A Non-damaging Upholstery System Applied to an 18th-century Easy Chair

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I. Background

The concept of non-damaging upholstery systems designed for historically or culturally important objects is not new. Since at least 1981 there have been public presentations concerning the need to preserve and study all aspects of upholstered objects. These treatments insure that the objects themselves retain the best preserved and largest amount of their original materials. It became obvious that the quality of first workmanship and preservation of original materials varied inversely with the quantity of reupholstering or reworking.

Early in the process The Philadelphia Museum of Art developed an alternative to the standard nailing involved in reupholstery. This concept also emerged at the Colonial Williamsburg Foundation where it was studied in depth and was implemented on several pieces of furniture. The Society for the Preservation of New England Antiquities (SPNEA) was an early experimenter with Ethafoam, an artificial loft material and they too developed alternatives to the standard reupholstering of historic objects.[3] Currently all of the institutions mentioned above, the MFA, Boston; The Connecticut Historical Society, The National Park Service and an ever increasing group of concerned curators and conservators are promoting, pioneering, and carrying out upholstery conservation treatments.

To a great degree the various treatments developed to preserve framework and fabric are viable because the status of the furniture has changed. It has ceased to carry out its original function such as increasing human comfort as in the case of seating furniture or beds. Instead it is used in an educational context for cultural understanding, visual delight, or as a technical information source. Because function changes so can approach. Many of the treatments developed, like the chair featured in this paper, are not functional with the degree of comfort originally intended or with the ability to stand up under this sort of use. Modifications of technique can, however, allow for use in many cases.

The treatments are often more time consuming than conventional reupholstering but the advantages are clear. Just as the numismatist understands the value of a coin in uncirculated condition, collectors and museum professionals are beginning to see how preserving all aspects of frame and fabric are important on upholstered objects. Many of us are all too familiar with weakened, pocked and patched underframes. These cobbled and cannibalized skeletons are sometimes virtually impossible to read in terms of original hail sites or preferentially oxidized areas which normally are our only definite clues to original form.

The Winterthur Museum is now actively involved in the research and implementation of upholstery conservation treatments. The museum has a large collection of upholstered objects that is under evaluation to allow the best use and greatest degree of preservation. The hairy paw foot easy chair featured in this article represents the type of research and treatment that is being applied to pieces of upholstered furniture in the Winterthur Collection.

The chair stood for years in the Blackwell Parlor until time, light and seasonal application of a tight fitting slipcover caused the fragile silk show cover to deteriorate. Since it appeared that the entire uphol-

stery structure was of 20th century materials the museum initially elected to remove the aged-over fabric and reupholster the chair with a new nailed on top cover.

While in the conservation labs for removal of the cover the staff wood anatomist sampled the timber used in the chair and carried out microscopic identification.[4] Surprisingly the secondary wood of the back frame proved to be bald cypress (Taxodium spp.) which is generally associated with furniture of southern origin. Observations compiled by staff and visiting scholars began to cast doubt on the regional attribution of Philadelphia.

The rear feet were exceedingly similar to those on an easy chair in the Metropolitan Museum which had recently been recatalogued as a Charleston, South Carolina chair. The basis for this change was the nearly identical frame construction and shaping of the rear feet on an easy chair in the collection of The Museum of Early Southern Decorative Arts (MESDA) in Winston-Salem, North Carolina.[6] The MESDA chair has a firm Charleston provenance and has bald cypress as one of the secondary woods. The Metropolitan easy chair also: has bald cypress as a secondary wood, so through a circuitous chain of evidence the Philadelphia attribution for Winterthur's chair began to erode.

The collective observations and continuing questions presented a strong case for removal of all of the 20th century upholstery from the chair frame so that a full study of any original material could be made. This was carried out and as is often the case there was not a stitch of original textile on the chair. However, many aspects of what the chair once must have been like did become clear.

The odd mortises cut into the interior faces of the front and back seat rails and suggestive line of staining on that same back rail all strongly indicated an early, if not original, fitment as a commode chair. X-Radiography of the front and rear feet revealed longitudinal holes, drilled by a spoon bit auger in the bottom of the feet. These recesses which had since been plugged most likely received the shanks of casters that were common on easy chairs in the 18th century. Most importantly, a striking similarity in frame structure became apparent between the Met easy chair and Winterthur's chair.

Another result of taking the chair down to the frame was the opportunity to study the nailing pattern of the original upholstery foundation. The patterns indicated that the square boxed edges of the wings that had been created by the 20th century upholstery were incorrect. Instead, a gradually sloping shape from the perimeter of the wing elements in toward the seating cavity of the chair was a more likely choice.

This concept is supported by the insubstantial number of original nail sites on the wing elements. Forming a tightly bolstered roll that makes up the foundation for a square boxed edge would have produced many more sites than actually exist. Also these cloth covered rolls which were traditionally filled with horsehair or marsh grass would not have been used next to the chamfer that is cut on the seating side of the wing elements. This type of beveling is associated with the other gradually sloping style just described.

Because of the continuing interest in specifics of the chair's frame and the fact that Winterthur's recent reattribution to Charleston has generated much discussion, a removable system of upholstery was desired. The system that was finally developed uses no nails and relates in various ways to earlier work

accomplished at Colonial Williamsburg, the SPNEA, and the Currier Gallery.[7]

II. Treatment

Several parameters were set up prior to developing the treatment. The system was to make no attachments into the framework of the chair, the upholstery should be readily removable and replaceable without breaking stitches or cutting seams. Artificial inert construction materials were to be used instead of the traditional horsehair stuffing and in order accommodate the Winterthur Museum's policy of rotating textiles seasonally, two separate show covers were required. By utilizing a substructure designed for the purpose each show cover could create the illusion of a firmly nailed on case. Above all the system was to allow for the greatest degree of study and the widest variety of interpretive display possibilities.

Drawing upon some of the techniques used at Colonial Williamsburg and the SPNEA[8] the treatment incorporated new ways of working with what have become standard materials and introduced new materials not before used in non-damaging systems.

The foundation materials that create the loft in the upholstered form are built from sculpted Ethafoam,[9] an expanded polyethylene foam board that is readily worked with a knife and file. In order to add visual softness to the forms, the Ethafoam was covered either with a 1/8" polyester felt[10] (one of the many varieties of Pellon) or with a combination of the Pellon and a 1" polyester upholstery batting.[11] Both covering materials were bonded to the Ethafoam forms using sheet BEVA,[12] a thermoplastic adhesive film.

The forms are designed to exploit the frame characteristic of the easy chair and key into various recesses. They are notched or blocked out to achieve this and in the vertical arm cone areas a cloth leader is attached to the trialing edge of the Ethafoam that surrounds this cone structure. The leader is wound onto the wooden cone from the outside edge of the wing element and then back upon itself with its attached Ethafoam form following and fully wrapping the cone. This Ethafoam wing form continues to pivot around into the chair interior and finally keys into the awaiting frame structure.

There are four main foundation structures. The right wing element, the left wing element, the back and finally the seat deck with its attached apron.

All of these units create some slight tension between each other at their junctures and this is an important quality that aids in the fitting of the show covers. The seat deck area is clear Lucite rather than plywood or a covered frame and this allows instantaneous visual access to many parts of the leg and rail joinery or a view of the commode fitment evidence simply by removing the seat cushion.

Because of the technique and the particular working characteristics of the materials, I will describe the actual methods used to construct two representative forms, the seat deck and the wing element.

The seat deck is made of 1/2" clear Lucite that is cut to fit on top of the seat rails. A Fome-Cor pattern was first made to fit the area with all of the appropriate notches to fit around structural elements. The Lucite was cut from this with great care taken so that the visible edge at the front of the seat was perfectly flush with the vertical face of the front rail. Onto the front edge of the Lucite, was attached an apron of 1/16" low density polyethylene sheet material.[13] This apron which is perpendicular to the seat area

tapped into pre-drilled holes. This structure serves two purposes to support the loose seat cushion and to create a tight wrinkle-free cloth covered face on the exposed face of the front seat rail.

The upholstered look on the Lucite unit was created by adding a pseudo upholstery roll at the front edge of the unit. The roll was shaped from Ethafoam using a Sur form rasp and attached with hot melt glue. The technique of gluing is adaptable to a variety; of applications and is more mechanical than adhesive in nature. Holes, 1/8", are drilled through the Lucite spaced 1" apart in the areas directly underneath the Ethafoam roll. Using the hot melt glue gun, liquified glue is flowed through the holes from the underside and allowed to melt its way into the underside of the Ethafoam roll. This technique creates a "glue rivet" and avoids the adhesion problem of attaching Ethafoam to Lucite.

The seat unit is completed by solvent welding a small strip of Lucite to the rear edge of the Lucite seat. This strip which projects approximately 1/2" down beyond the 1/2" thickness of the seat deck acts as a stop that limits forward movement of the seat unit. It also pulls the vertical polyethylene apron tightly against the face of the seat rail. The face of the apron is covered with the show fabric adhered with heat set BEVA sheet.

A final note on the construction of the Lucite unit deals with the attachment of the apron. Because there are two show covers, two separate Lucite units were made up. In the second one, rather than drilling and screwing the apron on, a channel was routed into the edge of the Lucite and a kerf bent strip of oak epoxied into the routed slot. The applied polyethylene apron was then stapled to the wooden area. In both seat units the heads of the staples or screws holding the apron were buffered with a swatch of self adhesive cotton tape. Pellon was then applied and finally the show fabric.

In considering how this seat unit acts as a cap on top of the seat rails, the question is raised as to how the front apron blends into the separate wing element units. This will be discussed in the section describing the preparation of the textile cases.

The wing element had several fitting requirements that made fabrication difficult. There was a loft difference in various locations on the wing unit. The loft had to pass successfully around the arm cone and appear tight yet be easily removable. The transition from the semi-rigid Ethafoam to the wooden edge of the wing element had to appear smooth and without a junction line transferring through the show cover. These problems were solved in a variety of ways.

The general contour of the wing was taken in paper and transferred to the Ethafoam board. Troughs were made simply by cutting to a fixed depth with a sharp shoemaker's knife blade, which is essentially all blade and no handle. By using your fingers as a depth stop the sides of the trench are defined and the waste cut out with a cranked neck chisel of the proper width. Added blocks of predetermined form were heat welded to the base structure for the raised areas.

When heat welding Ethafoam, which works very well and easily, the general rule of thumb seems to be if you are burning yourself, you have the proper technique. What this indicates is that rather than using a hot air gun[14] to heat the piece and then apply it to another, the pieces to be joined must be folded or rolled onto each other while heating the interface. This would be like closing a book while blowing hot

air into the open section of pages. Adequate ventilation is suggested and common sense required.

In order to create the profile of the Ethafoam form, a Surform file was used to sculpt and round the edges so that they approached the chamfered edge of the wing and crest rail element gracefully. Because in standard nailed upholstery this is the by-product of the spring of the stuffing material and the tension of the cloth cover, it makes some sense to study examples of the style you are imitating.

The area where the Ethafoam meets the chamfered wooden edge must appear homogeneous in the finished product. Pellon solved this problem. By attaching a layer of 1/8" Pellon with BEVA, the entire surface of the Ethafoam was softened, and by continuing the Pellon over the wooden edge of the wing element, a visually uninterrupted surface was displayed. The Pellon, of course, was not glued to the chamfered wooden edge of the wing but was sized with an acrylic solution so that it lapped the edge and held this profile even when the wing form was removed.

The sizing was accomplished by wrapping the chair's wooden wing elements with plastic, fitting the entire Ethafoam structure in place and brushing a 20% solution of Acryloid B-67 in petroleum benzine onto the overlapping perimeter edge of the Pellon. The acrylic was force-dried using a hot air gun, while at the same time, the damp Pellon was combed and pressed down with the free hand.

There was substantial discussion about how full the upholstery loft should be on the chair. A lean rendering of the upholstery was selected, but to accommodate a bit more fullness in the lower area of wings, a layer of 1" polyester upholstery batting was adhered with BEVA to the Pellon coated form. Since this loft was only needed in the lower area, the batting did not cover the entire wing form. It was faded into the overall shape by trimming it with electric barber's shears. The best technique to successfully feather the springy batting was to "slice" it with an arcing, sideways movement of the shears. This was much more successful than trying to plow directly ahead into the interlocked polyester.

Much of the fabrication of the Ethafoam was done on the bandsaw. This tool was very useful for cutting the long tapering swath of Ethafoam that surrounded the arm cone. The thickness of the Ethafoam as it approached the vertical arm cone was about 1/2", but this trailed out to zero as it wrapped around the wooden cone, and as previously described, was continued with a cloth leader applied with BEVA.

A wooden box, 12" high, was used to register the Ethafoam perfectly parallel to the bandsaw blade. The piece of Ethafoam being worked was held onto the side of the box with double-faced tape. Naturally, the height of cut of the bandsaw was greater than 12". By using the box as a fence and push stick all in one, the taper was cut to a line marked on the foam. This tapered piece was heat welded onto the larger body of the wing unit. In general, this was always the technique, to cut difficult sections separately and then weld them to the whole.

All three of the loft units were built up using the technique of addition. A large clothes iron was used to adhere the BEVA as well as a small tacking iron in some areas. A hot iron could collapse or glaze the Ethafoam, and this quality was taken advantage of in some areas. Experience led to a fairly aggressive handling of the materials during fabrication.

The fitting and construction of the textile cases was executed by the textile conservators here in the museum. The new look selected for the edge treatment of the wings (i.e. a sloping shape into the seating cavity rather than the boxed edge that was on the chair prior to treatment) was difficult to create without the advantage of nailing. Boxed edges are simply that, and are much easier to create. The sloping form sets up many more stress lines and they are difficult to control and work out. The covers were finally perfected after much cutting, basting, fitting and adjusting.

The general pattern was made using rice paper, which was thin and supple enough to conform to the Ethafoam inserts. The first case prepared was out of white muslin and was meant to go under the show covers, this gave a chance for a dry run before the show fabrics were cut.

The fabric cases enclose the Ethafoam and pull tight by either passing through abutments of various units as in the wing form and the back unit, or by using Velcro strips. The bottom edges of the wing cases overlap and close via Velcro on the underside of the side seat rails. The strategy in designing the closures is to create tension along the same lines that would be created by nailing. It is a great burden on the seamstress, however, to create cases that fit like a glove before any tension is created by Velcro or tuck-aways. Dora Shotzberger and Ruth Lee, the textile conservators who made the muslin and two show cases, did a superior job of tailoring the fabric to meet these requirements.

The outside corners of the cases at the back stiles of the chair join along their entire length with Velcro. A corded edge along these joints helps disguise the Velcro even though they are not historically correct. Zippers might also work well here, but the Velcro does give some measure of adjustment not to be had when using zippers.

The fixing of the show cover around the arm cone is accomplished by using a removable block of Ethafoam that plugs into a recess in the frame structure behind the arm cone. The fabric wraps around the cone, the block is placed on top and then pushed into the recess on the outside of the wing. The block is then covered by the outside of the show cover which pulls down and overlaps under the seat rails.

The union of the front rail apron and the side cases is made by simply tucking the apron terminations behind the cloth of the side cases. Decorative tape trims the edges of the cases and helps to disguise much of the case over- laps. In a few areas, straight pins with appropriately colored heads help hold problem areas down. The Ethafoam works well as a large pin cushion.

There are more details of construction that I will not cover here. Every situation is different and requires its own special solution. Keep in mind the lines of stress and tension involved in standard nailed upholstery and by using overlaps, tuck-aways and the compressibility of Ethafoam you can recreate these in the given treatment.

The Technical Library of the Conservation Section at the Winterthur Museum has a detailed videotape illustrating the disassembly of the easy chair upholstery system. This tape covers the actual mechanics of the process; it does not deal extensively with the techniques of working with the materials. This tape may be borrowed through the inter-library loan system.

III. Conclusion

The treatment applied to the easy chair fully meets the parameters established beforehand. There are some minor deficiencies in terms of duplicating exactly nailed upholstery, but this was expected from the outset. They are almost insignificant when weighed against the advantages of the system and for the purposes of the Winterthur Museum, the upholstery system works well.[15]

The chair frame is not polluted further by nail holes, it is not weakened and it is immediately available for study. The former option may prove important as more information surfaces concerning Charleston easy chairs. There are display potentials. Perhaps most important is the ability to rework our work if needed, due to new perceptions, worn fabric or even to accommodate changing tastes.

End Notes

[l]Tom Robinson addressed the Wooden Artifacts Group (WAG) of the American Institute for Conservation of Historic and Artistic Works (AIC) Annual Meeting 1981. A method of reupholstering a side chair using a greatly reduced number of nails was presented.

[2]Wallace Gusler, Leroy Graves, and Albert Skutans developed systems to create the illusion of nailed upholstery. These included copper shells covered with fabric for side chair seats and a removable show cover and upholstery foundation for an easy chair that was the work of Mr. Graves. These concepts were presented at WAG/AIC 1985 Annual Meeting by Gusler and Graves in "Alternative Methods of Upholstery."

[3]Robert Mussey's address to WAG/AIC Annual Meeting in 1984, "Upholstery System for Museum Seating Furniture Using No Nails" presents a case against using traditional stuffing and covering systems. Ethafoam, a semi rigid expanded polyethylene foam manufactured by Dow Chemical was used to sculpt forms imitating stuffed seats.

[4]Michael Palmer, the staff wood anatomist at the time, correctly identified the secondary wood of the back frame and wings as Bald Cypress.

[5]Metropolitan Museum of Art, accession #18.110.25 see "American Furniture in the Metropolitan Museum of Art," Random House 1985.

[6]MESDA accession #2788-2 see Journal of Early Southern Decorative Arts, May 1983; p. 10, 11, 17.

[7]see footnotes 2 & 3. The Currier Gallery with the help of Robert Trent and Andrew Passeri, preserved fragments of original foundation on an easy chair by adding pads of artificial loft, and a loose fitting slipcover. See "More on Easy Chairs." The Maine Antiques Digest, December, 1987, pp. 1-5B.

[8]Robert Mussey and the Society for the Preservation of New England Antiquities Furniture Conservation Facility have promoted the use of Ethafoam as an alternative upholstery loft material for years. This project was the author's first experience in utilizing it however. Leroy Graves, furniture and upholstery conservator at The Colonial Williamsburg Foundation (CWF), designed and executed a nail-less removable upholstery system for an easy chair while the author was a member of the CWF furniture conservation facility. The product is an excellent rendering of an easy chair with boxed edge wing elements. The

Winterthur easy chair system and the CWF system are as different as they are similar. The author would like to thank Mr. Graves for the opportunity to witness that a removable system of upholstery could be created for an easy chair.

[9]The Ethafoam used in this treatment was 220 Ethafoam, The Dow Chemical Company. My supplier was Zeitz Foam Corp., Camden, N.J. 08105, (609) 365-8111.

[10]The Pellon was style P15, grade A, Delaware Dry Goods, Wilmington, DE, (302) 731-0500.

[11]The polyester batting was in stock in the textile lab. One source for 1" polyester batting is E.R. Carpenter, P.O. Box 34526, Richmond, VA 23234, (804) 233-8391.

[12]BEVA 317 FILM, Adam Chemical Co., Inc., 18 Spring Hill Terrace, Spring Valley, N.Y. 10977.

[13]The polyethylene sheet is the low density or low molecular weight type, 1/16" or .060" thick. It is available from any plastic supply house. The sheet (4'x8') is preferable to roll goods because it has no memory of curl. Curl will relax in any case when using the low density variety.

[14]The gun was a 1000˚ F model and extreme care must be used, its discharge is very hot. Ethafoam is combustible and should not be exposed to open flame or ignition sources.

[15]The system development and construction is the work of Mark J. Anderson, Associate Furniture Conservator; Dora M. Shotzberger and Ruth Lee who are both Assistant Textile Conservators. Curatorial input was provided by Philip D. Zimmerman and Susan B. Swan.

The Winterthur Museum's easy chair #60.1058 before treatment. The chair was thought to be of Philadelphia origin but now is catalogued by the museum as originating in Charleston, South Carolina. The boxed edges of the wings were identified as an incorrect stylistic rendering based on information gained from the chair frame. (Photograph courtesy of the Henry Francis du Pont Winterthur Museum.)

The cotton toile cover. (Photograph courtesy of the Henry francis du Pont Winterthur Museum.)

The various components that make up the nail-less, removable upholstery system (three muslin and undercases identical in form to the suspended print cases in the photograph are not shown. There is also a set of show cases made in gold silk. (Photograph courtesy of the Henry Francis du Pont Winterthur Museum.)

A view of the Ethafoam, Pellon and polyester upholstery batting wing form. The Lucite seat deck is apparent, showing two of the four finger holes drilled through the seat deck area. These are used when removing the seat unit. (Photograph courtesy of the Henry Francis du Pont Winterthur Museum.)

One possibility for an interpretive display of the easy chair. (Photograph courtesy of the Henry Francis du Pont Winterthur Museum.)

Two silk covers. (Photograph courtesy of the Henry Francis du Pont Winterthur Museum.)