THINKING BIG: LOW-COST METHODS FOR CLEANING A LARGE PRINTED TEXTILE

JACQUELYN PETERSON

ABSTRACT—A large block-printed textile required treatment to remove a highly discolored coating layer and to reduce embedded soiling. The size of the textile and limited available funding necessitated the use of low-cost methods and materials. A poultice method using cotton flannel for solvent delivery successfully reduced the thick and yellowed top coating with limited mechanical action. A second phase of cleaning required an emulsion of solvent and surfactant solution to address remaining coating material and embedded soiling. The textile underwent wet cleaning to further reduce soiling and clear residual surfactant. Treatment resulted in a brighter appearance and greater legibility of the printed design and restored flexibility to the textile using materials commonly available in textile conservation laboratories.

PENSAR EN GRANDE: MÉTODOS DE BAJO COSTO PARA LA LIMPIEZA DE UN TEXTIL ESTAMPADO GRANDE

RESUMEN—Un gran tejido estampado requirió un tratamiento para eliminar una capa de revestimiento altamente decolorada y reducir la suciedad incrustada. El tamaño del textil y los fondos limitados requerían el uso de métodos y materiales de bajo costo. Un método de cataplasma que utilizaba franela de algodón para el suministro de solvente redujo exitosamente el recubrimiento grueso y amarillento con una acción mecánica limitada. Una segunda fase de limpieza requirió una emulsión de solvente y solución de agente tensioactivo para abordar el material de revestimiento restante y la suciedad incrustada. El tejido se sometió a una limpieza acuosa para reducir aún más la suciedad y eliminar el tensioactivo residual. El tratamiento dio como resultado una apariencia más brillante y una mejor legibilidad del diseño estampado, y restauró la flexibilidad del textil usando materiales comúnmente disponibles en los laboratorios de conservación de textiles.

1. INTRODUCTION

The project textile is constructed of a single layer of plain weave with a cotton warp and linen weft, block-printed with designs and imagery reminiscent of a traditional Indian palampore (fig. 1). It measures 2.9 m × 1.3 m and was likely created in the 20th century, evidenced by the fact that the image was block-printed rather than hand-painted, the colors are muted, and the fabric is of a coarser weave compared with traditional painted Indian palampores. There were several condition concerns before treatment, the most distracting of which was a severely yellowed coating that had been unevenly applied over the entire surface (fig. 2a). The coating was obscuring the printed image and greatly stiffened the textile, which accentuated existing structural damage as the textile was moved or flexed. The textile also had splits and holes of various sizes scattered throughout with embedded soiling concentrated along many of the cracks and areas of damage.

Microscopic examination of cross-section samples and instrumental analysis suggested the presence of two coatings: a gum-based material applied directly to the surface of the textile and a pine resin and drying oil mixture that had discolored with age. Pine resin and drying oil mixtures were historically used as varnishes for paintings, and patterns of folds and damage along the edges of the textile were reminiscent of tacking margins, suggesting that the textile may have once been stretched and varnished like a painting.

Fig. 1. Printed textile, before treatment.

The goals of treatment were informed by the owner's interest in improving the legibility of the printed image, restoring flexibility, and stabilizing structural damage so the textile could be safely handled, displayed, and stored.

2. COATING REDUCTION

Due to the large size of the textile and limited available funding, treatment required the use of low-cost methods and materials. Cleaning tests indicated that the yellowed top coating was soluble in ethanol, and cotton swabs dampened with solvent and rolled across the textile surface effectively reduced the coating. However, this method of coating reduction would have been time-consuming, and examination of the tested areas under magnification illustrated that the mechanical action of the swabs disrupted the textile fibers. Poultice cleaning methods were considered to limit mechanical action. A 5% (w/v) agarose gel, soaked in ethanol for

Fig. 2. Detail, (a) printed textile with coating partially reduced, (b) after coating reduction with the cotton flannel method, and (c) after treatment.

24 hours and placed directly on the textile surface, greatly reduced the coating but left behind distinct outlines where the gel block had been [note 1]. This method would also have incurred significant cost in materials and in treatment time. A piece of ethanol-dampened cotton flannel, a plain-weave fabric with a napped texture, proved to be as effective as the agarose gel blocks without causing the formation of distinct lines.

The whole surface of the textile was treated with the cotton flannel method; the flannel was dampened with ethanol and placed directly on the surface of the printed textile under glass weights for 15–30 minutes. The glass weights ensured good contact between the textile surface and the cotton flannel and slowed the evaporation of the ethanol. The solvent solubilized the coating, and capillary action pulled it into the cotton flannel. After the flannel was removed, any visible coating residues that remained were removed with ethanol-dampened cotton swabs.

This method greatly reduced the yellowed coating in a time-efficient manner with little mechanical action, and the visibility of the printed design was improved. However, the soiling embedded in the cracks in the coating and the textile weave structure also became more apparent, and the textile remained quite stiff (fig. 2b).

3. EMULSION CLEANING

Examination indicated that, as anticipated, the gum coating that was trapping the embedded soiling below had not been reduced by the first phase of cleaning. Results of testing, summarized in table 1, suggested that a solvent and water cleaning system was necessary to address the gum coating, the residual yellowed coating, and the embedded soiling.

An emulsion composed of benzyl alcohol and a solution of 1% (w/v) Orvus WA Paste in deionized water mixed in a 1:1 ratio was found to successfully meet treatment goals. The emulsion was brush-applied to the textile, following the contours of the design elements. Then blotter paper was used to remove as much coating material and soiling as possible from the surface. The emulsion and more deeply embedded materials were cleared from the textile with a series of rinses of deionized water pulled through the textile on a suction table. The amount of coating material and soiling released from the textile was apparent on the blotting paper that had been placed between the textile and the suction table during the emulsion cleaning process. This second phase of cleaning greatly reduced the amount of soiling and coating material present on the textile as evidenced by its brighter appearance, improved visibility of the printed image, and more supple hand.

Table 1. Notes on Cleaning Method Testing for Second Phase of Coating Removal

Cleaning Method	Method of Application	Observations
Aqueous surfactant cleaning 1% w/v Orvus WA Paste and 0.5% w/v sodium carboxymethyl cellulose in deionized water	Brush applied and blotter rinsed	The coating swelled with prolonged contact with water, but was not removed from the textile and became stiffer upon drying. Dyes were not affected.
Solvent cleaning Ethanol; acetone; benzyl alcohol; toluene	Thickened with Velvesil (15-20% w/v) and brush applied	Polar solvents removed some of the residual yellowed coating, but did not affect the soiling or second coating
Enzyme treatments 0.25% w/v lysing enzyme in 2.5% w/v methyl cellulose poultice; 0.25% w/v alpha-amylase in 2.5% w/v methyl cellulose poultice	Brush applied and cleared with water	Enzyme gel applied for 1 hour, covered to prevent evaporation. The coating swelled with contact with water, and amylase appeared to reduce the coatings slightly. Soiling was not affected. Method not pursued due to the expense of the enzymes.
Gelled emulsion cleaning system 5:3:2 aqueous xanthan gum gel (2% w/v): aqueous chelating solution (0.25% w/v citric acid, 0.5% w/v sodium DTPA): benzyl alcohol	Emulsion applied via brush, cleared with deionized water	Soiling and yellow coating material left behind by ethanol treatment were reduced, but chelator and mechanical action had a detrimental impact on dyes. Cleaned areas appeared much brighter.
Emulsion cleaning (nonionic surfactant) 6:3:1 Ecosurf EH-9 (w/v): benzyl alcohol: deionized water	Brush applied and cleared with ethanol on the suction table	Effectively reduced the residual yellowed coating and the embedded soiling; textile was much more flexible and bright after treatment. However, the surfactant could not be satisfactorily cleared.
Emulsion cleaning (anionic surfactant) 1:1 benzyl alcohol: aqueous Orvus WA Paste solution (1% w/v)	Brush applied and cleared with water on the suction table	Cleaning method effectively reduced the remaining yellowed coating and embedded soiling. Treated areas appeared much brighter and the textile was more flexible after treatment. Rinsing with water on the suction table allowed the emulsion to be pulled through the textile and into blotter paper below, carrying solubilized coating and soiling.

4. ADDITIONAL TREATMENT STEPS

The textile underwent an overall wet cleaning to further reduce the amount of soiling present and to ensure that the surfactant was fully cleared, and planarity was restored by drying the textile on a smooth, flat surface.

Fig. 3. Printed textile, after treatment.

After wet cleaning, the splits and areas of structural damage in the textile were stabilized with localized silk crepeline supports, coated with two coats of the adhesive mixture 3:1 Lascaux 498 HV: Lascaux 360 HV 15% (w/v) in deionized water, and heat reactivated onto the verso of the textile. The textile will be rolled on an archival tube for long-term storage as part of a private collection.

5. CONCLUSIONS

The treatment of the block-printed textile met the goals set in consultation with the owner of the object and allied professionals. The thickness of the yellowed coating and the differences in solubilities of the two coatings necessitated a three-phase cleaning approach. The first phase of cleaning greatly reduced the discolored coating in a gentle and time-efficient manner with little material cost. The second phase of cleaning was highly effective due to the concurrent application of solvent and aqueous phases. Overall wet cleaning removed any residual surfactant and aided in achieving an even level of cleanliness (figs. 2c, 3). The overall cost of the treatment consisted primarily of the ethanol ($90.60 for 1.5 L) and benzyl alcohol ($27.50 for 1 qt.), as all other materials used can be found in most textile conservation laboratories.

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NOTES

[1] A 24-hour soak was chosen based on a Winterthur/University of Delaware Program in Art Conservation paper conservation seminar, which recommended a minimum of 24 hours to allow for water-solvent exchange but warned that agarose gels become more rigid as the water is replaced with solvent. It was found that after 24 hours, the gels were easier to work with and still fairly flexible. There was good surface contact between the gels and the textile, and the gels effectively reduced the coating. During testing, when the agarose soaked for a longer time, the gels became more rigid and distorted, making it difficult to achieve surface contact with the flat textile.

FURTHER READING

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Francis, K. 2002. Tapestry cleaning: characterization and removal of soils. *NATCC preprints. North American Textile Conservation Conference, Philadelphia*. NATCC. 47–53.

Lewis, J., and D. Eastop. 2001. Mixtures of anionic and non-ionic surfactants for wet-cleaning historic textiles: a preliminary evaluation with standard soiled wool and cotton test fabrics. *The Conservator* 25 (1): 73–89.

SOURCES OF MATERIALS

Acetone, Alpha-Amylase, Citric Acid, Denatured Alcohol (Ethanol), Lysing Enzyme, Sodium Carboxymethyl Cellulose, Sodium Diethylenetriaminepentaacetic acid (DTPA), Toluene, Xanthan Gum

Sigma-Aldrich
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AUTHOR BIOGRAPHY

JACQUELYN PETERSON is a third-year graduate fellow in the Winterthur/University of Delaware Program in Art Conservation. Her studies focus on textile conservation, with a minor in preventive conservation. Her textile conservation experience includes internships in the textile conservation laboratories at the Smithsonian National Museum of American History, the Indianapolis Museum of Art, and Peebles Island Resource Center. Her third-year graduate internship experience will include time at the Philadelphia Museum of Art and the Victoria and Albert Museum. Address: 5105 Kennett Pike, Winterthur, DE 19735. E-mail: jmpeterson8@gmail.com.