



Restoration of Art Frames

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ABSTRACT

As demand for the knowledge and expertise of firms under the umbrella of the National Institute of Fire Restoration increases, these firms are handling a large number of art pieces. Information on the restoration of art frames, now limited in scope and availability, has become a requirement for these firms.

This report therefore reviews the proper techniques for packing, protecting and transporting frames, as well as types of frame construction and the actual restoration work. Since the artwork is an integral part of the finished product, its removal and replacement is considered. An evaluation of frame replacement versus restoration is also given.

It is not intended that this report will provide all the necessary information or available procedures. Instead, the objective is to provide a practical approach to the subject that may be used by a restoration contractor.

ACKNOWLEDGEMENTS

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My wife, Doris was understanding on good days and bad, during research and writing, and also typed the rough draft of the paper. My daughter, Sue, who has written several reports in her field of Survey Engineering, was helpful in the report structure and content.

To these and others too numerous to mention, I express my gratitude.

1. INTRODUCTION

In no department of house adornment is a knowledge of art required as in the making of a picture frame. The good points of a picture are often fatally hidden by the absence of taste and fitness. (Decor, 1883)

Today, as in 1883, this statement is still valid although frame composition and construction have evolved. The restoration contractor must have a knowledge of frame composition and construction to accurately determine procedures for restoring art frames, and in the end result, to arrive at a realistic cost estimate. Knowledge in the field of art frame restoration is important for firms belonging to the National Institute of Fire Restoration. This knowledge will assist them in expressing opinions related to the prevention of further loss, the restoration work to be performed, and the work to be referred to a conservator. The major aspects of frame restoration are examined in this report.

Frames are constructed in various shapes and sizes and from a variety of materials, demanding a wide range of restoration procedures. This report also considers the glass, mattings and accessories that are integral with the complete frame.

To minimize any damage subsequent to a loss, attention must be given to proper handling and packing methods. Procedures for removing and replacing art within frames are discussed. A brief outline of how artwork is placed on mediums is also presented to give

the restoration contractor more confidence in handling art pieces.

To be successful in frame restoration, identification of framing materials and finishes is critical. Structural repairs and procedures vary greatly according to the extent of damage and the composition of frames and their components. A working knowledge of appropriate cleaning products is also essential. Restoration supplies for light cleaning are normally available from local supply houses. However, the restoration contractor should also be familiar with specialty items available only from supply houses involved in conservation and restoration work.

In making a decision whether to restore or replace an art frame, care must be taken to properly assess situations where the cost of restoration approaches or exceeds the replacement cost. In an insurable loss, the insurance company could have the option of paying the lesser amount. Whenever such a decision is required, it is essential that all parties be well informed as to the expected quality of restoration and the related cost. Antique and high quality conservation frames normally fall within this type of decision.

This report may not address all the problems an individual contractor may face in specific situations. It does, however, provide general procedural guidelines and background information which would cover most cases of frame restoration.

2. FRAME CATEGORIES AND CONSTRUCTION DETAILS

2.1 Frame Categories

"Framed", according to Websters Dictionary, means "enclosed within a border". The picture frame serves the basic function of protecting the picture, allowing it to be seen. It also serves to define the space of the picture and, in some cases, to reflect light. Conservation framing is a special type of framing. It preserves and extends the life of artwork and requires special construction techniques and materials. Museum framing is normally of the conservation type. Frames have been categorized in Decor (1982) as follows:

Adjustable frames	Odd sized frames
Circle frames	Oval frames
Fan frames	Sectional frames
Miniature frames	Shadow box frames
Mirror frames	Spandrel frames
Odd shaped frames	Standard frames

2.2 Frame Mouldings

Frame mouldings are available from manufacturers in numerous forms. These have been classified in Decor (1982) as follows:

Wood unfinished	Metal covered
Wood finished	Embossed
Compo unfinished	Plastic
Compo finished	Leaf finished
Carved unfinished	Burnished finished
Carved finished	Formica covered
Metal	

In North America basswood and poplar are the most commonly used

woods in moulding manufacturing. Ramin, from Malasia and Burma has been used extensively, however, the supply of this wood is becoming scarce. Obeche, a soft light wood from Africa, finishes well but has a tendency to twist. Native hardwoods such as birch, walnut and maple are also used in the manufacturing of mouldings.

After the raw lumber is kiln dried, it is cut to size and fed through a shaper which cuts the profile. Stain is applied either by hand or by machine and then the surfaces are finished with two coats of lacquer. When antiquing, the lacquer surface is sanded and the desired colour or colours are applied. Fly specking is applied by spraying and the final antiquing (toning) is done by hand.

High relief "gingerbread" frames date back to the eighteenth century. The ornaments were first made of plaster of paris. Later, a more permanent material called "compo" replaced the plaster of paris technique. Compo is a malleable material made from whiting (gypsum), animal glue, resin and linseed oil. The material is pressed into moulds while hot and then applied to the wood frames. The ornaments are steamed, which softens the glue, and when placed over the mouldings the ornaments will stick to the wood without other adhesive. Compo is normally finished by gilding, either with silver or gold leaf, or by burnishing with bronzing powders. Today some inexpensive high relief frame ornaments are made of moulded plastic.

Good quality hand carved frames come from either France or Belgium; less expensive ones are made in Taiwan or Mexico. Most of

the carved frames made in the United States and Canada are carved by machines. These techniques have been perfected to a point where it is difficult to detect the difference between the machine carved and the hand carved frames. Generally, frames are carved from softer woods such as basswood, pine or poplar. Hand carved frames often receive a natural finish.

Metal frames for the most part are constructed from extruded aluminum shapes. First produced in the early 1960's, aluminum mouldings have been popular in the framing business, particularly in the field of graphic art. Aluminum mouldings are made by extruding hot 6063 or 6463 billets of aluminum through various shaped dies. Aluminum mouldings for frames must be painted or anodized. If painted, enamel or alkyd paint is applied after the surface has been cleaned and dried to produce a hard durable surface. Anodizing is performed by steps of cleaning, dipping, sealing and rinsing to produce gold, bronze, pewter or chrome surfaces.

Metal wrapped moulding was developed for design and construction reasons. Thin (0.012" and 0.016") gauge metal is embedded into the wood moulding and since the metal has the potential of conforming to the shape of the underlying wood, it can take on shapes not possible with extruded mouldings. Aluminum can be finished by either coating the surface with baked enamel or by anodizing. Zinc, copper and steel are used to a limited extent in the manufacturing of metal wrapped frames.

Embossed moulding is a substitute for hand or machine carved mouldings. The moulding is run in length through a machine equipped with

a steel wheel which bears the pattern. This wheel is heated by torches and the design is burned into the wood as it passes under the wheel. The result is a continuous pattern from one end of the moulding to the other.

An almost unlimited variety of shapes can be formed by the use of plastic. Plastic mouldings are shaped from extruded resins forced through dies. The composition of plastic allows for small, but very strong, mouldings to be produced.

Leaf finished mouldings are made by applying gold or silver leaf to the surface. The final effect depends greatly on the surface prior to the leaf application. A glue sizing placed on the moulding surface is used as an adhesive for the leaf. Gold and silver leaf is extremely fine and special procedures are used to place it on a moulding. A thin coat of shellac or lacquer is used to protect the leafing once placed. The leafed surface may then be antiqued.

Burnishing is a little easier than leafing. The burnishing liquid is painted on the moulding after it has been prepared by sealing and painting with a ground colour or "bole". Another method of burnishing is to use bronze powder on a moulding prepared with a glue sizing. The powder is dabbed on the sizing to produce a thin layer of powder over the surface. Burnished surfaces tarnish more easily than leaf and must be heavily antiqued and shellaced.

Formica covered mouldings are manufactured by pressing very thin

Formica strips, under extreme pressure and heat, over the surface of mouldings. Special contact glues are used to insure a permanent bond. This produces a very hard and durable surface, however, the moulding shapes are limited to flat or large radius rounds.

2.3. Frame Design

Good framing design depends on the moulding shape, finish and texture, as well as how the frame accentuates the artwork. The outside mouldings form the main frame to which other frame components are added. Mouldings have four basic measurements: the height and width of the rabbet and the height and width of the moulding, as depicted below.

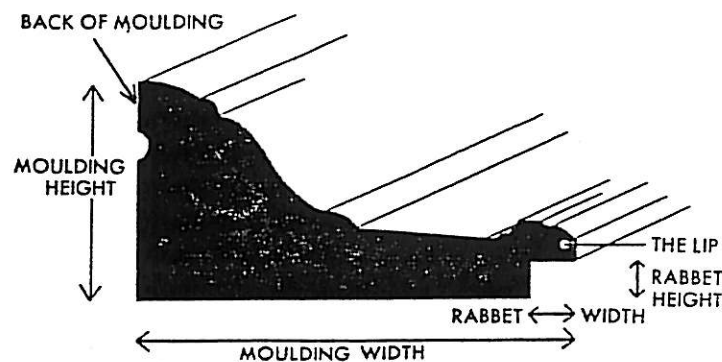
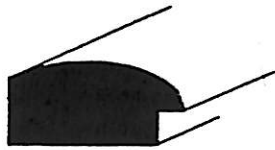
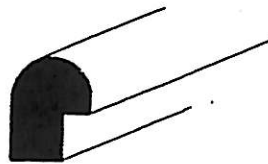


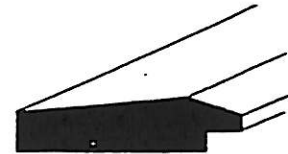
FIGURE 1: Moulding Dimensions (Freshman Framer, 1978)



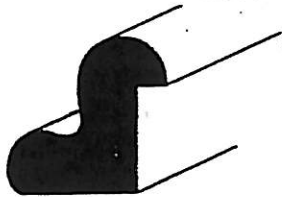
Clamshell



Half Round



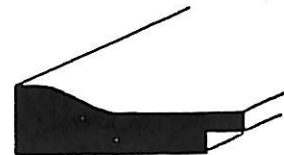
Reverse Slope



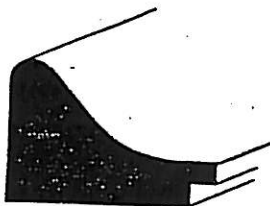
Swan



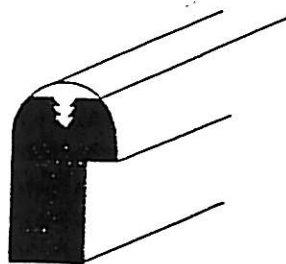
Reverse Scoop



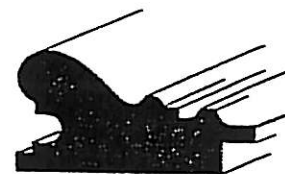
Shallow Scoop



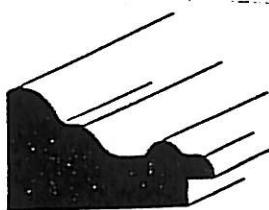
Deep Scoop



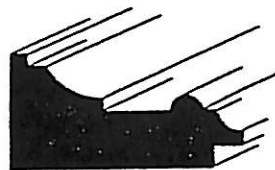
Tenite



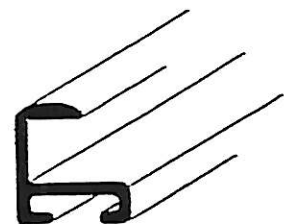
Scoop and Round Back



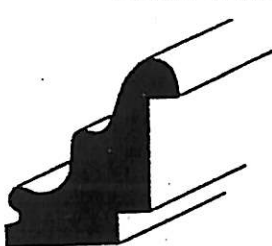
Borghese



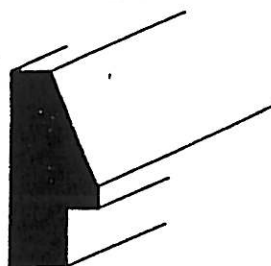
Scoop With Straight Back



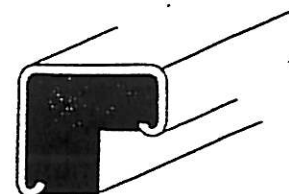
All Metal



Stem (Cap)



Wedge



Metal Clad

Frame mouldings are available in a multitude of shapes and sizes. The shapes have such names as ogee, deep scoop, wedge, box bergnese and tenite.

During World War II, when wood was scarce, manufacturers devised a way to produce moulding from thin boards. Instead of feeding a thick board straight through the cutters, the thin board could be tilted. A design could be cut on one side, leaving a "shell" on the other. This makes a bottom which follows the slope of the top design. "Scoop" refers to the design of the top (visible) part of the moulding. "Shell scoop" means the back and bottom have been similarly cut away. (Freshman Framer, No. 1, 19)

Profiles of some of these shapes are illustrated in Figure 2.

Framing is enhanced by the addition of liners and fillets which are shown in Figures 3 and 4. A liner is a moulding which goes inside a more ornate outer moulding. Liners are often fabric covered and their texture, colour and fabric serve the same function as mattings around artwork. Liners cover only the top and the lip of the moulding and cannot be used alone. A fillet is a narrow flat moulding, with or without a tiny bead on the lip, generally used just inside the outer moulding. Fillets are typically either gold, silver or plain steel. The purpose of the liners and fillets is to add sparkle, luster and richness to frames.

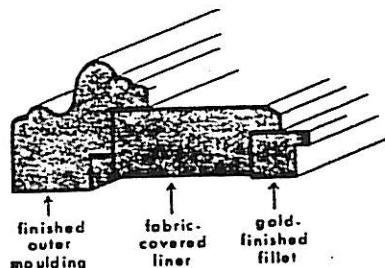
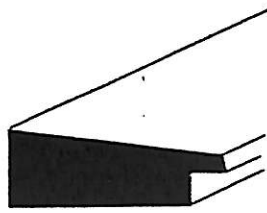
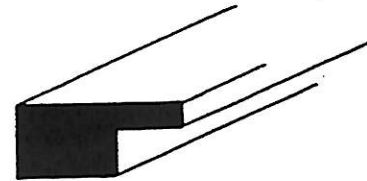


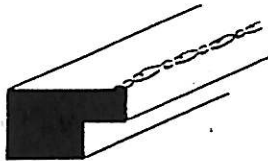
FIGURE 3: Moulding with Liner and Fillet (Freshman Framer, 1978)



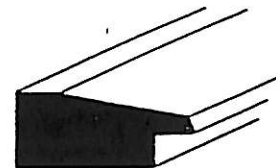
Slant



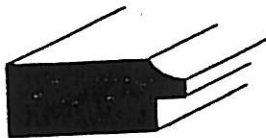
Flat



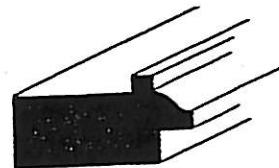
Fillet Beaded



Beveled Liner



Conge



Cgee

FIGURE 4: Typical Liner Shapes (Freshman Framer, 1978)

2.4 Glass

In framing pictures or prints, three types of glass may be used. Although window glass is the least expensive, it can have the most flaws. Picture framing glass is generally of higher quality; it has fewer flaws but is therefore more expensive. This special glass is also thinner, which makes it more subject to breakage. Non-glare glass is produced by etching one or both sides of picture framing glass with acid.

The glass quality used in framing is generally Grade A or B, that is, glass that has been inspected for flaws. Traditionally, Germany and Japan have been recognized for the quality of the glass they produce. Glass for framing also comes in two strengths: single and double. While single strength glass is used in routine framing, special display boxes often require double strength.

2.5 Matting

Matting provides the necessary physical separation between paper artwork or photographs and the glass. Moisture can form behind glass, which may stain artwork placed in contact with the glass.

Most coloured matboards have three parts. On top is a coloured paper sheet, which is either smooth or lightly textured. In the middle is a thick cardboard core. On the bottom there is a whitish sheet on which the board colour and/or manufacturer's name is printed.

Matboard called "ragboard" is solid and is composed of 100% cotton rag, acid-free fibres. It is the only type of matting used in conservation framing of paper artwork and photos. Acid free ragboard prolongs the life of the artwork by reducing chemical reaction. Another type of ragboard is made from a combination of chemically neutralized wood pulp and cotton.

Matting has also been made from masonite, chipboard, steel, aluminum and other unusual materials. Recent matboards, such as foam

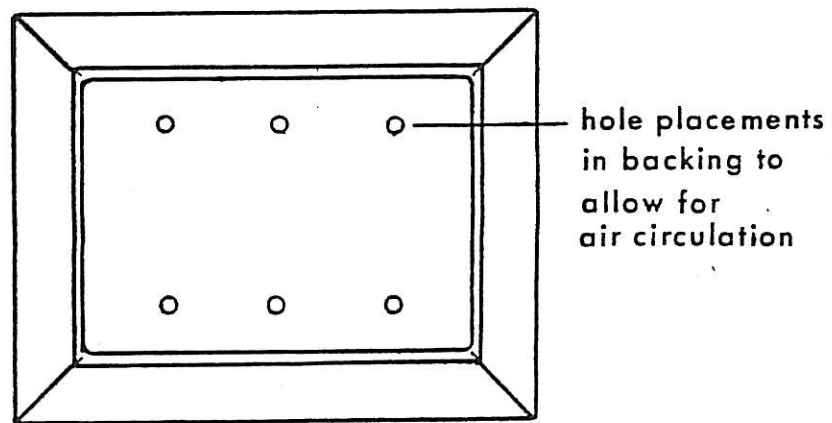
core-board, sponge board and upson board have begun to make inroads in the framing industry.

2.6 Stretcher Bars

Stretcher bars are lengths of smooth, beveled, shaped wood with mitered, tongue and groove corners. These fit easily together without glueing or nailing to form a back mounting frame for canvas, needlework and tapestries. As 'stretchers', they can be opened out slightly at the corners if further mounting tightness is needed. This is accomplished by 'keys', small flat triangular pieces of wood that are tapped into corner slots of the frame. Stretcher bars are usually manufactured from kiln dried pine.

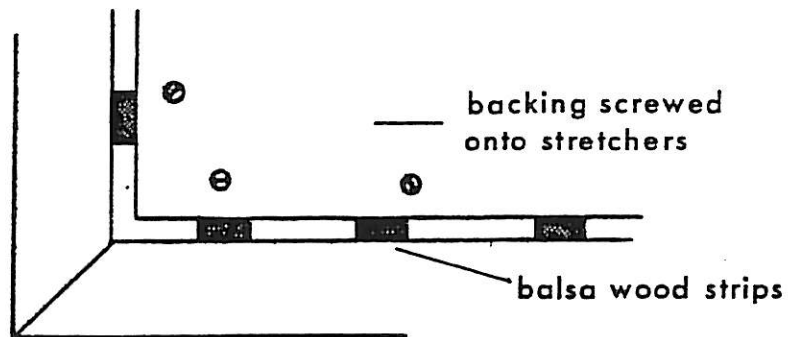
2.7 Backings

Backing is usually kraft paper or water repellant cardboard placed on the back of frames. There are two schools of thought concerning backings. One is that moisture and humidity entrapment in a back-sealed painting leads to mold and mildew growth and canvas rotting. The other is that leaving the back open may lead to accidental blows and punctures of the canvas, as well as to the accumulation of dirt which weaken the canvas. If backings are installed in conversation framing, then ventilation is usually provided by holes drilled in the backing or by wood strip vents placed around the perimeter of the frame. See figures 5 and 6.



To promote air circulation in paintings, place a series of small holes top and bottom in the backing board. You may want to cover with fine gauze to keep out the dust.

FIGURE 5



Balsa wood strips can be glued (with white glue) into the spaces between the stretcher and the moulding to give a firm yet not squeezed fit of the painting in the frame.

FIGURE 6

3. ARTWORK REMOVAL AND REPLACEMENT IN FRAMES

3.1 The Need for Protection

Restorers can be held liable for any damage to artwork while restoration is carried out. Improper methods could cause damage that might not be noticed for some period of time. For example, use of proper tools to remove the screws, brads and other hardware will help prevent damage to the frame, frame accessories and the artwork itself.

3.2 Protecting the Artwork

Knowledge of how an oil or acrylic painting is laid up will assist the restorer in protecting the painting. Figure 7 shows a cross-section of a painting. The circles and wave-like lines represent the weft and warp threads of the canvas. The priming coat, usually of white lead, provides an appropriate surface on which to paint. In addition, some painters apply imprimatura, a thin coat of pigment that may show through the finished work. One or several coats of (oil or acrylic) paint is then placed on the prepared surface to form the painting. A protective coat of varnish or shellac is sometimes sprayed over the painted surface.

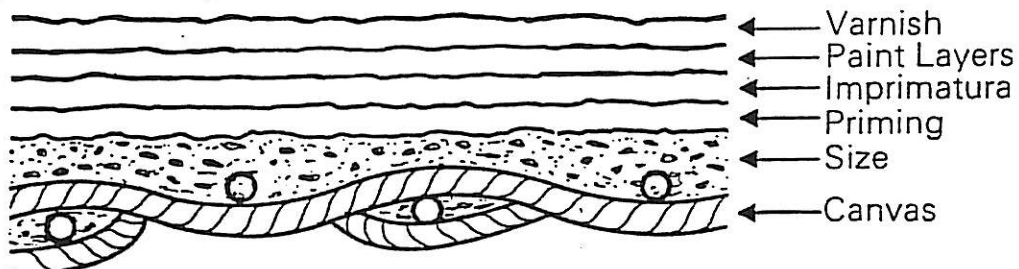


FIGURE 7: Cross Section of a Painting (Treasure Keepers, 1973)

Before commencing restoration work the painting must be removed from the frame. To avoid abrasion a canvas should be rolled with the paint film on the outside, with a sheet of paper or wax paper between the painted surface and the back of the canvas. Rolled in this manner, cracks in the paint film can be eliminated when the painting is restretched. The painting should be rolled over a heavy cardboard mailing tube to prevent crushing.

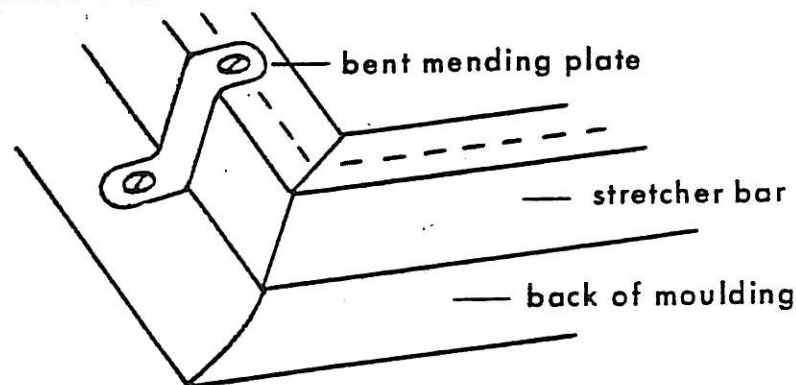
3.3 Replacing Artwork in Frames

Proper cleaning of glass is important before replacing artwork in frames. Commercial glass cleaners often contain chemicals that may damage the matting. A mixture of 1 pint alcohol, 1 gallon water, 2 tablespoons whiting or rottenstone, and 1 tablespoon Ivory Liquid detergent makes a good cleaner. The alcohol and water dissolve the grease, the whiting or rottenstone polishes, and the liquid detergent acts as an anti-static agent.

To prevent dust or 'fish' from getting behind the glass, it should be wiped with a dry dusting cloth. The matted artwork is placed face up over the backing board and the glass is placed on top. Any dust particles trapped between the glass and the mat should be readily visible.

The use of staples or nails is not recommended for holding the painting to a conservation frame as it makes it difficult to separate

the frame and painting in the future. In the case of artwork on canvas, staples and nails do not allow flexibility for tightening the canvas. The best method of fitting artwork to a frame is to use a bent strip of stiff metal screwed into the frame. The canvas will then be held by pressure only. Mending plates, shown in Figure 8 can be bent to follow the contour of the protruding stretcher. They are usually available in local hardware stores.



Mending plates can be easily bent to fit the exact shape of the stretcher protrusion. You may or may not wish to screw into the stretcher bar. The pressure of the plate alone may be enough support.

FIGURE 8

3.4 Rehanging the Artwork

For hanging the framed artwork, screw eyes are generally placed about $\frac{1}{3}$ of the frame height from the top of the frame. On long vertical pictures, the screw eyes may be placed at $\frac{1}{4}$ of the height from the top. The apex of the wire should be approximately $\frac{1}{6}$ of the height from the top and at least $1\frac{1}{2}$ " below the upper edge of the frame. If the wire is too tight, it will exert excess stress on the screw eyes; this could cause the eyes to pull out or split the wood of narrow frames.

4. TRANSPORTATION AND PACKAGING OF FRAMES

4.1 Preparation for Packaging

Damaged frames require careful examination as soon after a loss as possible. If they have been subjected to heat and smoke damage, particular attention should be paid to hairline cracks and spalling of compo and gilding. If the damage has been from water, a check for deterioration of the compo and staining of the moulding is necessary. A photograph is helpful in recording the frame condition and appearance. Any suspected predamage should be documented.

Loose pieces of compo or moulding should be saved, as some pieces can be reused; this could save the restorer time and materials. Any hangers, screw eyes, and wires must be removed to facilitate packing and to prevent damage to the frame. The artwork can be left in the frame if it is secure. If not, it should be removed and packaged separately.

4.2 Packaging

A bubble cushioning material, such as Astro Bubble, is a good material for packaging frames. This transparent material is lightweight, clean, easy to handle and lint free. Its resilient, air-filled cells of polyethylene reduce vibration, and the material is nonabrasive. The light weight of the cushioning wrap also helps to reduce shipping costs while providing maximum protection.

To pack a frame the following procedure should be used:

1. A piece of material of sufficient size to wrap the frame entirely is cut;
2. The frame, finished side up, is placed in the centre of the sheet of cushioning material;
3. The sheet should then be folded tightly around the frame and taped securely. If some overlap is allowed at the ends, it will help to protect the top and bottom of larger frames;
4. The wrapped frame is then ready to be placed in a packing carton lined with additional bubble cushioning material.
5. If the painting is still within the frame, it should be packaged in a mirror carton, taking care to cushion the bottom. No padding should be used on the sides or edges. The top and bottom of the carton are taped, leaving spaces for ventilation.

4.3 Transporting the Frame

The carton should be transported carefully in an upright position. If the carton is transported from heated to colder areas, or the reverse, it should be protected by additional wrapping. Extreme temperature changes can affect damaged compo or gilding.

The frame must be unpacked carefully; again any loose pieces should be saved for the restorer. It is best to lift the frame out of

the carton by the sides and not from the top or bottom. To prevent additional damage, the frame should then be hung until restored.

5. FRAME RESTORATION

5.1 Repair and Restoration

Repair means to attend to or remedy damage. Restoration means to bring back to its original condition. Economics dictates that, other than basic cleaning or minor treatment, the restoration of frames is generally confined to conservation and museum frames.

Before proceeding with restoration, removal of the artwork from the frame is advisable. The exception to this rule is when the scope of the restoration work is of a minor nature and there is no danger of damaging the artwork. For even minor restoration, gilded frames require special treatment and are exceptions to the general procedures discussed below.

5.2 Restoration Procedure for Smoke or Soot Damage

If smoke or soot have damaged the frame, the appropriate procedures are as follows:

1. Loose particles of soot or smoke residue should be vacuumed or blown from the frame;
2. Additional loose particles may be removed with small cubes of chemical sponge;
3. The frame should be wiped with a cream cleaner using a pad of

soft cotton or cheesecloth, then finished with a good wax or polish.

If the smoke particles have penetrated the finished surface of a wood moulding, the surface should be first cleaned with fine steel wool and a creme cleaner, worked in the direction of the wood grain. The frame should then be left for 24 hours before finishing with a good wax or polish. Note that other than removing loose particles by vacuuming, none of these procedures are applicable for gilded frames.

5.3 Restoration Procedures for Water Damage

Slight water damage to moulding usually affects only the top layer of lacquer. This can leave shallow white marks on the finish. To remove white spots:

1. The entire moulding should be rubbed, in the direction of the wood grain, with 4/0 or 6/0 steel wool with cream cleaner or pumice mixed with light oil;
2. Areas needing additional work may be redone, feathering it out from the affected areas;
3. The frame should then be dried and finished with a good wax or polish.

Where water damage is more severe, white spots are usually visible in the moulding subsurface finish. Damage to the wood, as

well as the finish, often requires refinishing. In this case, cost of restoration versus replacement is a consideration.

Damage to the lacquer finish can sometimes be restored by dissolving the finish with a thinner, then refinishing. The National Institute of Fire Restoration Division (1973) recommends the following procedure:

This method is to use a pad of five (5) layers of cotton, about an inch square; wet the pad with lacquer thinner and squeeze out the thinner. Using light pressure, stroke the area -- adding several drops of lacquer thinner to your pad. Hopefully, the spot will go away. After the area has dried for several hours, go over the entire surface with 000-grade steel wool. The last step is to wax the furniture. This technique is what will distinguish the professional from the "run-of-the-mill" cleaner. (AIDS 1973)

Once finished, the frame should be hung or packaged to prevent subsequent damage. Again, these procedures are inappropriate for gilded frames.

5.4. Restoration Procedures for Removing Dents in Soft Wood Mouldings

Sometimes dents in soft wood moulding can be removed by soaking the dent in water, letting the wood expand to its original shape:

1. Two or three holes can be made in the center of the dent using a small push pin;
2. A wet ball of cotton, squeezed out slightly, should then be

pinned in the dent and left for a few hours;

3. When the wood has expanded sufficiently, the pin holes should be filled with crayon or other filler.

Any water spots resulting from this technique may be removed by using the appropriate procedures.

5.5. Restoration of Liners and Fillets

Restoration of liners and fillets requires procedures similar to those used when restoring frame mouldings. The exception is when a liner is covered with a fabric. In this special case the restorer must deal with the type of fabric as well as the liner.

5.6 Gilded Frame Restoration

There are two basic techniques used in gilding a frame; oil gilding and water gilding. Water gilding imparts a brilliant tone to the frame, while oil gilding's effect is more subdued. Sometimes, both techniques are used on a single frame; the cove and recessed areas are oil gilded, while the highlights are water gilded. In water gilding, a solution of alcohol and water is applied to the 'bole' before applying the leaf. In oil gilding the 'bole' is painted with a varnish sizing prior to the leaf application.

Since the two types of gilding require different restoration

procedures, it is important to ascertain which method has been used before attempting to restore a gilded frame. The problem is sometimes compounded when bronze paint has been applied over the original gilding. For example, if an attempt has been made to remove bronze paint with a solvent, water gilding beneath will be unaffected but oil gilding will come off with the solvent.

Heat and smoke from fire, and moisture from firefighting can also cause ornamental loss and cracking gesso, in addition to accumulation of residue and dirt on a frame. Wooden frames expand and contract with changes in temperature and humidity, but the gesso layer does not. The gesso, therefore, cracks and falls off its base.

Restorers try to remedy gesso loss by bathing the frame in rabbit skin glue, which consolidates the remaining gesso and prevents further damage. Several brands of commercially prepared gesso are available. However, the closest to the old formula is 'Gesso Ground Dry Mixture'. A good gesso ground should be hard and shiny when tested with a fine sanding paper.

Ornamental loss is a particular problem with composition frames. Remaining portions of ornament can be pressed into plasticine or modelling clay, making a mould into which water putty or plaster of paris can be poured in order to reproduce the lost sections. These sections are then applied to the original frame with special glue. Algenate, a material dentists use to take teeth imprints, can be used to take imprints of

high ornaments, since modelling clay will not adapt easily to complicated designs. One or two coats of shellac on ornaments will make the surface ready for gilding.

Light residue and dirt on gilded frames may be removed by first vacuuming with a soft brush, and then swabbing the frame carefully with Q-tips dipped in a solution of 2 tablespoons of Ivory Snow detergent mixed with 1 pint of water. Care must be taken not to wet the frame excessively. Rubbing the surface too hard could also affect the gilding and the Q-tips should be checked frequently for evidence of particles of colour or gilding. "In the 13th century, urine was commonly used to dissolve grime from water gilded ornaments." (Framers Answer Book 1976)

Gilding is accomplished by one of two methods. Either the frame is painted with special metallic powders and burnished with an agate burnishing tool, or gold or silver leaf is applied to the surface. Usually an undercoat of gilders clay is placed on the gesso ground before gilding. Gilders clay is found in three colours; red, yellow and blue. Red or yellow colours are usually found under gold leaf, red being more common. Blue colour is normally found under silver leaf. The gilders clay undercoat, depending on the colour used, tones the final leaf or powder surface.

Gilding with metallic powders requires the application of two coats of warm well stirred gilding paint on the clay surface. "Mixing

the metallic powder for gilding paint is accomplished by stirring $\frac{1}{2}$ ounce of burnishing powder into 2 tablespoons of alcohol and $\frac{1}{4}$ cup of warm glue sizing. Once the gilding paint is dry, beeswax is placed on a soft cloth and rubbed over the frame to prepare the surface for burnishing." (Framers Answer Book 1976) Burnishing is accomplished by rubbing an agate hand-burnishing tool back and forth over the surface until the area touched by the burnisher has a high luster. Tarnishing of the burnished surface is prevented by the application of a thin coat of shellac or lacquer.

Preparation of the surface of frames for gilding with leaf is similar to burnishing. The leaf is applied with a warm solution made from 2 cups of water, 1 tablespoon of glue stock and 2 tablespoons of alcohol. Sheets of gild (gold or silver) are placed on the surface when it has the proper tackiness. A gilders tip brush will guide the leaf (1 micron thick) from the booklet to the frame. The leaf is overlapped and for high profile ornaments, additional sheets may be added to insure total coverage.

With the leafing completed, the whole frame is rubbed over a cake of beeswax. The beeswax helps remove small particles of unattached leaf. Once the leaf has dried it is protected with a thin coat of shellac or lacquer.

To antique the leaf, a solution of oil or Japan colour thinned with turpentine and flat varnish is used. The surface is painted with

this solution and then wiped to obtain the desired highlights. To simulate encrusted dust, grey rottenstone is sprinkled over the depressions in the frame.

5.7 Restoration Procedures for Frame Corners

Restoration of the frame requires a careful examination of the corner joinings for damage.

1. If damaged, the old brads should be removed carefully and the old glue scraped and cleaned from the joints;
2. The mouldings can be placed in a mitre vice to reglue and renail the joints. A glue especially formulated for joining wood is preferred. Ordinary white glue lacks the strength required for large frame joints;
3. Holes for nails should be redrilled, proper size nails installed and countersunk. The holes filled with coloured crayon or putty stick.

5.8 Restoration of Mattings

In the process of restoring art frames, damage to mattings is sometimes found. Some cleaning can be carried out by the restorer. For example, pencil and dirt marks can sometimes be removed by erasing with art gum, kneaded, rubber, vinyl art gum or architect's pad erasers.

Marks and scratches on dark mats can often be removed by spraying the damaged area lightly with water and then brushing with a soft brush. The wood pulp in the matting should swell to its original shape.

Grease spots are usually removed with spray cleaners, alcohol, or lacquer thinners. Another method of removing a grease spot is to place a piece of blotting paper over it and press with a warm iron. In some cases, rubbing the surface with white bread or silicone powder often improves the appearance of light mattings.

6. EQUIPMENT AND SUPPLIES FOR FRAME RESTORATION

6.1 Tools and Equipment

Some basic hand tools as well as special equipment are required to safely restore art frames. Most of these are available from local supply sources and are listed below:

- Hammer.....A good tack hammer and a medium weight carpenter's hammer;
- Screwdriver.....An assortment of screwdrivers including at least one with a Phillips head. Automatic spiral-ratchet screwdrivers are potential time and energy savers;
- Stapler.....An adjustable spring pressure staple gun is preferred;
- Awl.....A model with a tooled steel shaft will hold the point longer and breakage is less likely;
- Ruler.....A steel tape ruler with a Mylar coating on the top is preferable. A centre finding rule simplifies the business of centering hangers and pictures;
- Tape Dispenser.....A weighted desk model for cellophane tape;
- Vice.....At least two 90° vices and one which can be set at different angles to accomodate odd sized frames;
- Nail Set.....A small nail set with a self centering feature;
- Brad Pusher.....One with a magnetic tip is preferable;
- Point Driver.....A gun like type which shoots diamond shaped points into the moulding;
- Hand Drill.....A ½" drill either with a running gear or a

push drill with ratchet action and automatic return;

PliersSeveral types, including needlenose, glass breaking and wire cutting are necessary;

Utility Knife.....A standard type with retractable blade;

Glass Cutter.....A simple cutter with special tempered blade;

Mat Cutter.....A hand held mat cutter;

Rabbet Planer.....A small model is all that is required;

Dusting Brush.....A wide soft bristle brush;

Burnishing Tool.....An agate burnishing type.

More sophisticated equipment, such as straight line mat and glass cutters, glue guns, fitting tools of various types, and choppers, can reduce the time and effort of frame restoration where volume of work is large. This type of equipment is usually available only from supply houses that specialize in framing equipment.

6.2 Other Supplies

Local stores are a supply source for many materials used in art frame restoration. Some of the basic materials include:

Adhesives.....Glues for wood, plastic and paper;

Hardware.....Brads, finish nails, screws, screw eyes and mending plates;

Paint Supplies.....Varnish, shellac, brushes, crayons and touch up paint;

Frame supplies.....Mouldings, matting, backing boards and
liners;

Glass.....Plain or non-glare.

Conservation and museum framing supplies are available, on a
wholesale basis, from a small number of specialty supply houses.
Supplies for a small restoration project are sometimes available from
art galleries, university schools of art, and firms in the framing
business.

6.5 Decor magazine, (408 Olive St., St. Louis, Mo., 63102) is one
of many publications which lists specific sources of supplies and
materials. Decor usually publishes an annual Buyers' Guide Directory
in July which is an excellent information source for:

Framing supplies;

Archival framing supplies;

Framing equipment;

Books on framing and restoration;

Schools for conservation and restoration.

An example of the scope of the Directory is given in the one 'page'
excerpt on the following page.

Paper: Rice

Andrews/Nelson/Whitehead
Light Impressions Corp.
MBL Enterprises
McManus & Morgan
Padre Moulding Co.
Picture Framing Equipment Co.
Piedmont Moulding Co.
reid sales associates
TALAS
United Mfrs. Supplies
Windsor Graphics

Paper: Silicone Release

Allied Framing Products
Drytac
Frameguild Mouldings
Light Impressions Corp.
Padre Moulding Co.
Picture Framing Equipment Co.
TALAS
United Mfrs. Supplies

Paper: Tissue, Alkaline

Andrews/Nelson/Whitehead
Bonjon Enterprises
Light Impressions Corp.
TALAS
United Mfrs. Supplies

Paper: Wrapping, Acid-Free

Allied Framing Products
Light Impressions Corp.
McManus & Morgan
Opus Framing Ltd.
Rising Paper Co.
TALAS

pH Indicator: Kit

Academy of Professional Art
Conservation and Science
Allied Framing Products
Gainsborough Products Ltd.
Light Impressions Corp.
Picture Framing Equipmt. Co.
S&W Framing Supplies
Seaframe
TALAS
United Mfrs. Supplies

pH Indicator: Meter

Academy of Professional Art
Conservation & Science

pH Indicator: Pen

Allied Framing Products
Light Impressions Corp.
TALAS

**Renew your DECOR
subscription today!**

pH Indicator: Pencil

Allied Framing Products
Light Impressions Corp.
TALAS

pH Indicator: Strips

Academy of Professional Art
Conservation & Science
Gainsborough Products, Ltd.
TALAS

Polyester Film, Untreated

Light Impressions Corp.
Singer Distribution
TALAS
United Mfrs. Supplies

Polyester Web

TALAS

Portfolios, Acid-Free

Jordan Specialty
Light Impressions Corp.
TALAS

Repair Materials Archival

Singer Distribution

Resin, Polyvinyl Acetate

Academy of Professional Art
Conservation & Science
TALAS

Restoration Services: Frames

Academy of Professional Art
Conservation and Science
Adler Frames
Bobbitt Moulding & Frame
Canadian Native Prints
Corona Co.
Eastside Picture Framing
Gainsborough Products Ltd.
Husar Picture Frame
Kulicke Frames
Loving Picture Frame Equipment
& Supply Co.
Munn Picture Frames Mfg., Abe
Pitts Framing & Fine Art
Prestige Art Galleries, Inc.
Quality Picture Frame Co.
Seaframe
Singer Picture & Frame, Inc.
Stringer Art Factory
Tremellen Galleries

Restoration Services: Paintings

Academy of Professional Art
Conservation and Science

Caxton Frame Makers
Corona Co.
Eastside Picture Framing
Frames Unlimited
Gainsborough Products Ltd.
Master Framers
Pitts Framing & Fine Art
Prestige Art Galleries, Inc.
Seaframe
Singer Picture & Frame
Tremellen Galleries

Restoration Services: Paper Art

Academy of Professional Art
Conservation and Science
Andrews/Nelson/Whitehead
Canadian Native Prints
Corona Co.
Eastside Picture Framing
Fine Art Editions
Gainsborough Products Ltd.
Icart Vendor
Master Framers
Pitts Framing & Fine Art
Roseart
Seaframe
Singer Picture & Frame

Restoration Supplies

Academy of Professional Art
Conservation and Science
Artistic Woodwork Co. Ltd.
Gainsborough Products Ltd.
Light Impressions Corp.
S&W Framing Supplies
Seaframe
Singer Distribution
TALAS

Spacers, Plastic

Adler Frames
Colorado Moulding
Opus Framing Ltd.

Tapes: Cloth, White

Allied Framing Products
Artistic Woodwork Co. Ltd.
Charrette Corp.
Coast Frame Supply
Colorado Moulding
Dallas Frame Co.
Florida Framing Dist.
Gainsborough Products, Ltd.
Hallcraft Frame Products
Holliday Picture Frames
Light Impressions Corp.
McManus & Morgan
Picture Framing Equipment Co.
Piedmont Moulding Co.
Rocky Mountain Moulding Co.
Seaframe
Singer Distribution
Summit Framing Suppliers
TALAS
Texas Wholesale Frames
United Mfrs. Supplies
Victor Moulding Co.
Zinsel Glass & Supply

Tapes: Double-Faced

Adler Frames
Allied Framing Products
Artistic Woodwork Co. Ltd.
Charrette Corp.
Colorado Moulding
Light Impressions Corp.
M&M Distributors

Padre Moulding Co.
Picture Framing Equipment Co.
Piedmont Moulding Co.
Prata, Ltd., J.B.
reid sales associates
Rocky Mountain Moulding Co.
Seaframe
Singer Distribution
Sommer & Maca Ind.
Summit Framing Suppliers
TALAS
3M Company
United Mfrs. Supplies
Victor Moulding Co.
Zinsel Glass & Supply

Tapes: Linen (Gummed)

Academy of Professional Art
Conservation and Science
Allied Framing Products
American Moulding
Art Materials, Frames & Mouldings
Artistic Woodwork Co. Ltd.
Bobbitt Moulding & Frame
Coast Frame Supply
Colorado Moulding Co.
Culver Art & Frame Co.
DMR Distributors South
Dallas Frame Co.
DeCastro, Robert F.
Florida Framing Dist.
Gainsborough Products, Ltd.
Hallcraft Frame Products
Holliday Picture Frames
Joal Supply Co.
Juhi-Pacific Corp.
Larson Picture Frame & Moulding
Light Impressions Corp.
Lion Galleries
Loving Picture Frame Equipment
& Supply Co.
M&M Distributors
McManus & Morgan
Opus Framing Ltd.
Padre Moulding Co.
Palatine Frame & Moulding
Picture Framing Equipmt. Co.
Piedmont Moulding Co.
reid sales associates
Rocky Mountain Moulding Co.
S&W Framing Supplies
Santa Fe Supply Co., Inc.
Seaframe
Singer Distribution
Southern Moulding & Supply Co.
Sprague Hathaway Co.
Starcrest Moulding & Frame Co.
Stringer Art Factory
Summit Framing Suppliers
TALAS
Texas Wholesale Frames
Twin City Moulding & Supply
United Mfrs. Supplies
Valley Wholesale Mldg.
& Frame
Victor Moulding Co.
West Coast Picture Corp.
Zinsel Glass & Supply Co.

Tapes: Neutral pH

Academy of Professional Art
Conservation and Science
Allied Framing Products
American Moulding, Inc.
Artistic Mfg. Co.
Artistic Woodwork Co. Ltd.
Bonjon Enterprises

(continued)

7. RESTORE OR REPLACE: SOME CONSIDERATIONS

The restoration contractor may be asked to express an opinion as to the cost and time required to restore a frame and to assist the owner in deciding whether to restore or replace the frame. Insurance adjusters also need to know the cost of restoration, as well as the replacement cost of a similar frame, to be able to recommend payment for the loss. The payment is usually the lower of the two costs.

Traditionally, a frame has been regarded as a mere adjunct to the artwork itself, thus warranting only minimal conservation and care. When damaged, original frames have, in many cases, been discarded in favour of new ones. As a result, the new frames were often incompatible with the period and style of the artwork. Gilded frames have also been painted with bronze paint to restore a 'new' look, or to cover gild and gesso loss. This procedure obscures the original gilding and makes future restoration difficult.

Restoration work should not endanger the life of the frame or create problems for any future restoration work. However, the cost of appropriate procedures may not always be warranted.

Generally, the most popular art media frames are the least expensive. Decor (1983) has noted that the following percentages represent the share of marketable artwork:

Limited edition prints..29%	Untitled reproductions...8%
Fine art posters.....27%	Water colours, drawings..3%
Graphics.....17%	Photographs, fine art crafts.....3%
Oils, acrylics.....13%	

It could be expected that the replacement cost would decrease with the relative value of the artwork, that is, the most common artwork.

Inexpensive frames are normally replaced if the surfaces cannot be cleaned successfully. In 1983, the average wholesale price of a 16" x 20" frame (frame moulding based on \$1.50 per foot), mounted, fitted and regular glass installed was \$58.06 (U.S.). (Decor, 1983)

Restoring frames in this category is usually not feasible.

Only conservation and museum frames should be considered for extensive restoration. Conservation frames normally fall into a \$300.00 to \$800.00 (U.S.) price range. Some experience is required to determine an accurate estimate of restoration time and materials. Depending on this estimate, replacement may be more feasible. On the other hand, museum frames may be worthy of restoration, if only for their art value.

CONCLUSION

Members of the National Institute of Fire Restoration require confidence to express opinions concerning restoring art frames damaged by a disaster. The preceeding chapters contain some, but not all, information on art frame composition, manufacturing and packaging, as well as restoration procedures. This information should help the contractor to decide the best way to handle damaged frames. The contractor must make a decision to do the work himself or have it sent to a qualified restorer, if he does not have such a person on his staff. An accurate assessment of the damage and the procedure required to correct it is important to the contractor as he can be liable for future damage to artwork.

A few tips for the restoration contractor to consider are listed below:

1. Pay prompt attention to frame damage;
2. Save broken or separated pieces;
3. Work with proper tools;
4. Hang frames to prevent subsequent damage;
5. Package and transport frames carefully;
6. Record damage by use of photographs;
7. Use reference books and archival supply directories;
8. When in doubt -----DON'T.

The trained and experienced restorer is capable of producing quality work which should bring the frame back to its original condition. Completed, a properly restored art frame could be on its final trip through time, so therein lies the responsibility of the restorer.

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