

Leaf Casting

Lining is the traditional method of repairing and consolidating the areas of paper products such as archives (on Japanese paper) infested with insect damage or missing areas, and damaged areas around the edges. On the other hand, leaf casting is a method to fill the missing or damaged areas with Japanese paper fiber, and to repair and consolidate the said areas simply by hydrogen bond of filled fiber and original paper. No adhesive including paste is added to the filling material. It is also an efficient and cost-effective method in that it can provide an even repair with one process, even when there are a few to large number of missing areas on a sheet of paper. In addition, since no paste is used, its finish is softer than that by lining.

However, the filled areas can be partially thicker than the original paper, and the paper size is made larger. Plus, since the entire document needs to be immersed in water, the method is not applicable to documents with pigments. Fold and texture are also inevitably lost.

Materials Used for Leaf Casting

- Pure water
 - *Fukuronori* or *gloiopeltis furcata* (Postels et Ruprecht) J. Agardh, a kind of sea moss
 - Japanese paper made from paper mulberry: for filling.
Select a paper made of the identical material to the original document.
 - Polyacrylamide (PAM): thickener
Note: Polyacrylamide
A high polymer of acrylamide ($C_2H_3CONH_2$ / melting point: 84.5°) . It is an odorless white crystal, which dissolves in an aqueous or alcohol solution. Though commonly used for paints and adhesives, it is highly toxic as well as carcinogenic, and
- gives adverse effect on nervous system and liver. Handling must be done with utmost care, as it is dermally absorbed.*
- Small pot
 - Electric stove
 - Glass rod
 - Brush: flat and long ones
 - Unwoven cloth
 - rayon lining paper
 - Square stainless steel bars wrapped with sponge
 - Felt
 - Plywood sheets
 - Press
 - Suction table
 - plastic sheets

Procedure of Leaf Casting

As the work involves immersing the paper with aqueous solution, first temporarily fix the areas that can be separated from the paper by buoyancy, then line the entire paper from the back. In case there are vermilion scriptures, fix the vermilion letters with animal hide glue to avoid blur. The liner can be machine-made Japanese paper that contains wood pulp.

1 Temporary fix

Making of *funori*

Cook 8 gram of *fukuronori* (see Photo) in 640 ml of water until the sea moss dissolves. Filter out the remaining core.

Note: Refrigerate the unused paste, since it degrades easily.



Temporary fix

Temporarily fix the areas that can come off by buoyancy with small pieces of rayon lining paper and *funori*. It is convenient to mark the rayon lining paper with non-aqueous pens for ease of locating at removal.



Air-dry the paper.

2 Preparation of Filling Material and Thickener

Take one gram of paper, cut a half into 1×3 cm pieces, and the other half into 5×5 cm pieces. Crumple the pieces with hands, so that the pieces separate more easily in water, before putting them into one liter of pure water. Mix for 10 seconds in a mixer. This is used as filling material. Prepare 0.02 % Polyacrylamide (PAM) solution as thickener.



Filter PAM into the filling material and mix it with a glass rod. Mix in a cutting motion. Circular motion will get the paper fiber tangled around the glass rod.



Spread a piece of unwoven cloth on the suction table. Stick it firmly to the table by spray of water.



Seal the unused area of the suction table with plastic sheets for maximum suction effect.



Place the dried document with temporary linings face down on the unwoven cloth. Float the two pieces together on a vat (square tray) filled with water, and spray water from above.



Wet them completely, smooth out creases with a flat brush, and pull the unwoven cloth out of the water together with the document on top.



Place them on the designated area of the suction table from the far edge line towards the body with as little air intrusion as possible. Brush away the captured air with a dry flat brush.



Smooth out the surface completely.



Remove all the temporary liners using tweezers.



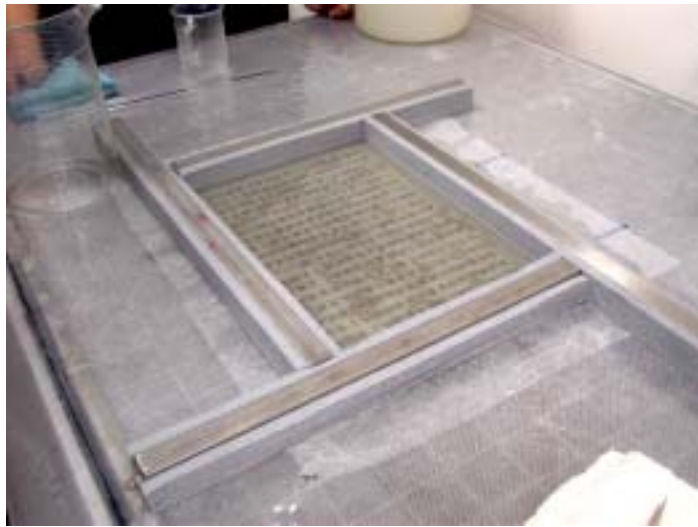
Surround the document with four square stainless steel bars, taking a slight distance away from the edges of the document.



Pour the filling material over the document.



Start the suction.



After the suction, place another sheet of unwoven cloth over it and stick the papers firmly with a dry flat brush.



Sandwich the unwoven-covered document with sheets of felt. Sandwich it further with plywood and press dry. Replace the felt about every hour.



(at Gangoji Institute for
Research of Cultural Properties)