

ONSERT®

Quick and process-reliable bonding of fastening elements with light-curing adhesives

A joint project between

BÖLLHOFF
DELO

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ONSERT® – An efficient joint



An ever increasing diversity of models and variants, new designs and materials as well as reduced development times and product cycles lead to new and versatile tasks when joining most different materials.

The typical tasks include:

- Superior design of design and visible surfaces (customer component)
- Determination of material requirements to be joined (material type and the condition of the joining part surface)
- Flexible fastening technology (platform technology, plastic moldings, component modifications)
- Diverse process requirements

As a result, BÖLLHOFF®, as a specialist in mechanical joining technology, and DELO®, as a specialist for intelligent bonding technology, have jointly developed a new fastening system.

The idea behind:

The advantages of bonding technology are combined with those of detachable screwed connections. Fastening elements made of transparent/translucent plastic with or without metallic thread reinforcements are fixed using light-curing adhesive. The most important aspects are reliable adhesive curing with short cycle times and the geometric fastener design.

The result:

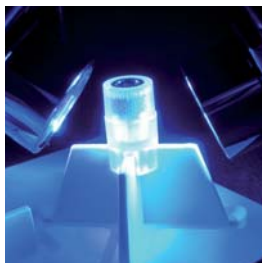
The ONSERT® technology – quick and process-reliable bonding of fasteners. The innovative joining process provides ideal conditions for versatile applications in a wide variety of industries.

ONSERT® – Advantages



ONSERT® basic

- Optimized design ensures distortion-free surfaces:
Ideal where close tolerance or visual appearance are important
- Fastening elements do not become apparent on the visible side through heat input as occurring during welding or heat curing
- Processing parameters independent of customer component
- Full mechanical load capacity immediately after irradiation (no post-crosslinking)
- Short curing times (< 5 sec)
- Connection of joint points also after surface treatment (such as cathodic dip coating)



ONSERT® plus

- Reduction/prevention of sink marks and scrap
- Reduced tool and process costs (shorter injection cycles, simplified tool concepts)
- Standardized elements
- Processing at every level of automation
- Full mechanical load capacity immediately after irradiation (no post-crosslinking)
- Short curing times (< 5 sec)
- Additional optional functions (positioning/fixing)

ONSERT® – The product range

Currently two principles are available:

ONSERT® basic – surface connection and ONSERT® plus – rib connection.



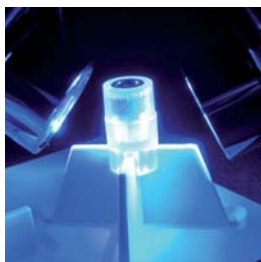
ONSERT® basic – surface connection

Principle and concept

Optics, haptics and light-weight construction also influence the design of thin-walled components. The use of materials with ever decreasing material thicknesses impedes the use of conventional mechanical or thermal joining processes.

For example, a particularly strong load is applied on the joining part (joining forces / joining temperature). This can result in visual and/or mechanical damage to the customer component.

ONSERT® basic is the answer. A transparent plastic sheath is applied to fasteners such as screws, threaded bushes or snap connections. The geometry provides for sufficient bonding surface.



ONSERT® plus – rib connection

Principle and concept

The ONSERT® joining process is a real alternative, not only for particularly small but also for large wall thicknesses. If a housing with material accumulation is produced by injection molding, visible shrinkage can often be observed after cooling down (sink marks). ONSERT® plus can solve this problem.

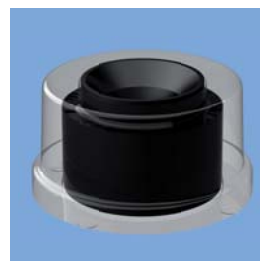
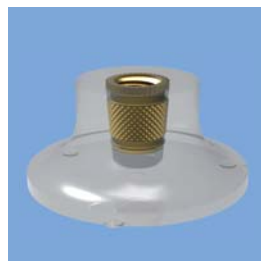
ONSERT® plus allows quick, form-closed bonding to optimized ribs on the corresponding component.

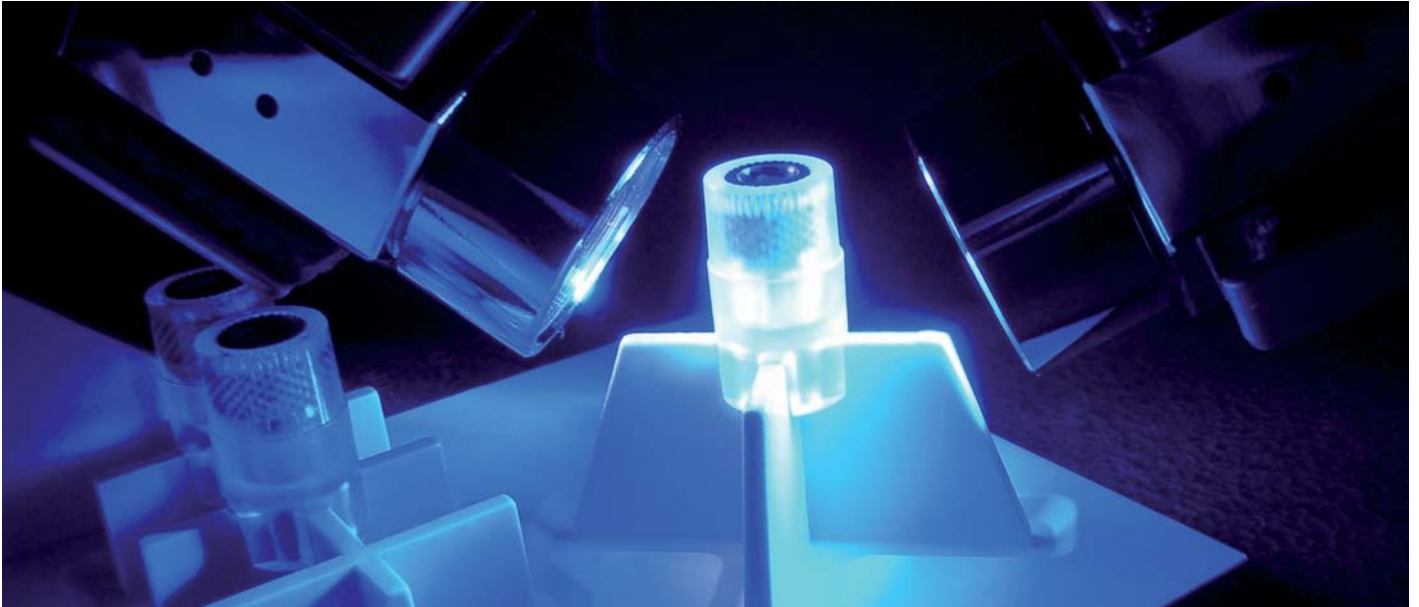
As an alternative to bosses produced with the original mold, the system provides new design possibilities thanks to subsequent joining.

Fastening elements, such as well-proven AMTEC® thread inserts, are overmolded with transparent plastic (adhesive dome) and are then fitted using light-curing adhesive systems. Adhesive domes can be produced in various designs, for example with internal threads, bolt threads, ball studs or snap connections.

Generally, all geometries which can be produced by injection molding are possible:

Screwed connections on plastic moldings, detachable and non-detachable snap connections, adhesive SNAPLOC® fasteners, and many more can be applied to materials such as CFRP, FRP, glass, lacquer, cathodic dip coating, plastic or metal.



ONSERT® – Adhesives

DELO® – The ideal partner for a reliable joint

DELO® Industrial Adhesives is a globally successful company specialized in the field of bonding processes for technical applications of growth markets, such as optoelectronics, consumer electronics, RFID, automotive, photovoltaics and mechanical engineering. DELO® as a supplier of bonding system solutions provides the development of adhesives, the technology for dispensing and curing, and individual consulting services during the entire development process and product life cycle.

Thanks to expertise and individual commitment, DELO® customers have been able to rely on fast and reliable solutions for more than 50 years.

Which adhesive is suitable?

There are two product families in DELO®'s range of adhesives that are suitable for ONSERT® bonding. Both cure within seconds with the help of corresponding light. The coordination of DELO® and BÖLLHOFF® allows optimized processing with ONSERT® elements.

Characteristics of the two product families:

DELO®-PHOTOBOND®

- Light-curing acrylate
- Curing in less than 10 seconds
- Universal adhesion to various substrates
- Application-specific mechanical properties (ultimate elongation, T_G , Young's modulus)

DELO®-KATIOBOND®

- Light-curing epoxy resin
- Curing in 5 – 60 seconds
- For temperatures up to +150 °C
- Resistant to chemicals

The ONSERT® process guarantees optimized adhesive curing since the transmissive elements transmit the light. Adhesives should be chosen individually for your substrate and field of application in consultation with DELO® and BÖLLHOFF®.

Material examples:

- Fiber-reinforced plastics: CFRP, GRP
- Glass, also coated and printed
- Plastics, such as PBT, ABS, blends, etc.
- Metals

DELO® and BÖLLHOFF® will be pleased to assist you during the entire development process and product life cycle.

ONSERT® – Light systems
DELOLUX® curing lamps

Efficient bonding technology. DELO® curing lamps and adhesives are matched to optimize joining processes. The especially developed lamps can be adapted to different surfaces and intensities (cycle times).

- Curing of adhesives within seconds
- Fast and reliable series processes

- Minimum heat generation at the component (cold light source)
- Achievable service life > 20,000 h (at normal operating conditions)
- Great process reliability thanks to monitored functions
- No hazardous radiation in UVB or UVC range – high occupational safety


DELOLUX® 80

LED curing lamp, light exit area dia. 23.0 mm


DELOLUX® 20

LED area lamp, light exit area 101 x 101 mm²

DELOLUXcontrol

Even if the light source is constant, there are influencing variables which affect curing considerably. The decrease in light intensity resulting from dirt or a larger distance between adhesive and lamp (for example through misalignment) is often underestimated. For a reproducible curing process, the light intensity at the component should be regularly checked using the DELOLUXcontrol light intensity meter.

- Monitoring of radiation intensity for completely cured adhesive and reliable production processes
- Measuring heads adapted to lamp type



ONSERT® – Processing systems semi-automatic

- Optimized curing thanks to special LED lamp geometry
- Reliable due to active cooling and temperature monitoring
- Quick and reliable positioning
- Reduction of operator fatigue
- Easy handling
- Flexibility
- Suitable for various element types



ONSERT® – Process description

The production process is flexible and consists of only a few steps.

ONSERT® basic – Surface connection



1. Dispensing

The one-component, UV- and light-curing DELO®-PHOTOBOND® acrylate is applied to the surface.

The adhesive is dispensed with the DELO®-XPRESS 951 pressure tank via up to four pinch valves from the one litre container. The DELOMAT control unit is used for control.

2. Joining

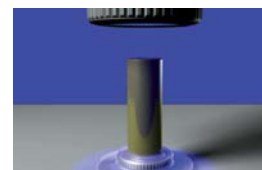
The ONSERT® basic is joined onto the plastic plate.

At least one joining partner – in this case the adhesive boss – must be translucent in the absorbing range of the adhesive.

3. Curing

DELO®-PHOTOBOND® is irradiated for several seconds (for example < 10 s) until final strength is achieved.

All DELOLUX® curing lamps, such as the DELOLUX® 80 LED lamp, are suitable.



ONSERT® plus – Rib connection



1. Dispensing

The one-component, UV- and light-curing DELO®-PHOTOBOND® acrylate is applied to the bar.

The adhesive is dispensed with the DELO®-XPRESS 951 pressure tank via up to four pinch valves from the one litre container. The DELOMAT control unit is used for control.

2. Joining

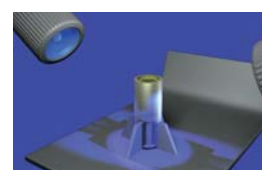
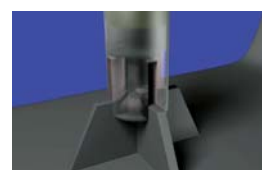
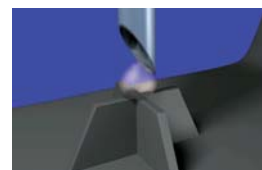
The adhesive boss is joined onto the plastic rib.

At least one joining partner – in this case the adhesive boss – must be translucent in the absorbing range of the adhesive.

3. Curing

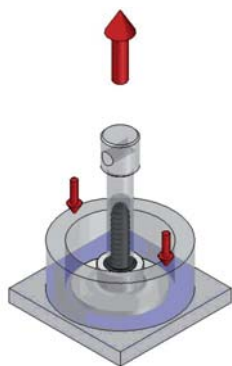
DELO®-PHOTOBOND® is irradiated for several seconds (for example < 10 s) until final strength is reached.

All DELOLUX® curing lamps, such as the DELOLUX® 80 LED lamp, are suitable.

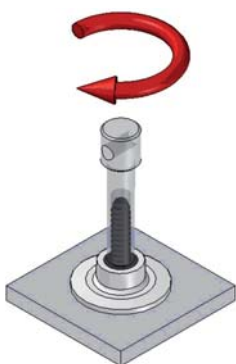
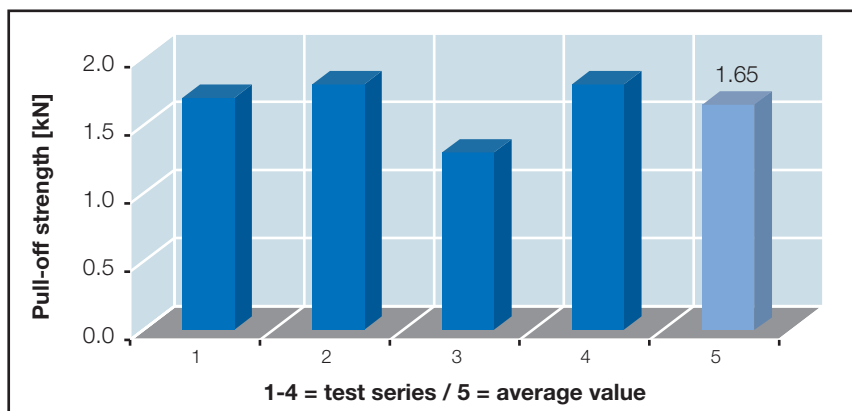


ONSERT® – Technical data

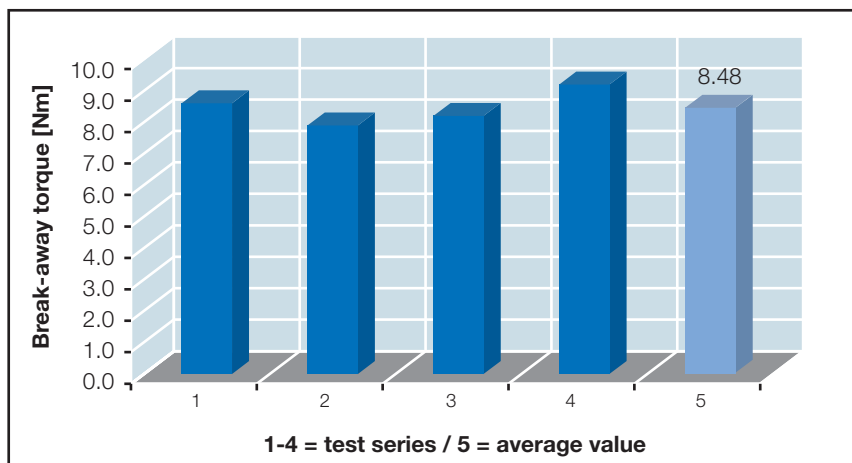
Specimen	F _A [kN]	M _L [Nm]	Deviation F _A [kN]	
1	1.70	8.60	+	-
2	1.80	7.90	0.15	0.35
3	1.30	8.20	Deviation M_L [kN]	
4	1.80	9.20	+	-
average value	1.65	8.48	0.73	0.57



Mechanical properties with ONSERT® basic F_A [kN]



Break-away torques with ONSERT® basic M_L [Nm]



Test set-up

ONSERT® thread bolts T 5; substrate: steel; component surface: cathodic dip coating; adhesive: DELO®-PHOTOBOND® AD494; thickness of adhesive layer: 0.2 mm; light source: DELOLUX® 80; irradiation time: 5 sec; lamp distance: 32 mm

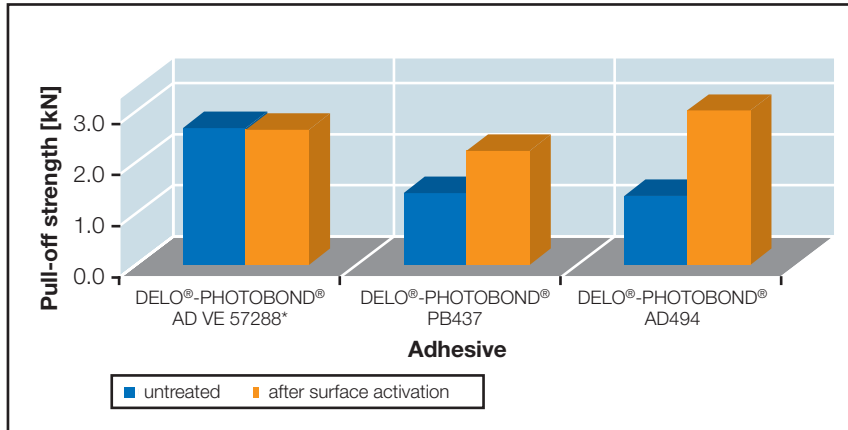
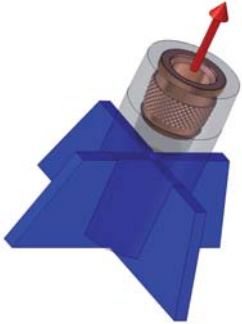
Ageing

VDA climate change test: Joint stability remains constant after a four-week storage period. After 1,000 hours of storage in Skydrol (hydraulic fluid used in aviation technology), the joint stability is not significantly reduced.

The data given are typical average values or specific values that have been determined once under laboratory conditions. Therefore, the data and information provided are no guarantee or assurance of certain product characteristics. They do not indicate the suitability of the product for a certain purpose.

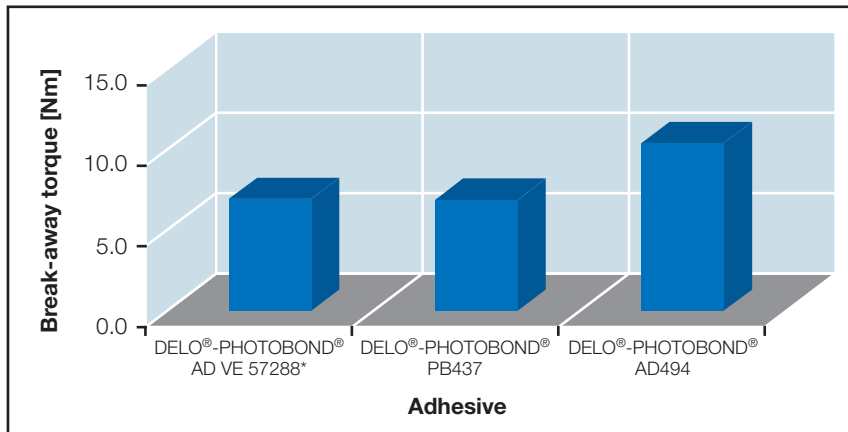
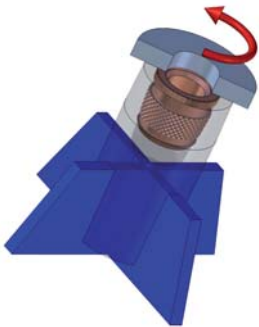
ONSERT® – Technical data

Mechanical properties with ONSERT® plus F_A [kN]



* The adhesive is a development product that is bound to a minimum order quantity.

Break-away torques with ONSERT® plus M_L [Nm]



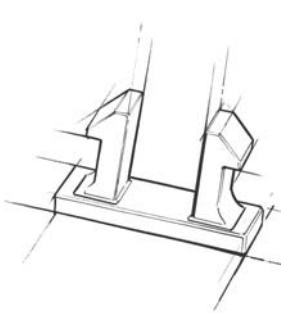
* The adhesive is a development product that is bound to a minimum order quantity.

Test set-up

ONSERT® adhesive domes made of PC with adjusted draft angles have been tested (inclination of ribs is equal to inclination of dome). The basic substrate is an unfilled ABS. The bonding surfaces of the ONSERT® have been treated with low pressure plasma. An atmospheric pressure plasma treatment has been conducted for the ribs.

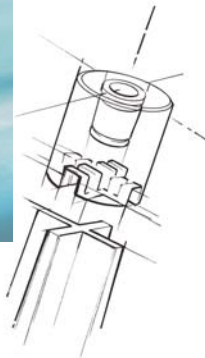
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ONSERT® – Fields of application



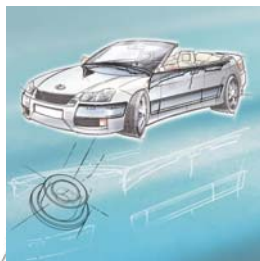
White goods

- Glass panels, plastic linings for displays, surface-coated coverings for electrical household appliances such as refrigerators, freezers, electric cookers, washing machines, dishwashers, hoovers and laundry dryers



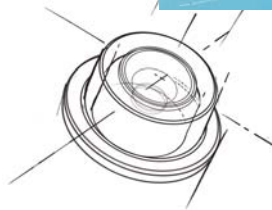
Aerospace

- Connection of joint points on lightweight structures (sandwich materials, CFRP, aluminum)
- Easy handling due to optimized and flexible processing devices
- Easily controllable/reproducible process



Automotive industry

- Bodyshell, car structures
- Mounting of coverings
- Connection of fixing points after cathodic dip coating
- Alternative to welding elements on materials which are not suitable for thermal joining and very thin-walled components
- Independent from previous processes and flexible in use
- Easy repair solutions





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