Acrylic Glazing
Towards Invisible Protection

By Jed Bark

Acrylic offers many more options than it once did, making it the right choice for many of today's framing needs

A demonstration sample from our shop showing a variety of glazing options. We use a copy of a Man Ray photograph to show a range of tones from black to white and how they appear with different kinds of glazing. Our customers find it very useful.

Decades ago, when I entered the field, framers had one option for glazing a frame—glass. For small frames, single weight glass was used. For larger frames, it was double weight glass. Like window glass, this picture glass blocked some short-wave UV but allowed UV from 340nm to 400nm to pass through. Today, there are many more options for glazing. The range of glazing possibilities has been discussed in some excellent articles in previous issues of PFM. Here, we will focus on acrylic glazing—on its virtues, its varieties, and its limitations.

Margaret Holben Ellis states in *The Care of Prints and Drawings,* "Conservators consider the primary function of framing to be protective." Picture frame glazing has only one function: protection, and the ideal glazing material would be invisible.

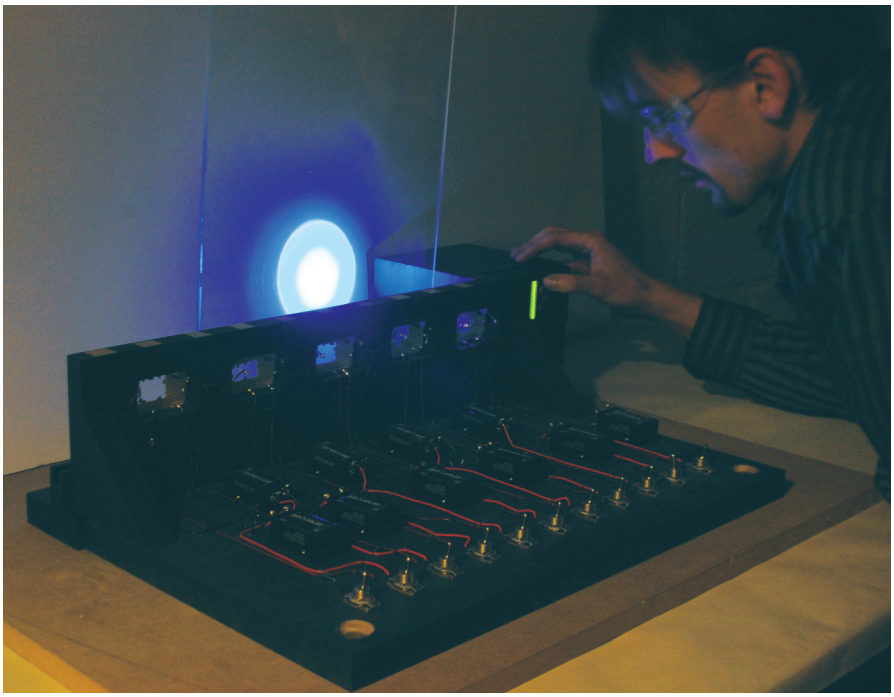
It goes without saying that the materials used in framing must not themselves put framed art at risk. Glass is brittle; acrylic is not. And for that reason, for framing works of significant value, we and our customers generally prefer acrylic. The impact resistance of acrylic is usually stated to be close to 20 times that of glass.

But there's more to it than that. When glass breaks, it shatters into sharp, pointed shards—a serious hazard for framed art. In most instances of shattered glass in frames, the artwork is damaged. In the past few decades, I have seen only a couple of sheets of broken acrylic glazing; these were simple, clean breaks and the artwork was undamaged. Heavy impact may break it, but it doesn't shatter. It's also lighter than glass and a better insulator.

The framer's job is not just to protect the art when it is on the wall, but also when it is in storage or in transit. With that in mind, the risk of broken glass (and the risk is greater the larger the frame) is the principal argument for acrylic glazing. Shippers often tape glass before packing frames, which may limit the damage from shattered glass but won't eliminate it. And there's a film known as GlassSkin, sold by Masterpak, which is an improvement over taping.

But acrylic glazing is much safer. Some of the properties of acrylic are not ideal, but for works that are valuable or large, it's usually the safer choice.

Another principal way that glazing protects works of art is blocking



Testing UV blocking acrylic sheet that had been in use for more than 25 years with our spectrophotometer.

ultraviolet radiation. It's safe to say that any work of art that is worth the cost of custom framing should be protected from UV. This band of ultraviolet radiation lies just at the edge of the visible light spectrum and is invisible to the human eye (but apparently visible to most animals). UV radiation is more energetic than visible light and thus more damaging to art. Ordinary glass blocks some UV of the shortest wavelengths. To block ultraviolet of longer wavelengths, acrylic can be specially treated with UV absorbing agents. The ideal is to filter out all UV radiation while admitting all the visible light—a neat trick that has proven difficult to attain. It turns out that glazing that completely blocks UV also blocks a small amount of visible violet, so the acrylic glazing has a slight yellow tint. For the glazing to be completely water-white, it must admit a bit of UV.

Acrylite OP3 is a UV-shielding acrylic that our shop has used for about 30 years. It absorbs virtually all ultraviolet light, and a small amount of the visible violet, so Acrylite OP3 has the slight yellow tint. Tru Vue has recently brought to market Conservation Clear acrylic, which blocks UV up to 380 nm. It is absolutely clear with no tint, but is somewhat less UV protective than Acrylite OP3 (both Conservation Clear acrylic and Acrylite OP3 meet the ISO 18902:2013 standard for UV protection.)

These products offer two excellent options: with Conservation Clear, slightly better clarity; with Acrylite OP3, slightly better UV blocking. In choosing which to use, the major considerations are the vulnerability of the artwork to UV radiation and the likely light source. A nineteenth-century photograph, for example, might be better framed with OP3, while Conservation Clear would be the preferred choice for a contemporary lithograph. In a sunlit room, perhaps OP3; in an interior space, perhaps Conservation Clear. There are no hard and fast rules. It's always good to remember that sunlight, even with the UV removed, can still seriously damage organic materials.

The urgent question has been raised for years whether or not UV-blocking acrylic ages over time, thereby losinges its UV blocking property. Some accelerated aging tests have demonstrated that this is unlikely, but such tests are not always reliable; there is no substitute for a real-time test. A few years ago at our company, we collected 11 sheets of UV-blocking acrylic from frames that we had made on average more than 25 years before. All these frames had been on display for that period of time. We built a spectrophotometer to test a range of UV wavelengths from 325nm to 395nm with an ELSEC UV meter from Art Preservation Services. The report concluded, "These 11 sheets of UF3, exposed on average for 27 years, have all retained their UV-blocking properties and would be safe to use today. Even the sheet that scored lowest in our test blocked almost 99 percent of UV energy by our measurements."

Acrylic Glazing Properties

Clarity: acrylic is clearer than glass, which has a slight green tint (though low iron glass is about as clear as acrylic).

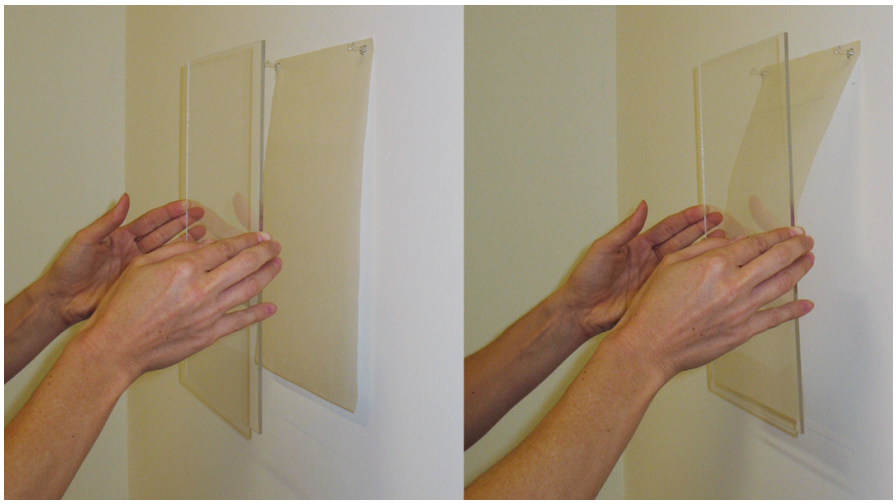
Hardness: The surface of an acrylic sheet is softer than glass. In practice, however, our business has only rarely had a framed work returned because the acrylic glazing had been scratched. Acrylic sheet can be purchased with a harder surface if greater abrasion resistance is required.

Expansion and contraction: Acrylic expands and contracts in response to changes in temperature

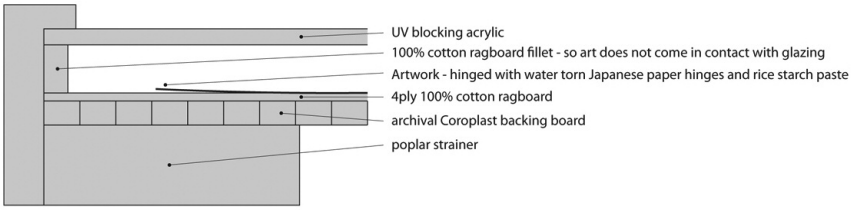
and to changes in humidity. For example, if the temperature increases 20°F, a 48" wide sheet of acrylic will expand almost 1/16". In an interior environment, this is rarely a problem. But sometimes, in transporting framed works, it can be an issue. I learned this years ago when delivering some frames that were about 6' long and glazed with acrylic. We had to stop, so we parked our truck in the shade. When we came back, the parking spot was in full sun, the acrylic had expanded. All three frames had popped their corners. This was an expensive lesson—acrylic's response to changes in temperature takes place quickly. Acrylic also expands and contracts in response to changes in relative humidity, but much more slowly, over a number of days. In general, the dimensional stability of acrylic will not be problematic in framing except for very large works and extreme conditions.

Bowing: Acrylic is flexible. Reflections may be distorted, and acrylic glazing may bow in towards the framed work or it may bow out in response to changes of temperature or humidity. Especially for large frames, sufficient space should be allowed between the work and the glazing to take this into account. Under normal conditions, bowing, like expansion and contraction, should not pose a problem.

Static charge: The surface of acrylic, like almost all plastics, typically is charged with static electricity, which can be somewhat dissipated by cleaning agents that coat the surface with detergent and allow the charge to drain off. But this is only temporary. This makes acrylic problematic when used with loose media such as charcoal or pastel and with Japanese papers or other thin or lightly sized sheets. There are acrylic sheets from Tru Vue that dissipate static electric charge immediately: Optium and StaticShield.



Effect of electrostatic charge: These photos show a sheet of acrylic attracting a piece of Japanese paper.



A typical frame cross section with a fillet made of cotton fiber museum board separating the acrylic glazing from the surface of the artwork.

Anti-reflective, anti-static acrylic: Tru Vue's Optium is coated to eliminate reflections. Such coatings have been applied to glass for years, and I remember asking an engineer who worked on that technology if there would ever be acrylic sheet with non-reflective coatings. He thought it very unlikely. Now, Tru Vue makes a sheet that achieves not only excellent control of reflections but also eliminates static charge. There are two varieties: Optium Acrylic and Optium Museum Acrylic. My shop prefers the latter for its UV blocking effectiveness.

Our experience has shown us that acrylic glazing can be an excellent choice for framing—especially for larger works and when a framed piece may be shipped or moved in and out of storage. In these circumstances, where the risks of shattered picture glass are highest, acrylic is likely the safest choice for custom framing. ■

Jed Bark started his framing career as an apprentice in the frame shop of H.J. Dengler in Palo Alto, CA. After graduating from Stanford University, Bark moved to New York, where he started Bark Frameworks in his SoHo loft in 1969. He soon focused on framing for preservation and on frame design for contemporary art. In recent decades, he has expanded to the study of artists' frames from Impressionism to the modern era. Bark is also a practicing artist—a number of his works were recently exhibited at the Whitney Museum.