

BONDING OF MICROWAVE AND OVEN GLASS DOORS



Optimal bonding of glass doors in ovens and microwaves

Microwaves, ovens and ceramic glass induction cooktops have become indispensable in modern kitchens. The functionality and safety of these appliances depend heavily on the quality of their components and workmanship, as well as optimal bonding and sealing.

In microwaves and ovens, the glass door is both a design and functional element. Brackets are bonded to the inside with a structural adhesive from Henkel to attach the door frame, which holds the inner glass pane inserted there.

The heat-resistant glass of the door not only provides a clear view of the cooking or baking process but is also an essential part of the safety mechanism of microwave ovens to contain microwave radiation. The accurate bonding and sealing of the door glass together the door latch ensure that microwave radiation remains inside the appliance when the door is closed.

Whatever the material of your product, from plastic to glass ceramic to stainless steel, we offer a wide range of innovative structural adhesives with a variety of properties.

Are you looking for a complete system solution for bonding glass doors of microwaves and ovens from a single source?

We can provide you with an optimally coordinated system solution consisting of adhesive, dosing system and process automation. It offers fully automatic material application and high-precision dispensing controlled by contour robots. This allows you to meet your various technical requirements optimally and reliably.

Our system solutions give you exactly the longevity, quality and reliability that your customers expect from your products.



Microwave door open



Oven door open

Customized adhesive solutions for microwave doors

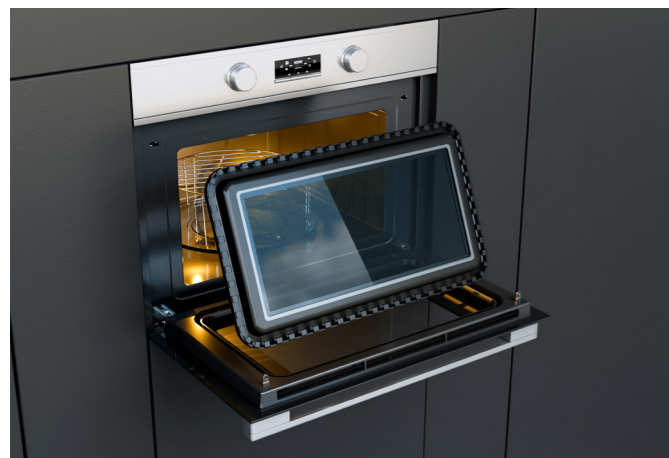
LOCTITE® 2-component silicone structural adhesives for bonding interior door glazing

For many years, leading appliance manufacturers have relied on our wide range of innovative adhesive systems for bonding the inner glass pane of microwave doors. The glass bonding of the microwave door also acts as a seal to prevent microwave radiation from escaping the microwave chamber.

LOCTITE® SI 5619 A/B is a fast curing 2-component silicone structural adhesive with low viscosity for easy dispensing and self-leveling. The surface of the adhesive forms a skin after approximately 10 minutes upon exposure to atmospheric moisture at 23 °C / 50 % RH.

The self-leveling property of this silicone adhesive results in an almost seamless coupling of the circumferential adhesive bead. This aesthetic eliminates the need to cover the gap between the inserted glass pane and the adhesive-sealed frame.

LOCTITE®SI 5619 A/B has a good bond strength to porcelain coated metals, steel and stainless steel, as well as Ceran® glass, polycarbonate and ABS surfaces.



Reference material:

Mixing ratio (by weight)

Adhesive release time at 23 °C / 50 % RH

Curing at ambient temperature

Viscosity A-Component

Viscosity B-Component

Shore-A-Hardness (ISO 868)

Elongation at break (ISO 527-3)

Tensile strength (ISO 527-3)

Tear strength (ISO 34-1)

Service temperature

LOCTITE® SI 5619 A/B

4 : 1

approx. 10 min.

approx. 30 min.

approx. 19,000 mPa·s

approx. 20,000 mPa·s

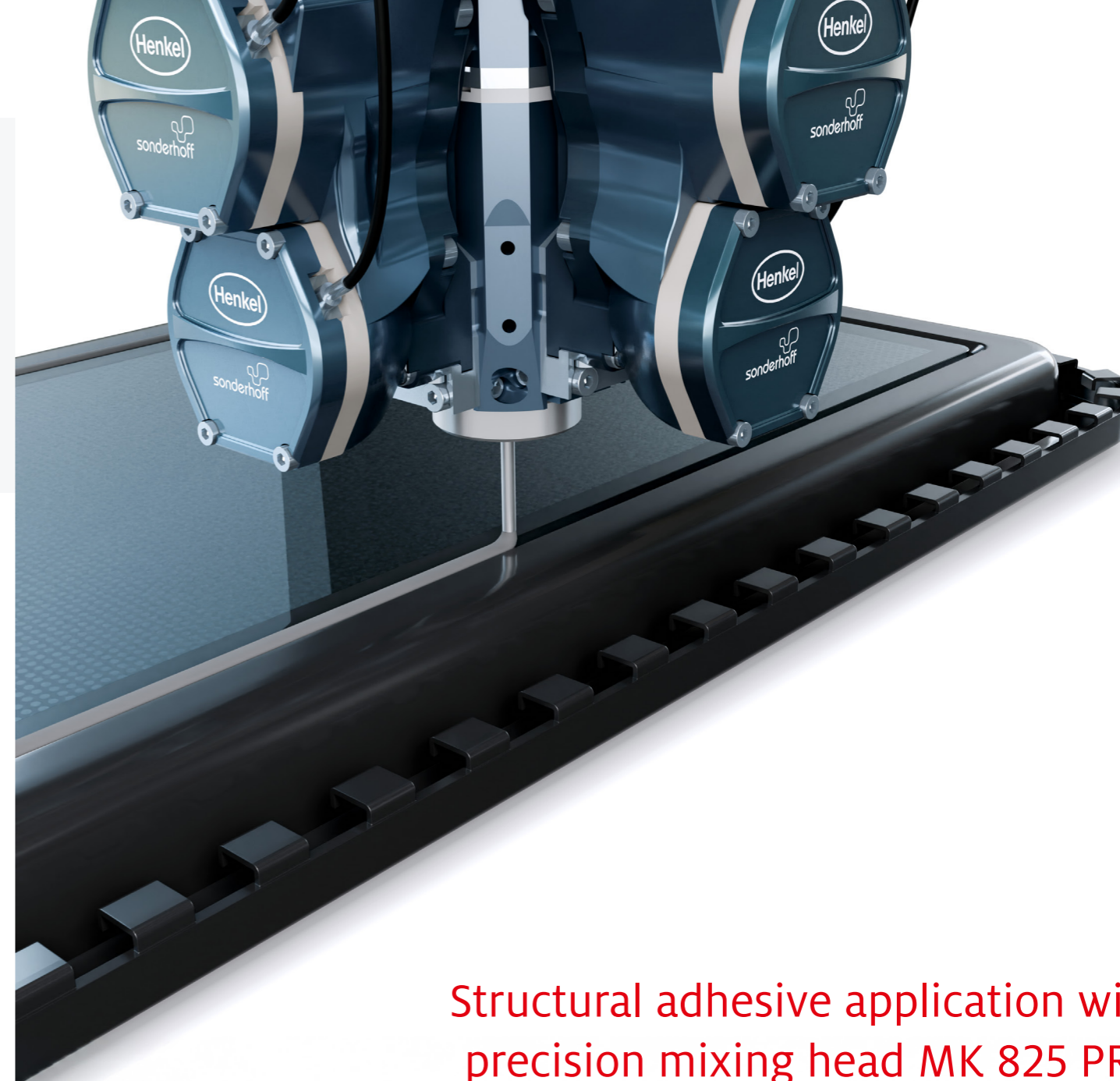
approx. 35

200 %

approx. 0.9 (130 psi)

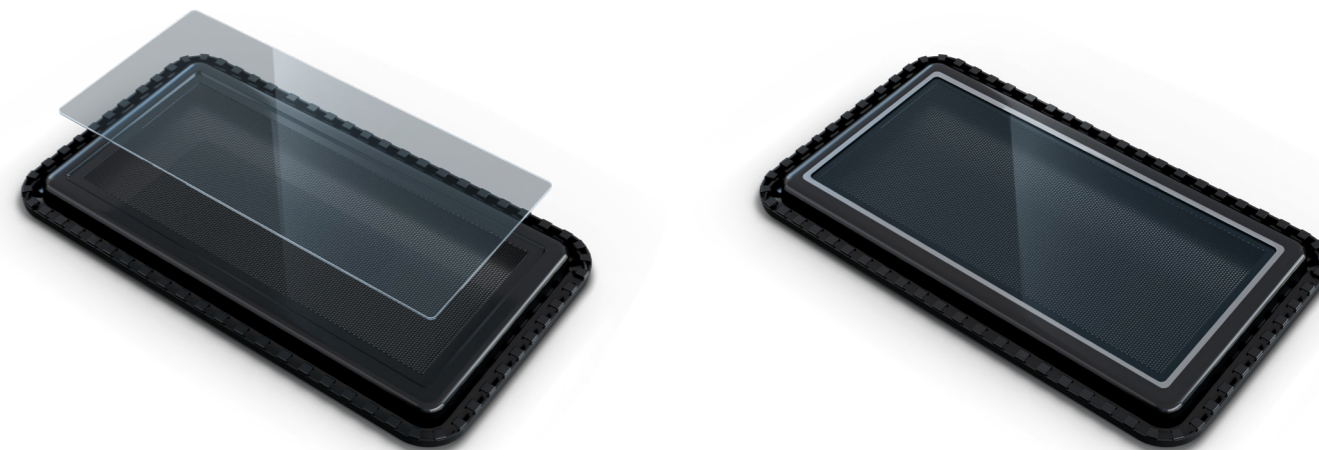
1.1 N/mm

from -40 to +200 °C



Structural adhesive application with precision mixing head MK 825 PRO

The silicone structural adhesive **LOCTITE® SI 5619 A/B** is applied directly into the gap between the inserted glass pane and the door frame of the microwave door using FIP (Formed-In-Place) technology and our fully automatic dosing machines – very precisely, safely and efficiently.



The inner glass pane is glued into the module.

Flexible and fully automatic – according to your requirements

DM 502 mixing and dosing system with 3-axis linear robot for adhesive application for glass bonding of microwave doors

Leading appliance manufacturers rely on our joining and bonding technologies, as well as our formed-in-place (foam gasket) sealing technology, for the fully automated application of LOCTITE® structural adhesives.

The reference configuration shown here consists of the DM 502 mixing and dispensing system with a 3-axis linear robot and a shuttle/sliding table. It is used for precise, fully automated adhesive application for glass bonding of microwave doors. For these applications, we also offer the option of using a transfer belt when different processing steps are combined in a production line at the customer's premises.

Parts are picked up and processed on the WT 1-LEVEL shuttle table in continuous pendulum operation in one plane.

The highly dynamic LR-HD ensures that the MK 825 PRO precision mixing head is guided over the part with contour accuracy. The mixing head applies the adhesive precisely and fully automatically with high dosing accuracy into the gap between the frame and the glass pane inserted on the inside of the door.

The LOCTITE® structural adhesive and the dispensing machine used are optimally matched and ensure a precise and efficient application process for the glass bonding of the microwave door thanks to the contour robot-controlled mixing head.

Highly dynamic **3-axis linear robot LR-HD** for the precise guidance of mixing heads for the application of polymer reaction materials. The rack and pinion drive with high rigidity and acceleration enables dynamic application speeds.



Optional for B-material component: automatic **SUPPLY TAP** drum refilling station



Optional for A-material component: automatic **ELEVATOR** drum refilling station with pneumatic lift and agitator



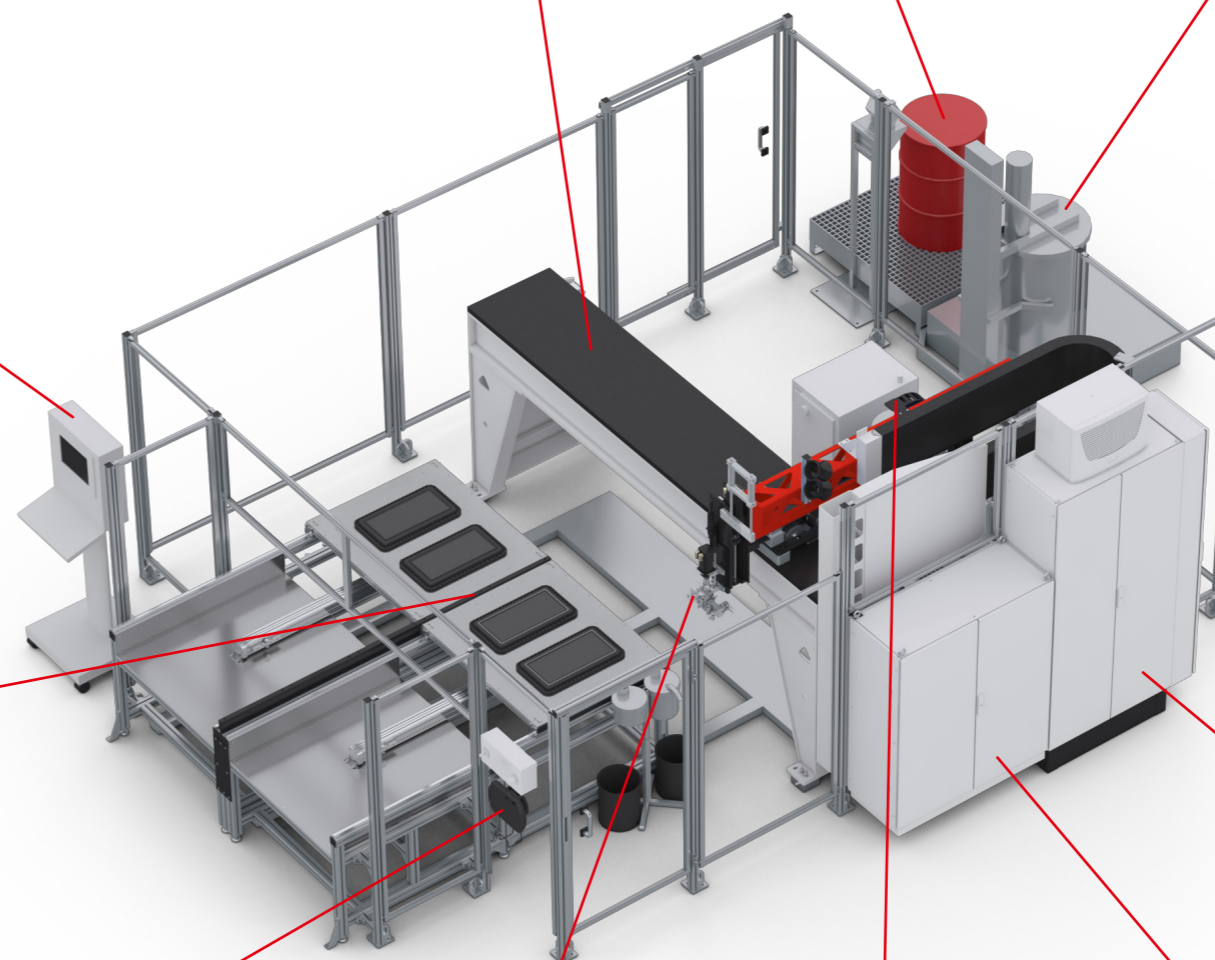
Optionally available: **CONTROL 2 touchscreen operating panel** (21.5") for operating the dosing system



WT 1-LEVEL shuttle / sliding table
Two mounting plates working in pendulum mode on one level



The multifunctional **MP 2 mobile panel** (10.1" WXGA TFT) enables convenient operation of the dosing system.



MK 825 PRO precision mixing head with high-pressure water rinsing



Material pressure tanks (24 l or 44 l, single-walled or double-walled) with minimum level sensors, on a grating platform with adjustable leveling feet and drip tray



The **dosing machine cabinet** contains the components of the dosing periphery, such as the dosing pumps.



The control electronics, safety engineering and industrial PC are installed in the **control cabinet**.

Customized adhesive solutions for oven doors

LOCTITE® 2-component silicone structural adhesives for bonding brackets to the inside of the oven door

For bonding metal brackets to the inside of oven doors, we recommend LOCTITE® SI 5610 A/B.

It is a 2-component fast cure silicone structural adhesive used in high temperature applications, resistant up to 180 °C and higher temperatures for short-term exposure.

The metal brackets are bonded for fixing a support frame for the inner glass pane of the oven doors.

The dosing application takes place within the pot life of approx. 2 to 3 minutes. Due to the fast-setting time of LOCTITE® SI 5610, the oven doors can already be assembled approximately 3 minutes after application.

LOCTITE® SI 5610 with excellent adhesion to metals and Ceran® glass generally does not require primer pretreatment of the bonding surfaces but should always be tested in specific cases.

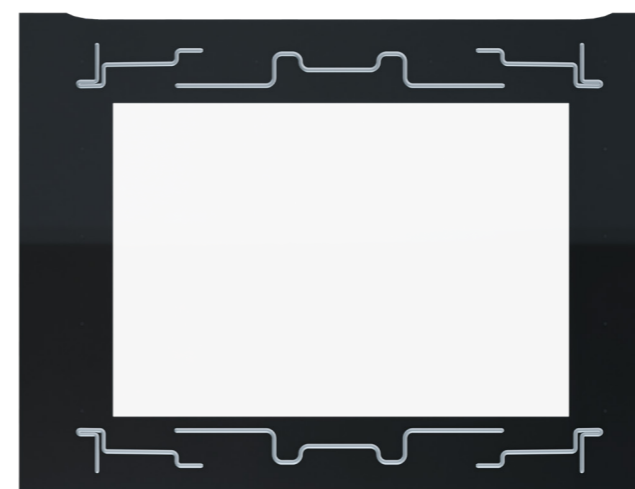
In addition, we offer a wide range of structural adhesives with different properties for other applications in this field.



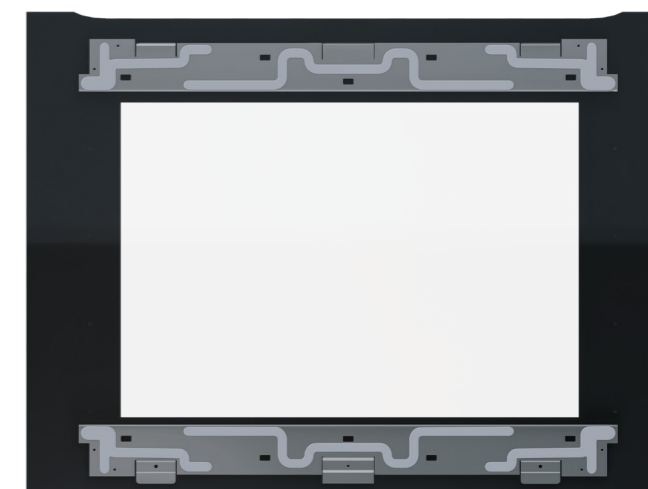
Structural adhesive application with precision mixing head MK 825 PRO

The silicone structural adhesive **LOCTITE® SI 5610 A/B** for bonding the metal brackets is applied directly without primer on the inside of the glass door using FIP (Formed-In-Place) technology and our fully automatic dosing machines – very precisely, safely and efficiently.

Reference material:	LOCTITE® SI 5610 A/B
Mixing ratio (by weight)	2 : 1
Pot life (A + B mixed)	2 - 3 min.
Adhesive release time at 23 °C / 50 ± 5 % RH	≤ 6 min.
Curing at ambient temperature	approx. 30 min.
Viscosity A-Component	approx. 20,000 - 100,000 mPa-s
Viscosity B-Component	approx. 10,000 - 80,000 mPa-s
Shore-A-Hardness (ISO 868)	approx. 30 - 50
Elongation at break (ISO 527-3)	210 %
Tensile strength (ISO 527-3)	approx. 1.35 (200 psi)
Service temperature	from -40 to +180 °C (short term higher)



Oven glass door with LOCTITE® adhesive bead applied



Transparent view shows metal brackets on the oven glass door with compressed LOCTITE® adhesive bead

Flexible and fully automatic – according to your requirements

DM 502 mixing and dosing system with 3-axis linear robot for adhesive application for bonding metal brackets on the inside of oven doors

The reference configuration shown here is used for the precise, fully automatic application of the LOCTITE® 2K structural adhesive for bonding metal brackets to the inside of oven doors.

It consists of the DM 502 mixing and dosing system with the LR-HD 3-axis linear robot and a transfer belt for feeding and removing parts.

The oven doors are fed to the dosing station on the transfer belt in the cycle specified for your production. The LOCTITE® 2K structural adhesive used is applied there by the 3-axis linear robot-controlled mixing head 825 PRO to the application areas on the inside of the oven door intended for bonding the metal brackets.

In the next step, the 6-axis robot joins the metal brackets with the LOCTITE® adhesive beads.

The highly dynamic LR-HD 3-axis linear robot ensures exact guidance of the MK 825 PRO precision mixing head over the part.

An alternative process option to the transfer belt is to feed and discharge parts using the WT 1-LEVEL shuttle table (as shown in the previous reference configuration).

Our mixing and dosing machines can be operated easily and intuitively without the need for extensive training. The automatic recording of dispensing program data means that the machine operator can track and evaluate all process data via the CONTROL 2 operating panel while production is running.

With all solutions, our focus is on highly reliable system technology, minimized maintenance times and consistent dosing quality. As process experts, we support you with customized advice for the automation of your production processes.



The **6-axis robot** joins the metal brackets for attaching a holding frame to the inside of the oven glass door



Material pressure tanks (24 l or 44 l, single-walled or double-walled) with minimum level sensors, on a grating platform with adjustable leveling feet and drip tray



Highly dynamic **3-axis linear robot LR-HD** for the precise guidance of mixing heads for the application of polymer reaction materials. The rack and pinion drive with high rigidity and acceleration enables dynamic application speeds.



MK 825 PRO precision mixing head with high-pressure water rinsing



Optional for A- and B-material component: **automatic barrel-type pump station** for 30 to 200 liter containers, with scoop piston pump, as twin-column lifting unit, for highly viscous / pasty materials

Optionally available: **CONTROL 2 touchscreen operating panel** (21.5") for operating the dosing system



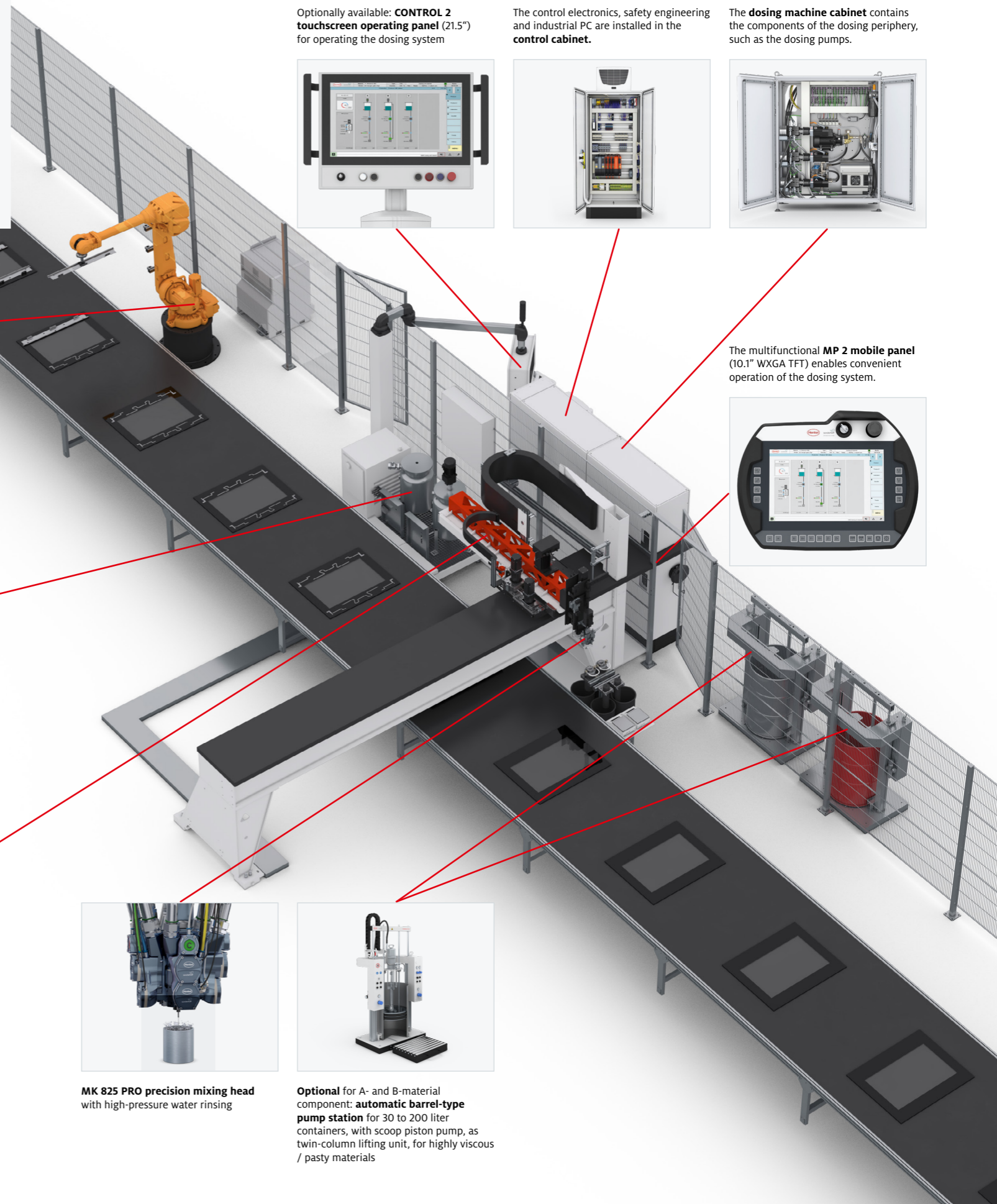
The control electronics, safety engineering and industrial PC are installed in the **control cabinet**.

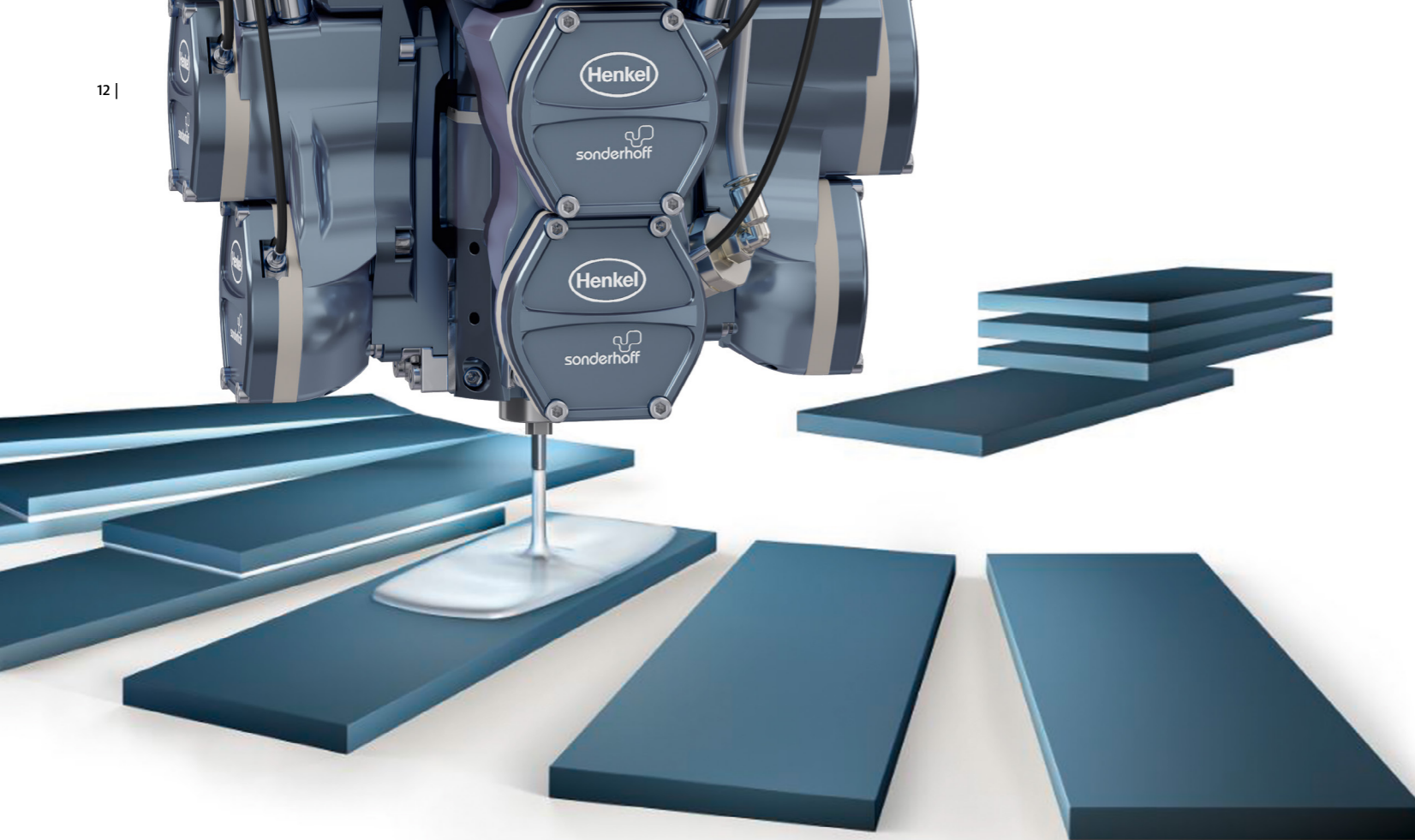


The **dosing machine cabinet** contains the components of the dosing periphery, such as the dosing pumps.



The multifunctional **MP 2 mobile panel** (10.1" WXGA TFT) enables convenient operation of the dosing system.





Advantages of Sonderhoff mixing and dosing machines

- › Combination of processes (bonding, foaming, potting)
- › Simple, intuitive operation and maintenance
- › Automatic material preparation incl. handling
- › Optimal processing of 2K adhesives
- › Constant quality: high dosing and repeat accuracy throughout the process
- › Exact adherence to accurately defined mixing ratios
- › Precise system technology with systematic process monitoring
- › Short machine downtimes and cycle times
- › Ecological high-pressure water rinsing of the mixing chamber

This is why you should use the FIP technology in your production process



Advantages of the Formed-In-Place Technology for 2K adhesive application

- › Process technology for high-precision, contour robot-controlled application of 2K adhesive systems in many industries
- › Reduced material consumption: precise adhesive application only where it is needed
- › Perfect coordination of adhesive system and dispensing system
- › Suitable for 2D and complex 3D part geometries
- › Easy to integrate into existing production processes for increased efficiency and low production costs
- › Time-saving: material is applied in a single step, eliminating the need for time-consuming manual processes
- › High future viability, as it can be used in a wide range of industries & applications



Advantages of LOCTITE® 2-component structural adhesive systems

- › Two-component silicone adhesives with fast fixture and curing time
- › Fully automatic adhesive application for seamless sealing and bonding
- › Thixotropic LOCTITE® SI 5610 A/B is applied stable within the pot life of approx. 2 to 3 minutes and can be joined approx. 3 minutes later due to its fast curing time.
- › Low viscous LOCTITE® SI 5619 A/B for easy dispensing and self-levelling
- › High temperature resistance
- › Cures at room temperature and this saves CO2 emissions compared to another product requiring temperature curing.
- › Strong adhesion to a wide range of substrates
- › Durable and weather resistance
- › Well-suited for a wide range of bonding and sealing applications

Perfectly coordinated solutions for material, machine, and contract manufacturing

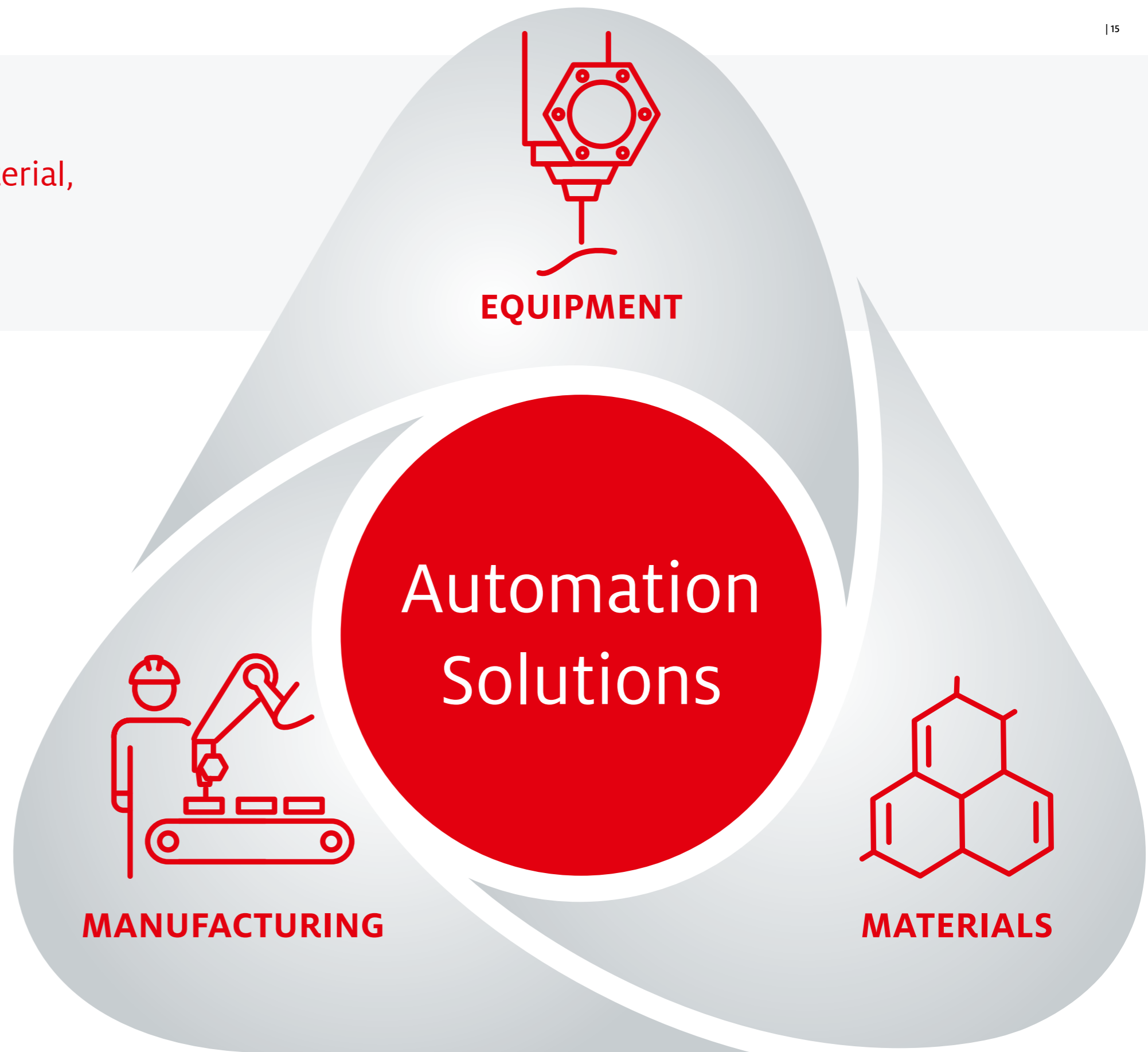
With its Sonderhoff brand, Henkel has not only acquired many years of experience in the manufacturing of tailor-made 2 component sealing systems and mixing and dosing machines, but also process expertise for very precise material application using the FIPFG (Formed-In-Place-Foam-Gasket) technology.

With the Sonderhoff portfolio, we offer our customers the advantages of a system provider from a single source and the solutions to meet your technical and commercial challenges.

We ensure efficient production processes in accordance with the requirements of fully automated series production with the dosing technology that is tailored to our sealing foams.

If you would like to take advantage of all the benefits of the FIPFG technology for your production in a flexible, fast, and effective manner, we provide sealing solutions for your components at one of our many contract manufacturing sites worldwide without having to make your own acquisition investments. The spectrum of capabilities ranges from the sampling of prototypes and small batch series to production scale manufacturing.

The choice is yours! You can take advantage of our all-inclusive package, consisting of material, machine and contract manufacturing, supported by application advice, sampling, and training. If you prefer, individual solutions are also available to suit your needs. We combine our products and services from a single source in such a way that you receive the optimum solution for your requirements profile.



Flexibility & Precision

Customer-specific solutions – worldwide and for many industries

The Henkel specialists for the Sonderhoff portfolio
are available globally

Every year, more than 300 million seals are manufactured in more than 50 countries using products from Henkel's Sonderhoff portfolio. At our Centers of Expertise and Regional Hubs, our specialists offer application engineering advice, e.g. selecting a suitable material system and sampling of your components, as well as project management for dosing systems and automation. You will receive training from us on how to use the FIPFG technology and we will support you with the selection of spare parts and a regular service offering. Furthermore, we will be pleased to take over parts of your production for you – from small to large series – at our subcontracting locations.

Sales staff at all other Henkel locations worldwide will also be happy to answer any questions and provide you with further information on our sealing, bonding, and potting solutions. We look forward to hearing from you.

KOLO, POLAND
External Subcontracting Location

DÜSSELDORF, GERMANY
Center of Expertise

ELGIN, ILLINOIS, USA
Regional Hub

RICHMOND (KANSAS CITY), USA
Regional Hub

DORNBIRN, AUSTRIA
Center of Expertise

BARCELONA, SPAIN
External Subcontracting Location

OGGIONO, ITALY
Regional Hub

INCHEON, KOREA
External Subcontracting Location

SHANGHAI, CHINA
Regional Hub

PUNE, INDIA
Regional Hub

PUNE, INDIA
External Subcontracting Location

SÃO PAULO, BRAZIL
External Subcontracting Location

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