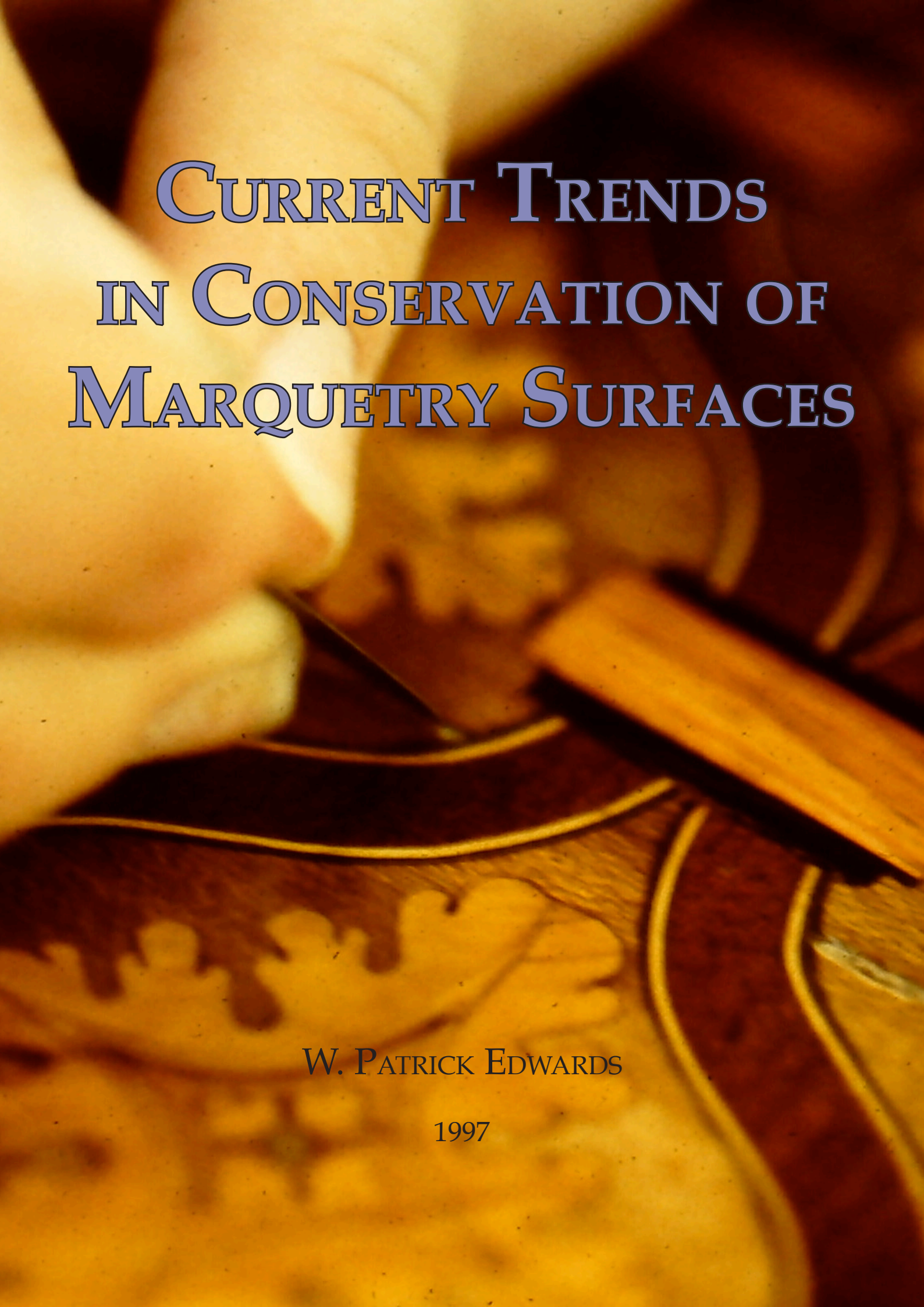

Current Trends in Conservation of Marquetry Surfaces

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Abstract:

There have been several exciting and innovative new methods developed during the past decade, both in America as well as in Europe, for conservation of marquetry surface decorations. Since marquetry is composed of extremely diverse hardwood elements, often mixed with exotic materials such as ivory, bone, tortoiseshell, mother-of-pearl, metals, straw or horn, the rich decoration is itself relatively unstable over time, and further compromised by the natural decay of the animal glue and gomme lac finish which were designed to protect it. In the majority of early work the solid wood groundwork which supports the marquetry is itself the major cause of the damage. Traditional conservation techniques have included repair of damaged surfaces “in situ” as well as completely removing the surface.

The process of removing, restoring and re-gluing a complete surface has been used in the past as an accepted process for restoring and conserving marquetry. The success of this method relies on relative differences in the glues which are used both on the top and back of the marquetry. Previously, this difference was often so slight, as, for example, between fish and hide or bone glues, that only the most experienced restorer would choose this approach. As synthetic glues were developed and incorporated in this process, the risk of further damage to the marquetry was reduced to a more acceptable level, and it has gained in popularity. During the past decade, in fact, this process has been the standard practice in several workshops, both private and public. Material will be presented which illustratesthe most successful current practices in this field.

A more exciting approach to the problem of stabilizing a marquetry surface involves the re-hydration of the existing animal glues and allows the original glue to remain in place under the veneer. Work in this method has been developed by the author as well as Nicolas Boucher of the Museum of Decorative Arts in Paris, and is being considered in other workshops as the least invasive and most secure approach to the problems inherent in marquetry. Essentially, this involves the proper preparation of the surface through hydration, and the addition of a urea product to the animal glue which allows it to remain liquid much longer than normal. Finally, a controlled heat source is applied which re-heats the existing glue, causing it to adhere to the marquetry as it did originally. This process will be discussed and illustrated in detail, as, in certain cases, it represents the optimum solution available today.

Introduction

Since the Renaissance, European furniture in general and, to a lesser degree, American furniture has been decorated with a wide variety of techniques which require specific conservation and restoration procedures. One of the most interesting form of surface decoration is that of marquetry, which evolved from Italy into Germany and France in the 17th century, and remained the primary form of decoration in the larger cities of Europe throughout the 18th century.
Historically, there exist f ive distinct procedures used to create a marquetry surface: Tarsia Certosina, Tarsia Geometrica, Tarsia a Toppo, Tarsia a Incastro, and The Classic Method, more commonly know as "piece by piece". In general, marquetry is an assembled surface composed of various elements, often of different materials, which is glued onto a solid wood ground with animal collagen glues. Since marquetry designs can contain a wide variety of exotic hardwood veneers, animal horn, bone or ivory, mother-of-pearl, tortoiseshell, straw and different materials such as brass, copper, and pewter, the problems associated with the conservation are complex. Even with proper conservation and ideal environmental parameters marquetry surfaces are subject to predictable damage over time which requires some form of restoration. For example, the most common form of damage occurs when the solid wood ground shrinks and cracks through the marquetry surface **(Fig.1)**. There is also the natural dehydration of the animal protein glues, inherent movement of the diverse materials used in the surface relative to heat and moisture, and the problems associated with the finishes used to protect the surface **(Fig.2)**.

Figure 1 - Example of substrate shrinkage and movement creating marquetry surface damage.

Traditional techniques used to restore damaged marquetry surfaces evolved directly from the original 18th century fabrication procedures, and remained essentially unchanged until the 1970's. One of the best references available today which describes these methods is "Restauration du Mobilier" by Daniel Alcouffe, published in 1977, in which the removal of a damaged marquetry surface is accomplished "piece by piece" using a warm iron and spatula. Other, more drastic, methods were also employed by workshops which included complete removal of the groundwood by hand planes and carefully sawing between the marquetry and the ground to separate the surface. Problems associated with each of these restoration methods limited their applications.

The purpose of this paper is to present a brief history of the completely new restoration and conservation developments since 1970 which have increasingly been accepted in private practice and museum workshops. These new methods involve the removal and repair of marquetry as a complete surface with much less risk of damage, as well as dramatically improved methods of rehydration of the existing animal collagen glues that conserve the original marquetry surface "in situ".

Figure 2 - Examples of damaged Boulle Marquetry

Damp Method for Boulle Marquetry

Between 1972 and 1975 an innovative approach to marquetry restoration was developed at the Institutet for Matérialkunsap in Stockholm. Two conservators, Rune Hakansson and Anna Østrop, under the direction of Björm Hallström, were faced with the problems of restoring a severely damaged Boulle marquetry surface on the floor of the Swedish royal coach, fabricated in Paris in 1699. The tortoiseshell and brass surface was in poor condition, with damages and missing elements, areas that had been worn thin by feet, prior restorations, and a solid wood ground that required extensive repair. To make restoration possible, a decision was made to completely remove the Boulle Marquetry from the ground. However, instead of removing the surface "piece by piece", as was the usual method at that time, a new system was created that would allow the removal of the entire surface in one piece. The advantages of this method were immediately obvious, and, after the successful completion of the project, were included in Pierre Ramond's book, "Marquetry", published in French in 1977. Dr Ramond referred to this new method as the "damp method" and included the essential details, which became widely available when his book was translated into English by Jacqueline Derenne, Claire Emili and Brian Considine in 1989.

Once this concept of complete removal of a marquetry surface was introduced to the Paris workshops in 1975, it quickly became the preferred method, undergoing further refinement and application at the Louvre and Versailles, as well as the Museum of Decorative Arts in Paris and Lyon, and remains today an accepted procedure. The removal of the entire surface in one piece preserved the original positions of the elements of the marquetry relative to each other, and made it easier to replace damaged or missing parts. The relative ease with which marquetry surfaces could be removed allowed for further research into the procedures used in the original fabrication, improving our understanding of the different methods. With the complete removal of the surface, visual and ultra-violet examination of the ground revealed the original design, as well as subsequent restorations. The original colors found on the reverse of the marquetry surfaces also illustrated how much the visible surface had changed over time.

The "damp method" for removal of a Boulle marquetry surface used by Hakansson and Østrop is as follows: The tortoiseshell

Figure 3 - B72 Paraloid Adhesive in pellet form.

and brass surface is first covered with a wet cloth under a layer of plastic and left for a period of 12 hours. During this phase, the animal glue absorbs the water and softens, the tortoiseshell becomes soft and flexible and many elements begin to lift from the ground. At this point a layer of Japanese paper is attached to the entire surface using Paraloid B 72 glue **(Fig.3)**, which has the property of sticking to a wet surface, and which can be removed with tolulene. In addition, this glue makes the paper transparent, allowing visual examination of the surface during removal.

Once the marquetry surface is held together by the paper on the face, it can then be gradually removed as a single piece by inserting thin spatulas, using syringes to inject alcohol under areas which are still attached. Once lifted completely, the animal glue residue is removed from the back side of the marquetry and the front side of the groundwork with a sponge and warm water, being sure to quickly dry the moisture from both surfaces as soon as they are clean.

At this point, an assembly board the same size as the marquetry is prepared. Several assembly boards are used during the process, allowing the transfer of the marquetry surface from the face side to the glue side as required. Brown Kraft paper is moistened slightly and attached to the edges of a flat panel of plywood slightly larger then the size of the marquetry. Once dry, the Kraft paper stretches tightly, and the marquetry surface is glued face side up on the paper with animal glue, and placed in a press.

After removal from the press, the Japanese paper and Paraloid B 72 glue are completely removed from the face with tolulene, leaving a clean surface. At this time all missing elements are replaced and damaged elements repaired. Once the marquetry is repaired, it is cut away from the first assembly board and glued face down onto a second assembly board, using animal glue. The allows the removal and cleaning of the Kraft paper and animal glue on the back side of the marquetry, which is done with cold water and gentle scraping. The water is quickly removed and the marquetry surface is ready to glue onto the original groundwork with animal glue. To remove the Kraft paper and glue from the face, the same method of cold water and scraping is used, and the surface is ready for finishing.

Dry Method for Wood Marquetry

The “damp method” was first developed for Boulle tortoiseshell and brass and when it was applied to wood marquetry surfaces, it produced the undesirable effect of expanding the wood elements in different directions, making it dangerous for complicated designs. Thus, several restorers (notably Pierre Costerg, Michel Tigréa, and Michel Jamet, among others) modified this system, creating what is

known as the “dry method” for removing marquetry.

The dry method for removal of wood marquetry surfaces is described in detail in Pierre Ramond’s book as follows: The finish is removed, and a layer of cotton gauze or thin fabric is stretched across the surface and held at the edges with tape. Over this gauze is brushed a layer of neoprene glue which is allowed to dry about 20 minutes. This layer of gauze and glue acts to keep the marquetry surface intact during removal from the ground.

Using a hot iron or heat gun with temperatures between 50 and 60 degrees centigrade, the original animal glue is softened and a spatula is introduced between the ground and the marquetry surface. This action continues until the entire marquetry surface is removed in one piece, at which time the old glue is cleaned as usual from the back of the marquetry and the front of the ground. One reason neoprene glue is used is that it has a resistance to heat as high as 200 degrees centigrade **(Fig.4)**.
As in the wet method described previously, the marquetry is now glued face side up onto an assembly board with animal glue. The neoprene glue and gauze is removed from the face, using trichlorethylene or pure alcohol. Repairs are made at this stage of the process. Once all missing and damaged elements are restored, the marquetry is glued face side down to a second assembly board. Finally, the paper and animal glue is removed from the counter face, using cold water and gentle scraping. The marquetry is ready to glue back to its original position (fig.4).

Figure 4: After application of tissue and neoprene glue, a heat gun and spatula is used to lift the marquetry surface in one piece.

Dry Method for Boulle Marquetry

The success of the dry method of wood marquetry removal encouraged several restorers and conservators (such as Nicolas Boucher, Michel Jamet, and Yannick Chastang, among others) to develop a dry system for restoration of Boulle tortoiseshell surfaces. One distinct advantage of this proceedure is the preservation of the original finish and mastic. This is a recent development which promises to become the next standard in the treatment of Boulle surfaces. For this process it is not necessary to remove any of the existing finish. Standard transparent adhesive cellulose tape is firmly applied to the entire surface which is to be lifted. There is a wide variety of clear tapes on the market, and less expensive brands seem to have a better resistance to heat, so one is selected which resists deformation below 60 degrees centigrade. Virtually all clear tapes are damaged at higher temperatures, and this is an advantage since the tape will be damaged before the marquetry is affected by excess heat. The tape is left on the marquetry for 24, which provides better adhesion.

As in the dry method for wood marquetry, the surface is now lifted using a heat gun and spatula, working from the edges slowly and carefully. The lowest heat setting is used, as excessive heat makes the tortoiseshell brittle and causes the metal elements to expand. Once removal is accomplished, the old animal glue is cleaned and the marquetry is attached face side up to an assembly board with animal glue. This allows the removal of the tape from the surface, using white spirits as necessary. It is often the case with Boulle marquetry that the individual thickness of the materials used varies greatly due to the wide range of densities and hardness of tortoiseshell, ivory, horn, mother-of-pearl, brass, copper and other materials. One distinct advantage of the dry process is that the various elements of the existing marquetry can be restored to a flat face position, conserving any finish and engraving which exists, and eliminating the need for further sanding or scraping of the surface.
This procedure is called “repoussage” or embossing **(Fig.5)**, and involves the pressing of the marquetry surface in a press, in such a way that the individual elements of the design are pushed into a flat face position.

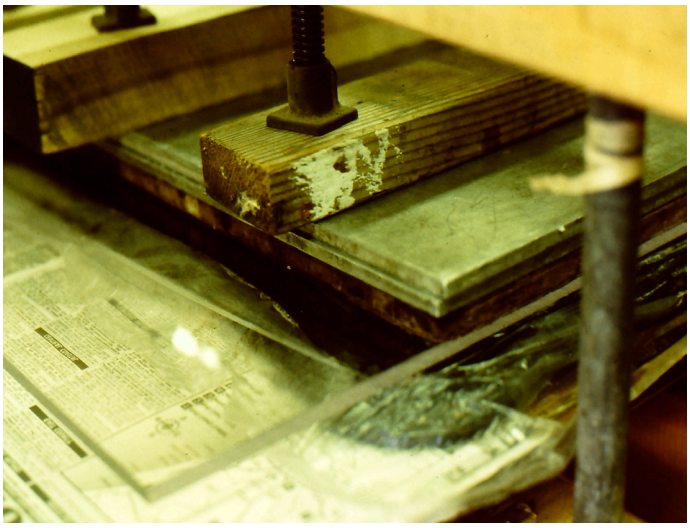

Figure 5: Embossing of the marquetry during restoration

As the marquetry surface is transferred face down onto the assembly board in the usual way, a softer material (such as card stock, many layers paper, thin carpet, or wall board) is placed on the glue side so that the pressure of the press acts to push all elements forward into position. A thin (4 mil) layer of plastic film is placed between the glue surface and the softer material to prevent any adhesion.

To allow for the uneven thickness of the restored marquetry panel when it is glued back into its original position, either a very thin (1 mil) layer of cork or a thick mastic/glue mixture is used under the marquetry. Another approach, suggested by Michel Jamet, is to conserve all existing animal glue residue on the counter face of the marquetry as well as the ground, and carefully replace the restored marquetry in its original position, adding a fresh layer of animal glue to insure proper adhesion.

Rehydration of Old Animal Glues

As a result of these recent developments in the restoration of damaged marquetry surfaces, a method has been developed which allowed the conservation “in situ” of less damaged marquetry surfaces.

In 1987 Nicolas Boucher, working with Roch Pyet, restored the surface of a marquetry commode belonging to the Musée Vouland in Avignon, France, using as experimental system that allowed the rehydration of the existing animal glues without removal of the marquetry. The results were encouraging and in 1991 the same method was used on a 17th century commode at the Museum of Decorative

Arts in Paris, also with dramatic results.

After several more years of study and application, this procedure, called the "rehydration of old animal glues" was published in the November 1995 issue of the French magazine "L'Objet D'Art". This important article, by Nicolas Boucher, was called "decisive progress in the restoration of marquetry furniture".

Immediately after the publication of this article, a small group of restorers and conservators formed with the goal of perfecting this method. Leading this group was Nicolas Boucher, conservator at the Museum of Decorative Arts in Paris, and Marie-Christine Triboulot, professor of wood technology at ENSTIB (Ècole Nationale Supérieure des Technologies et Industries du Bois) located in Nancy, France. The name of the study group was chosen as ADEN and the purpose was to meet annually to suggest specific areas of research into the problems associated with marquetry restoration and conservation. International interest in this group has grown quickly, and at the most recent meeting in 1997 there were 95 members from 12 countries.

The results of this collaboration between the Museum of Decorative Arts in Paris and ENSTIB in Nancy, under the direction of the group ADEN has been the publication of new research into this field each of the past 3 years. To date the areas of interest include: methods of accelerating the aging of marquetry surfaces and animal glues; various additives used to modify the properties of animal collagen glues manufactured and used, and how their working properties can be restored after accelerated aging; and methods of restoring curved and shrunken ground wood to original dimensions using polyethelene glycol (PEG). These articles are listed in the references at the end of this article. The group ADEN can be accessed through the Internet, under the site "Musée des Arts Décoratifs" (http://www.ucad.fr).

One of the most interesting ideas has been the modification of the traditional animal collagen glues, specifically with small amounts of thiourea or urea, so that the glue remains liquid at room temperature. Using this modified glue has made the process of rehydration of old animal glues reliable and applicable to a wide range of projects.

As in the dry method used for Boulle surfaces, the rehydration process preserves the original finish. In fact, the presence of the existing finish is necessary to slow down the penetration of the water, allowing the moisture to penetrate deeply into all damaged areas. The surface is covered with wet cloth or tissue **(fig.6)** and allowed to sit briefly (from 20 minutes to a few hours) until lifting of the elements begins to occur. Constant observation is required as different marquetry surfaces respond at different rates.
Once deformation of the surface begins

Figure 6: Initial stage of rehydration process, showing we tissue under plastic. Constant observation is required to monitor progress.

Figure 7: Detail of a marquetry surface after rehydration, showing expansion of original mastic, and slight deformation of wood elements, ready for application of modified animal glue.

to occur **(Fig.7)**, the water is removed and animal collagen glue modified by the urea is brushed onto the surface, using syringes and spatulas to work the glue fully under any damaged areas of the veneer. Since the glue is modified and remains liquid at room temperature, there is no real pressure to work quickly, and care can be exercised to insure full application of glue, which may take up to 30 minutes.

Onto this marquetry surface coated with the modified glue is placed a (1.2 mm) thin sheet of lexan plastic **(Fig.8)**. On top of the plastic is placed two sheets of card stock with a temperature sensor in between.

On top of this layer is placed a special heating screen cut to shape with aluminum bars attached at each end. Once in the press this heating screen is connected to an electrical transformer which provides 400 amps at 4 volts for 20-45 minutes, until an operating temperature of 65 degrees centigrade is reached (**Fig.9**). After 5 minutes at this temperature, the power is turned off and the marquetry

Figure 8: Thin sheet of Lexan placed directly on wet glue insures a flat referance surface.Shown is Nicolas Boucher, furniture Conservator at Museum of Decorative Arts, Paris.

is left in the press for an additional 72 hours. The marquetry must be kept under pressure, covered by a piece of cellophane, until completely dried, about a week.

Figure 9: Marquetry panel, Lexan, card stock, heat sensor, and heating grill in press at 55° C.

This same procedure is used for Boulle marquetry with minor changes. Before the rehydration process is started, all the loose brass work is removed and reglued in place using fish glue. After this is done, the Boulle surface is rehydrated in the usual manner, placed in the press with the plastic caul and heating elements, and left for 72 hours.

Conclusion

During the past two decades there have been significant developments in the field of marquetry conservation and restoration. An important study group, ADEN, has been formed in France, and the collaborative efforts of a diverse group of professionals promises to make further advances in this field in the near future.

The purpose of this new research has been to create new methods which will allows less invasive and more controlled restoration of damaged marquetry surfaces as well as suggest new procedures for conservation of existing marquetry surfaces. As a direct result of this work, several different techniques are currently being used to aid in the restoration of marquetry surfaces and groundwork, as well as conservation methods which preserve the surface in its original position, including the glue, mastic, engraving and finish.

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