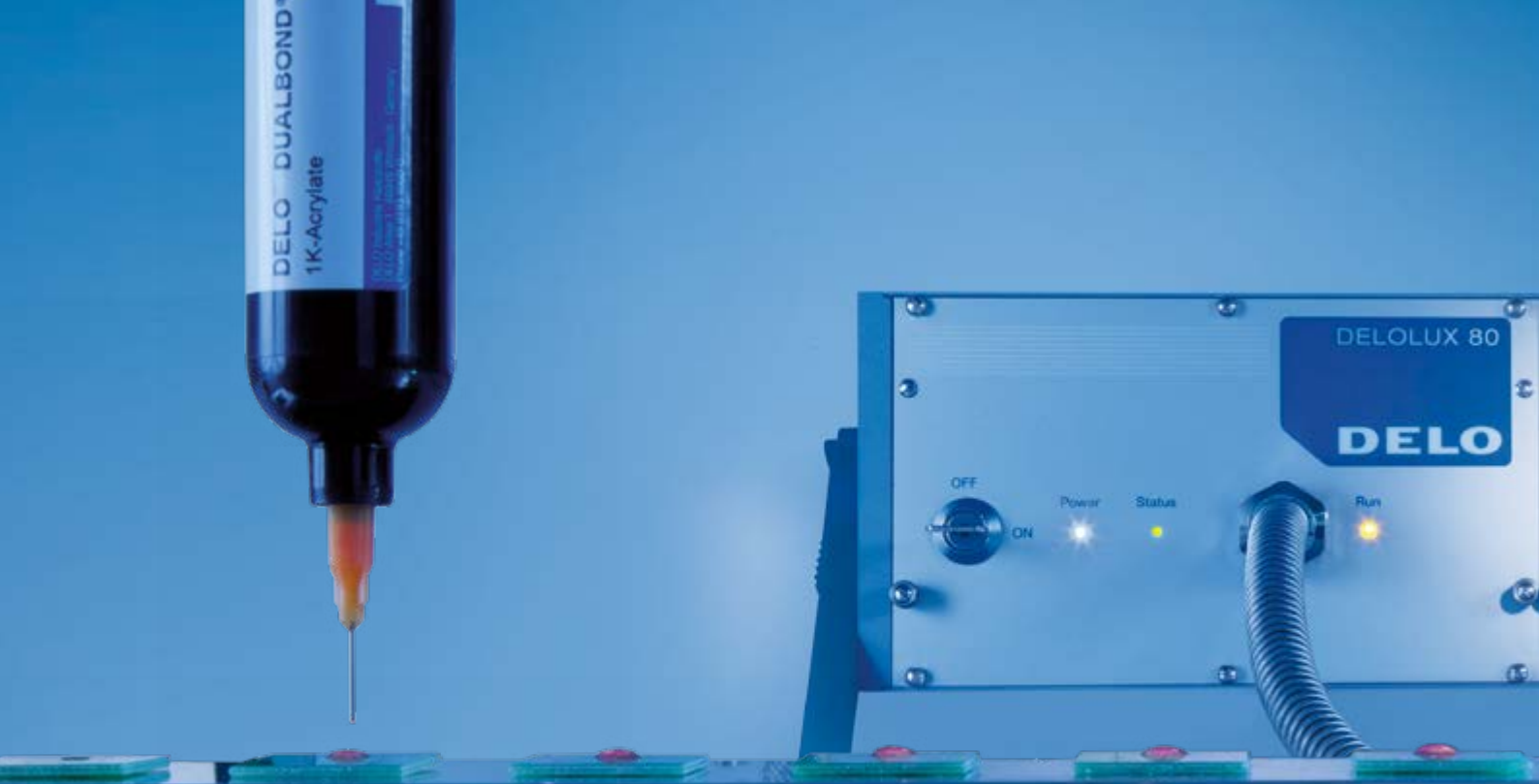




Curing of microswitch sealing with DELOLUX 202

## Light Curing

Benefits, Adhesives  
and Curing Lamps



# Durability at the Speed of Light

## Light curing – the fast way to a perfect bond

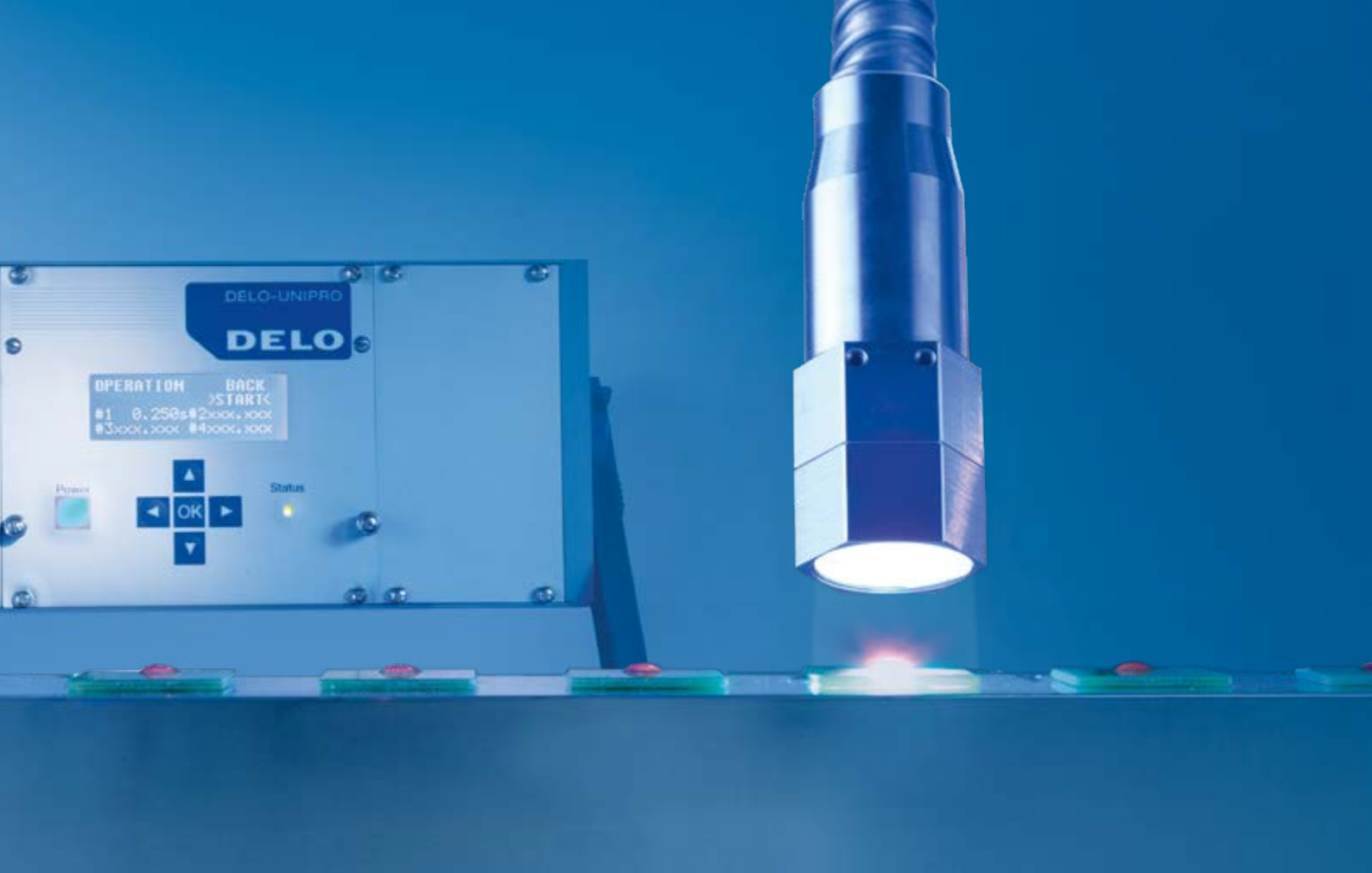
Short cycle times, smoothly running processes and reliable products are essential criteria in industrial serial manufacturing. DELO's light-curing adhesives ideally exceed these expectations. The products are characterized by reliable function and fast curing in seconds. The bonding process is easy to integrate into production processes.

Bonding has successfully established itself as an outstanding and material-friendly joining method in a wide variety of industries. Without DELO's light-curing adhesives, it would not be possible to produce mobile phones, smart cards, CCM cameras or modern shower enclosures as efficiently and effectively as we know them today.



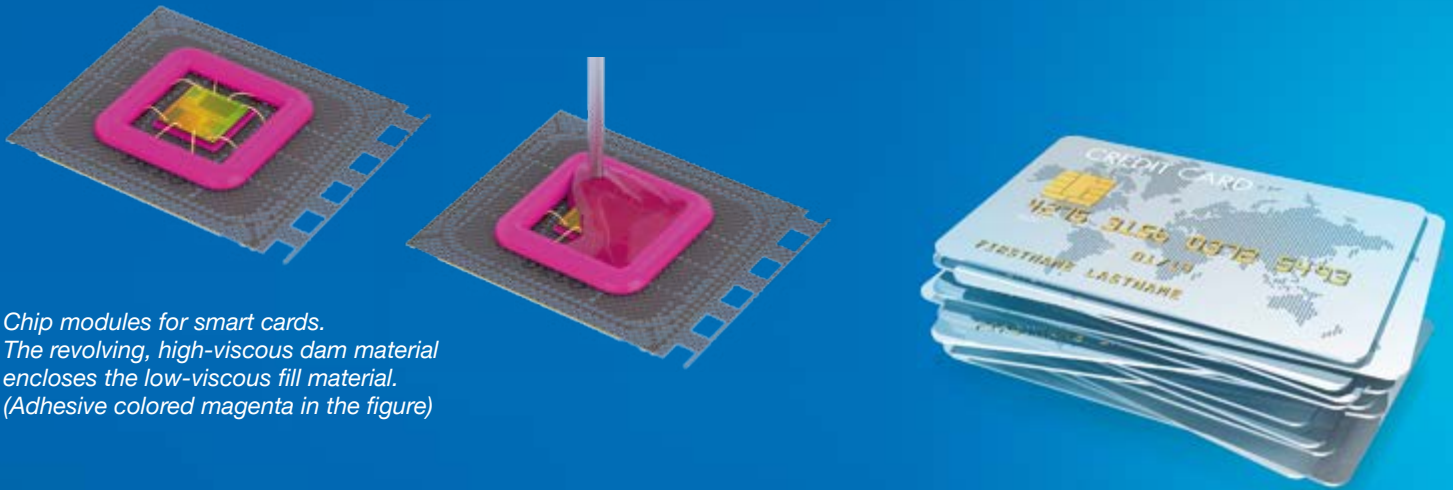
You can find many light curing processes on





**Clear advantages of DELO's light-curing adhesives:**

Advantages of light curing	Your benefit	
Fast curing in seconds	Short cycle times, high output and reproducibility	Page 4
Curing on demand	Adhesive cures after irradiation with the required wavelength and thus enables precise positioning and fixing of the components to be bonded	Page 5
Flexibility in production/process	The adhesive is flexible over a wide temperature range	Page 6
Innovation	New construction and design possibilities, e. g., thanks to the high transparency	Page 7
Miniaturization	Joining of tiny components when screwing is not possible	Page 8
High reliability	Reliable function over the entire lifetime of the component	Page 9
Simple processing	One-component, no mixing systems required	Page 10
Excellent adhesion	Outstanding strength over the entire lifetime of the component	Page 11
Low temperature stress	Joining of temperature-sensitive components, increased flexibility in the selection of component materials	Page 5, 8
Product types with secondary curing mechanism available	Curing of adhesive in shadowed areas, for example by heat, humidity or anaerobic curing	Page 5, 6, 11



Chip modules for smart cards.  
The revolving, high-viscous dam material  
encloses the low-viscous fill material.  
(Adhesive colored magenta in the figure)

# Light Curing = Fast Curing in Seconds

## Dam & fill chip encapsulation

In the production of chip modules for smart cards, the contacted chip is first encircled by a high-viscous adhesive (dam), that is subsequently filled with a low-viscous chip encapsulant (fill). The adhesive can be applied with systems provided by Mühlbauer or Ruhlamat.



Both DELO KATIOBOND dam&fill adhesives are then cured in one go with the DELOLUX 820/365 curing lamp.

### Technical properties of DELO KATIOBOND dam & fill

- High ion purity
- Dam & fill encapsulants can be processed wet in wet, that means that the dam does not have to be cured first
- Dam & fill adhesives form a chemically homogeneous unit
- Tension-equalizing or hard products for various requirement profiles
- Also suitable for glob top

Advantages of light curing	Your benefit
High production capacity	Encapsulation of up to 40,000 modules/h
Quality	Steady dispensing results even when using showerhead dispensers
Optimized production flow	In-line process from the blank tape to the finished module
Operational reliability	Requirements of the ISO specification are exceeded



16-way dispenser head for simultaneous  
adhesive dispensing on 16 modules  
© Scheugenpflug AG



#### Fast curing in seconds – further examples:

- Bonding of mini speakers
- Bonding of compact camera modules
- Bonding of lenses into LED packages

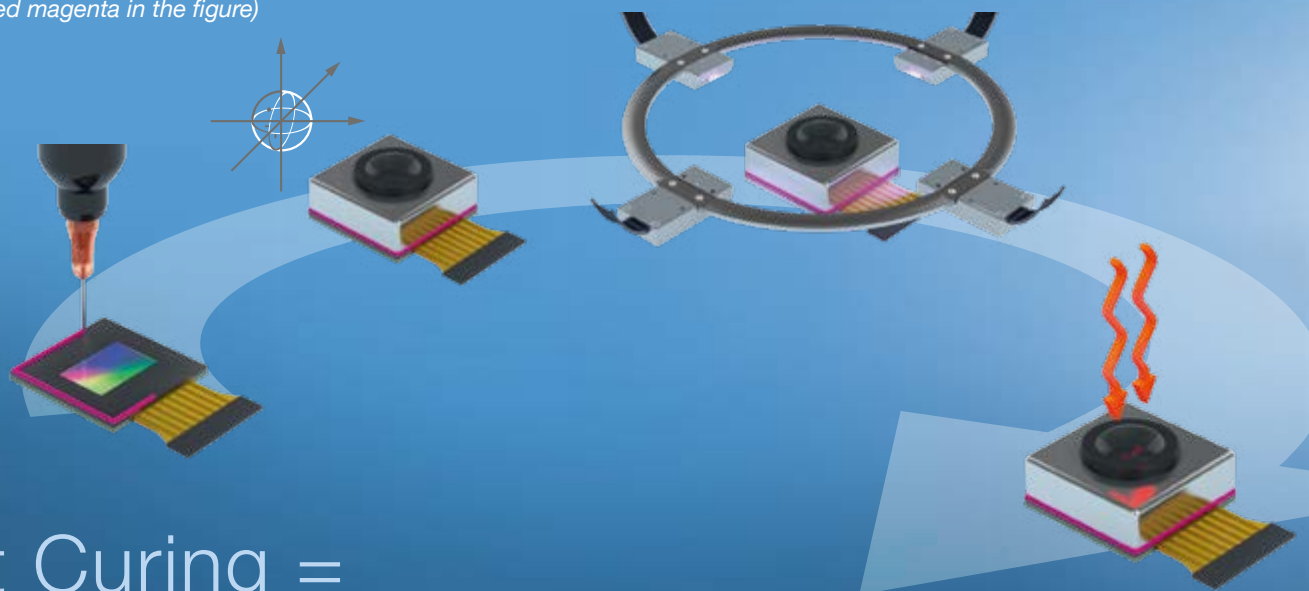


We have been collaborating with DELO for more than 20 years. We use DELO KATIOBOND dam & fill adhesives to produce our smart card modules as they cure fast in seconds and enable short cycle times. The innovative and reliable products help us achieve our goals as technology and quality leader.

Peter Stampka, Director Marketing,  
ChipCard & Security, Infineon Technologies AG



Active alignment process of camera modules:  
 dispensing – alignment – light fixing – heat curing  
 (Adhesive colored magenta in the figure)



# Light Curing = Curing on Demand

## Bonding of compact camera modules

Optical components, such as lenses and image sensors, are precisely aligned using DELO DUALBOND. The adhesive remains liquid during alignment. As soon as the component has reached the position for optimal image quality, the adhesive is quickly fixed within seconds by exposure to light using DELOLUX LED curing lamps specifically adapted to this process. Subsequent final curing by heat proceeds at just +80 °C.

### Technical properties of DELO DUALBOND

- Fast fixation by UV light in less than 1 second
- Curing at low temperatures:  
Final curing possible at +80 °C
- Excellent adhesion to plastics, such as PBT, FR4, etc.
- Low outgassing, low shrinkage
- Good temperature stability
- Good resistance to climatic changes, humidity and in salt spray test
- Halogen-free according to IEC 61249-2-21

Advantages of light curing	Your benefit
Increased production capacity	Reliable fixing in less than 1 s (depending on component) enables short cycle times
Optimized process flow	Curing at low temperatures (at only +80 °C) makes possible the bonding of temperature-sensitive components
Process reliability	Unchanging, low shrinkage leads to high yield
High efficiency	Low energy consumption



Compact camera module for smartphones



### Curing on demand – further examples:

- Fixing and bonding of optical components such as lasers or sensors
- Applications in precision engineering



Thanks to DELO DUALBOND, it is now also possible to bond temperature-sensitive components and cure shadowed areas in a fast and highly reliable process. These adhesives are perfectly suited for the active alignment process by providing fast light curing with secondary temperature curing at only +80 °C. We often recommend that customers use DELO DUALBOND adhesives because we know, they work without fail!

Andre By, Chief Technology Officer,  
 Automation Engineering Incorporated







Display housing sealing for a smartphone with DELO-DOT PN (Adhesive colored magenta in the figure)

# Light Curing = Flexibility in Production

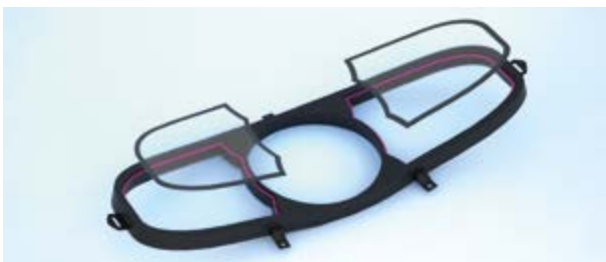
## Bonding of displays

Various adhesives can be used for bonding display frames, protective glass, or for joining display panel and housing. DELO has developed special adhesives for this purpose, which allow for fast production processes. The adhesives can be preactivated and reach their final strength through humidity curing.

### Technical properties of DELO PHOTOBOND and DELO DUALBOND display adhesives

- High flexibility over a wide temperature range
- Tension-equalizing
- Secondary curing mechanism (humidity) for shadowed areas, for example under black print on the display glass
- Fast, reliable and durable connection of various materials

Advantages of light curing	Your benefit
Flexibility	Equalization of component tolerances, bonding of 3D structures and different layer thicknesses in one component possible
Short innovation cycles	Faster development of new products and designs compared to tapes
Quality	Flexibility and high strength over a wide temperature range
Prolonged lifetime	Resistance to shock, vibration and impact load



Display frame bonding is one exemplary adhesive application in Center Information (CI) (Adhesive colored magenta in the figure)



### Flexibility in production – further examples:

- Sealing of housings CIPG (Cure in Place Gasket)
- Bonding of fastening elements / ONSERT®
- LiDAR bonding



Radtech Europe Innovation Award 2011 for the development of light-curing, transparent adhesives for display bonding.

RadTech Europe Association, October 2011



# Light Curing = Innovation

© Duscholux AG

## Bonding of door hinges for glass shower enclosures

DELO PHOTOBOND is used in mixed glass bondings for shower enclosures, as an example, to join door hinges made of stainless steel to glass panels. The adhesive is cured with DELOLUX LED area modules. Intensity and irradiation time can be controlled. The irradiation time can precisely be set by simply switching the lamp on and off. As a result, the LED does not age or consume current during the non-irradiation phase.

### Technical properties of DELO PHOTOBOND

- Reliable adhesion to glass, stainless steel, and anodized aluminum
- Invisible, yellowing-resistant and light-fast
- Humidity-resistant
- Equalization of thermal tensions between glass and metal, impact-resistant

Advantages of light curing	Your benefit
New design possibilities	Esthetical and easy-to-clean designs
Cost-efficient production	Omission of boreholes and screws
Quality	Positively tested acc. to DIN EN 14428 with more than 250,000 opening/closing cycles



Bonding of door hinges made of stainless steel for glass shower enclosures. © Duscholux AG

The world market leader Duscholux, Switzerland, uses DELO's light-curing adhesives to bond its shower enclosures.

We decided to use bonding technology as joining methods in order to provide our customer with modern appearance and innovative design with user-friendly cleaning properties. The invisible and yellowing-resistant DELO PHOTOBOND adhesives are ideal for this application.

*Guido Riegger, Development Manager, Duscholux AG*



### Innovation – further examples:

- Bonding of organic solar cells
- Encapsulation of OLED displays
- Bonding of connection elements/ONSERT®



Eight individual components are bonded to assemble mini speakers for mobile phones, dictating machines, etc. Light-curing adhesives are used for most of them.



# Light Curing = Miniaturization

## Bonding of mini speakers for mobile phones

Today's mobile phones include two to three high-performance mini speakers. The individual components, such as membranes, coils, or covers, are bonded with DELO PHOTOBOND adhesives which are cured with specifically adapted high-power DELOLUX LED lamps.

### Technical properties of DELO PHOTOBOND

- Fast curing in less than 1 second
- Good adhesion to various materials, such as metal and plastic
- Very good temperature and humidity resistance
- High flexibility and impact resistance
- Light curing: No thermal stressing of the sensitive membranes

Advantages of light curing	Your benefit
More flexible production	Easy adaptation of the bonding process over many product generations
Quality	Speakers bonded with DELO PHOTOBOND are characterized by superior acoustic quality over their entire lifetime
Increased production capacity	Short cycle times allow production of up to 6,000 speakers per hour on one system
Production reliability	In-process check of the exact adhesive application thanks to the fluorescence of the adhesive
Optimized process flow	Speakers can be fully tested directly after adhesive curing, buffer stock not necessary therefore



Comparison of an outdated speaker with today's models: The performance density of modern mini speakers clearly increased while the size was reduced  
© Knowles Electronics Austria GmbH



### Miniaturization – further examples:

- Smart label applications
- Bonding of compact camera modules



We are the market and innovation leader in mobile phone speakers and have successfully been collaborating with DELO for more than 20 years. Here, world market leader meets world market leader! We can rely on DELO when we develop new products. They always supply us with innovative adhesives that fulfill our individual needs for mobile acoustic products.

Wolfgang Suete, Process Engineer,  
Knowles Electronics Austria GmbH







# Light Curing = High Reliability

Cast microswitches  
(adhesive colored magenta in the figure)

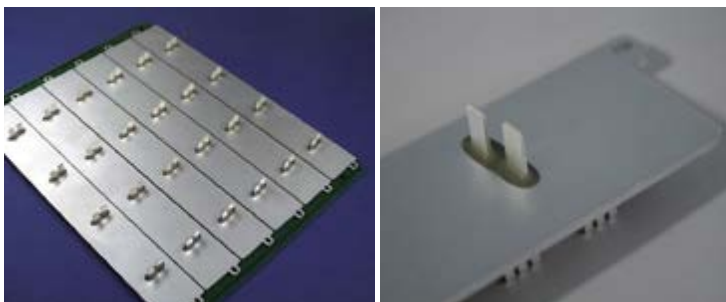
## Casting of automotive microswitches

When bonding electronic automotive components such as microswitches, relays or sensors, special adhesives are in demand: they must seal the components against temperatures, pressure, humidity or aggressive media. Open contact areas at the housing must be reliably covered to protect the entire component from corrosion.

### Technical properties of DELO KATIOBOND

- Excellent adhesion to plastic, metal, and glass
- High flexibility even at low temperatures
- Very good flow and wetting behavior
- Resistant to media, humidity, temperatures, and shocks
- High corrosion resistance

Advantages of light curing	Your benefit
Quality	Reliable function of safety-relevant components even after years of use
Process reliability	Fast curing allows functional tests directly in the system
Increased efficiency	Technically and economically ideal solution compared to two-component or heat-curing adhesives



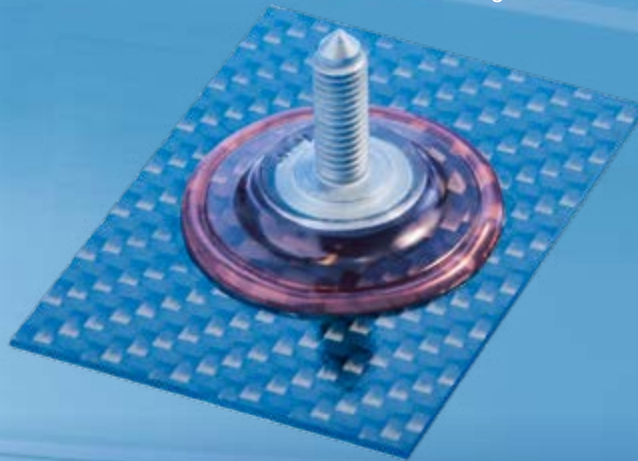
Casting of connector pins for operator and control devices in automotive air conditioning systems  
© Behr-Hella Thermocontrol GmbH

Behr-Hella Thermocontrol produces operator and control devices for automotive air conditioning systems. They use light-curing adhesives to cast electrical pins.

“ Important requirements on the adhesive include that the component is reliably sealed against contaminations and humidity. DELO KATIOBOND is ideal for this purpose. ”  
Heinz Sträter, Production Engineer,  
Behr-Hella Thermocontrol GmbH

**i** High reliability – further examples:

- Smart card encapsulation
- Bonding and sealing of mobile phone displays



# Light Curing = Simple Processing

## Bonding of connection elements

In the aircraft and automotive industries more and more carbon-fiber-reinforced plastics (CFRP) are used. Boreholes are omitted to prevent damage to the material when attaching connection and fixing elements. Instead, clips or thread inserts covered in transparent plastic are bonded to the CFRP.

The ONSERT® method jointly developed by DELO and BÖLLHOFF (supplier of mechanical connection elements, such as rivets and screws) has many advantages over other joining methods.

### Technical properties of DELO PHOTOBOND

- Excellent adhesion to many plastics, metals, and glass
- Tension-equalizing
- High long-term and media resistance

Advantages of light curing	Your benefit
Decrease in production costs	Easier handling compared to two-component or heat-curing adhesives
Increased production capacity	Fast curing in seconds for short cycle times
Production reliability	A high degree of automation is possible
Continuously high level of the product properties	Unlike rivets, bonding does not weaken or damage the component structures
New design possibilities	In contrast to welded elements, bonded fixing elements can flexibly be attached and are not apparent on the visible side



© Böllhoff



### Simple processing – further examples:

- Bonding of faceplates of household appliances (ovens, dishwashers, washing machines)
- Bonding of stop rails and door hinges of shower enclosures – instead of boreholes
- Bonding of automotive cameras



The ONSERT® joining method is an excellent combination of innovative bonding technology and connection elements.

Short cycle times, a simple process with a high degree of automation and adhesive curing in just seconds enable simple and reliable handling. This is a fantastic creation of DELO and BÖLLHOFF.

*Michael Stumpf, Product Manager,  
Böllhoff Verbindungstechnik GmbH*





# Light Curing = Excellent Adhesion

## Bonding of electric motors

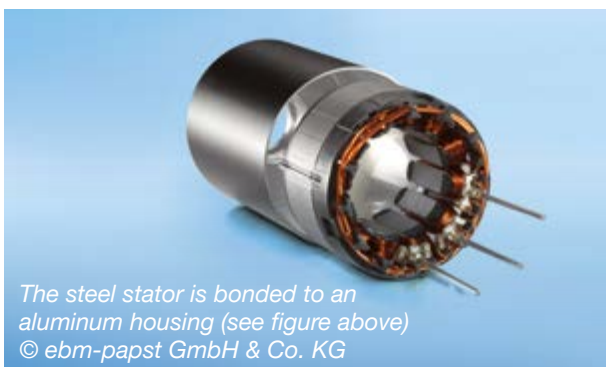
Electric motors are getting more and more compact and efficient. The degree of efficiency of small motors is continuously increasing.

DELO-ML DB adhesives connect the individual components in seconds, save weight, equalize tensions and, unlike anaerobic-curing competitive products, provide high strength even at high torque.

### Technical properties of DELO-ML DB

- Dual-curing: Curing by light and under exclusion of oxygen (anaerobic)
- Very good resistance to media in the engine compartment including oil, gasoline, and Diesel
- Normal temperature range of use up to +180 °C
- Tension-equalizing
- Very high impact resistance
- Excellent adhesion to smooth metal surfaces

Advantages of light curing	Your benefit
Increased operational reliability and longer lifetime	Metals with dissimilar coefficients of expansion and even larger magnets are bonded with high strength
Optimized production flow	Preliminary light fixation enables immediate initial strength and saves mechanical component fixtures
Increased efficiency	Anaerobic adhesive curing in shadowed areas reduces energy costs and saves expensive process steps



The steel stator is bonded to an aluminum housing (see figure above)  
© ebm-papst GmbH & Co. KG



### Excellent adhesion – further examples:

- Bonding of lenses into LED packages
- Bonding of connection elements/ONSERT®
- Bonding of chips to RFID labels

“ We bond with the dual-curing DELO-ML DB as it provides clearly better strength in torque tests than the previously used adhesive.

*Daniel Rauer, Project Team Leader, Industrial Drive Development, ebm-papst GmbH & Co. KG*

” In addition, it is not necessary to mechanically fix the components during anaerobic curing thanks to the preliminary light fixation.





# DELO's Light-curing Adhesives

	DELO PHOTOBOND acrylates	DELO KATIOBOND epoxy resins	DELO DUALBOND acrylates / epoxy resins	DELO-ML DB methacrylates DB = DUALBOND
<b>Curing</b>	UV-curing, light-curing, preactivated	Light-curing, partly light-activated	Dual-curing: Light-curing and heat- or humidity- curing depending on the product	Anaerobic-curing, with additional light curing
<b>Wavelength range for curing</b>	320 – 450 nm depending on the type	320 – 550 nm depending on the type	320 – 550 nm depending on the type	320 – 450 nm depending on the type
<b>Application areas</b>	<ul style="list-style-type: none"> <li>▪ Automotive</li> <li>▪ Mobile phones</li> <li>▪ Displays</li> <li>▪ Glass</li> <li>▪ Optoelectronics</li> <li>▪ Smart labels</li> <li>▪ Printed circuit boards</li> <li>▪ Medical accessories</li> </ul>	<ul style="list-style-type: none"> <li>▪ Automotive</li> <li>▪ Mobile phones</li> <li>▪ Displays</li> <li>▪ Optoelectronics</li> <li>▪ Organic electronics</li> <li>▪ Smart cards</li> <li>▪ Printed circuit boards</li> </ul>	<ul style="list-style-type: none"> <li>▪ Automotive</li> <li>▪ Mobile phones</li> <li>▪ Displays</li> <li>▪ Optoelectronics</li> <li>▪ Photovoltaics</li> <li>▪ Printed circuit boards</li> </ul>	<ul style="list-style-type: none"> <li>▪ Automotive</li> <li>▪ Electric motors</li> <li>▪ Mechanical engineering</li> </ul>
<b>Special features*</b>	<ul style="list-style-type: none"> <li>▪ Extremely fast curing</li> <li>▪ High equalization of tensions</li> <li>▪ High impact resistance</li> <li>▪ High optical clearness and UV resistance</li> <li>▪ Universally good adhesion</li> </ul>	<ul style="list-style-type: none"> <li>▪ High thermal and media resistance</li> <li>▪ Low outgassing</li> <li>▪ Optically clear and yellowing-resistant even at elevated temperatures</li> <li>▪ High ion purity</li> <li>▪ Low corrosion potential</li> <li>▪ High water barrier effect</li> </ul>	<ul style="list-style-type: none"> <li>▪ Secondary curing mechanism for reliable curing in shadowed areas</li> <li>▪ Otherwise like the corresponding basic product group</li> </ul>	<ul style="list-style-type: none"> <li>▪ Anaerobic- and light-curing, one-component adhesives</li> <li>▪ Excellent adhesion to metal</li> <li>▪ Good adhesion even to certain plastics</li> <li>▪ Tension-equalizing and impact-resistant</li> </ul>
<b>Curing in shadowed areas</b>	✗	✓ light-activated product types	✓ by heat or humidity depending on the product	✓ by anaerobic curing

\* The strong points show in which areas the product groups are particularly efficient. Depending on the product, these strong points may differ.

Precise and bubble-free adhesive dispensing with  
DELO-DOT PN3 and DELO FLEXCAP.



# Adhesive Dispensing

In order to better utilize the advantages of light curing in production, including miniaturization, maximum reliability and extremely fast processes, DELO has developed

complementary dispensing technology, such as the DELO-DOT PN3 jet valve and DELO FLEXCAP.

## DELO-DOT PN3 microdispensing valve – Precise, compact and light-weight

The pneumatic DELO-DOT PN3 microdispensing valve is precise, fast and compact. It has an operating frequency of up to 330 Hz (drops per second). This unique system is made to be robust due to its modular design. This design allows the dispensing valve to be easily

disassembled into its single parts. The fluid system is strictly separated from the actuator. This avoids time-consuming cleaning, and the valve can be put into operation again quickly. The actuator has an extremely long lifetime of more than 1 billion cycles.

## DELO FLEXCAP cartridge system with integrated fill level sensor in the pressure tank

A flexible, hermetically tight foil replaces the conventional cartridge piston. As a result, adhesives can be stored, transported and dispensed without bubbles. The cartridge system which is free of trapped air enables the highest dispensing reliability, precision and maximum emptying. DELO FLEXCAP is available in 10 ml and 30 ml container. The fill level sensor of the pressure tank for DELO FLEXCAP provides benefits for fully automated production. Integrated sensors transmit a signal that indicates when the cartridge is nearly empty and again when it is completely empty. As a result, the user can prepare a new cartridge in time to minimize downtime.

### Advantages at a glance:

- Process reliability thanks to bubble-free dispensing
- Reproducible processes with a high yield rate
- Easy to integrate into every production system
- Cost savings through reduced waste, minimized downtime, and maximum emptying of the cartridges
- The air-tight cartridge enables easy and cost-efficient transport



All DELO products are developed and produced in Germany, ensuring the highest quality of design and manufacture.



# Curing in Seconds with DELOLUX



DELOLUX 50



DELOLUX 80

<b>Description</b>	High-intensity spot light source	High-intensity area lamp for smaller bonding areas
<b>Dimensions of lamp head</b>	×1: 12 mm dia. × 71 mm ×4: 15 mm dia. × 76 mm	365 nm: 27 mm dia. × 92 mm 400 nm: 27 mm dia. × 92 mm 460 nm: 20 mm dia. × 85 mm
<b>Light exit area</b>	×1: 8.6 mm dia.* ×4: 11.5 mm dia.*  * various optics available	365 nm: 23.0 mm dia. 400 nm: 23.0 mm dia. 460 nm: 16.9 mm dia.
<b>Wavelength/ typical intensity</b>	365 nm ×1: ≥ 18,000 mW/cm <sup>2</sup> 365 nm ×4: ≥ 3,500 mW/cm <sup>2</sup> 400 nm ×1: ≥ 15,000 mW/cm <sup>2</sup> 400 nm ×4: ≥ 7,000 mW/cm <sup>2</sup> 460 nm ×1: ≥ 14,000 mW/cm <sup>2</sup>	365 nm: ≥ 4,000 mW/cm <sup>2</sup> 400 nm: ≥ 5,500 mW/cm <sup>2</sup> 460 nm: ≥ 2,500 mW/cm <sup>2</sup>
<b>Cooling mechanism</b>	Passively cooled Powerguide, heat sink in lamp head	Closed and monitored Coldguide liquid cooling system
<b>Control</b>	DELOLUX pilot and optional downstream PLC	DELO-UNIPRO, DELO-UNIPRO Light or external PLC

**Application examples**



Bonding of compact camera modules:

- Several LED heads are spread over the component circumference and enable flexible irradiation of several bonding areas
- Any installation position of the LED heads thanks to flexible, robust conduit



Bonding of mini speakers for mobile phones:

- The light exit area is ideal for the size of the mini speaker components
- High intensity
- Short switching cycles are possible with the LED lamp

Properties	Your benefits
<ul style="list-style-type: none"> <li>Emission spectra optimized for adhesives</li> <li>Evenly distributed intensity</li> <li>Monitoring of the LED temperature and function</li> <li>Regular intensity measurement at the component with DELOLUXcontrol</li> </ul>	<ul style="list-style-type: none"> <li>Reliable adhesive curing, high process reliability</li> </ul>
<ul style="list-style-type: none"> <li>Low energy consumption</li> <li>Service life of more than 20,000 h possible</li> </ul>	<ul style="list-style-type: none"> <li>Low operating costs</li> </ul>
<ul style="list-style-type: none"> <li>Stable light power at a constantly high level</li> </ul>	<ul style="list-style-type: none"> <li>Fast curing in seconds, short cycle times</li> </ul>
<ul style="list-style-type: none"> <li>Lamp heads are easy to install</li> </ul>	<ul style="list-style-type: none"> <li>Easy integration into systems</li> </ul>



## DELOLUX 20, 202

Version: A1 / A2

High-intensity area lamp  
for even irradiation

DELOLUX 20:  
112 mm × 112 mm × 121 mm  
DELOLUX 202:  
209 mm × 67 mm × 121 mm

DELOLUX 20:  
100 mm × 100 mm  
DELOLUX 202:  
202 mm × 49 mm

365 nm (A1): ≥ 600 mW/cm<sup>2</sup>  
365 nm (A2): ≥ 1,200 mW/cm<sup>2</sup>  
400 nm (A1): ≥ 1,000 mW/cm<sup>2</sup>  
400 nm (A2): ≥ 2,000 mW/cm<sup>2</sup>  
460 nm (A1): ≥ 1,000 mW/cm<sup>2</sup>  
460 nm (A2): ≥ 2,000 mW/cm<sup>2</sup>

Active air cooling

DELOLUX pilot and optional  
downstream PLC



Bonding of displays:

- Arraying the lamp heads creates the optimal light exit areas for the specific display size
- Fast light curing within seconds, handling of the display can continue immediately

## DELOLUX 820

Area lamp  
for even irradiation

×4: 848 mm × 82.8 mm × 179 mm  
×6: 1,267 mm × 82.8 mm × 179 mm

×4: 830 mm × 30 mm  
×6: 1,250 mm × 30 mm

365 nm: ≥ 250 mW/cm<sup>2</sup>

Liquid cooling with  
external cooling unit

DELO-UNIPRO, DELO-UNIPRO Light  
or external PLC



Smart card – chip encapsulation:

- The light exit area enables the linear irradiation of smart card modules in reel-to-reel processes
- Evenly distributed intensity, the cold LED light source and defined heat influence by heating bars from below enable absolutely constant adhesive curing



The right  
curing lamp  
for every task



# CONTACT

**DELO** Industrial Adhesives  
Headquarters

► **Germany** · Windach / Munich .....



- **China** · Shanghai
- **Japan** · Yokohama
- **Malaysia** · Kuala Lumpur
- **Singapore**
- **South Korea** · Seoul
- **Taiwan, China** · Taipei
- **Thailand** · Bangkok
- **USA** · Sudbury, MA

..... [www.DELO-adhesives.com](http://www.DELO-adhesives.com)

The data and information provided are based on tests performed under laboratory conditions. Reliable information about the behavior of the product under practical conditions and its suitability for a specific purpose cannot be concluded from this. It is the customer's responsibility to test the suitability of a product for the intended purpose by considering all specific requirements and by applying standards the customer deems suitable (e.g. DIN 2304-1). Type, physical and chemical properties of the materials to be processed with the product, as well as all actual influences occurring during transport, storage, processing and use, may cause deviations in the behavior of the product compared to its behavior under laboratory conditions. All data provided are typical average values or uniquely determined parameters measured under laboratory conditions. The data and information provided are therefore no guarantee for specific product properties or the suitability of the product for a specific purpose. Nothing contained herein shall be construed to indicate the non-existence of any relevant patents or to constitute a permission, encouragement or recommendation to practice any development covered by any patents, without permission of the owner of this patent. All products provided by DELO are subject to DELO's General Terms of Business. Verbal ancillary agreements are deemed not to exist.

© DELO – This brochure including any and all parts is protected by copyright. Any use not expressly permitted by the Urheberrechtsgesetz (German Copyright Act) shall require DELO's written consent. This shall apply without limitation to reproductions, duplications, disseminations, adaptations, translations and microfilms as well as to the recording, processing, duplication and/or dissemination by electronic means. 01/21

ADHESIVES

DISPENSING

CURING

CONSULTING

**DELO**