

Tech Notes

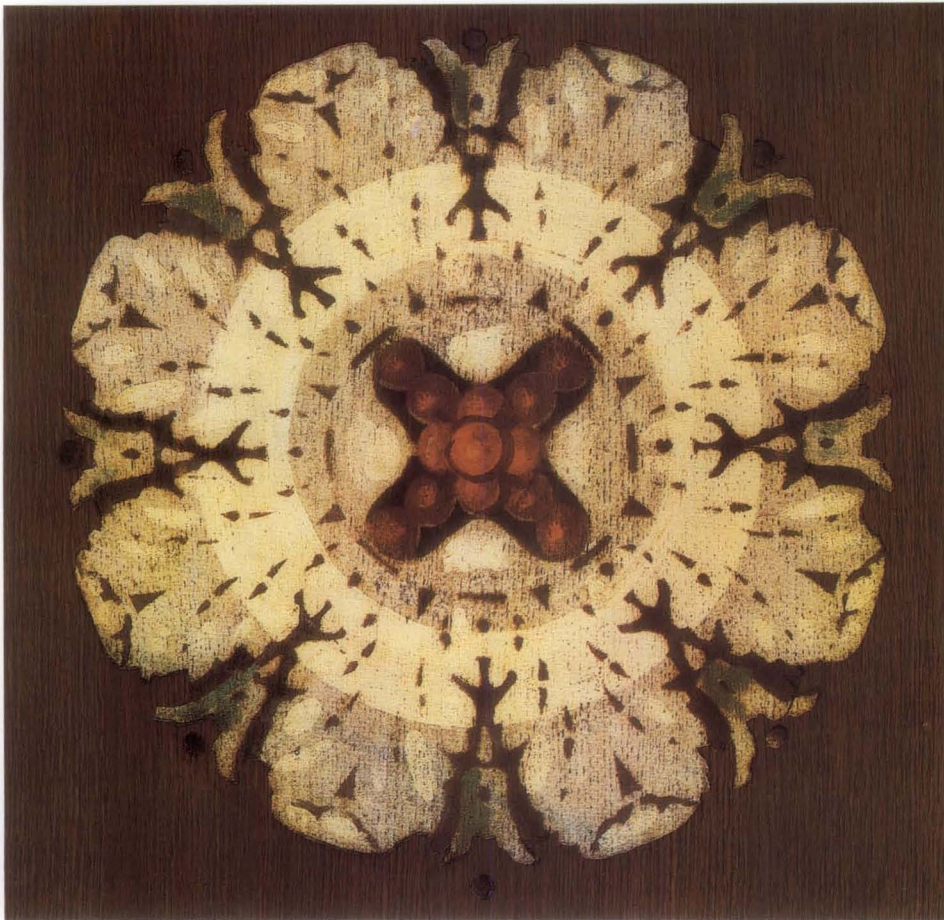
U.S. DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
WASHINGTON, D.C.

FINISHES:

NUMBER 1

Process-Printing Decals as a Substitute for Hand-Stencilled Ceiling Medallions

Sharon C. Park, AIA
Preservation Assistance Division
National Park Service



NATIONAL ARCHIVES Washington, DC.

Completed in 1935, the National Archives was designed by John Russell Pope and is part of the Federal Triangle of monumental buildings in Washington, D.C. (see figure 1). As the repository for official Federal documents, including the Declaration of Independence and the United States Constitution, it is used daily by many visitors and researchers. The Central Search Room, the most ornate of the public research space, is a rectangular space paneled in "Gothic oak."

Twenty-two feet above the floor is an imposing oak ceiling consisting of 105 coffered sections set within five large bays, separated by boxed beams. Decorative stencilling at the center of each coffered section consists of a 12" diameter medallion of leaves curling around a grouping of red cherries. The shading and highlighting of the painted surface creates a trompe l'oeil effect of a carved wooden feature.

Problem

The coffered ceiling had been badly damaged in 1962 with the installation

of fluorescent light fixtures (see figure 2). Forty of the coffers had been drilled with large holes to attach the light fixtures and the central medallions had been removed (see figure 3). In 1988, the General Services Administration (GSA) authorized a new sprinkler system in the Central Search Room. As part of the sprinkler project, the 1962 intrusive fluorescent lights were proposed for removal, with attendant enhancement of the desk level lighting. The two historic chandeliers were to be retained.

Using the ceiling openings created by removal of the modern light fixtures, 2" diameter pipes were installed for the new sprinkler system. Because the intact historic panels were so tightly glued in place, it was difficult to remove them without damage. Therefore, the new sprinkler heads were located at the centers of the 40 replacement panels, which were evenly spaced across the ceiling. One historic panel was removed to serve as a model for the replacement panels.

At the beginning of the project, GSA

Substitute materials used to replace lost or damaged features or finishes should match the visual qualities of the historic elements without damage to the historic resource.

considered replacing the damaged panels with hand-painted stencils to recreate the medallions. While the craft techniques of stencilling are still practiced, in the end GSA preferred replacement panels that would appear to match the historic ones from the floor level, yet up close would not duplicate the original in every detail. This approach would both preserve the integrity of the historic work and set high standards for the fabrication of the replacement panels.

The historic ceiling, which had aged to a warm brown, would not be cleaned as part of the work, due to limited funds. Thus, in order to have the 40 new panels visually match the original, but uncleaned panels, the contractor would have to age the replacement panels artificially, permitting cleaning to take place in the future without creating a difference between the new and the original work. The treatment or solution used to "age" the new panels would have to be applied without obscuring the new

decorative medallions. At the same time it had to be capable of being stripped later without damaging the new decorative work.

Historic Coffers

The original coffers were made of strips of white oak veneered onto plywood panels, approximately 16" x 18". The coffers were arranged in 5 bays of 21 coffers separated by boxed beams. Decorative egg and dart moldings, made of an early wood substitute known as "compo," trim the edges of each coffer. The hand-stencilled medallions, in the center of each panel, were individually shaded to highlight the curled leaves and cherries, giving a 3-dimensional effect. The colors had all aged to muted browns as a result of the darkening of the oil-based varnish overcoat.

Original medallions used as backing for access panels and shim pieces when the fluorescent lights were installed served as test panels for cleaning. Various chemicals were tested to find a treatment that would remove the old varnish without removing the paint. One entire undamaged panel was removed and cleaned, based on the test results, and served as the model for the replacement work. The varnish overcoat was removed using cotton swabs dipped in a solvent solution. It took 6 applications to carefully strip the varnish without removing the original brush marks. This was followed with up to 6 cleanings of the paint and highlights using a

commercial stripper of toluene, acetone, and butyl-acetate. The result was that the original lighter tones of the white oak background were also revealed along with the bright colors of the original painted medallions (see figure 4).

Solution

Various options were investigated for replicating the visual appearance of the hand-stencilled medallions. These included painting the medallions and panels as well as printing and photographic reproduction techniques. Had traditional hand-stencilling been selected, varnishes and light-stable acrylic pigments would have been used to retard aging of the new paints.

Besides hand-stencilling, consideration was given to having lithograph prints made of the entire cleaned panel, wood graining included, and gluing them onto new plywood panels. The completed panel would then have received a protective varnish coat. Since the background wood panel would be printed along with the stencilled medallion, several original panels would need to be removed to use as models in order to keep the replacements from standing out due to a uniform appearance. This approach was rejected because of the difficulty of removing undamaged panels from the ceiling. A modified stencil was also considered; in this approach the stencilled medallions alone would be cut out and applied to oak veneered plywood panels. As the outer edges of



1. Completed in 1935, the National Archives is the repository for official Federal documents. Photo: Hugh Talman.



2. The 40 large visually obtrusive fluorescent lights, installed in 1962, damaged the coffered ceiling in the Central Search Room. Photo: Dell Corporation.



3. The light fixtures were carefully removed to permit installation of a sprinkler system behind the coffered ceiling and to restore the ceiling to its original appearance. It was necessary to reproduce 40 new panels for installation in the coffered ceiling, due to the damage resulting from the 1962 lighting work. Photo: Dell Corporation



4. A historic stencilled panel was removed and cleaned in order to have a model for the replacement panels. In this view, only half of the panel has been cleaned, revealing the difference between the aged and original appearance of the ceiling. Since the ceiling was not scheduled to be cleaned, a decision was made to reproduce the original panel appearance and then artificially age the replacement panels to blend in with the existing ceiling. Photo: Dell Corporation.

the medallion contain free-floating decorations, the paper backing would have to be carefully trimmed and the decorative elements separately applied in order for the natural wood background to be visible. This was a possible alternative, but would require careful handwork in the workshop.

A fourth option, and the one selected, involved creating a stencil on a clear background similar to decals used in model building. This water-

release transfer decal would be placed directly onto the prepared plywood veneered panel. By having a transfer decal of the medallion on a clear background, the regularity of the pattern would be less noticeable, since portions of the different oak veneered panels would be visible. Slight hand shading of the medallion during the final varnish coating of the panels could affect highlights similar to the originals.

Process

The fabrication of the 40 new oak-veneer plywood panels used the same techniques as in 1935. The panels, however, were made slightly smaller as they had to be installed in the ceiling coffers from below, whereas originally they were seated from above the coffer. To match the oak, penetrating brown wiping stain was applied, followed by a non-linseed oil varnish. This produced



5. This demonstration model shows the various stages involved in finishing the ceiling panel. Starting with the raw wood panel in the upper right corner (1) and moving clockwise, a penetrating stain was applied (2) that matched the historic stain. A tinted varnish, or sealer, (3) was then applied to ready the backing panel to receive the decal (4). Two coats of acrylic sealer were used to protect this "cleaned" condition. The next 3 steps (5, 6, 7) produced the "aged" appearance with tinted varnish layers sprayed on using cardboard masks to produce the proper tones. A top coat of clear varnish (8) provided the final protective layer. Photo: Dell Corporation.

darkening within the grain, without obscuring the wood itself. A non-yellowing, light-stable oil varnish was used to seal the panel and to receive the medallion decal.

The decals were made using a photograph transparency of the original cleaned medallion. The decals were a water-release type printed with light-stable ink colors. The process-printing technique takes the

photographic positive and with the use of a computer makes color separation negatives. Quality control is obtained by using a gray scale and color bar. Inks are not solid films of color, but rather transparent dots of color laid out in a pattern of 180 dots per inch. The variation in colors in the final product is achieved by printing the three primary colors (red, blue, yellow) and all the other resulting colors are from

the overlapping of the color dot negatives. This way, as few as three screens with inks and a fourth screen of black for shading and depth are used. Each medallion decal required 7 runs through the printer (clear base, white background, 3 colors, black, clear top coat). Thus, it was critical to have precision registration to avoid blurred detail or a shift in color. Once the printing process was perfected, all

the decals were printed in one day, and left to dry overnight (*see cover photo*).

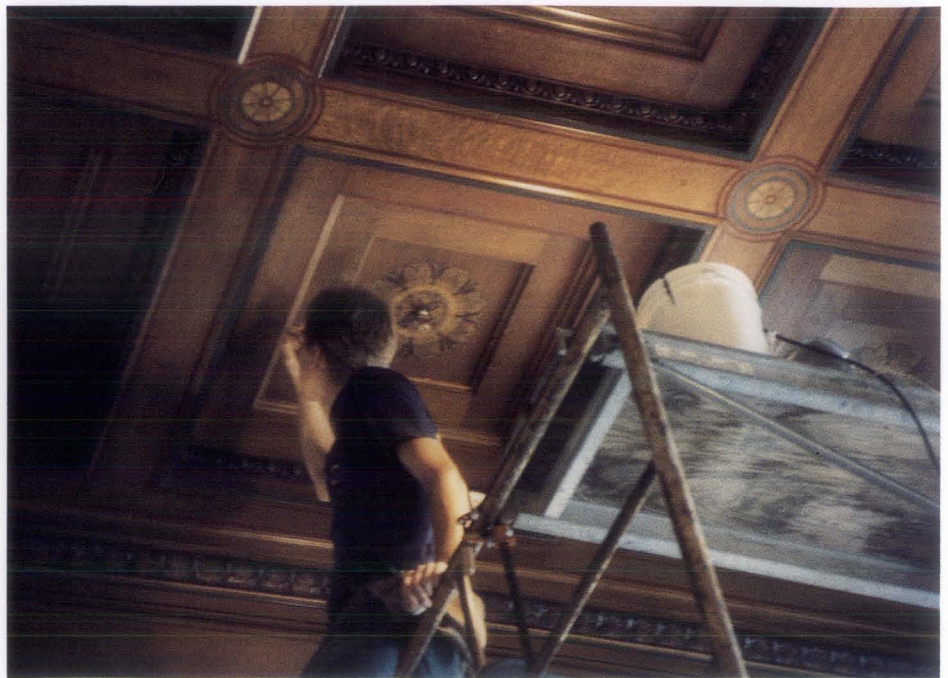
At the contractor's workshop the finished decals were applied to the prepared panels by 2 people in a single day. The decals were transferred to the moistened surface of the panels and positioned around the fire sprinkler hole. Pressure from a squeegee blade was applied to affix the decal to remove any water or air bubbles. Upon drying overnight, two coats of clear acrylic were sprayed on to form an isolating layer over the decal. At this point, the new panels closely match the one original panel that had been cleaned.

Because the original panels were not to be cleaned at this time, the replacement panels were artificially aged to match the current appearance of the historic panels. To give an individual appearance to each medallion with a minimum amount of hand work, highlighting was done by rubbing a solvent soaked cotton swab over the tinted overcoats, removing some of the topcoat varnish in selected areas. A clear coat was sprayed over the tinted coat to provide a final protective layer (*see figure 5*).

Upon the completion of the sprinkler piping system, the finished panels were installed using 1 3/4" long stainless steel pins to set the panels into the coffers (*see figure 6*). This side pinning (6 per panel) was necessary, as the panel had to fit around the sprinkler head and there was no room to manipulate the panel up into the small cavity space. The 40 panels were reinstalled over a one week period using a rolling scaffold and a crew of four. Upon completion, the replacement panels were virtually indistinguishable from the historic panels when viewed from below (*see figure 7*).

Conclusion

The use of the preprinted water-release decals on the prepared panels took less time than artisans working within the studio recreating the original technique. Traditionally, each color was hand-stencilled separately, allowing time between color applications for drying. While the cost of the decals was less than that of artisans doing the actual stenciling, it was difficult to determine exactly how much saving was realized on this job. The research and development time offset some of the potential cost savings that would be realized in a subsequent project of this type. For



6. The finished panels were installed in the ceiling with new sprinkler heads located in the center of the cherry motif. Stainless steel pins were used to set the panels, since there was no room to lift the panels in place from above the ceiling once the wet piping system was in place. Photo: Dell Corporation.



7. Following the work, the difference between the decal replacements and the historic stencilled panels is not discernible from the floor of the Central Search Room. Photo: Dell Corporation.

jobs involving larger quantities of mass-produced decals, the unit cost would be substantially reduced.

The challenge to find a cost-effective technique that could substantially recreate the appearance of a historic decorative detail was met—without resorting to the historic method of hand-stencilling. The high ceiling partly accounted for the successful use of this technique, since the differences with the original stenciling are not

apparent from the public view. To the casual observer, the replacement panels are not discernible. To the trained observer, it is clear what is genuinely historic and what is replacement.

Application of this technique to other projects must be evaluated in terms of the impact on surviving historic material, and in terms of whether the new feature will be seen up close or at a distance. This fabrication technique may have applicability to

other projects when it is necessary to replace lost elements that originally were repetitive in appearance, polychromed, and viewed from a distance. It has the potential advantage over decorative painting of requiring less time at the site. It may be cheaper, especially where large numbers of repetitive patterns are involved. It should not be considered as a replacement for the still practiced craft of stenciling, but rather as a technique that can be effectively used where appropriate conditions exist along with budgetary constraints.

PROJECT DATA

Building:

The National Archives
9th and Constitution Avenue
Washington, D.C.

Owner:

U.S. Government
under the management of the
General Services Administration

Project Date:

1988

Project Manager:

Andrea Mones-O'Hara
General Services Administrator
National Capital Region
Washington, D.C.

Contractor:

Dell Corporation
J. Bryan Blundell, President
Rockville, MD

Cost:

The cost for photographing and printing 50 decals was \$4,000. (For comparison, the cost of printing 200 decals would have been only \$4,800, indicating considerable savings with larger quantities.)

This PRESERVATION TECH NOTE was prepared by the National Park Service. Charles E. Fisher, Preservation Assistance Division, National Park Service, serves as the Technical Editor of the series. Special thanks go to J. Bryan Blundell, President, Dell Corporation, for providing considerable information on the project work. Thanks also go to Andrea Mones-O'Hara, General Service Administration, for her review and comments on the draft and to Michael Auer, Preservation Assistance Division, National Park Service. Cover Photo: Dell Corporation.

PRESERVATION TECH NOTES are designed to provide practical information on innovative techniques and practices for successfully maintaining and preserving cultural resources. All techniques and practices described herein conform to established National Park Service policies, procedures and standards. This Tech Note was prepared pursuant to the National Historic

Preservation Act Amendments of 1980, which direct the Secretary of the Interior to develop and make available to government agencies and individuals information concerning professional methods and techniques for the preservation of historic properties.

Comments on the usefulness of this information are welcomed and should be addressed to Tech Notes, Preservation Assistance Division, National Park Service, P.O. Box 37127, Washington, D.C. 20013-7127. This publication is not copyrighted and can be reproduced without penalty. Normal procedures for credit to the author and the National Park Service are appreciated.