



Figure 1. Tryon Palace.



Kelly Culpepper

Figure 2. Coat-of-arms original to the building just prior to 1993 restoration

THE REPRODUCTION OF THE ROYAL COAT-OF-ARMS OF KING GEORGE III OF ENGLAND

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Introduction

THE TRYON PALACE WAS ORIGINALLY built between 1767-70 in New Bern, North Carolina as the Seat of Government for the colony and the residence of Royal Governor William Tryon. It was described by contemporaries as “the most beautiful building in America.” The Georgian style structure was designed by architect John Hawks, who came from England along with Tryon, and was the first professional architect to take up residence in America. (*fig. 1*)

Royal Governor Josiah Martin, Tryon’s successor, lived in the Palace until he fled New Bern in 1775. On January 16, 1777 the first officials of the independent state of North Carolina were inaugurated in the Palace. The state general assembly met there until 1794, the same year the capitol was moved to Raleigh. On the night of February 27, 1798 the Palace was destroyed by fire. What was left of the main building was torn down and in 1799 the property was divided into lots and sold. (*Henry, 1960*)

One hundred thirty years later efforts were begun to generate support to reconstruct the palace. The original plans were located in England and an extensive archeological dig unearthed the original foundations. Reconstruction of the building was started in 1950, the large coat-of-arms of King George III was placed on the north pediment of the building in 1957, and the doors were opened to the public in 1959.

Fabrication of the coat-of-arms was supervised in England by Sir John Heaton-Armstrong, of the College of Arms in London, and carved by E. and A. Bradford of New Gate. The substrate is mahogany with a gilt and polychrome surface (*fig. 2*). It measures 9' wide x 5 1/2' tall x 11" deep and weighs approximately 400 lbs. The coat-of-arms was removed from the front of the palace in February of 1993 for treatment, only the second time in 36 years.

Condition, Construction and Initial Treatment

When considering treatment options, we looked at treatment strategy and treatment limitations in terms of the objects function and the stresses that this function placed on the object. In this case we were faced with the continued poor performance of a wooden substrate with inherent vices in an exterior environment. With no control over this environment and with an understanding of the practical limitations of the treatment and available materials, we felt the coat-of-arms would have to be retreated every 10-15 years. With this in mind, we began to investigate the cost of making a reproduction while continuing with a treatment strategy based on placing the original back on the building.

The condition of the coat-of-arms in February of 1993 included large cracks at almost every joint in its laminated construction, the polychrome surface was at an advanced stage of flaking and was powdery in many areas, and there were losses in the substrate-the largest being about the size of a brick.

The mounting system of the original played a very big role in causing the extensive cracking of the substrate. This system is made up of eleven bronze bars of various lengths placed at right angles to the joints and grain of the wood, with numerous screws attaching the bars across the back. (*fig. 3*)

The right and left outer extremities were backed with plywood, as part of the original construction, to make them less susceptible to damage while handling. The cross-grain construction combined with exposure to changing weather had caused compression shrinkage of the wood, resulting in the cracks at all the joints and several losses.

The previous treatment in 1976 had included reduction of the flaking paint with a solvent

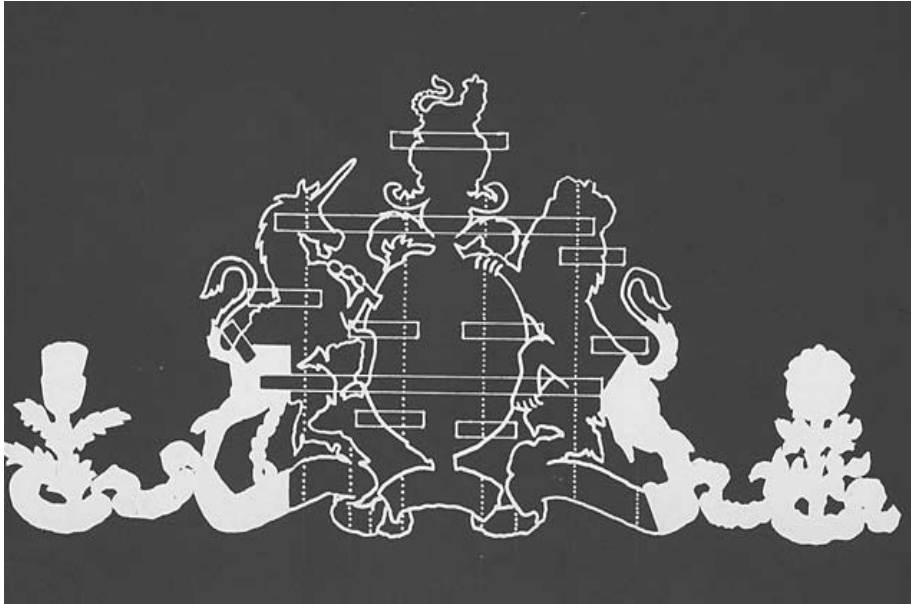


Fig. 3 Diagram of coat-of-arms showing bronze mounting bars (horizontal rectangles), plywood backing (solid white areas), and joints in wood (vertical dotted lines).

based paint remover and scraping, filling all the cracks with an epoxy, repainting the polychrome areas with an oil based exterior house paint, and regilding the lion (Thomas 1976). A number of elements which had fallen off the coat-of-arms over a period of time also were reattached.

By the time the coat-of-arms was removed from the building in February of 1993, all the joints that were consolidated with epoxy in 1976 were beginning to fail. Within two weeks after the object was brought into the conservation lab the cracks began to open up even more. A polyethylene tent was built over the object large enough to accommodate two people working inside, along with an ultrasonic humidifier and a hygrothermograph. This allowed us to create a working environment close to 50% relative humidity, rather than the 20–30% normally found in the conservation lab in February, in order to prevent the cracks from opening up any further.

After equilibrating in the tent for a month and a half, we began to consolidate the joints. Conserv 100, a wood consolidant, was introduced into all the joints. This was followed by Conserv 200, a flexible epoxy with an optional thixotrope. The first several applications of the epoxy were ap-

plied as a liquid to maximize penetration. Thixotrope was added for the final application in order to match the profile of the carvings. The flexible epoxy should allow the wood at the joints to expand slightly without causing irreversible cellular compression, which had caused the cracks to form in the past.

By July of 1993, the Tryon Palace Commission approved a budget for making a reproduction. Architectural Conservation Inc. of Malden Bridge, New York

was chosen as the contractor because of their familiarity with casting large architectural elements and their low bid. Before shipping the coat-of-arms, the surface was prepared for casting by reducing the flaking and powdery areas using an air abrasive gun.

As part of the crating system, three 4' x 8' sheets of plywood were joined together and bolted to the back of the coat-of-arms using the original bronze mounting bars. This backboard allowed the object to be handled without the risk of breaking the delicate ribbon and flower elements. The backboard was then laid flat on top of Ethafoam blocks, which acted as shock absorbers, in a larger open crate. Bolts between the backboard and the crate were introduced as insurance, and were left slightly loose to allow a small amount of up and down movement of the coat-of-arms in the crate during shipping.

The moldmaking, casting and finishing of the reproduction, as well as the surface restoration of the original coat-of-arms, were carried out in the workshop of Architectural Conservation Inc. The information contained in the following section was taken from telephone conversations with Phil Holbrook of Architectural Conservation Inc. and from information gathered during a trip to New York to pickup the original and the reproduction coat-of arms.

Moldmaking and Casting the Reproduction

The surface of the coat-of-arms was further prepared for moldmaking by very light scraping and sanding. Plasticine was used to fill the gaps between the plywood backboard and the coat-of-arms to keep the moldmaking material from flowing behind the object. Two parting agents were applied to the surface of the object and plywood. First a polyvinyl acetate mold release was brushed on followed by a thin paraffin lubricant, which was sprayed on.

A three-part urethane rubber was used as the mold material, consisting of resin, catalyst and thixotrope. The first layer consisted of only resin and catalyst and was flowed on with a brush. Subsequent layers, where thixotrope was added to increase the viscosity, required a spatula for application. Once the object was completely covered by a layer of cured urethane rubber, parting agents were applied to the complete surface of the outside of the mold.

Upholstery foam was cut to closely fit into the voids and undercuts, some of which were fairly large. Urethane rubber was poured into these same areas to surround and coat the foam. The amount of thixotrope in the mold material was increased and this thicker material applied with a spatula into the larger gaps. These chunks of foam and rubber would later be separated from the mold in order to facilitate its removal from the wood substrate. In preparation of the mold for casting work, they would help hold the various elements of the mold in their proper positions. Marking the exact location of these pieces was critical for reconstructing the mold, otherwise it would have been difficult to distinguish one from the other.

Once these areas had cured parting agents were again applied to the outside surface of the complete mold. A fiberglass shell, or “mother mold”, was then cast on top of the complete rubber mold. The mother mold consisted of a typical fiberglass lay-up schedule (Gougeon Brothers 1994). Both the mother mold and the chunks of foam/rubber were very critical to the proper alignment of the mold for the casting work, especially due to the soft flexible nature of the urethane rubber mold

material. These characteristics also made it easier to remove the mold from the complex surface of the coat-of-arms.

The rigid and tightly fitting fiberglass shell had to be carefully cut into several sections to be removed. When reconstructing the shell fiberglass tabs were used to hold the sections together. The 1/8" saw kerf had to be maintained between all sections in order to preserve the proper size of the shell.

The reconstruction of the mold began with laying out a very large sand pit in order to support the odd shape of the fiberglass shell. The foam/urethane rubber pieces were then situated on the fiberglass shell in their appropriate locations. Some of these pieces were worked into the large rubber mold first and then the large rubber mold laid on top of the fiberglass shell. (fig. 4)

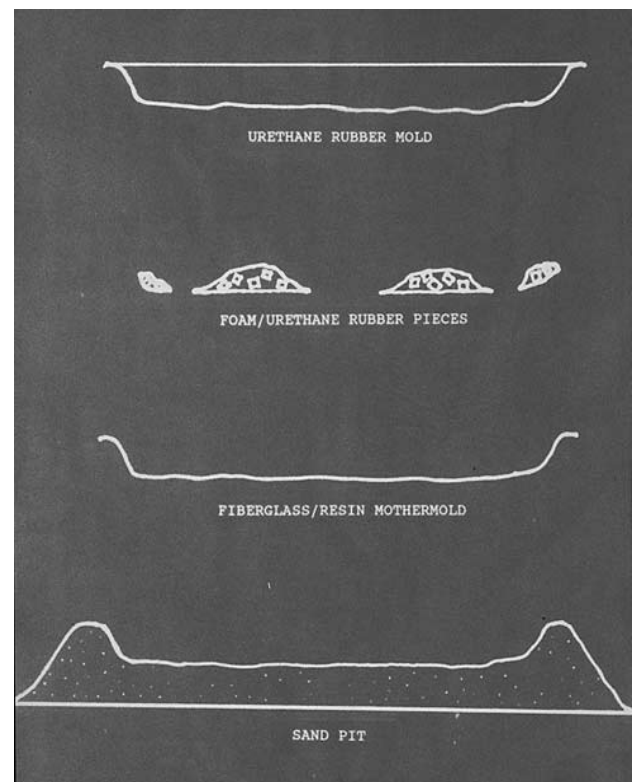


Fig. 4 Diagram of mold layout for casting reproduction.

The first step in the casting process was the application of a white polyester gel coat which was brushed on the inside of the mold. The thin gel coat was a good first layer to pick up details and the pigment acted as a UV block (*Gougeon Brothers 1994*). For the deep details, milled glass fiber approximately 1/8" in length, alumina, slate flower and Cabosil were added to the polyester resin. The alumina and slate flower help reduce shrinkage (*Holbrook 1994*) as well as assist the cabosil in bulking up the resin. The chopped up glass fiber gives the cured resin strength, especially for the finer details.

The following types of fiberglass fabric were used: surface veil, a fine woven material which holds corners and details well, and helps eliminate print through; chop strand mat, consisting of randomly oriented short fibers held together with a binder; and mat, made up of randomly distributed felt held together with a binder. These were applied in 5 to 6 layers between applications of polyester resin to build up the body of the reproduction. This type of construction is very common in architectural restoration for replicating damaged or missing elements, and is identical to that used for fiberglass boats.

Once the material had cured, the casting was removed from the mold. There were bubbles in the surface and the long narrow horn of the unicorn was bent. The horn was cut from the casting,

glued back on in the proper position and then the surface repaired with polyester resin.

After repairing minor casting defects with polyester resin, the surface was sanded with 200 grit sandpaper, cleaned with acetone and wiped with a tacking cloth. Linear polyurethane colors were brushed in the surface. In place of gold leaf, a primer coat of bright yellow polyurethane was brushed on followed by bronze and mica powders mixed in clear polyurethane.

Final Placement and the Issues Involved

The bronze mounting bars were left on the original coat-of-arms, with their holes plugged, and cast in place. These same elements were used as the mounts for the glass reinforced polyester coat-of-arms. For the installation, the reproduction was held in place on the front of the building, the location of the mounting holes marked, and new holes drilled through the fiberglass elements.

The use of scaffolding for working out the mounting system was critical. Two people manipulated the object while another did the marking and the drilling. It took many dry runs to get all the holes marked, drilled and the mounts attached. Rubber washers were placed on either side of the fiberglass on each mount and large washers were used to spread the pressure of the mounting bolt over a larger area of the fiberglass.

The physical difference between the original and the reproduction was probably most evident when trying to match up the 11 mounts to the original holes in the building. A few of them did not line up and were not fully load bearing (*fig. 6*). Fortunately, because of the lighter weight of the reproduction, a fewer number of mounts were required.

Aesthetics

The primary function of the coat-of-arms is to provide an image on the front of the building. The quality of the reproduction successfully duplicates the



Figure 5. Glass reinforced polyester reproduction.



Figure 6. Closeup of a mount on reproduction which did not properly line up.

image of the original in terms of shape, color, texture and finish. Although, one visual trade-off was the use of a mica and bronze powder coating in place of the oil gilded surface. The new coating is one that can now be easily maintained by the painters on staff.

There was also a certain margin of error acceptable in the casting of the reproduction since the object's location is 50 feet off the ground, and the typical viewing distance actually much greater than this. There are a few areas on the reproduction which display a slight plastic deformation up close, but these areas are not visible from the ground.

Preservation/Authenticity

Should we have removed the original from the building and replaced it with a reproduction? In trying to answer this question, I think it is important to consider the value that the object has to the local community.

On the one hand, the coat-of-arms is significant enough to preserve because of its technical and artistic qualities. On the other, because it is part of a reconstructed building and relatively young, the community has been more tolerant of the original being replaced with a reproduction. As the

building ages and becomes more important on its own merit, future generations will respond to this issue differently.

The coat-of-arms that was original to the reconstruction is now displayed in a prominent place in the visitors center. Even though we have separated the object from its original location we have not altered the nature of the original, it is accessible to any visitor (fig. 7), it is protected from the harsher outdoor environment, and the option remains to return the 1957 coat-of-arms to the front of the building.

Another question we had to ask ourselves was should preservation resources be applied to a 37 year old building? Certainly the people of New Bern would think so. The reconstruction effort has already taken on a historical significance of its own in terms of the people who were involved and the impact it has had on the town of New Bern. It took a tremendous effort to convince the state legislature to purchase the property, raise the money to build and furnish the Tryon Palace, and to track down surviving documentation of the building and its inhabitants.



Figure 7. Original coat-of-arms in its new location.

Stability/Durability

It was important to consider the inherent problems with the construction and materials of the original, and how much longer they would last in an exterior environment. The location of the coat-of-arms and its great weight discouraged cyclical maintenance and caused it to be neglected until it was in very poor condition—literally falling apart. Our goal was to produce a copy lighter in weight in order to facilitate periodic maintenance which could be carried out by the Tryon Palace staff.

Not only did we want to slow down the deterioration of the original, but it was important to produce a cost effective substitute that was durable. The performance characteristics of the fiber reinforced polyester substrate should be better than the mahogany substrate if protected from its most damaging elements, mainly exposure to UV and water (*Abeyasinghe et al. 1982; Gougeon Brothers 1994*). Fortunately, the coat-of-arms is on the north pediment of the building and protected from direct sunlight and driving wind and rain.

Economics

The cost of removal or reinstallation of the coat-of-arms is \$5000 each time the scaffolding is set-up. Due to the length of time required to carry out the treatment, during this time the scaffolding cannot remain in place, therefore doubling this figure each time the coat-of-arms is worked on. The light weight of the reproduction will allow a less expensive method of removal/reinstallation to be utilized. This should substantially lower the cost. The time between required restorations should be greater for the reproduction and it will be less expensive to repair.

Resources

It is a reality that in New Bern, a coastal community, the boat building trade is much more prevalent than the carving and gilding crafts. It is much easier to find a boat yard to repair blisters in your gelcoat than to find an accomplished gilder or carver. The fiber reinforced

polyester technology is very familiar to the local community and to the maintenance staff of the Tryon Palace.

Safety

The nature of the construction of the coat-of-arms and the fact that its removal from the building was difficult and expensive, and was therefore only done when it had reached an advanced state of deterioration, had caused several losses in the past. Although relatively small, these pieces were large enough to possibly injure someone walking underneath, which is the front entrance to the building. This should not be an issue with the reproduction. Because the reproduction is lighter it will be easier to handle in subsequent de-installations and will be less susceptible to damage by handling.

Tourism

The image of the coat-of-arms serves as a focal point for the Tryon Palace Historic Sites and Gardens. It is used extensively in national and regional advertising because of its high visual impact and significance. For this reason it is important that the image be kept on the building and in presentable condition. Both the 1979 and the 1993 restorations kept the coat-of-arms off the building for a significant amount of time. The reproduction should maintain a better appearance for a greater length of time, lengthen the time between required restorations, and will not be as time consuming to repair as the wooden coat-of-arms.

In the end, the decision whether or not to replace the original with the reproduction depended on the quality of the fiberglass coat-of-arms. There was much concern about whether or not such a complex form could be reproduced successfully. But when both were delivered to New Bern in February of 1994 many people were not sure which one was the original, even from fairly close range.

The use of reproductions in place of original artifacts will always be surrounded by complex

issues, and for this reason these cases have to be considered carefully and on an individual basis. For exterior environments, there should be a strong emphasis to preserve original fabric through a schedule of regular maintenance. It is important to realize that sometimes this is all we can accomplish. On the other hand, using reproductions can be a viable treatment alternative in exterior locations where regular maintenance is not feasible and we have little or no control over environmental conditions.

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Sources of Materials

Alumina (bulking agent)

Astro Chemical Inc.
3 Mill Road, P.O. box 1250
Ballston Lake, New York 12019

Cabosil (coated fumed silica)

Conservation Materials Ltd., Sparks, Nev.
(702)-331-0582

Conserv 100 (wood consolidant)

Conserv 200 (flexible epoxy)

Conservation Services, Kinnelon, N. J.

Fiberglass

Gelcoat

Paraffin lubricant (mold release)

Polyester resin

Polyvinyl acetate mold release

Urethane rubber mold material

Polytek Development Corp., Lebanon, N. J.
(610)-559-8620

Polyurethane paint (Awl Grip)

U. S. Paint Corporation, St. Louis, Missouri
(314)-621-0525

Slate flower (bulking agent)

Astro Chemical Inc.

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