


Coating and dispensing systems for multifunctional applications



Protecto series
Coating | Dispensing



Coating & Dispensing

Optimal coating and bonding processes for high quality electronics

Secure and flexible protection of electronics

Coating, bonding, sealing and fixing

The surface of leaves serves as the outermost protective barrier for plants. Through this, they can protect themselves from pests or drying out, remove dirt more quickly, or increase their strength. This is particularly well-known in lotus flowers: water simply beads off their leaves. This so-called „lotus effect“ served as the biological inspiration for innovative, self-cleaning surface coatings

Similar to lotus flowers, this also applies to the protective coating of electronic assemblies. Our dispensing systems, ProtectoXP and ProtectoXC, not only shield the assemblies from aggressive environmental influences such as moisture, corrosion, chemicals, dust, or vibrations but can also be used for bonding, sealing, and fixing.

Highly selective conformal coating is the key to reliable electronic functionality and is now indispensable in modern manufacturing. The protective coating is used to preserve the functionality of the circuit board in the long term – application areas range from offshore wind turbines, shipbuilding, military products, telecommunications, medical technology, and automotive to household electronics. Additionally, today nearly every electronic device undergoes at least one bonding process during the manufacturing process. This includes bonding displays, sealing airbag sensors against external environmental influences, fixing SMD components, or even encapsulating entire circuits or individual components.

The Protecto series at a glance

Strong in the process – the coating & dispensing systems

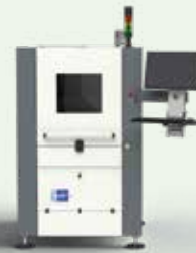
Would you like to combine optimal coating and dispensing solutions and reliable drying methods in your manufacturing process? Are you looking for a high-performance facility that can be smoothly integrated into small production spaces, perfectly suited for processing small batches and requiring only manageable investment costs? The coating and dispensing systems from Rehm impress with their process reliability – for large and small lot sizes. Our conformal coating concept consists of the Protecto coating and dispensing unit and an RDS coating dryer, including handling based on customer specification.



ProtectoXP

Full power even for oversized assemblies

- › Greatest possible process reliability
- › Flexible coating and dispensing options thanks to a wide range of options
- › Highly selective coating and dispensing



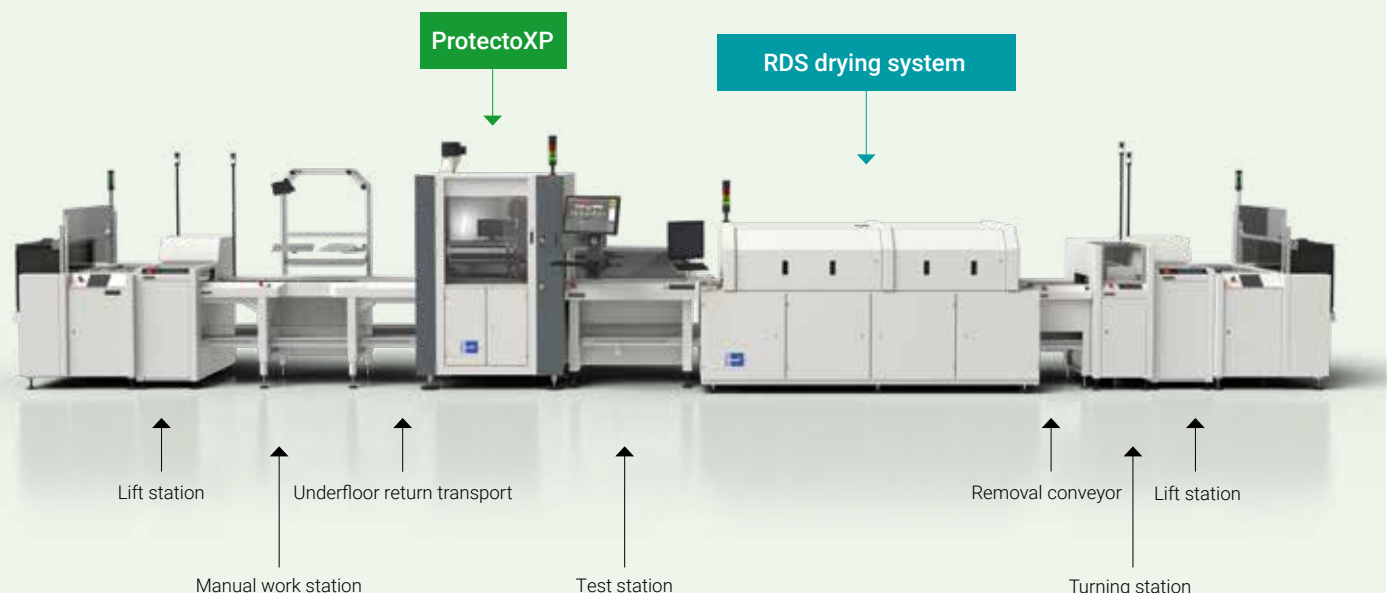
ProtectoXC

Perfect performance

- › Reliable coating process
- › Compact unit for easy integration
- › Optimum process documentation

Turnkey solutions

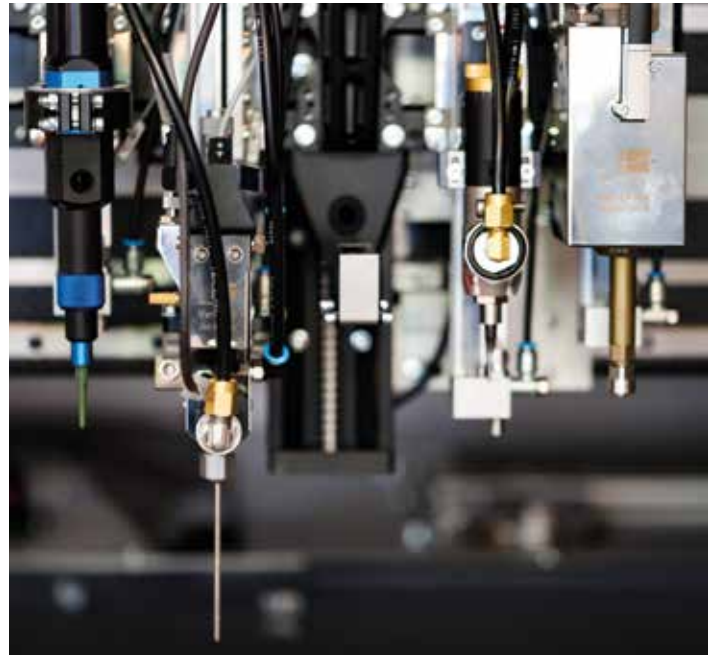
(example solution)



Safe and accurate to the result material application

Protecto meets your requirements for the highest quality, stability and productivity in inline coating and dispensing services. With up to 4 coating applicators, you can synchronise several modules simultaneously in master-slave mode to apply the coating or directly apply with up to 4 different materials without set-up time.

At the heart of the Protecto is coating management working in tandem with nozzle technology. Up to two coating applicators can be used – with a wide range of possibilities. The same nozzle can be used to switch between dispensing, spraying and jetting procedures “on the fly”. Parts which are high up or close together are easy to reach thanks to the slim nozzle design with only 2.4 mm and a length of up to 100 mm. If necessary, parts can be flushed from below due to the patented Vario Coat nozzle, ensuring that hidden ports.



All-in-One lacquering



The patented Stream-Coat® nozzles are compatible with all conventional coatings, from low-viscosity to high-viscosity. With Protecto coating systems you can carry out the various selective application procedures of dispensing, spraying, jetting and curtain coating, “on the fly”. An implicit air nozzle

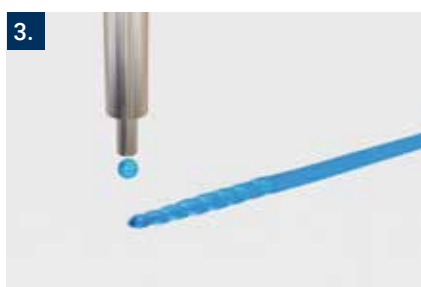
precisely dispenses the coating and distributes it with little splatter or mist. The homogeneous film of coating can, with the aid of the adjustable airstream, even be applied under or behind adjacent component pins and in shadow zones without the need to tilt the applicator.



Precise coating of electronic connections between tightly packed, tall components



Multifunctional system for perfect application



1. Dispensing

Uniform and precise application of a highly thixotropic material

2. Spraying

Coating of large areas with a low splatter and mist spraying procedure

3. Jetting

Pinpoint lacquer application of up to 240 miniature dots per second through rapid opening and closing of the valve

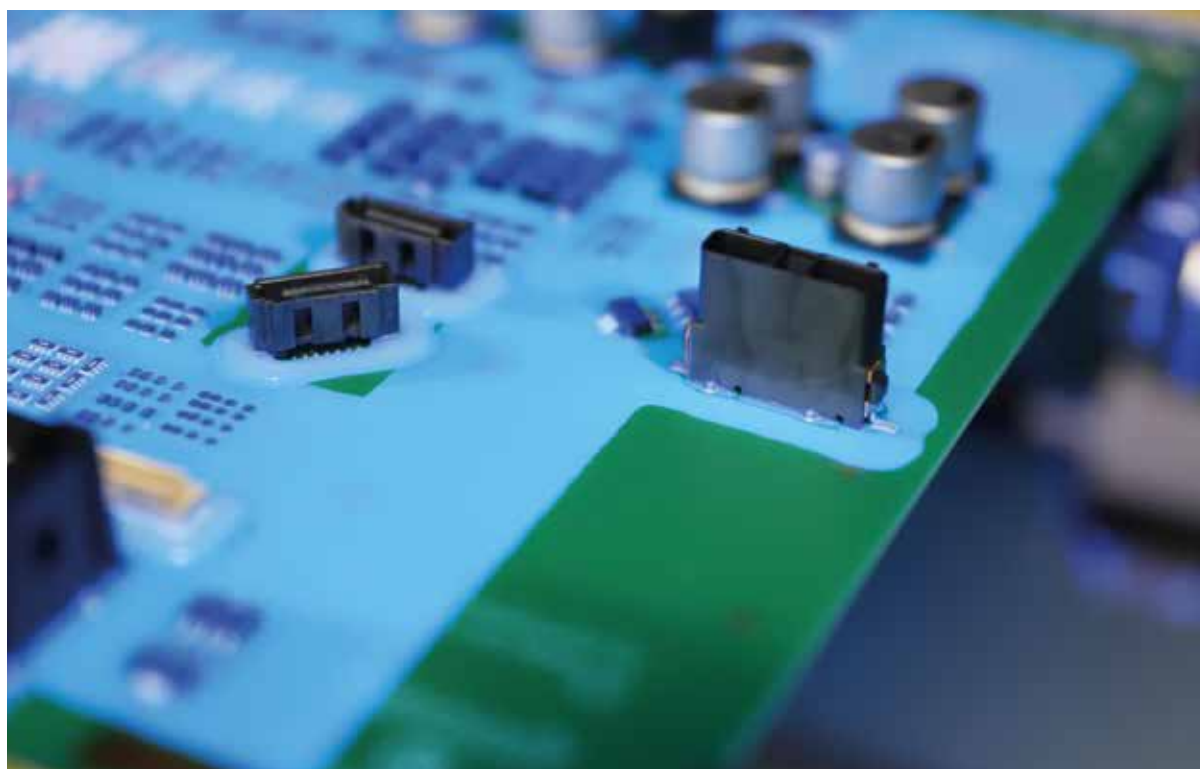
4. Curtain Coating

Spraying and fog-free coating of large surfaces at very high process speed

Optimum coating profile

XP

XC












Protecto systems make precise and homogeneous coating very easy and intuitive to realize.

The application determines the equipment

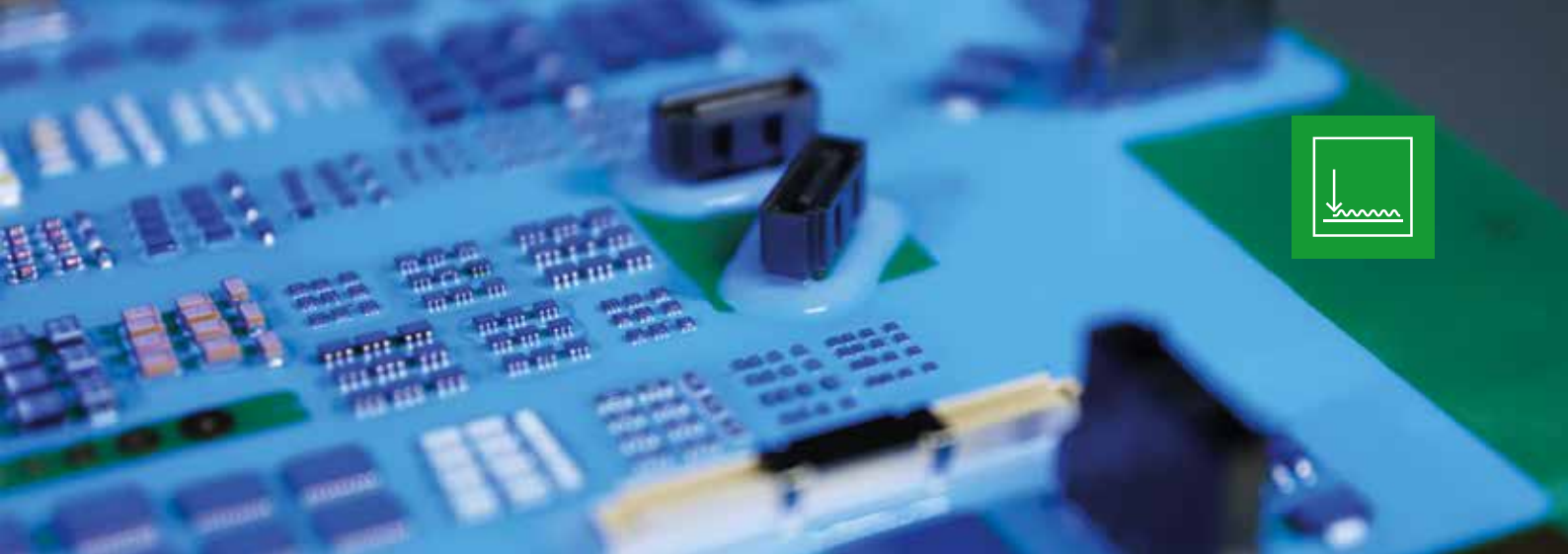
Variety of coating applicators









We have the right equipment for every individual process. Our broad portfolio of paint applicators allows a variety of applications. Both proprietary developments come into play as well as applicators from suppliers who have already established themselves in the market. Various options such

as material needles, patented two-material nozzles and material warmers, are available for the respective applicator. Thus, the plant equipment can be selected using a wide range of different accessories that provides the best combination of cost-effectiveness and process performance.

| | | | |
|------------------------------|--|--|--|
| |  |  |  |
| | Rehm VarioJet System   | Piston return valve   | Rehm VarioFlex Curtain Valve   |
| Application process | Jetting, Dispensing, Spraying | Dispensing, Spraying | Curtain Coating |
| Track width | 0,5 – 12 mm | 2 – 12 mm | 3 – 20 mm |
| Max. component height | 100 mm | 100 mm | 60 mm |
| Application speed | 10 – 500 mm/s | 10 – 500 mm/s | 200 – 800 mm/s |
| Viscosity | 1 – 10.000 mPas | 1 – 150.000 mPas | ≤ 100 mPas |
| Min. dosage | > 3 nl | 0,002 ml | – |
| Repeatability | > 97 % | > 99 % | > 99 % |
| Ø Nozzle | 2,4 mm | variable | 12 mm |

All technical data is dependent on the application material and does not claim universal applicability. Specific parameters shall only be regarded as binding on the basis of a material test.



| | | | |
|------------------------------|---|---|---|
| |  |  |  |
| | Auger doser   | 1K Cartridge Valve   | 2K System  |
| Application process | Volumetric dosing | Dispensing | Volumetric dosing |
| Track width | 0,25 – 5 mm | 0,2 – 8 mm | 1 – 8 mm |
| Max. component height | variable | variable | variable |
| Application speed | 10 – 70 mm/s | 10 – 70 mm/s | 10 – 70 mm/s |
| Viscosity | 1 – 500.000 mPas | 500 – 150.000 mPas | 1 – 500.000 mPas |
| Min. dosage | 0,001 ml | variable | 0,01 ml |
| Repeatability | > 99 % | variable | > 99 % |
| Ø Nozzle | variable | variable | variable |

More than “just” coating

Application possibilities with ProtectoXP/XC

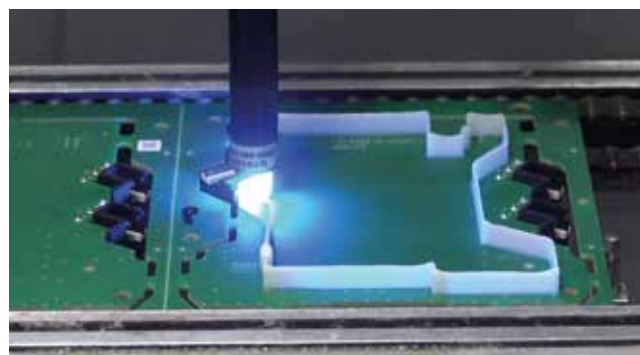
With the Protecto systems, completely new application fields are emerging. Thanks to the highly flexible system construction, you can use ProtectoXC to combine for three and ProtectoXP for four processes within one machine. In addition to sealing the entire circuit board, partial areas or

individual components can also be coated on the support. From the “Glob Top” to “Dam & Fill” to the “Flip Chip Underfill”; diverse applications arised. With innovative nozzle technology, the user can apply a wide variety of materials to the module.

Dam & Fill / 3D-Application



Dam & Fill allows individual areas to be selectively coated on the circuit board, thereby efficiently protecting them. Two materials with different viscosities are used for this purpose. First, a dam is placed around the component to be protected with a highly viscous material. If a UV-curing material is used, this can be cured directly using a suitable UV spot. Subsequently, the component can be cast in the same operation with a low-viscosity material.



Sealing



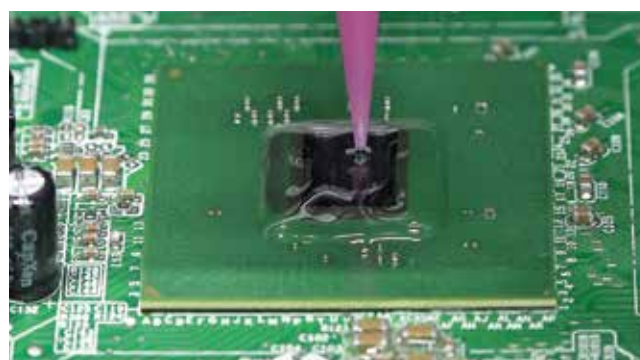
In this process, a 1K or 2K (only XP) material is applied to a component such that a continuous and uniform sealing loop is produced. Volumetric applicators are particularly suitable for this purpose.



Glob Top



A Glob Top is used to protect a selective area on the circuit board. For this purpose, a material is used which, on the one hand, is fluid enough to securely encapsulate all the components involved, but on the other hand, is not so low in viscosity that it flows onto adjacent components.



Flip Chip Underfill

XP

XC

Underfills increase the mechanical stability between the chip and the circuit board and distribute locally occurring voltages over a larger area, which significantly increases the service life. For this purpose, a low-viscosity material is applied along the edge region of the chip, which then independently fills the gap between the chip and the circuit board using the capillary effect.



2K Encapsulation

XP

Encapsulation is always used when a particularly high level of protection is needed. Thanks to the volumetric applicators, it is ensured that exactly the same amount of material is always supplied in the correct mixing ratio, independent of temperature and pressure fluctuations.

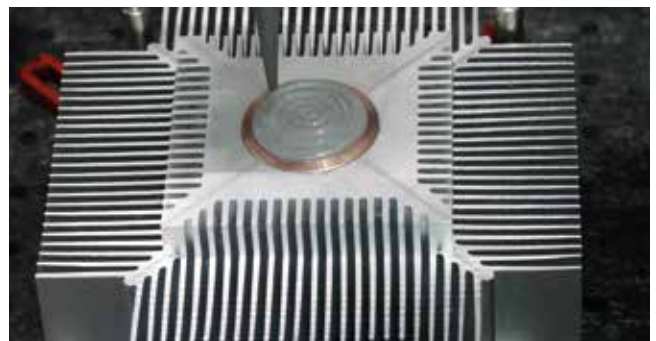


Heat dissipation

XP

XC

Due to the constant miniaturisation in electronics, less and less surface is available for heat dissipation. This makes it all the more important to have an optimal passage between the heat sink and the component. Liquid heat-transfer media can be adapted to the individual contours better than fixed pads or foils and ensure a safe heat dissipation, which significantly increases the service life of the components.



Individual requirements

XP

XC

Are you looking for a partner who can offer you a complete solution for your coating and dispensing process? Then you've come to the right place! Thanks to versatile applicators and conveyor units, we are standing ready to meet many requirements with our standard applications. We are also prepared to tackle new challenges and to implement them for you in a series-production process.





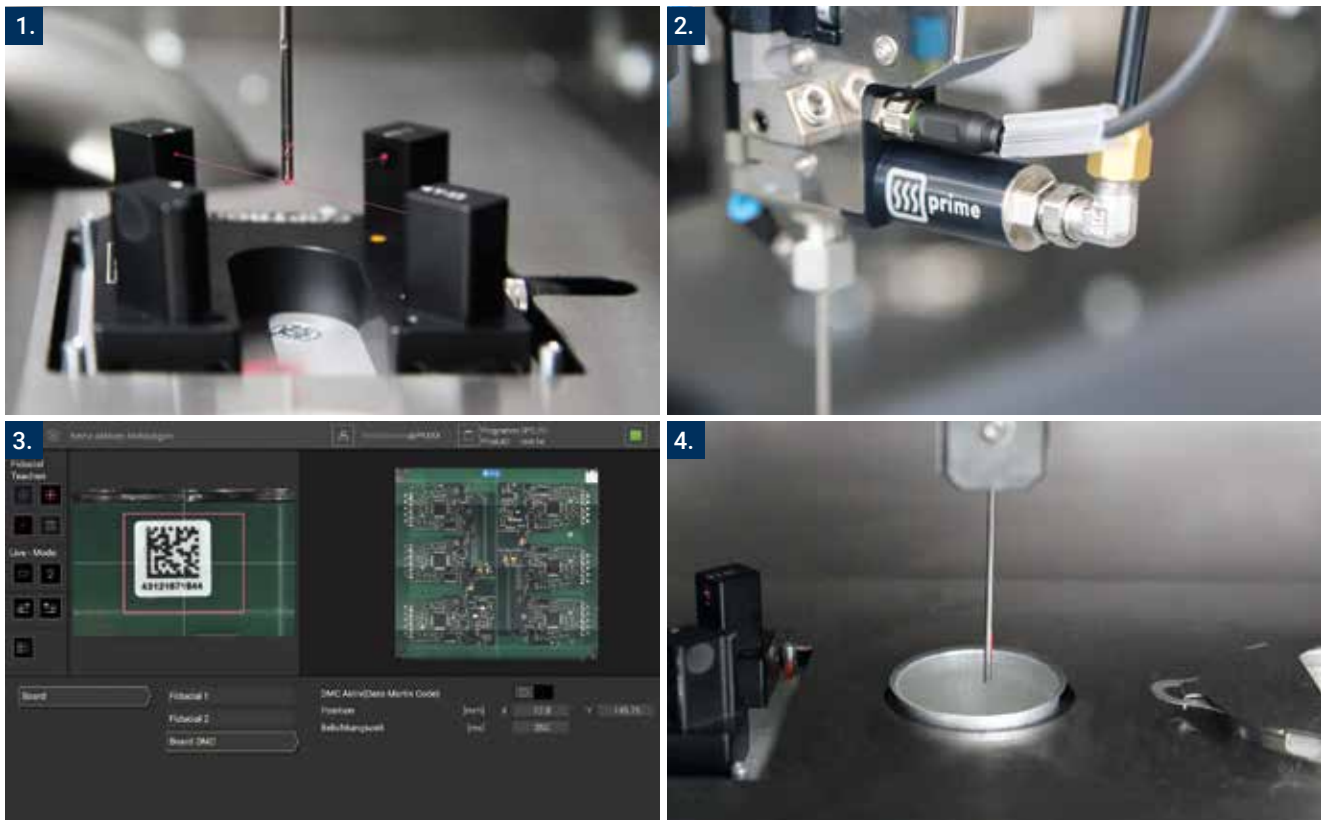
Greatest possible process reliability with innovative options

When it comes to coating and dispensing, one thing is essential: precision. Protecto systems are designed to ensure that the required volume of material is always evenly applied, whether through a pressure valve, a cartridge or a pump from the original container. Automatic needle measurement checks the target position of the applicators in freely definable cycles and if necessary corrects the program automatically. The dispensing of the medium is controlled by the software, which loads the appropriate program with the suitable medium and nozzle type. An optional heated nozzle keeps the protective coating always at a constant temperature and thus a consistent viscosity regardless of environmental conditions. A specially developed lacquer lance with a level indicator prevents bubble formation when changing the lacquer.

For absolute process reliability Protecto systems are optionally equipped with a fiducial camera. This means the coating program can be corrected and coated in the correct position

by registering the marks even if a board is laid into the carrier inaccurately. A barcode checks whether the set coating program is right for the assembly in place. If there is a deviation the process is automatically blocked.

A high-precision weighing cell is optionally available for the Protecto systems, which compares the weight of the paint applied by any given applicator with a previously defined setpoint value and provides the user with corresponding feedback in the setup mode as well as cyclically during series production. As a result, errors in the fluid circuit can be easily and efficiently detected, and eliminated without delay. The acquisition of weight data, as well as configuration and adjustment, are software controlled and can be individually adapted.



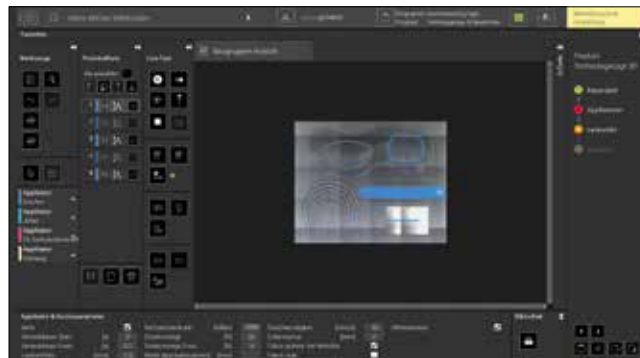
1. Needle measuring cross with auto-correction, 2. Jetter-heating, 3. Fiducial camera (Screen overview), 4. Weighing cell



3D height sensor for precise material application



Precise material application on complex geometry



Software 3D Scan of the example

With a 3D height sensor, the surface of an assembly can be precisely measured in height before the actual application of the material to be applied. This makes it possible to apply the material at a defined relative distance to the surface of the assembly. This allows, for example, individual protrusions of an assembly to be automatically compensated for.

The scanned heights and their corresponding trajectories are displayed in real-time on the ViCON Protecto. Additionally, an image of the actual assembly is superimposed in the background. This allows the operator to track the progress of the material application at any time.

Optimum assembly protection without contamination of the work environment

To avoid exposure to evaporating solvents from the lacquer and encapsulation materials in the immediate vicinity of the Protecto systems, the supply is integrated into the rear of the system. This eliminates any odour issues caused by solvent vapours being released haphazardly into the environment. Additionally, the system is equipped with a securely monitored exhaust that captures and removes solvent-laden fumes generated during the coating process to the in-house ventilation system.



Easily accessible lacquer supply at the back of the plant

Reliable process for cleaning and maintenance



Brush and blowout station ProtectoXP

Rehm has developed a ground-breaking cleaning tank for Protecto systems which is particularly maintenance-friendly. A brush station with a solvent bath allows precise cleaning of the lacquer nozzles. Even if the system has been off for up to several days – depending on the used material – it is operational at the touch of a button without additional cleaning work. The cleaning tank protects nozzles, cables, connections

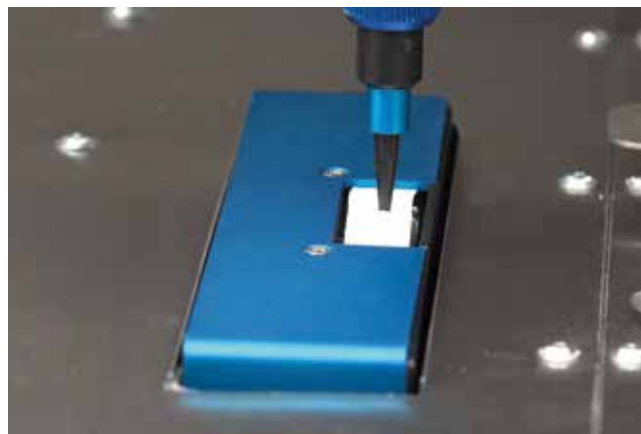


Brush and blowout station ProtectoXC

and ports from drying out and automatically cleans the system during downtime, without wasting resources. This allows long processes to run without requiring maintenance. Depending on the materials even long downtimes without cleaning and flushing the valves or system are possible. All control elements and lacquer stocks are easy to access for the performance of maintenance tasks.

Cleaning band It's not possible without cleaning

Especially in a needle-based application process, it is crucial to have consistent starting conditions for each application. For this purpose, an optional cleaning belt is available, which can automatically clean dispensing needles before an application process.



Integrated residual material wiper

Smart software for efficient processes

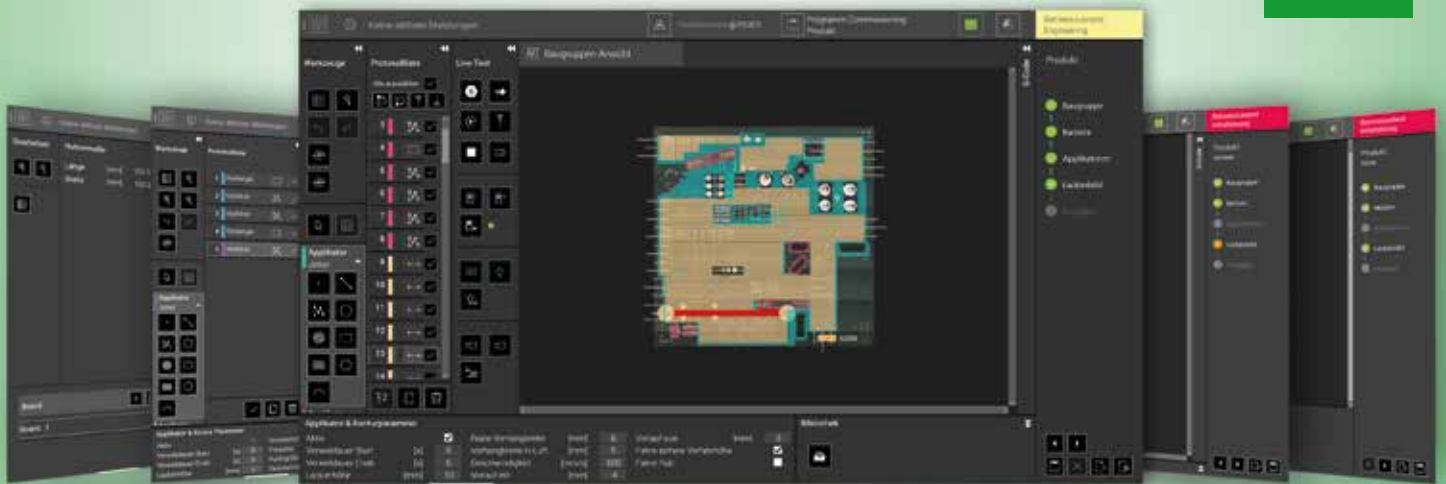


With ViCON, Rehm offers the optimal software solution for its systems – ECAD data import possible with ProtectoXP and ProtectoXC

A variety of analysis tools, more productivity, efficiency, flexible working and the highest quality: With ViCON, Rehm Thermal Systems has designed and created software that meets all the requirements of modern, networked, and above all, future-orientated electronics manufacturing. Alongside the use of touch operating elements and gestures, the new organisation of menu options and control panels, the core feature of ViCON software's development lies in the option of accessing the software from a variety of devices. The ProtectoXP and ProtectoXC dispensing systems are equipped with the ViCON Protecto system software and have numerous features for easy program creation for reproducible coating results.



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



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

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

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

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

Process locking, traceability & co.

for a detailed process documentation

Depending on the production environment, the Protecto systems can be optionally connected to an MES in various ways. Any combination of the various configuration stages of production data acquisition (PDA), traceability, process locking and material locking ensures flexible production. The Protecto systems can be optionally connected to a line master computer or an MES. Depending on the configuration, various data is communicated between MES and ProtectoXP/XC. An interface specially designed by Rehm (ROI – Rehm Open Interface) is used. On the one hand, this

means a high degree of standardisation; on the other hand, customer-specific adaptation can be carried out without problems. To identify the module, an ID-reader (bar code, DMC, RFID) is installed on the conveyor belt in front of the system and connected to the Protecto control. Alternatively, the barcode can also be transmitted via the Hermes interface. Optionally, the identification can also be carried out via the MES. This ensures absolute process reliability through process locking and can guarantee seamless documentation by means of unique data records for each module.

MES-components

PDA

Documentation of the system state according to SEMI E10

- › Productive
- › Stand-By
- › Error
- › etc.

Trace Data

Recording process data for each use

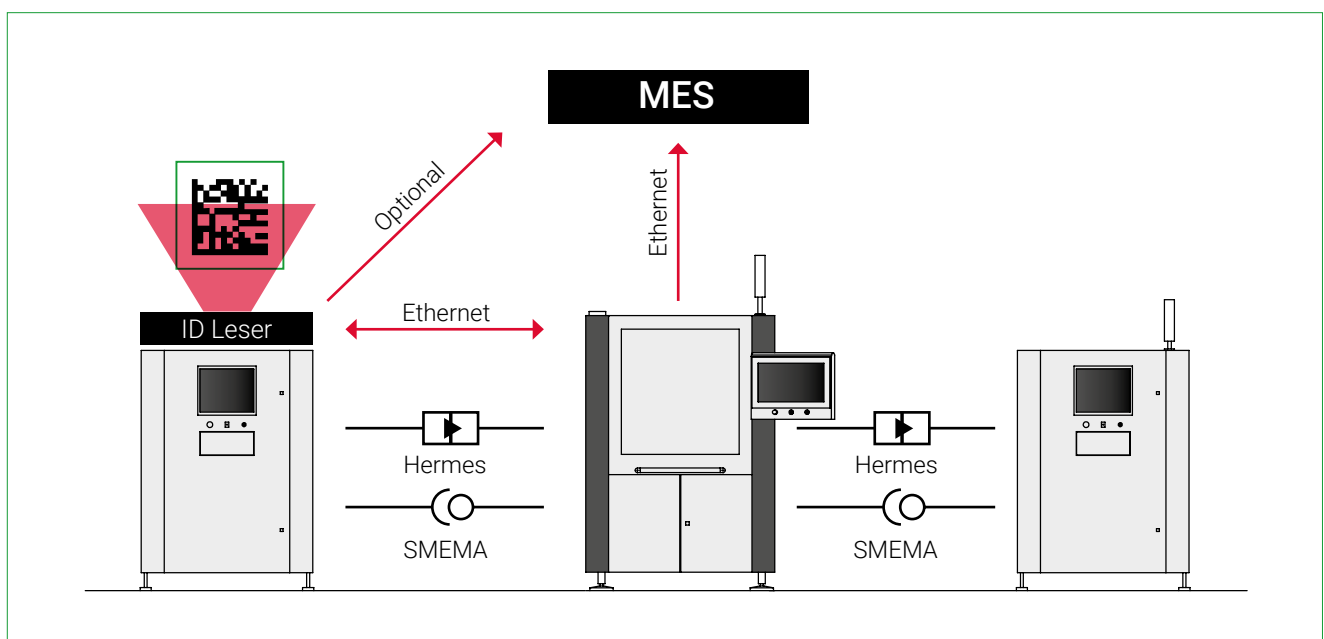
- › Temperature
- › Pressure
- › Serial number
- › Time stamp
- › etc.

Process locking

Verification with every use, whether the program fits the product. Automatic changeover, if another program is required.

Material locking

Verification with every program or change of package, whether the program fits the product. Otherwise, it is not released and the process is locked.



Reliable process control and documentation

Efficient coating and dispensing

Innovative and smart production line solutions

The requirements for the new generation of manufacturing systems have continuously grown: today, it's no longer just about individual machines but about intelligent and smart interconnected production line solutions.

Rehm Thermal Systems offers innovative inline complete solutions. Each project is customised to meet specific requirements, which can be purely technical or may also involve certain configurations related to the environment and efficiency. In this context, in-depth expertise and strong partnerships are essential to achieve the perfect end result for the customer.



Individual Turnkey Solutions

Competence all in one place

Rehm provides flexible line concepts with individually tailored dispensing systems, handling, integrated drying systems, and the option of underfloor transport, all under one roof.

For instance, all models of the Protecto series can be integrated into a single line with the RDS UV dryer, specially designed for curing UV coatings and adhesives with very short cycle times.

To achieve even faster cycle times, the RDS UV dryer has been optimized with a multi-part transport system. This allows two assemblies to be processed simultaneously in the oven while ensuring 100% traceability of each circuit board.

Furthermore, the UV dryer is equipped with a 4-chamber technology, ensuring that no UV radiation escapes to the outside at any time.

Line solution with the RDS UV



Line solution with Under floor return transport



THE BENEFITS

- › Competent consultation from project inception to line installation.
- › Customisation of the line concept according to customer requirements.
- › Ongoing process consultation and optimization in the Technology Center.
- › Integration of handling and inspection systems.
- › Pre-acceptance of the line with all components.
- › Integration of relevant software interfaces and MES connections.



Strengthen your team

Additional products for a consistent concept

We want to offer our customers the greatest flexibility in the coating of sensitive electronics. That's why you can add to your Protecto systems with innovative optional equipment to make it a complete conformal coating line. The compact structure and ingenious equipment of our systems mean they can be integrated in any production line – regardless

of whether you want to produce series with a high output or small batch series with frequent changes of materials. Take advantage of our long years of experience in mechanical engineering! With our coating and hardening plants you'll be at the cutting edge of technology and ideally equipped for all requirements.

RDS UV



Rehm has developed an innovative UV dryer for hardening all UV lacquers. According to material requirement, the system is available with UV curing lamps with mercury medium pressure lamps or UV LED lamps for gluing applications. Its small, compact structure allows the system to be adapted flexibly to any production landscape.

RDS with infrared and/or convection



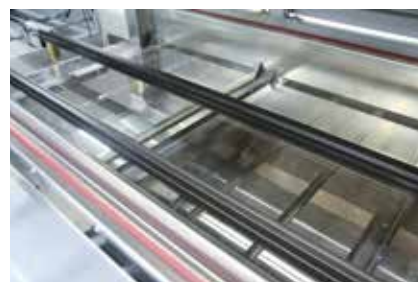
Rehm offers the RDS range for optimum drying and hardening processes. With powerful IR radiators or convection in a heating chamber, the plant dries all common lacquers fast and reliably. A glass cover over the IR radiators minimises maintenance costs.



High-performance lamps in the RDS 1200 UV for drying all UV-hardened coatings



Trouble-free processing of boards with very tall components with the RDS range



Glass covering in the RDS plant for easy cleaning

On-site service

We are there for you worldwide.

The quality levels of our systems are of the highest order. We aim to maintain this high level in our service activities as well. From Blaubeuren via Georgia and Příbor to Szendehely or from Dongguan to Guadalajara – we are there to help for all questions related to sales and service. Anywhere in the world!

Need special advice on our systems, something fitted or a spare part? Our responsibility does not end with the sale! We remain in close contact with our clients and suppliers after they have invested in a Rehm system and make every effort to keep our response times short. We make sure we keep to delivery deadlines, installations and service inspections. And we are also available at any time for questions about applications – ensuring that your production runs smoothly.



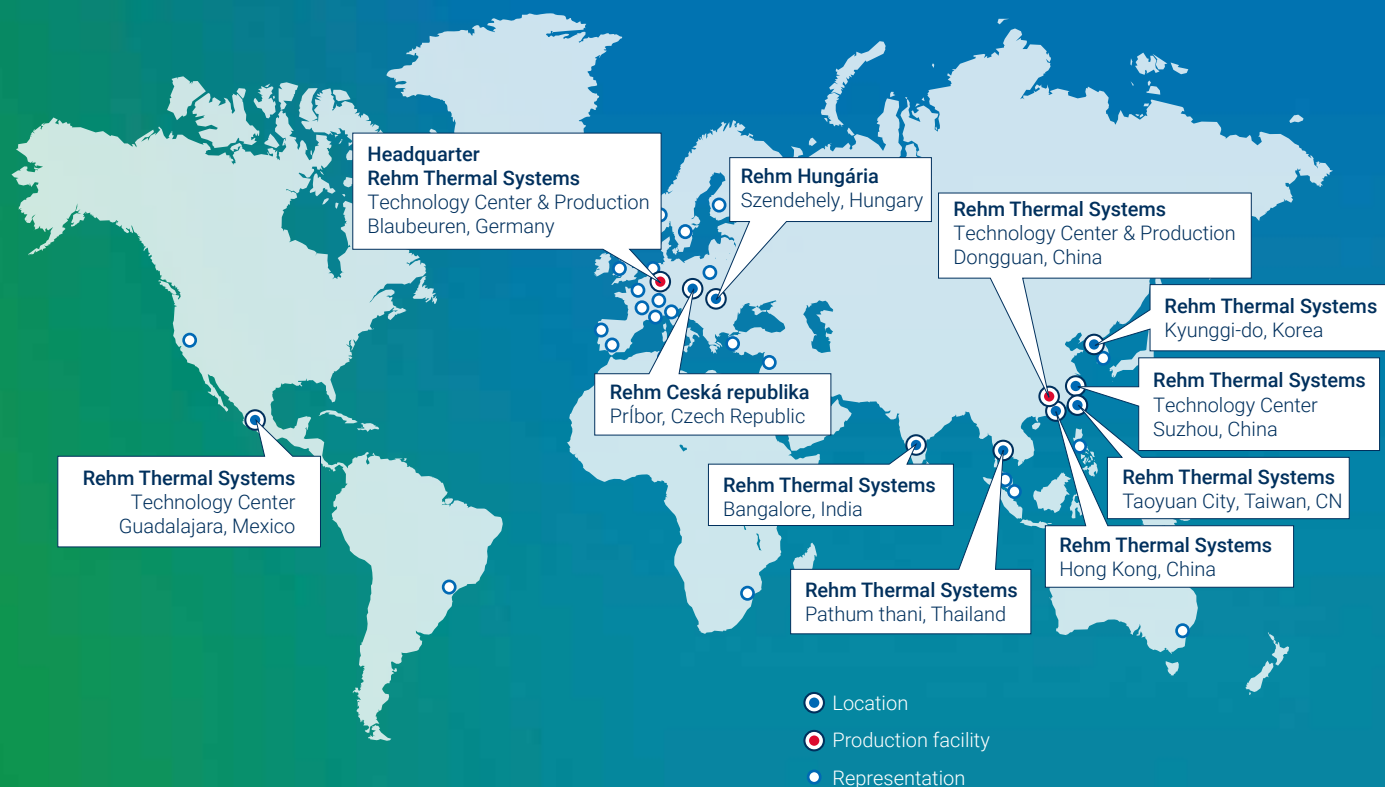
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Rehm Worldwide

As a leading manufacturer of innovative thermal system solutions, we have customers on every continent. With our own locations in Europe, 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!

