5 Contemporary Sculptural Techniques

Traditional papermaking is a form of casting. The flat, rectangular shapes formed on the mold are usually bound in books or covered with an image. But the papermaker’s craft and materials offer today’s artists fertile ground for experimentation. Each pulp has its own inherent texture, color, and transparency, which can be used as is or pigmented or dyed. Sizing and adhesives can be added to change further its character. Its malleable nature makes it a much sought-after material.

With some water removed, pulp can be manipulated by hand much like clay. Found objects can act as armatures to support the image or can be added for texture. The wet pulp can be formed in and easily removed from conventional plaster or rubber molds. It can be sprayed from modified air guns, and shaped molds can be dipped into a vat of pulp to form thin translucent, three-dimensional objects.

Many artists have invented new methods and equipment for working with the materials to express their ideas. These inventions and the contemporary paper art object itself will undoubtedly stand as our contribution to paper’s ever-expanding history.

*Hand Manipulation*

Hand manipulation is simple, inexpensive, and quick in comparison with more traditional papermaking techniques. It can be used to create large forms or sheets, since traditional molds are not required. A beaten pulp can be strained to remove excess water and handled much as clay is handled. It can be pushed into forms or around them. Different colored pulps can be laid next to each other to create imagery viewable from both the front and the back. If viewing from only one side is intended, additional layers of pulp can be used to enclose an armature or hanging device or to create additional thickness and bulk.

Lin Fife applies colored pulp to areas of the draped image of her piece Interrupted Carpet. (See finished work in color section.)
The fibers in this procedure do not interweave as they would in a traditional, vat-formed sheet. Although the sheer bulk of the work may hold it together, binders (methylcellulose or other high-grade archival adhesives) are generally added to the wet pulp to give the work added or necessary strength. On some thin pieces, the back of the work can be coated with gesso for additional strength.

The drying time for thick pieces can be reduced by pressing them with sponges to remove excess water. Felt can be pressed on flat pieces to smooth the surface. If the work is flat but too large for a conventional press, improvised presses can be made using building blocks as weights. A fan and heat lamp will speed drying.

As this kind of work dries, it may become distorted, but this effect can be minimized by using a low-shrinkage pulp such as cotton linter or abaca or by adding a filler such as clay. The work should be dried slowly and evenly and may be weighted in areas as it dries.

When working in such a free method, certain precautions need to be taken. As the water evaporates from the work, any dissolved materials in the pulp will be carried with it and deposited on the high spots of the casting. This contamination appears as brown stains. It can be eliminated by filtering the water system. If the water is filtered and stains still appear, the contamination may come from atmospheric particles, pigments, or the leaching of color from a wooden form or element in the work itself. This can be minimized by sealing all wood with polyurethane or Thompson’s Water Sealer and by using strainers, storage buckets, fasteners, and screens made of noncorrosive materials such as plastic, aluminum, or brass.
Untitled, from the series Secret Ceremonies
David Merker, 1979. 36" x 36" x 3". Cast paper
and graphite.
Once the impressions were formed, she couched sheets made on a 9" x 12" mold onto the dampened earth. For pulp she used phone books, newspapers, and scraps, which in the forming process picked up stones and twigs.

In order to create Framed Calipered Traverse, Diane Katsiaficas had to learn to drive a tractor. The tiretracks were the image and mold for her work.

In order to make the piece stable and durable, she treated the back with a layer of cheesecloth and liquid adobe stabilizer, which gave the final work a rubbery quality. It was then rolled up and taken to her studio, where it was treated with pigments.
Framed Calipered Traverse, *detail*.

Framed Calipered Traverse, *Diane Katsiapis*, 1980. 9' × 15' × 10'. (*See color section.*)
Let De Boat Walk II, Joan Hall, 1980. 72" × 56" × 6". Cast, dyed, and painted three-dimensional sculpture.

Maisi, Joan Hall, 1981. 22" × 56" × 3". Mixed media.
Pressing the work with felts speeds the drying, compacts the fibers, and affects the final surface texture.

Impressions are made in the work. Other objects are added, and the piece is left to dry with the aid of fans. Later, the finished form is painted and treated with other coloring agents. (See Mosaic in color section.)

In a collaborative effort at Dieu Donne Press and Paper in New York City, Fredric Amat takes pulp directly from a large ten-pound beater using a hose.

Layers of color are applied, and chunks of other colors are added for texture. The work rests on a plastic screen, which aids drainage and speeds drying.
Piano Trap with Suite of Poems for John Cage, a performance installation by Coco Gordon, October 25, 1981, London, Ontario. Photograph by Helmut Becker. The structure used in this event was made by pouring cotton rag, flax, and silk pulp over a wire mesh form. These pulps were beaten separately to different stages of hydration in the Hollander beater and then mixed together. This method of preparing pulp ensured thorough fibrillation yet maintained long fiber length, which was needed because the work could not be pressed. This pulp increased the strength and ensured the stability of the exaggerated forms.
Prairie Ridge Series VIII, Carol Rosen, 1982. Preformed Oriental papers were dampened and stretched over tall reeds.

Prairie Ridge Series IX (detail), Carol Rosen. 1982. The paper became taut upon drying and was then covered with graphite for color.
Plaster Casting

For hundreds of years plaster has been used to create molds of real objects. It can also be carved. In either case, the absorbent nature of plaster makes it ideal for use in paper casting.

There are many grades of plaster, each for a specific function. Common plaster of paris, available at most hardware stores, can be used for some simple casting projects, but its main function is to patch holes in walls. It is not very absorbent, and the molds made of it will deteriorate after only a few castings have been made. U.S. Gypsum Molding Plaster #1 and Georgia-Pacific K 59 are plasters produced for mold-making and can be purchased at ceramic supply stores. They may be sold under the name of pottery plaster. They are very absorbent, strong, and durable and can be used many times without decomposing or suffering any loss of image detail.

Plaster forms crystals when mixed with water. When added to cold water, the crystals formed are small, producing a tight, dense plaster and a mold with a hard, durable surface. When the plaster is mixed with hot water, the crystals formed are large, producing a mold with a grainy texture.

The proportion of dry material to water is critical for proper crystal formation. Twenty-two ounces of plaster are added to every pound of water. (For convenience, one pint of water equals one pound.) The dry powder is always added to the water, and stirring the powder through a strainer will eliminate lumps in the mixture. Stirring will speed the setting time and produce larger crystals. The longer it takes for plaster to set, the denser and stronger it will be.

When determining the amount of plaster for a specific mold, several formulas may be used. For the volume of a cube, the formula is: Volume equals Length times Width times Height ($V = L \times W \times H$). For example, a box 6 inches high, 7 inches deep, and 8 inches long contains 336 cubic inches of volume ($V = 6 \times 7 \times 8 = 366$ cubic inches). One quart of water plus 2½ pounds of plaster will make 80 cubic inches of solid plaster. When converting from cubic inches to quarts, the cubic inches divided by eighty equals the number of quarts of water to be added ($cu.\ in. \div 80 = qts.$ or $336 \div 80 = 4.1$ quarts).

The following table will help you determine the amount of plaster you will:

<table>
<thead>
<tr>
<th>Water Ratio—1:1½ by weight</th>
<th>Water</th>
<th>Plaster</th>
</tr>
</thead>
<tbody>
<tr>
<td>½ pt.</td>
<td>11 oz.</td>
<td>1 lb. 6 oz.</td>
</tr>
<tr>
<td>1 pt.</td>
<td>2 lbs. 4 oz.</td>
<td>2 lbs. 12 oz.</td>
</tr>
<tr>
<td>1½ pts.</td>
<td>2 lbs. 12 oz.</td>
<td>4 lbs. 2 oz.</td>
</tr>
<tr>
<td>1 qt.</td>
<td>5 lbs. 8 oz.</td>
<td>6 lbs. 14 oz.</td>
</tr>
<tr>
<td>1¼ qts.</td>
<td>8 lbs. 4 oz.</td>
<td>9 lbs. 10 oz.</td>
</tr>
<tr>
<td>2 qts.</td>
<td>11 lbs.</td>
<td>12 lbs. 6 oz.</td>
</tr>
<tr>
<td>2¼ qts.</td>
<td>13 lbs. 12 oz.</td>
<td>15 lbs. 2 oz.</td>
</tr>
<tr>
<td>3 qts.</td>
<td>15 lbs. 2 oz.</td>
<td>16 lbs. 8 oz.</td>
</tr>
<tr>
<td>3¼ qts.</td>
<td>19 lbs. 4 oz.</td>
<td>22 lbs.</td>
</tr>
<tr>
<td>4 qts.</td>
<td>24 lbs. 12 oz.</td>
<td>27 lbs. 8 oz.</td>
</tr>
<tr>
<td>4¼ qts.</td>
<td>27 lbs. 8 oz.</td>
<td>30 lbs. 4 oz.</td>
</tr>
<tr>
<td>5 qts.</td>
<td>32 lbs.</td>
<td>35 lbs. 12 oz.</td>
</tr>
<tr>
<td>5¼ qts.</td>
<td>38 lbs. 8 oz.</td>
<td>41 lbs. 4 oz.</td>
</tr>
</tbody>
</table>

For each additional quart beyond 15, add 2 lbs. 12 oz. of plaster.

Courtesy of Chris Guston.
Mold release agents are used to prevent objects from sticking to the plaster. In most cases they are water soluble soaps (liquid dish soap will work). A commonly used release agent called green soap can be purchased at ceramic and art supply stores. It needs to be cooked for several hours. The resulting soap is very fine and thin and does not produce bubbles when brushed on the object to be cast. Bubbles can cause pockmarks on the surface of the image.

The main consideration in examining an object to be cast is the awareness of undercuts, any plane on the surface of the object which goes behind another. For example, when casting a round rubber ball, any point beyond the midline will make it impossible to remove the trapped ball from the hardened plaster.

One more word about objects to be cast. Right angles are difficult to remove from a mold. If at all possible, taper the form slightly to aid separation.

Water is absorbed in a plaster mold, passes through it, and evaporates off its back side. Plaster molds for papermaking do not need to be heavy and thick to do their job well. A thin mold of uniform thickness can be strong, and water will evaporate quickly from it.

In some cases, undercuts can be incorporated if the object can be removed from the casting at another angle.

Some forms cannot be cast as a one-piece mold but can be successfully reproduced with a multiple-piece system.
Plasticene, an oil-base clay available at art supply stores, can be pressed against the objects to be cast and used to delineate seam lines. For a one-piece, simple mold, the plaster is then brushed onto the object and the plasticene, which creates a lip for the mold. For small objects, plaster is applied in even layers until the mold is one half inch thick all over. As the plaster sets, heat develops, and the object should not be removed until the mold is cool again, forty minutes or so. At that point, if a multiple-piece mold is to be made, the plasticene can be removed and repositioned for the next section. The edge of the first section should be lightly coated with soap and the next area of plaster brushed in place.

The mold will be completely dry when it no longer feels cool to the touch. At this point, the object can be removed and casting can begin. Once set, a plaster mold is insoluble in water.

Pressing wet pulp directly into the mold will result in a thick, opaque casting. Adding a small amount of adhesive (methylcellulose) to the pulp beforehand will improve its strength. Too much, however, will attach the casting to the mold.

Another approach to casting, laminate casting, involves the layering of small pieces of already formed and lightly pressed paper. These pieces are tapped in place with a stiff bristled brush. Methylcellulose is brushed on the base layer, and the process is repeated until a thin casting is formed. Soaking the mold in cold water for ten minutes before starting prevents the papers from drying out too quickly and allows more time for the laminating process. These techniques may be combined when exotic plant pulps are used for their surface qualities or color and when only small amounts of these pulps are available. A bulkier casting can be produced by laminating the mold with the exotic pulp, then backing it with a more readily available pulp.
Spraying Pulp
Louis Lieberman has modified the procedure for creating castings in plaster molds. His image is created in hard-grade plasticene modeled directly on a Formica surface. Plaster is applied to this image in two layers. A hard plaster is applied directly to the plasticene and forms the durable working surface of the mold. A second layer of plaster whipped full of air by a mixing device is applied on top of the first. Upon drying this second layer will be extremely absorbent and will pull out the large amounts of water sprayed on the mold during the casting process.

For pulp Lieberman uses commercial etching paper that has soaked and aged for several weeks in a refrigerator. This is then mixed in a kitchen blender and added to the chamber of a modified paint spray gun. An air compressor powers the gun and forces the fibers into intimate contact with the mold, producing an extremely smooth surface on the casting.

A modified spray gun is used to apply a thin layer of pulp to the absorbent plaster mold.

The casting is removed from the mold with the aid of compressed air.

An extremely short-fibered pulp is prepared in the blender.

The resulting paper is very thin.
To ensure that the casting does not stick to the mold, Lieberman sprays the mold with talc. These thin castings are made more rigid after drying by coating each side with a sizing and applying several coats of gelatin-based gesso to the back. He combines additives, flocking, clay, and powdered dry plaster to the pulp to reduce shrinkage and distortion of the casting while in the mold and to give the sheet the proper tooth or texture needed to make the dark pencil lines of his images.

This technique can be modified to produce papers without molds. Artist Joe Zina sprays colored pulps onto a taut bed sheet to create large, colorful and lightweight papers. These are then shaped into forms, or the paper is torn and used collage-style for two-dimensional wall works. His sprayer is a gun used for spraying concrete. Because of its large orifice, some long-fibered pulps can be sprayed.

First Mist, Joe Zina, 1982. 4' x 5'. Sprayed, dyed pulp.
First Mist (detail).
Rubber Molds

An object with undercuts cannot be cast in a one-piece plaster mold, but it can be successfully cast in a mold made of latex rubber (natural rubber). Its flexible nature allows latex rubber to be stretched and pulled away from the object and from the dried paper casting.

The process of making a latex mold is more time-consuming but no more difficult than making a plaster mold. Several thin layers of latex (available at many art supply stores) should be brushed on the object and allowed to dry completely—twelve to twenty-four hours. Fine wood dust from a sanding machine can be mixed with latex in the next layers to make them thicker and speed the building up of the mold. If the mold is to undergo extreme stretching, it should be reinforced with a layer of cheesecloth between layers of latex. When dry, the latex will detach easily from the model without a separating agent.

Before you remove the mold from the object, a support mold of plaster should be made to hold the flexible latex mold during casting and storing. The plaster is brushed on the back of the latex mold and when dry can be separated.

Latex rubber molds should be stored in a cool, dry place. They do not last long, becoming dry, brittle, and easily torn within a year. Storing them in their plaster support mold is essential to maintain their original shape.

Silicone rubber is a long-lasting synthetic and quite expensive. It is available through the Dow Corning Chemical Co. One advantage of this material is that it can be poured over an object to create a mold of any thickness. It cures in only a few hours. Only a single application is needed. The release agent is dish soap that has been allowed to dry on the object. The tough, durable mold will stretch to release undercuts. Silicone rubber molds also should be backed with a plaster mold for support.
To produce the casting, the pulp is pressed into the mold to form a casting approximately one inch thick.

When dry, the final casting is ready for use in the work.

**Shaped Molds**

These highly refined molds were built by Winifred Lutz for producing three-dimensional artworks. They are based on the idea of mold-making as the direct process for image-making. They are designed to be used with the Oriental sheet-forming process using gampi, ramie, linen, and bast fiber from indigenous plants and nerii or its synthetic substitute. The resulting images are thin and translucent, emphasizing the character of each fiber.

Inherent in the success of these castings is a thorough understanding of and familiarity with a wide range of fiber types and their preparation. Depending on how fibers are prepared, each has a specific color, density, sheen, shrinkage rate, and fiber length. An understanding of these variables increases the visual possibilities of the casting and guarantees its success.

Fibers are carefully prepared by cooking, retting, or simple washing to ensure that the final paper is clear of lignin and other impurities. The fibers are then beaten in a stamper beater or in a carefully controlled Hollander beater to ensure that fiber length is maintained for strength and a particular surface quality and density.

*Shaped brass screening is sewn to wooden frames. These sections are attached to each other with brass screws and wooden clips. The paper casting is formed nagashizuki style. Photographs courtesy of Winifred Lutz.*

*Pulp and nerii are poured into the mold and distributed over the surfaces. The casting is allowed to dry in the mold, and the sections are then disassembled to reveal the totally three-dimensional translucent form. This casting is made of ramie beaten nine hours.*
This fabric screen mold has a very high deckle to ensure the complete covering of the ridge on the image. The finished casting (left) is made of ramic fiber by the Nagashizuki method.

The cloth surface is tied to the frame with waxed linen cord, a very time-consuming process. The cast image is allowed to dry on the mold. The cloth is then untied from the frame and pulled gently away from the casting.

This shaped frame has been designed to support a removable cotton cloth surface on which the paper will be formed.
Deckle Box
A very deep deckle attached to a mold can be floated in the vat. Pulps can be poured into this frame and shaken to align the fibers and produce extremely thick sheets or special marbled effects. When removed from the water and allowed to drain, the deckle can be taken off and the sheet couched onto the felt. Since pulp is poured directly into the mold, this method is also useful when only a small amount of pulp is available.

The pulp is poured into it as it rests in a vat of water.

This deckle box is attached to the frame with metal fasteners and has handles for easy lifting.

The deckle is removed to reveal the thick sheet.

Some of the excess water is removed with sponges.
The pulp is distributed by hand.

The deckle box is removed from the water and allowed to drain.

It is then couched directly onto the back of a latex mold.

The sheet is then pressed.
The mold is removed from the sheet.

The sheet is pressed again.

Two works by Cynthia Carlson, Fleur-de-lis and Loop, 1981. Published by 724 Prints and produced at Exeter Press, New York. The images were formed in latex molds and backed with thick sheets formed in a deckle box. The work was then painted.
1. A more complicated deckle box was made for the production of Living Room Diptych by Cham Henlin. It was made from metal and plexiglass at Exeter Press.

2. Into each area, colored pulps are placed and mixed to produce swirls of color.

3. With the deckle box removed, the thick pulp areas are ready to be couched.
The mold is tipped.

5 The mold is pressed and then pressed again in the hydraulic press.

Living Room Diptych, Cham Hendon, 1982, 44" × 30". Manila hemp and pigment. Photographs of the production of this artwork are by Lynn Forgach.
**Vacuum Table Casting**

Generally, three-dimensional objects cannot be pressed in a papermaker's press because of their high relief. At other times, fragile elements embedded in a work prevent traditional pressing, or the limited size of the press does not allow larger pieces to be pressed. For these occasions and for other uses, a vacuum table is a useful piece of equipment.

Designed by California artists Harold Paris and Charles Hilger, it consists of a flat surface attached to a vacuum chamber, a vacuum pump, and a water storage tank. A vacuum table is relatively easy to make using a wet and dry vacuum cleaner available at most hardware stores and lumberyards. Commercial tables are available as well and are much quieter and more durable than those run by a vacuum cleaner.

The surface of the table is drilled with small holes every six inches, but this distance does not seem to be critical and can be increased. The holes feed into a vacuum chamber, which can be simply a space under the table. All of the seams of this enclosure should be caulked with silicone sealer to ensure an airtight seal. Through a hole in the bottom of the chamber a vacuum hose is attached. The top of the table should be covered with several layers of flexible plastic screening, and a felt, on which the artwork is formed, should be placed on top of the screening.

Once the image is created, the entire surface of the table is covered with thin plastic sheeting, which will seal all of the air holes and create a vacuum within the box once the pump has been turned on. The extracted water travels beneath the felt, through the space created by the screen, through the small holes, and into the vacuum chamber. After several minutes, the pump can be turned off. The image will require further drying, but a great percentage of water is removed by this process.

Because of its structure, polystyrene plastic can be used as a mold on the vacuum table. Sheet-formed papers or pulp can be placed on top of this Styrofoam image. Water extracted by the vacuum will be pulled through the foam, partially drying and adhering the pulp to the mold. This table can be used to pull excess water from plaster molds, as well.

*This vacuum table was produced by Charles Hilger. It consists of a vacuum pump, a water storage tank, and a table surface covered with two layers of flexible mesh.*
Elaine Koretsky demonstrates one of the uses of the Hilger vacuum table. A basketry mat is placed on a white felt, and a freshly made unpressed sheet of paper is placed over it.

A piece of wood restrains additional pulp poured over the sheet for added thickness.

Thin plastic is placed over the surface of the paper and the table. Here you can see the contours of the mat as the pulp is flattened by the vacuum's pressure. After several minutes, most of the water will be removed from the object. It is then uncovered and left to air dry. Once dry, the undamaged mat can be removed.
Colored pulp is applied freehand for decorative effects.

A variation on the Hilger vacuum table can be made using two layers of marine plywood held apart by a 2" × 4" wooden frame. The top layer has holes drilled every six inches for the removal of water. To the bottom of this box is attached a wet and dry vacuum cleaner. All of the edges of this frame have been sealed with silicone sealer to ensure a proper vacuum.

The surface of the table is covered with two layers of flexible screen. These create a space below the white felt and paper object. Water travels from the casting through this space into small holes that carry it to a holding tank.