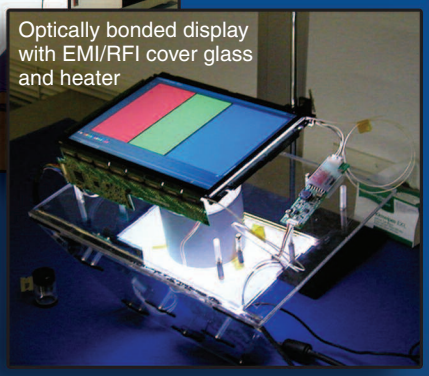


Vacuum coating chambers deposit broadband VAR coatings to reduce surface reflections on displays



Dontech Therma Klear™ transparent heater



Optically bonded display with EMI/RFI cover glass and heater

Dontech IMO-bond™ Optical Bonding & VARGard™ Film Laminations

Electronic displays are commonly used in outdoor applications such as digital signage, kiosks, GPS systems, military, medical, and industrial hand-held instrumentation.

Operating electronic displays in these high ambient light conditions poses engineering challenges including:

- **Contrast**
- **Color Saturation**
- **Thermal Loading**
- **Temperature Extremes**
- **EMI/RFI Shielding**
- **Ruggedization of the Optics (e.g., shock, vibration and impact)**

Dontech's IMO-bond™ process is designed for a high ambient light environment, which occurs when the amount of light reflected by a display is close to or exceeds the amount of light emitted by the display. Direct sunlight can have illumination of greater than 100,000 lux. When this ambient light is reflected off a display's untreated glass or plastic surfaces, the contrast loss can be close to 100% and will cause "wash-out" as the display's luminance is exceeded. In addition, high ambient light can cause thermal loading of the display system. This is particularly an issue with LCDs in which the "clearing temperature" of the liquid crystals can be exceeded, causing the display's contrast to degrade.

As shown in Fig. 1, in order to minimize the impact of reflected ambient light, it is necessary to:

- Apply broadband antireflective coatings to reduce surface reflections (e.g., less than 0.75%, 0.50% or 0.25% photopic reflection).
- Optically couple optical filters or touch screen to the front of the display to eliminate internal reflections.

Dontech's solutions for improving electronic display performance in high ambient light conditions include:

- **VARGard™** - antireflective and antiglare film laminations
- **IMO-bond™** - Index-Matched Optical (IMO) bonding of optical filters and touch screens
- **Passive Enhancements** - addition of optical compensation films and reflectors
- **Active Enhancements** - addition of custom CCFL and LED lighting solutions
- **Display Enhancement Components** - AR, AR/AG cover glass, enhanced touch screens, polarizers, colored contrast filters

DONTECH
Innovating Optical Solutions
www.dontech.com
Tel: 215-348-5010

Dontech Optical Coating Solutions

- **VARGard™** antireflective, antiglare and antireflective/antiglare films can be laminated to the front of a display. By reducing first-surface reflection by more than 85%, display contrast and brightness are improved without increased power consumption. "VARGarding℠" a display will increase sunlight readability, as well as improve the durability (e.g., chemical and scratch resistance).

  VARGard™ films are available in PET and TAC. They can be combined with conductive coatings or conductive grids for EMI/RFI shielding, and with polarizers to minimize internal display reflections.

- **IMO-bond™** is Dontech's proprietary process of applying rigid optical filters (e.g., antireflective, conductive antireflective, or Therma Klear™ transparent heaters) to electronic displays via a refractive index matched optical (IMO) bonding process. IMO-bond™ includes a family of durable, index-matched adhesives that optically couple a cover glass or touch screen to the display to eliminate reflection losses.

- **Passive LCD Enhancements** include the addition of optical compensation film such as reflective and prismatic films and high-efficiency polarizers to LCDs to optimize light transmission and improve display "transflectiveness" in high ambient light conditions.

  Contrast enhancement filters (including polarized, bandpass, antireflective or antiglare) can be fully optically or perimeter bonded to displays to reduce reflections and increase contrast without additional energy consumption.

  Dontech's passive thermal management includes the addition of Heat Shield™ IR-blocking filters and films.

- **Active LCD Enhancements** include the addition of high-bright CCFLs and supplemental LEDs to improve display luminance.

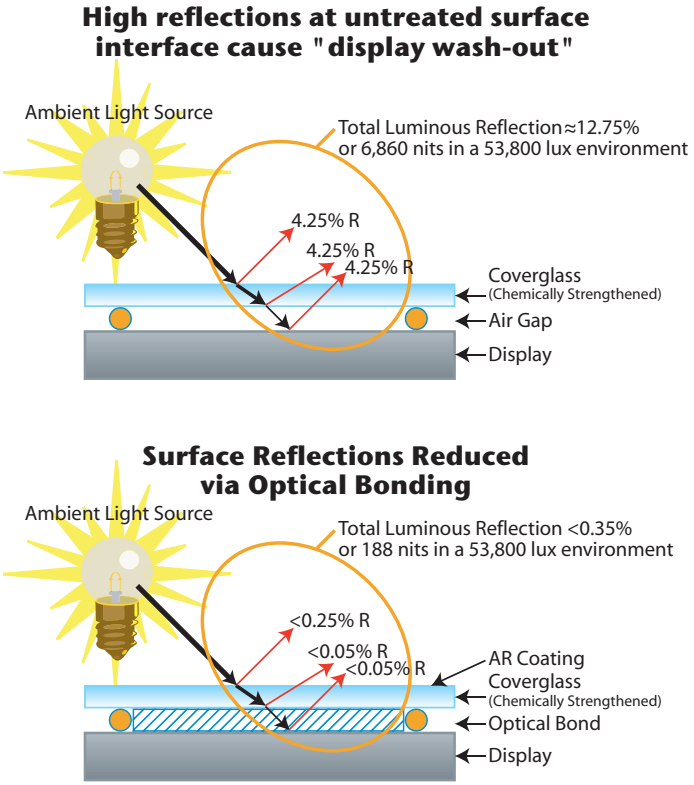


Figure 1

Examples of Screen "Wash-out" in high ambient light



Dontech's antireflective surface treatments, optical bonding and display enhancement services provide high ambient light display readability and performance in the "worst-case" direct sunlight conditions.

Figure 2

Company Profile:

Dontech, Inc. is an ISO-9001:2000 certified designer and manufacturer of optical filters, coatings and enhanced display products for medical, military, aerospace and industrial applications. With more than 40,000 square feet of facility space and over 10,000 square feet of clean rooms and optical coating labs, Dontech is well-positioned to support display enhancement projects of any size. Visit us at **www.dontech.com**

DONTECH Innovating Optical Solutions
Dontech Inc., 700 Airport Blvd. Doylestown, PA 18902
215-348-5010 • Fax 215-348-9959 • www.dontech.com

© 2009 Dontech Inc.

Printed in U.S.A. DON-027 AP-1000-05-09