

HENKEL AUTOMOTIVE

Dr. Christian Köhling | 01.07.2021 | 2nd DFF Focus Meeting



SALES

€19.3 BN



MORE THAN

144 YEARS

SUCCESS WITH
BRANDS AND
TECHNOLOGIES



WE ARE ACTIVE IN

78

COUNTRIES

THREE BUSINESS UNITS

ADHESIVE TECHNOLOGIES
BEAUTY CARE
LAUNDRY & HOME CARE

€2.6 BN

ADJUSTED
OPERATING PROFIT
(EBIT)



LEADING IN
SUSTAINABILITY

+64%

RESOURCE
EFFICIENCY



AROUND

2,700

SOCIAL PROJECTS
SUPPORTED



WE EMPLOY
MORE THAN

52,950

PEOPLE
WORLDWIDE FROM
125 NATIONALITIES



AROUND

37%

WOMEN IN
MANAGEMENT

▶ ADHESIVE TECHNOLOGIES

2020 SALES BY BUSINESS AREAS

Automotive & Metals (22%)



Solutions for:

Automotive OEMs & Components, Metals

#1 worldwide

Packaging & Consumer Goods (33%)



Solutions for:

Packaging, Consumer Goods & Lifestyle Products

#1 worldwide

Electronics & Industrials (15%)



Solutions for:

Semiconductor Packaging & Electronics Assembly, Aerospace, Industrial Assembly

#1 worldwide

Craftsmen, Construction & Professional (30%)



Solutions for:

DIY, Craftsmen, Construction, Professional Users in Manufacturing & Maintenance

#2 worldwide

▶ HENKEL KEY SUPPLIER FOR THE AUTOMOTIVE INDUSTRY

TECHNOLOGIES & FOCUS APPLICATIONS

Surface Treatment

**Adhesives &
sealants**

**Thermal Interface
Material**

**Cleaners &
Lubricants**

e-Mobility

Automotive
Electronics

Display &
Infotainment



Exterior, Interior
& Lighting,

Powertrain &
Transmission

Body Shop

▶ HENKEL AUTOMOTIVE R&D CAPABILITIES

GLOBAL NETWORK FOR THE AUTOMOTIVE INDUSTRY

**8 R&D
Centers**
**Automotive
Expertise**

**+500
Scientists**
**Multi-
Technologies**

**75
Thermal
Industry
Experts**

+400*
Patents
**Automotive
Applications**
* Active patent families

**+130M€
Invest**
**Innovation center
Düsseldorf**



> Unparalleled innovation power to foster market positions

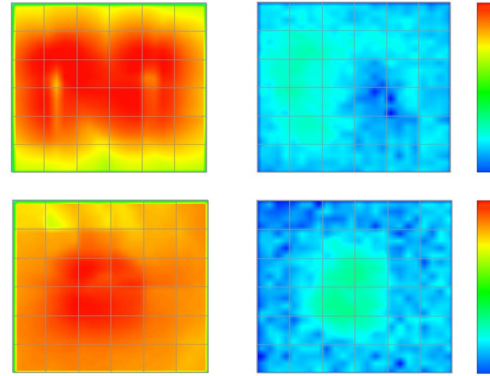
▶ CAPABILITIES IN MATERIALS, ENGINEERING & PROCESSING

Material



- Global Product Development Teams for Innovations
- Technology Road Mapping
- Determined properties by Modelling & Simulation
- Strategic Sourcing

Modelling & Simulation



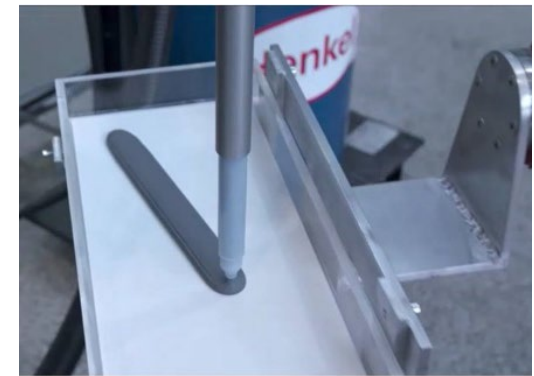
- Thermal Modelling
- Failure Analysis
- DoE Statistical Analysis
- Material Data Cards
- FE-Calculation on material & Components

Mechanical Validation



- Durability Testing
- Static & Dynamic Test Equipment
 - Thermal
 - Structural/Crash
 - Climate Chamber
- Investigation on Customized Components & Test Vehicles

Application & Processing



- Specific Dispensing Equipm.
 - 1C, 2C, Jetting, 3D,..
 - Robot based application
- Process Auditing
- Equipment Set-up & Layout
- Line Operator Trainings
- Interactive Application Engineering with Core & Strategic Partners

▶ AUTOMOTIVE COMPONENTS

VALUE CREATION THROUGH TRANSFORMATIVE SOLUTIONS



Electrification



Leightweight



Clean Air



Autonomous Driving

Global coverage through state-of-the-art innovation centers

Industry trends

Customized solutions

Industry insights through strong and unique customer base

Foundation



People



Technologies



Applications



Footprint



Digitalization

▶ HENKEL AS KEY SUPPLIER FOR THE AUTOMOTIVE INDUSTRY

TRUSTED PARTNER OF OEMS & TIER 1 SUPPLIERS



- Henkel solutions in > 90% of built vehicles
- Focus on OEM and Tier 1 Suppliers
- > 1.000 Sales Engineers serving 8.000 customer sites
- Strong global footprint in all regions and markets

Our vision for 2024



“Drive industry transformation towards E-Mobility & autonomous driving with best-in-class innovation addressing key customer needs”

▶ HOW HENKEL IS SHAPING THE CAR OF THE FUTURE

NEW SOLUTIONS FOR ELECTRIFICATION AND NEW DESIGNS

Electrification

Battery system

Autonomous Driving & Connectivity

Sensors, cameras and radar systems

Electronic Components

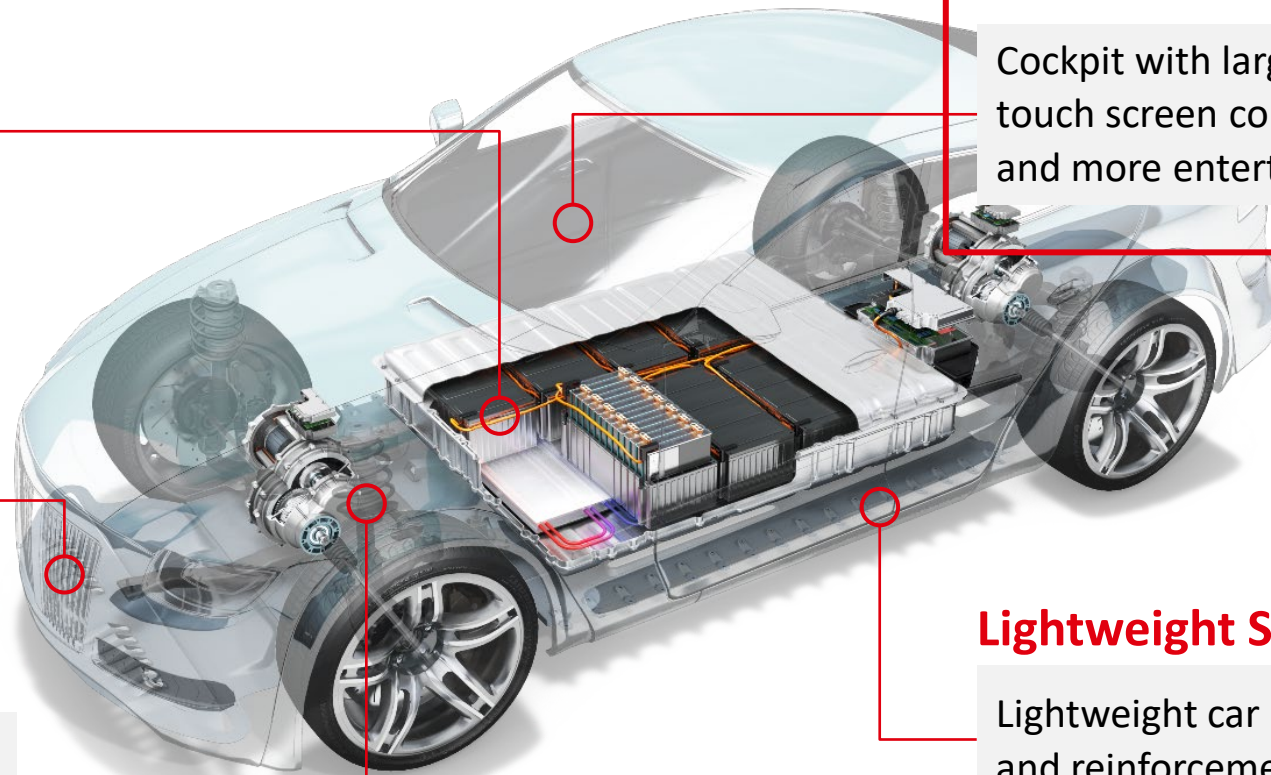
Chassis with integrated e-motors, electronic brakes & steering

Infotainment & Display

Cockpit with large/multi displays in touch screen connected with internet and more entertainment displays

Lightweight Structures

Lightweight car body structures and reinforcements





AUTOMOTIVE & OTHER HIGH-PERFORMANCE DISPLAYS MATERIALS & PROCESS FOR STRUCTURAL BONDING

Penny Yi Pan | 01.07.2021 | 2nd DFF Focus Meeting

▶ AUTOMOTIVE DISPLAYS/INTELLIGENT COCKPIT HENKEL TOTAL SOLUTION AND TODAY'S FOCUS TOPIC

1. Optical bonding

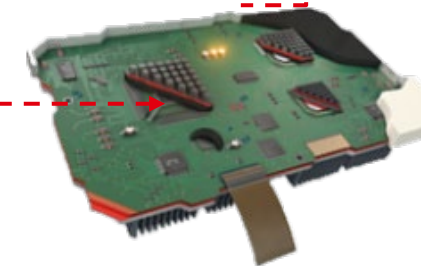
Henkel



2. Structural bonding

3. Equipment

5. Underfill



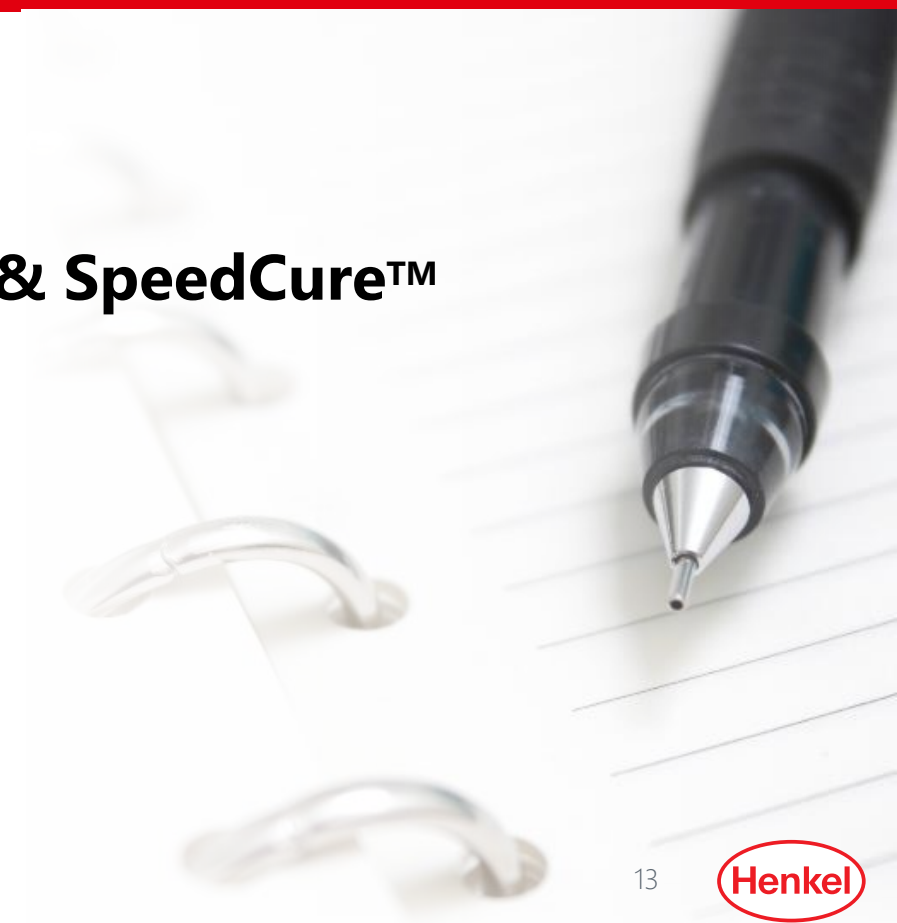
4. Thermal Interface material

Henkel

AGENDA

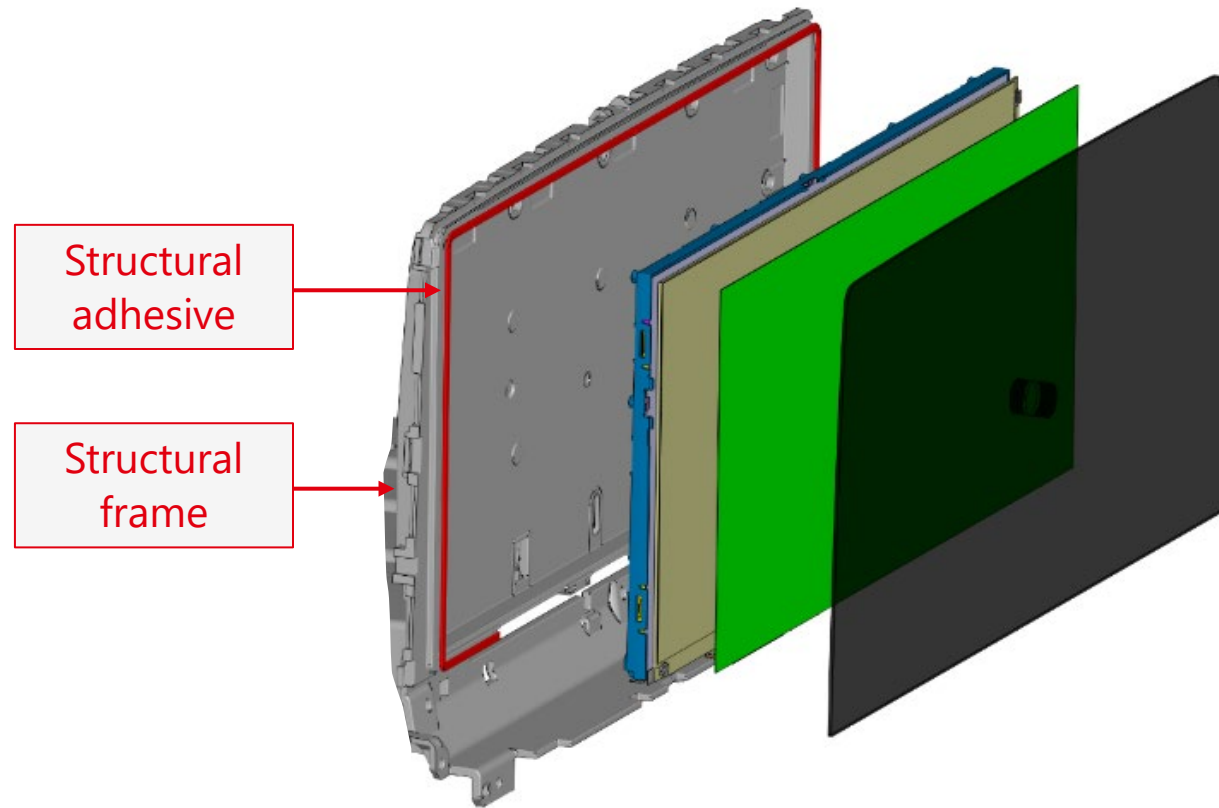
01 **Material & process for Structural Bonding & SpeedCure™**

02 Q & A



► Structural Bonding

WHAT IS A STRUCTURAL BONDING APPLICATION?



Tasks of a structural adhesive:

- Bond multiple substrates
- Compensate thermal expansion differences w/o stress transfer to the display
- Provide/enhance handling strength in acceptable cycle times
- Offers a bonding area reduction compared to tapes

▶ AUTOMOTIVE DISPLAY LEVERAGING HENKEL'S TECHNOLOGY POWER

Smartphones / LCD devices



Henkel adhesives are used **in more than 70% of smartphones** produced today

Automotive Interior Trend



Demand increases about the **design flexibility for integrated automotive cockpit** that require high performance /durable structural adhesive.

► Structural Bonding

DESIGN TREND

- **Narrow-bezel** and **larger size design**
- **Free-Form & Curved** designs for Premium Look
- **Thinner display** module for lighter weight.
- **More multi-substrate materials** use for striving rich in design/unique cockpit.

Henkel can answer the requirements from the design trend !

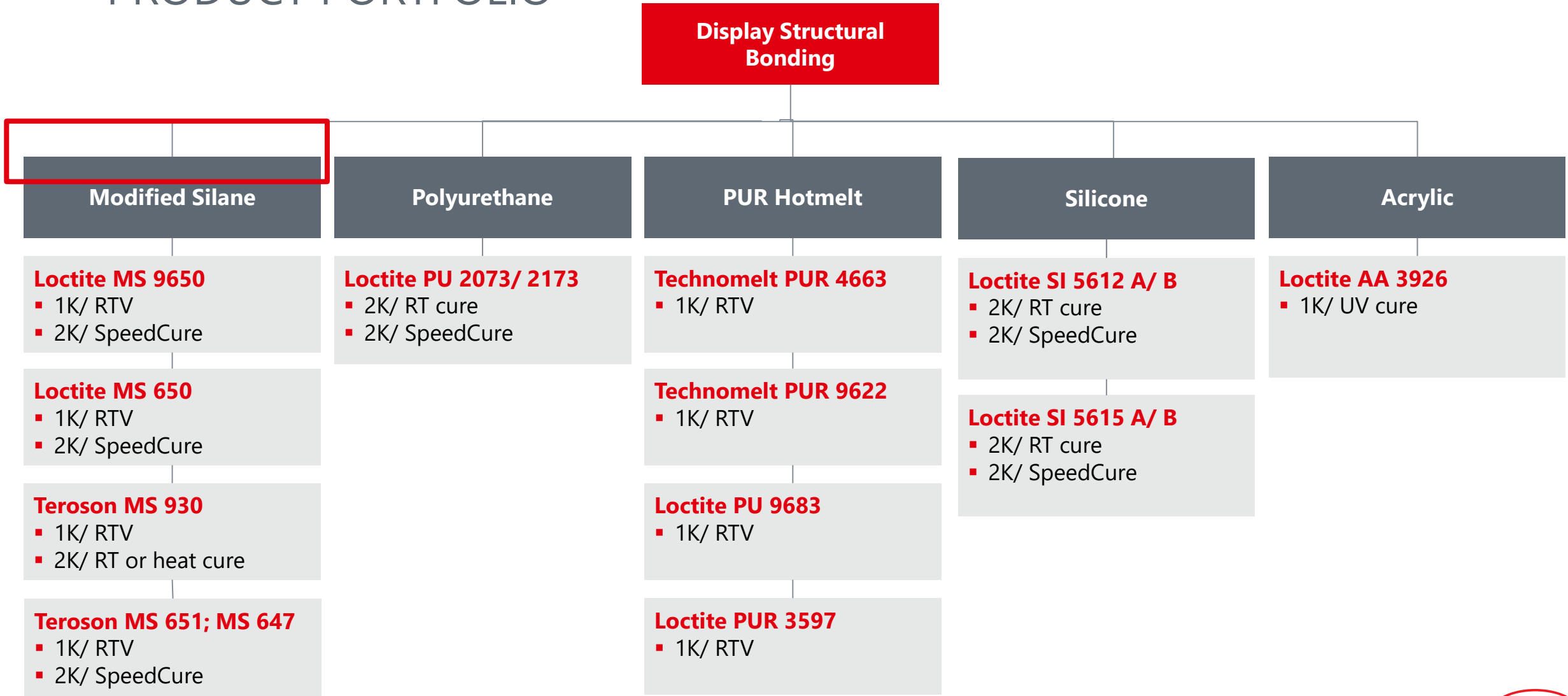


Panel : Glass, Polycarbonate

Frame : Metals - Aluminum, Magnesium

Plastics - ABS, PC, PP, CFRP

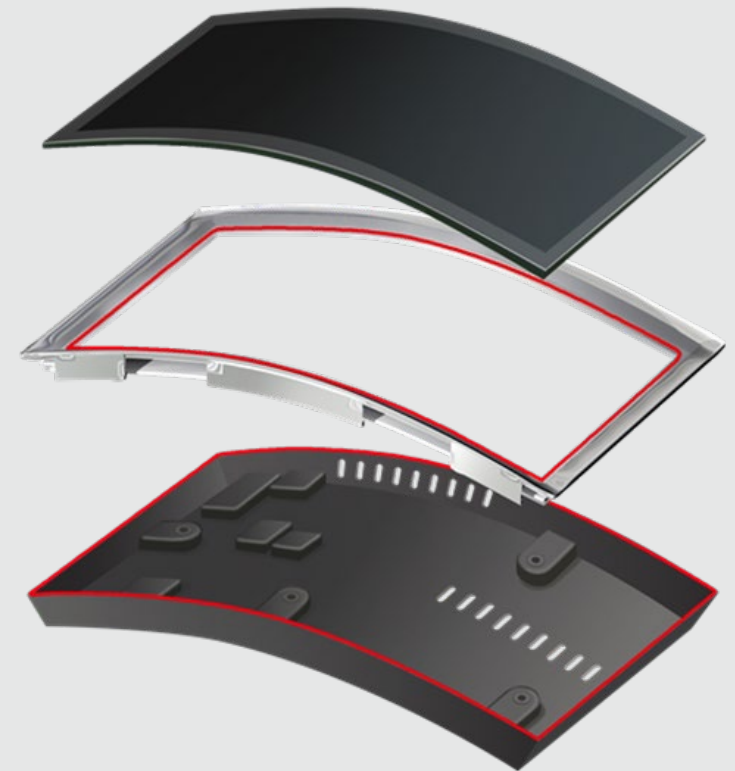
▶ STRUCTURAL BONDING PRODUCT PORTFOLIO



▶ STRUCTURAL BONDING

WHAT IS SPEEDCURE™

- **SpeedCure™** is a Henkel method to accurately and efficiently cure adhesives in display applications.
- Uses radiation to induce the heat required to cure, or accelerate the cure of adhesives and materials
- Can be used for direct heating of the adhesive or indirect heating of the substrate area around where the adhesive is applied
 - Equipment for particular layout can follow certain contours
 - We can define with high accuracy which areas will be heated and which not
- **Practicable cycle time for mass production is 30-90 seconds!**
- Suitable to bond e.g. **cold bended glass/ plastic lenses to curved frames**



▶ VIDEO

STRUCTURAL BONDING BY SPEEDCURE™ PROCESS



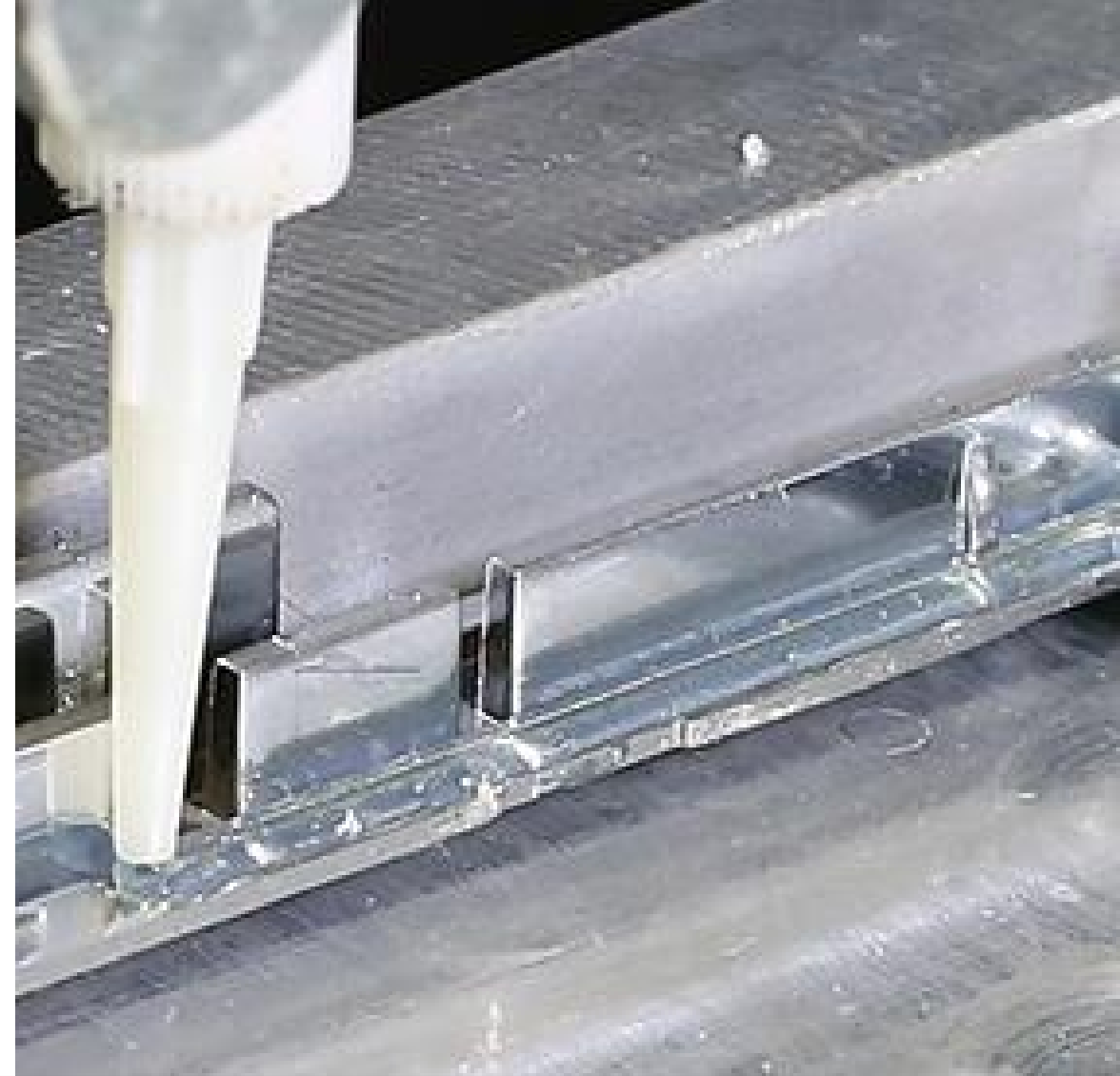
▶ Henkel equipment capabilities

STRUCTURAL ADHESIVES

Structural Bonding:

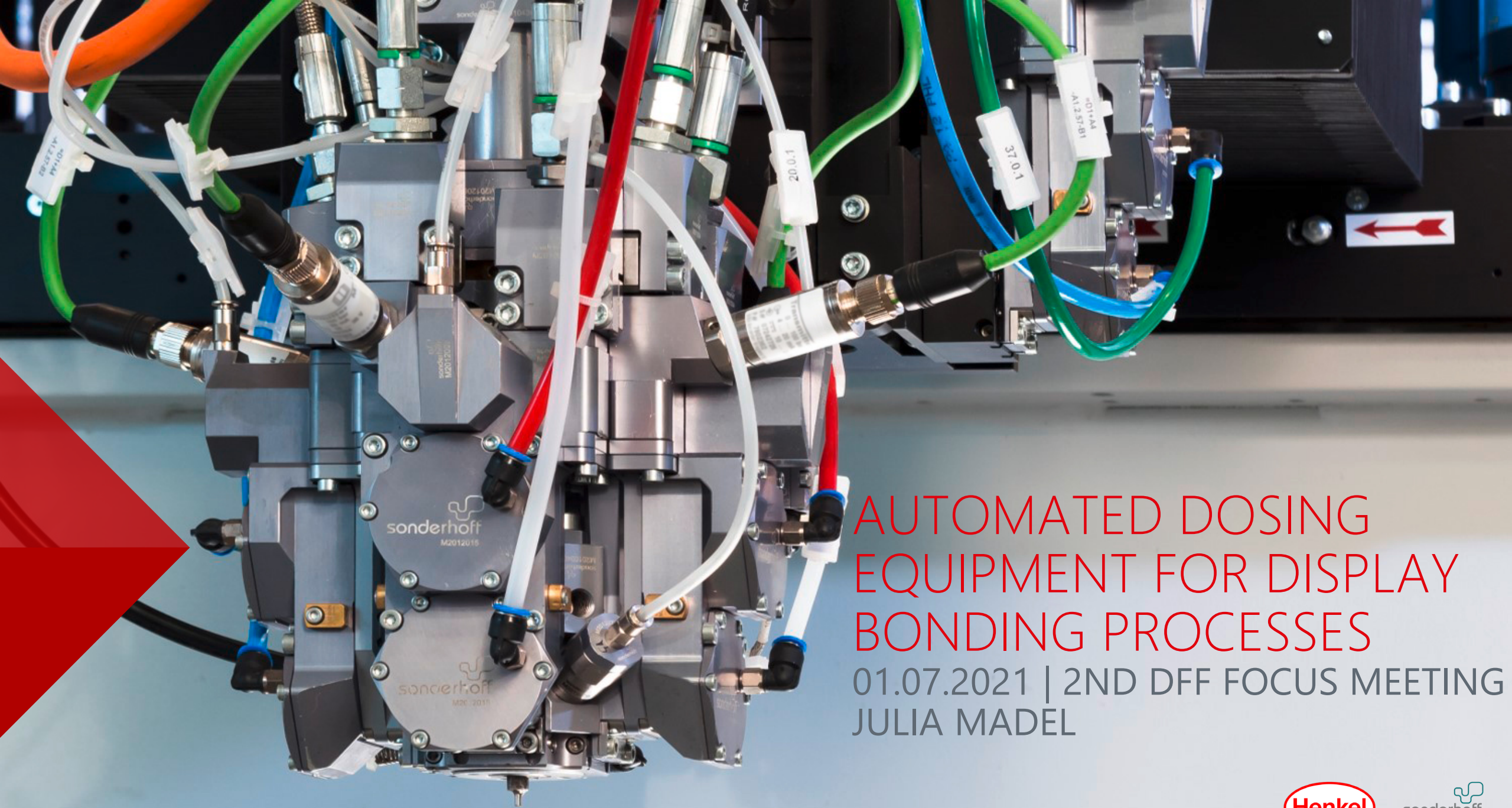
- Dynamic 2K mixing dispensing equipment and robots
- Static 2K mixing dispensing equipment and robots
- 1K dispensing equipment and robots
- SpeedCure equipment

Henkel's Sonderhoff brand also offers highly reliable process & efficiency for display manufacturing.



QUESTIONS...





AUTOMATED DOSING EQUIPMENT FOR DISPLAY BONDING PROCESSES

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JULIA MADEL



► S3 – SONDERHOFF SYSTEM SOLUTIONS

CUSTOMIZED EQUIPMENT, MATERIAL AND SUBCONTRACTING WITHIN HENKEL

Equipment



Automated customized mixing & dosing technology

- Up to 7 component mixing & dosing machines; static and dynamic mixing
- 3-axis linear and 6-axis robots
- Systems for part handling

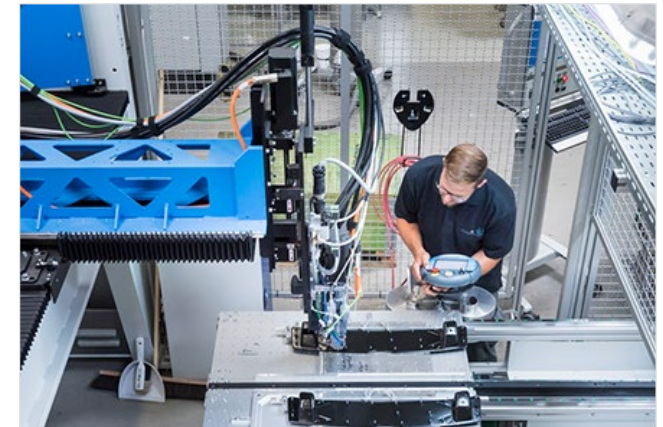
Material



Customized 2C polyurethane and silicone material

- Foam Gasketing (FIPFG)
- Potting
- Bonding

Subcontracting



Service of customized manufacturing solutions

- Foam Gasketing (FIPFG)
- Potting
- Bonding

▶ YOUR SYSTEM SOLUTION PROVIDER ... AND CONSULTANT ON YOUR DAILY LIFE CYCLE MANAGEMENT



EQUIPMENT SOLUTIONS

THE REFERENCE CLASS

SONDERHOFF DM 402/403/404/CC

- High-performance mixing and dosing system for 2 – 4 components
- Optimized for SONDERHOFF 2C PU or silicone foam sealing technology (FIPFG)
- Precise dosing of adhesive and gaskets from LOCTITE & TEROSON portfolio (2-component PU, Silicone or SMP)





EQUIPMENT SOLUTIONS

THE COMPACT CLASS

SONDERHOFF SMART-L

- Low-pressure mixing and dosing cells for 2 – 3 components
- Optional: with a lift-door and conveyor belt

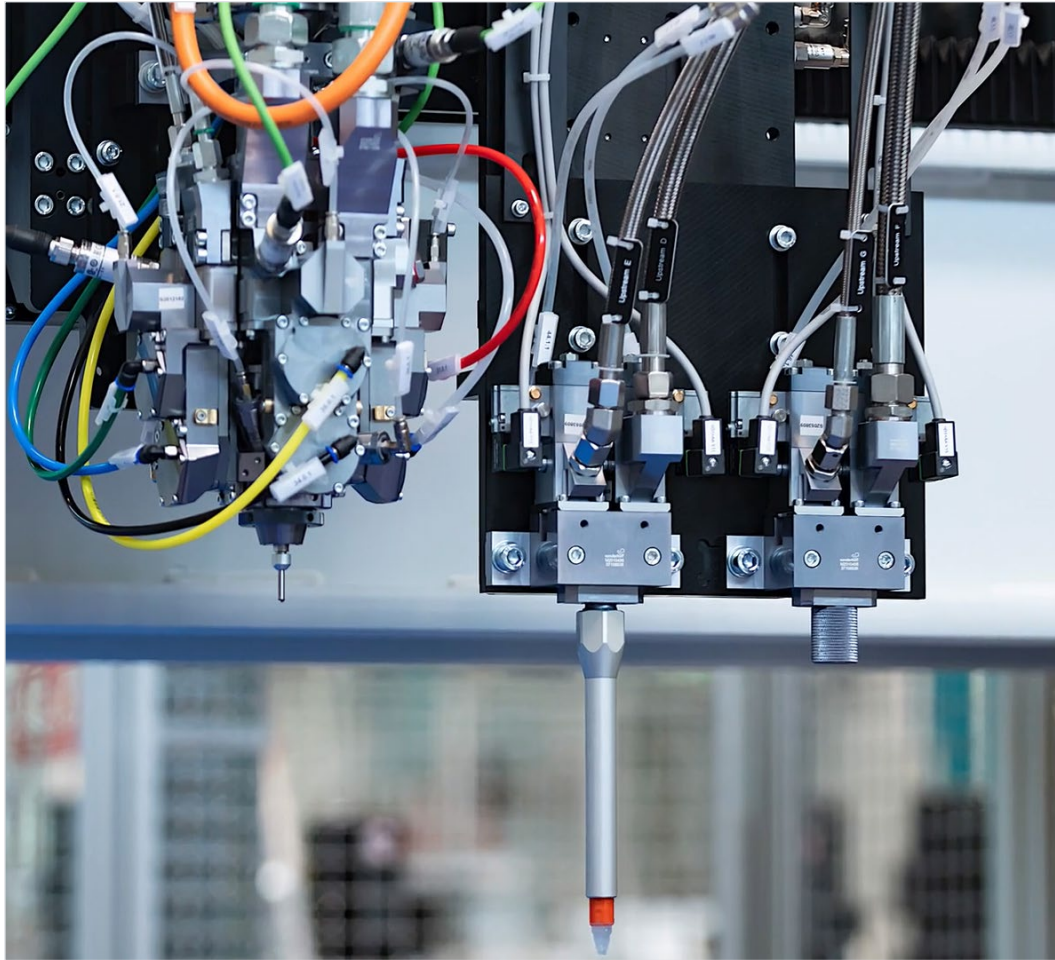


SONDERHOFF SMART-M

- Low-pressure mixing and dosing cells for 2 components
- Optional: with automatic rotary indexing table or conveyor belt

▶ EQUIPMENT SOLUTIONS

THE MIXING HEADS



**SONDERHOFF
MK 600 / 625 / 650**



**SONDERHOFF
MK 400 / 425**



**SONDERHOFF
MK 50 / 100**



**SONDERHOFF
MK 20**

▶ EQUIPMENT & PROCESS BENEFITS

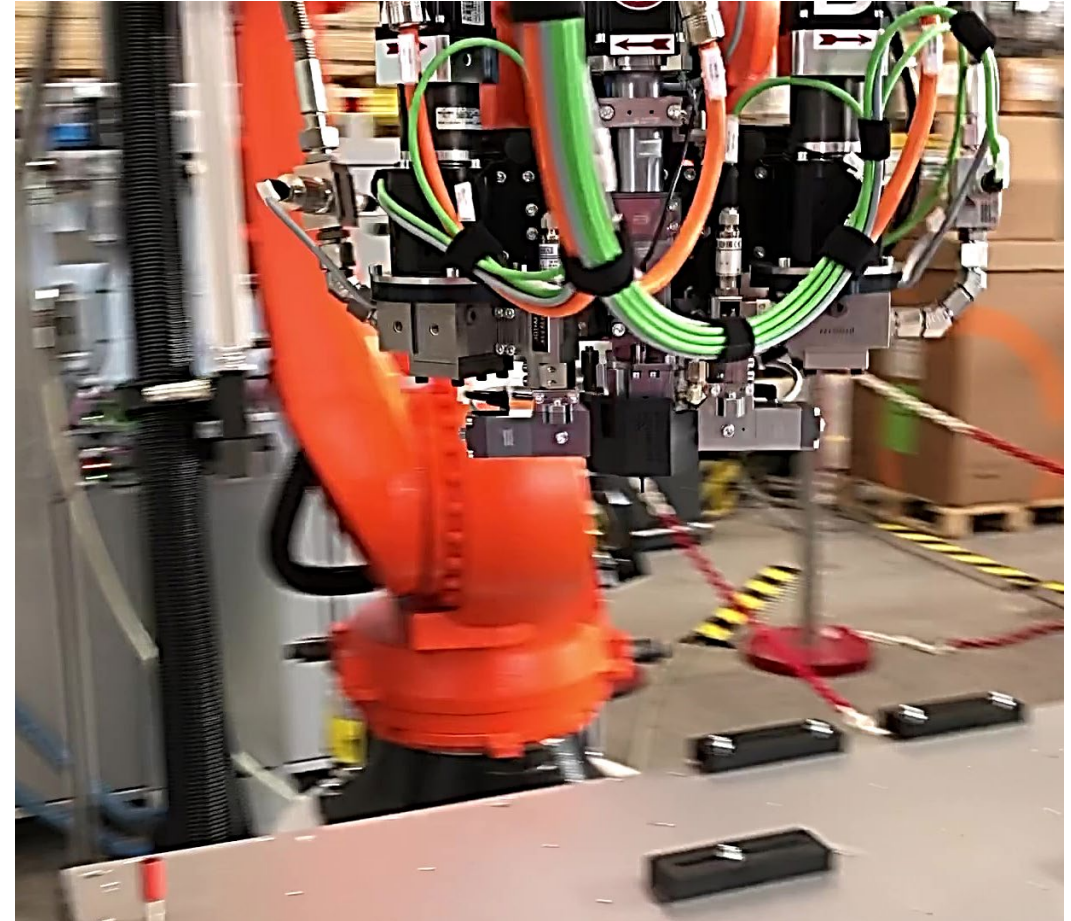


- The **mixing ratio** is infinitely variable from 1 : 100 to 100 : 1
- The **application** rate ranges from 3 to 100 g/s with an **accuracy of +/- 1%**
- Outstanding **homogeneity** of the material system ensured by dynamic mixing of the two components
- **Complex contour** geometries possible through freely programmable 3 or 6 axis robots
- **Repeating accuracy** +/- 0,1 mm
- Perfect **coupling point** through adjustable material output and contour programming
- **Sustainability** due to high pressure water cleaning
- **High dimensional precision** of the sealing/adhesive bead through perfect coordination of the robotic mixing head control and the material dispensing (g/sec)

▶ OPTIMIZED DOSING TECHNOLOGY FOR DISPLAYS

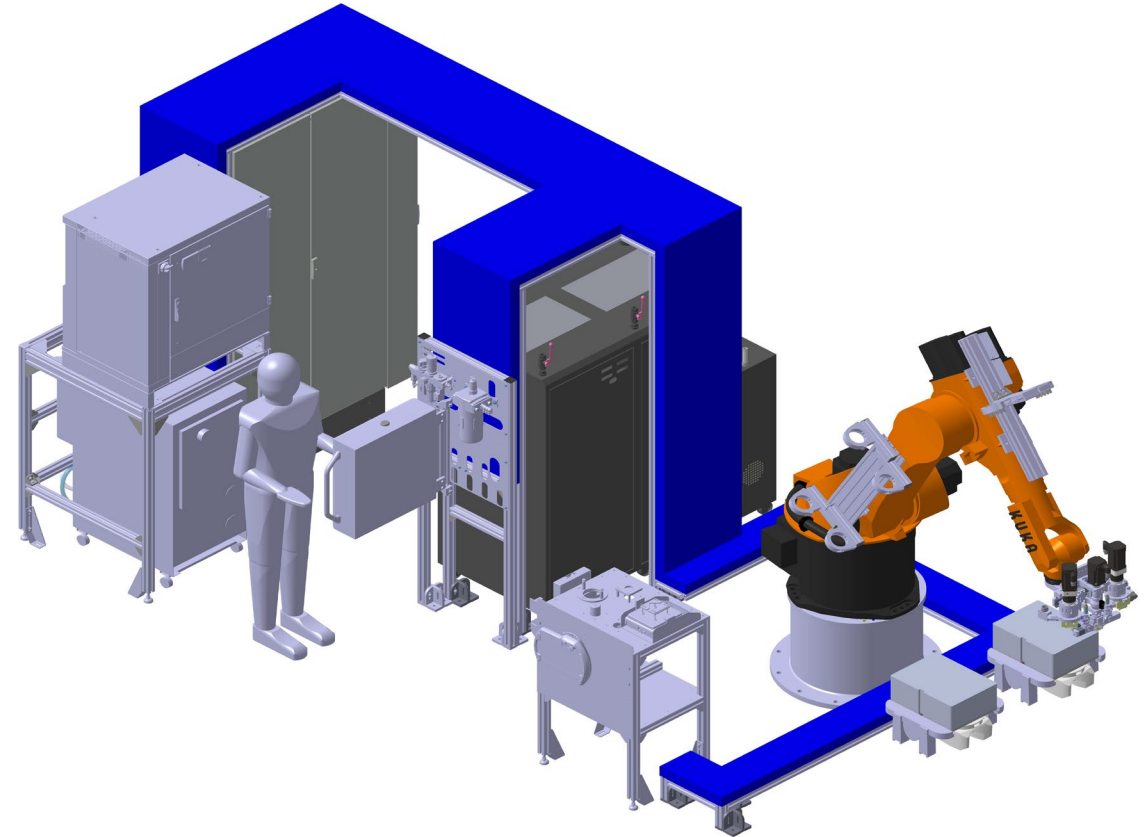
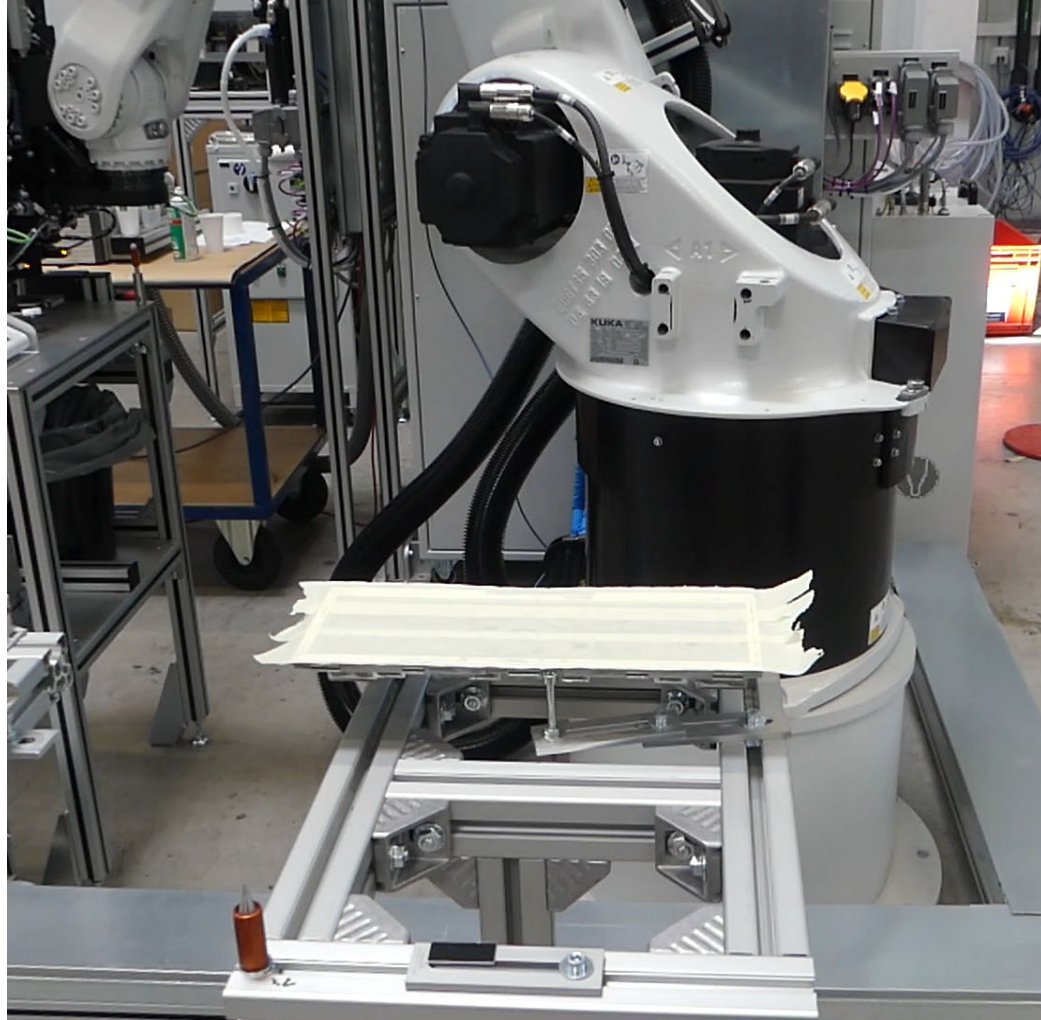
Additional benefits of adapted mixing head technology for display bonding:

1. Cooling of the mixing head down to 5°C to reduce residual mixing chamber pollution resulting in reduced downtime
2. Material pump at mixing head promoting faster system reactivity
3. New addition: Active Quantity Adjustment



▶ DISPLAY BONDING DOSING PROCESS

ALTERNATING DOSING PROCESS WITH 2 WORKSTATIONS



▶ INNOVATION: ACTIVE QUANTITY ADJUSTMENT STRUCTURAL BONDING

KEY CHALLENGE



- 1. Reduce speed in corners**
Reducing time constant of dosing system (short connection between pumps and valve, predictive speed information)
- 2. Gap tolerance compensation**
Synchronizing gap information with contour of part (interface to gap measurement station, fast interface to robot, ...)

Active Quantity Adjustment (AQA)

Technology

Quantity Adjustment

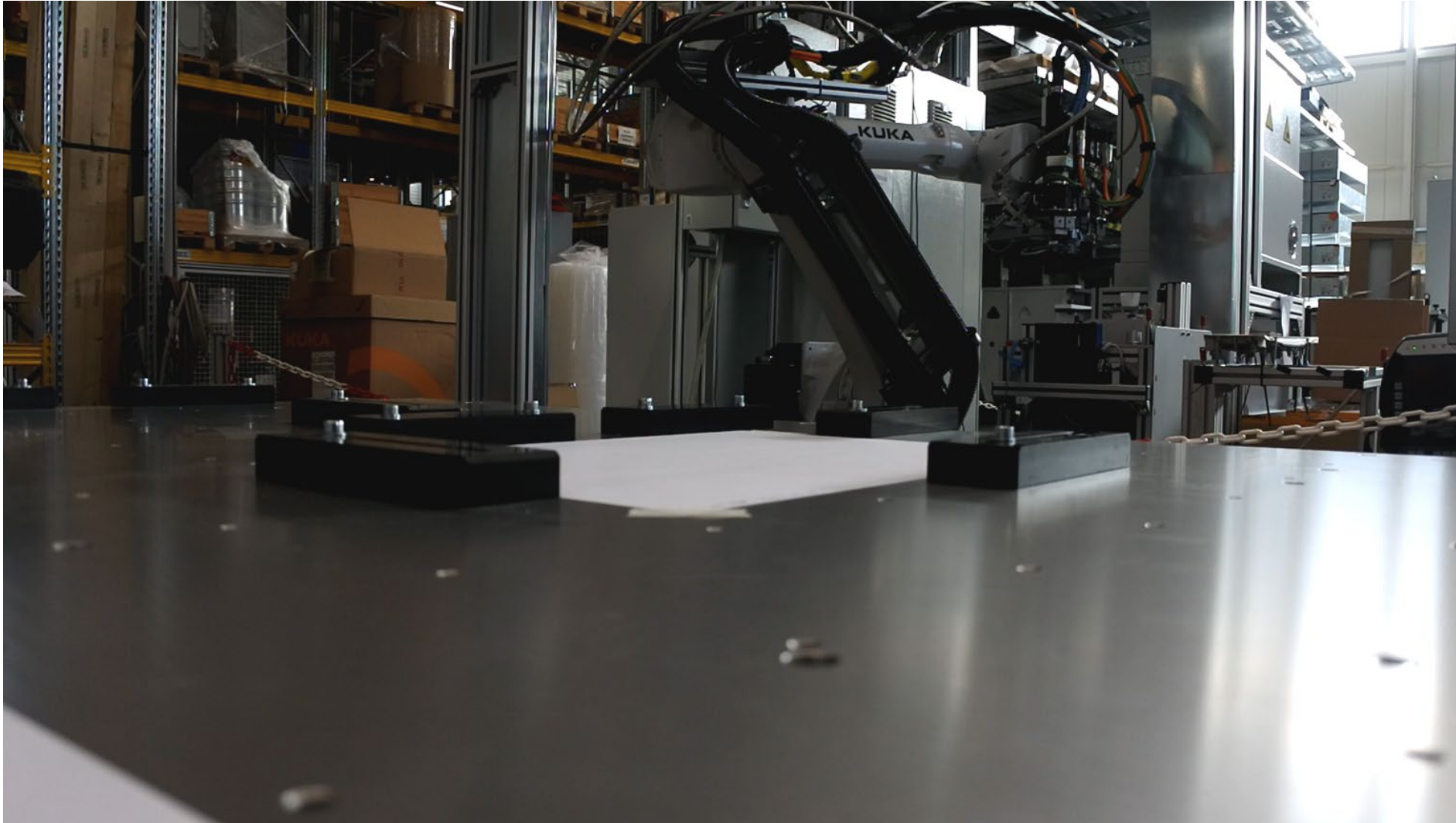


CUSTOMER BENEFITS

- 1. Better cycle times on parts with smaller radiuses in corners**
- 2. Compensation of gaps enables dispensing on parts with higher tolerances**

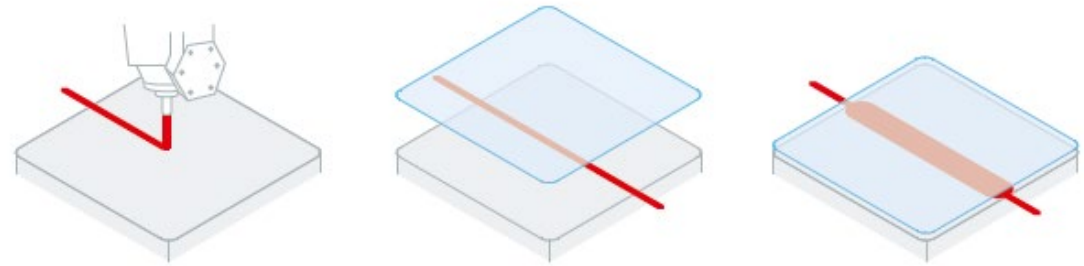
▶ AQA IN PRACTICE

OPTIMIZING DISPENSING SPEED FOR SHORTER CYCLE TIMES

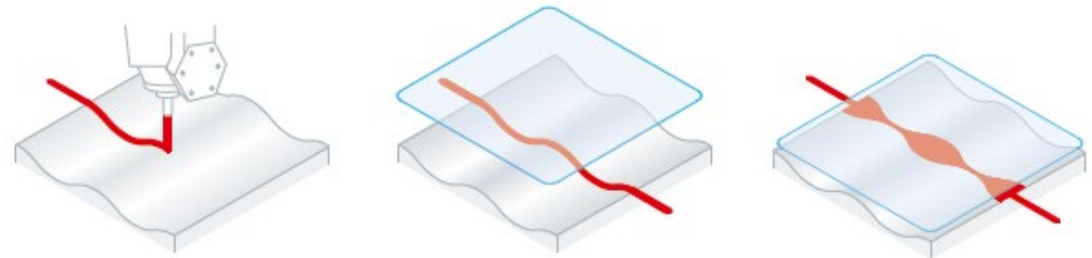


▶ TOLERANCE COMPENSATION BENEFITS OF AQA

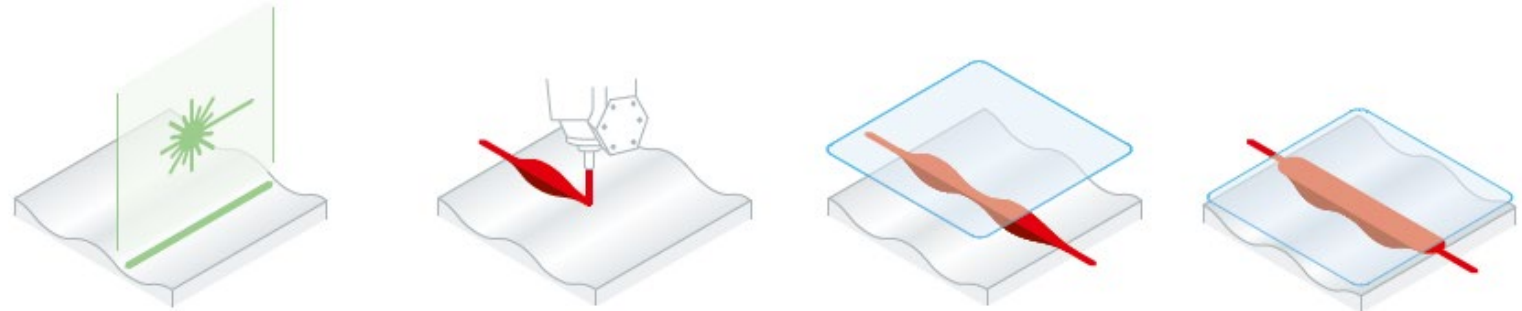
Dispensing w/o AQA
on flat surface



Dispensing w/o AQA
on tolerance surface



Dispensing with AQA
on tolerance surface



QUESTIONS?

THANK YOU