REVERSIBLE MOUNTING TECHNIQUES FOR THE DISPLAY OF LARGE-FORMAT CONTEMPORARY PHOTOGRAPHS

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ABSTRACT

This paper describes reversible mounting methods devised to exhibit large-format unmounted photographs by conservators from George Eastman House/International Museum of Photography and Film, Amon Carter Museum, and Atelier de Restauration et de Conservation des Photographies de la Ville de Paris. The descriptions of similar approaches devised by other conservators follow in addendum.

INTRODUCTION

As more and more large-format photographs enter the fine art market, private collections, and museums, conservators are facing the challenge of caring for their storage, exhibition, and transportation. Very often, artists will permanently mount their large photographs onto rigid substrates for better support and aesthetic reasons. However, a significant number of large-format photographs remain unmounted.

Traditional presentation methods used for smaller formats including photo corners or hinges are often inadequate to support photographs larger than 30 x 40 inches. Large-format photographs will tend to buckle or sag if not properly supported during exhibition. An ideal conservation mounting system should keep the photograph safely flat, be aesthetically pleasing and, if possible, be reversible. Considering these requirements, the edge-lining method used on canvas paintings seemed a possible alternative. The method consists in attaching edges strips along the back of a canvas and stretching them around a rigid panel.

GEORGE EASTMAN HOUSE

In 2006, the Conservation Department at George Eastman House tested the stretching edge-lining method for fourteen unmounted chromogenic photographs that had been approved for a three-month loan. Twelve prints were 40 x 60 inches Kodak Professional Endura Paper by artist Andy Lock. The other two were 98 x 23 inches digital chromogenic prints by German artist Johannes Hepp. The photographs by Andy Lock had been stored horizontal between weights and were flat to begin with; those by Johannes Hepp had been stored rolled and exhibited visible cockling as the mounting process began. The mounting method was devised in a way that it could be undone or kept as a long-term mounting solution after exhibition; it involved three stages: lining, mounting, and sealing. The lining

process was consistent for all the photographs; there were slight variations in the mounting and the sealing because of the difference in object size and planar condition.

Preliminary Tests

Unlike canvas, resin-coated photographic paper (RC paper) has a sleek surface and can be sensitive to heat and to some organic solvents. Preliminary tests were carried out to find the appropriate lining materials and adhesives. Different combinations of Japanese paper, non-woven polyester webbing of various thicknesses, and adhesives were tested. Hollytex 3221 and Lascaux 498 HV provided the best working properties with good strength and adhesion.

Lascaux 498 HV can be used directly as a paste or reactivated with organic solvents. We preferred the reactivation method, which provided good adhesion bond between the Hollytex and the RC paper, yet was very easy to peel off. This method also provided cleaner application; the adhesive strips could be prepared ahead of time and required only light pressure for bonding.

Different solvents and solvent mixtures were tested. A mixture of toluene and heptane (1:1) reactivated the adhesive quickly, evaporated at a rate that allowed enough working time, and did not cause harm to the RC support and the image dyes.

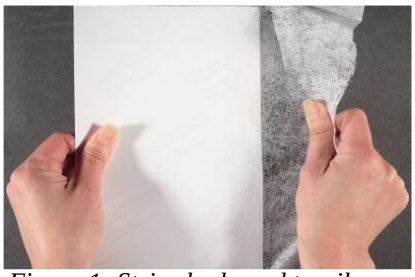

Figure 1: Strips had good tensile strength

Reversibility of the attached lining strips was one of the main concerns. Tests showed that Lascaux 498 HV has very good tensile strength but very poor sheer strength. These properties enable tight stretching from sideways (figure 1) and easy removal of the strips (figure 2).

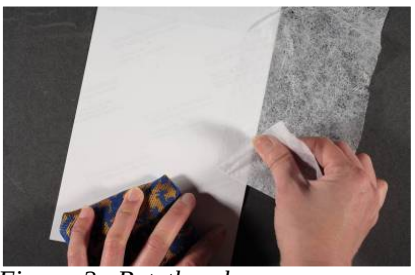

Figure 2: But they have very poor shear strength

For this reason, the mounting substrate had to be at least one centimeter wider than the photograph at all edges, so that the strips could be stretched out first before wrapping around it. The adhesive residue was easily removed with a Magic Rub eraser or rubber cement pick-up stick.

Lining

The lining process involved preparing the strips and attaching them to the edges around the back of the photographs. The corner strips were cut in an L-shape to prevent weak joints at the corners.

Lascaux 498 HV was applied on the strips in bands of about 3 cm wide and allowed to dry. The solvent mixture of heptane/toluene was applied to the adhesive. When the adhesive became sticky, the lining strip was attached to the photograph. Light hand

pressure was enough to obtain a good bond. The adhesive was let to set under light weights.

Mounting and Sealing the Photographs by Andy Lock

After the adhesive was set, the photographs were mounted onto Tycore panels, which consist of a core of paper honeycomb cells sandwiched between off-white Bristol boards. Tycore was chosen due to its light weight and rigidity. The panels were cut about 1 cm bigger than the photographs at all edges. As mentioned above, the extra space allows the edge strips to be stretched out before wrapping around the panel.

Stretching of the strips was performed with the photographs face down on a sheet of Mylar. The Tycore panel was positioned precisely over the back of the photograph.

Figure 3

The corners of the L-strips were trimmed tangentially to the corners of the panels (figure 3) for easy stretching and clean joints (figure 4). The lining strips were stretched from all four sides at the same time and attached to the back of the panel with 3M 415 double-sided tape.

In order to prevent fluctuations that could affect their planar stability, the mounted photographs were sealed inside a humidity-conditioned package. A piece of Artsorb conditioned at 40% relative humidity (RH) was adhered to the back of the Tycore panel and covered with a sheet of Marvelseal 360. Quarter-inch thick high density polyethylene black spacers were used to cover the visible outer edges of the Tycore panel.

Figure 4

Plexiglas glazing was added and the entire package was sealed with 3M 427 aluminum foil pressure-sensitive tape (figure 5). The middle section of the 3M 427 tape was covered with a strip of Teflon wide enough to block the tape from sticking to the lining strips (figure 6). The corners of the package were reinforced to ensure good sealing (figure 7). The sealed packages were then secured into their frame. Figure 8 shows a cross section of the sealed package.

Figure 5

Figure 6

Figure 7

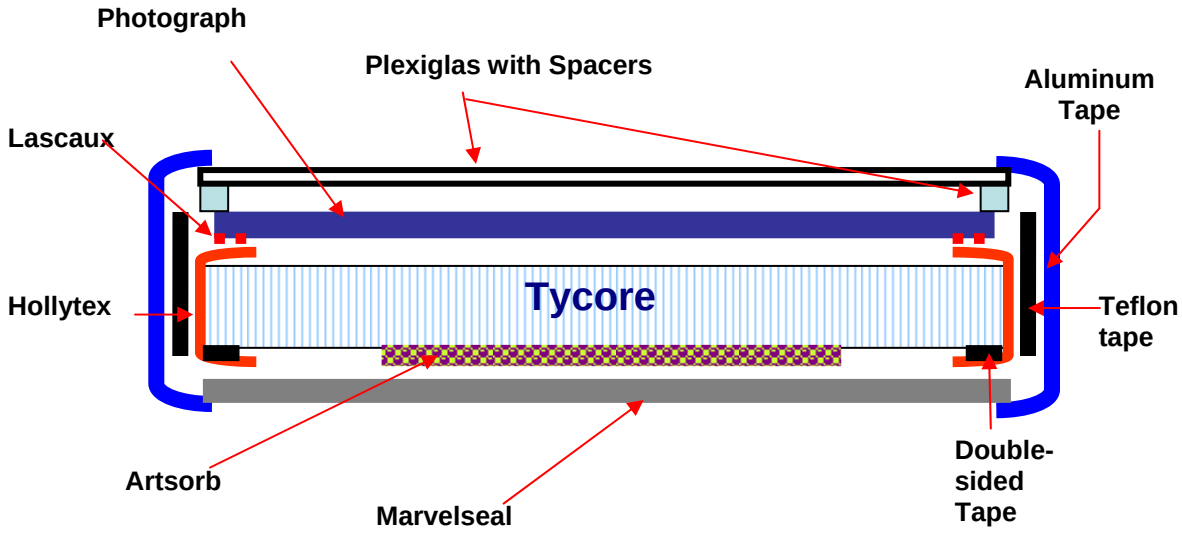

Figure 8: Cross-section of the sealed package

Mounting and Sealing the Photographs by Johannes Hepp

Because the two panoramas are longer than the maximum available size of Tycore panel, a custom panel was constructed by joining two sheets of Tycore with epoxy and PVA. Concerns with the off gassing of these adhesives prompted the isolation of the entire panel with aluminum foil and metal tape before the photographs were mounted. Due to their length, these custom-made panels were somewhat flexible. The rest of the process was the same as that for Andy Lock's photographs. The planar distortion was significantly reduced but not completed corrected.

Assessment

The photographs were examined upon their return from exhibition. Most of the photographs by Andy Lock remained flat and only one photograph exhibited slight cockling. We also noticed that the photographs buckled immediately when we lifted the frames from one corner and that the buckling disappeared after the corner was set down. It is evident to us that the Tycore panel is not rigid enough to resist the flex from the frame.

The mounting method did not work for the two panoramas by Hepp. The buckling was very visible and the photographs were in contact with the Plexiglas in some areas. Apparently, the RC paper had expanded as the lining strips were well adhered. Unfortunately, no datalogger was incorporated to record the temperature and RH the photographs were experiencing. It is still inconclusive whether it is the RH or temperature fluctuation that affected the dimensional stability of these two photographs.

AMON CARTER MUSEUM

In 2006, the Amon Carter Museum organized the exhibition *Regarding the Land: Robert Glenn Ketchum and the Legacy of Eliot Porter*[1]. The exhibition was to last four months, from September 2006 to January 2007. Among the works selected for the exhibition were thirty-eight unmounted color photographs measuring 30 x 40 inches —thirty-six Cibachrome® or Ilfochrome® and two Fujicolor Crystal Archive. About half of the photographs belonged to the museum; the other half was borrowed from several private collectors. All the photographs in the exhibition would be over matted with a four-ply white window mat. Previous experience with over matted and cornered photographs of that size had resulted in sagging of the art inside the mat board to the point where the surface of the photograph came in contact with the acrylic glazing. To prevent this from happening again, we decided to use the edge-lining approach.

The materials selected were a medium-weight non-woven polyester web Reemay 2014 (8 mil) for the hinges, and acrylic adhesive Lascaux 498 HV. Straight adhesive was applied with a brush on both sides of the Reemay strips and let dry.

The photographs were placed face down on the table, over sheets of blotter and a very smooth non-woven polyester web. Prints were held in place with a few soft weights. When the hinges were ready to be applied to the verso of the photographs, the adhesive was reactivated in the fume hood with a 1:1 solution of toluene and heptanes. After the hinges were positioned along the edges of the prints, slight pressure was applied with fingers and bone folders. Everyone working on the hinging was wearing a respirator. The photographs were air dried until the solvents had completely evaporated.

We wanted a relatively inexpensive, non-hygroscopic, rigid support that would not bow when handled. Dibond®, an aluminum composite material consisting of a core of polyethylene faced with thin sheets of aluminum on both sides was used. Sheets of Dibond® cut approximately an inch wider than the photographs all around were centered on top of the prints' verso. The hinges were then stretched over and secured on the verso of the Dibond® panels with 3M 415 double-sided adhesive.

The mounted photographs were cornered into sink mats made of white Coroplast® (for the back) and corrugated blue board (for the walls). The photographs were over matted with rag board and an acrylic glazing was placed on top. The package was sealed with white Artists' Tape™ (figure 9). Although not appropriate for long-term usage, the tape would protect the art from eventual water spills during exhibition and prevent dust from entering the package. The packages were placed in the frames vertically to avoid any bowing of the acrylic glazing and its contact with the photograph.

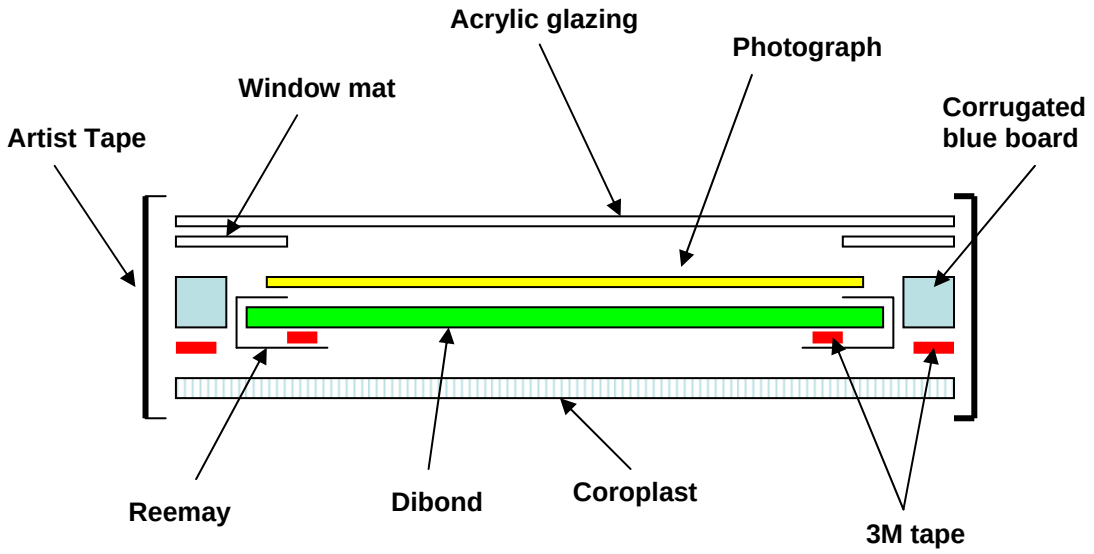

Figure 9: Cross-section of assembled package

The photographs remained very flat and no planar distortion or bulging was observed during the exhibition. Unmounting was very straightforward: the packages were opened, the mounted photographs taken out of their sink mats, and the strips of Reemay cut with a blade along the double-sided adhesive line on the back of the rigid panel. The hinges were removed mechanically and the adhesive residues were brushed away after rolling swabs of ethanol along the edges. No changes in coloration or texture were noticed on the verso of the prints. This completely reversible mounting technique was simple enough and safe for the objects.

ATELIER DE RESTAURATION ET DE CONSERVATION DES PHOTOGRAPHIES DE LA VILLE DE PARIS

A request from the Carnavalet museum[2], when it purchased five large Ilfochrome® glossy prints from Stéphane Couturier[3], prompted ARCP, the *Atelier de Restauration et de Conservation des Photographies de la Ville de Paris* (Paris Photography Conservation and Preservation Laboratory) to seek alternatives to the Diasec® mounting process favored by the artist.

While we were quick to opt for the kind of stretched mounting technique used for paintings and graphic artwork, we yet had to identify materials suited to Ilfochrome® prints. We favored materials of a composition similar to the prints themselves, responding identically to climate fluctuations and meeting the requirements of preventive conservation. The most suited materials were selected on the basis of tests conducted beforehand. Having seen a prototype, Stéphane Couturier agreed to a light-backed, hinge-

stretched mounting solution. After being mounted the images were framed, eventually to be stored vertically, space being in short supply.

Support Board Treatment

The support material was an alveolate polycarbonate board, chosen for its lightness, rigidity and chemical composition.

To prevent any direct contact between the backs of the prints and the polycarbonate surface, conservation cardboard sheets (grade 089 Klug, 1mm thick, no alkali reserve) were pasted with roller-applied acrylic glue Lascaux HV498 on both sides of the support boards. Adhesion was optimized by scratching the surfaces of the boards with a medium-grain abrasive pad prior to pasting.

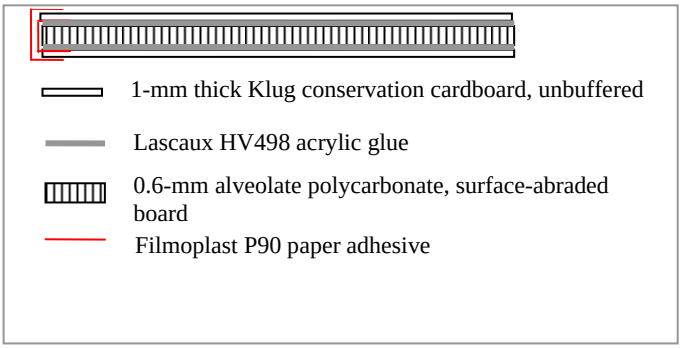

Figure 10: Cross–section of support board

The edges of the board were also insulated using two coats of paper adhesive Filmoplast P90, 3cm wide, over and under the cardboard sheets (figure 10). Thus covered the boards were placed between sheets of blotting paper, pressboards and weights, and left to dry for 48 hours. After drying, two strips of double-sided 3M 4154 adhesive tape were applied side by side along the edges on the back of the boards. Their purpose was to attach the hinges when mounting and stretching the prints.

Prints Preparation–Test

Two adhesives (an acrylic glue Lascaux HV498 and an acrylic double-sided tape 3M 415) and three hinge materials (a thick Japanese paper–Kozo 31 g/m^2, a non-woven material made of polyester, viscose, and cellulose Cokon 35 g/m^2, and a non-woven polyester material Bondina 100 g/m^2) were tested. Adhesion and tensile strength tests were performed for each adhesive-hinge pair. The selected pair was the non-woven polyester hinge with double-sided adhesive tape.

Placing the Hinges

Strips of double-sided adhesive tape were applied to the back of the print, along all four edges. Each length of tape was divided into five segments so as to distribute tensions[4].

Figure 11: Overall view after the hinges were placed ©arcp

The non-woven polyester hinges were attached to the strips of

adhesive tape with the same distribution. On the corners the protective strip on the adhesive tape was slit diagonally.

Mounting

Thus prepared the image was placed on the board, which exceeded it by a few millimeters. It was maintained in place with glass panes arranged crosswise and doubled up with weights. The contraption was set on the workshop table, in overlap so as to have access to the double-side tape used for fixing the hinges on the back of the mounting board.

Figure 12: Stretching ©arcp

We started with the central hinges on the short sides of the prints, securing them one after the other. Then we attached the central hinges on the long sides. We always worked from the center of the hinges outwards. Before attaching a hinge, we slit the protective strip of the double-side tape on the back of the board, to match the size of the hinge. We stripped it off as the hinge was being attached, to prevent the adhesive surface of the tape from sticking to the table during operations.

The side hinges on either side of the central hinges were then secured in the same fashion, first on one side, then on the opposite side of the print, ending with the angles. Weights were removed gradually.

Figure 13: The print, mounted ©arcp

When mounting was completed, the back of the board was dressed with Filmoplast 90 along the edges so as to cover the hinges.

Framing

A frame was custom-built for the print. A raising strip made of conservation cardboard protected the print from the Plexiglas pane. The groove was itself covered with a strip of conservation cardboard so as to prevent any damaging contact between the wood and the hinges.

The bottom of the frame was made of honeycomb polycarbonate board. This made the frame more rigid while remaining light. It was secured using a back frame, itself screwed into position on the back.

With polyester showing little response to hygrometric variations, and the work being intended for permanent framing, we decided to seal neither the mounted print nor the frame.

Figure 14: Placing bottom of frame ©arcp

Figure 15: Frame raising strip ©arcp

Figure 16: Placing frame, face up ©arcp

Figure 17: Closing frame, face down ©arcp

Figure 18: Print, mounted and framed ©arcp

Assessment

The result was satisfactory, especially as regards flatness – a most critical issue with this highly glossy process where reflections amplify the slightest distortions. No alterations were found after the prints had been stored vertically for ten months. There is, however, room for improvement; in particular the support board should be more rigid. And of course we have no long-term practice of this technique, so monitoring stability over time will be the key in assessing it.

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NOTES

[1] Rohrbach, John with Robert Glenn Ketchum. *Regarding the Land: Robert Glenn Ketchum and the Legacy of Eliot Porter*. Fort Worth, TX: Amon Carter Museum, 2006.

[2] Dedicated to the history of Paris, the Musée Carnavalet houses some 150,000 documents in its graphic arts division, some of which date back to the invention of photography (1839). The variety of photographic processes (daguerreotypes, calotypes, salt prints, albumen prints, woodburytypes, black & white and color photographs) reflects the wealth

of the collection, which includes some of the greatest artists in the history of photography: Le Secq, Nadar, Marville, Baldus, Collard, Atget, Doisneau, Ilse-Bing, Cartier-Bresson, Brassaï, etc. See www.carnavalet.paris.fr/

[3] Stéphane Couturier was born in 1957 in Neuilly-sur-Seine near Paris. His work on urban landscapes is to be found in many galleries, institutions and collections in France and elsewhere (USA, Switzerland, Germany, Belgium…). See Mathieu Poirier in *Stéphane Couturier*, Éditions Adam Biro, Paris 2004.

[4] In the first trial we used a single continuous hinge on each side. As this led to serious distortion, we unmounted the print and re-mounted it using the segmented technique, and flatness was restored.

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MOUNTING LARGE FORMAT PHOTOGRAPHS AT THE NATIONAL GALLERY OF VICTORIA, AUSTRALIA

PIP MORRISON

In preparation for an exhibition of over 50 large format photographs, and in order to address the backlog of unframed oversized photographs in the National Gallery of Victoria collection, a system was devised to permanently mount and frame works in a manner that could be achieved effectively, efficiently, and with little assistance. In collaboration with the Senior Textiles Conservator, Bronwyn Cosgrove, and the Conservation Technician, Gervais Battour, a variety of adhesives and hinging materials were tested for their effectiveness on various contemporary photographic supports. The materials deemed the most successful and their method of use are outlined briefly below.

1. A film of 2:1 Lascaux 360HV:498HV is made by rolling the adhesive mixture on to a sheet of tensioned polyethylene with a glass rod. This is air dried, and then one of the edges is cut to provide a straight edge. It was found that this adhesive mixture provides the desired amount of adhesion and flexibility, but if brushed on to the hinge, it seeps through and both sides of the hinge are tacky.

2. 34 gram Hollytex strips are cut to the desired width. Hollytex, a non-woven polyester, was chosen as it can be pulled extremely taut without breaking or warping, and does not have as fibrous a surface as Reemay.

3. 1cm strips of the Lascaux film are heat set on to the Hollytex hinge using a heated spatula at 80°C (176°F). Large numbers of adhesive edged hinges are made in batches, and stored for future use. The polyethylene acts as the adhesive carrier.

4. The Hollytex hinges are cut into strips of approximately 20 cm to reduce the risk of the hinges warping and creating tension at the edge of the photograph. The polyethylene is peeled off, and the hinges are heat set along the edges of the verso of the photograph through silicon release, using the heated spatula at 80°C. Lower temperatures can be used, but it was found that risk of burnishing the emulsion surface is reduced at 80°C as less pressure is required to activate the adhesive.

5. Dibond® is used as the secondary support, and can be cut in-house to the required dimensions. It has a polyethylene core, with aluminum on either side, and remains rigid at large sizes. It has passed the PAT performed at the National Archives of Australia.

6. With the photograph face down, the Dibond® is put into position and weighted. The hinges are wrapped around to the verso of the Dibond®, pulled taut, and attached using pressure sensitive Velcro. The Velcro enables re-tensioning of the photograph at a later date if any buckling has occurred.

7. The mounted work is then housed permanently in a box frame of standardized profile, with a spacer width dependent on the size of the photograph, UV protectant acrylic glazing, and a Fome-Cor backing board.

With ready made hinges, it takes one person between one to two hours to mount one large photograph. A second person is only needed to assist with lifting the Dibond into place if large, and for the framing. The hinges can be reversed by peeling them back at an acute angle, and any adhesive residue removed with a crepe eraser. Photographs of up to over two meters in length have been mounted and framed successfully using this technique for the last year. In this year, the photographs have been transported to an off-site exhibition space, been on display for five months, and then returned to storage. The photographs mounted this method appear not to have buckled, indicating the system is holding in various environments. They will continue to be monitored.

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MOUNTING MEDIUM AND LARGE-FORMAT PHOTOGRAPHS

MARIA FERNANDA VALVERDE

This is a mounting technique that has been used for medium size to moderately large format photographs (up to 110 x 80 cm approximately). It takes advantage of the contraction experimented by paper, which is more pronounced in the machine direction (in machine-made papers), as it dries. Its principle is similar to that used by artists for stretching watercolor paper (in preparation for using it as support) and by paper conservators for flattening large format prints and maps. It is also used by canvas-painting conservators for stretching wavy supports before lining the paintings.

Four paper bands (7 to 10 cm wide), to be used as hinges, are cut the same size of each side of the photograph. The hinges can be adhered to the photograph in either wet or nearly dry state (with the humidity provided by the adhesive only), but they need to be **entirely moistened** when attached to the rigid support. 8-ply rag board has been used as support but another type could be tried. Wheat starch paste (with or without a small amount of methyl cellulose – depending of the size and thickness of the photograph and the working time determined by the RH of the environment) has been used as an adhesive. This has been used to attach the hinges to both the photograph and the rigid support. Other water-based or water-compatible adhesives might be used.

The photograph might be dry or moist during the mounting process but the latter state will create more tension (which might be desirable or not depending on the photograph). 1 to 2.5 cm of "free" hinge must be left around the photograph; between the edges of the photograph and the area of the hinge to be attached to the rigid support. This area of "free" or loose paper creates an even tension as the hinge dries and will compensate or absorb possible dimensional changes of the photograph in the future. The outer edge of the hinge is attached (to the front) of the rigid support.

Hand-made Japanese papers of various thickness have been used as hinges, but machine-made papers might be also used for larger photographs or when more tension is required (the machine-direction of the paper must be parallel to the edge of the photograph. The hinges can be left air dry but the areas attached to the photograph and to the rigid support **must dry first** or at the same time than the loose or "free" surrounding zone, otherwise the tension exerted by the latter will provoke detachments of the hinge (from either the photograph or the rigid support) and consequent deformations.

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