BONDING SOLUTIONS:

OPTICALLY CLEAR ADHESIVE
ASSETGENIE, INC.

- Global Leaders in LCD Enhancements, Notebook Parts, PCB and LCD Repairs, and Reverse Logistics.

- Established in 2000 in the historic town of Greensburg, Pennsylvania.

- In the past three years, AGI has grossed over $85,000,000 with over 145 employees.

- AGI deals with over 1200 schools nationwide supplying them with parts for their 1:1 programs (21st Century Learning Program).

- Locations:
  - Greensburg, PA (Corporate Headquarters)
  - Wisconsin
  - Shanghai, China (IPO)
  - Boston, MA
AGParts is an industry leader in parts and repairs of mobile devices across brands and product categories. We provide complete parts management solutions and select repair services for many leading brands and models of smartphones, tablets and laptops. AGParts also provides a turnkey parts management solution for large customers.

AGDisplays leads the way in offering the latest technology in LCD enhancements and ruggedized displays. We deliver an extensive range of custom panel solutions to improve standard LCD display attributes and to maximize their performance in any environment. Our knowledge and high quality control standards separate us from the rest.

AGiRepair has established itself as an industry leader in the repair of Apple devices and components, providing repairs for businesses and educational systems throughout the United States. AGiRepair is dedicated to providing the highest quality, fastest turnaround time, and the most affordable price on Apple device repairs and replacement parts for educational institutions.
MISSION

AGDisplays strives to provide an extensive list of integration and enhancement options for our customers; we take great pride in designing unique solutions that work intelligently with your design.

VISION

Our vision is to provide our customers with excellent support and to maintain a multifaceted approach to business relations. We aim to expand our technological processes through the collaborative experience of our research and development team.

• Established as a DBA of AssetGenie, Inc. in 2007, in Greensburg, Pennsylvania

• Leading provider of high quality LCD enhancement products and services for the medical, industrial, military, transportation and other markets

• Continuous research and development performed in-house to advance our technical expertise

• Team of 30+ years of LCD repair experience

• Four state-of-the-art class 1000+ clean rooms, ESD control on production floor, laminating equipment up to 46” LCD, universal testing equipment

• As a certificated Part 145 Repair Station, we implement top-notch quality assurance procedures to evaluate efficiency.
OCA Bond*
OCA bonding is a safe and cost-effective alternative to liquid bonding. The material is considered a dry film, its pressure-sensitive applications allows for precise and unique processing in which it fits into your industrial LCD. OCA reduces reflection layers in a panel, while providing a high yield and is reworkable.

Optical Bond
Our best performing bonding solution is the optical bond. Optical bonding is performed with a proprietary adhesive, and is solidified with one of our three curing methods. We offer full touch screen and full cover glass optical bonding.

LOCA Edge Bond
We deliver a cost effective, scalable system in which the components are processed at ambient temperature without the use of vacuum, temperature, pressure and need for multiple tooling.

Tape Bond
When optical bonding is not practical for your LCD, AGDisplays offers perimeter bonding. Perimeter bonding helps your company save on costs while still ruggedizing your panels sufficiently. Our tape bond provides a secure bond that increases productivity, & long-term durability.

*OCA bond 65% average cost savings over full optical bond
Optically clear adhesive (OCA) bonding is considered a safe and cost-effective alternative to liquid bonding. Like liquid clear adhesives, OCA reduces the reflection layers in a panel. There are various advantages to choosing OCA bonding over liquid optical bonding. OCA bonding is cleaner, eliminating the need to clean up residuals after the bonding process is complete. The process produces high yield and is reworkable.

OCA bonding is thin, making it an ideal choice for rigid bonding and small LCD frames. Our OCA adhesives are precisely adjusted to fit LCD panels 12” or smaller. The material is considered a dry film, its pressure-sensitive application allows for precise and unique processing in which it fits into your industrial LCD. Although thin, bonding protects the LCD against environmental factors as well as foreign contaminants and abrasive material.

Benefits

- 65% average cost savings over full optical bond
- Increased Readability
- Strengthened Durability
- High Adhesion
- UV Protection
- Bare ITO Compatible
- Whitening and Yellowing Resistant
- Outgassing Resistant
- Eliminates moisture and contamination
- Reworkable
Integrating our OCA solution to your panel will improve the following vulnerabilities:

- **Moisture/condensation and debris**: will migrate into viewable area, significantly decreasing visibility.

- **Weakened structural stability**: OCA creates a singular structural unit, which outstands rough environments with ease.

- **Lowered optical clarity due to increase in glare layers**: the addition of a single piece of glass will create two additional reflective surfaces which trap glare not only from ambient light but can even produce glare from the actual LCD. Adding an AR film does not match the level of clarity and visibility achieved with OCA bond.

- **Decreased brightness and readability**: considering the possible debris, moisture and multiple refraction layers, readability and brightness are decreased significantly without OCA.
EXAMPLE: BOND COMPARISON

Secured OCA bond, eliminated air gap, ruggedized structure, increased contrast, optical quality and overall visibility.

Not bonded, existing air gap, weakened structure, lowered visibility in ambient light.

iPad 2 Air with OCA Bond
# OCA Functionality Benefits

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ruggedization</td>
<td>Scratch, moisture, vibration, impact resistant. Up to 300% increase in strength</td>
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<tr>
<td>Security</td>
<td>Reworkable</td>
</tr>
<tr>
<td>Optics</td>
<td>Contrast enhancement, one layer optical refraction means superior optical clarity</td>
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<tr>
<td>Material Characteristics</td>
<td>Resistant to UV light, non-yellowing Acid-free, colorless, high purity, high transparency</td>
</tr>
<tr>
<td>Bond Strength</td>
<td>High adhesion, secure bond, no delamination or degradation</td>
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</table>
## CAPABILITIES

<table>
<thead>
<tr>
<th>Substrates</th>
<th>Product Size*</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCD</td>
<td>1”-12” (typ) diagonal max</td>
</tr>
<tr>
<td>Touchscreens</td>
<td>1”-12” (typ) diagonal max</td>
</tr>
<tr>
<td>Mobile devices</td>
<td>Samsung Galaxy S4, S5, Note 3, Note 4, Apple iPhone 6, 6+</td>
</tr>
<tr>
<td>Glass</td>
<td>9”x13” max / 15” diagonal max</td>
</tr>
<tr>
<td>Polycarbonate</td>
<td>9”x13” max / 15” diagonal max</td>
</tr>
<tr>
<td>Transparent materials</td>
<td>9”x13” max / 15” diagonal max</td>
</tr>
<tr>
<td>Acrylic</td>
<td>9”x13” max / 15” diagonal max</td>
</tr>
<tr>
<td>Optical lenses</td>
<td>9” max diameter</td>
</tr>
</tbody>
</table>

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<tr>
<th>OCA Thickness*</th>
<th>Application</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>250 um (microns); minimum thickness available</td>
<td>Best for keeping an LCD thin, with optical benefits &amp; added strength</td>
<td>-Keeps LCD thin -Improved optics -Reworkable -Enhanced contrast</td>
</tr>
<tr>
<td>900 um (microns); maximum thickness available</td>
<td>Better for displays that will be in a rugged environment.</td>
<td>-Rugged applications -Improved optics -Reworkable -Enhanced contrast</td>
</tr>
</tbody>
</table>

*OCA thickness varies per application

*Subject to results of evaluation per product.
Choosing the correct adhesive material is critical to the OCA bond process. AGDisplays selects an optically superior OCA material that has high reworkability and better optics. Other competitors will use a low-cost adhesive materials with little reworkability that can result in a lower yield of repairable displays.

AGDisplays uses a proprietary material that allows for the adhesive to be easily removed, and the application procedure will be performed again. Our global resourcing ensures continuous material availability, allowing for no disruption in production. Reworkable OCA promotes recycling practices, reduced delivery delays and continuity of supply.
Impact and environmental resistance, increased visibility and durability are all of increased importance in today’s fast-paced industrial environments. When down-time cannot be afforded, ruggedized display units become crucial.

GPS systems are found in various industry sectors. GPS aids in making work more productive, safe and easier.

As the world shifts to handheld devices for everything, it is crucial to ruggedize mobile devices to ensure against easy breakage.

Visibility in all lighting conditions is crucial, as is the ability to sterilize and maintain function during emergency situations.

Seals sensitive displays to safely improve function when exposed to harsh environments including moisture, vibration, and glare.
BONDABLE MATERIALS

- Glass
- Acrylic
- Touch Sensor
- LCD
- Optical Lenses
- Other materials
The following are examples of the rigid to rigid surfaces we can bond together:

- LCD/touch screen
- LCD/cover glass substrates
- LCD/polycarbonate
- LCD/acrylic
- LCD/optical lenses
- Touch screen/cover glass
- Touch screen/polycarbonate
- Touch screen/acrylic
- Glass/glass
- Acrylic/acrylic
- Polycarbonate/polycarbonate
- Other/other – what are your needs?
BONDING FACILITY & EQUIPMENT

- Quality and process control procedures in place for quality assurance and internal audits
- Multiple class 1000 clean rooms
- Capability to withstand small, medium and large volume projects
- Semi-automated equipment
- Short turnaround times for sampling and prototyping, compared to our competitors
- Beneficial logistics, as our facilities are located on the East Coast.
SPECIALIZED BONDING SERVICES

Rigid to Rigid

From industrial to medical to marine devices, OCA bonding improves LCD panels in all industries. OCA bonding does more than just rugged displays. With OCA bonding capabilities, AGDisplays is able to bond any two rigid surfaces together.

Our double-coated adhesive bonding material is rigid enough to bond any surfaces together securely, staying strong even through moist or rugged environments. Our adhesive is 100% transparent, and even enhances optical quality. We will be happy to discuss your bonding needs.

LCD/Touch Bonding

This solution offers a durable projective capacitive touchscreen with a finished border on the front cover glass that gives your LCD a professional and polished look. The touch sensor is embedded behind glass for protection, allowing increased durability without compromising the integrity of the technology. We are offering ruggedized touch screen sensors to fit the following sizes of LCD panels: 5 inch, 7 inch, 10.4 inch.

Characteristics of OCA + Glass Bond:

- Improved Optics
- Increased Readability
- Scratch Resistant
- Increased Strength and Frontal Protection
- Stable Manufacturer Supply
- Thickness Range from .5 to over 3 mm.
WHY WORK WITH US?

• AGDisplays is the only company to be performing OCA bonding on mobile devices in the United States
• Customer portal for order tracking progress
• Handcrafted workmanship
• Custom display layouts, including unit dimensions and segment content
• Technology upgrade and consulting service
• Top of the line proprietary optically clear adhesive
• Photographic documentation for quality assurance purposes
• Low-cost, time-sensitive forecasting
• Full diagnostic analysis for each design
• Certificated Part 145 Repair Station for FAA
• Approved vendor for GE Avionics, General Dynamics, Leidos, Harris and many more.
THANK YOU

AGDisplays is committed to becoming your trusted partner.

Visit our websites for tools and more information:
ocabond.com
engineeringlcd.com
agdisplays.com