

## Primer Shadow Cure Technology for Display Applications

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A primer shadow cure technology has been developed to broaden the range of applications of UV curable acrylate adhesives and to achieve a fast and sufficient cure of adhesive areas unreachable by UV. The newly developed primer shadow cure technology is suitable to applications in case of light blockage due to ink coatings or 3D dimensions. The primer shadow cure technology depends on a redox initiated curing process. We have achieved fast cure of acrylate adhesives at room temperature using the UV/Redox dual cure process. The fast room temperature cure is especially important to the assembly process of electronic display devices.

LOCA is a liquid-based bonding technology used in a wide range of electronic equipment – especially those with touch panels and display devices to bind cover lens, plastic or other optical materials to the main sensor or display unit such as LCD (Liquid Crystal Display). LOCA improves the optical characteristics of the device as well as other attributes such as durability. LOCA is typically UV cured onto the devices. Shadow cure has been a technical challenge in the application of UV curable adhesives under complex use conditions. Henkel and competitors have long been searching for effective shadow cure solutions. The Henkel's fast, simple and robust new approach to shadow curing eliminates the cure through depth limitation of side curing, the potential damage to the LCD of heat curing, and the long cure time required for moisture cure.

We have investigated the mechanisms using spectroscopic, adhesive force measurement, and photorheometry methods. The investigation is focused on a single application type of shadow cure of LOCA. One of the key requirements of shadow cure is to fast cure a thick layer of the LOCA adhesive at room temperature. The cure efficiency has been evaluated by the measurement of cure speed under various cure conditions. The adhesive cure profiles of thickness have been characterized. Various application parameters such as redox selection and usage level have been examined for the optimization of dual cure process. The performance of the dual cured acrylate adhesives has been assessed under various application conditions. The new primer product can shadow cure LOCA up to 300 microns in less than 2 hours. The cure efficiency has been evaluated by the measurement of cure speed under various cure conditions. The use process of the primer product is very simple. To ensure precise and rapid primer application, a simple and low cost dispensing process has been developed specifically for the primer application using foam transfer pads. The method has high process capability and high accuracy of the primer pattern applied typically ranging from 50 to 150 microns.



**Fig. 1. Primer Shadow Cure Profile and Application**