

Acrylic for display applications: The glare-free choice over glass

Today, specialty acrylic sheet is increasingly regarded as a viable and preferable alternative to glass for a number of products, and new coating technologies make it especially appealing for display screen applications. Acrylic is lightweight, and when manufacturing items such as large display screens, lighter materials become more appealing because of their practicality and safety. Acrylic also offers shatter resistance and improved impact strength compared to glass, giving display screen OEM's and designers more flexibility and greater choices to improve product design.

Recently, new anti-reflective coatings have been applied to acrylic sheet to significantly reduce glare and improve clarity. Cutting glare is an increasingly important design element for consumer display products, and it is one more reason why acrylic is becoming the material of choice.

Below are some frequently asked questions and answers on the benefits of new acrylic technologies for display applications.

Q: What are some display applications for which acrylic can be used?

A: Acrylic can be used for any display application, with few exceptions. Acrylic sheet is easy to fabricate into any desired shape, and the material is available in a range of thicknesses with a variety of specialty coatings. Some of the more popular applications include: computer flat panel display monitors; automotive, aviation and marine instrument clusters and navigation displays; medical displays and monitors; ATM and tablet PC touchscreens; LCD & LED displays; ruggedized industrial displays; global positioning system displays; projection televisions, etc.



Q: Why is acrylic a better choice than glass for displays?

A: Acrylic is half the weight of glass, yet unlike glass it does not shatter, making it a safer material. Acrylic is also many times more resistant to impact and shock, so the risk of breakage and replacement is reduced. For many applications—like LCD displays—this is a significant advantage. Acrylic also offers superior clarity because it transmits 92 percent of light, whereas glass transmits about 88 to 90 percent. Acrylic is easy to fabricate, offering more freedom of design, and it can be custom tinted to improve contrast.

Q: How important is acrylic's light weight for display applications?

A: Acrylic's light weight is extremely important for handheld applications as well as applications with large viewing areas, such as PTV's and LCD monitors.

For consumers, lighter materials are obviously preferable to heavier ones, particularly for products that are carried around in pockets or handbags, or on belts. In addition, for PTV's and LCD computer monitors acrylic provides freedom of design benefits compared to heavier glass products.

Q: Is there a trend for anti-reflective display designs? If yes, why?

A: Until recently it was almost instinctive for people to close curtains in a room when watching television during the daytime. Today's anti-glare technology makes this a thing of the past, and it is quite apparent that the marketplace is seeking out new anti-reflective materials for visual display applications. Today, a range of products with the full spectrum of performance capabilities, from contrast to non-glare/anti-reflective, is required to meet the needs of the marketplace. There

are a number of reasons to explain this new development, but one example is the aging consumer population. Recent studies have shown that as people age they become more optically challenged in terms of contrast perception. Glare becomes increasingly problematic for older consumers when reading display screens at check-out counters, ATM's, etc. It is important for designers to anticipate and respond to these consumer needs.

Q: What is the science behind acrylic sheet with an anti-reflective coating?

A: To understand how anti-reflective coatings work, it is first necessary to understand what causes reflection. Reflection occurs whenever light passes from one material to another if the refractive indexes of the materials are different. In the case of light striking an acrylic sheet surface at an angle of 90 degrees, four percent of the light reflects off the surface of the acrylic. If the acrylic is transparent and colorless, then the rest of the light passes through the acrylic until it reaches the back surface of the sheet. At this point, four percent of the remaining light is again reflected as the light passes from the acrylic back into the air. Thus, approximately four percent of the light is reflected from each surface.

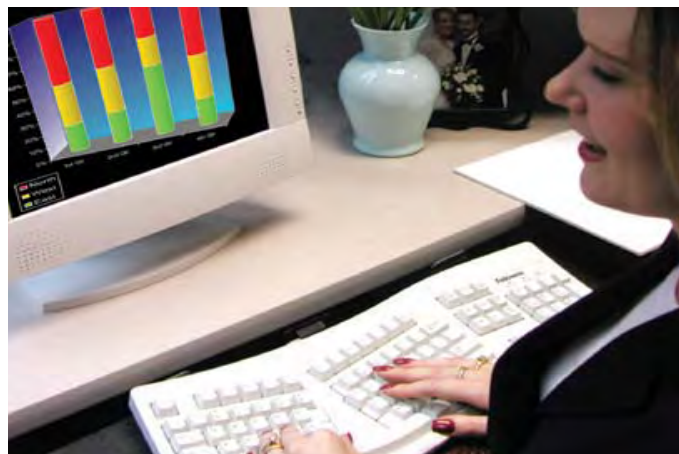
Think of light as consisting of waves having both crests and troughs. If the crests of one beam of light can be superimposed over the troughs of a second identical beam of light, the crests and troughs will cancel. This is the concept that is exploited with anti-reflection coatings.

Q: How does anti-reflective acrylic sheet work in applications where light conditions vary (e.g., products used outdoors)?

A: Anti-reflective coatings on acrylic will work in any lighting conditions. In addition, the option of diffusing and minimizing the reflection by incorporating a diffuse coating surface is available. Based upon the application requirements, there are a variety of acrylic solutions to optimize display performance.

Q: Can this material be used in medical displays and readouts?

A: As many displays in the healthcare environment incorporate LCD flat panels, the need to eliminate glare has become more prevalent. Anti-glare/anti-reflective coated acrylic sheet is the product of choice for such applications.



Q: Do certain electronic displays or wireless applications require anti-reflective technology more than others?

A: For automotive navigation and instrument clusters the need for excellent optical clarity and reduced glare is important enough to be considered a matter of safety. In general, however, any electronic display benefits from anti-reflective or anti-glare technology, depending on the incidence of light. For many applications—ranging from computer monitors, PDA's, to projection and LCD televisions, anti-reflective acrylic sheet offers an ideal solution to improve performance.

About the author

Grant LaFontaine, Director of Research and New Business Development for Sheet Products, Evonik Cyro LLC, directs all performance aspects and operations of technical service, new product development and new business development for Evonik Cyro's acrylic sheet products. LaFontaine also provides technical support for the company's Sheet manufacturing facilities, as well as supports internal/external customers for all Sheet products. LaFontaine holds an M.S. in Chemical Engineering from the University of Toronto.

For further details on our specialty acrylic products, please visit our website at www.cyro.com or www.acrylite-magic.com. Contact us for information regarding custom colors and sizes.

Evonik Cyro LLC
379 Interpace Parkway
Parsippany, NJ 07054 USA
Phone 1+ 800 631 5384 or 1+ 973 541 8000
www.cyro.com www.evonik.com

ACRYLITE® is a registered trademark of Evonik Cyro LLC, an Evonik Degussa group company.

