THERMAL SYSTEMS

# Protective coating for multifunctional applications

Highly selective conformal coating for maximum flexibility

## Protecto series

Coating

# Conformal Coating

Optimum coating processes even for small batches

## **Protective lacquer coating**
with a focus on what matters most

**The upper surface of a plant's leaves is its outermost defence, not only protecting it against pests and water loss, but also helping shake off dirt or increase resistance. This is a particularly well-known characteristic of the lotus flower. Water just drips right off its leaves. This was the biological inspiration behind innovative, self-cleaning surface coatings with what is known as the "lotus effect".**

The protective lacquer coating on electronic units acts in a similar way. Our coating systems ProtectoXP and ProtectoXC protect sensitive components so that aggressive environmental influences such as moisture, corrosion, chemicals, dust or vibration simply drip off. High-selectivity conformal coating is the key to ensuring electronics work reliably and is indispensable in modern manufacturing. The use of protective lacquer coatings makes perfect sense for conserving the functionality of circuit boards over a long period. Fields of application range from offshore wind farms through shipbuilding, military hardware, telecommunications, medical technology, industrial control and automotive systems to electronics in private households.

# The Protecto series at a glance
## Strong in the process – the coating systems from Rehm

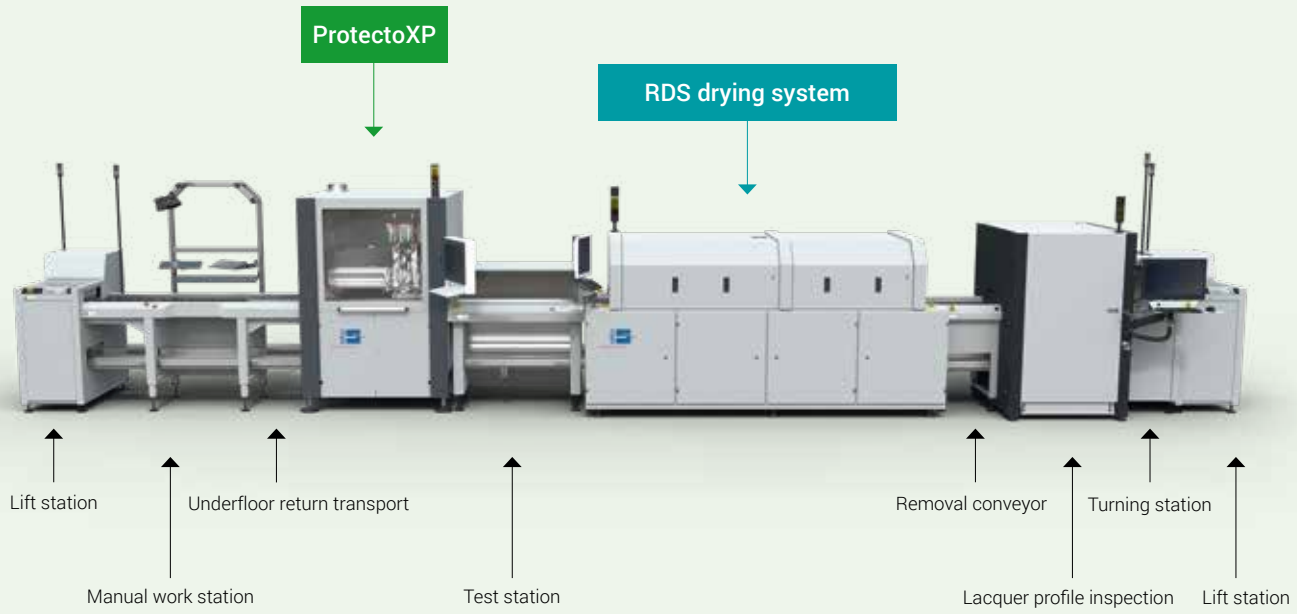
**Would you like to combine optimal coating solutions and reliable drying methods in your manufacturing process? Are you looking for a high-performance facility that can be smoothly integrated into small production spaces, perfectly suited for coating small batches and requiring only manageable investment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

### ProtectoXP
Full power for your turnkey solution

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

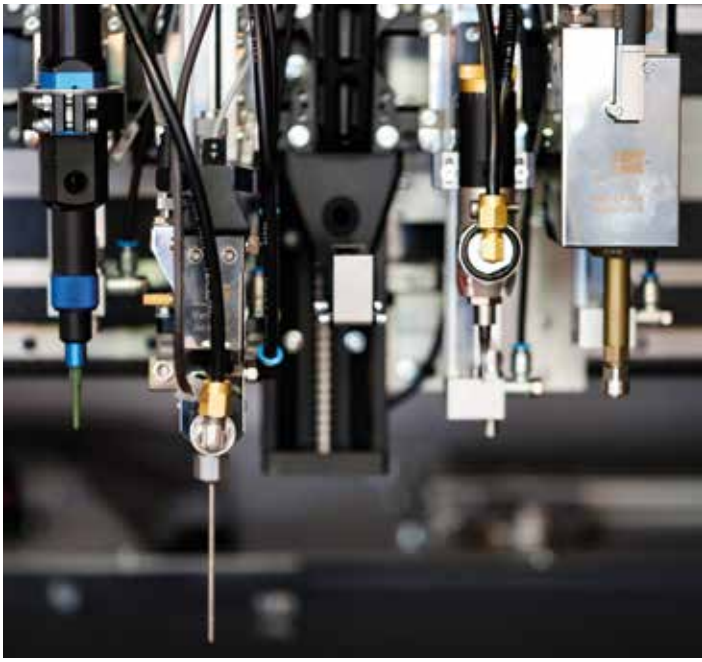
### ProtectoXC
Perfect performance - even at small lot sizes

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




The ProtectoXC can also be integrated into an SMT line, but without underground return transport.

# **Safe and accurate to the result**
# material application



Protecto meets your requirements for the highest quality, stability and productivity in automatic inline coating 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.

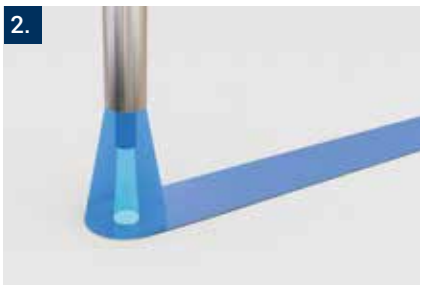
## All-in-One lacquering

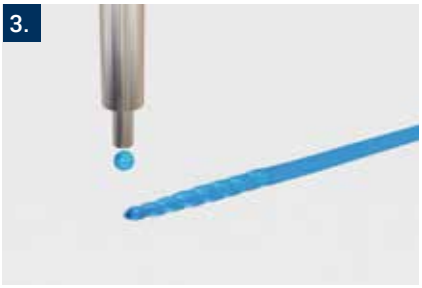
XP XC

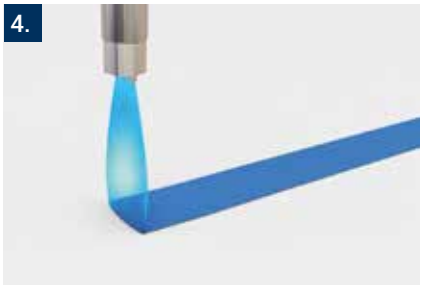
The patented Stream-Coat® nozzles are compatible with all conventional coatings, from low-viscosity to high-viscosity. With Protecto coating systems you can carry out the various selective application procedures of dispensing, spraying, jetting and curtain coating (only XP) “on the fly”. An implicit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

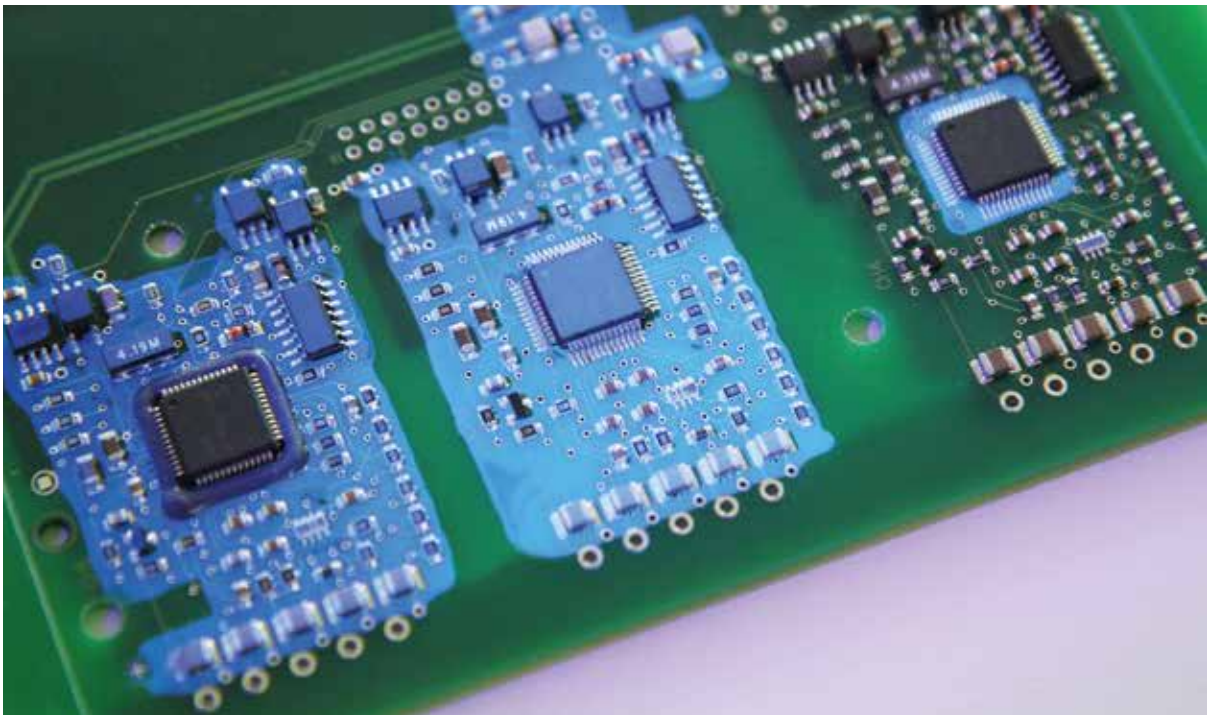
**2. Spraying**
Coating of large areas with a low splatter and mist spraying procedure

**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 (only available for ProtectoXP)

## Optimum coating profile

XP XC



Protecto systems make precise and homogeneous coating very easy and intuitive to realize. The picture shows the following application procedures under UV light: laying a barrier by dispensing and then jetting with multi-line (left), jetting of large areas without distributor air (middle) and jetting without distributor air with frame tool for high edge accuracy (right).

# **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** XP XC | **Piston return valve** XP XC | **Rehm VarioFlex Curtain Valve** XP | **Auger doser** XP | **2K System** XP |
| Application process | Jetting, Dispensing, Spraying | Dispensing, Spraying | Curtain Coating | Volumetric dosing | Volumetric dosing |
| Track width | 0,5 – 12 mm | 2 –12 mm | 3 – 20 mm | 0,25 – 5 mm | 1 – 8 mm |
| Max. component height | 100 mm | 100 mm | 60 mm | variable | variable |
| Application speed | 10 – 500 mm/s | 10 – 500 mm/s | 200 – 800 mm/s | 10 – 70 mm/s | 10 – 70 mm/s |
| Viscosity | 1 – 10.000 mPas | 1 – 150.000 mPas | ≤ 100 mPas | 1 – 500.000 mPas | 1 – 500.000 mPas |
| Min. dosage | > 3 nl | 0,002 ml | – | 0,001 ml | 0,01 ml |
| Repeatability | > 97 % | > 99 % | > 99 % | > 99 % | > 99 % |
| Ø Nozzle | 2,4 mm | variable | 12 mm | variable | variable |

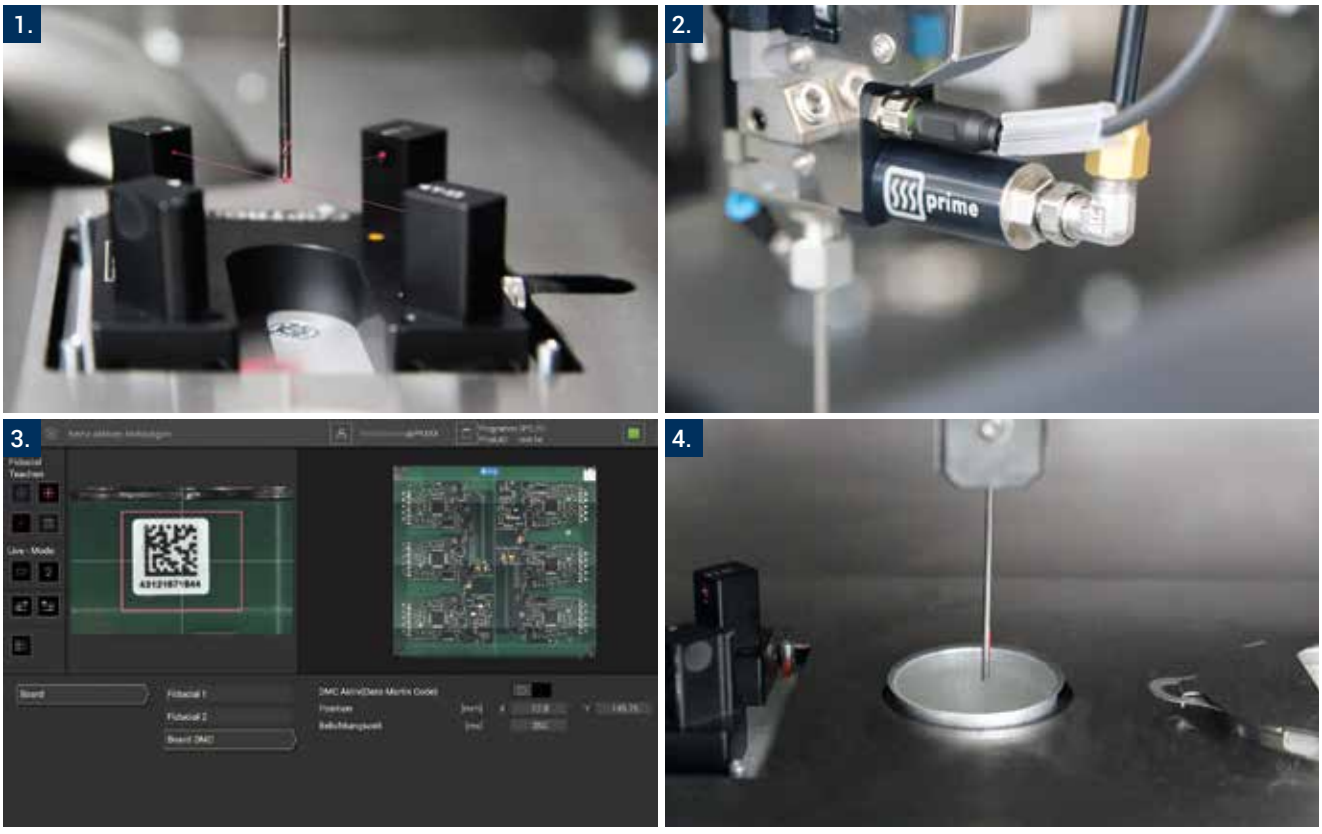
All technical data is dependent on the application material and does not claim universal applicability. Specific parameters shall only be regarded as binding on the basis of a material test.

# **Greatest possible process reliability**
with innovative options

When it comes to coating, one thing is essential: precision. Protecto systems are designed to ensure that the required volume of coating 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 coating program automatically. The dispensing of the lacquer is controlled by the software, which loads the appropriate coating program with the suitable lacquer 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 positionby registering the marks even if a board is laid into the flight bar 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

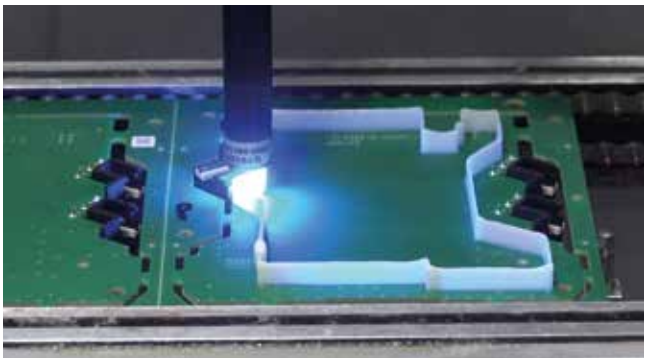
# More than “just” coating
## Application possibilities with ProtectoXP/XC

With the Protecto systems, completely new application fields are emerging – even outside of the conformal coating sector. Thanks to the highly flexible system construction, you can use ProtectoXC to combine for two 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 “Globe 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 – so each product will be optimally protected later according to the requirements.

### Dam & Fill / 3D-Application

XP XC

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 (only XP). Subsequently, the component can be cast in the same operation with a low-viscosity material.



### Sealing

XP XC

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 (only XP) are particularly suitable for this purpose.

### Globe Top

XP XC

A Globe 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

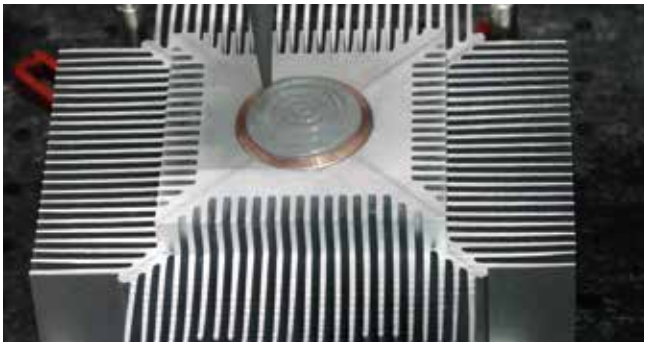
XP

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

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.

# **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. 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

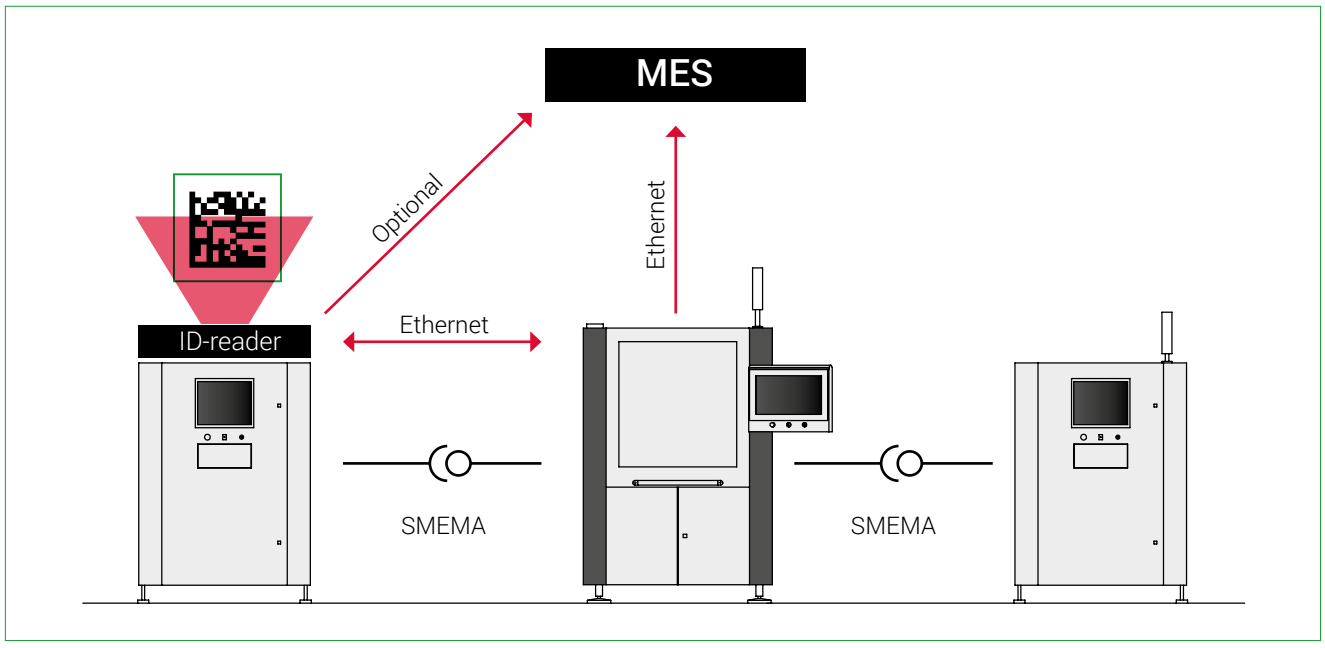
- Temperature
- Pressure
- Serial number
- Time stamp
- etc.

### 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

# **Reliable process**
# for cleaning and maintenance

Brush and blowout station ProtectoXP

Brush and blowout station ProtectoXC

Rehm has developed a ground-breaking cleaning system for Protecto systems which is particularly maintenance-friendly. A brush station with a solvent bath allows optimum cleaning of the lacquer nozzles. Even if the system has been off for up 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 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.

# **Optimum assembly protection**
# without contamination of the work environment

To prevent contamination from vaporised solvents of lacquers and compounds in the immediate vicinity of the Protecto systems, the lacquer supply is integrated in the system at the back of the plant (XP) or at the front of the machine (XC). This means there is no odour pollution from random releases of solvent vapours into the environment. The plant also has an extractor system which conducts and removes solvent-containing evaporations to the in-house exhaust system during the coating process.

Easily accessible lacquer supply at the back of the plant (XP)

Lacquer supply at the front of the plant (XC)

# 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

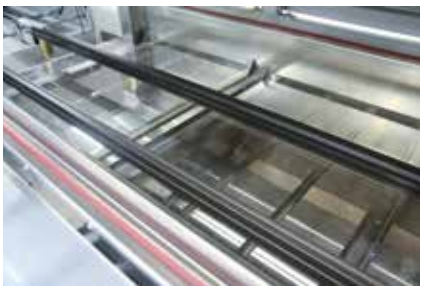
Rehm has developed an innovative UV dryer for hardening all UV lacquers. According to material requirement, the system is available with UV curing lamps with mercury medium pressure lamps or UV LED lamps for gluing applications. Its small, compact structure allows the system to be adapted flexibly to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


**24 hours**
a day available

**Service**
from A to Z

in **24** countries
**on site**

### Your service contact person

**Service-Center:**

Mon - Thurs 07:00 – 16:30
Fri 07:00 – 12:15
service@rehm-group.com

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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, America and Asia as well as 27 agencies in 24 countries we are able to serve the international markets quickly and to offer outstanding on-site service – worldwide and round the clock!

- Location
- Production facility
- Representation

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