Mastering Mounting

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PVA vs. EVA Wet Glue

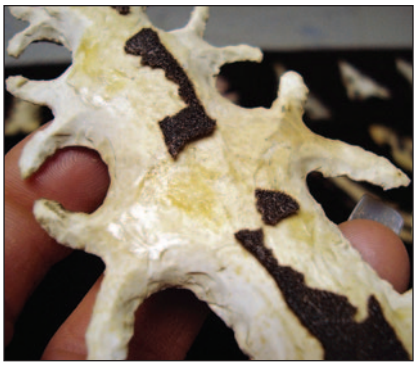
As part of a recent framing project, 32 arrowheads needed to be removed from a black velvet-lined shadowbox, cleaned, rearranged, and re-adhered to a new neutral-colored cream silk backing to match three previously completed boxes in a collection. The original gold leaf frame was cleaned, corners repaired, and acrylic glazing replaced with Museum Glass. Two adhesives had been used in the original mounting, which appeared to be hide glue and a PVA (polyvinyl acetate), more commonly called white glue.

Most of the removed arrowheads had pieces of rotten velvet still adhered to them, so they were soaked, hoping water would be an adequate solvent. A thin layer of yellow-brown adhesive—probably hide glue—had been used to mount several of the heads. This left a brittle film that was not water soluble, while the white glue did soften. A sharpened bamboo knife was used to scrap the remaining fabric from the back of the heads because its slightly pliable edge would not damage the stone. Once cleaned and dry, the arrowheads were realigned to form chevron lines and rearranged to better match similar carved shapes left and right. In the other shadowboxes in this series, hide glue had been used to mount trimmed pieces of color-matched felt to the back of each head, then each was mounted with same adhesive to a silk backing. For this project, since most of the

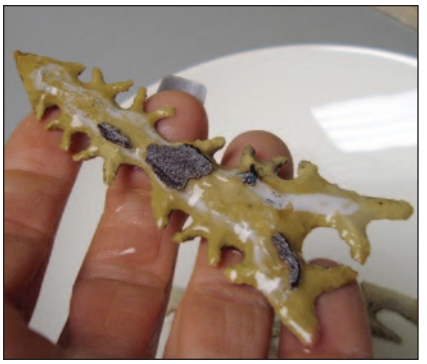
Not all white glues are the same. Some are for wood, others for fabrics, still others for paper. Some are reversible and some are not. Do your research and select the correct adhesive for the job.

The new layout used a cream silk backing to match three other shadowboxes in the framed set.

The original arrowhead layout was mounted on a black velvet background.



Thin, brittle hide glue had been used to coat the back of some heads.



Soaked black velvet fabric and white glue.

A bamboo knife was used to scrape the softened glue because it wouldn't damage the arrowhead.

arrowheads were mounted with white glue, a water-soluble PVA was initially chosen.

Removing the Hide Glue

Hide glue—as designated by its name—is made from animal products. It is perfect for cabinetmaking, furniture, and wood instruments; it does not creep; and it stands the test of time. It dates back over 4,000 years to Egyptians who used it on furniture for the pharaohs. Dry hide glue needs to be cooked to prepare, similar to starch paste, but Titebond® Liquid Hide Glue is available premixed and bottled. Unlike traditional hide glues, this is a one-step product that shares many of the characteristics of regular hide glue—a relatively long setting time and a non-creeping grip. It is designed for use with porous materials, but once opened it does not have a long shelf life.

Hide glue can be reactivated—softened—for removal with a combination of heat and moisture as long as the item is not harmed by either of those elements. Hide glue's dependable strength and durability made it a choice for making fine furniture for centuries. While it has been largely displaced in the furniture industry by PVA glues, it is still used today by guitar and violinmakers. One of its chief advantages over modern glues for instrument-making is the ability to unglue the joints of an instrument for repair, though its sensitivity to moisture can cause wood glued items stored in damp locations to begin to delaminate and fall apart.

For total hide glue removal, once an item has been removed from its backing it must be soaked in a small amount of 160°F water for two to four minutes, depending on thickness of the glue. After soaking, the soaked surface is immediately scrubbed with a stiff-bristle brush, then the loose glue is removed with a clean, damp rag. These steps should be repeated until the surface is free of glue. Any final traces of hide glue can be removed by wiping the surface with a clean rag soaked in vinegar. This was the process used to remove all the hide glue from the arrowheads in preparation for rebonding.

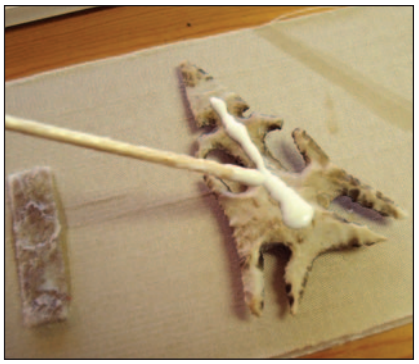
Testing PVA

To select the correct PVA, scraps of silk were wet/dry mounted to sample boards to replicate the silk and board used in the actual backing. This allowed assorted glues to be tested for strength and reversibility. Thermoplastic polymer adhesives can be reactivated by water, while thermosetting polymer adhesives are only removable by chemical solvents, rendering them non-reversible. Though many PVAs reactivate by the application of heat, they are permanent when dry. Lineco Neutral pH Adhesive is reversible but too thin for this project because it soaked through the felt.

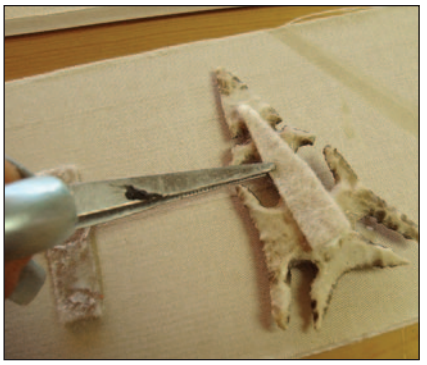
Polyvinyl Acetate (PVA)

It is critical to research products by type and manufacturer when choosing a wet adhesive for any specific project. There are thousands of different formulations of adhesives on the market, all of which have distinct properties with respect to viscosity, drying times, dry film characteristics, etc.

Basic PVA is probably the most common adhesive sold today. It has good wood-to-wood bonding and cleans up with water but requires the pressure of clamping until cured for maximum bond. It is designed to work on porous materials and is pH neutral, fast setting, and may remain flexible with age. It is a rubbery synthetic vinyl polymer adhesive component of a widely used type of liquid vinyl resin glue, referred to variously as wood glue, white glue, carpenter's glue, school glue, wet glue, or PVA



Jade R, an EVA glue, was applied to head. The soaked felt test strip is on the left.



After applying Jade R, the shaped felt was added.

The felt was trimmed so is wouldn't be seen from the front.

glue. These traditional wood glues will not adhere strongly or consistently to nonporous materials, such as metal or plastic, and they do not stick well to other glues, including hide glue. Conservation grade PVAs are often permanent when dry but can still absorb water if submerged or exposed to constant humidity.

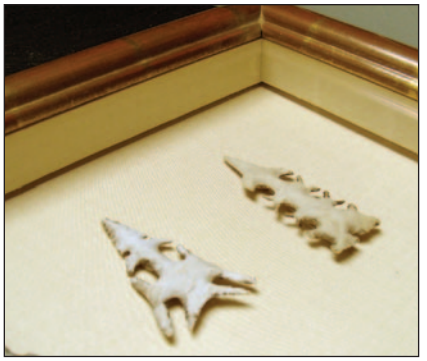
Common framing industry PVAs include wood glues such as Corner Weld, Maxim, Titebond, and Elmers Wood Glue, plus numerous other private label brands. These wood glues are very useful for exterior bonding of moulding corners as they are fast setting and clean up with water, but they are designed for use outside a sealed frame environment.

Heavier PVA adhesives—designed not to soak through or saturate sheer to heavy fabrics—include such as Frank's Fabric Adhesive, Framing Fabrics' Fabrimount, and Raphael's Miracle Muck. These are water soluble when wet, and they dry clear. They are inert once dry and therefore allowable in a frame enclosure for bonding fabrics to a substrate or wrapped mats. They are not, however, suitable for use with artwork.

One framing industry PVA that is allowable for use with paper art is lightweight Lineco Neutral pH Adhesive. It works for basic preservation applications but is too thin for fabrics or bonding objects. Another PVA, Jade 403, sets the standard for bookbinding as a general purpose, pH neutral, acid-free adhesive that is fast drying, water-soluble when wet, and permanent when dry. It is sought after for its strength, flexibility, and long-term stability as it won't yellow or become brittle over time. It is commonly used for book and box making, adhering paper to paper and cloth to wood or leather, filling in cracks in art canvases, and repairing ceramic objects. It holds firmly to plastic and can even be used on such uncommon materials as vellum (not that vellum documents should ever be glued down).

Ethylene Vinyl Acetate (EVA)

For this project, Preservation Editor Hugh Phibbs recommended using EVA rather than PVA glue. EVA stands for ethylene vinyl acetate. Both PVA and EVA are very broad classifications of adhesive. EVAs are copolymers of ethylene and vinyl acetate commonly made as water-reversible formulations. They maintain softness and flexibility, clarity and gloss, barrier properties, low-



Museum glass was fitted into the frame, and the frame was suspended over the backing to verify the depth and visual alignment prior to final fitting.

temperature toughness, and resistance to UV radiation. They are often used in packaging, textiles, and bookbinding and even for bonding nonporous surfaces like plastic films and metal surfaces.

Jade R is a reversible EVA that is an acid-free, archival adhesive that provides a very strong bond similar to Jade 403 but is water-reversible after it dries. Ideal for conservation work where reversibility is a concern, it is excellent for bonding paper, board, fabric, canvas, leather, and films to like surfaces. Evacon R is another conservation grade water-soluble, non-plasticized EVA used for fusing papers and boards, box and envelope making, and bookbinding. It is a mild-smelling white liquid with a pH of 7 to 8. This one was recommended by Hugh as the reversible wet glue solution for bond-

ing stone arrowheads to fabric. (EVAs like Jade R are available through Talas, Gaylord's, and University Products as well as other conservation materials suppliers.)

Another option would have been Beva Gel, which is a mixture of water-soluble EVA and acrylic resins, fairly thick in viscosity compared to Jade R. The Beva line was designed for relining and painting conservation, and it is an excellent adhesive that bonds to a wide range of surfaces. It also heat bonds at low 150° to 160°F temperatures when dry. Beva products are permanent thermosetting adhesives that require toluene, xylene, isopropyl alcohol, or ethanol as solvents.

Mounting Preparation

Though many glues were tested, Jade R was the perfect EVA solution for this project. It dried fast, held well while maintaining flexibility, did not soak through the felt, and proved to be reversible with water once dry. After applying Jade R, each stone arrowhead was fitted with a strip of polyester felt to serve as a shock absorber and as a buffer between the rigid covered substrate and the stone arrowhead. This also lifted each arrowhead slightly, allowing it to visually float above the backing. The shaped piece of felt was aligned and lightly pressed to saturate it, then the head was turned over to allow the weight of the stone to assist in providing light pressure during drying. After 24 hours the glued felt was trimmed to eliminate visibility from the front. All dried felts were again checked for bond strength by sheer and T-peel tests, then the pieces were placed into their new arrangement on the mounted silk backing board.

The alignment was then verified and measured for vertical and horizontal placement, and all heads were checked for balance with small pieces of felt glued to unbalanced or unsupported areas. Visual sightlines were checked to verify that no felt was distractingly visible, and the arrangement was fused into place with a bead line of Jade R. The glazing was cut and fitted into the frame with 3/16" silk-covered foamboard strips used as a glazing holder and spacer between the glass and the backing. (The backing in the photo has not yet been fitted flush to the bottom of the spacers, hence the 1/4" gap between backing and spacers.) All arrowheads are preservation-mounted with EVA, are water-reversible, and the refreshed project now matches the rest of the set.

The bottom line is that not all PVAs and EVAs are the same. Know what is required to do such a project right, including the porosity level of items being mounted and what glues may have held them in place before. Then do your research by selecting the correct adhesive for the job. ■

If you're interested in learning more about glues and many other mounting techniques, Chris will be teaching a number of courses at the National Conference in January.

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