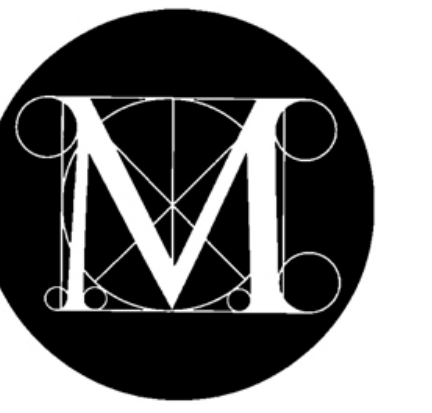


Technique for Paper Pulp Fills on Mold-Damaged Drawings

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Decontamination and local stain reduction is performed before implementation of this technique.

This technique was developed during the conservation of a large number of drawings by the Louis Comfort Tiffany Studios at the Sherman Fairchild Center for Works on Paper and Photographic Conservation, The Metropolitan Museum of Art. The method is suited for the conservation of watercolors that have been severely damaged by microbiological contamination and cannot be thoroughly wetted. The main advantages of this method are:

- the fill is created separately, preventing the drawing from excessive wetting
- it allows to fill large support losses with minimum tension applied to the original support
- it reinforces strata that have been structurally compromised by biological action
- it helps to aesthetically improve areas of paper that have been irreversibly stained by fungal and bacterial activity
- it provides planar stability to objects that, because of biological damage, include areas with differentiated hygroscopic behavior
- the method is reversible

Selecting the pulp

(1) The pulps are chosen based on specific qualities such as color, transparency/opaqueness and expansion/contraction rate. For instance, areas of paper degraded by enzymatic hydrolysis expand at a greater rate than the healthy areas in the same drawing. Reinforcing a damaged cotton paper with a combination of both cotton and linen fibers can compensate for this phenomenon. Preparing swatches can help in making a pulp that matches the exact color of the healthy paper.

Blending

(2) After weighing it, the pulp is soaked for at least one hour in deionized water. (3) Blending time and speed vary based on specific needs for expansion/contraction rates during drying. (4) Additionally, fiber length and amount of fibrillation achieved during the blending will impact the quality of the paper strength and hygroscopic stability. For best results for dyed linen and cotton, the blending time is approximately 30 minutes at medium speed.

Preparing for the casting

(5) A Mylar template is made by drawing the missing areas as well as the areas that we want to reinforce. Irreversibly stained areas that contain no media can also be covered, thus providing structural integrity and aesthetic improvement in one step. Notes are made on the template for which areas are meant to be covered and which areas are meant to be filled.

(6) A "mould" is prepared with a sheet of non-woven polyester (Hollytex® 0.0029") attached with tape to a Methacrylate frame.

Casting the pulp

(7) The template is placed on a light table, and the mould on top. Plastic pipettes and/or small beakers are used to pour the pulp on the mould following the contours of the template. (8) A gentle vertical tapping is then performed with a corn brush to distribute fibers evenly. Two pulp papers are cast, a fill and a reinforcement: 1) the fill must be as thin as the damaged area of the drawing and of the exact shape of the loss; 2) the reinforcement must be much thinner and will cover the loss as well as the damaged area of the original. (9) Once the cast is complete, the mould is transferred to a thick blotter and brought to the suction table. (10) When the suction is on, the frame is released from the mould.

Drying the cast pulp

Drying the fill and the reinforcement on the suction table prevents them from shrinking laterally, thus producing a precisely matching contour. (11) Hollytex and a thick blotter must cover the pulp to ensure gentle drying.

Adhering the fill to the artwork

(12) Once completely dry, the fill is attached to the artwork in the usual manner, using wheat starch paste. (13) The artwork is then ready to be gradually humidified in a chamber.

Adhering the reinforcement to the artwork

(14) Before bringing the drawing out of the humidity chamber, a 10% solution of cooked wheat starch paste in deionized water is mixed in the blender for a few minutes and placed in an air-brush bottle. Blending produces a very homogeneous aqueous paste. The paste will slightly strengthen the hydrogen bonds that form between the fibers on the suction table, while still making the reinforcement reversible. Other adhesives, such as Methylcellulose, can be alternatively employed.

(15) The artwork is placed on the suction table, the suction is turned on, and after making sure that the drawing is completely flat and free of creases, (16) a protective blotter is placed over the artwork, leaving exposed the area that will be covered by the reinforcement.

(17) The diluted paste is applied with the air-brush over the damaged areas of the art, the attached fill, as well as the reinforcement paper, which has been placed face down onto a piece of Mylar for easier handling. (18) The reinforcement is then carefully positioned on the artwork.

(19) The Mylar is removed and the artwork is covered with Hollytex and a thick blotter until drying is complete.

Flattening

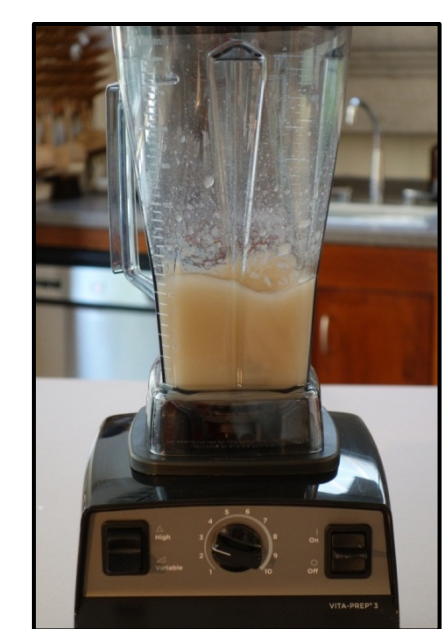
(20) Finally, the artwork is flattened following the traditional procedure of humidifying it in a chamber (21) and placing it under weight for several weeks.

Conclusions

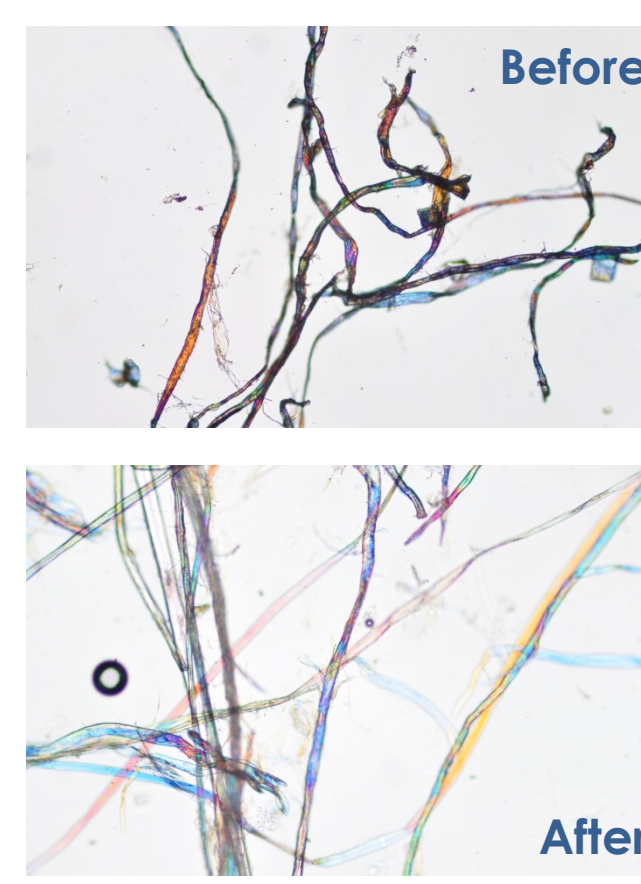
This technique, although based on the principles of paper-making that are followed by other leaf and hand casting methods allows the conservator very precise control. Since the casting process is independent, it is designed for complex cases of mold-damaged drawings that are sensitive to excessive wetting. The technique allows to both reinforce weakened supports in comprehensive, sensitive manner, and to bring an aesthetic unity to the drawing.



Preferred pulps are high quality cotton and linen dry pulp boards. They contain Carboxymethyl Cellulose as a sizing agent, are buffered with Magnesium Carbonate and pre-dyed with direct dyes.

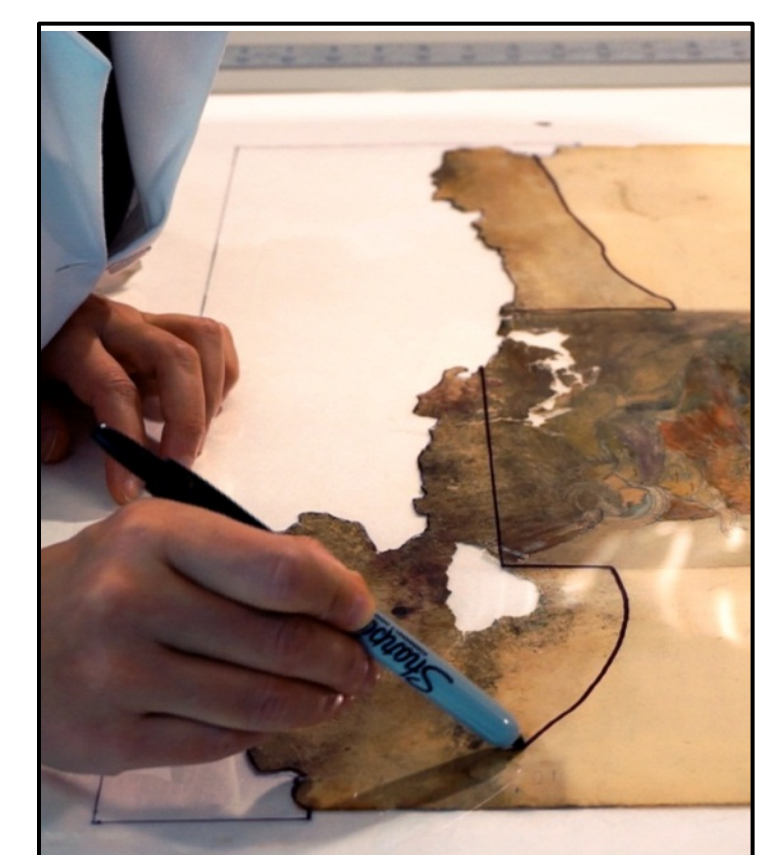


After 30 minutes of blending, linen fibers show signs of greater fibrillation but hardly any reduction of fiber length.



Proportion of pulp in water & paper thickness

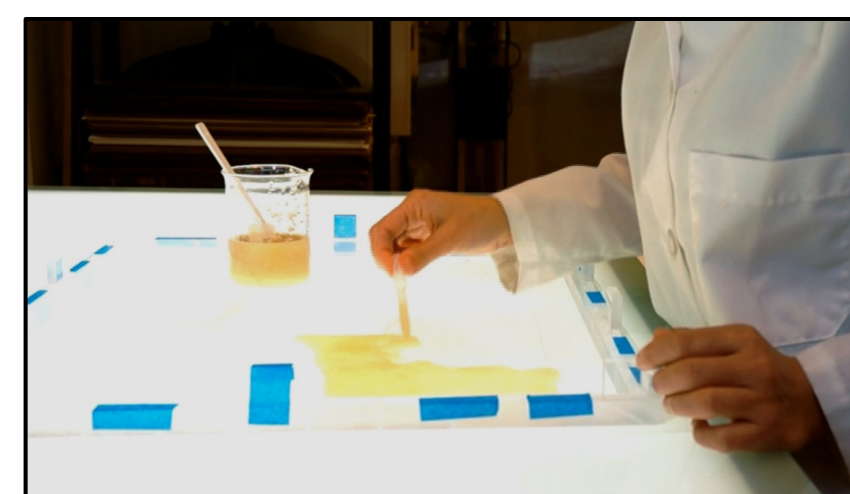
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|-----------------------------------|---------|
| 300 gr | 0.25 mm |
| 250 gr in 250 ml H ₂ O | 0.15 mm |
| 150 gr | 0.08 mm |



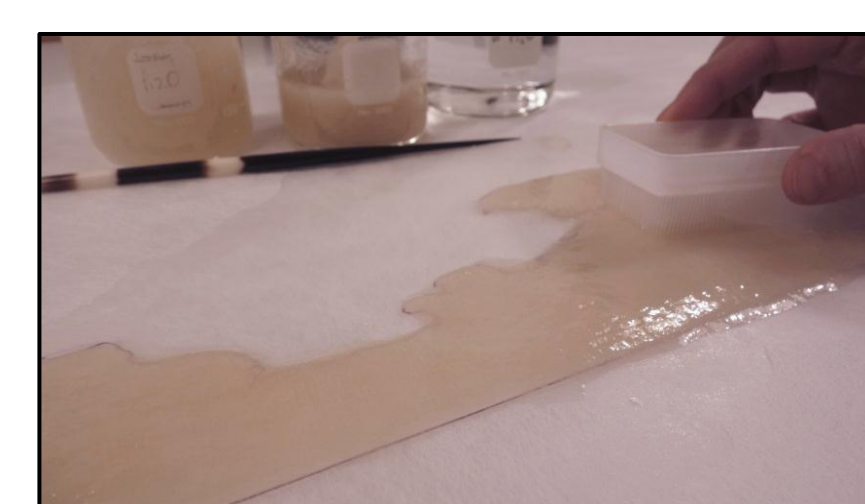
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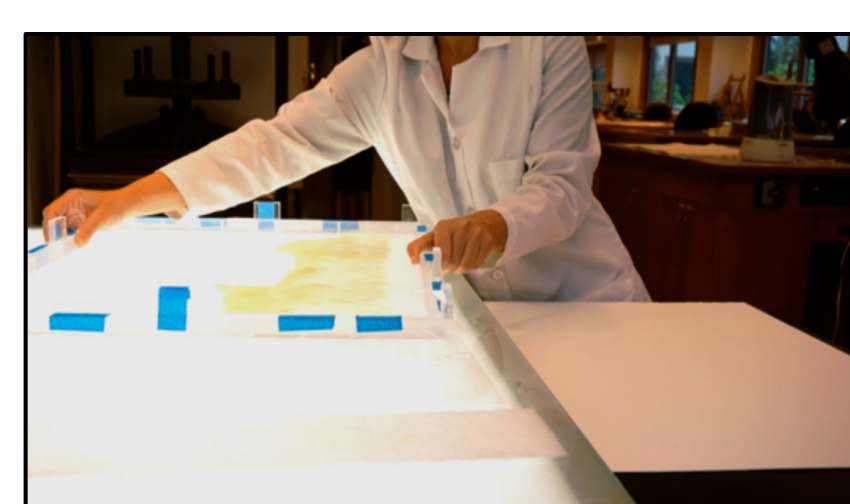
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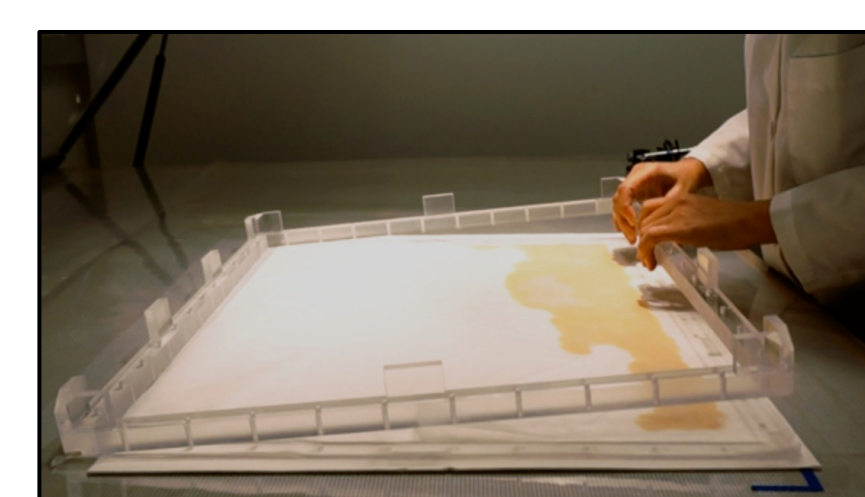
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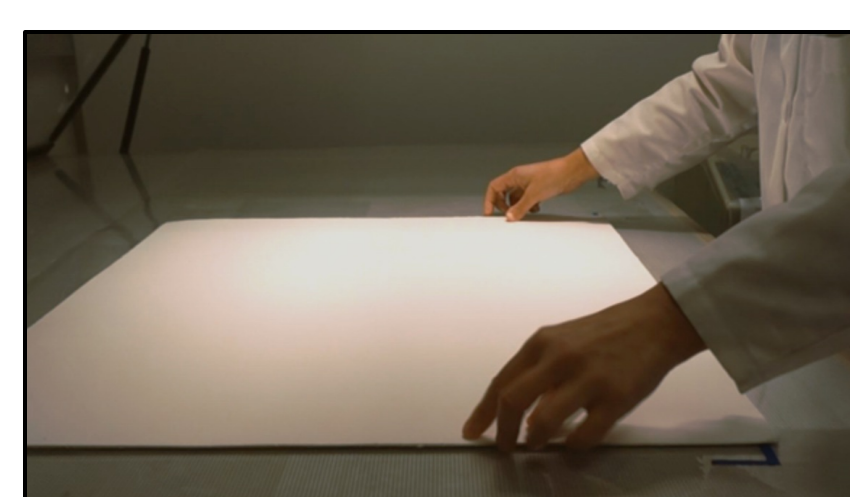
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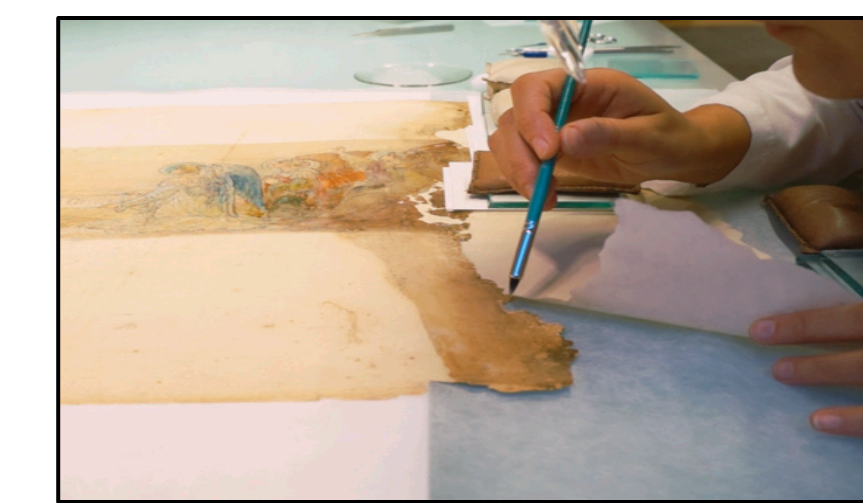
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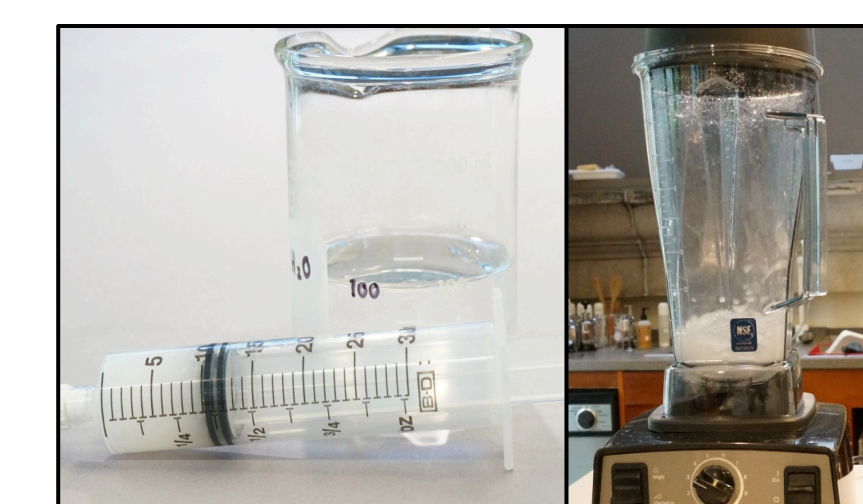
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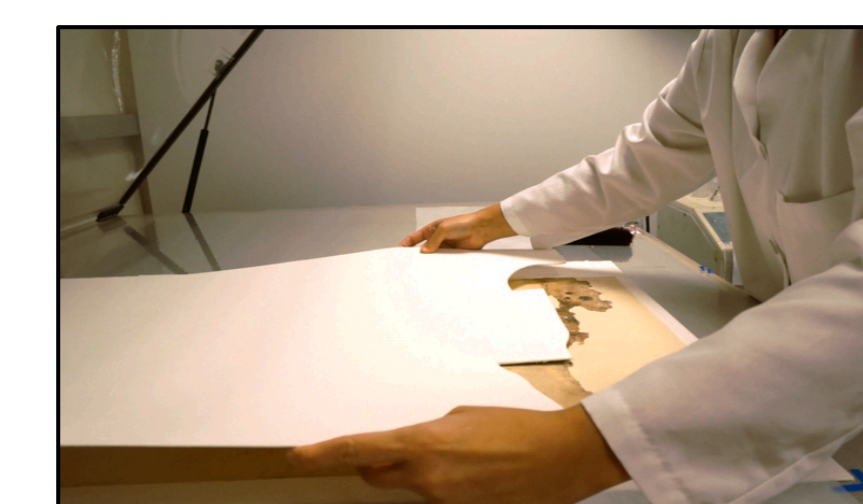
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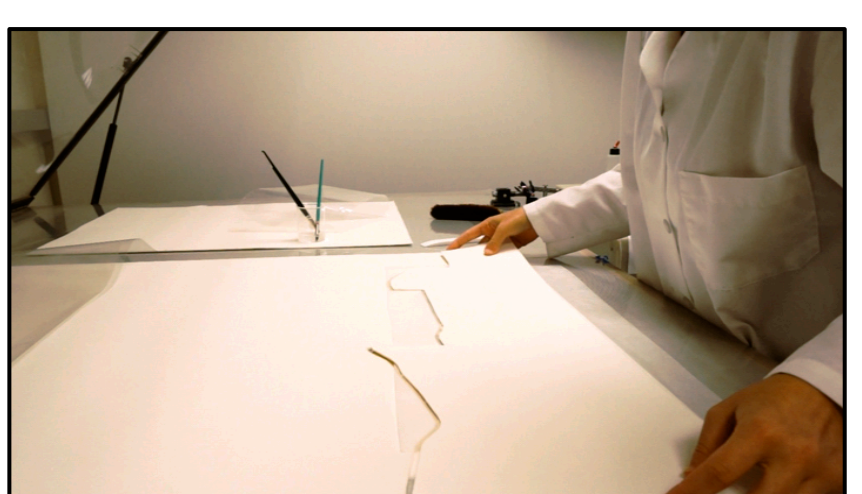
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After Treatment