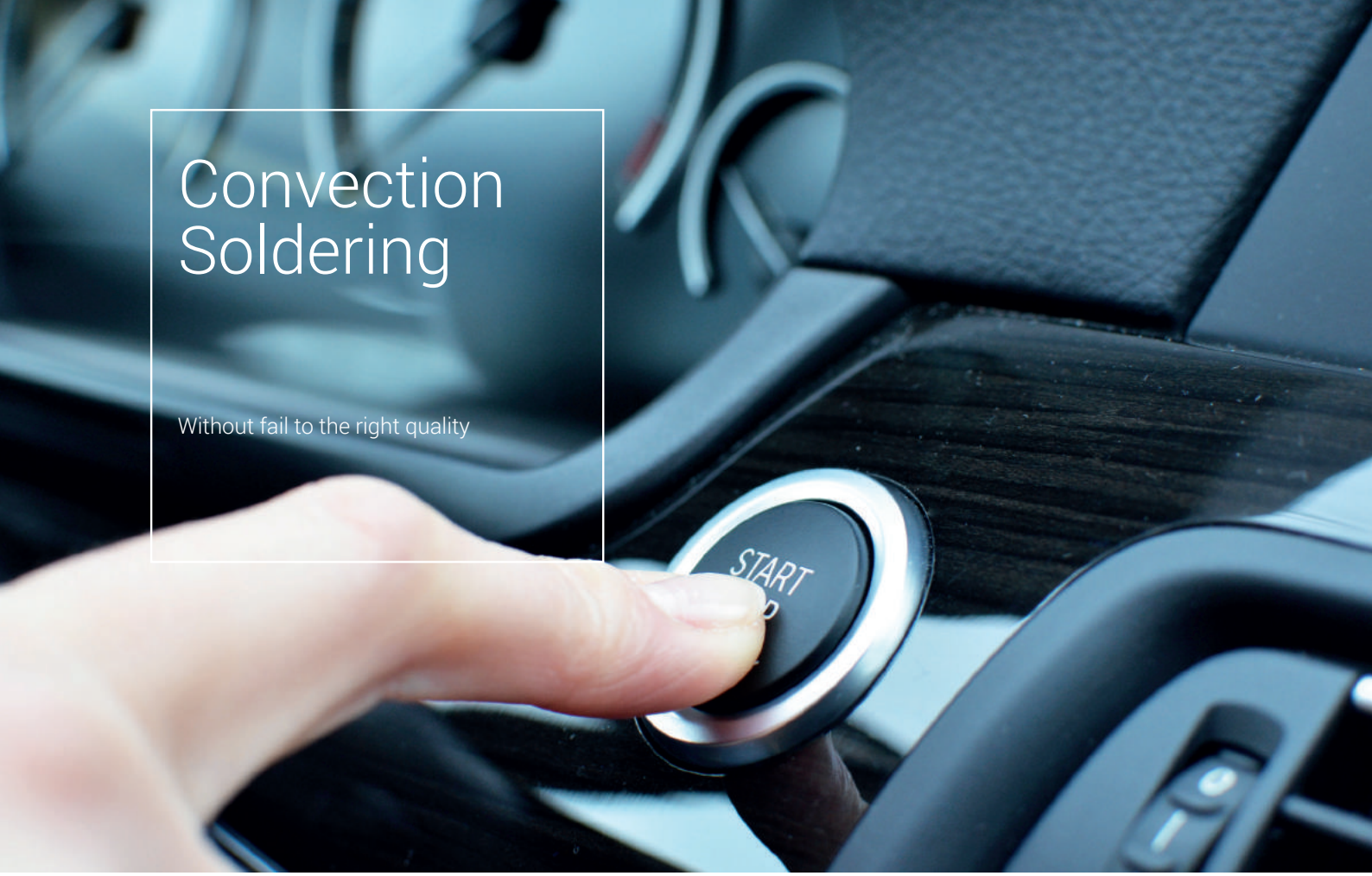
THERMAL SYSTEMS

Efficient and powerful
in every production ambience



Vision series
Convection soldering

www.rehm-group.com



Convection Soldering

Without fail to the right quality

Reflow soldering with convection
Diversity with the Vision-Series

Whether laptop, smartphone or in-car control systems – almost every technical end product contains sensitive electronics. The contacting of the electrical components on the circuit board using high-quality soldering is crucial when it comes to guaranteeing smooth function. Rehm Thermal Systems works to develop reflow soldering systems for your production which can be integrated seamlessly into the manufacturing environment.

Systematically applied technology and superb construction are the features of our convection reflow soldering systems. In the Vision-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. As an inert, protective gas, nitrogen is the ideal heat transfer medium and prevents disturbing oxidation during the soldering process. The modular system configuration of the Vision-Series also offers a high level of flexibility for your production facility.

The Vision-Series
As individual as your production

Does your production environment need a compact system which can be adapted optimally to your requirements? Do you process sensitive electronic components which need to correspond to certain temperature conditions? Or would you like a system that can solder void-free under a vacuum? We have a diverse range of products!



NEW! Vision TripleX
Convection soldering with vacuum and Galden®

- The 3-in-1 solution for void-free reflow soldering
- Combination of convection soldering with and without vacuum and vapour phase soldering
- Vacuum down to 10 mbar for reducing the number of voids in the solder joints
- Removes pores and voids immediately after the soldering process reliably and vibration free



VisionXP+ | VisionXP+ Vac
High-End convection soldering

- Efficient reflow convection soldering process at highest process stability
- Industry 4.0
- Vacuum down to 10 mbar for reducing the number of voids in the solder joints
- Efficient residue management with pyrolysis
- Highest energy efficiency with reflow soldering



VisionXS
Convection soldering for Mid-Range applications

- Modular system concept
- Efficient heat transfer
- Stable process for lead-free applications
- Minimal downtime
- Integrated residue management
- User-friendly software tools for process monitoring



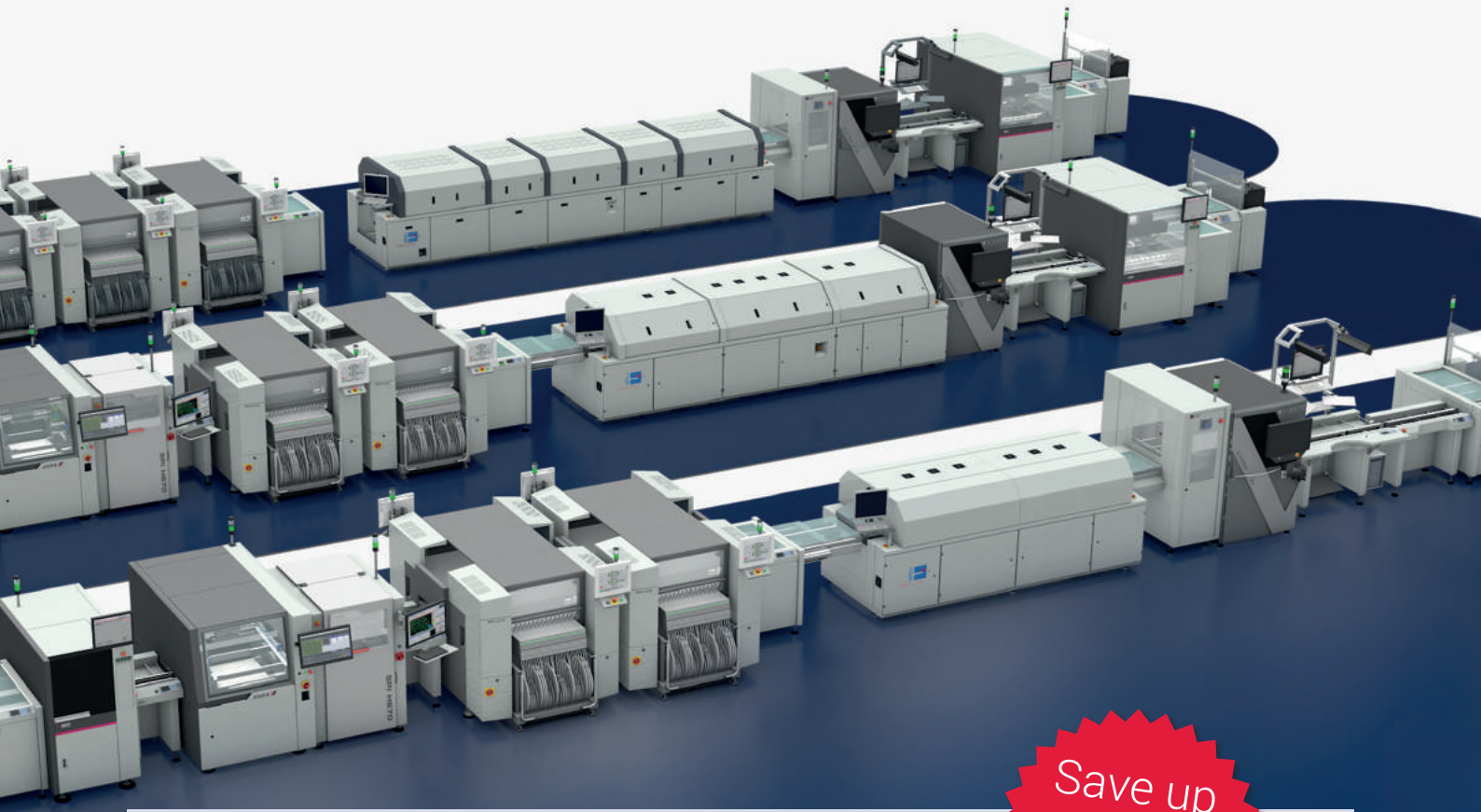
VisionXC
Convection soldering with compact design

- Optimized heat transfer and thermal stability
- Excellent process performance at minimal space
- Efficient residue management system for a clean process chamber

The right system for every application
Innovative solutions from Rehm

Your production department can meet any requirement using manufacturing equipment from Rehm!

With the **Vision-Series** we offer different systems for optimum soldering processes in the most diverse of manufacturing environments. Different process zone lengths are available depending on the type of system. The pre-heating, peak and cooling zones have the same pitch and therefore are constructed in a modular design. Additional features such as a vacuum unit for void-free soldering, double pyrolysis for a better cleaning result or underside cooling for gentle processing of high-mass boards are optionally available and can be added to the system concept seamlessly.



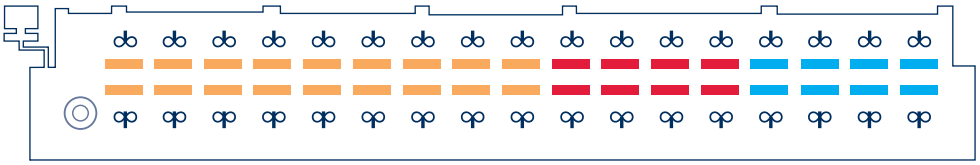
Save up to **20 %** energy!

- **Modular, flexible system concept**
- **Energy efficient system with lowest CO_2 emission**
- **Highest process stability even with lead-free soldering**
- **Minimum downtime and lowest maintenance effort**
- **Excellent traceability due to smart software tools**
- **Lowest „Total Cost of Ownership“**

System varieties
using the example of VisionXP+ nitro:

VXP+ nitro 3500 (Typ 734)

- nitrogen operation
- length of heating zones
- number of pre-heating zones
- number of peak zones
- number of cooling zones



TYPE	Process zone	Throughput*
523	2450 mm	115 / h
634	3150 mm	130 / h
734	3500 mm	145 / h
834	3850 mm	160 / h
934	4200 mm	180 / h
944	4550 mm	200 / h

pre-heating zones · peak zones · cooling zones

*approximated values of a PCB length of 300 mm and a distance of 100 mm

Large batch sizes – frequent product changes?
We will find the best system for you!

Requirements in the field of reflow soldering are as varied as the products produced on an SMD production line. That is why we provide you with intensive guidance before the purchase decision as to which system is the most efficient for the applications you require.

We take all relevant parameters into consideration in the process of this. Take for example the throughput rate, this is one of the most important parameters for determining the optimum process zone length. If frequent product changes and multi-shift operation are added to the equation, additional options will be required that need also be taken into account. After clarifying all the process-relevant parameters, you can rest assured that you will have a reflow soldering system adapted to all your needs, one with which you can manufacture reliably and efficiently. The diverse range of options within the VisionX range means that we have the right system for every manufacturing environment.

Reliable from A to B
with flexible transport systems

Your component will run through various sections of the system during the soldering process: from the preheating zone, through the peak zone to the cooling zone. Secure transportation is a key entity when it comes to continuous processes. Rehm offers flexible systems for this.

Our transport systems provide the perfect fit for your components regardless of the circuit board geometry. Transport lanes and speeds are variably adjustable and enable parallel soldering processes with lead-free or leaded soldering in one reflow system. Depending on the product requirements, you can choose from various transport models such as individual and double track transport, quadruple or multi-track transport.

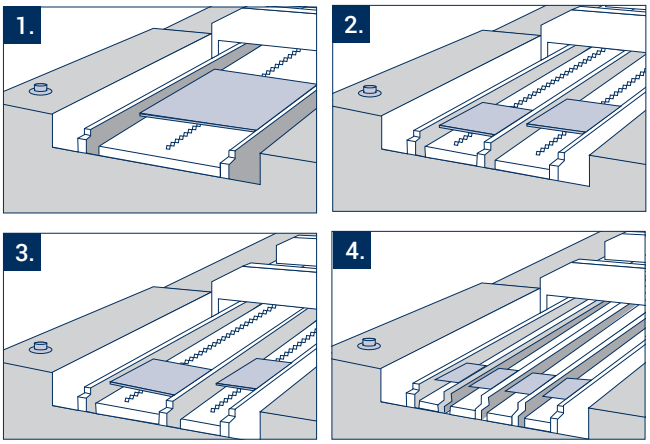
The optional centre support enables even the processing of large circuit boards or boards with a flexible base material with ease and prevents any sagging during the reflow soldering, thus guaranteeing a maximum degree of process stability.



top left: dual lane transport, top right: chain oiler
bottom left: lash chain centre board support, bottom right: quad lane transport



Transport systems



1. Single lane transport
one adjustable chain

2. Dual lane transport
two adjustable chains, synchronous/
asynchronous transport speed

3. Multi-track transport
three adjustable chains, synchronous/
asynchronous transport speed

4. Quad lane transport
four adjustable chains, synchronous
transport speed and width adjustment

- **Reliable, failure-free production guaranteed by absolutely parallel transport**
- **Precise and repeatable adjustment of the transport width**
- **No influence of the temperature profile by transport or center board support**
- **Reduced maintenance, transport drive mechanism is outside of the process chamber**
- **Ideal for any application due to various transport systems**
- **High process reliability by integrated center board support**

From zero to 240 °C
due to optimized heat transfer

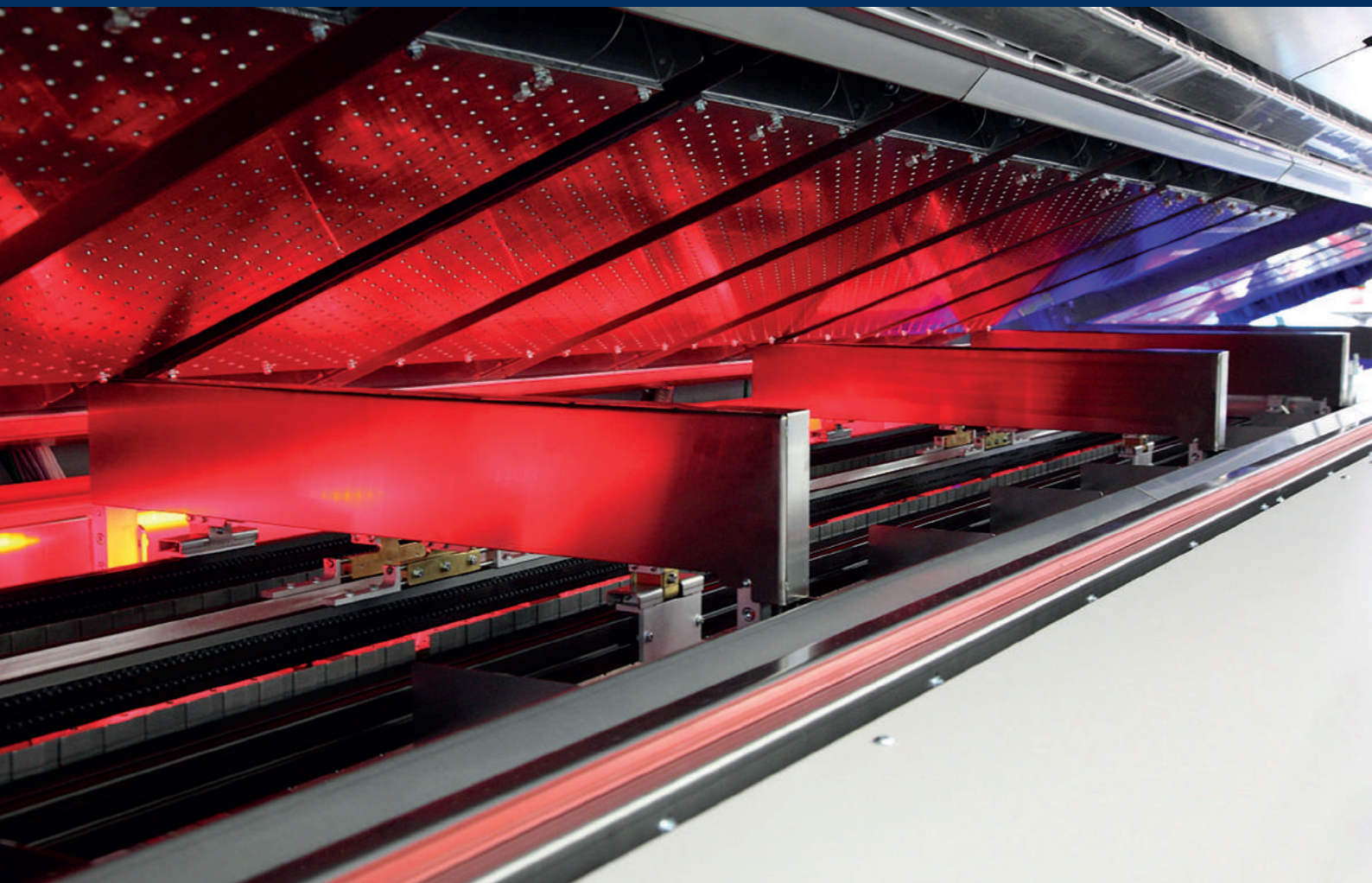
Each product has its own requirements in the manufacturing process. Optimized heat transfer over the entire soldering process is the basis for best possible results.

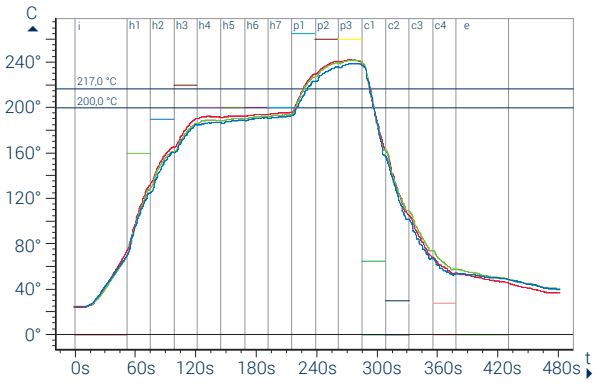
The Vision-Series offers flexibly controllable pre-heating zones within which your PCB is preheated and prepared for the actual soldering process. The individual zones can be controlled independently of each other via fan frequency, and assure best possible processes.

The VisionXP+ is equipped with special nozzle sheets for optimized heat transfer by means of uniform air flow over the PCBs. Flow speeds in the upper and lower heat zones can be separately controlled, assuring that your PCB is heated up through and through – completely and uniformly. This prevents stressing of the material which can disturb the soldering process. In addition, smaller componants are not overheated and bigger ones are still heated through enough.

To ensure that the heat flow in the system runs stably and the outward heat radiation is as low as possible, our Vision systems have optimum insulation between the process chamber and the exterior wall.

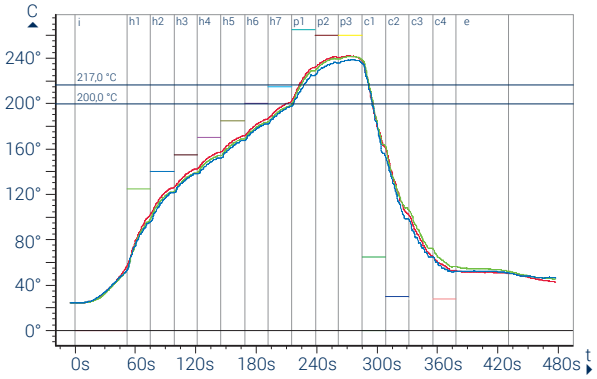
Using precise profiling we can generate precision-reproducible temperature profiles which are tailored to component size, material or process parameters.





Saddle profile

The component is brought to a temperature of at least 240 °C for soldering. Using a saddle profile the board is gradually heated in line with pre-defined, individual temperature ranges. Even components with differing thermal masses are heated homogeneously and temperature differences minimised.

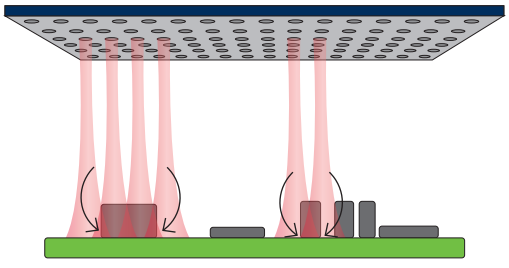


Linear profile

With a linear profile, the component is not heated in a stepped manner during soldering, in fact it is heated along an identical linear temperature gradient. Linear profiles can reduce cycle times and can help to reduce soldering errors such as tombstoning.

Convection

The centrepiece of our Vision-Series is the process chamber with its outstanding heat transfer owing to advanced hole nozzle geometry as well as monitored adjustable overpressure in the heating module, guaranteeing homogeneous and gapless heat transfer to the circuit board. The inert process atmosphere can be assured throughout the entire soldering process and beyond because the closed system ensures that no external air finds its way into the process chamber. The heat flow within the system takes place by means of circulation, i.e. the process gas of the preheating and peak zones is extracted, cleaned and reinserted into the process at the sides.



Homogenous heat transfer

- **Separately adjustable heating zones**
- **Reproducible temperature profile**
- **Outstanding process stability with the smallest possible ΔT**
- **Homogenous heat input over the entire PCB thanks to specially designed nozzles**
- **Low maintenance effort**



A clean machine:
effective Residue Management

As is the case with all industrial processes, substances are generated during SMT production which have to be removed from the process cycle because they contaminate the system. Our highly effective residue management function purifies the process gas safely and reliably, and keeps your system clean and dry.

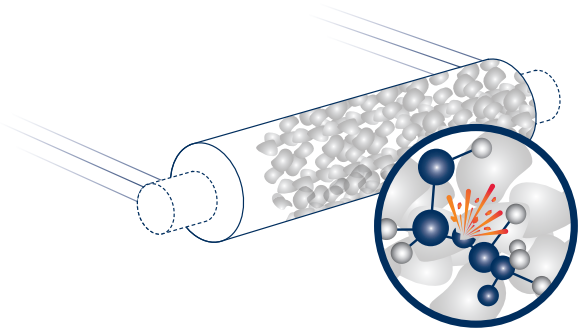
The residue management function included in the Vision-Series combines depending on the system type two different modes of action: pyrolysis in the heat zone and cold condensation in the cooling tract's filter units. Liquid and crystalline residues are effectively removed by means of this combination.

VisonXP+, Vision XP+ Vac and Vision TripleX are equipped with pyrolysis and filter units in the cooling zone as standard. Pyrolysis can optionally be added to VisionXS models for the purposes of cold trapping. VisionXC systems are fitted with cooler filter units in their cooling zone.

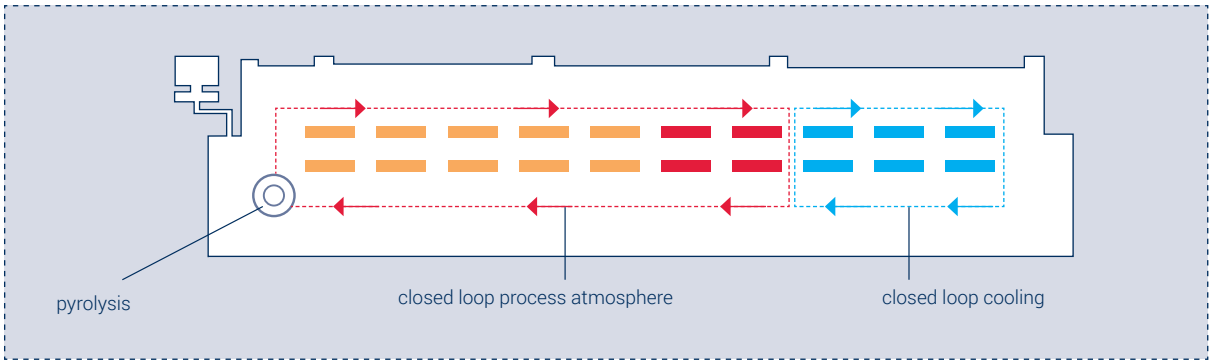
In order to make your manufacturing system even more efficient, the VisionXP+ is optionally available with double pyrolysis. Your system's cleaning efficiency is significantly increased. The first pyrolysis unit is located underneath the inlet area. It purifies the nitrogen from the heating zones. The second pyrolysis unit is installed on top of the inlet area and filters the process gas from the heating zones. Cleaning efficiency is significantly increased for the process gas and the soldering system's chambers are kept clean and dry with very little maintenance and minimal downtime.

Pyrolysis at 500 °C

not available for VisionXC

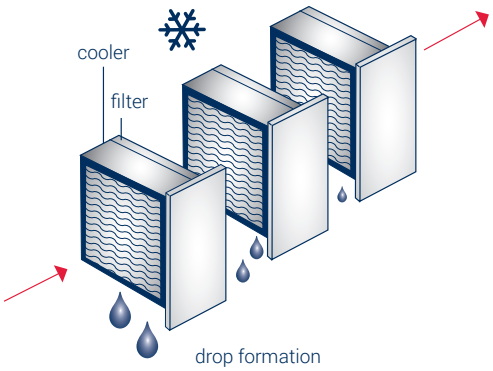


Residues are separated with the help of a special granulate during pyrolysis. Long molecular chains are broken down (cracked) into smaller elements by means of thermal fission. Temperatures from about 500 °C are required to this end. Afterwards, the molecular chains are small enough to be taken up by the granulate and removed from the production process. The granulate only needs to be changed once a year, making the pyrolysis unit easy to maintain – and you profit from minimal downtime. Your manufacturing processes continue to run smoothly.



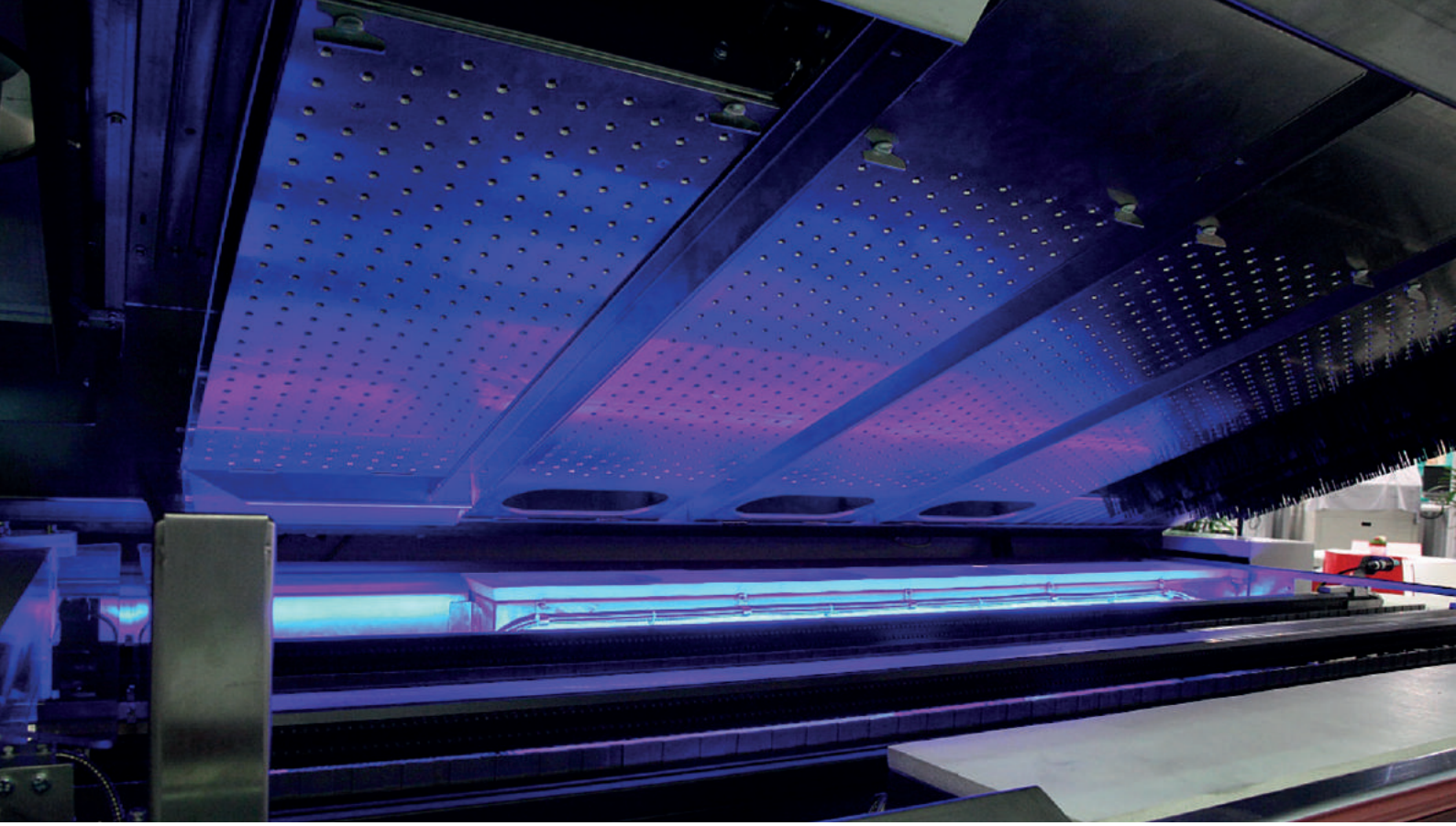
Cold condensation

Liquid residues condense above all on the cooling tract's filter units, by which they are then removed. The system is easy to clean. The filters are exchanged in sets at the back of the system. The process chamber doesn't even have to be opened. Depending on system type, the oven is equipped with a 2, 3 or 4-stage condensation trap.



- **Efficient cleaning for a clean and dry process chamber**
- **System integrated solution**
- **Reliable, stable process**
- **Easy accessibility**
- **Low maintenance effort**

low maintenance expenses



Stress-free to below 50 °C
with powerful cooling systems

It is important to have a high-performance cooling tract in order to guarantee optimum soldering results and ensure that modules are cooled gently.

Rehm Thermal Systems offers a wide range of cooling tract variants for reflow convection soldering with its VisionX-Series, which can be precisely fine-tuned to suit any production process. The water-cooled standard solution with heat exchanger and adjustable ventilation system works as an effective "Closed Loop" system. There are several efficient, additional options for large and high-mass boards, primarily a power cooling unit as an extended cooling tract or a bottom cooling system.

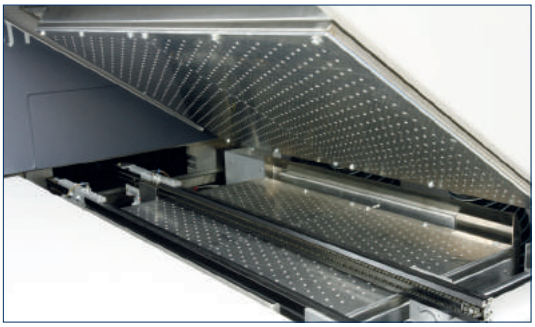
- **Stress-free cooling using individually adjustable ventilators in the classic cooling zones**
- **Gentle cooling through the use of the power cooling unit as an extended cooling tract**
- **Optimum cooling of large, high-mass boards thanks to additional bottom cooling**
- **Flexible combination possibilities through a range of different options**
- **New, sustainable cooling principle as a result of liquid nitrogen cooling**

Closed Loop System

The Vision-Series transforms the classic cooling tract into a two or four-layer system, depending on the facility. This design incorporates an active cooling process, water-cooled using heat exchangers following an efficient "Closed Loop" system. The process air is cooled in the heat exchangers and then flows onto the module from above. The air is subsequently sucked underneath, cleaned using a filter system and is then ready for the next cooling process. Individually adjustable ventilators in each of the zones make it possible to precisely control the cooling process and influence the cooling gradient accordingly.

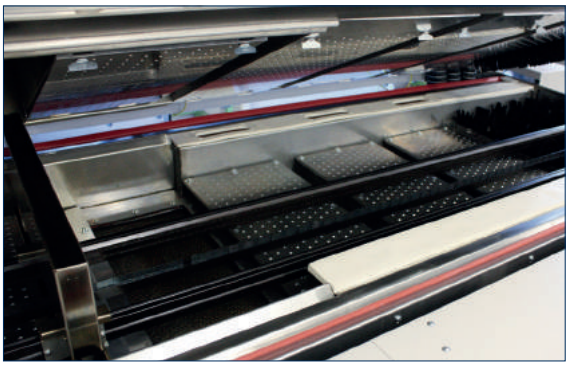
Power Cooling Unit

In order to cool complex modules it is possible to extend the cooling zones using a power cooling unit. As part of this process, cold air is fed onto the board from above and below, where it can be cooled in a more intensive, gentle manner as a result of the process being extended. The power cooling unit can be implemented in the form of an extension to the standard cooling zones under nitrogen atmosphere and is also available as a separate, downstream module for increased cooling capacity for insensitive materials under normal atmospheric conditions.



Power Cooling Unit PCU

Bottom Cooling



Cooling zone with bottom cooling

Bottom cooling makes it possible to cool high-mass boards easily and effectively. The cold process air is blown onto the board in equal measures from above and below in order to facilitate a particularly homogeneous cooling process and to reduce tension in the material. It is possible to adjust the ventilator speeds for each module. This means additional cooling measures, such as an outfeed belt with ventilators, are unnecessary thanks to the low outlet temperatures. It is predominantly modules with inhomogeneous distribution of the copper positions that will be protected against twisting and warping as a result of bottom cooling.

Rehm CoolFlow

only VisionXP+

Rehm Thermal Systems has been working with its partner Air Liquide to develop an innovative cooling principle for the effective use of the nitrogen required for inertisation and designed the first coolant-water-free reflow soldering system with liquid nitrogen cooling. The liquid nitrogen, which reaches temperatures as low as -196 °C, cools the inside of the cooling tract, evaporates and is then used for inertisation whilst in a gaseous state. This not only provides the system with the necessary coldness, but also the inert environment. As a result, the coolant water that is re-cooled using a high amount of energy, as well as the cooling unit and refrigerant are no longer required at all. This method could save around 17 tonnes of CO_2 and 30,000 kWh per system, per year.

2-in-1 solution for reflow soldering
VisionXP+ with or without vacuum

Energy-efficient, low-maintenance and void-free - with the Vision TripleX, we offer an innovative solution for reflow soldering. The combination of vacuum unit and condensation soldering process in only one system provides undreamt-of possibilities!

Vision TripleX is a patented new development in the field of convection and vapour phase soldering. The system is based on the reflow convection soldering systems of the Vision series and combines the convection soldering process with the proven vapour phase soldering process of the Condenso series. Thus, three processes can be run in the **Vision TripleX:** Reflow convection soldering with and without vacuum as well as vapour phase soldering using Galden®. This offers uniquely flexible manufacturing options.

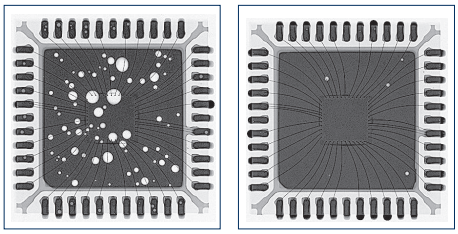


- 3-in-1: The combination of classical convection soldering, convection soldering under vacuum and condensation soldering in only one system
- Flexible temperature profiling due to the combination of convection and condensation, in combination with the applicable atmosphere (air, N2 and/or Galden®)
- High quality solder joints on assemblies with large differences in thermal mass
- Compared to existing Condenso systems, the Vision TripleX requires no additional carrier is necessary

Efficient, easy to maintain and void-free

valid for VisionXP+ Vac and Vision Triplex

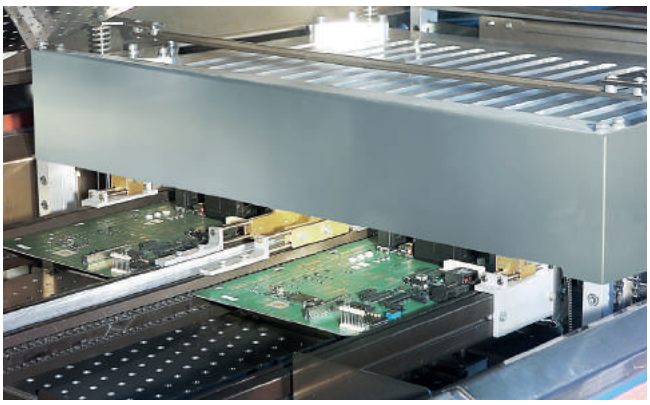
The vacuum chamber is installed as an enhancement to the available peak zones. The integrated pyrolysis and separate filtering of the atmosphere extracted from the vacuum chamber are additional plus points in terms of maintenance and cleaning. A generously dimensioned vertical travel range of the vacuum chamber in the service position enables good access to the internal mechanisms during maintenance periods.The automatic running of the process chamber into the processing or maintenance positions minimises downtimes and reduces maintenance effort.



without vacuum | with vacuum

Divided, separately regulated transport system

valid for VisionXP+ Vac and Vision Triplex



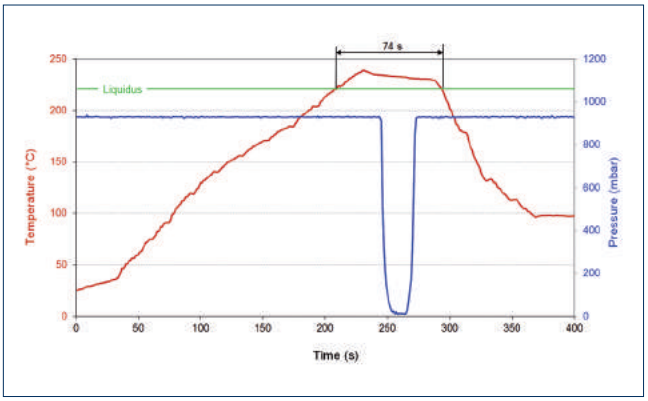
Opened vacuum chamber of the VisionXP+ Vac

The systems with vacuum chamber are equiped with atripartite transport system: pre-heating/peak area, vacuum unit and cooling zone. All three areas of the transport system can be optionally equipped with a central support for particularly wide boards. The possibility of reducing the transportation speed in the cooling zone when using the vacuum enables the extension of the cooling time of components and therefore guarantees an optimum temperature for subsequent process steps. The throughput of the system is additionally increased with the expansion of the transport system by a second track.

Precise pressure and temperature profiling

valid for VisionXP+ Vac and Vision Triplex

All heating zones are regulated individually and separated from each other thermally, guaranteeing flexible profile guidance and a stable reflow process. The measurement of a temperature profile with the vacuum process switched on shows that despite a very low vacuum of 10 mbar, all profile settings have been fulfilled (≤ 3 K/s heating, tL ≤ 90 s, TP ≤ 240 °C). With the help of the heating integrated into the chamber, the temperature of the components inside the vacuum unit can be adapted to the settings of the most common standards. This refined solution ensures a time-efficient and stable production process.



Pressure and temperature profile of a soldering process with the VisionXP+ Vac



1. Alarms

The top area of the screen gives you a clear overview where you can view, interpret and edit alarm messages.

2. Favourites bar

In the favourites bar you can view selected values. This then appears on the main screen and on every page in the defined position.

3. Status bar

Colour-contrasting markings in the status bar provide you with information on the operating mode of the system.

4. Machine view

The machine view offers an overview of the modular construction of your system, the current loading situation and the status of the process zones.

5. Options

Machine options can be set depending on the system equipment. For this there are up to ten different options available for your manufacturing process.

6. Display area

The display area shows you all profile parameter actual values, e.g. temperature, filter or system power consumption.

ViCON Vision

Innovative software
User-friendly and easy operation

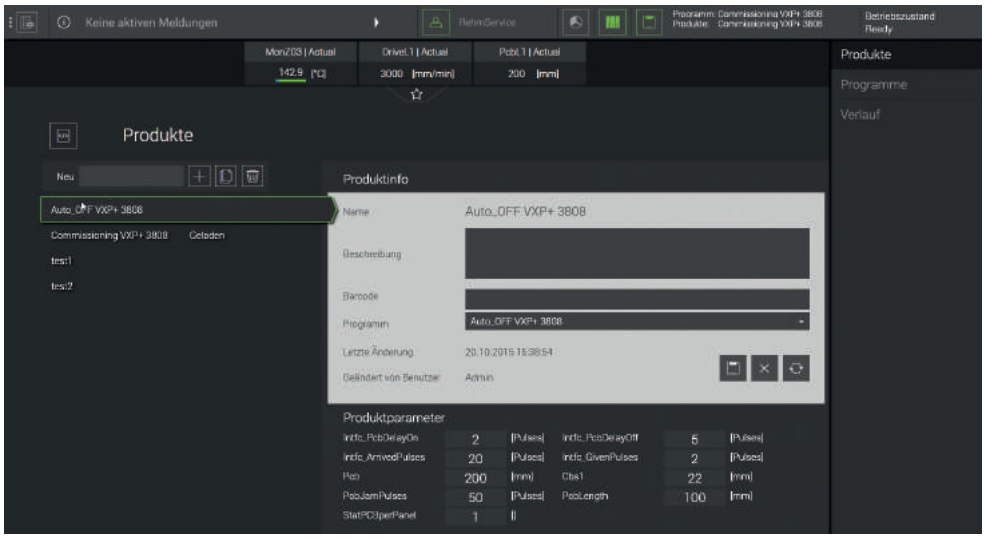
With the ViCON Rehm offers straightforward software for the Vision-Series, boasting intuitive operation with its touch-screen surface.

All messages, commands and parameters can be viewed at one glance on the main screen using machine view. With a number of features including a freely configurable favourites bar, the structured grouping of parameters or individual process tracking and documentation ViCON provides you with optimum assistance in your production processes.

While developing the software Rehm experts have refined many aspects including product management. The creation of new products or the copying of certain properties in parallel with production on the machine is enabled. The parameters for new creations are directly selectable, meaning that the production sequence can progress faster and without any disruption.

As well as that, you can immediately recognise which action mode the system is in from the operating status. Errors are easier to differentiate and alarm messages can be evaluated quickly and reliably.

Another plus of the ViCON is defining user administration. Through the assignment of specific user roles each user has exactly those rights activated that he or she needs for operation and work on the system – without any rigid hierarchy.



Clear product management with offline programming

- **Intuitive software operation with touch-screen surface**
- **Clear product management with offline programming**
- **Parameter transparency through module groupings**
- **Easy adaption due to favourites bar**
- **Multilingual software**



Industry 4.0
Intelligent Software Solutions

Software solutions from Rehm allow the reliable control and monitoring of systems from the VisionX-Series.

The software components are consisting of monitoring tools and various modules, each of which completes its own individual task. Master software compiles the data and evaluates it, for instance in order to keep the specified parameters constant for the respective manufacturing profile. The modular system can be assembled into individualized packages and matched to the customer's respective requirements. Custom tailored master software is available for each system type.

Product management

VXP+ Vac | VXP+ | VXS | VXC

Clearly structured product management ensures in everyday production that the right reflow program is clearly attributed to the component/item number to be manufactured. Alongside the oven settings, component-specific data can also be saved in product management.

Optimal tracking

ProCap

VXP+ Vac | VXP+ | VXS | VXC



ProCap guarantees the process stability of the reflow soldering system for each individual product. The process parameters are automatically stored for the product upon first start-up. Every additional order is compared with the parameters stored for this product. Each individual component is saved to the ongoing product and order and, where applicable, order numbers and serial numbers are stored along with these. Process deviations and operator errors are logged too. Gradual changes such as, for example, a clogged filter are reliably detected.

Traceability and process interlocking

VXP+ Vac | VXP+ | VXS | VXC

A variety of packages are possible for the VisionX design series in the field of traceability and process interlocking:

- **Traceability / Process traceability via hand-held scanner (order-specific)**
- **Process interlocking via fixed position scanners**
- **Process interlocking and traceability via fixed position scanners**

A data set containing the relevant process parameters during the process is generated in a file for each component as a basis for all packages. Depending on the package, the components can, using the barcode scan, be identified on the component directly or using a routing slip scan (by hand or stationary). If the package contains process interlocking too, the scan is compared with the database and the component is only transported into the oven upon release. With the traceability option, a data set containing the relevant process parameters during the process is generated in a file for each soldered component.

MES connection and ROI

VXP+ | VXS | VXC

Long-standing experience with MES connections makes it possible for Rehm to offer an innovative solution for MES master computer connection which meets every known requirement of modern MES systems. Communication here is based on XML logs transmitted via TCPIP. All data relating to process interlocking, traceability, machine status and other operating data is exchanged here.

ProMetrics
Profiling and monitoring of the soldering process

ProMetrics was developed for monitoring thermal profiles during the soldering of electronic assemblies. It checks how well the created profile meets the required predefined specifications. An envelope graph visualizes deviations of the temperature profile from the specified temperatures. ProMetrics can be used for single and dual lane systems with and without vacuum.

To use ProMetrics effectively, software as well as hardware components are combined for optimal quality control of your temperature profile. For data acquisition, the Solderstar software with associated license dongle is required. Temperatures of a reference board or of the products to be soldered are recorded by means of a measurement data logger in order to be able to check the process stability of the system. The system is equipped with sensors for recording temperatures.



Reference values of module 1



Reference board runs through the soldering system

Integrated System

ProMetrics is a tool for profiling and monitoring the soldering process. The Solderstar software is integrated into the ViCON interface and helps with thermal profiling. The advantage of the integration is on the one hand the central availability of the information in the MES: There is a clear assignment of the data and a uniform logging in the ViCON. Repeated maintenance of data is not necessary and the susceptibility to errors is reduced.

On the other hand, real-time data is generated. The software tracks the exact path of the assembly through the reflow system and notices if the situation changes and there may be a delay. Thus, process changes can be detected immediately. This leads to the highest possible reliability in the calculation of the temperature profile of an assembly.

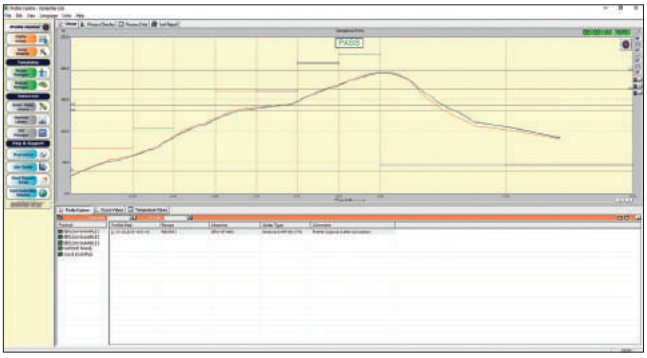
HIGHLIGHTS

- **Clear assignment of the data**
- **Localization of the assembly in the system**
- **Uniform logging in the ViCON Complete data control via MES**
- **Alarm messages in case of deviations from the temperature profile outside the envelope curve**

Procedure
for temperature profiling

Step 1

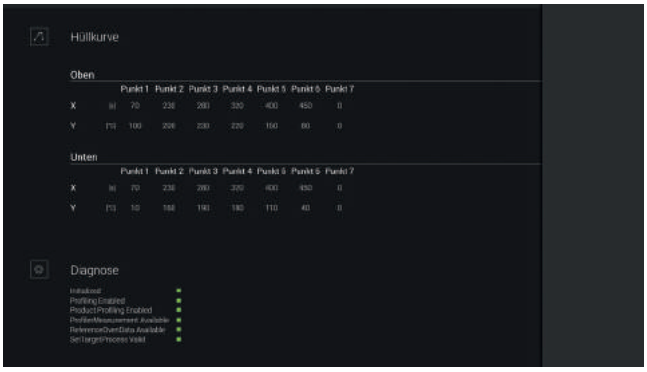
A temperature profile is created with the aid of a test board and the measurement data logger located on it. A reference assembly is then sent through the reflow soldering system. During this process, the transport speed and the zone temperature on the assembly are measured. The measured profile is the result of the environment within the soldering system and the thermal properties of the assembly.



Display of the temperature profile in the Solderstar software

Step 2

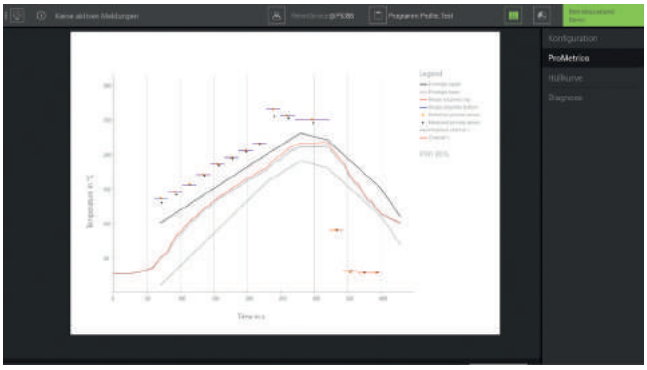
In the meantime, the values for the envelope curve can be entered on the ViCON interface. Every time an assembly enters the reflow soldering system, the board is tracked without gaps and the temperatures are recorded. As soon as the board leaves the reflow soldering system again, the temperature profile is compared with the reference board.



Input of the envelope curve in ViCON

Step 3

This is indicated by an envelope graphic on the integrated monitor. Should a deviation of the parameters occur during the soldering process, it can be detected and evaluated immediately. Thus, a very accurate statement about the soldering process is possible.

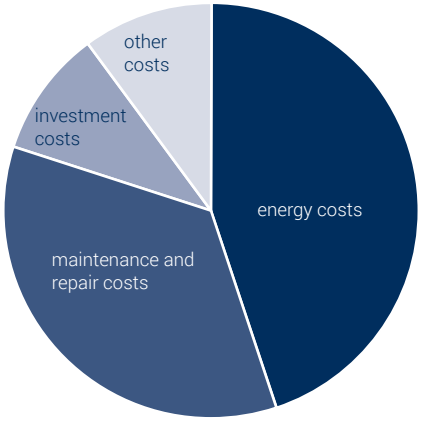


Alignment with reference board in ViCON

Total Cost of Ownership
Searching the true costs

We are aware that the idea of investing in a machine go further than just the one-off cost. Which daily operating costs are taken into account? As can be produced optimally conserve resources? And how often is a maintenance necessary?

Against the backdrop of the current economic environment, companies need when purchasing their production equipment and of course to think about where savings are possible. The "Total Cost of Ownership" program Rehm provides answers to these challenges. It aims to help companies to reduce their operating costs over the long term and maximize profitability.



Recordable apportionment of costs over the system life cycle

Factors of influence operating a soldering system
using the example of VisionXP+

Our systems enable a particularly efficient production. They are equipped with several features like optimum insulation, best heating and cooling performance and stand-by mode, which protect both your pocket book and the environment on a sustainable and long term basis.

Power

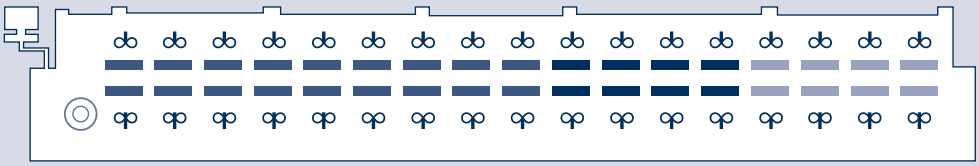
- Stand-By-Mode
- Innovative fan control

Nitrogen

- Sealed process chamber
- No nitrogen loss
- Nitrogen control

Water

- Closed cooling water loop



Noise emission

- Insulation
- No cover fans

Production environment

- High-quality insulation
- Concept for heat recovery

Emissions

- Pyrolysis
- Combined residue management (crystalline/liquid residues)



Resource management
Environmental concerns in focus

Sustainability is essential – this realisation has long since dawned on the electronics sector. "Go Green" nothing more than a future vision of the industry? Not necessarily! Investing in efficient systems can enable companies to reduce their energy consumption in the long term. We are no stranger to energy efficiency, sustainability and resource management.

For us, energy efficiency and resource management mean taking responsibility for our products throughout their entire life cycle. Using raw materials from suppliers from throughout the region we manufacture systems which hold their ground on the global market. Less material consumption and reliable valuable waste material recycling during production, short transport routes as well as robust, long-lasting and upgradable systems with low energy consumption values and minimum emissions form the basis of our product philosophy.

- **20 % less energy consumption**
- **Reduced operating costs**
- **Improved site efficiency and minimized downtimes**
- **Control of costs and performance of your reflow system**
- **Optimized budget calculation**

THERMAL SYSTEMS



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 27 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!

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