REPORT ON NEW CONSERVATION FORM FOR ARCHIVES AND LIBRARY MATERIAL IN JAPAN (ASIA).

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Tokyo Restoration & Conservation Center is a private company established in 1988 and located in Ome City about 50 km from the center of Tokyo.
The present staff consists of 8 people. The Center is working with the restoration of historical documents from institutions such as the Foreign Ministry's Diplomatic Record Office, Tokyo Metropolitan Archives, and other archives, libraries and universities in the Tokyo area.
The Center is characterized by mainly working with restoration of historical materials that have been neglected hitherto, i.e. material from the period 1600-1900, more contemporary material, and materials given up by other conservators.

ABSTRACT
Documents in Japan and the rest of Asia is commonly damaged by insects and mold, and high humidity causes pages to stick together and degrades the strength of fibers. The scale of the damage is impossible to fathom. However, to mention an example, it is estimated that it will take 700 years for 8 restorators to restore the damaged documents presently stored and requiring conservation at The Imperial Archives in Tokyo. Confronted with these vast tasks and the severe conditions for preservation, application of the leaf-casting and other mass-restoration methods, as a supplement to the traditional manual methods, such as backing, has met with spectacular success - although the leaf-casting method was considered unapplicable to washi due to the length of the fibers of this kind of paper.

KEYWORDS
JAPAN, WASHI, LEAF-CASTING, FIBER LENGTH, MASS-RESTORATION

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The average annual temperature in Tokyo is 15.6°C, and humidity 64%. Corresponding figures for Kuala Lumpur are 26.5°C and 84.1%, and 27.0°C and 77.0% for Djakarta. Just a glance at these figures makes it clear that paper materials are exposed to their worst enemies, insects, mold and high humidity, during most of the year in Asia.

In Japan, documents from before the beginning of the Edo-period (1603-1867) are few. Most are kept at temples, libraries, museums, archives, universities and other such kind of institutions. Today, most of this material has been registered, restored and is maintained under satisfactory conditions. However,

a massive amount of paper materials exists from the Edo-period. Much of this material is stored away at private storehouses (kura), at town halls, etc. under appalling conditions. Belatedly, the Public Archives Law of Japan was established in December 1987. As a result, some documents and archives, belonging to the State or in private possession, have been systematically collected and preserved. Regrettable, in terms of organization, and lack of facilities in certain local areas, much is still lacking and the amount of material is still insignificant.

As you will see from the slides, even strong washi material has suffered badly from the haphazard conditions under which it has been stored. Damaged to the extent that it cannot be used for studies, research, exhibitions, etc. without preliminary restoration. To repair all these documents by the traditional one-sheet-at-a-time conservation methods will require an enormous amount of labor - and labor shortage is one of Japan's biggest headaches these days. Furthermore, these documents, etc. often look very dirty; they take up space - and are often thrown away as rubbish! Accordingly, the race against time is also a factor here. In Japan, a number of cases has proved the leaf-casting method to be the most effective for restoration of these large amounts of documents and historical materials, mainly damaged by harmful insects such as termites and anobiid, mold and high humidity.

The advantages of the leaf-casting method are as follows:
(1) Compared to hitherto used conservation techniques the process is extremely fast, permitting large quantities to be processed quickly.
(2) Backing has been the common restoration method in Japan so far. Using this method, however, almost doubles the thickness of the treated paper. The leaf-casting method results in very little or almost no increase in thickness.
(3) Only clean water and paper pulp are required for the process. Since no glue, adhesives, or polyacrylamide is used, future conservators will not be faced with difficulties in removing the parts restored with the leaf-casting method since these are easily removed.
(4) Since no brushes are used for the process, the paper hardly never stretches nor expands.
(5) It is a prerequisite that the staff involved in the restoration receive instructions and a certain amount of training from a conservator who has received specialized conservation training. However, in the case of leaf-casting the necessary knowledge can be imparted in a short time; i.e. the time required for training staff is very short. Restoring a normal booklet-sized collection of washi documents, using traditional methods, will probably require that the restorator has amassed practical experience for 4 to 5 years. Using the leaf-casting method, the same result can be obtained by a person with much less training.

Disadvantages are as follows:
(1) The method cannot be applied to material with water soluble colors, ink, etc. unless a color fixing process is preliminary carried out.
(2) Bast fibers obtained from kozo (paper mulberry), and two shrubs, gampi and mitsumata, are used for washi making. The fiber length of these materials is very long (See Table I). If these materials are mixed in a mixer without preliminary treatment, the fibers will lump up. Accordingly, it is necessary to cut, etc., the fibers first.

Using the leaf-casting method and applying time and labor, various beautiful results and application variations are possible. This paper is based on results and experiences gained by two persons processing 15,000 - 20,000 sheets of documents (minoban; approximately B4 size) annually on a leaf-casting machine not equipped with suction pump. In addition, four persons are occupied with documentation, cleaning and other pre-operational duties necessary for preparing normal insect damaged documents for leaf-casting.

The cutting of the material for the paper pulp is the most crucial element of the process. The material is cut into 3-5 mm pieces before cooking. This process prevents the fibers from lumping up when the dried fibers are mixed in a mixer for a short time. At our Center, the cooking is done with potassium carbonate (K_2CO_3) which has much the same composition as wood ashes.

Determined by the paper making process, fiber types, cooking methods, etc., a wealth of washi variations are found among historical paper materials. In case of restoration of very important historical documents, the analysis of the paper's fiber structure is left to the Kochi Prefectural Paper Testing Institute. Based on the result of the analysis, the fiber type closest to the original is selected. However, in most cases, due to time and economical restrictions, we select one of the present-day manufactured washi pulps (kozo, gampi, mitsumata/ bleached or unbleached) according to which one matches the original document best in color and feeling (thickness, softness, etc.). In general, if cooking is done with lime, the color becomes dark. We use the leaf-casting method in combination with different cooking methods, utilizing the differences between bleached and unbleached, etc. The composition of our most frequently used pulp is:

Unbleached kozo 0.9 g
Unbleached mitsumata 0.25 g
Bleached kozo 0.35 g

Taking into account the loss caused by the pulp clinging to the net, this formula produces an amount sufficient to cover approximately 450cm² of blank or damaged areas. In other words, 1 g washi pulp is enough to repair approximately 300 cm² of damage on washi paper 0.05 mm thick. In the case of UKIYOE and other thicker paper types, the paper thickness is first measured and a

test sheet made to check the color, feeling (thickness, softness, etc.) in advance.

After leaf-casting, the paper is left pressed between nonwoven polypropylene fabric for one night. Then the paper is simply left to dry sandwiched between acid free boards with a little weight applied. Sizing is not done.

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In the leaf-casting restoration of Western paper there is also a trend towards adding a tiny amount of washi pulp to facilitate the filling of very small holes caused by insect damage.

In Japan, there are two types of leaf-casting machines in use currently. One type without suction pump developed by Mr. Per M. Laursen at the Royal Library in Denmark and another type equipped with suction pump developed by Mr. Katsuhiko Masuda of Tokyo National Research Institute of Cultural Properties. Research and study of ways to improve equipment and techniques for restoration of Oriental paper materials (including modern Brittle paper made from pulpwood) is slowly under way, too.

CONCLUSION:

Leaf-casting has proved immensely useful for the restoration of Japanese paper, washi, although the fiber length of this kind of paper was thought to prevent effective application of this method. The solution is basically very simple: To prevent the fibers from lumping up, the fibers should be cut to appropriate length before cooking.

TABLE I. Length and Width of Fibers

Material	Fiber Length (mm) (average in brackets)	Fiber Width (microns) (average in brackets)
Kozo	4.5 - 30 (10.9)	10.0 - 23.0 (16.0)
Gampi	3.0 - 7.5 (4.6)	3.0 - 10.0 (7.0)
Mitsumata	1.2 - 10.5 (4.1)	7.0 - 23.0 (11.0)

TABLE Ⅱ. JAPANESE PAPER (WASHI)

Sample No.		1	2	3	4	5	6	7	8	9	10
Areal weight(g/m^2)		19.1	18.3	38.5	49.3	35.8	23.7	19.3	13.5	19.7	21.3
Thickness(mm)		0.055	0.031	0.088	0.104	0.101	0.073	0.054	0.050	0.056	0.065
Apparent dens.(g/cm^3)		0.35	0.59	0.44	0.47	0.35	0.32	0.36	0.27	0.35	0.33
Tensile strength(kg)	MD	2.98	4.80	7.22	9.35	5.73	3.53	3.07	1.61	2.62	3.61
	CD	1.08	1.89	2.51	7.20	2.35	2.15	1.96	1.12	1.90	2.30
Breakeing strength(km)	MD	10.4	17.5	12.5	12.6	10.7	9.93	10.6	7.95	8.87	11.3
	CD	3.77	6.89	4.35	9.74	4.38	6.05	6.77	5.53	6.43	7.20
Elongation(%)	MD	2.1	2.4	3.5	2.9	3.0	3.1	2.7	2.2	2.3	2.9
	CD	2.0	2.7	3.0	3.7	2.4	2.8	2.6	2.3	2.3	2.9

Sample No.	Name of WASHI	Size(cm)	Weight(gr.)
1	Sekisyu hanshi(kozo)	24.8x35.0	1.67/sheet
2	Sekisyu gampishi	53.5x74.0	7.59
3	Sekisyu kozogami (*)	53.5x74.0	15.8 (*)clay
4	Sekisyu mitsumatashi	53.5x74.0	20.9
5	Hosokawashi(kozo)	60.0x90.0	20.2
6	Karasuyamashi(kozo)	68.5x97.0	16.3
7	Karasuyamashi(kozo)	68.5x97.0	13.1
8	Karasuyamashi(kozo)	68.5x97.0	9.19
9	Minogami(kozo)	63.1x92.5	11.8
10	Minogami(kozo)	63.5x98.5	14.4

[Agency for Cultural Affairs,
Washi Testing Report 1984.Tokyo]