for sustainable electronics manufacturing. The nitrogen savings when using the mechatronic curtain alone can reach up to 20%.

The new cooling design, with a 30% larger separation area for residues, extends the service life of filters and agglomerators. By separately adjusting each zone through direct control of the EC motors, more flexible cooling gradients are also achieved.

INNOVATION





Eco Mode
short, medium, long

The new 3-stage Eco Mode of the VisionXP+ provides smart energy savings during the unproductive times of the system.

Eco Mode short

(recommended as soon as the system is idle)

The fan speed is reduced while keeping the system temperature stable, saving approximately 30% of electricity and nitrogen during unproductive times.

Eco Mode medium

(recommended after 20 minutes of idle time)

The fan speed is reduced, and at the same time, the temperature and nitrogen can be reduced by a specified percentage.

Eco Mode long

(recommended after 120 minutes of idle time)

A separate program defines the corresponding parameters, including fan speed, temperatures, nitrogen, and transport width, among others.



New cooling system design
with optimised gas flow

The new cooling system design with a 30% larger separation area for residues extends the service life of filters and agglomerators. By separately adjusting each zone through direct control of the EC motors, more flexible cooling gradients are achieved. The optimised gas flow, with three loops, separates hot and cold gases, resulting in additional energy savings.



User-friendly due to
modern design

The new PC swivel arm with an adapted design not only makes the VisionXP+ look more modern and robust but also more flexible. The new design gives the PC arm a less protruding appearance, allowing for optimal technical integration. Another advantage is the easy access to the inlet area and the ergonomic arrangement of the monitor.



Efficient fan technology
with EC motors

An established feature of the VisionXP+ is the use of efficient EC fan technology. The integrated motor electronics of each individual fan can be controlled individually. This allows for the retrieval of operating data such as speeds, motor temperatures, and electrical power parameters through a bus system (Industry 4.0). Other advantages of the new EC motors include reduced noise levels, lower power consumption, and the elimination of frequency converters.



Always Informed

When different PCB widths are being processed, the width adjustment function is monitored, and the operator is informed about its condition.

The optional filter monitoring, including volume flow control, also ensures a constant cooling performance.



Mechatronic curtain for
nitrogen savings

The optimised process chamber of the VisionXP+ reduces the nitrogen consumption, making the VisionXP+ even more sustainable for efficient manufacturing. The new mechatronic curtain at the inlet and outlet of the system significantly reduces the escape of nitrogen into the environment, with a potential savings of up to 20%.



TCS – Temperature
Control System

The VisionXP+ has been enhanced with a Temperature Control System (TCS). This automatic regulation of the cooling of individual zones ensures that the preset temperature is maintained, especially for large, heavy, and demanding assemblies. This control system leads to additional energy optimisation and better zone separation.



Easy access to
relevant areas

The redesign of the extraction hoods at the inlet and outlet ensures optimal accessibility while maintaining functionality. This ensures that the extraction remains active, even when manual insertion, such as for inspection measurements, requires the inlet/outlet area to be free.

The swiveling gas/water build-up plate also improves accessibility for maintenance purposes, saving time. This reduced downtime of the system results in lower outage costs.



Design



Ressources



Maintenance



Process technology



Integrated filter monitoring for individual zones including volume flow control



Innovative gas management in the newly designed cooling section

RETROSPECTIVE EVENTS REVIEW 2023

Only through regular knowledge and experience exchange with colleagues in the field can new ideas be developed: Rehm was present at the event.



Wir Gehen in die Tiefe 2023: Expert Seminar in Dresden

The reissue of our event “Exploring the Depths” in Dresden under new leadership generated significant interest and provided a unique platform for discussing the latest trends in the industry. Key terms such as Smart Factory, digitization and connectivity, resource conservation, and sustainability are shaping the future of electronics manufacturing. The energy transition is one of the most pressing issues in our economy, and the electronics industry, as an innovation driver, plays a central role in providing the necessary technologies and components. Our event featured twelve high-profile presentations and offered the opportunity for direct knowledge exchange with experts and colleagues, establishing itself as the optimal platform for dialogue on current topics and future technologies in electronics manufacturing.

The event team consists of the companies ASM Assembly Systems, ASYS Group, Christian Koenen, Rehm Thermal Systems, Vliesstoffe Kasper, and Zevac.



Positive Feedback at the 13th Berlin Technology Forum

For the 13th time, the Berlin Technology Forum took place in the capital, and Rehm Thermal Systems was once again a partner company.

At the Siemens AG Conference Center Berlin, this year's participants could look forward to exciting presentations on sustainability, process optimization, and digitalization in electronics manufacturing. In the sustainability segment, process- and material-dependent solutions for recycling and cleaning, as well as new printed circuit board technologies for reducing CO₂ emissions in electronics manufacturing, were introduced. In the context of process optimization, the focus was on how optimal stencil design and precise solder paste printing form the basis for defect-free and, consequently, resource-efficient electronics manufacturing. In the digitalization section, on the other hand, the experts on-site presented established and still crucial communication interfaces. Furthermore, they showcased innovative future usage scenarios in the field of digitalisation based on current research projects.



Technical Seminar in Romania: Experts Share Insights

For the second time, Rehm hosted a series of presentations in Timisoara, Romania. In the tri-border region of Romania, Hungary, and Serbia, experts delivered lectures to an enthusiastic audience from across Eastern and Southern Europe on topics related to Advanced Reflow Soldering and Conformal Coating. The feedback from the participants was clear: More of these events are wanted!

What are the key aspects of an optimal soldering profile? How can common and specific sources of errors be avoided, and how can sustainable protection for electronic components on printed circuit boards be ensured? These and many other questions were answered by Dr. Paul Wild, Andreas Heltmann, and Gianfranco Sinistra from Rehm, along with a guest speaker from Senju Metal Europe, during the two-day seminar in various presentations. In addition, the guests had the opportunity to discuss and share their own experiences and issues as users at an open roundtable. Overall, it was a successful event!

REHM BLECHTEC IS PLANNING AN EXPANSION

After 20 years of successful sheet metal processing, the production space is once again becoming insufficient – a new construction phase is being initiated.

Rehm BlechTec GmbH from Blaubeuren-Seißen has clearly demonstrated in recent years that quality and growth are achievable even in the highly competitive field of sheet metal processing. In 2016, the company's headquarters were expanded to nearly double the size of the buildings occupied in 2003, and the machinery has been continuously upgraded over the years. The consistently strong order receipt indicates that the investments in the Blaubeuren site were significant steps in the right direction. Now, the development of another construction phase is in the planning stage.



Powder coating system with nanotechnology: an environmentally friendly process for increased sustainability.

In 2003, Rehm Thermal Systems GmbH's locksmith's shop was spun off as an independent company within the Rehm Group and has since operated independently in the market. Due to the solid work in recent years, nearly 70% of the total turnover is now generated outside the Rehm Group. Since January 2014, Thomas Hack has been leading the well-equipped company as the plant manager and has driven and implemented several expansions in the machinery park. At the end of 2016, the existing production hall was expanded by a new building, adding an additional 2600 square meters, bringing the total production area to 5600 square meters. Yearly investments have been made since then in expanding the machinery park. The portfolio in the field of laser technology was extended with a CO₂ - 2D laser cutting machine from Trumpf and a powder coating system with nanotechnology. The following year, an investment was made in a plasma cutting machine with a bevel unit, allowing not only vertical but also angled cuts, eliminating the need for subsequent machining for weld seam preparation. The expansion of the machinery park with a tube laser, bending robot, welding robot, and most recently, an additional 180 storage spaces for laser cutting, completes the development.

However, resource conservation is also taken into account in the expansion of production capacities. As an energy-intensive company in metal processing, Rehm BlechTec sees



Additional expansion possibilities were already included in the planning in 2016. In 2024, the time has come – the third construction phase will encompass approximately 4100 square meters of production area.

itself as having a special responsibility to act sustainably. In the past, this has included reducing metal waste, recycling, investing in energy-efficient equipment, and using environmentally friendly processes such as powder coating as important steps toward sustainability. In the meantime, the company relies entirely on electricity from renewable sources through a large-scale photovoltaic system, which has covered almost every available roof surface of the company building since the end of 2022. With a capacity of 521 kWp – equivalent to 521,000 kWh per year – Rehm BlechTec generates enough renewable energy to regularly feed surpluses into the public grid.

The planned third construction phase encompasses approximately 4100 m² of production area. This expansion has become necessary due to the continuous expansion of manufacturing depth and investments in the machinery park, resulting in an expanded customer base and an increased order intake. In order to continue delivering the corresponding metal parts to customers on time in the future, the expansion will begin in 2024. The planning is in place, and the first contractors are already ready to start. In addition to expanding the current production capacities, the expansion also provides opportunities to further increase manufacturing depth and implement additional processing processes that were previously outsourced.



Picture above: 180 new storage spaces have already been created
Picture below: Photovoltaic system with an output of 521 kWp



REHM RECEIVES AN AWARD AS THE “EMPLOYER OF THE FUTURE”

Rehm Thermal Systems has been awarded.

The award for the “Employer of the Future” in the fields of digitalisation, sustainability, and innovation was officially presented by the German Institute for Innovation in Digitalisation and Sustainability (DIND) during the German Entrepreneur Day on September 6, 2023, in Essen.

Today, to attract the best emerging talents and well-trained professionals to one's own company, it is no longer sufficient for the compensation and the number of vacation days to be adequate. Potential employees are increasingly paying attention to the core values of a company. How is sustainability addressed? Are there modernly equipped workspaces? What path is the company taking in the realm of digitalisation? What is the work-life balance like, and what other benefits does the prospective employer offer?

Rehm Thermal Systems is a globally operating mechanical engineering company based in Blaubeuren-Seissen, producing manufacturing equipment for the electronics and photovoltaic industries. In this rapidly evolving industry, a continuous transformation must occur within the company itself to remain competitive.

The company has been committed to sustainability from an early stage, starting with small steps like outfitting the entire plant with LED lighting and gradually advancing to today's photovoltaic system with 527 kWp capacity and a digital energy management system. Employees are actively

involved in the process. The company's intranet, QWiki, not only houses the central processes of the company digitally but also integrates a Continuous Improvement Process (CIP) platform where improvement suggestions on various topics can be submitted. From these suggestions, a carpooling platform was created, saving both travel costs and reducing CO₂ emissions.

Social sustainability is also a priority at Rehm Thermal Systems. Educational partnerships, support for local associations, and in-house fundraising initiatives for social institutions are now integral parts of the company's philosophy.

Modern, well-equipped workspaces, remote working, digital production documents, service reports, remote support with smart glasses, and training via body cameras are utilised to facilitate daily work and drive the company's digital transformation forward. An online training portal ensures that employees can further their qualifications to successfully implement this transformation.

“In times of skill shortages, it is important to position ourselves as a future-proof, innovative company that constantly evolves. This is the only way we can retain employees and strengthen the team with new professionals. We are pleased to receive the ‘Employer of the Future’ award, which shows that our efforts in this area are also recognised by impartial parties,” says Joachim Erhard, HR Manager at Rehm Thermal Systems.



Together for the Mittelstand (medium-sized businesses)

The patron of the “Employer of the Future” initiative is Brigitte Zypries, former Federal Minister for Economic Affairs. The DIND, in collaboration with her, advocates for Germany's medium-sized businesses and assists them in their entrepreneurial challenges, including the “War of Talents.”

NEW CONTACT PERSONS IN SALES AT REHM

We are expanding the international network for local sales and service and welcome the following new employees to our sales team:



Lisa Leonhardt
Sales Manager Line Solutions

The topic of line configuration and turnkey solutions is steadily increasing. Especially in the area of conformal coating and dispensing, this is an important core competence. Therefore, we have provided reinforcement in this area with Lisa Leonhardt since November 2023. Lisa Leonhardt completed her dual degree in production engineering and organisation with a focus on technology and management in 2014 and has since worked as a team leader in the technical offering for the Auxiliar Equipment division of MAG IAS GmbH.



Jasmin Fuchs
Sales Manager Medicine Electronics

In order to best meet the special requirements in medical electronics, we have expanded our sales team. Jasmin Fuchs, is available as your contact person for this and will be happy to present the corresponding application areas and systems to you in detail. She already completed her studies in business administration in cooperation with the DHBW Heidenheim at Rehm Thermal Systems and is therefore very familiar with the product portfolio and processes.



Anna Reinhard
Area Sales Manager

After completing her studies in business administration with a focus on industrial companies at the DHBW Heidenheim, Anna Reinhard started as Sales Manager at Rehm and took over the sales territories of Austria, Switzerland and the USA for the entire product portfolio. In close cooperation with the distributors, she ensures competent support for existing and new customers. She is the contact person for all sales-related topics and represents the company at trade fairs and events on site.

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Mate Rubelj
Sales South East Europe

Since June 2023, Mate Rubelj has been strengthening sales in South-Eastern Europe with a focus on Serbia, Slovenia, Croatia, Bosnia and Herzegovina, Montenegro and Macedonia. He comes from Trogir, Croatia, and studied project management at the Faculty of Economics at the University of Trogir before graduating as an occupational health and safety engineer specialising in CNC machines. Further stations were project management in shipbuilding and production planning at his family's olive oil factory.



Vasco Marta
Sales Portugal & Spain

Our direct contact in Portugal and Spain since June 2023 is Vasco Marta. He is a familiar face both in his home country of Portugal and in Spain. He is very familiar with the area of responsibility itself – for 10 years he was Product Manager for Rehm products and Service Manager at SMT Europe on the Iberian Peninsula. With his knowledge of the local market, the customers there as well as the systems and processes, he is ideally equipped to present Rehm competently on site - in cooperation with SMT Europe, which will remain our partner.



Betzadi Cruz
Sales Mexico

Since June 2023, Betzadi Cruz has been supporting sales in northern Mexico, as there is great potential for growth in the more than 3,000 km border area with the USA. He has 28 years of experience in electronics manufacturing with PCBA and SMT companies for automotive, consumer electronics and contract manufacturing for top brands such as RCA, Philips, Delphi, Jabil, Flextronics and Honeywell. As Engineering Manager, Commercial and Operations Manager, his responsibilities included introducing new products and relocating production lines in various plants between Mexico, the USA and China.

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INTERVIEW

In conversation with Rich Weng

Optimal service for our customers on all continents – Rich Weng and his team contribute significantly to this.

The quality standard of Rehm systems is based on the highest level. We aim to meet this standard with our service offerings as well. At our Dongguan location, we have a service team that serves the entire ASEAN region, including mainland China. This enables us to provide competent assistance to our customers on-site for all matters related to sales and service.



What is your role at Rehm Thermal Systems in Dongguan exactly?

Rich Weng: In May 2023, I took over the leadership of the service department, stepping into the shoes of Tony Lam, who left the company after more than 15 years. My new responsibilities focus on the service and support area of the ASEAN region, which includes mainland China, Taiwan, South Korea, Thailand, Vietnam, India, Malaysia, Singapore, and so on. In short, we have customers throughout Asia who expect competent service support.

What challenges did you face when you took on this crucial business area?

R.W.: The service department is one of the largest departments at RTS in Dongguan. Some of the structures had to be reorganised, as the company, the customer base, and the countries to be served have grown significantly in the past 15 years. It's a challenge to bring everyone on board, and the fact that they are scattered across different locations didn't make it any easier.

How will the service department at your Dongguan location change in the near future?

R.W.: As the number of installed systems is increasing, and we now handle not only reflow soldering systems but also coating and dispensing systems, we will be expanding our



1. Rich Weng with Mr Rehm in front of the company building in Blaubeuren during the Technology Days.

2. The company building in Dongguan, China. Rich Weng's place of work.

team in the coming months. The after-sales department will also see continuous growth. This ranges from the service hotline to updating and illustrating spare parts lists, as well as optimizing inventories outside of Dongguan.

It sounds like a lot of time and effort. What does your family think about it?

R.W.: Besides my professional role, I am a happy - albeit tired - father of two beautiful daughters, one of whom was born just a few months ago. Family provides the necessary balance to the demanding work routine – I think that's true for everyone.

The Rehm Thermal Systems location in Dongguan is in one of the largest industrial centers in China. Why did you choose to work for Rehm?

R.W.: Oh... the decision took only a few seconds. The product portfolio and the opportunities for development convinced me right away. And the good gut feeling turned out to be accurate. In 2014, I started with the company as a service engineer in the after-sales department and from the very beginning, I was responsible for service support in the ASEAN region outside of mainland China. My first three years at Rehm were spent taking care of the installation and maintenance of reflow ovens, dryers, fast-firing, and condensation systems.

So, you had a typical start in the service area to gain initial experience. What happened next?

R.W.: It progressed very quickly. After three years, in 2017, I was promoted to senior service engineer and led and trained the teams on-site in the ASEAN region. In 2022, I took on the position of Assistant Service Manager in South China. Just a year later, due to Tony's unexpected departure, I assumed the role of Director of Service and Support in the ASEAN region. This position was newly established at the beginning of the year, and I work closely with my colleague Max Fu, who is also new and primarily responsible for after-sales.

Leading the entire service department in the ASEAN region is a significant responsibility and likely has many interactions with the headquarters in Germany. Have you visited the headquarters before?

R.W.: So far, visiting the Rehm team in Blaubeuren had not worked out. Two earlier planned trips were canceled due to the Covid pandemic. However, everything aligned this year. In honor of Rehm Thermal Systems' 33rd anniversary and after I had already accepted the new position as Director of Service and Support in the ASEAN region, even though the official start was in May, I was finally able to visit the headquarters. It was nice to exchange ideas personally with the German management and my European colleagues Kai Kathan and Robert Holoch during the celebrations.

What impression did you gain, and what key insights did you take away from the trip?

R.W.: Now, half a year after the 33rd anniversary, we can see an improvement in cooperation and technical exchange between Rehm in China and Rehm in Germany. Mutual understanding and support have increased. Our goal is to continue this path of good exchange and communication and swift support. Hopefully, by integrating field service management at both locations, many processes can be simplified and automated, allowing more room for intensive personal exchange and support.

Collaboration and communication between locations are essential factors in a globally operating company. How do you view this, especially in your area of responsibility?

R.W.: After-sales service is one of the departments where national and international communication and collaboration are critical for success, as we offer services to customers worldwide and need well-trained service engineers at all our locations to maximise customer satisfaction. Besides a strong technical understanding of our machines, software, and processes, our engineers must also have good communication skills to quickly and effectively resolve any issues that arise.

Where do you see the most critical interface in communication?

R.W.: As the Director of the service team in Asia, it's my responsibility to acquaint my colleagues in the ASEAN region with their tasks, reporting lines, and to manage them, in addition to the approximately 40 team members in mainland China. Strengthening internal communication between the headquarters of Service & Support and the Service Software department is particularly important, establishing a smooth workflow. This has been improving lately, and this kind of exchange needs to continue and expand in all areas in the future, with the ultimate goal of providing our customers worldwide with the best possible service.



1. Rich Weng, Director of the Service Team, manages our customers in ASEAN along with his team.
2. First visit to the headquarters on the occasion of the Rehm Technology Days.
3. Celebrating together with colleagues from Germany: the evening event provided the perfect opportunity for that.



METHODS AUTOMATION INC. IS NEW DISTRIBUTOR

Methods Automation Inc. is the new distributor for vapour phase soldering systems by Rehm Thermal Systems in North America.

Rehm Thermal Systems has secured Methods Automation, based in Baltimore, Maryland, USA, to handle the sales, service, and support of Rehm's vapour phase soldering systems in North America.

With over 30 years of experience in the electronics manufacturing industry, Methods Automation Inc. has established itself as a leading sales and service provider in the Mid-Atlantic region. Their strategy of exclusively representing "A-Tier" suppliers in their portfolio continues with the addition of Rehm Thermal Systems' Condenso series of vapour phase soldering systems.

"We are delighted to have found an experienced and competent partner in Methods Automation, who can effectively position our vapour phase soldering product portfolio in North America and provide excellent on-site support to our customers," said Michael Hanke, C.S.O. of Rehm Thermal Systems GmbH.

The primary focus for Methods Automation in distributing the CondensoX series will be on the Avionics and Defense sectors, as well as traditional EMS (Electronics Manufacturing



Services) providers. The company serves the entire manufacturing chain, including processes such as SMT (Surface Mount Technology) assembly, inspection, and functional testing, in addition to reflow vapour phase soldering.

Methods Automation places special emphasis on knowledge transfer, offering customised training to ensure that customers have the resources and tools to optimise their capabilities and increase profitability. The result is satisfied customers who enhance their attractiveness to their target markets through this expertise, fostering a partnership on all levels.

SUMMER, SUN AND GOOD MOODS!



The traditional summer festival has sweetened the daily routine

As every year, the entire staff of Rehm Thermal Systems and Rehm Blechtec celebrated the traditional summer party at the end of July. After it looked like an indoor event at first, the weather had mercy and the barbecue buffet was enjoyed in bright sunshine in a cosy atmosphere. A colourful selection of salads, grilled vegetables, steaks, salmon and classic grilled sausages - the catering left nothing to be desired!

A candy bar was set up for the sweet tooth in between and those who wanted something vitamin-rich could have a delicious smoothie prepared for them. For the "sportsmen"

among the colleagues, there was also a giant foosball table, which provided an additional good atmosphere with some interesting matches. So that all employees could benefit from the gifts for the 33rd company anniversary, which the companies Hannusch, Vliesstoff Kasper and MTM Ruhrzinn had sent us, these were raffled off among the employees at the summer party.

The mood was good, the drinks cold and the weather perfect. No wonder that the party went on until the early evening!



Good weather, delicious food and great people – at the end of July the employees of Rehm Thermal Systems and Rehm BlechTec celebrated the traditional summer party

SAVE THE DATE

SHOWS & EVENTS 2023/24

Rehm is present at the most important venues in the electronics industry with interesting trade shows and events.

Whether it's a trade fair, technology event, seminar, training or workshop - take advantage of the opportunity to get to know our system technology and receive advice from Rehm experts. If you are interested, you can find more information about the events at www.rehm-group.com.

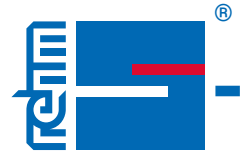
DATE	EVENT
06.12.2023	Troubleshooting (On site seminar), Blaubeuren, Germany (only in german)
31.01.2024	Basics Reflow Soldering (virtual) Blaubeuren, Germany (only in german)
29.02.2024	14. Berliner Technologieforum , Berlin, Germany (only in german)
13. – 17.03.2024	EE-Kolleg , Colònia de Sant Jordi, Spain (only in german)
20. – 22.03.2024	Productronica China , Shanghai China
17.04.2024	EPP InnovationsFORUM , Leinfelden, Germany (only in german)
19. – 22.06.2024	Nepcon Thailand , Bangkok, Thailand
20.06.2024	Evertiq Expo , Berlin, Germany
24. – 26.09.2024	Wir gehen in die Tiefe , Dresden, Germany (only in german)
08. – 11.10.2024	bondexpo , Stuttgart, Germany



Dates

Here you will find the current dates for trade fairs and events.

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

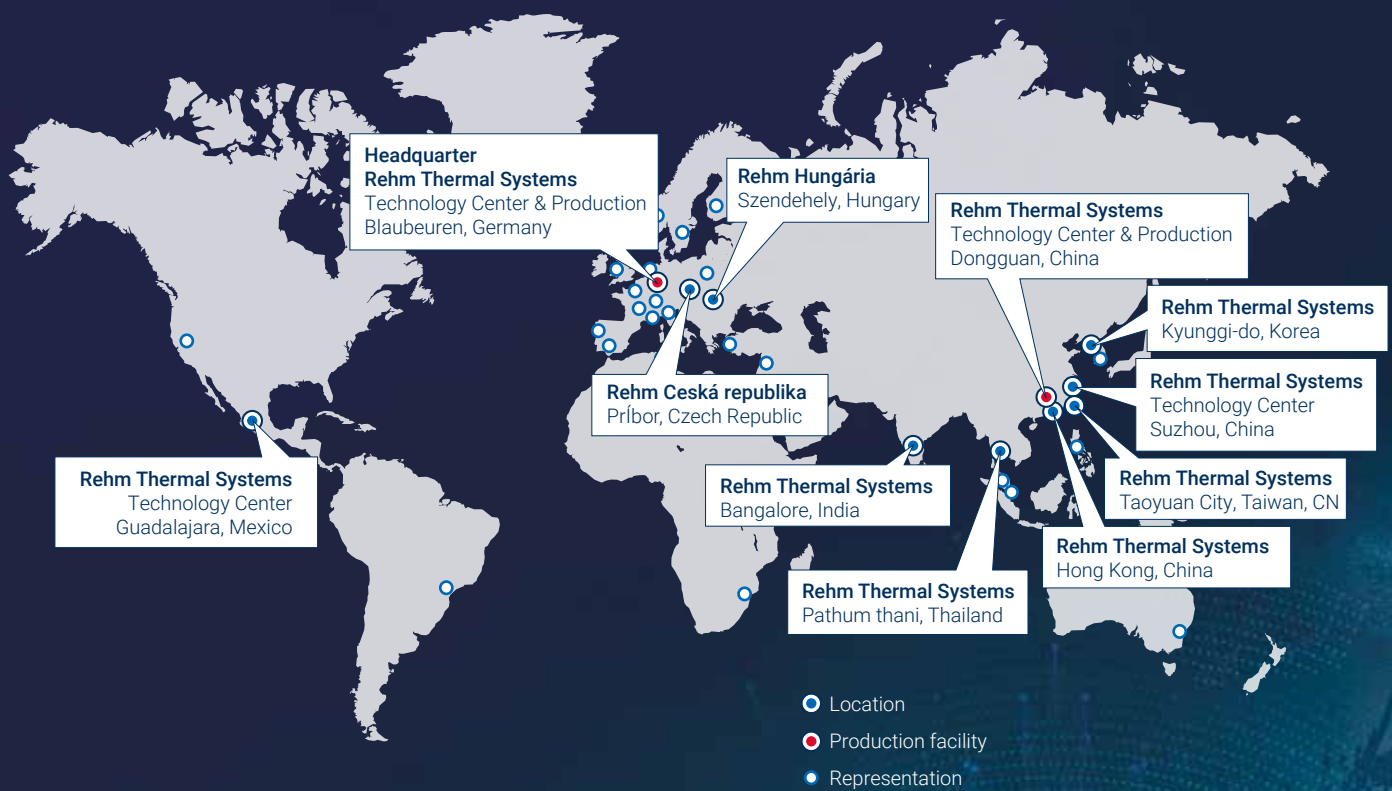


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October 2023. Technical changes without prior notice. Art.-No. 1105957



Rehm Worldwide

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