OPTICAL BONDING

Optical bonding process of display layers improves both optical performance and durability. By selecting an appropriate adhesive that matches the index of refraction of the flat panel and the overlay, remove the air gaps, thus reducing the number of internal reflecting surfaces that can lead to degradation of optical performance. Providing a durable adhesion between the flat panel and the overlay improves the displays' ability to resist shock, vibration and moisture.

Optical Bonding is the affixing of two optical elements to one another using a liquid adhesive. The qualifier optical implies that the adhesive is transparent, has a suitable refractive index and is made under adequate control such that there are no significant variations in the optical properties within a single bond. In this way, we differentiate bonding from lamination.

ADVANTAGES

* Performance of Flat Panel Display and Overlay
* Increased Luminance
* Increased Contrast
* Reduced Internal Reflections
* Improved Ruggedization
* Bonded display assemblies withstand the high shock and vibration typically associated with MIL-STD-901 and MIL-STD-810 applications
* Vandal Prevention
* Extended Operating Temp Range Through the use of Optically Bonded LCD or OLED Heaters
* Elimination of Condensation and Moisture Between LCD or OLED Display and Overlay

Types of Adhesives

Silicone-RTV

This adhesive has been used for more than 30 years in making bonds to displays, in both commercial and military applications. Because it is a relatively soft material, it is very feasible to rework, with minimal risk, any bonds that have a problem. The major drawback to this material is a tendency to form debris if the edge of the bond is rubbed during handling. To reduce the severity of this, we seal the edges of the bond using thin black tape or a configuration that does not expose the edge to abrasion.

Epoxy

Another adhesive that we have used successfully is a flexible epoxy formulation. This makes a much more rigid bond than silicone, but does not have the tendency to form particulate debris. It is not reworkable in the event any problems arise during production or use. However, for some designs in which the use of tape to seal the edge is not practical, this may be the adhesive of choice.

Polyurethane

Polyurethane adhesives possess good environmental integrity for use in high altitudes and may be superior at low temperatures. However, they exhibit a severe yellowing over time when exposed to high ambient (solar) lighting conditions. Because of this tendency to yellow, General Digital Optical Bonding Laboratories discourages the use of polyurethane adhesives.

(Illustration Below made by Koto Electric)