IN TOUCH WITH TOMORROW

25 YEARS
1990 – 2015

REHM TECHNOLOGY DAYS

16./17. APRIL I BLAUBEUREN
25 years Rehm
In touch with tomorrow
Dear clients, partners and friends,

to celebrate our company’s 25th anniversary I have the pleasure of inviting you to this year’s Technology Days!

Take a look back at developments in the electronics industry over the last 25 years and find out everything you need to know about future trends. A diverse conference programme awaits you with lectures from researchers and practitioners, as well as workshops on current trends such as the vacuum process in reflow soldering, the coating of extremely sensitive electronics and current developments in process monitoring.

We look forward to lots of visitors, entertaining technical discussions and a cosy get-together at the evening event!

[Signature]
Programme

Rehm Technology Days 2015

Thursday, 16 April 2015

9.00 am
Welcome!
Johannes Rehm

9.30 am
25 years in the electronics industry
Dr. Hans Bell, Rehm Thermal Systems

10.00 am
High-volume production with the VisionXP Quad Lane
Bernhard Erras, Siemens Amberg

10.30 am
Reducing the tombstone effect – Six Sigma in the SMT process
Reinhold Egger and Thomas Mückl, Zollner Elektronik

11.00 am
Coffee break

11.30 am
Paste Dispensing for Advanced Microelectronics Packaging – Material Rheology and Processes
Dr. Tanja Braun, Fraunhofer IZM

12.00 pm
Blackout – Is progress a step back?
Keynote Speaker – Marc Elsberg

13.00 pm
Lunch

14.00 - 16.30 pm
Live broadcast from the Technology Centre – Wolkenschloss meeting point
Session 1 Vacuum soldering with the VisionXP+ Vac
Session 2 Coating of sophisticated electronics
Session 3 CondensoXLine
Session 4 Smart data in everyday manufacturing

19.00 pm
Evening event
Friday, 17 April 2015

9.30 am
Welcome!
Johannes Rehm

9.45 am
Vacuum technologies
Paul Wild, Rehm Thermal Systems

10.15 am
Sustainable thermal systems
Marcel Kneer, Rehm Thermal Systems

10.45 am
Coffee break

11.15 am
Innovative technology for the photovoltaics industry
Caroline Clement, Rehm Thermal Systems

11.45 am
Insight into manufacturing with Rehm software monitoring tools
Matthias Kley, Rehm Thermal Systems

12.15 pm
Conformal coating – innovative line concept
Manuel Schwarzenbolz, Rehm Thermal Systems

12.45 pm
Lunch

14.00 pm
Open workshops and exhibition

16.00 pm
End of event
Marc Elsberg explains the long-underestimated vulnerabilities of modern, cross-linked societies.

What would the breakdown of all petrol stations mean for the supply chains of a just-in-time company, whether in industrial production, industrial agriculture or for a modern hospital that relies on external service providers to deliver meals for patients and personnel three times a day?

How does a society coordinate if its technical communication system completely fails within just a few hours?

Developments like the impending "Internet of Things" will significantly increase the number and complexity of these mutual interdependencies.

But the stories behind "Blackout" – as well as Elsberg's new novel "Zero – Sie wissen was du tust", which discusses the "transparent person" – also focus on our high standard of living. These technologies and structures alone permit our comfortable, healthy and safe lifestyle.

In his thriller "Blackout – Morgen ist es zu spät" Marc Elsberg tells a story of the fundamental change that has taken place in our society over the last twenty years, yet has gone unnoticed by most.

Never before in human history have so many people lived in such comfort, health and safety as today. But this lifestyle comes at a cost. Never before in human history have billions of people been utterly dependent on the perfect functioning of highly developed and precisely coordinated technologies and structures. One of the most important of these is energy supply, and above all electricity, though this is certainly not the only one.

We have fundamentally changed the organisation of our society over the last twenty years.

All elements of modern society are mutually dependent on various other elements - more closely and more diversely than ever before. You really notice how serious this change is when the systems and structures fail.

Using examples from various spheres of life, including food and water supply, heath care and financial systems, Marc Elsberg explains the long-underestimated vulnerabilities of modern, cross-linked societies.

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Marc Elsberg was born in Vienna in 1967. He was a columnist for the Austrian daily newspaper Der Standard as well as strategic consultant and creative director for advertising in Vienna and Hamburg. His breakthrough came in 2012 with the techno-thriller Blackout, for which he was awarded the German literary prize “Wissenschaftsbuch des Jahres”. His meticulously researched and captivating economic thriller about the effects of a total power outage in Europe dominated the best-seller lists for months. In his latest book Zero, he tackles the power of digital algorithms and once again addresses the burning issue of the advance of ‘big data’, which fundamentally alters our self-perception in the 21st century.

Marc Elsberg lives and works in Vienna.
The electronics industry will continue to grow in the future, regardless of economic figures. The complexity of electronic products will continue to rise. The production of printed circuit boards requires increased speed and precision. In short: complexity and production volumes are increasing.

The proportion of production areas however often remains constant. The result is increased productivity simply due to more efficient use of existing production areas.

The solution is the use of a four-track system, which reduces the length of the SMT line by almost 50%. Mr. Erras reports on everyday production in high-volume series manufacturing and the latest innovations of a German electronics company.
The ever-diminishing value-added share in electronics requires controlled, optimised processes. If an external factor interrupts the process, it is extremely important that the scale of the malfunction can be identified quickly.

Furthermore, clients increasingly offer reworking or general repair. The lecture highlights how a systematic approach using Six Sigma tools in the individual phases of the DMAIC cycle can identify causes and improve processes.

In coating technology, the choice of material is governed by the requirements as regards protective coating and casting. Acrylic, silicon, epoxy resin or polyurethane plastic are typically used in conformal coating. The lecture provides an overview of materials and processes for dispensing polymers and solder pastes for use in microelectronics.

Additional methods for measuring the rheological properties of materials and the associated structure-property correlation are discussed to provide a deeper understanding of the process. Illustrative examples from research and development round off the topic in a practical manner.
VisionXP+ Vac – design, function and results
A reliable soldering joint in power electronics presumes a smaller proportion of voids due to the enhanced thermal and electrical conductivity. The VisionXP+ Vac by Rehm concentrates on reducing voids in combination with high throughput. During this workshop we will demonstrate the design and functionality of this convection soldering system with vacuum chamber. You will have the chance to deepen your understanding during the subsequent question and discussion session.

Vacuum soldering with the VisionXP+ Vac
Paul Wild and Jochen Burkhardt, Rehm Thermal Systems

Inline vacuum soldering with the CondensoXLine
Nico Fahrner and Stephan Pesch, Rehm Thermal Systems

The entire process of inline soldering with CondensoXLine is performed in a nitrogen atmosphere in order to reliably prevent an oxidation layer from forming on the PCB assembly, thereby protecting the copper for subsequent bonding processes. We will show you the inline condensation soldering process in a vacuum live and analyse the resulting void-free solder joints by means of X-ray inspection.
In keeping with the motto “Coating made easy”, we show you live on the coating plant Protecto how simply and yet flexibly you can apply different coating applications, such as jetting, spraying or dispensing, in one operation.

After a live presentation of the coating plant’s various options we will be available to discuss any questions you may have about the topic of conformal coating.

Session 2

Coating sophisticated electronics

Manuel Schwarzenbolz, Rehm Thermal Systems

There is an increasing demand from modern production plants for production data to be recorded as completely and comprehensively as possible. Rehm Thermal Systems has several options on offer in order to meet this requirement.

But which customers require which tools?

In order to provide some clarity here, two similar looking tools for convection reflow soldering systems are considered in more detail in this workshop. We will compare our in-house ProCap and the third-party product KIC RPI that Rehm has integrated. We will explain the respective modes of operation, reveal differences and discuss advantages and disadvantages.

Session 4

Smart data for everyday manufacturing

Matthias Kley and Markus Mittermair, Rehm Thermal Systems
Multiple nitrogen utilisation
Together with our partner Air Liquide, we have set ourselves the goal of drastically reducing the energy consumption of the reflow soldering system’s cooling water by directly using the energy of the cryogenic liquid nitrogen (as cold as -196°C) in the tank. By using a vacuum-insulated conduit (Thermos flask principle), the cryogenic medium can be conducted to the reflow soldering system with virtually no losses. The nitrogen gives up its coldness inside the cooling line, vaporises and is then used for inertisation, thereby ensuring multiple nitrogen utilisation. The amount of nitrogen required to generate the desired residual oxygen atmosphere is sufficient to provide the system with optimum cooling capacity.

The liquid nitrogen cooling ALIXCoolFlow can be used to dispense with the medium cooling water for Rehm convection reflow soldering systems. This completely eliminates energy costs for the internal and external circulation of the cooling water as well as any provision of cooling energy. In addition, the already pre-heated gaseous nitrogen, which is introduced into the system for the purpose of inertisation, saves even more energy. The associated reduction in CO₂ emissions makes a significant contribution to the environment.
Some applications require a wireless temperature measurement or temperature profile measurement. This is also the case with the CondensoX series condensation soldering systems. In order to record the temperatures in the hermetically sealed process chamber, Rehm offers the new WPS 2.4 temperature monitoring system.

The system works with surface acoustic waves (SAW) and can be used wirelessly and without its own power supply for reflow profiling. Thermocouples and tracking data loggers are thus not necessary and thus cannot affect the process. The new low-mass system ensures reliable process monitoring throughout the soldering process. The integrated evaluation unit allows easy and constant monitoring of the temperature profile directly in the operating software as well as documenting it for quality verification.

WPS sensor with antenna

ViCon

Markus Mittermair, Rehm Thermal Systems

The field of software development has always seen rapid changes and developments. However, although these developments have generally taken place on a technological level in the past, we are currently experiencing the biggest changes in the area of processes and optimising operating concepts.

Rehm Thermal Systems has thus reinstalled the existing system software accordingly and with the ViCon now presents a software system according to state-of-the-art standards. In addition to the use of touch controls and gestures, the development focused on restructuring the menu items and control panels. The aim was to give the system’s current operating mode a clear structure, thereby enabling the operator to react to status and alarm messages quickly and intuitively. This was achieved mainly by means of the individually configurable role management. Access rights, views and favourites are thus precisely tailored to each user in order to ensure that only the relevant information is displayed and that a cluttered and confusing software interface is a thing of the past.

ViCon software with Touch Display
Vacuum technologies

© 09.45 am | Paul Wild, Rehm Thermal Systems

When Galileo Galilei (1564-1641) questioned the existence of absolute emptiness (Latin: vacuus), this was the first time the philosophical concept was converted into a physical/technical concept. Today, 368 years after Torricelli generated the first artificial vacuum, vacuum technology is an important and common component of process engineering.

In technical applications a vacuum is usually divided into four separate types: rough vacuum from 1 bar to 1 mbar, medium vacuum from 1 mbar to 10-3 mbar, high vacuum from 10-3 mbar to 10-7 mbar and ultra-high vacuum < 10-7 mbar. The rough vacuum in particular is commonly used for various applications in electronics manufacturing, which are:

**DRYING //** For drying materials - e.g. pastes, substrates in the vacuum - the vacuum dryer takes advantage of the fact that the boiling point of matter falls with increased ambient pressure. Thus e.g. solvents (water, alcohol) from materials and coatings can escape more easily.

**LACQUERING //** In casting technology the vacuum enhances the expansion and distribution of the casting material, as capillaries and small gaps can be filled better when there are no air bubbles. The Protecto conformal coating line permits the integration of a vacuum model between coating and drying electronic assemblies to support e.g. the underfill processes of ball-grid components.

**SOLDERING //** While the impact of pores on the reliability of soldered component joints with lower current loads, e.g. for signal transmission, has been the subject of fiery debates between researchers and practitioners for many years, void-free (pore-free) soldered joints are increasingly required in power electronics and high-reliability technology. These can be produced by suspending molten solder in a vacuum once the solder joint has been formed. Vacuum soldering is deeply rooted in the history of Rehm and is based on the most popular conventional soldering methods.

The Condenso vacuum system combines condensation soldering technology (vapour phase soldering) with suitable vacuum technology. In the soldering process the vacuum can be used either as a pre-vacuum and/or final vacuum. Thus, in addition to its exceptional heat distribution, the Condenso can also dry pastes and produce void-free soldering joints. The condensation vacuum technology is available for process temperatures up to 240 °C. The demand for a higher throughput and enhanced SMT line integration requires new technological solutions. Rehm has expanded its product portfolio with the addition of a VisionXP+ convection reflow soldering system combined with a vacuum chamber. As a result, vacuum soldering processes based on different physical foundations produce comparable, significant void-free soldering joints.

**GAS-SWITCHING AND SPECIAL APPLICATIONS //** The combination of convection heating technology and vacuum technology is used for higher temperature areas. VAC 400 vacuum units are designed for temperatures up to 400 °C and can be operated with either air, nitrogen or forming gas. As a result, it is possible to switch the process gas during the process for special applications.

Production-specific, assembly-specific and client-specific aspects always play a crucial role in selecting the optimum combination of soldering and vacuum technology.
“Empty space can be very important ... 
... increased reliability through vacuums.”

Paul Wild, Research and Development, with Rehm since 2015
In the field of photovoltaics, Rehm Thermal Systems realises state-of-the-art developments in system technology through research projects and industrial collaborations. The research project “MWT-plus”, funded by the BMBF (funding code: 03SF0420F), is delivering exciting results as regards future MWT heterojunction solar cells. Within this framework and in cooperation with project partners from FhG IKTS, Rehm is developing an inert low-temperature oven with a residual oxygen content of less than 30 ppm in order to optimally dry silver and copper metallisation pastes.

A new technology for solar cell contact springs is being tested, which replaces the conventional radiator with a system which uses micro lasers. Thus new profile types with temperature gradients of up to 1000 K/s in the peak range are possible.

“Sustainable development means shaping the future with vision, imagination and creativity, having the courage to try something new and exploring uncharted territory”
- a guiding principle of the German Federal Government for the national sustainability strategy. Rehm has also been developing and optimising innovative thermal systems in accordance with this strategy for over 25 years. Rehm focuses on sustainable development, starting with holistic approaches for recovering heat from cooling water and including space-saving manufacturing technology with four-track economisers and energy-savings in reflow soldering system technology. The VisionXP series became even more environmentally friendly through the use of new thermal insulation concepts, a gas management system and an intelligent nitrogen regulation system. The latest innovation is a cooling water-free reflow soldering system that continuously improves the energy efficiency of systems and eliminates the use of cooling units and harmful coolants in the reflow process.

In the field of photovoltaics, Rehm Thermal Systems realises state-of-the-art developments in system technology through research projects and industrial collaborations.
Due to increasing reliability requirements in the electronics sector, particularly in harsh environments such as damp and dirty ambient atmospheres, the market is increasingly demanding the use of protective coatings, the so-called conformal coating.

To this end, Rehm Thermal Systems has, after extensive market research, developed a coating plant that can be very flexibly adapted to the sometimes very complex requirements of different customer segments.

This includes, for example, coating with 4 heads at the same time or the application of up to 4 different coats in a machine without setup times.
Places to be!

09.00 am Lectures in the 'Wolkenschloss' (5.0G)

14.00 pm Live broadcast from the Technology Centre – Wolkenschloss meeting point (5.0G)

14.30 - 16.30 pm

Session 1  Vacuum soldering with the VisionXP+ Vac
Session 2  Coating of sophisticated electronics
Session 3  CondensoXLine
Session 4  Smart data in everyday manufacturing

Info Points

Info Point 1
- Liquid nitrogen in electronics manufacturing
- WPS 2.4 - Wireless Temperature Profiling

Info Point 2
- ViCon - The new system software

Info Point 3
- Rehm Info

Room for ideas

Main entrance
The story of every company starts with an idea and someone who is passionate about achieving it. In the case of Rehm Thermal Systems GmbH the idea was to manufacture an inline reflow soldering system with an easy-open, nitrogen-tight chamber and the person behind it was Johannes Rehm. The driving force behind this development and the establishment of the company were the clients who still rely on Rehm Systems technology today.

Johannes Rehm started his own company in 1990. Certainly at this point no one could have foreseen how the company would develop over the next 25 years.

Just as in 1990 it was impossible to predict how the first cross-computer message would develop into the world wide web we know today, it could not have been predicted how nitrogen technology would prevail in electronics manufacturing. And yet nowadays both technologies are indispensable.

The development of Rehm over the last 25 years has always been based on technological advancement in the electronics industry.

This industry always had its finger on the pulse, reacting to client requirements and market developments. On-going globalisation led to the expansion of sales activities across the globe and ultimately to another production facility in China.
New energy sources, the continuous miniaturisation of electronics and the rapidly increasing use of electronic assemblies in almost all spheres of life opened up new business areas. Thus Rehm invested in the development of systems to manufacture solar cells, and is involved in battery production projects and the protective coating of sensitive electronics. The resultant newly emerged product areas and market segments ensured further growth in all directions.

Today Rehm Thermal Systems not only offers soldering systems, but is also a competent partner to the electronics industry in all areas of thermal processes. There was no doubt that the company premises also needed to change to keep up with this development. In 1990 the first systems were still manufactured in a small production hall. The head office in Blaubeuren is now a business complex with vast production areas, offices and social spaces for almost 200 employees.

Right from the beginning Johannes Rehm was known for his technical know-how and client-focussed work methods. Close cooperation with the client and an ambition to develop innovative and technologically sophisticated products was and is a hallmark of Rehm.

This dialogue with clients, knowledge transfer and our technical consultancy skills have been highly regarded by clients and partners over the last 25 years. The construction of our new technology centre in Blaubeuren shows that we are constantly growing.

Just as the WWW will certainly continue to grow in years to come and will bring a number of surprising developments, Rehm Thermal Systems is sure to have an exciting future ahead of it in a rapidly developing electronics market. The future looks exciting!
Various studies have proven that the success of a company is largely dependent on its employees. Rehm's motivated, loyal and dedicated employees ensure that our clients are also satisfied.

Many of our employees have worked for the company for many years and some even began their careers with us. They have driven developments, contributed to decisions and experienced the highs and lows of the electronics sector.

The continuous growth of the company and the flexibility and globalisation associated with this have often opened up new career paths that will also be available to our employees in the future.

For example, electricians have become planning engineers, mechanics have become service technicians and service technicians have become sales representatives; both on a national and international scale.

Significantly, more than 40% of employees have been with the company for more than 10 years of its 25-year history. Rehm is an owner-managed company that does everything in its power to create outstanding, sustainable benefits for our clients. The last 25 years have shown that competent, dedicated employees make the difference and are crucial to guaranteeing the success of our company in the future.
“We only know one direction...
...up.”

Wolfgang Zeifang, Joachim Erhard and Johannes Rehm, Management Rehm Thermal Systems
The success of a company lies in the sum of the ideas of its employees.
How do future trends influence research and development at Rehm?

Key technologies must be developed that enable and accelerate the implementation of major future projects for the global population such as climate + energy, mobility, health + nutrition, communication and safety. Allow me to provide a few examples of how Rehm has actively participated in ground-breaking projects jointly with its clients.

Sustainable mobility through electric vehicles is one of the major requirement areas of the future. Working in conjunction with VW VARTA Microbattery, Rehm has developed a new kind of nitrogen dryer that can be used to dry electrode films for lithium batteries. Regenerative energy production is promoted worldwide.

Together with various research partners from science and industry, we are working on the development of high-temperature-resistant bonding technology for powder modules to be used in offshore wind parks (joint BMBF project HotAI: 16ES0138).

Another research project in this requirement area concerns the development of a heterojunction MWT solar cell with the aim of saving silver in the future. PV modules should be highly efficient but contain less valuable raw materials (required by the German Photovoltaics Innovation Alliance: 03SF0420F).

For both collaborative projects Rehm develops thermal manufacturing systems as prototypes for industrial use.

Finger on the pulse

Research & development made by Rehm // Interview with Dr. Hans Bell
A flow soldering system was developed in conjunction with the Siemens AG Industry Sector, which has the same productivity as two reflow soldering systems but uses less energy and, in particular, requires a smaller proportion of valuable production space. In 2013 we were awarded the New Product Introduction Award for this development.

What technological milestones has Rehm set?

Two particular milestones stand out: In the nineties and then again with the changeover to lead-free soldering initiated by the RoHS, the enhanced wetting properties in a nitrogen atmosphere were in great demand. What's more, Rehm has possessed the skill to construct nitrogen-tight systems since its founding. Clients also found that the excellent accessibility of the systems, whose process chamber can be fully opened, was an excellent advantage as regards maintenance. Our systems are still characterised by this standard.

In the early 2000s Rehm combined the first condensation soldering (vapour phase soldering) with vacuum technology and thus offered new technological possibilities for power electronics and high-reliability electronics.

Our wide range of further training events, where we impart process know-how to our clients, should also be mentioned at this point.

How important is environment and resource management?

Extremely important of course!

CO₂-saving, energy-efficient and climate-proof systems are more and more sought-after. What's more, our clients are obviously interested in the cost-of-ownership. When developing the first thermal system by Rehm, we dealt with residue management systems (soldering fume control). These systems considerably decreased harmful emissions, while at the same time minimising the maintenance costs of our clients in production facilities. Today our systems effortlessly fall below the threshold values (e.g. according to the German Clean Air Act) and function maintenance-free for up to three weeks. The consistent development of pyrolysis technology contributed significantly to this. In 2011 we were awarded the Solar Award for Excellence Product for our thermal oxidizer, which cleans exhaust air when drying pastes.

Many clients are very price-focussed nowadays. So how important are issues like quality and innovation?

To answer the question in terms of quality, perhaps we should look at it from an Asian perspective - German mechanical engineering is in stronger demand than ever. Our production facilities in the Chinese city of Dongguan manufacture more than 200 systems per year in accordance with the quality standards laid down in Blaubeuren. We do, of course, face tough international competition and must align our developments with pricing conditions. However clients like to approach us with new ideas because they know from experience that Rehm is a reliable and determined partner when it comes to the realisation of such ideas. Here are two examples.

A few years ago Endress+Hauser came up with the idea of processing thermally sensitive through-hole components in the reflow process – known as backside reflow soldering (BSR). Together we developed the system technology and the associated process. BSR soldering systems reached production standard a long time ago. The first four-track nitrogen re-

"We have a very strong commitment to innovation."

Dr. Hans Bell, Head of Research and Development, with Rehm since 2000
We focus on quality!

Rehm supplies everything from a single source – from the initial idea to design right through to the finished system. “Made in Germany” is seen as a quality guarantee and success factor. We manufacture systems at the production site in Dongguan, especially for the requirements of the Asian market. Strict quality guidelines based on the German standard ensure reliability.

“Made in Germany” symbolises the huge trust that clients worldwide place in consumer and investment goods manufactured in Germany.

We can always rely on the emotional and differential power of this worldwide-regarded label. In addition to the quality of our industrial products, the label “Made by Rehm” also stands for services, knowledge production and problem-solving expertise.

The place of manufacture is less important for the Rehm Group. As a global company, our “Made by Rehm” label signifies that the overarching responsibility for value-added and production chains is shaped by German quality standards.

“Made in Germany” quality from China - is that even possible?

The quality of the final product is based on client appreciation, market acceptance and sustainable market impact. At Rehm Thermal Systems we achieve this through set standards in all divisions of our company. Why are identical quality standards necessary? The reasons behind the introduction of a QM system are e.g. sales arguments, cost-savings, increased flexibility and short throughput times. 25 years’ experience has taught us that each error over an acceptable average of approx. 3 – 4 % causes a decrease in sales volume.

What does all this mean for “Made by Rehm” quality?
The Rehm Group has a uniform quality policy and quality targets. The Rehm Group head office is located in Blaubeuren. The quality management division in Dongguan is also coordinated and managed from here. All quality specifications and quality standards are stipulated in Blaubeuren in consultation with senior management and implemented across the company. Using specific quality assurance plans we guarantee product quality by distributing responsibilities, inspections, interim inspections and certifications throughout the entire production process.

These also ensure the inspection of:
> the organisational structure
> specialist client certifications
> the correct use of materials in accordance with the contract
We know that we must perform extensive quality assurance in China to maintain our own quality standards and to meet legal requirements. To meet these objectives we have an on-site quality assurance team comprising several employees, who are responsible for incoming goods inspections, manufacturing checks, certifications, training and process analyses. The central quality management division performs audits at regular intervals.

Personnel training and the use of qualification matrices should illustrate how important individual employees are to our company. This is also an important aspect of Rehm’s corporate policy. This training is driven by the extremely high staff turnover rate among workers in China over recent years. This disproves the common belief that manufacturing in China is always particularly favourable. Equal standards and requirements for a product which meets client specifications come at a price in China too. Every minute and every euro saved on preventative quality assurance measures must then be spent several times over to tackle discrepancies in quality and function.

Trust is good, checks are better.

The certification of our production facilities in China by TÜV Süd ensures that our specifications are implemented and adhered to. Regular visits by senior management and the quality assurance team from Germany should reinforce this. New suppliers are also qualified on-site in cooperation with the central divisions in Germany.

The details show that “Made by Rehm” quality is also subject to certain rules in China and thus it is possible to manufacture high-quality machinery here.

“Quality remains long after the price has been forgotten!”

Günter Dieckmann, Head of Quality Management, with Rehm since 2008
In addition to conventional reflow soldering with convection and vapour phase soldering systems, as well as lacquer dryers for conformal coating systems, since 2013 Rehm has also offered dispensing systems thus closing a gap and offering our clients a corresponding line configuration from a single source.

The first stage of developing the new Protecto dispenser was to analyse the existing solutions on the market and the demand among clients, users and technology partners based on their individual requirements and up-coming market trends in coating technology. The knowledge obtained here was used to develop Protecto and the entire selective conformal coating line. The aim was not to copy an existing system, but rather to promote and integrate innovative technologies in the coating sector.

During research it became clear that one of the most important client requirements is reducing set-up times when using a variety of coating materials. Thus Rehm fitted the Protecto with a 4-head system that can accommodate up to 4 application heads, so 4 different coating materials can be held in the system at the same time. The changeover to another assembly and another coating material takes just a few seconds by program request.

The unique Stream-Coat® and Vario-Coat® nozzle technology, developed and patented by our partner KC-Produkte, enables coating between high and densely packed components: even in cases where "curtain systems" fail due to their nozzle diameter and curtain width. This flexibility not only applies to the coating material, but also to the conveyor system.

For the Protecto it is irrelevant whether individual boards, PCBs or assemblies on goods carriers are passed through the coating line. The maximum conveyor width of 508 mm meets all requirements, but Rehm still goes one step further.
Both the Protecto and RDS drying oven are already equipped with enough room to integrate a goods carrier return transport. The assembly transport height of 950 mm +/- 50 mm is not affected by this.

Another important aspect of coating is the leakage of solvent vapours through large inlets and outlets. Rehm already offers safety locks in the basic configuration, which prevent the leakage of solvent vapours during the coating process and also provide contact protection.

The integrated exhaust air system ensures the quick extraction of solvent vapours and thus a clean working environment.

Close attention was also paid to software in the development phase. The Protecto can be programmed either directly via the system monitor or at an offline workstation.

“Flexibility in coating is more important today than ever before.”

Bernd Marquardt, Sales Product Manager, with Rehm since 2005
Production lines in the electronics industry are normally fitted with conveyor systems and uniform, standardised conveyor systems to guarantee a seamless process. This is not the case for drying processes. The product usually determines the type of conveyance through the oven and there is a wide range of different handling methods.

The multitude of special systems for thermal processes that we have developed and planned with our clients over the last 25 years are always based on the individual requirements of the production environment in which they will be used. The technical design of these systems is largely determined by part dimensions, thermal mass, materials, process specifications and throughput volume or cycle times.

Customer-specific solutions are necessary if high production figures, i.e. short cycle times, paired with long process times need to be processed. The choice of an appropriate conveyor system is decisive for a successful process. Variable heating gradients, long process times with limited space and the different substrates to be dried help determine the type of conveyance.

In addition to standard conveyor systems such as chain conveyors and mesh conveyors, Rehm Thermal Systems can also fit special systems with accumulating roller conveyors, pallet conveyors or special goods carriers. Some applications require a meander transport or a shuttle transport conveyor system, which have already been integrated several times.

The process parameters are defined and a corresponding specification is created in close cooperation with the client. Current processes already include temperatures of 40 to 1000 °C and were realised using a wide range of heat sources and transport systems.

Whether infrared or UV radiation, with or without convection, or a pure convection oven - practically every drying process is possible with our systems!

40 – 1000 °C
Modern electronics are now used in a variety of sectors and are thus exposed to a broad range of temperatures. Electronic assemblies in applications areas, particularly where safety is crucial, such as medical technology, air and aerospace travel technology and the automotive industry, have to be 100% reliable in all application conditions.

As any stoppage can entail high costs and have far-reaching consequences, it is increasingly important already to test the manufactured assemblies under the actual environmental temperatures during manufacture and/or prior to dispatch. To check winter performance, working assemblies are today tested at temperatures down to -45 °C. To simulate the installation conditions in the vehicle, the electronic assemblies are subject to temperatures of between 80 °C and 120 °C.

Rehm offers individual systems in the area of hot/cold operating tests that are configured based on the requirement of the assemblies to be tested. The required ambient conditions can be simulated by exposing the assemblies to specific temperatures in an air/nitrogen atmosphere.

The Rehm Securo series is designed for broader temperature range of between -55 °C to +120 °C. The Securo system has flexible loading options in the form of an exchangeable carrier system that enables a great variety of assembly designs and geometries to be handled.

It therefore does not matter whether you are planning small and medium-sized series with manual loading or large series with automated parts handling.

Our Securo series has a modular design and can be excellently integrated into island solutions or fully interlinked into your production line as an inline system.

Rehm Securo systems offer you excellent flexibility and security when designing and implementing your test procedures.
Reliable electronics in cold and hot conditions. Run the test ...

Cold functional test down to \(-55 \, ^\circ C\)

- Cooling chamber with
  - downstream test system

Hot functional test up to \(+120 \, ^\circ C\)

- Heating chamber with
  - downstream test system

Securo - With safety at the right quality

- Compact system for hot / cold function test
- Temperature range down to \(-55 \, ^\circ C\) during cold function test possible
- Temperature range up to \(+120 \, ^\circ C\) in the hot function test possible
- Manual or automatic loading and unloading of the Carrier Circulation System
- Handling interface (e.g. SMEMA or Siemens)
- Interchangeable, flexible carrier transport system
- System as a batch or inline variant available
Technology Centre

Experience soldering live at Rehm on site.

How can you create optimum temperature profiles? Or what kinds of technology can be used to prevent voids in the solder joint?

Rehm provides both the answers and the solutions.

Our measuring equipment

- ASM placement system
- ASYS handling systems
- Viscom X-ray inspection
- EKRA paste printer
- Zevac rework station
- Techno-Lab FlyInspector
- Techno-Lab BGA.Inspector
- Thermal imaging camera
- Coating thickness measuring instrument
- Conductivity measuring instrument
- Nitrogen logger
In the fall of 2013, a high-tech application and demonstration centre was built on a total of 460 m² at company headquarters in Blaubeuren. Here customers can directly apply vacuum, condensation or convection soldering processes to test PCB assemblies, create individual temperature profiles and define optimal parameters for the manufacturing process with the help of application specialists. For this purpose, the technology centre is equipped with state-of-the-art facilities for a complete SMT production line – from the paste printer and pick and paste machine to the reflow soldering system. A complete coating line for selective conformal coating demonstrates the reliable protection of PCB assemblies against environmental influences. The technology centre also features a wide range of accessories for PCB assembly testing and analysis of test results.

Your advantages at a glance

> Expert advice before deciding to buy
> Analysis and improvement of process parameters
> Improved quality for your PCB assembly production
> Increased first pass yield
> Increased process stability through detecting and elimination of soldering defects
> Option of running PCB assembly tests on different systems
Production equipment

Take advantage of innovative technical expertise and 25 years of experience!

Rehm supplies energy-efficient production equipment for the electronics and photovoltaic industries. As a manufacturer of reflow soldering systems with convection or condensation as well as drying and coating systems, we are a technology and innovation leader in economical PCB assembly production today. The automotive, medical technology, aerospace technology, power electronics and military technology sectors are important industries in which our thermal systems are used. In the solar sector, Rehm provides high-quality equipment for metallisation of solar cells. We have been implementing custom applications when it comes to soldering, coating and curing of PCB assemblies for 25 years now.

Convection Soldering
In the VisionX series, the soldering process is performed on the basis of convection – that is, the transfer of heat via a flow of gases. Our systems are available in air or nitrogen versions.

Condensation Soldering
Our CondensoX series can solder even the most difficult assemblies quickly and dependably, at temperatures up to 240 °C. In order to improve control of the condensation phase, Rehm has developed a patented injection process that allows the soldering procedure to be individually regulated.

Contact Soldering
Void-free soldering by contact heat and vacuum. The VS family of soldering systems guarantee the best results with a reflow process using contact heat in a vacuum. They thus meet the highest requirements of power electronics.

Test | Trials
Rehm offers systems that can accurately simulate these extreme conditions by selectively heating and/or cooling the assemblies in an air or nitrogen atmosphere. Thus we cover temperatures from -55 °C to 120 °C.

Drying | Hardening
The drying systems of our RDS series can be configured individually to our clients' requirements. The flexibility of these units offers sufficient scope to cover the most diverse of applications.

Dispensing
Our Protecto conformal coating system protects sensitive electronic assemblies from damage by corrosion or other environmental influences such as humidity, chemicals or dust.

Special Equipment
Our special RSS systems offer you a system concept that allows technically flexible and economically attractive solutions for various areas of application to be realised quickly.

Solar Equipment
Rehm’s fast firing systems and RDS solar dryer for the typical metallisation of monocrystalline and multicrystal-line solar cells have outstanding heating capacity and so achieve top-class results.
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