

**DELO**

# **Compact Camera Module Assembly**

Customized Adhesives



Smart phone with compact camera



# Adhesives for compact camera module assembly

## Perfection is our goal

That is why we have developed a wide range of high-quality adhesives to answer the technical needs of CCM design and production.

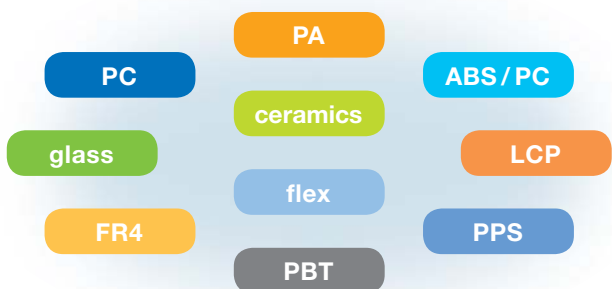


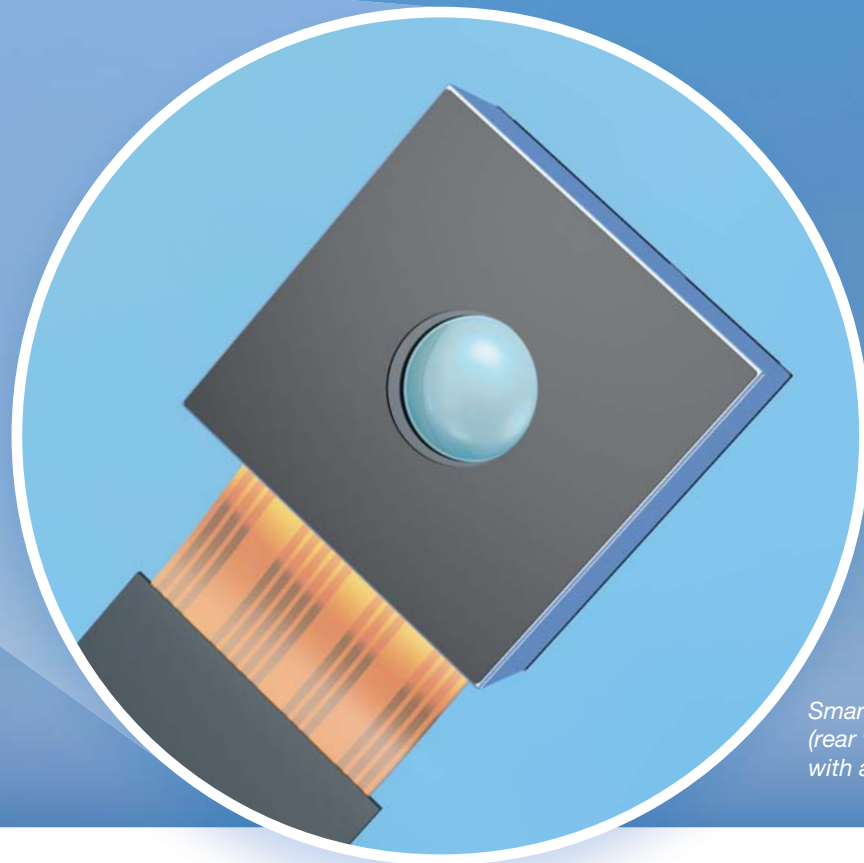
DELO's customers receive everything from just one supplier: Individual adhesives, dispensing technology, and associated LED curing lamps. Comprehensive consulting and intensive project support are part of the package for DELO as a supplier of turnkey solutions.

*DELO's adhesives are available in containers of various sizes, and adapted to the production processes. Typical cartridge contents are 10 cc and 30 cc.*

Various adhesive families and the new edge curing technology can be used for various assemblies and many substrates.

All bondable substrates at a glance:



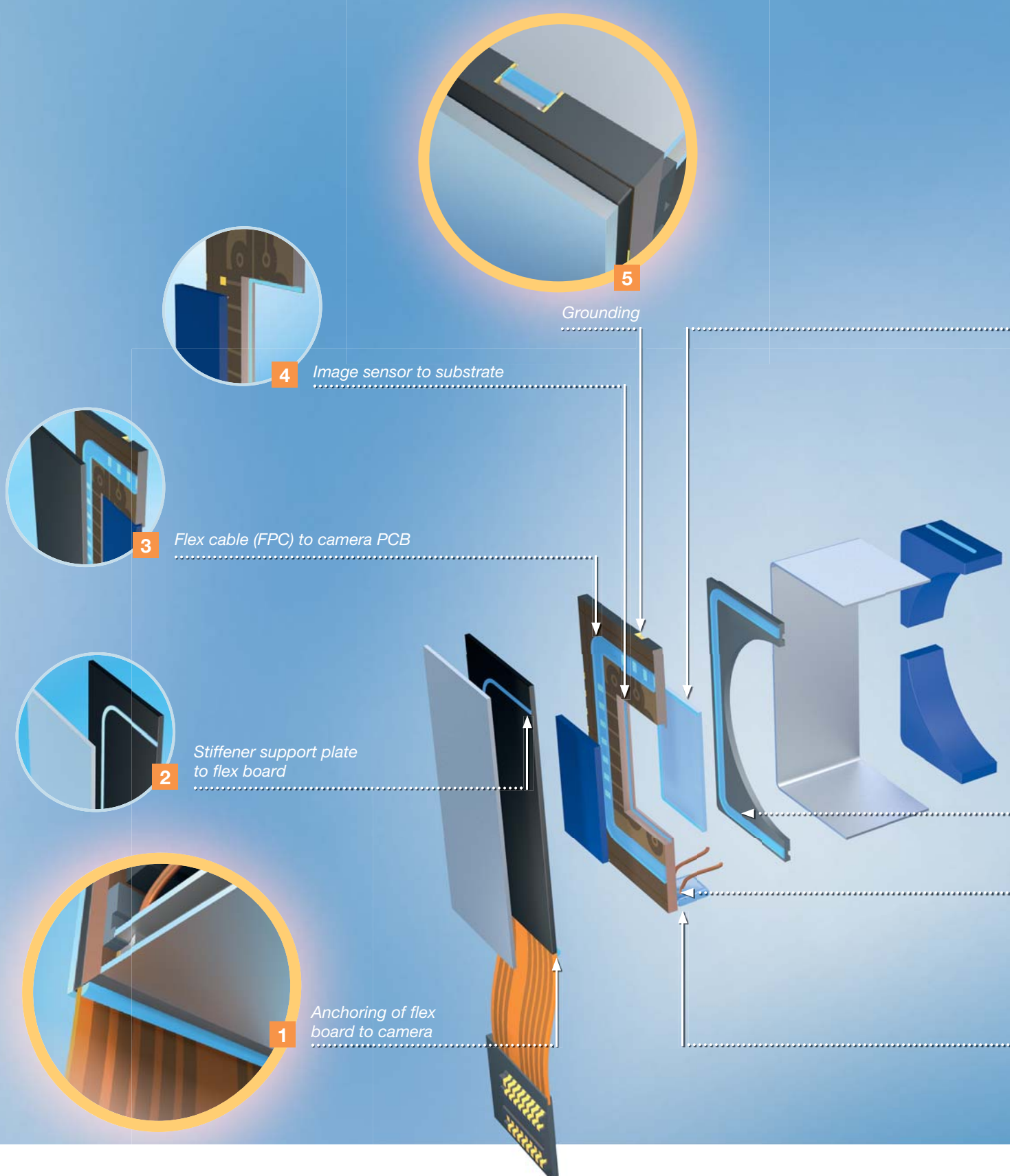


*Smart phone camera  
(rear view)  
with autofocus*

## We pave the way to your success: Customer-specific support

<b>Idea</b>	<ul style="list-style-type: none"> <li>Define the adhesive requirements together with the customer</li> <li>Determination of process specifications</li> </ul>
<b>Design</b>	<ul style="list-style-type: none"> <li>Analysis of the adhesive characteristics in relation to the customer's technical and quality requirements</li> <li>Tests in DELO's lab</li> <li>Adhesive samples for customers</li> </ul>
<b>Prototype</b>	<ul style="list-style-type: none"> <li>Functional tests on the prototype</li> <li>Customer conducts test under operating conditions</li> <li>Fast on-site support</li> </ul>
<b>Introduction</b>	<ul style="list-style-type: none"> <li>Joint determination of process specifications based on the prototype phase results</li> <li>On-site process and start-up consulting</li> </ul>
<b>Production</b>	<ul style="list-style-type: none"> <li>Ongoing intensive customer support during production</li> <li>Process finetuning where necessary</li> <li>Support of quality assurance</li> </ul>
<b>Ongoing support</b>	<ul style="list-style-type: none"> <li>Global support</li> <li>Adapt to process changes</li> <li>Assist the customer in improving process efficiency</li> <li>Application-specific staff training</li> </ul>

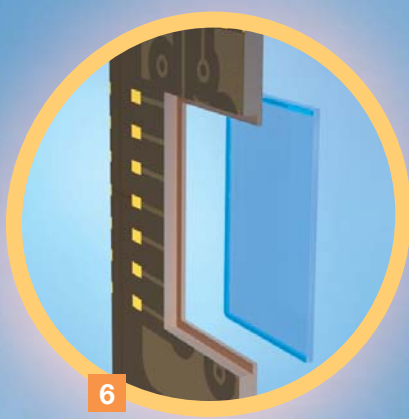
**DELO is capable of customer-specific global support.**  
**The early involvement of DELO for new projects cuts down development time and helps reduce the time to market.**



## DELO's solutions for compact camera module bonding (CCM)

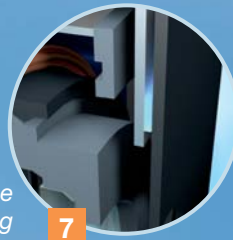
- 1 Anchoring of flex board to camera:**  
Light-curing adhesives give improved adhesion and cure within seconds (→ page 8)
- 2 Stiffener support plate to flex board:**  
The adhesives cure at low temperatures and adhere well to the stiffener
- 3 Flex cable (FPC) to camera PCB:**  
Flexible solutions and lower cost through liquid anisotropic adhesives
- 4 Image sensor to substrate:**  
Heat-curing adhesives give high reliability in both COB die attach and flip-chip attach
- 5 Grounding:**  
Fast dual-curing adhesives are electrically conductive and allow fast preliminary UV fixation (→ page 9)
- 6 IR filter to substrate:**  
Fast-curing and light-blocking adhesives are designed for the best drop test performance (→ page 7)





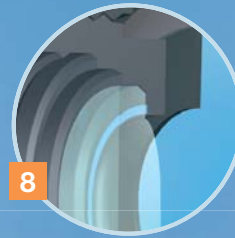
6

IR filter to substrate



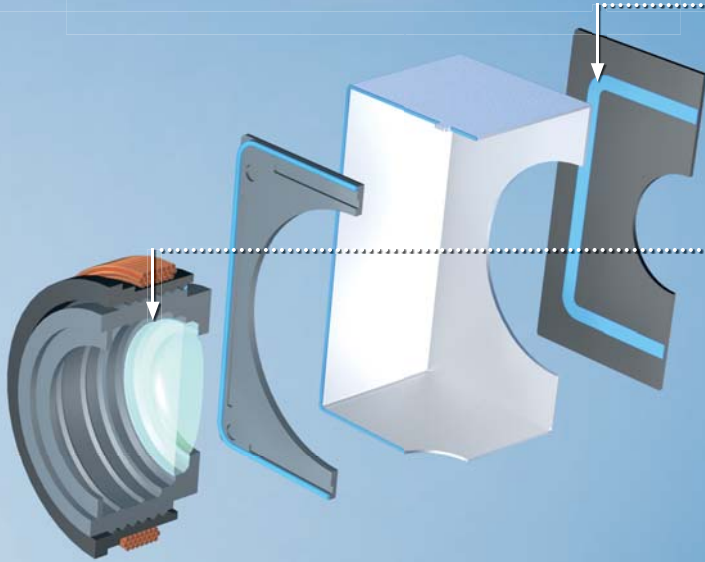
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Trim piece to housing

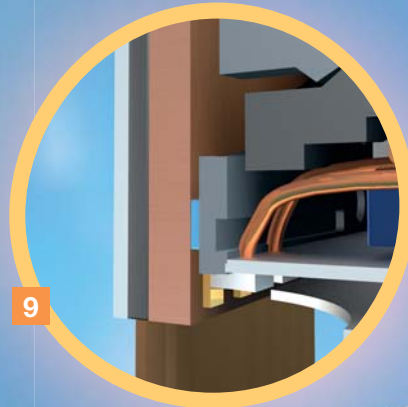


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Lens bonding and lens barrel fixation



Housing bonding by active alignment



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Contacting the wires of VCM (voice coil motor) to board



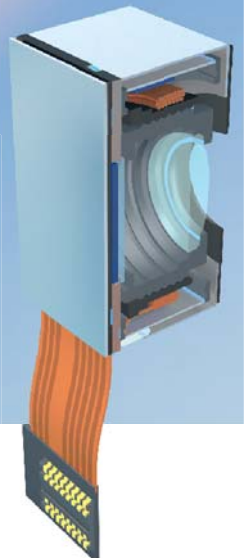
10

Sealing of contacts

11

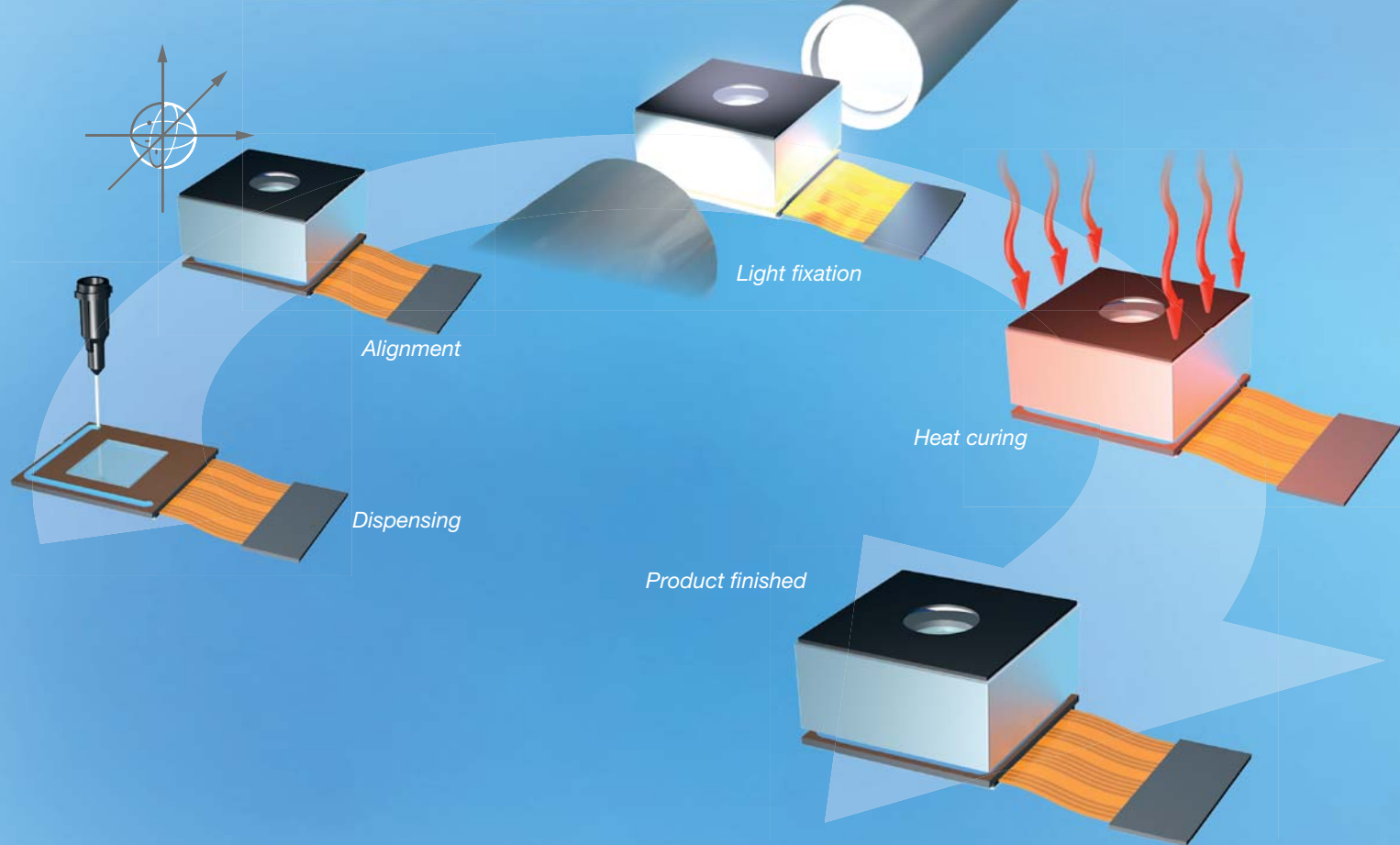


Assembled CCM  
(cross section)



- 7 Trim piece to housing:**  
Low temperature snap cure adhesives
- 8 Lens bonding and lens barrel fixation:**  
UV curing with very fast fixation and high glass transition temperature (Tg)
- 9 Housing bonding by active alignment:**  
Fast preliminary UV fixation for high-precision placement of housing (→ page 6)

- 10 Contacting the wires of VCM (voice coil motor) to board:**  
Adhesives with good electrical contact and adhesion to gold. Low-temperature curing to protect optical coating.
- 11 Sealing of contacts:**  
The adhesives are optimized for jet dispensing and low corrosion.



## Housing bonding by active alignment



Cameras with high image quality require highly accurate placement solutions. We make sure that our customers achieve high output and highly reliable solutions in their camera production.

### Benefits in application

- UV fixation in less than 1 s
- Heat curing mechanism to cure shadowed areas
- Low-temperature curing:  
Final curing at +80 °C is possible
- Utilization of the process advantages of a heat-curing adhesive
- Excellent adhesion to plastic substrates, such as LCP, PPA, and PP

### Adhesive properties

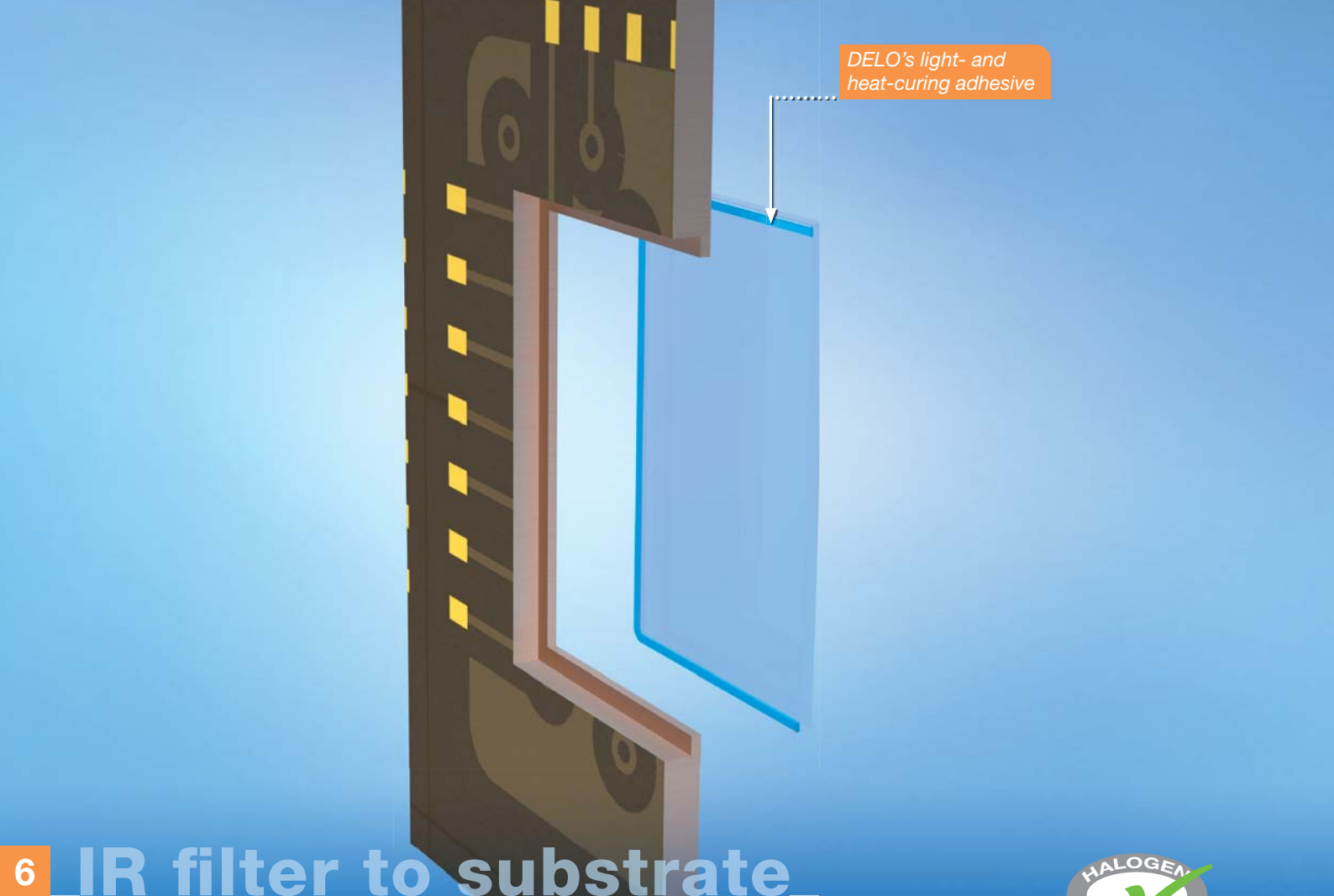
- Short cycle times can be achieved
- Automotive test passed: more than 1,024 h
- Low outgassing and low shrinkage
- Good temperature stability
- Good resistance to climatic changes, humidity and salt spray test
- Solvent-free material
- Halogen-free according to IEC 61249-2-21

### Product group examples

- DELO-DUALBOND AD34x<sup>\*)</sup> series
- DELO-DUALBOND OB7xx<sup>\*\*)</sup> series

<sup>\*)</sup> AD = ADhesive

<sup>\*\*)</sup> OB = Optical Bonding



DELO's light- and heat-curing adhesive

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## IR filter to substrate



In this application, it is essential to prevent the unintentional incidence of light. The IR filter helps block light and protects the sensor image quality from being impaired. DELO's fast-curing adhesives with UV fixation capability impress with their superior quality.

### Benefits in application

- Optimized modulus for drop test reliability
- Excellent adhesion to IR glass, many plastic materials and ceramics
- Optimized flow behavior and viscosity to allow tilt adjustment
- Very fast curing for high production volumes
- Low-temperature curing at temperatures above +80 °C to avoid damage of optical components and coating

### Adhesive properties

- UV light fixation in less than 0.5 s
- Fast heat curing at temperatures above +80 °C
- Modulus adapted to bond line requirements
- Adhesives with color from transparent to black available
- Low outgassing
- Halogen-free according to IEC 61249-2-21

### Product group examples

#### DELO-DUALBOND adhesives

- DELO-DUALBOND AD34x series
- DELO-DUALBOND AD4xx series

#### DELO-PHOTOBOND adhesives

- DELO-PHOTOBOND GB<sup>1)</sup> series

<sup>1)</sup> GB = Glass Bonding

# 1 Anchoring of flex board to camera



The anchoring process is an additional protection of the board-to-camera connection by the adhesive. As the previously used ACF foil does not have sufficient adhesion and peel resistance, the fast-curing adhesive bead at the edge ensures a permanent joint.

## Benefits in application

- High peel resistance for good handling during final assembly process
- UV curing in less than 1 s for very high production volumes
- Optimized flow behavior and very low tailing to allow high output

## Adhesive properties

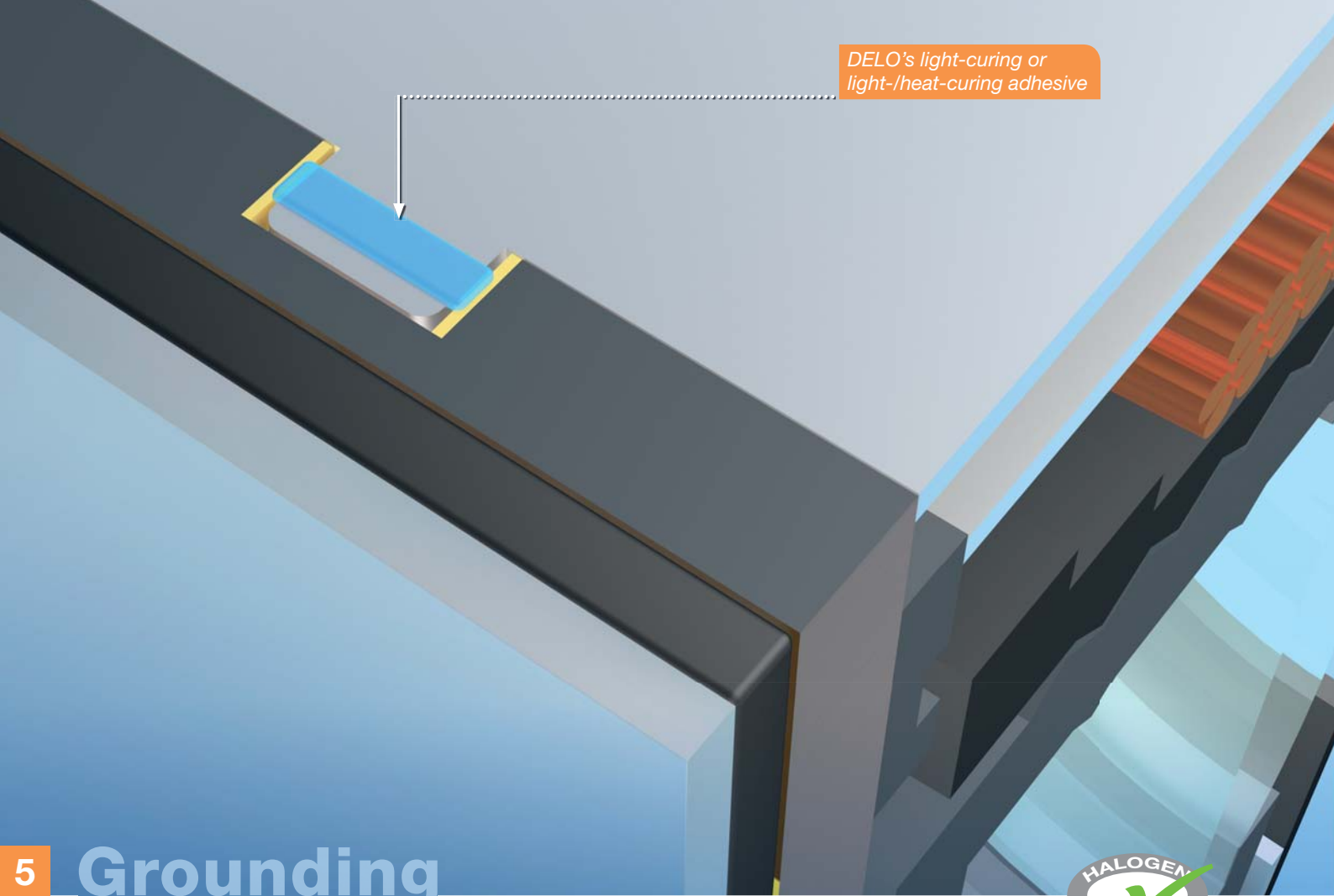
- Solvent-free material
- Good resistance in reliability tests like +85 °C / 85% r.h.
- Excellent bond strength on various substrates like ceramic, FR4, LCP
- Halogen-free according to IEC 61249-2-21

## Product group examples

- DELO-PHOTOBOND GB<sup>1)</sup> series

<sup>1)</sup> **GB** = **G**lass **B**onding





DELO's light-curing or  
light-/heat-curing adhesive

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## Grounding



Besides the typically used heat-curing IC adhesives, DELO also offers dual-curing products combining fast light fixation and final curing at moderate temperatures. Depending on their needs, customers can choose from various isotropic conductive materials (IC) for electrical grounding and contacting.

### Benefits in application

- Less heat impact compared to soldering during assembly process
- Low resistance for good grounding
- Dual curing process with light fixation possible – no negative flow behavior in later process steps

### Adhesive properties

- Dual curing process capability – light fixation within 1 s
- Heat curing at +80 °C
- Halogen-free according to IEC 61249-2-21

### Product group examples

- DELO-DUALBOND IC3xx<sup>\*)</sup> series
- DELOMONOPOX DA<sup>\*\*)</sup> series

<sup>\*)</sup> IC = Isotropic Conductive

<sup>\*\*)</sup> DA = Die Attach

Precise and bubble-free adhesive dispensing with  
DELO-DOT PN2 and DELO-FLEXCAP,  
fast curing in seconds with DELOLUX 202



# Everything from one supplier



## DELO-DOT PN2

*Pneumatic microdispensing valve*

### Modular design

Separate pneumatic actuator and fluid system

### Actuator lifetime

Normally more than 1,000 million cycles

### Max. dispensing frequency

300 Hz (drops per sec.)

### Min. dispensing quantity

0.03 mg



## DELO-FLEXCAP

*Bubble-free container*

### Pressure tank with fill level sensor

Full process control

### Bubble free adhesive

No voids  
Precise dispensing  
Reliable results

### Hermetically closed cartridge

Dry ice transport possible  
Reduced transportation cost

### Flexible membrane

Maximum emptying



## DELOLUX 50

*Pinpoint LED curing lamp*

### Design

Slim lamp head with heat sink

### Radiation exit area

8.6 mm dia. (x1)  
11.5 mm dia. (x4)

### Intensity

Up to 12,000 mW/cm<sup>2</sup>

### Cooling mechanism

Passively cooled Powerguide



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

# Excerpt: Material Selection Guide

		DELO-DUALBOND						DELO-PHOTOBOND	
Product code number		AD340	AD342	LT354	IC343	OB749	AD465	DELO-PHOTOBOND	
Base		mCD	mCD	mCD	mCD	cationic	mod. acrylate	GB368	
Color		beige	black	dark grey	silver grey	white translucent	red fluorescent	colorless clear	
Particles		unfilled	unfilled	mineral particles	silver-filled	mineral particles	mineral particles	–	
Curing mechanism		UV / light fixation and mandatory heat curing						UV / light curing	
Curing temperature [°C]	min.	+80	+80	+80	+90	+80	+110	–	
	max.	+150	+150	+150	+150	+150	+160		
Light curing UVA intensity: 55 – 60 mW/cm <sup>2</sup> ; wavelength range 320 – 400 nm		preliminary fixation 1 s – 5 s	preliminary fixation 1 s – 5 s	preliminary fixation 1 s – 5 s	preliminary fixation 1 s – 5 s	9 s	min. curing time 4 s	15 s	
	max. curing depth [mm]	1.5	0.15	0.15	0.15	0.35	4	4	
Heat curing in convection oven		10 min @ +100 °C 15 min @ +90 °C 30 min @ +80 °C	10 min @ +100 °C 15 min @ +90 °C 30 min @ +80 °C	10 min @ +100 °C 15 min @ +90 °C 30 min @ +80 °C	10 min @ +100 °C 15 min @ +90 °C 30 min @ +80 °C	15 min @ +130 °C 30 min @ +100 °C 60 min @ +80 °C	3 min @ +130 °C 5 min @ +110 °C	–	
Processing time at room temperature (max. 25 °C)		3 days	3 days	2 days	3 days	5 days	30 ml: 2 weeks 180 ml: 5 days 900 ml: 24 hours	2 weeks	
Viscosity [mPas]		12,000	13,000	75,000	30,000	14,000	24,000	5,700	
Young's modulus [MPa]		400	700	500	–	5,200	320	900	
Glass transition temperature [°C]		+75 TMA	+76 TMA	+80 TMA	–	+95 TMA	+100 rheometer	+102 rheometer	
Coefficient of linear expansion [ppm/K]	below Tg	115	112	150	150	44	–	236	
	above Tg	182	185	179		113	–		
Shrinkage [vol. %]		3.1	2.4	2.4	2.2	2.2	5.6	7	
Water absorption [%]		0.50	0.30	0.24	0.2	0.1	1.2	0.5	
Elongation at tear [%]		4	4	on request	–	0.9	220	17	
Hardness		D52	D41	D72	–	D81	D50	D67	
Storage life		6 months at –18 °C	9 months at –18 °C	6 months at –18 °C	6 months at –18 °C	6 months at –18 °C to –40 °C	6 months at 0 °C to +10 °C	12 months at room temp. (0 °C to +25 °C)	





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