



Optically bonded Multi-Functional Terminals

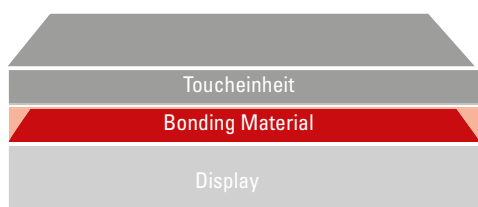
Optically bonded DEUTA terminals

DEUTA will use optical bonding as standard for future new terminal series. The additional finishing process optimises image quality and reading angle by increasing contrast sharpness and minimising reflections.

Everyone is familiar with the optically bonded surfaces of smartphones. With the optically bonded DEUTA terminals, this technology is now also finding its way into the driver's cabs of railway vehicles. Our employees Stefan Koch and Markus Brylinski tested and introduced the optical bonding process at DEUTA. In our interview they talk about their motives, the development process and the manufacturing method.

Would you please explain the basic idea behind the term "Optical Bonding"?

Stefan Koch: In optically bonded DEUTA terminals, the air gap between the cover glass with touch sensor and the display is closed by a highly transparent bonding material.



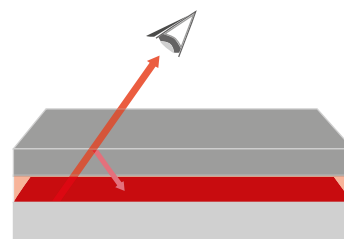
Schematic diagram of optical bonding

What advantages do optically bonded terminals offer?

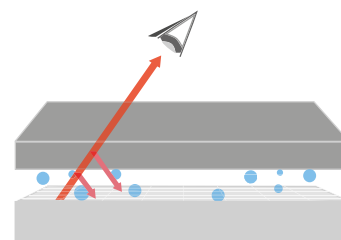
Markus Brylinski: Dust or condensates can accumulate in the air gap. With optical bonding, scratches become invisible, the image display improves and optical problems or malfunctions caused by condensation do not occur. The display is rich in contrast and brilliant even when viewed at an oblique angle. In addition to the visual

enhancement of the driver's cab, this also makes the driver's job significantly less tiring.

Without optical bonding, the air gap between the touch unit and display generates additional light refraction. Optical bonding completely eliminates this light refraction.



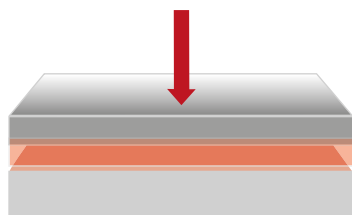
Reflection behaviour with optical bonding



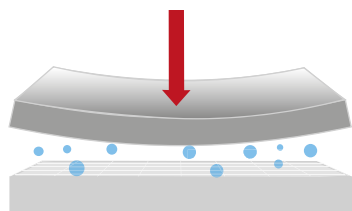
Reflection behaviour without optical bonding

Is it true that DEUTA is breaking new design ground with its bonded terminals?

Stefan Koch: The full-surface bonding creates a stable bond with very high vibration and shock resistance. In the qualification tests, the bonded terminals proved to be significantly less sensitive to shocks and vibrations compared to non-bonded terminals. In terms of design, the bonded stability allows more intricate terminal develop-



Improved touch performance with optical bonding



Less touch performance without optical bonding

ments with thinner displays that bring a more modern look to the driver's cab. The front unit consists of the components glass, display, touch unit and metal frame. Thus the cover glass is safely embedded and protected in the carrier.

Why did you decide to bond the terminals yourself at DEUTA?

Markus Brylinski: The demands placed on our terminals in railway vehicles are very specific from a technological point of view, but also with regard to the harsh environmental conditions.

Our aim is to supply our customers with the most innovative products. That is why we choose our suppliers very carefully. Nevertheless, we have integrated the field of optical bonding into our production process because this is the best way to combine our extensive knowledge of production, component selection and long-term availability, especially with regard to smaller batch sizes.

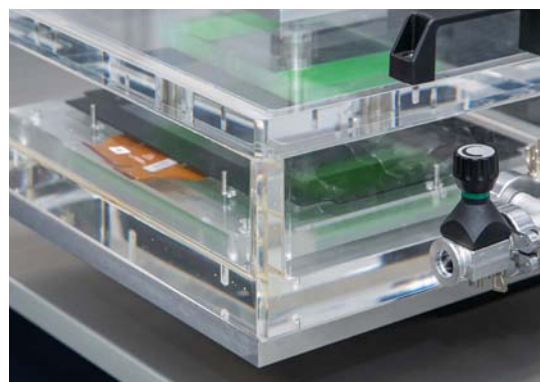
Our in-house test laboratory allows us to test far beyond the normative requirements within the scope of product qualification. We paid special attention to temperature



fluctuations and submitted the bonded terminals to an extensive stress test.

Was it a big challenge to introduce the optical bonding process?

Stefan Koch: We are constantly working to optimise our technology for the future. The decision to integrate the optical bonding production step at DEUTA is a logical, but also very challenging step in our production process, which once again underlines the high manufacturing depth of our company. The local conditions had to be created first, because this finishing process requires a not inconsiderable investment volume and a great deal of experience. It also requires a very thorough knowledge of surface treatments and bonding techniques. We also transfer this knowledge to other production processes.



To optically bond displays requires considerable experience in surface treatment and bonding techniques.

Optically bonded DEUTA terminals

Advantages of Optical Bondings at a glance:

- Improved image display
- Higher contrast
- Improved readability
- Protection from condensation
- High vibration and shock resistance
- Increase in overall robustness



With bonding technology, the displays of DEUTA Multifunctional Terminals are thinner and more resistant to vibration and shock.



Bonded DEUTA terminals: Still easily readable even from an inconvenient viewing angle.

DEUTA-WERKE

Paffrather Strasse 140 | -51465 Bergisch Gladbach
Phone +49 2202 958-100 | Fax +49 22 02 958-145
support@deuta.de | www.deuta.de | www.icontrust.de



DEUTA-WERKE GmbH | Paffrather Str. 140 | 51465 Bergisch Gladbach | Germany | Phone +49 (0) 2202 958-100 | Fax +49 (0) 22 02 958-145 | E-mail: support@deuta.de | www.deuta.com
Represented by the managing directors: Dr. Rudolf Ganz and Mr. Thomas Blau | Registry court: District Court Cologne, registry number: HRB Köln 67 107 | Value added tax identification number as per §27 a, Value Added Tax Act: DE 265417448 | The photos and articles printed in the brochure and any other contents are protected by copyright. Reprint, reproduction, distribution as well as other copyright infringement activities are only permitted with previous written permission of DEUTA-WERKE GmbH.