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Advanced LCD Solutions Specialist

# INDUSTRIAL DETECTION SOLUTIONS



**OFF THE SHELF DISPLAYS  
BONDING SOLUTIONS  
EMI SHIELDING**

# About Us



For over a decade AGDisplays has been a leading provider of high quality LCD enhancement products and services for the industrial markets. We lead the way in offering an extensive range of custom panel solutions that improve standard display attributes while maximizing performance in any environment. The AGDisplays teams are experts in LCDs, from building simple or complex designs to integration work.

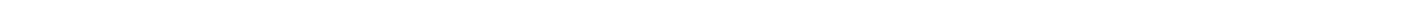
In our 124,000 sq. foot facility, we offer over 800 off the shelf products that include tablets, open and closed frame LCDs and much more. Our knowledge in innovative LCD technology and our high-quality control standards separate us from the rest. At AGDisplays, our teams have a true commitment to being your trusted partner.



## OUR SERVICES

- Off The Shelf LCD Products
- NVIS Integration and Design
- OCA, Optical & Bonding Services
- Custom LED Integration & Design
- Touch Screen Integration & Design
- Custom Glass Supply Services
- Turnkey & Design Services
- EMI Shielding & Design

- Film Enhancements & Repolarization
- Certificated FAA Part 145 Repair Station
- Component Assembly & Integration
- LCD Controller, Cabling & Design
- Testing/Certification of EOL Panels
- Drop-in Replacement
- Industrial Repair Program
- Zero Dead Pixel Inspection



# Industries Served



## MILITARY



## AVIONICS



## HOTEL



## MARINE



## MARKETING



## MEDICAL



## RESTAURANT



## RETAIL



## TRANSPORTATION



# Industrial Detection



AGDisplays provides a wide range of LCD displays for easy integration into an industrial detection project involving an LCD. Our team of experts helps you design and integrate custom LCD specifications so your project is built to last. We help you acquire new, EOL or refurbished LCDs.

With value adds like touchscreen integration, strengthened glass and ruggedization solutions, LCD performance can quickly surpass user expectation.

AGDisplays features other ruggedizing value adds, such as our EMI solution, which quickly and easily integrates into our LCDs in accordance with your specifications.

All design solutions are dependent on individual applications and lead to a completely unique technical solution to fulfill customer requirements.

Our team can help you acquire new, EOL or refurbished LCDs, and can customize virtually any panel to meet your specific requirements. From a simple spec enhancement to full solution kitting, AGDisplays handles LCD sourcing, logistics, assembly and repair—all in one place.



## RUGGED MOBILE

These devices meet military standards for shock & vibration, limited water submersion and dust ingress.

## GLASS SUPPLY

Optical clarity, display strength with integrated coverglass & custom screen-print designs.

## TOUCH DISPLAYS

Our touch panels are eligible for performance upgrades like ruggedization, optical bonds and EMI protection.

## LCD DISPLAYS

Our LCD design solutions maximize standard LCD performance in any environment.

## BONDING DESIGNS

Full range of custom OCA, optical or tape bonding for rugged enhancements.

## TOUCHSCREEN INTEGRATION

We offer popular technologies like projected capacitive, resistive, surface capacitive, IR, and SAW touch sensors.

## EMI SHIELDING & DESIGN

Block electronic interference between LCDs & surrounding equipment with EMI solutions.

## TURNKEY & DESIGN

Work with our team to create turnkey solutions on new or existing designs.

## INDUSTRIAL REPAIRS

Reduce costs by repairing LCD components with full outgoing diagnostic analyses on all units.

# List of Products



## RUGGED MOBILE

These devices meet military standards for shock & vibration, limited water submersion and dust ingress.



## TABLETS

AGDisplays makes commercial off the shelf tablets easy to purchase with flexible spec options and easy purchasing.



## TOUCH DISPLAYS

Our touch panels are eligible for performance upgrades like ruggedization, optical bonds and EMI protection.



## LCD DISPLAYS

Our LCD design solutions maximize standard LCD performance in any environment.



## MEDICAL DISPLAYS

Our LCDs support medical applications with long life cycles, high bright display readability and sharp contrast.



## MARINE DISPLAYS

Marine displays can be IP rated and are designed specifically for use in all marine/boating applications.



## DIGITAL SIGNAGE

Digital signage offers fast on-sight installation and easy access for maintenance & repairs.



## PANEL MOUNT DISPLAYS

Panel mount displays are designed for industrial environments and can be outfitted to meet specific requirements.



## TOUCH TABLES

Hold meetings and communicate business messages with superior and sensitive touch table technology.



## MULTIMEDIA KIOSKS

AGDisplays offers a wide range of multimedia kiosks to effectively reach your customer.



## SPECIALTY DISPLAYS

Bring interaction, creativity and technology together with 3D displays, all in ones and interactive whiteboards.



## VIDEO WALLS

With narrow bezels for a seamless feel, users are captivated by the media displayed on our video walls.



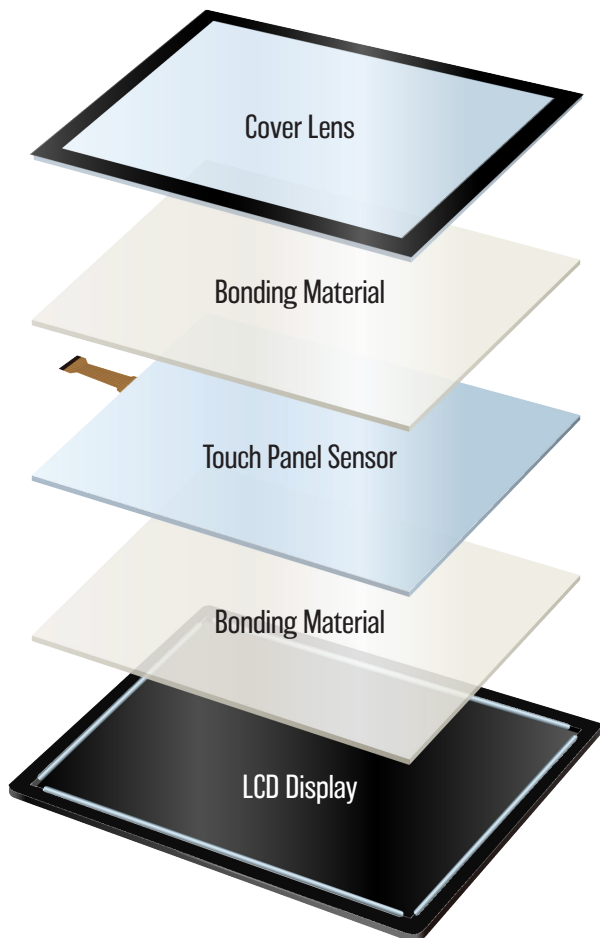
# Custom Glass



Display assemblies with integrated strengthened cover glass have become a popular solution in years past. Utilizing a glass substrate has the superior advantage of increased hardness and scratch resistance as well as having a higher design value.

Pairing glass with various strengthening methods increases the robustness even more. AGDisplays offers a variety of cover glass options to add durability and protection to an LCD. Each material substrate provides unique benefits. Glass options we offer include chemically strengthened soda lime: clear and tinted, grey glass, low iron, AG etched, low emissivity, heat absorbing float glass; AGC Dragontrail™; Corning® Gorilla® Glass.

AGDisplays integrates the cover glass displays using a process called bonding. We offer three different bond integration methods: optical bond, OCA bond, and tape bond. Service options are available based on the size and specifications of your project.



## BENEFITS

- Chemically-Strengthened
- Scratch and Crack Resistant
- Improved Surface Quality
- Enhanced Response
- Thin and Light without Fragility
- Promote Sunlight Readability
- Ruggedized
- Protection From EMI Interference

# Custom Glass



## CAPABILITIES

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### CUTTING

- Water jet: max material size 90"x46", min material size 2"x2"
- Scribe cutting: excalibur, bystronic, TLC, handcutting, precision XY sawing

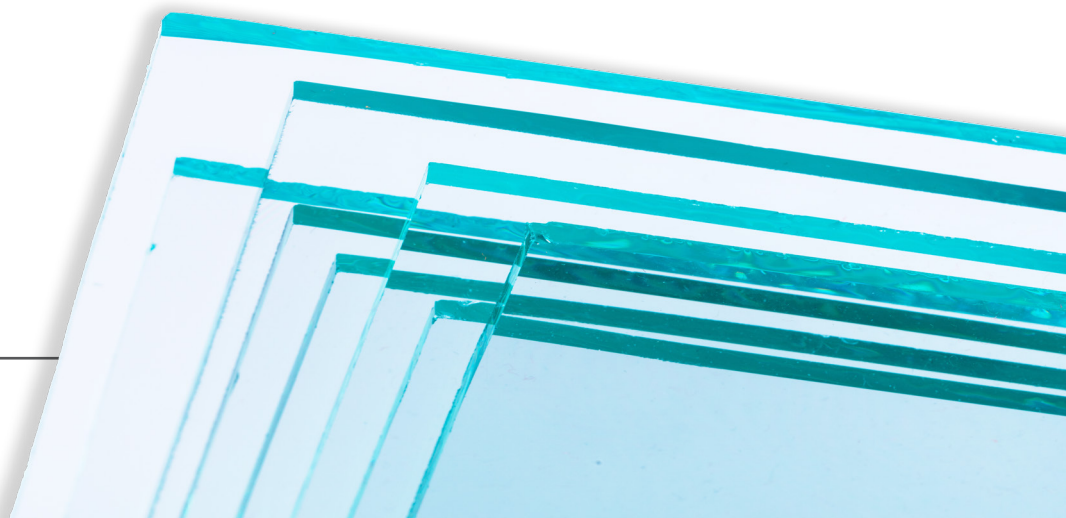
### SCREEN PRINTING

- Ekra X4, Argon - Large, Cameo/Saturn, Saturn, Custom Press
- Ink types: epoxy/polyester, frit
- Etching & bus bars: Ekra X4, Cameo 18, Cameo 30, Saturn
- Edge printing

### EDGING

- Angled and multilevel bevels, seams, corner dubbing, circle & flat ground, pencil & polished
- Edge types: flat ground, flat polish, flat polish with arris, pencil ground, pencil polished, safety seamed, dubbed corners, stepped and route surfaces, beveled edges, bullnose edges (half & full)

## EDGING



# Custom Glass



## CHEMICAL STRENGTHENING

### STANDARD SODA LIME

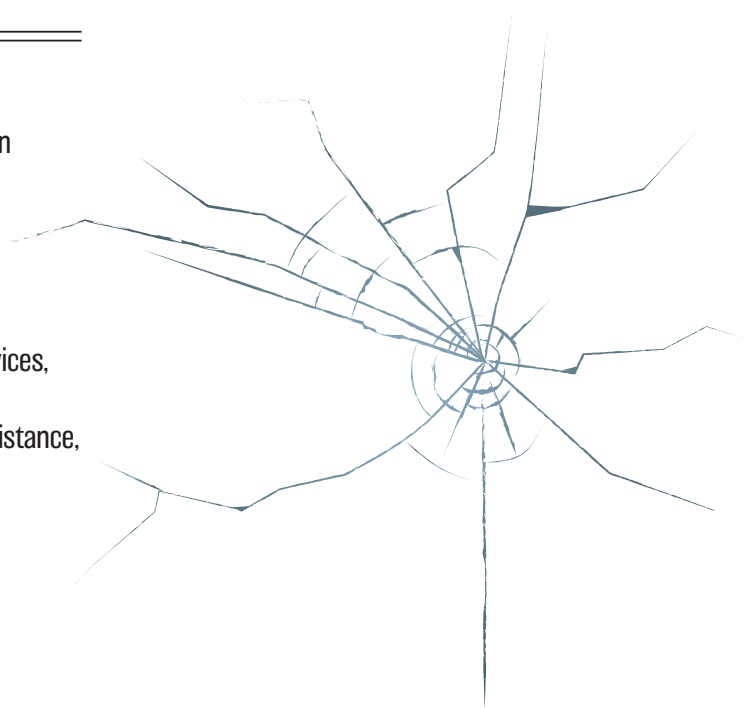
- Soda lime is toughened through a sodium and potassium ion exchange. Often requested for thin display applications
- Thickness: min .30 mm - max 19 mm

### HIE GLASS

- 6-8x stronger than float glass.
- Typically used for electronic displays like tablets, mobile devices, touchscreens.
- Improves impact resistance, flexibility strength, scratch resistance, resistance to temp changes.

### HEAT TEMPERING (ASTM C-1048-04)

- Heat strengthening
- Safety tempering (dices when broken)



## POPULAR OPTIONS

AGC Dragontrail™ is a chemically strengthened and tempered float-glass material that is 6x more durable than soda lime glass. With this strength, the glass can be produced in thinner material.

### Vicker's Hardness

Unstrengthened	596 kg f/mm <sup>2</sup>
Strengthened	673 kg f/mm <sup>2</sup>

### Thickness Availability

Standard	0.8 to 1.1 mm
Special Request (MOQ req.)	0.5 to 5.0 mm

Corning® Gorilla® Glass is a thin sheet glass with a high degree of chemical strengthening. Benefits of Gorilla® Glass include high scratch resistance, high retained strength after use, and pristine surface quality.

### Vicker's Hardness

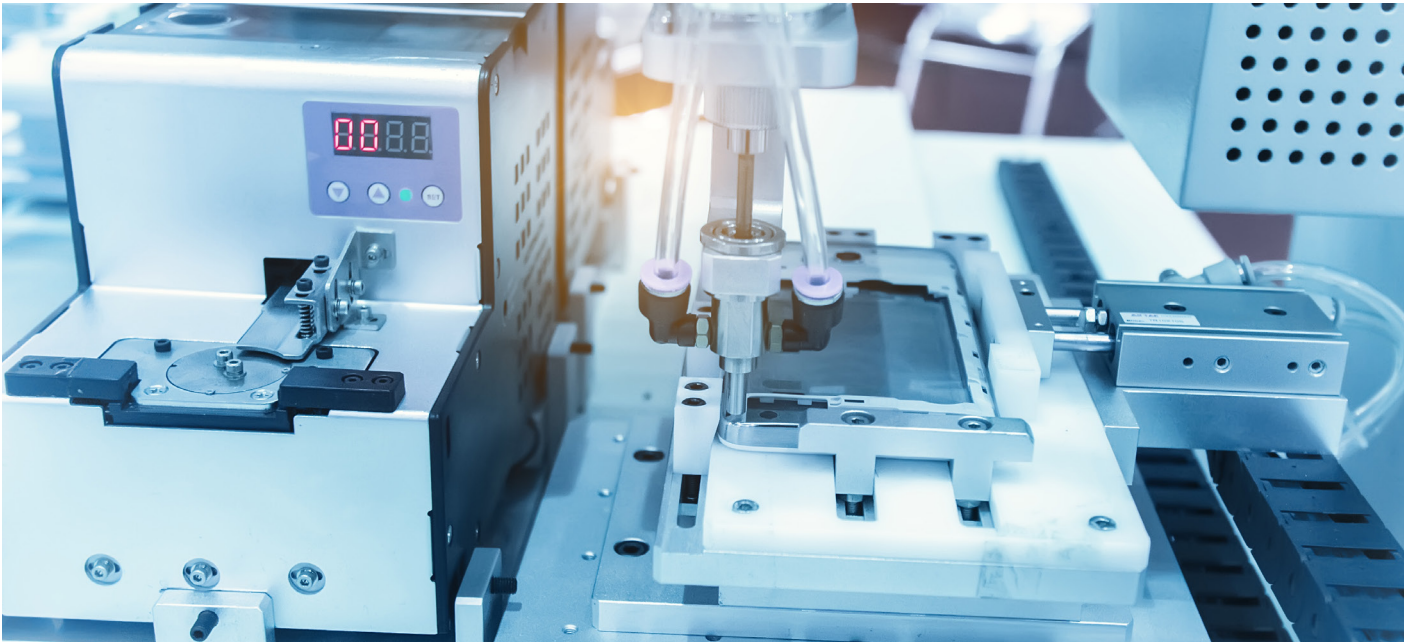
Unstrengthened	534 kg f/mm <sup>2</sup>
Strengthened	649 kg f/mm <sup>2</sup>

### Thickness Availability

0.4 mm to 2.0 mm



# Bonding



**AGDisplays offers three different methods of bonding for your LCD to add strength and clarity, as well as using it as an integration method when incorporating one of our other value add services. In performing a bonding procedure on your LCD, your display will be more rugged and less prone to environmental vulnerabilities such as dust collection and moisture condensation.**

Often, LCD designs that add hardware to the LCD, such as touchscreens or front cover glass, are constructed in such a fashion that air gaps are left in between the layers of its components. Internal reflections are created by these air gaps created between these layers. Gaps create internal reflections, and internal reflections decrease optical clarity as well as leave the LCD vulnerable to contamination.

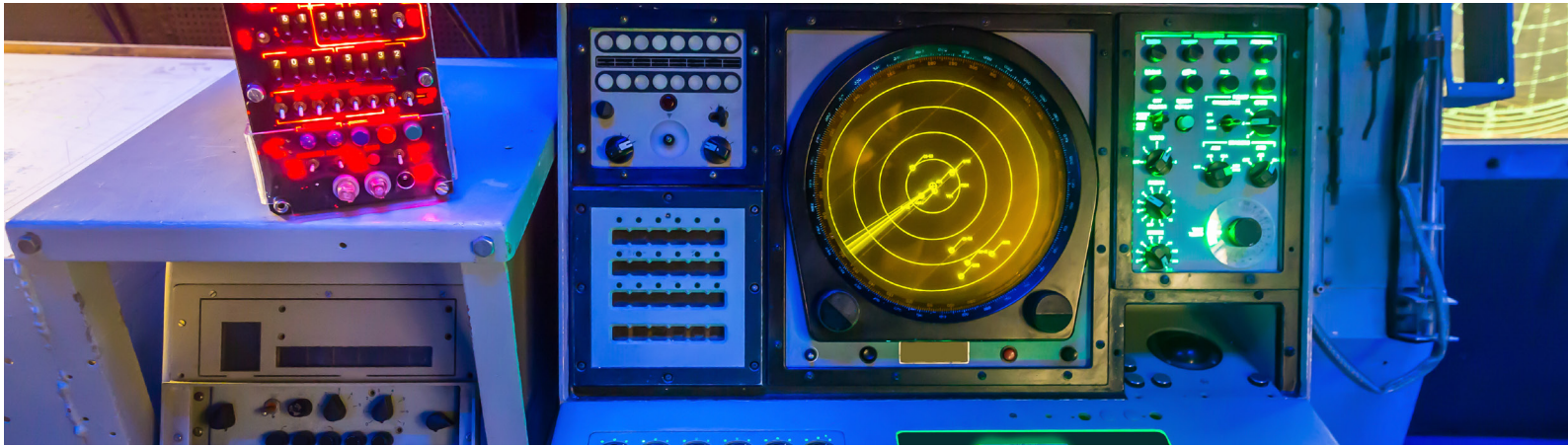
Applying a bond solves much of the refraction and other vulnerabilities mentioned, depending on the application requirements.

Optical clarity and readability may also increase because of

the refractive layers being decreased. The lower the refractive surfaces, the increase in clarity and transmission.

Bonding methods are performed in one of AGDisplays' Class 1000 clean rooms. A clean room is used across various industries where tiny contamination particles may be susceptible for intrusion in the manufacturing process. A clean room is a controlled environment that is specifically designed to keep levels of air pollutants very low. AGDisplays performs all critical manufacturing processes in clean rooms, including our bonding services.

# OCA Bonding



Displays and touch panels are at their best when they perform with highly transparent, low-haze, and UV resistant features. Adding an optically clear adhesive to your LCD's stack up promotes these features.

OCA bonding is considered a safe and effective alternative to costly liquid optical bonding. There are various advantages to choosing OCA bonding as your preferred integration method. Like liquid bond, OCA reduces the reflection layers in a panel. OCA bonding is clean, which eliminates the need to clean up residuals after the bonding process is complete. The process produces high yield and is repairable.

SUBSTRATES	OCA PRODUCT SIZE CAPABILITY
LCD	1"-12" (typ) diagonal max
Touch Screens	1"-12" (typ) diagonal max
Mobile Devices	Samsung Galaxy S4, S5, Note 3, Note 4, Apple iPhone 6,6+
Glass, Polycarbonate, Transparent Materials, Acrylic	9"x13" max/15" diagonal size
Optical Lenses	9" max diameter

## BENEFITS

- Increased readability and brightness.
- Strengthened Durability
- High Adhesion
- UV Protection
- Bare ITO Compatible
- Whitening and Yellowing Resistant
- Removes moisture/condensation and debris to increase viewability
- OCA strengthens structural stability to outstand rough environments.
- OCA creates a single optical layer, reducing glare and increasing optical clarity.

# Optical Bonding

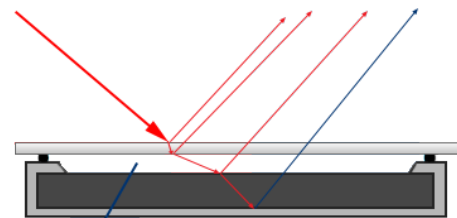


AGDisplays offers optical bonding for panel sizes as large as 21.5 inches. This robust solution may involve a full lamination, consisting of two outer substrates sandwiching layers of adhesives and other elements. The solution creates superior LCD strength, prevents a screen shatters and is less vulnerable to contamination & moisture. It also provides extended operational temperature range and increases touch response. Substrates available are glass, polycarbonate and acrylic. Laminated applications can include: EMI shielding, privacy filters, enhancement filters and security screens.

Optical bonding increases quality and lifespan of an LCD, keeping overall replacement costs low. Although our optical bonding service is the strongest bonding service we provide, the solution is reworkable through our production process. AGDisplays performs quality assurance measures and testing on each LCD to ensure specifications are met. Our facility is capable of performing low and high volume production.

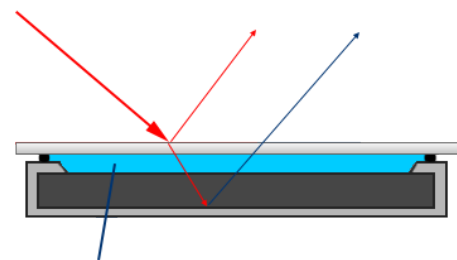
## BENEFITS

- Optical performance: increased luminance & contrast, reduced internal reflections
- Ruggedization: superior LCD strength and prevents shattered screens
- Reworkable through production process
- Halogen-free: low toxicity, environmentally-friendly materials
- Excellent UV resistance
- Extended operating temperature range



Air Gap

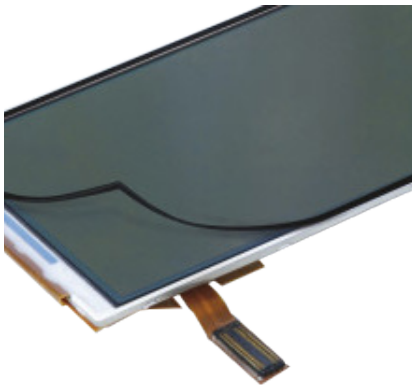
BEFORE



Bond Adhesive

AFTER

# Tape Bonding



When optical bonding is not practical for your LCD, AGDisplays offers tape, or perimeter, bonding. Perimeter bonding helps your company save on costs while still sufficiently ruggedizing your panels. Our tape bond services provide a secure bond that increases LCD flexibility, long-term durability and improved appearance. The adhesive offers a wide temperature specification, allowing a durable integration method in various environments.

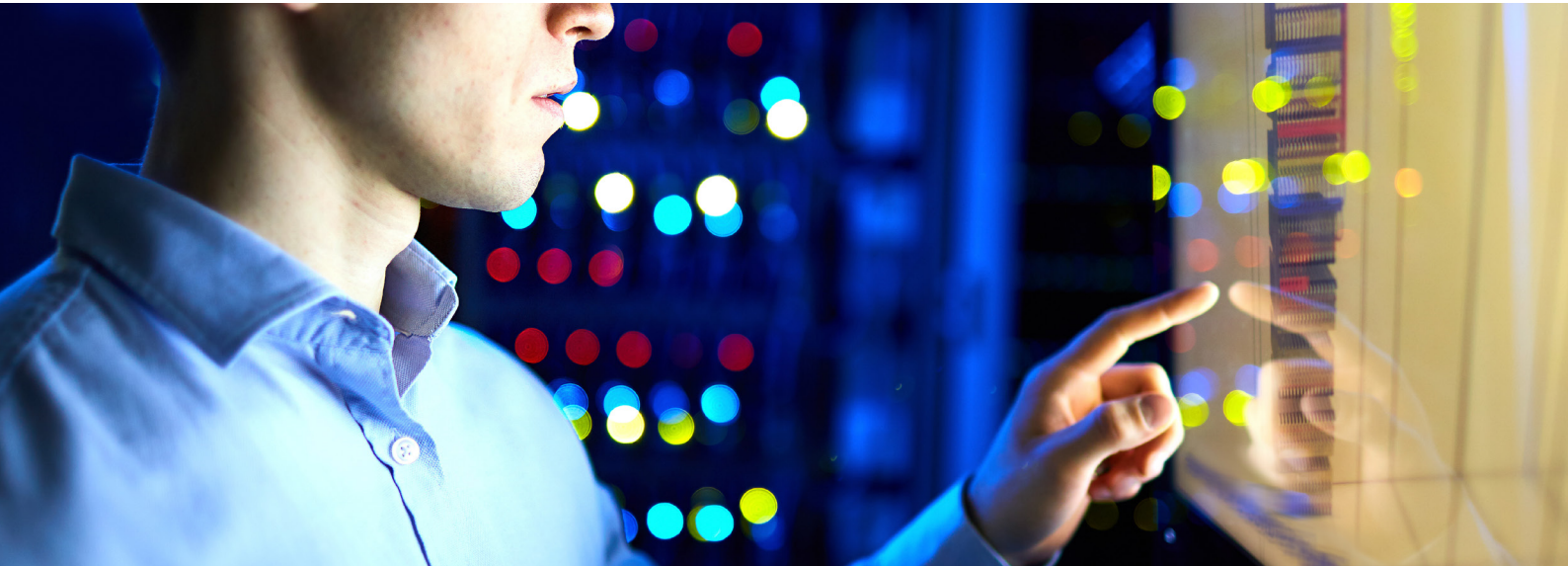
Our technical experts manually perform each bond with precision inside a class 1000 clean room. AGDisplays supports virtually any manufacturer of LCD and touchscreen. For cover glass shield protection, AGDisplays can work with your requirements to offer products and glass materials to achieve your exact requirement. Consult AGDisplays today to speak with a representative about which option is best for your project.

## BENEFITS

- Retrofitted to All LCDs
- Bond with High Adhesion
- Withstand Static or Dynamic Strength
- Continuous Bond Distributes Stress Over Entire Bond
- Viscoelastic
- Resistant to Extreme Weather
- Seal Against Environmental Conditions



# Touch Integration



Touchscreen technologies are not all created equal. In fact, their structures and features differ widely from technology to technology. From the simple touchscreen on a home printer, to the quick touchscreen experience of the latest smartphone. With ACDisplays, you're not the end user, you are the creator. With so many sizes, technologies and specifications floating about, it's impossible to just select one from the masses without being informed first.

## SURFACE ACOUSTIC WAVE

### FEATURES

- High Transmission
- Durable glass construction
- Pressure sensitive
- Advanced technology

### END USER BENEFITS

- High optical clarity
- Rugged in indoor environments
- Activated with stylus, glove or fingernail

### INDUSTRIES

- Medical
- Touchscreen Kiosks
- Indoor Retail Environments

# Touch Integration



## RESISTIVE

### FEATURES

- Low light transmission at 75%
- Activation with any object
- Protective substrate on top of glass layer
- Able to be assembled from component parts, screen and sensors

### END USER BENEFITS

- No glass shattering
- Works in rain or other liquids
- Good functionality in hot or cold weather
- Input is acceptable with any stimulus: finger, pen, gloved fingers, stylus, and anything else

### INDUSTRIES/APPLICATIONS

- Marine
- Commercial
- Food and beverage

## PROJECTIVE CAPACITIVE

### FEATURES

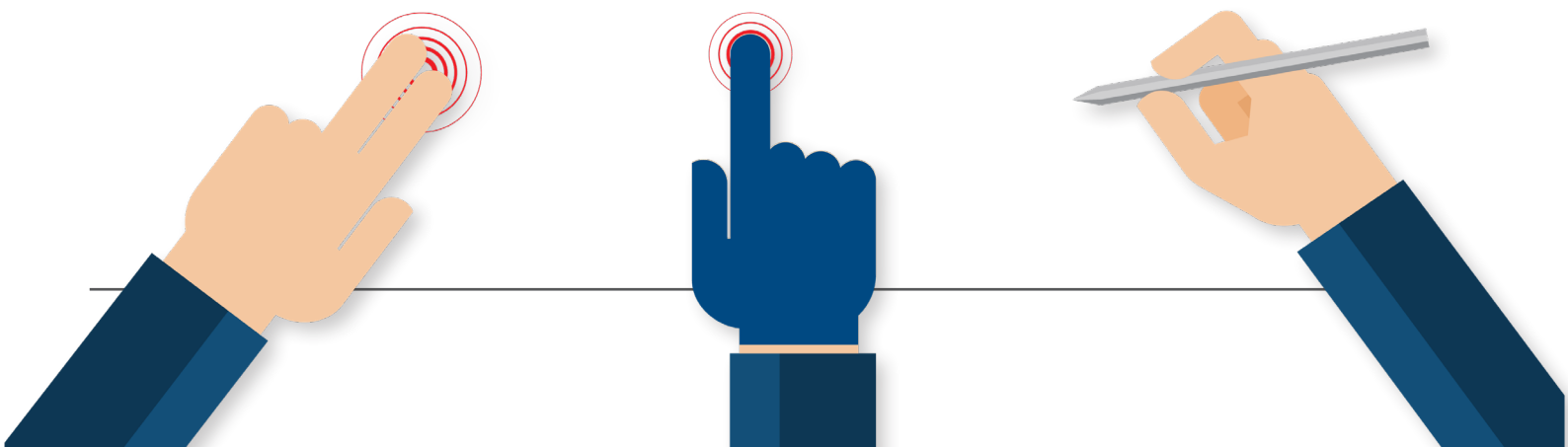
- Integration with various cover lens options: standard, tempered, chemically-strengthened glass
- Single, dual or multi-touch
- High light transmission, in excess of 90%

### END USER BENEFITS

- Superior image clarity
- High durability in rough environments
- Flexible touch points
- High transmissivity
- Input triggered by bare hands, latex gloves and stylus

### INDUSTRIES/APPLICATIONS

- Retail
- Gaming
- Digital Signage



# Touch Integration



## SURFACE CAPACITIVE

### FEATURES

- Fast, sensitive touch response
- Glass layer for ruggedization
- Protective cover

### END USER BENEFITS

- Good image clarity
- Highly scratch resistant
- Fingertip or stylus activation
- Durable in rough environments
- Resistance to contaminants and liquids

### INDUSTRIES/APPLICATIONS

- Gaming
- Entertainment
- Point of Sale
- Kiosks

## INFRARED

### FEATURES

- High light transmission
- No glass substrate
- Light beam touch technology
- Scratch resistant

### END USER BENEFITS

- Unlimited touch life
- Durable lifetime
- Superior image quality
- Finger and glove touch activation

### INDUSTRIES/APPLICATIONS

- Retail
- Hospitality
- Large Display Applications



# Turnkey Design



A turnkey LCD solution is a project built so that the end customer is sold a completed LCD product, ready for use. It is our specialty to take on the responsibility for designing and developing a product that is ready to be used upon completion.

We have a team of experts ready to take on any challenging turnkey LCD need you have. AGDisplays offers in-house assembly, testing and quality measures, packaging and drop ship capabilities. We are able to accommodate small and large volume production quantities.

LCD turnkey projects involve kitting LCD peripherals and components or just selling commercial off the shelf LCD products that are applicable across all industries.

## BENEFITS

- Project administration and management control
- Subcontracting
- Focus on the total integrated system
- Considerable experience and skill in panel selection
- Development team that provides options based on budgets
- Quality functionality testing
- Inventoried spare parts
- Focus on procurement efficiency and flexibility
- Experience and expertise in all major industries, applications, and environments
- Quick reaction time, less opportunity for miscommunication
- Hassle-free design changes
- Cost targets high priority
- Adherence to all US industry standards and specifications
- Regular shipments to destinations around the world
- Comprehensive technician training and familiarity of quality improvement methods
- Complete factory testing prior to shipment
- In-house assembly, testing and quality measures, packaging and drop ship capabilities



# EMI Shielding



EMI film provides the “immunity” for electronic components that are susceptible to EMI (electromagnetic interference). Our solution options offer maximized optical performance and makes display/touch screen RFI compliant.

EMI film or mesh solutions integrate quick and easy, requiring no redesign and allowing for fast production. Our service installs new EMI shielding, or replaces existing EMI system. While our transparent film and mesh solutions are our most popular solutions, AGDisplays also offers other EMI options to meet your design requirements.

Transparent thin-film conductive coatings provide LCD technology with great optical and EMI shielding properties. Typically the frequency level ranges in 100 kHz - 20 GHz. Films may be offered with conductivity ranging from 1 to 100  $\Omega$ /sq.

Conductive grid mesh solutions provide panels with a high level of protection. A fine-conductive grid may be built of woven stainless-steel or copper mesh, or alternatively made with a patterned conductive metal coating on the substrate's surface.

## EMI MESH SOLUTIONS

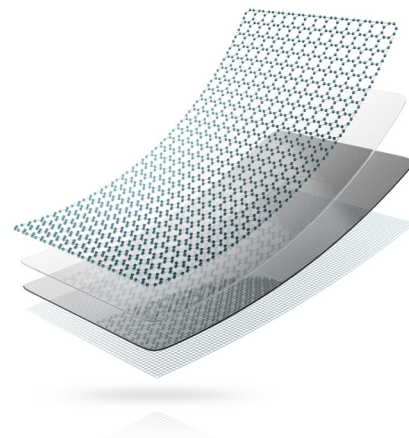
- Woven wire mesh
- Robust active enhancement, providing high level of protection
- Compatible for use with a touch sensor
- Photopic transmission at  $\geq 85\%$
- Diffuse reflectance at  $30^\circ$  at  $\leq 0.14\%$
- Specular reflectance at  $30^\circ$  at  $\leq 1.2\%$
- $\leq 0.25 \Omega$ /sq. surface resistance
- Shielding effectiveness:
  - 50 Mhz (megahertz):  $\sim 75$  dB
  - 100 Mhz:  $\sim 65$  dB

## EMI FILM SOLUTIONS

- For panels needing low attenuation (10-20 dB)
- Cost effective solution, passive enhancement
- Compatible for use with a touch sensor
- High visible transmission with low electrical resistance:
  - 10 ohms/sq.
  - 20 ohms/sq.
- Reduces problematic EMI and/or IR emissions from surface
- Superior to ITO films at low resistance for transparency & mechanical properties

## BENEFITS

- Passive Integration Solution
- Compatible with Touch Sensors
- High Visible Transmission
- Reduces EMI/IR Surface Emissions
- Superior to ITO Films
- Several Custom Design Options



# Industrial Repair



**AGDisplays repairs most components on an LCD, so our customers don't have to replace whole units for minor repairs. Over years of finely-tuning our in-house manufacturing processes, we provide a smooth transition from modification, to inspection, to shipping. All repairs are performed at our US-based headquarters in Greensburg, PA.**

AGDisplays is focused on refurbishing and repairing your LCDs; we specialize in providing cost-effective alternatives to LCD replacements. Located in Greensburg, Pennsylvania, our 124,000 square foot facility utilizes our multiple production lines and class 1,000+ clean rooms to perform precise modification and improvement procedures. For quality assurance measures, we perform a full diagnostic analysis for each repaired unit before sending restored LCDs back to customers.

With 40+ years of experience, AGDisplays trains our individuals through a stringent curriculum in which we evaluate regularly. If your unit has gone end of life (EOL), AGDisplays offers you access to our list of trusted LCD distributors. We also provide repair warranty services for panels that are no longer under OEM warranty.



## BENEFITS

- ✓ **Access our line of trusted LCD distributors. Distributors are audited for quality assurance.**
- ✓ **Keep maintenance costs down without compromising quality of units.**
- ✓ **Access end of life (EOL) panels that are out of reach for others.**
- ✓ **Warranty program for products that are no longer under OEM warranty.**
- ✓ **Competitive and flexible pricing, including value add upgrades**
- ✓ **Full diagnostic analysis performed on each repaired unit**

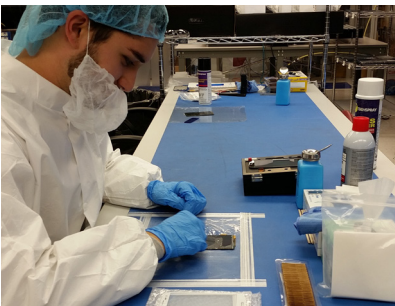
# Thank You



## COMMUNITY OF EXPERTS

Whether we are met with a new design or challenged with improving an existing design, AGDisplays supports your team by delivering unparalleled LCD expertise and technology. AGD partners benefit from our efficient design process and our dedication to creating quality design solutions.

We saw the need for off the shelf products, so we've added an expansive line of open/closed frame LCDs, digital signage, and all-in-one products. We offer unique LCD products like advanced touchscreen tabletops, high quality medical displays and rugged mobile devices. All of which are eligible for value add integration services. Our products are used across many industries including Military, Avionics, Marine, Industrial, Medical, Transportation and many more.



## CERTIFICATIONS

AGDisplays values high-quality working and design standards. We support your teams with the knowledge & expertise needed to make the strategic design and manufacturing decisions.



CERTIFICATED PART 145  
REPAIR STATION



AGDISPLAYS IS  
ISO 14001, 45001 & R2  
CERTIFIED

## CONTACT US

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