THERMAL SYSTEMS

Protective coating for multifunctional applications

Highly selective conformal coating for maximum flexibility

ProtectoXP

Coating

Coating

Reliable protective lacquer coating
for high grade electronics

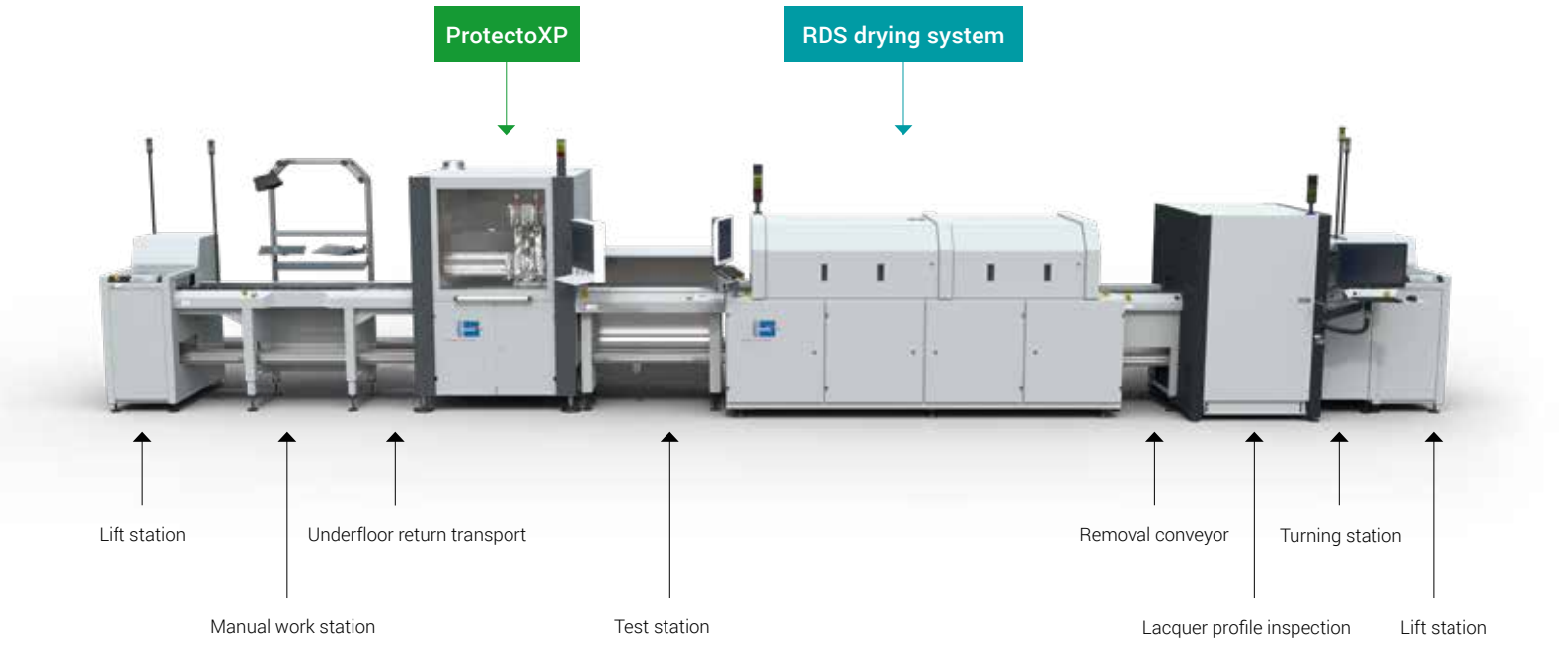
Highly selective conformal coating
as a key to a wide range of applications

Conformal coating offers many possibilities in electronic manufacturing. Protective lacquer coatings are used particularly in the manufacture of products where error-free functioning needs to be ensured in spite of strenuous environmental influences, and ensure reliable control of complex electronics. Extreme variations in temperature or humidity should be irrelevant – the electronics have to function just as well on the North Cape as in a desert country or a rainforest.

The use of protective coatings improves the quality and durability of your products. Our ProtectoXP selective conformal coating system protects sensitive electronic assemblies from damage by corrosion or other environmental influences, such as humidity, chemicals or dust. There are numerous areas where circuit boards are constantly exposed to dirt or demanding environmental conditions. Many of these products are closer to us than we think, and some of them even protect our lives. In these cases 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.

Full power for your turnkey solution
Flexibility from start to finish

Would you like to combine optimal coating solutions and reliable drying methods in your manufacturing process? Our conformal coating concept, which consists of the Protecto coating unit and an RDS coating dryer, including handling based on customer specification, is a turnkey solution for the selective conformal coating process. Thanks to highly efficient and accurate coating technologies, the Rehm Thermal Systems line can be used for all selective coating applications and is available with a range of handling variations. This allows you to produce in a flexible and reliable way and makes you ideally equipped for the demands of complex processes. The RDS drying system is suitable for hardening all conventional coatings immediately after the coating process. An optional integrated underfloor return transport system ensures an even faster and more effective production flow.

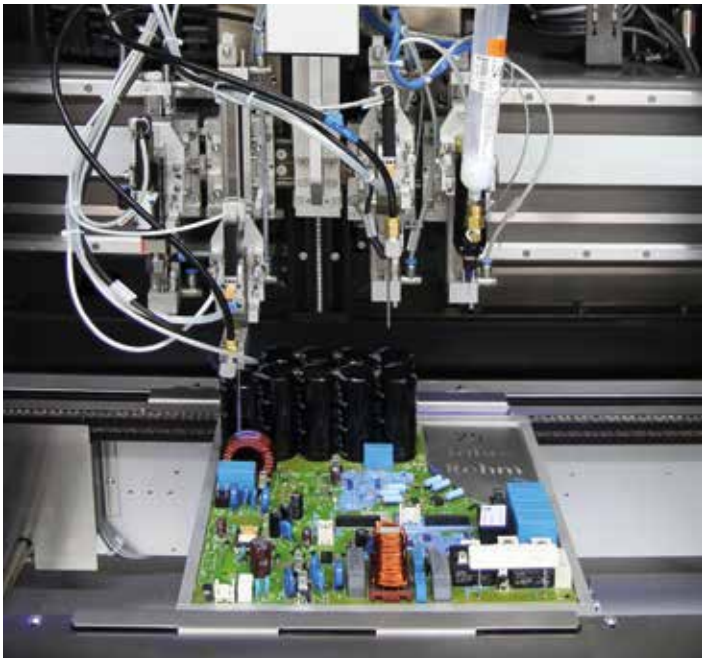


- **Greatest possible process reliability**
- **All-in-One lacquering**
- **Flexible lacquering options thanks to multifunctional lacquer applicator**
- **Highly selective coating**
- **Minimal maintenance**
- **Effective lacquering and drying in a line concept**
- **Quick, intuitive programming with dependable software tools**

Flexible coating process for optimal coatings

ProtectoXP meets your requirements for the highest quality, stability and productivity in automatic inline coating services. The product specification is determined by the plant equipment.

Circuit boards must not be coated completely; parts such as switches or electrical plug connections must remain uncoated in order to maintain their function. There are various application methods for this partially highly-selective coating application. 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.

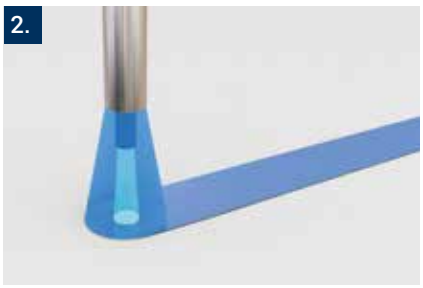


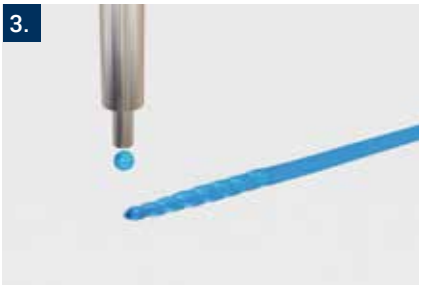
All-in-One lacquering

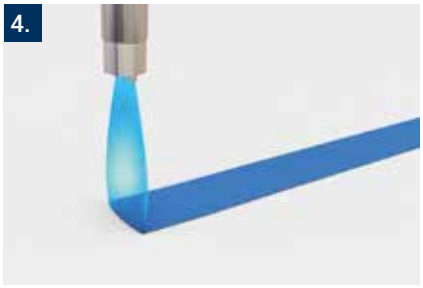
The patented Stream-Coat® nozzles are compatible with all conventional coatings, from low-viscosity to high-viscosity. An external diameter of just 2.4 mm with a length of up to 100 mm allows optimum coating even between tightly packed, tall components or even under the components themselves. With Protecto 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 lacquer applicator
for perfect application







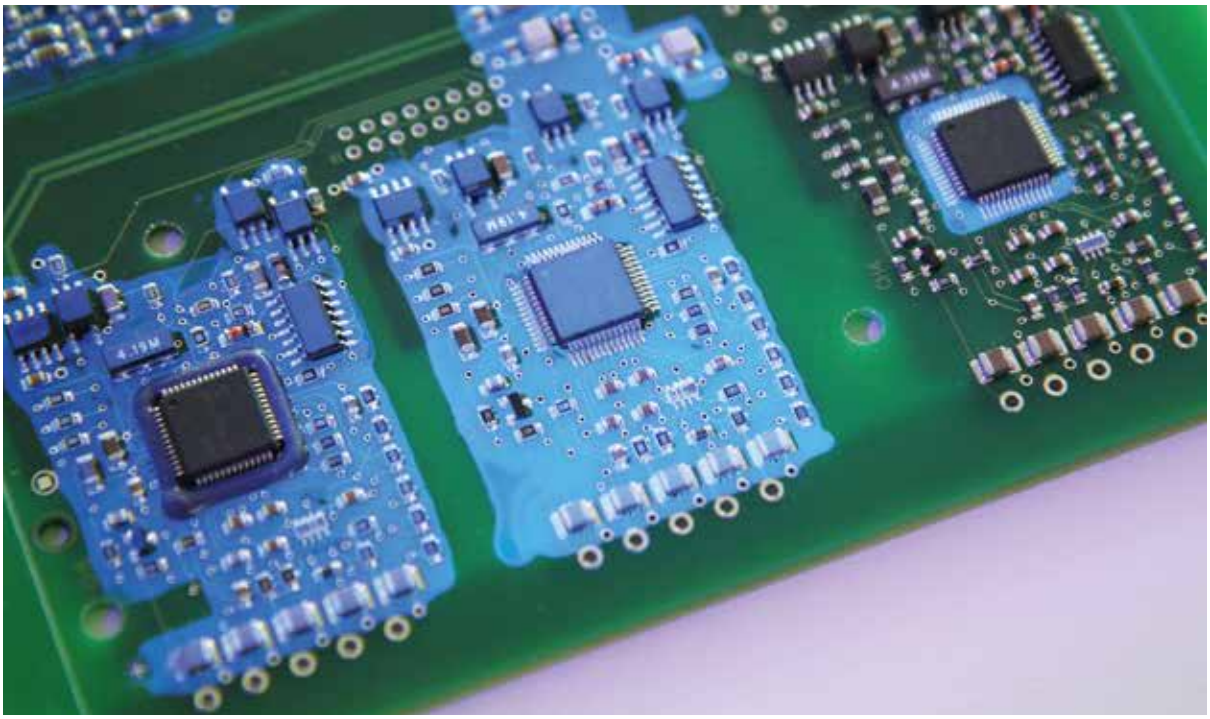
1. Dispensing
Uniform and precise application of a highly thixotropic material

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

3. Jetting
Pinpoint lacquer application of up to 120 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



ProtectoXP makes precise and homogeneous coating achievable. 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

Which equipment is most suitable for which type of coating? With the broad range of Rehm coating applicators, customers always find the right plant equipment for their individual processes. We offer in-house proprietary developments 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.

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

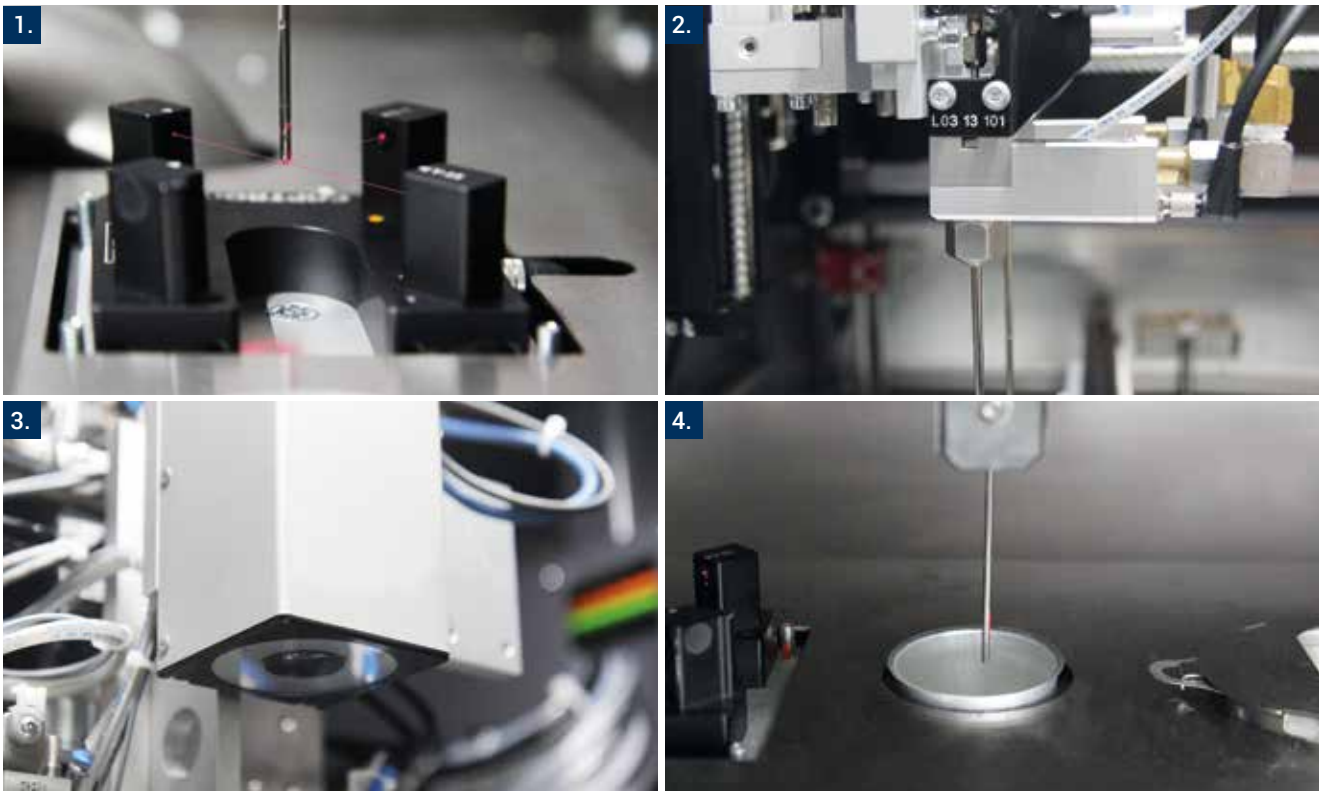
All technical data is dependent on the application material and does not claim universal applicability. Specific parameters shall only be regarded as binding on the basis of a material test.

Greatest possible process reliability
with innovative options

When it comes to coating, one thing is essential: precision. ProtectoXP is 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 ProtectoXP is optionally equipped with a fiducial camera. This means the coating program can be corrected and aligned by 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, 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.



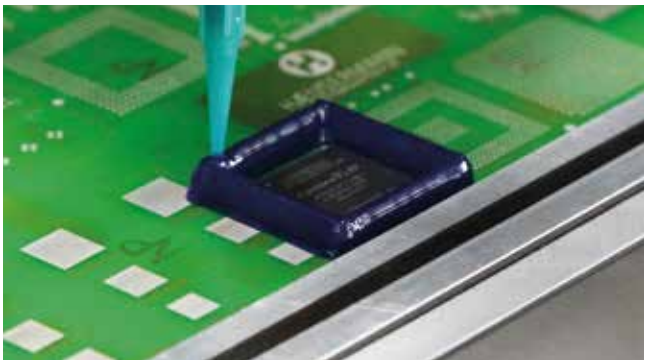
1. Needle measuring cross with auto-correction, 2. Jetter-heating, 3. Fiducial camera, 4. Weighing cell

More than “just” coating
Application possibilities with ProtectoXP

With the ProtectoXP, completely new application fields are emerging – even outside of the conformal coating sector. Thanks to the highly flexible system construction, you can use ProtectoXP to combine several 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”; different procedures have been developed here. With the ProtectoXP, a large number of applications – all in one system – can be realized. 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

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. Subsequently, the region within the dam is filled with a low-viscosity material.



Sealing

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

Globe Top

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

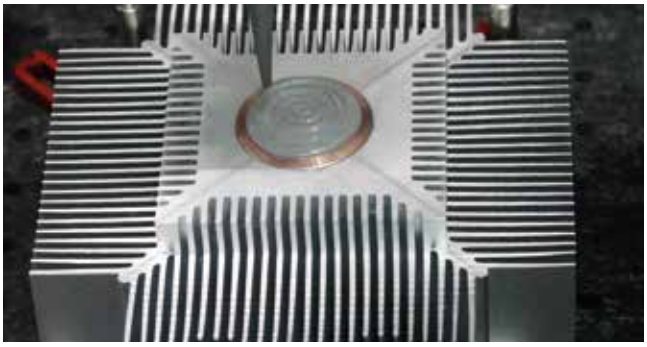
Underfills increase the mechanical stability between the chip and the circuit board and distribute locally occurring voltages over a larger area, which significantly increases the service life. For this purpose, a low-viscosity material is applied along the edge region of the chip, which then independently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

1K and 2K encapsulation

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

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

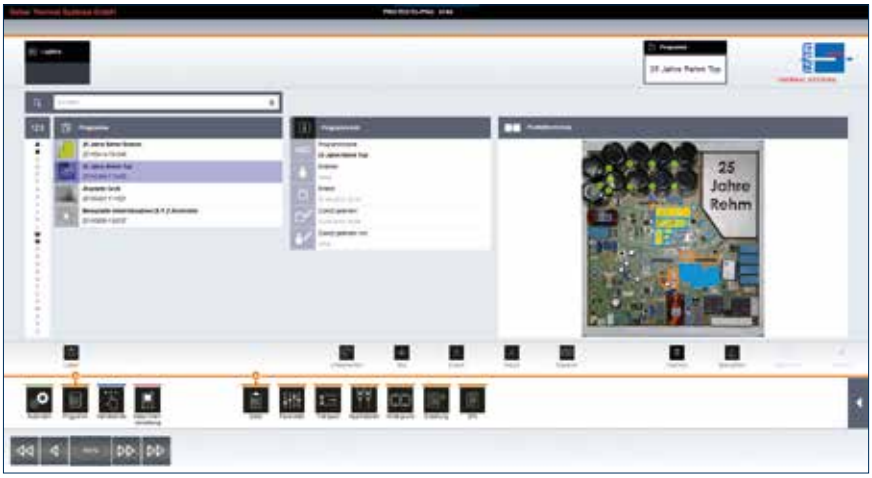
Are you looking for a partner who can offer you a complete solution for your coating and dispensing process? Then you've come to the right place! Thanks to versatile applicators and conveyor units, we are standing ready to meet many requirements with our standard applications. We are also prepared to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

Innovative software tools
for easy programming

The ProtectoXP is operated with an intuitive software and is especially user-friendly thanks to a newly developed touch-screen interface. It has numerous software features, including online and offline programming, language switching, rights management, MES connectivity and clear user guidance. Not only can you adapt all work steps flexibly to the process flow and your product requirements, you can also track and document all processes at any time.

For optimum and reproducible coating results!

Programming and product management
Easy and quick to the goal



Simple program selection through product management with preview

The Protecto software makes programming the coating process easy and fast. The module is placed as a picture in the background. The areas to be coated can then be defined using different line and surface elements. Multiple areas can be copied or cloned. This saves a lot of programming time. The other process parameters, such as coat, feed containers and valve settings, are stored in the product management.

For testing the programming, there are various test tools with which the coating program can be created, tested and optimised step by step. A position correction as well as a scan of the DMC code of the module located in the system can be carried out via the Fiducial camera, guaranteeing traceability. This is particularly important with respect to traceability and MES connections.

Operating system

The new Protecto software is installed on a powerful industrial computer and uses the reliable Windows 7® operating system.

Windows 7
inside

Offline programming

The Protecto software can be installed on an external device at any time. This permits offline programming of further production jobs at a separate workplace while the plant is in operation.

Process locking, traceability & co.
for a detailed process documentation

Depending on the production environment, the ProtectoXP 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 ProtectoXP can be optionally connected to a line master computer or an MES. Depending on the configuration, various data is communicated between MES and ProtectoXP. 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

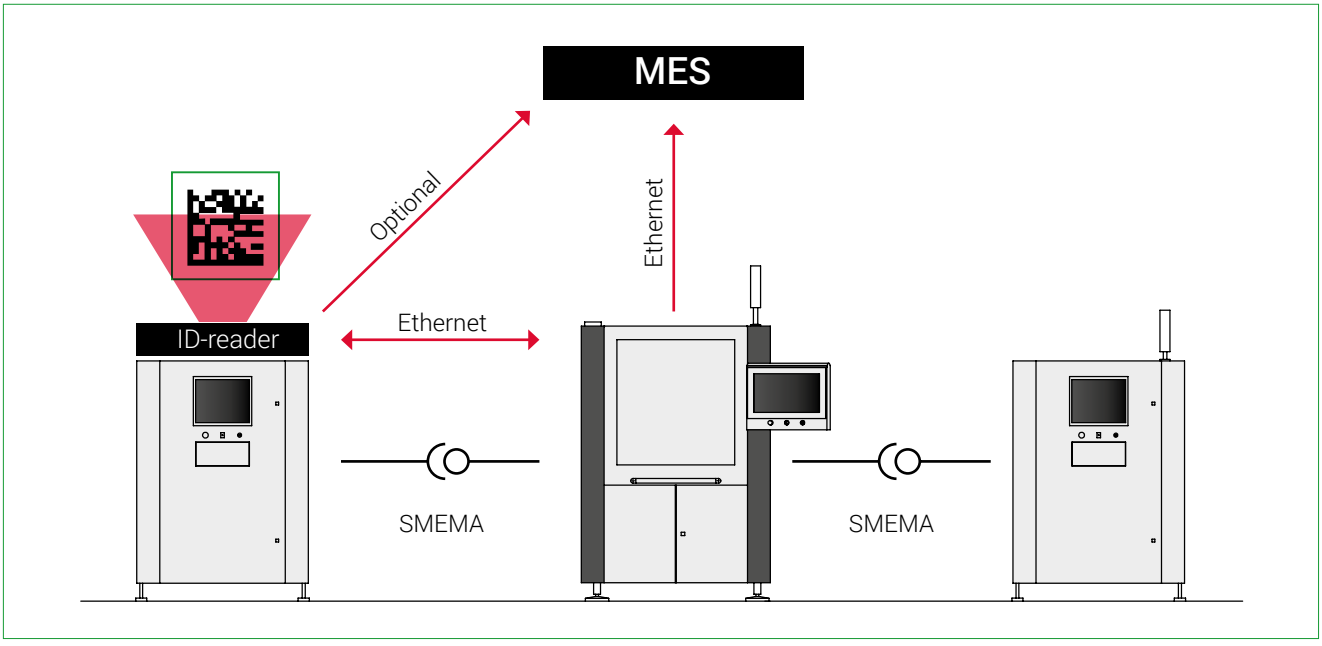
- Temperature
- Pressure
- Serial number
- Time stamp
- etc.

Process locking

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

Material locking

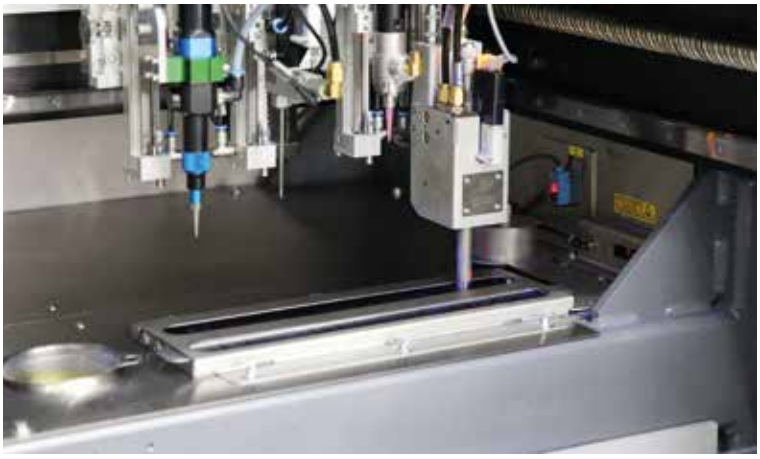
Verification with every program or change of package, whether the program fits the product. Otherwise, it is not released and the system is locked.



Reliable process control and documentation

Reliable process
with low maintenance costs

Rehm has developed a ground-breaking cleaning system for ProtectoXP 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 to ten days, it is operational at the touch of a button without additional cleaning work. An innovative blowout station allows automatic cleaning in just a few minutes when materials are changed. All technical control elements, including cleaning equipment, are compactly integrated in the plant and easily accessible for maintenance work.



Brush and blowout station

Optimum assembly protection
without contamination of the work environment

Easily accessible lacquer supply in the plant

To prevent contamination from vaporised solvents of lacquers and compounds in the immediate vicinity of the ProtectoXP, the lacquer supply is integrated in the system at the back of the plant. 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.

For a clean process and comfortable working atmosphere in your production line!

Data and facts:
An overview of ProtectoXP

Dimensions and consumption

SYSTEM DIMENSIONS

Width:	1325 mm
Height:	1950 mm
Depth:	1750 mm

ENERGY CONSUMPTION*

Electric:	0.4 kW/h
Pneumatic:	2 Nm^3/h
Exhaust air:	400 Nm^3/h

* Energy used is dependent on the profile or program

Technical specifications

DRIVE SYSTEM

3-axis system with CFRP arms and closed-loop servo motors	
X-Y speed:	1 m/s
X-Y acceleration:	10 m/s^2
Z speed:	0,25 m/s
Z acceleration:	2,5 m/s^2
X positioning resolution:	10 µm
Y positioning resolution:	4 µm
Z positioning resolution:	0.25 µm
X-Y repeat accuracy:	± 20 µm
Z repeat accuracy:	± 10 µm

TRANSPORT SYSTEM

Inline chain transport system with support of 5 mm respectively (optionally 3 mm), assembly clamping via transport chain	
Width adjustment:	80 – 460 mm (Optional 508 mm)
Max. circuit board weight:	5 kg/m
Max. component height:	± 100 mm
Prepared underfloor return transport	

(further transport systems available on request)

LACQUER SUPPLY

Gear pump/diaphragm pump
Bubble-free container change via special lacquer lance
Pressure-regulated cartridge holders
2K materials
Pressure pot

WORK AREA

Max. working area (L x W):	890 x 460 mm
Accessible to every lacquer applicator	
With 4 lacquer applicators (L x W):	350 x 460 mm
With 1 lacquer applicator (L x W):	620 x 460 mm

Options

LACQUER APPLICATORS

Up to 4 lacquer applicators
Lacquer applicator heating
Up to 4 lift cylinders in each case with 100 mm lift

FLUID

Up to 4 lacquer pumps for original container
Up to 2 lacquer cartridge holders (Euro/Semco cartridge)

CONTROL

- Material level monitoring for original container
- Material level monitoring for cleaning station
- Material level monitoring for lacquer cartridge holder
- Material level control for old coating containers
- Material volume monitoring by scales
- Laser needle positioning system
- Laser curtain width monitoring
- Fiducial camera
- Fluid pressure regulator via software

Strengthen your team
Optional products for an even better result

We want to offer our customers the greatest flexibility in the coating of sensitive electronics. That's why you can add to your ProtectoXP plant 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

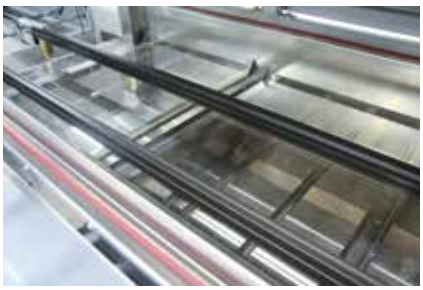
Rehm has developed an innovative UV dryer for hardening all UV lacquers. According to material requirement, the system is available with UV curing lamps with mercury medium pressure lamps or UV LED lamps for gluing applications. Its small, compact structure allows the system to be adapted flexibly to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

THERMAL SYSTEMS

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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, 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!

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