ULTRA Integration and Installation

A D Metro Guide

A D Metro

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Introduction

The information in this document describes recommended practices for integrating your display and bezel with an A D Metro ULTRA touchscreen. There are a number of considerations that should be examined when approaching this issue and each item is important to consider in order to achieve an optically, mechanically and electrically robust and effective touch solution. The information in this guide will help to give you an idea of the potential problems that can arise throughout the bezel design and touchscreen integrating process and afterwards during the long run, and how to avoid or minimize the chance of failures down the road

The methods described in this guide are recommended practices. Other methods may be equally feasible but it is up to the clients to test the configuration for themselves and determine whether it is a fit for their application. Note that certain mountings not described in this guide may invalidate the warranty of your touchscreen. Refer to the terms and conditions found at www.admetro.com.

Installation Information

In this section mechanical and assembly considerations are covered.

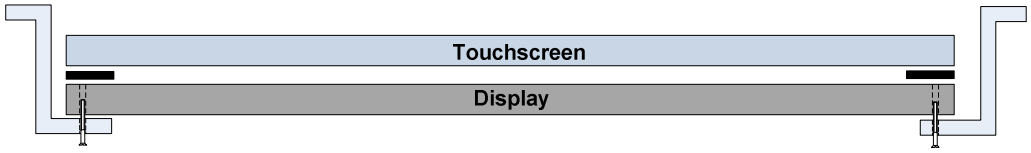
Mechanical Considerations

1) Display Strength

In order to secure the touchscreen firmly in place, clamping or compressing forces should be exerted upon the touchscreen and the display itself. Some displays are unable to withstand high clamping forces, so if you are clamping, make sure to determine what your display can withstand prior to bezel design or integration. If fixing the touchscreen to the display directly is not an option, then a separate mechanism should be used to hold the touchscreen and seal the border to your bezel. Adhering the sensor to the bezel is not recommended (see section 2 of Assembly Considerations below).

2) Mounting Location

If the border touchscreen must cover the mounting holes of the display, use horizontal standoffs. These help to reduce the protrusion of the mounting screws. There should be no protruding screws if mounting like this, as the protruding tip may press into the back of the touchscreen and cause a crack when the assembled unit is clamped to the bezel.



3) Gap Between Touchscreen and Display

The touchscreen should be separated from the display surface and not pressed tightly against it. If placed too close, the touchscreen may flex through use and contact with the display surface, possibly causing damage to the touchscreen and display alike and cause optical inclusions in the area of contact. The gap should also not be too large, as it may introduce inaccuracies when operating at an angle and reduce visibility of the display. Aim for the smallest gap possible, so long as the sensor does not touch the display screen. A good guide to use is 1/16”. It is possible to install the touchscreen directly against the surface of the display, but this must be done by optical bonding, and this will invalidate the warranty of the sensor and possibly the display as well, depending on the manufacturer.

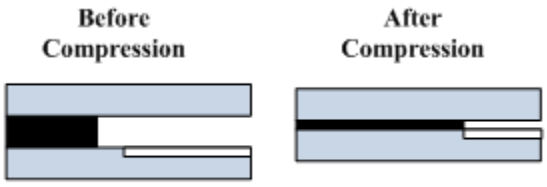
Assembly Considerations

1) Rear Gasket

The purpose of the rear gasket is to provide a seal as well as cushioning between touchscreen and your display in order to keep out dust and other foreign material that may contaminate display visibility and help prevent damages to the surfaces in contact. The recommended solution is to use compressive foam, but it may also be done with pressure sensitive adhesive.

Using single or double sided adhesives are popular solutions that provide stability in gasket location and positioning and touchscreen alignment. Generally, although the clamping forces between display and touchscreen are sufficient to keep the gasket in place, rear gaskets with adhesives are very common. If deciding to use adhesive, select one that can stay firmly in place and is not easily removed, such as 3M's VHB. An adhesive-backed gasket may be placed on the back of the touchscreen or along the border of the display housing. It should also be unaffected by heat from the display, which can cause the adhesive to peel.

When the gasket is compressed, the material will flatten and may become visible in the sensor's visible area. As such, your gasket should be designed in such a way that it allows for material distortion due to compressing forces and that it will not affect the visibility of the display or the touchscreen's active areas. Anywhere that any metal, glass or plastic parts meet should have a gasket in between to both protect the materials and to maintain a dust-proof seal for the air gap.



Ensure gasket has room to compress without overlapping the display's active area

2) Touchscreen

ULTRA uses resistive touchscreen technology and as a result is not sensitive to EMI or RFI from outside sources. However, the touchscreen cable should avoid being run near an inverter or other circuit board prone to vibration containing lead cut-offs. These sharp edges may over time rub through the cable and short out the cable circuitry.

The cable is meant to be used as an electrical connection only. Therefore, never trim or otherwise modify the cable, and never carry or support the touchscreen by its tail. The cable may be bent in any number of locations with a minimum 0.125" radius. Creasing or folding the cable is not recommended but can be an effective way of relieving z-axis stress in situations where the cable must be sharply routed beneath the touchscreen. If you do crease or fold the cable, do not attempt to unfold it as it may result in breaking the cable conductors.

Align your touchscreen with your display as desired prior to finalizing your assembly design. When designing, use adhesive that can be easily removed in order to allow for

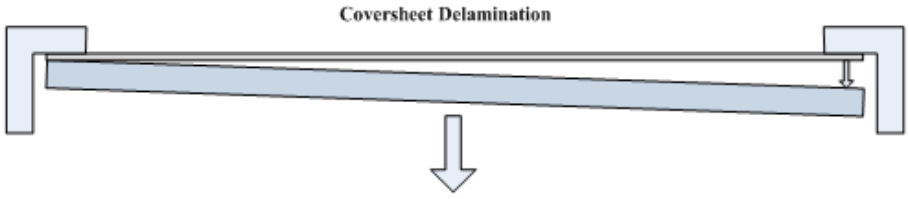
any required corrections in placement or positioning. The active area of the touchscreen should be centered with the active area of the display. If possible, let the inner silver traces be covered by the bezel to provide greater optical clarity and cosmetic appeal.

3) Front Gasket

The front gasket is located between the front of the touchscreen and the back of your bezel. Like the rear gasket, it provides a seal against contaminants and helps to make a sturdy assembly. Closed cell foam is again recommended as front gasket material. However, extra factors must be taken into consideration when designing the bezel mounting, since the front of the touchscreen is where all touch activations occur, which makes it a rather sensitive area.

The most important thing to know is that, unlike the rear of the sensor, the front of the sensor should not be adhered to the bezel in any way, either by film adhesives, RTV adhesives or any other adhesive. The gasket should be adhered to the underside of the bezel. There are several reasons why this is not recommended:

- Most of the weight of the touchscreen lies in the glass substrate (and LCD if the touchscreen is adhered to it), so in any position other than face down, if the bezel is adhered to the touchscreen via adhesive with no support for its substrate, the weight of the substrate may cause the coversheet to delaminate from the substrate over time. While giving the substrate constant support would help, the sensor would still run the risk of a full delamination should the bezel ever be removed from the assembly or picked up by the bezel frame.

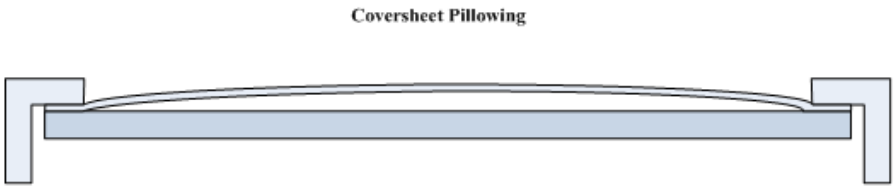


  A partial delamination can also be harmful. Even if the sensor does not look like it has delaminated, small tears in the coversheet adhesive may occur, which means the sensor may no longer have its airtight seal. Moreover, a conductor is placed between the glass substrate and the coversheet to serve as a conduit for electricity to be delivered to the surface of the coversheet coated with ITO conductive coating. If the coversheet delaminates only slightly on one side, it could separate completely from the conductor and no electricity will be delivered to the coversheet, thus the touchscreen may become inoperative.

- Similarly, when the touch panel is used the operator presses against the surface which in turn will press against the substrate. If the substrate is not secured and the topsheet is held static to the bezel, the touches may over time deflect the substrate away from the topsheet and cause visual or functional failures over time.

The topsheet is comprised of a thin layer of PET and a thin layer of borosilicate glass.

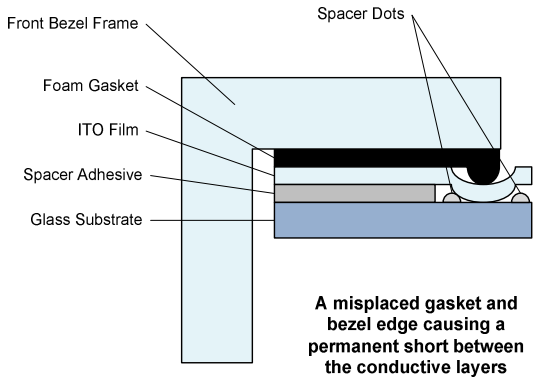
This topsheet is designed to allow for slight expansions in order to compensate for changes in temperature and other environmental changes. The two materials comprising the topsheet have different thermal expansion rates. Having it static to the bezel does not allow it to expand outward. If held in place, the topsheet may begin to warp and internal stresses in the layers may cause distortion, pillowing, microglass cracking or even functional issues.



The best and safest practice is to employ compressive foam against the front of the touchscreen for any sealing or cushioning requirements. 50-70% compression is recommended and should be sufficient for most dust or water seal requirements.

Similar to the rear gasket, ensure that the dimensions and placement of the gasket and bezel opening are selected in such a way that it allows for material compression which will not result in the gasket being squeezed into the active area of the touchscreen. Not only will it reduce the cosmetic appeal, but it runs the additional risk of the foam gasket to cause a constant short between the two touchscreen layers.

Moreover, if the bezel edge is placed too close to the active area, not only will it obstruct the visibility of the display, but over time there may be in this area a buildup of dirt, dust or other contaminants which may cause a false activation if packed tightly enough.



It is very important to understand that ULTRA, being a ruggedized variation of a standard resistive sensor, is often placed in applications and environments which would never consider a standard resistive sensor to be used in. As a result, ULTRA applications are frequently subjected to excess temperatures and changing internal pressures from temperature swings such as with outdoor use or avionic applications which can compromise the hermetic seal of the sensor and cause a rupture that can

lead to pillowing or a collapse of the coversheet which is not a warrantable defect.

While not a common occurrence in most applications, it strongly recommended to employ a common mitigation method that can greatly reduce the risk of seal rupture by positive Z-axis clamping of the sensor's non-active boarder. This is done with the bezel gasket described above. The bezel gasket should be of a closed cell dense foam material which is compressible but with little compression memory. The gasket should be cut wide enough to cover from the edge of the viewable area to the edges of the sensor. The gasket should be a minimum of 1.6mm thick and with the sensor and display assembly fully clamped to the bezel should be compressed 80%. This methodology assures the coversheet edges will be tightly secured in place with little chance of excess heat and/or pressure changes rupturing the coversheet seal when operating outside normal specified ranges.

4) Controller

Before ULTRA can begin functioning, the controller for the touchscreen must be installed. The placement and installation of the controller is much more flexible since there are fewer restrictions as far as where the controller can be placed or its orientation.

The controller should be fixed in secure location, such as the inside of the monitor or display casing, with adhesive, glue, plastic fasteners or mounting screws. The controller should be placed in such a way that the touchscreen cable can easily connect to it and have some degree of slack to it. The touchscreen cable should not be significantly creased or bent in order to connect with the controller.

Finally, the controller is an exposed circuit board, and as such must be placed in an environment within its operational specifications.

If securing the controller by adhesives, glue or plastic fasteners, a ground wire should be soldered to one of the mounting eyelets of the controller board and then electrically fastened to the monitor's metal chassis or other ground point.

Maintenance Information

Storage

When not using ULTRA for extended periods of time, ensure that the touchscreen is stored in a temperature controlled environment ranging from -40°C to 70°C. Store the touchscreens in their original packaging if possible, as the packaging is designed to protect its surfaces from dust and finger prints. Multiple sensors should not be stacked on one another, but should be placed on their side instead, especially if storing for long periods of time. Do not place any heavy objects on a touchscreen that might cause damage to the sensor.

Handling

When picking up or moving the touchscreen, use two hands to support it evenly and always be gentle when picking it up or putting it down. Use gloves to avoid getting fingerprints on the sensor's surfaces. Never carry the touchscreen by its tail; it is meant to be used as an electrical connection only. Avoid dropping the touchscreen or striking it against any hard surfaces, as the glass substrate runs the risk of cracking, chipping, or breaking completely.

Packaging Assemblies

After an ULTRA touchscreen has been integrated into your assembled unit, be sure there is no contact with the packaging material and the face of the touch screen. The installation of a low tack protective film is recommended. Do not use expandable foam packaging as this can cause excessive force against the surface of the touch screen when shipping and has been known to cause seal rupture.

Cleaning

ULTRA touchscreens are laminated with a thin sheet of borosilicate glass. Therefore, if touch surface or the back substrate needs to be cleaned, any cleaning agent may be used so long as it does not degrade or attack glass quality. Extra care must be taken however if any part of the surface not covered by this layer of glass becomes dirty, as that portion is made of polyester and not glass. Select cleaning reagents accordingly to account for this. Use a soft, lint free cloth to avoid getting scratches or other marks on the surfaces of the touchscreen.

Glossary

Overall Area – Refers to the full area of the sensor, usually delineated by the dimensions of the glass substrate.

Viewable Area – Refers to the section of the sensor outside the active area that is transparent. This area is not obstructed by silver traces, cables, or other objects and the display is clearly visible through it.

Active Area – Refers to the section of the sensor where touch activations may occur. Lies within the viewable area.

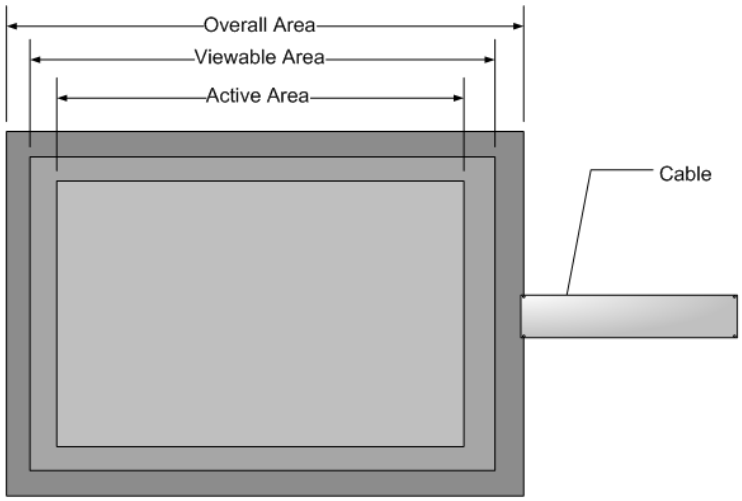
Topsheet – Refers to the surface, the top layer of the sensor, constituting borosilicate armor glass laminated onto PET polyester. Also known as coversheet.

Gasket – Usually made of foam, serves as a separator between LCD and sensor, and between sensor and bezel. Compresses when clamped between layers, ensuring a tight seal and minimizing damages.

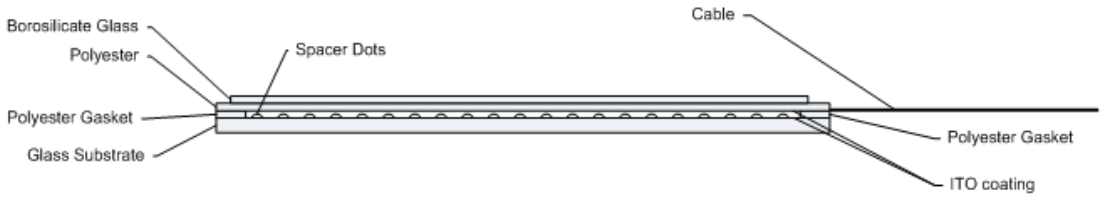
Indium tin oxide (ITO) – A coating used on glass or film to make it electrically conductive and maintain good optical properties.

Appendix A - Diagrams

Touchscreen Areas



Touchscreen Stack-up



Typical Final Stack-up