

# **New Applications of Non Damaging Upholstery**

by Mark Anderson

The concept of non-intrusive upholstery has developed significantly in the past year, more actual treatments have been carried out in 1988-89 than probably all those carried out in the years before. A definite core group of institutions<sup>1</sup> continue to design and implement these non destructive techniques of upholstery. In addition a varied and widely scattered audience of conservators, restorers, museums and collectors now seem to be entering the field. They have been both the committed and the curious, people who find merit in treatments that are not subtractive to the integrity of the object by virtue of more nails, more split wood, more repairs or replacements. They realize that preservation of original material, albeit non presentation surfaces, is the type of conservative treatment that allows the evidence of craft work or design intent to remain retrievable.

An underlying concern for all interested parties is how non intrusive upholstery treatments can be carried out effectively in terms of visual appearance or in some cases situations of actual use, and how they can be achieved practically in terms of time invested. I hope to illustrate in the following examples and suggested techniques how a range of non intrusive or at least less intrusive upholstery treatments can be carried out on a variety of furniture forms. The treatments are a result of Winterthur's endeavors to re-upholster its furniture objects in ways that will be non-nailed, that allow for future recovering, and permit the study of non presentation surfaces. We are not unique in the use or development of non intrusive techniques, many use similar techniques or variations of them. It is the purpose of this article to share our techniques and to comment on the feasibility for others to make use of them.

## **TREATMENTS**

### **1.) Side Chair - Philadelphia 1770 (W.M. 58.2290)**

Originally commissioned by John Cadwalader

## **PROPOSED TREATMENT**

Make a removable upholstered cap so details of the chair are visible for future comparison to other (6 known) chairs from set. (Some controversies exist as to whether the side rails once displayed additional carving.)

## **TREATMENT**

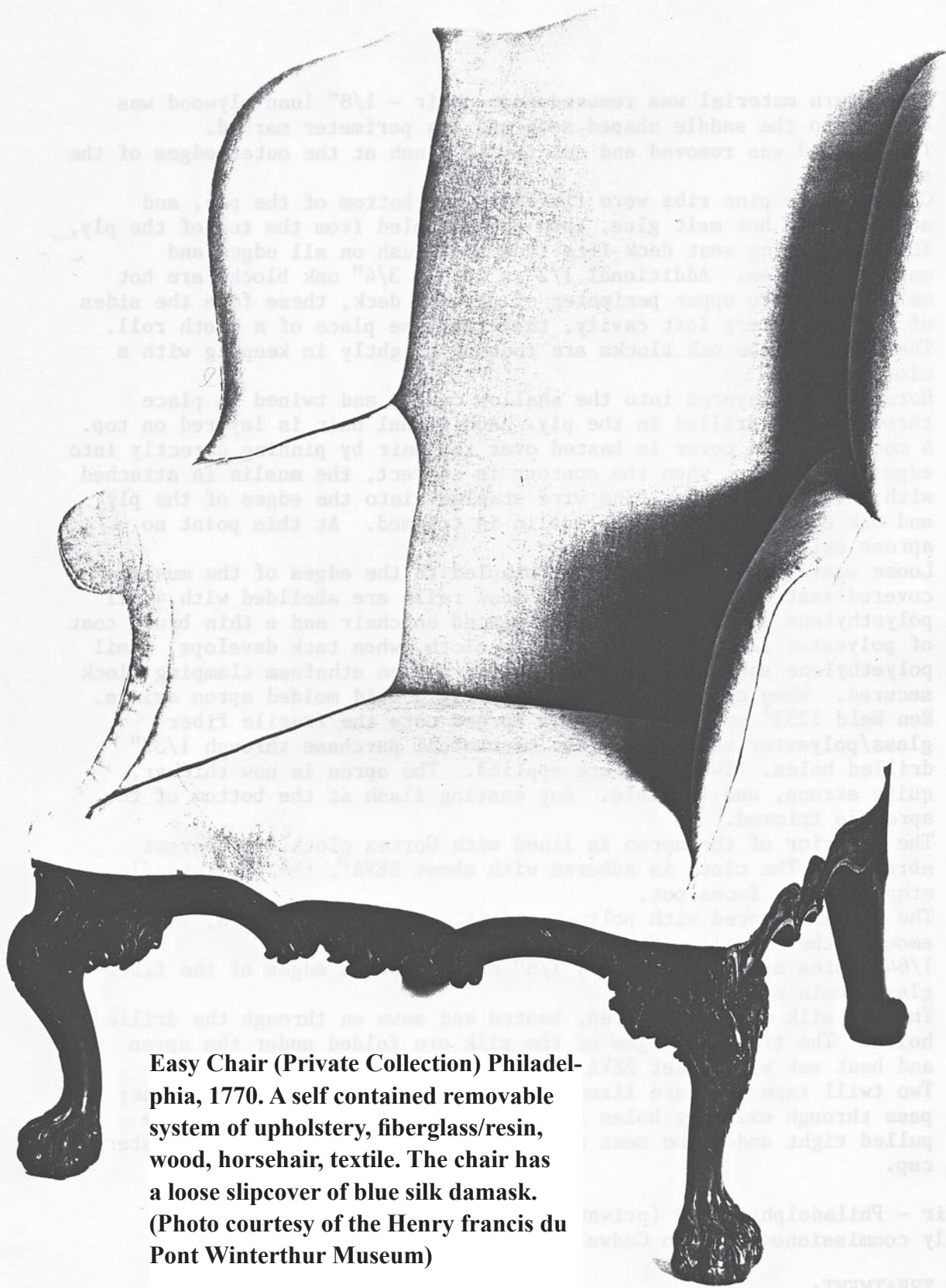
An earlier treatment of a side chair by the Colonial Williamsburg Foundation utilized a copper shell seat stuffed with curled hair. Copper was not chosen for this treatment due to the difficulties in working it and its rigid quality which would not allow the needed flexibility for the cap's apron to be spread open over the wider upper most portion of the seat structure.

In other words the side rails are not plumb but angle outwards at the top. When placing the cap on the chair the side aprons must be flexed open, the cap seated, and the aprons of the cap allowed to spring back snugly against the seat rail. Molded fiberglass worked well for this purpose. The upholstered cap was fabricated in this order:



Side chair (WM 58.2290), Philadelphia, 1770. Removable upholstery cap; fiberglass/resin, wood, horsehair, textile. Note pre-existing filled tack holes that constitutes an intrusive intervention. (Photo courtesy of the Henry Francis du Pont Winterthur Museum)

1. All modern material was removed from chair - 1/8" luan plywood was clamped to the saddle shaped seat and its perimeter marked.
2. The plywood was removed and cut to fit flush at the outer edges of the seat rails.
3. Curved white pine ribs were fitted to the bottom of the ply, and adhered with hot melt glue, then thru stapled from the top of the ply.
4. This conforming seat deck fits true and flush on all edges and mating surfaces. Additional 1/2" x 1/2" x 3/4" oak blocks are hot melt adhered to upper perimeter of plywood deck, these form the sides of the upholstery 10ft cavity, they take the place of a cloth roll. The edges of the oak blocks are rounded slightly in keeping with a cloth roll.
5. Horsehair is layered into the shallow cavity and twined in place through holes drilled in the ply. Additional hair is layered on top.
6. A cotton muslin cover is basted over the hair by pinning directly into edges of the ply, when the contour is correct, the muslin is attached with pneumatic driven, Fine wire staples<sup>2</sup> into the edges of the ply and oak edge blocks, excess muslin is trimmed. At this point no aprons exist on the ply deck.
7. Loose weave fiberglass cloth is stapled to the edges of the muslin covered seat deck. All original seat rails are shielded with 4 mil polyethylene sheet. The deck is placed on chair and a thin brush coat of polyester flowed onto fiberglass cloth, when tack develops, 4 mil polyethylene sheet is overlayed on top and an ethafoam clamping block secured. When cured a very thin but rigid cold molded apron exists.
8. Ren Weld 1253<sup>3</sup> carvable epoxy is spread onto the fragile fiber- glass/polyester apron, it makes mechanical purchase through 1/32" drilled holes. Two coats are applied. The apron is now thicker, quite strong, and flexible. Any casting flash at the bottom of the apron is trimmed.
9. The interior of the apron is lined with Gortex cloth<sup>4</sup> to prevent abrasion. The cloth is adhered with sheet BEVA<sup>5</sup>, the polytetrafloro-ethylene side faces out.
10. The cap is covered with polyester felt, heat set with BEVA, this smoothes the overall contour.
11. 1/64" holes are drilled every 1/8" around bottom edges of the fiber- glass/resin apron.
12. The top silk cover is fitted, basted and sewn on through the drilled holes. The trailing edges of the silk are folded under the apron and heat set with sheet BEVA.
13. Two twill tape ties are fixed to the inner edge of the apron, they pass through existing holes in the seat rail. These ties can be pulled tight under the seat and aid in a tight fit of the upholstery cap.



**Easy Chair (Private Collection) Philadelphia, 1770. A self contained removable system of upholstery, fiberglass/resin, wood, horsehair, textile. The chair has a loose slipcover of blue silk damask. (Photo courtesy of the Henry Francis du Pont Winterthur Museum)**

## **Easy Chair - Philadelphia 1770 (private collection)**

Originally commissioned by John Cadwalader

### **PROPOSED TREATMENT**

Upholster easy chair frame without nails in a way that allows complete removal of upholstery for further study and comparison to other known en suite furnishings. The chair was to be sittable.

### **TREATMENT**

The chair frame itself is comprised of six unit areas: the back, the seat, two upper and two lower wing areas. These were viewed as locations that would be suitable for individually stuffed units that would fit into each area.

A contemporary Philadelphia easy chair with original foundation upholstery was used as a model.

1. The seat was handled by inserting a slip seat frame constructed from 3/4" red oak, webbed with 2" linen webbing; sacking and a front edge roll were added. An apron on the front edge of the slip seat was formed from fiberglass cloth, polyester and epoxy. It conformed directly to the front apron profile (see Cadwalader Side Chair treatment). Because of documentary evidence and comparison to the model chair a tight seat was chosen without a cushion. The seat was lofted with horsehair, the top linen was basted and stapled into the oak slip seat. The front apron flap of linen was heat set with sheet BEVA. The seat unit could slip into the chair and rest on original frame members while the front apron fit tightly against the face of the front seat rail.

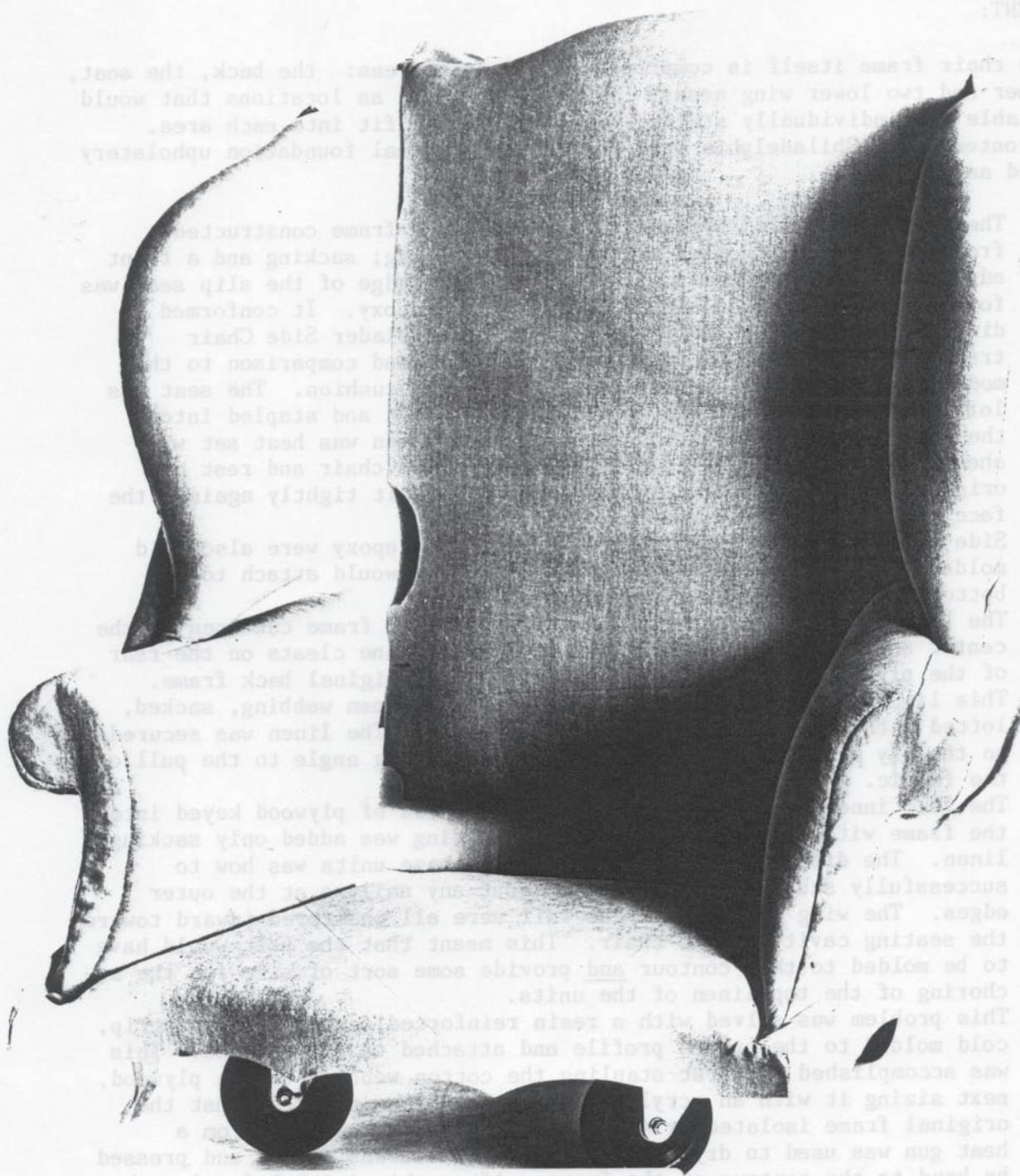
2. Side aprons of fiberglass/polyester/resin and epoxy were also cold molded to the side rails of the frame. These would attach to the bottoms of the outer wing covers.

3. The back unit was built on a 1/4" birch plywood frame cut open in the center and reinforced with 3/4" x 3/4" white pine cleats on the rear of the ply. They fit into the recess of the original back frame. This light open framework was webbed with 2" linen webbing, sacked, lofted with horsehair and covered with linen. The linen was secured to the ply with staples driven in at an opposing angle to the pull of the fabric.

4. The four inner wing units are also constructed of plywood keyed into the frame with added pine cleats. No webbing was added only sacking linen. The difficult aspect of creating these units was how to successfully stuff them in linen without any nailing at the outer edges. The wing edges and crest rail were all chamfered inward toward the seating cavity of the chair. This meant that the unit would have to be molded to this contour provide some sort of site for the anchoring of the top linen of the units.

This problem was solved with a resin reinforced cotton webbing strip, cold molded to the curved profile and attached to the plywood. This was accomplished by first stapling the cotton webbing to the plywood, next sizing it with an acrylic emulsion and forming it against the original frame isolated by 4 mil polyethylene. Low heat from a heat gun was used to dry the emulsion while it was formed and pressed by hand to the contour of the frame. After this initial forming the entire curved cloth surface was reinforced with Ren-Weld 1253 spread onto the cotton webbing and an armature of 19 ga. metal brads driven into the edges of the ply. The thick Ren-Weld edge was rasped to form a smooth curve.

This system worked well for several reasons. The cloth webbing formed a soft inner surface that fit over



**Upholstery for Easy Chair. Removable upholstery system supported on a temporary framework for the purpose of photography.**  
(Photo courtesy of the Henry Francis du Pont Winterthur Museum)

the curved wing element. Most importantly the top linen that covers the horsehair could be basted and sewn into the outer most edge of the cotton webbing (just visible under the layer of Ren Weld). A similar process was carried out for the lower wing arm units. This process allowed the fabrication of fully lofted, self-contained units.

5. The six basic units were sewn together at visible points where they touched. The out wings and out back are sewn onto the top inner units. Hinging only at visible junctures allowed the units to be folded inward on top of each other and the whole mass of them removed at once.

6. The molded fiberglass/resin side aprons which are necessary to create the illusion of half over-the-rail nailed upholstery on the side rails were attached to the outwings with heat set sheet BEVA. Etha-foam “keys” were glued to the rear of these side aprons and enabled them to fit snugly into the frame work. The junction of the outwings and outback were united with strips of cloth snap tape.

The finished easy chair is fully sittable and copies the profiles of a contemporary chair of similar form that has its original linen upholstery. The Cadwalader Easy Chair was completed with a rich blue silk damask loose cover detailed with fringe and silk tapes.

#### **Side Chair - Maryland c.1790 (W.M. 57.771.1)**

#### **PROPOSED TREATMENT**

Remove 20th century upholstery, analyze frame for evidence of original upholstery styles, decorative nailing etc.. Provide a non nailed removable upholstery treatment.

#### **TREATMENT**

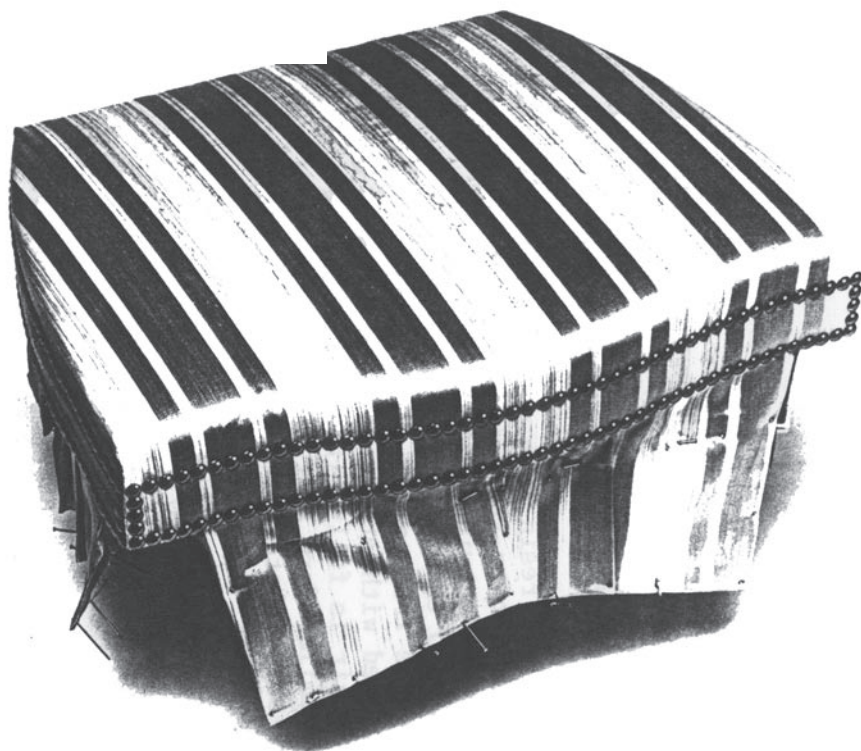
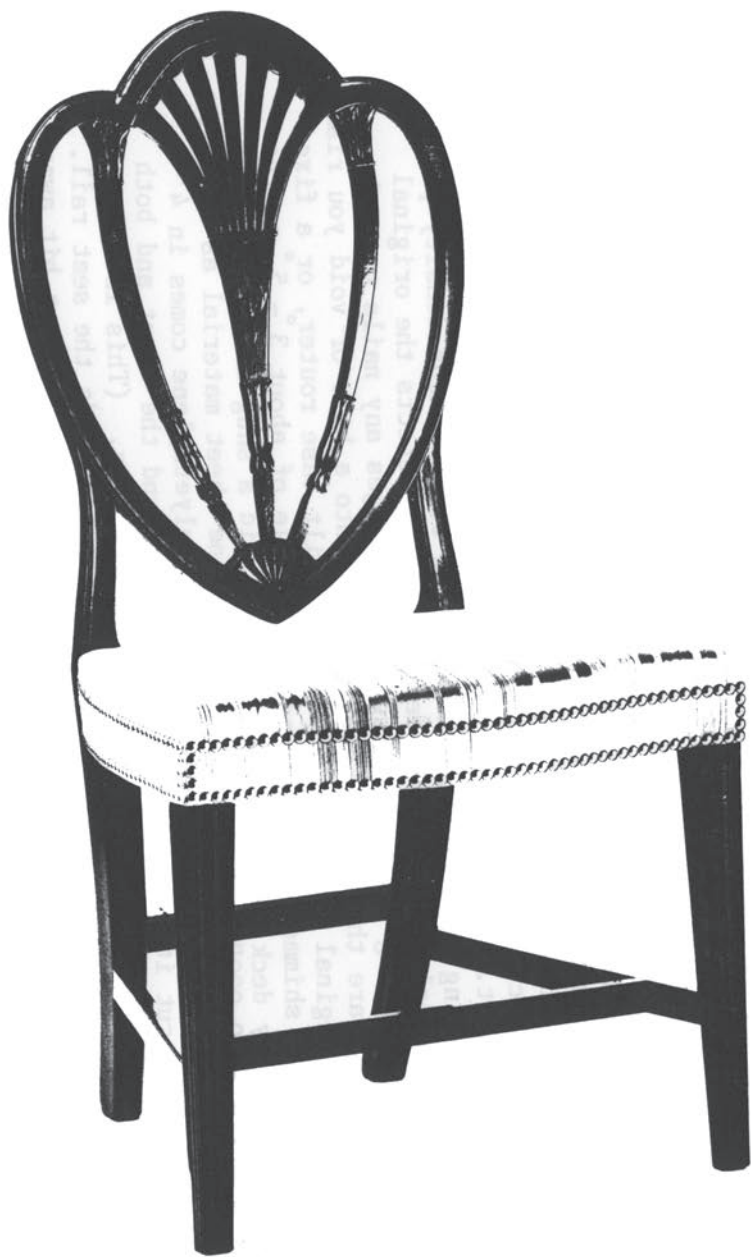
The work carried out on this chair is the result of many experiments in creating upholstered caps for side chairs. I believe it is a direct and effective method for full over the rail systems. It requires simple tools though stationary power tools can make the project easier.

Steps:

1. Remove all upholstery (chair was completely reupholstered c. 1960).
2. Rough cut 1/2” birch ply seat deck and clamp to seat rails. Mark outer perimeter, then cut to 1/16” of line.
3. Prepare to flush cut seat deck to chair rails with a ball bearing flush cutting router bit.

**IMPORTANT:** The bearing must ride on an isolating strip. High density polyethylene sheet material 0.030”<sup>6</sup> works very well; it protects the original surfaces from any marring by the bearing and it bridges any nails or tack holes. Please be aware that if the bearing dips into a hole or void you risk cutting into the original material. By using a tilt base router, or a fixed base router that is shimmed a slight under cut angle of about 3°- 5° on the edge of the 1/2” ply deck can be formed and will aid a snug fitting apron.

4. Cut a strip of 0.030” high density polyethylene sheet material as deep as the seat rail and ply-



Side Chair (WM 57.771.1), c.1790  
Maryland, removable upholstered  
shell, polyethylene sheet, rigid  
polyethylene foam, wood, textile.

wood deck plus 1". The polyethylene comes in 4' x 8' sheets so cut it long enough to fully surround the front and both side rails. Staple it onto the edge of the 1/2" ply. (This is where the bevel helps to direct the apron inward a bit towards the seat rail. Also the 0.030" thickness of the strip that held the flush cut bit away from the seat rail, gives just enough play to prevent binding when the cap is installed. Start stapling in the middle of the front rail use the 1" overage so that the strip will lay flat without buckling. Don't worry about irregular run out at the top of the deck or bottom of seat rail. When the corners are reached, lightly incise the perpendicular line that will be the corner, by folding the apron, crease the material along this incised line; the plastic will open but will not break or tear. Continue to staple back along the edge of the 1/2" seat deck.

5. The excess apron material can now be trimmed flush with the top of the deck and bottom of the seat rail. If desired the open angles at the incised corners can be "welded" with an ordinary electric soldering iron and thin strips of the apron material.

6. An Ethafoam<sup>7</sup> form is cut to imitate the upholstery 10ft. This is easiest if a full piece of appropriate thickness is glued to the plywood seat deck and flush trimmed to the apron edge. Next use the table saw and fence to cut kerfs of incremental depth that describe the falloff of the seat contour from the crown. About every inch is adequate, these register the depths and the Ethafoam can simply be trimmed to these registers with a knife. Final contour is made with a rasp; of course the entire form can be sculpted with a rasp but this takes much longer.

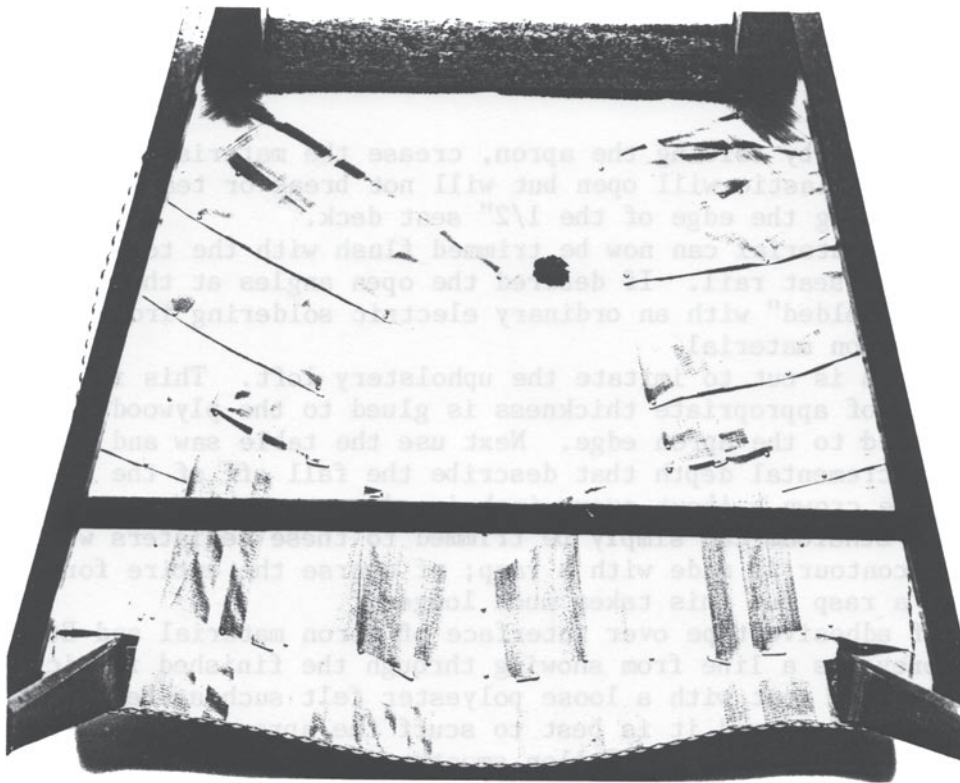
7. Run a strip of adhesive tape over interface of apron material and Etha-foam. This prevents a line from showing through the finished fabric.

8. Cover the apron and seat with a loose polyester felt such as Pellon.<sup>8</sup> Sheet. BEVA holds it in place and it is best to scuff the apron with coarse sand paper before heat setting. The Pellon smoothes out the surface and bridges any interfaces.

9. Cut a block of Ethafoam to fit up inside seat rails from the underside. This doesn't have to be too precise; it is going to act as a large pin cushion for the show cover.

10. Next cover the Pellon with another layer of sheet BEVA. Layover the show fabric, tailor the front corners and pull the long sides under the chair and baste pin into the ethafoam "pin cushion". Carefully heat set the BEVA so there is no bleed through. The cap can now be removed and replaced as often as desired, the fabric quickly develops a memory for the pinning folds and can be repinned in 5-10 minutes. If the cap needs to be recovered the show fabric can be heat released from the Pellon and a new cover installed.

11. The illustrated chair originally had decorative brass nailing as evidenced by the nailing pattern and embedded brass shanks found beneath the upholstery that was removed. To install reproduction brass nails simply push them through the polyethylene apron, clip off the shanks and grind smooth with a small flexible shaft grinding wheel. The grinding smoothes the shank but also turns a slight burr that melts into the apron. They are very secure. A band of adhesive linen tape over the shank ends guard against any possible abrasion.



Detail, Side Chair (WM 57.771.1).  
Underside of chair showing  
loosely inserted block of Etha-  
foam to which top cover is  
pinned.



Detail, Side Chair (WM 58.2290).  
Underside of upholstered shell.  
(Photo courtesy of the Henry  
Francis du Pont Winterthur  
Museum)

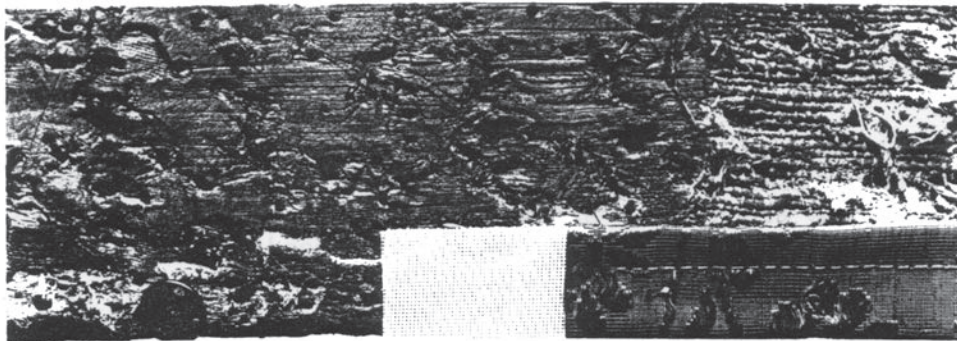
## **OTHER TECHNIQUES**

1.      Stitching strips - thin anchoring strips or fabrics can be made by machine sewing cloth onto a finely woven plastic mesh.<sup>9</sup> The mesh allows locating of existing holes in the frame by simply probing with a straight pin. Once an old tack hole is found, small (#1 or #2) flat head wood screws will secure the strip in place. Small upholstery tacks could also be driven into the existing holes.
2.      Snaps - standard male/female sewing snaps can easily be attached using existing holes in the framework. Punch a tiny hole through the inside of the female snap, a cut down straight pin will slide through the hole. The head of the pin nestles in the recess and allows the male snap to still make purchase. These snaps can be placed wherever needed on a frame.
3.      Auxiliary inset frames - new wood frameworks inserted into old frames are often used as nailing sites when a less reversible situation is desired. They will fit into backframe areas, side areas, etc. Don't spend too much time being precise since the frames are covered and are expendable. Hot melt the miter joints and staple.
4.      Metal reinforcements - metal angle iron has been used to strengthen thin plywood seat units so they can be webbed for sitting.

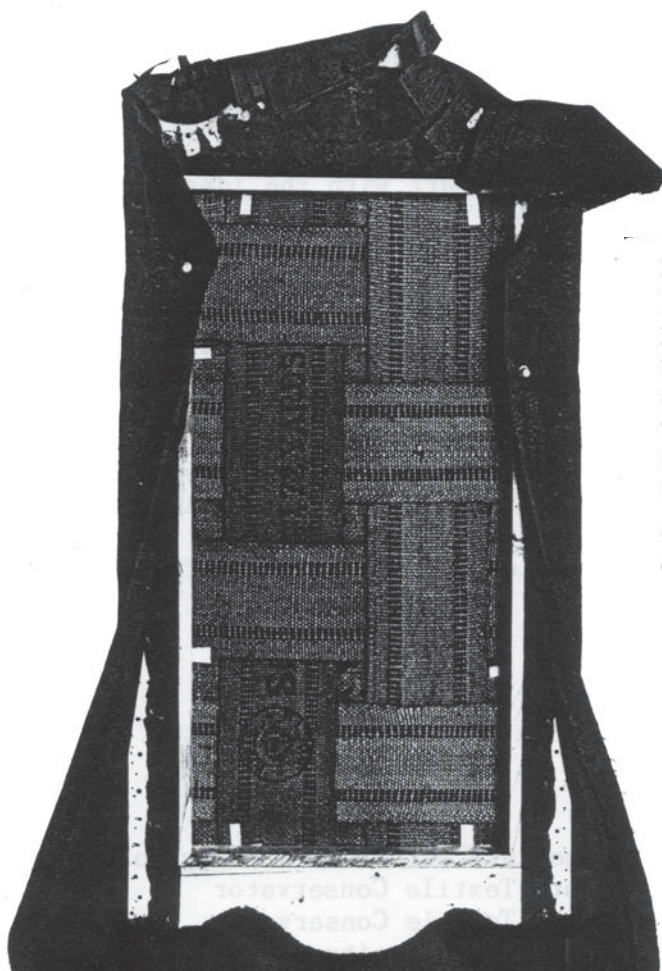
## **ADDITIONAL THOUGHTS**

In developing strategies for upholstery conservation hold original materials in the highest regard. Start with the premise that no original material will be removed or permanently changed, this includes nailing into original wood members. Use a variety of methods to achieve the above, drawing on conservation techniques currently available. Question yourself, do not rationalize, keep in mind those pristine examples that somehow survived with just on history of nailing, but be realistic given your parameters. Avoid the pitfall of saying that "Just one more set of nails won't hurt;" insight into this is available from museum files where objects have been upholstered every other decade as the staff changes. Again be realistic given finances, form and function; do not revert to commercial methods because it was not possible to treat the object without using some nails, a dozen nails are preferable to five hundred nails. If nailing surfaces of new wood have to be attached onto original wood, use small screws into existing tack holes. Not only will the frame be preserved in a structural way, but if desired, all can easily be returned to the condition before the treatment was carried out. In developing treatments for upholstered objects start with the idea that a non intrusive, reversible system can be developed.

The treatment of textiles themselves, separate from the framework that supports them, is an aspect of upholstery conservation that links the textile conservation speciality. Many of the treatments require the scientific approach of the textile conservator as well as the dexterity of the seamstress. Deteriorating fabrics may need to be lined before they can be safely displayed on an object. Original fabrics on foundations that have degraded form, color or integrity can often be covered with a suitable loose case selected from appropriate period examples. In a more aggressive way collapsed foundations could be fortified with added structural stitching, missing webbing could be replaced with new if it is added using methods of non intervention. In general these more aggressive steps should be taken in lieu of removal of original material.



Detail, stitching strip with #1 flat head wood screw. Also snap held in place by pin driven into existing tack hole. (Photo courtesy of the Henry Francis du Pont Winterthur Museum)



Detail, Side Chair (WM 58.569). Inserted wooden frame is held in place against existing 20th century upholstery foundation by slip tabs (0.030" polyethylene) that slide through yoke on new frame and lodge between old frame and webbing. (Photo courtesy of the Henry Francis du Pont Winterthur Museum)

Mark Anderson	Associate Furniture Conservator
Ruth Lee	Asst. Textile Conservator
Dora Sholtzberger	Asst. Textile Conservator
Robert Trent	Curator of Furniture

The above were the primary parties involved, to varying degrees, in the illustrated treatments.

## END NOTES

1.
  - a. The Colonial Williamsburg Foundation
  - b. Conservation Analytical Laboratory
  - c. The Metropolitan Museum of Art
  - d. Museum of Fine Arts, Boston
  - e. The National Park Service, Harpers Ferry
  - f. The Pennsylvania Museum of Art
  - g. Society for the Preservation of New England Antiquities
  - h. The Winterthur Museum
2. # 7 Fine Wire Staples 30ga. x 3/8" crown available in stainless steel from Quaker Jobbing, Philadelphia, PA 215-739-9233. They also carry upholstery supplies including a large selection of needles and regulators.
3. Ciba-Geigy product available from Plastic Tooling Specialties Inc., Exton, Pennsylvania.
4. The material used was a thin polyester faced with polytetrafluoroethylene.  
W. L. Gore and Associates  
555 Papermill Road  
Wilmington, DE  
302-738-4880
5. BEVA 371 Film, Adam Chemical Co., Inc., 18 Spring Hill Terrace, Spring Valley, N.Y. 10977.
6. The polyethylene sheet is the high density or high molecular weight type, 0.030" thick. It is available from any plastic supply house. The sheet (4' x 8') is preferable to roll goods because it has no memory of curl.
7. The ethafoam used in this treatment was 220 Ethafoam, The Dow Chemical Co. My supplier was Zeitz Foam Corp., Camden, N.J. 08105, 609-365-8111.
8. The Pellon was style P15, grade A, Delaware Dry Goods, Wilmington, DE, 302-731-0500.
9. Plastic mesh and netting is available from most large distributors; one of them is:  
Internet Inc.  
2730 Nevada Ave. N.  
Minneapolis, MN 55427  
612-541-9690