Interim Meeting / Réunion intermédiaire

Working Group “Leather and Related Materials”
Groupe de Travail “Cuir et Matériaux Associés”

The Conservation of Gilt Leather
La conservation du cuir doré
Post-prints

Brussels, 25-27 March 1998
Bruxelles, 25-27 mars 1998

at/à
Koninklijk Instituut voor het Kunstpatrimonium
Institut Royal du Patrimoine artistique
Royal Institute for Cultural Heritage

The papers and abstracts published here have remained unpublished since 1998. Over the years many people have asked when they will be published. In late 2006 I took over the editing of the papers, and preparation for publication. It was clear that most of those authors who had already submitted their papers, and a few others who have since submitted them, were still keen to see the publication go ahead. A few papers have had to be dropped because they have been published elsewhere. Sadly, it is not a complete set of papers, but the original abstracts, where available, are all included. Only a very small amount of editing has taken place, if the paper was clear as it stood, or with only minor changes to the English, it was left as it was.

Although the meeting was held at the Koninklijk Instituut voor het Kunstpatrimonium / Institut Royal du Patrimoine artistique / Royal Institute for Cultural Heritage, Brussels, it must be made clear that the late publication is in no way the fault of this Institute.

Theo Sturge
Editor

Les articles et les résumés présentés dans cet ouvrage n'avaient pas été publiés depuis 1998. Durant ces années de nombreuses personnes avaient demandé quand ils seraient diffusés. Fin 2006 je me suis chargé de l'édition des articles et de la préparation à la publication. Les auteurs dont la plupart avaient soumis leurs articles il y a longtemps et pour un petit nombre qui l'avait envoyé récemment, souhaitaient voir cette publication aboutir. Quelques articles ont été éliminés car ils avaient déjà été publiés ailleurs. Ce n'est donc malheureusement pas un ensemble complet d'articles mais néanmoins tous les résumés ont été inclus. Si les articles étaient clairs, peu ou pas de modifications éditoriales ont été faites, mis à part des corrections mineures dans le vocabulaire anglais. Bien que la réunion ait eu lieu à l'Institut Royal du Patrimoine artistique / Royal Institute for Cultural Heritage/ Koninklijk Instituut voor het Kunstpatrimonium à Bruxelles, cette institution n'est en aucun cas responsable de cette publication.

Theo Sturge
Editeur

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SCORCHED OR DAMASK LEATHER

Christopher Calnan, England, and Mariabianca Paris, Italy.

Introduction

The decoration of leather by stamping or embossing over a silver leaf background followed by glazing and hand painting to produce gilt leather is well known and a much studied process. There is another more simply decorated leather material, which perhaps predates gilt leather and that is scorched leather. This strange descriptive term is also known by another name in England namely that of damask leather. In France and Italy it was known as damaskine leather and in Spain it was known as Cuero Godrado.

Leather substrate

Scorched leather is made from a plain unfinished vegetable tanned sheepskin. In England this leather is normally referred to as *basil*, that is a sheepskin tanned with bark, which would have traditionally been oak bark. This would have been an inexpensive and very easy to produce material. It is referred to by a number of names as follows:

In English: basil, bazil, bazell, basan, bazan
In French: basane
In Spanish: badana
In Arabic: bitanah

It is interesting to see that the route for the name basil comes from the Arabic, and this is an indication as to the possible early origins for scorched leather.

Origins and Centre of Production

The earliest reference to scorched leather is a reference in a French inventory of 1399 which is as follows: “a pair of chairs painted with fine colours and covered with vermilion Cordovan leather, scorched with the arms of the Queen and Louis of France”. (1) The earliest extant examples date from the 16th century but the majority of the scorched leather that survives undoubtedly dates from the 17th century. It is likely that production in the UK went on well into the 19th century from the few examples that survive from this time.

The three main countries associated with scorched leather production are Spain, Italy and England but it is also likely to have been made in other countries known to have used scorched leather, namely France and Poland.

Fig. 1. Chair cover, Palazzo Chigi, Ariccia, Italy.

Uses of scorched leather

One of the principally uses for scorched leather was as a covering material. These covers were intended for very fine or delicate pieces of furniture to prevent physical damage from handling, impact and scratching, as well as the prevention of fading. There are known examples of fitted covers made for chairs, tables and chests of drawers. Other items that are also known to have had covers are globes, musical instruments and

billiard tables. For everyday use the covers would have been kept on the furniture and would only have been removed when entertaining guests or for special occasions. Some covers have very elaborate floral or geometric decorations sometimes with a range of colours and were clearly intended to be attractive and be seen (fig.1).

In the 1710 Inventory of goods and furniture at Dyrham Park (5) near Bath we learn of the following leather covers:

A billiard table with leather cover
6 pier tables with leather covers
4 Japan tables and pairs of stands with leather covers
An Indian table and pair of stands with leather covers
Three Japan writing tables and leather covers

The 18th century cabinet maker and upholsterer Thomas Chippendale supplied most of his high value workshop pieces with case covers mainly of wool (serge or baize) but for certain items case covers were supplied of damask leather. In the account for furnishings supplied to Harwood House in 1773 reference is made to supply of damask leather covers for a large japanned commode and "A very large rich commode with exceeding fine Antique Ornaments curiously inlaid with various fine woods" (2).

There are also estate accounts at Chatsworth and Burton Constable of furniture supplied by Chippendale with damask leather covers. Most of these covers in England have not survived as covers became worn and were replaced with textile covers or more often with none at all.

Fig. 2. Piano cover from The Argory, Northern Ireland.

The National Trust has 5 properties with examples of damask or scorched leather covers, namely Ham House near Richmond in Surrey, the Argory and Castle Coole in Northern Ireland, Hardwick Hall in Derbyshire, and Scotney Castle in Sussex. Interestingly in the Northern Ireland examples the scorched leather covers are fitted to two 19th century musical instruments, one a harp the other a piano (fig. 2). The selection of scorched leather as a cover for musical instruments is a very appropriate material as the heavy leather covers not only would have helped to provide physical protection to fine surfaces but also helped to buffer against temperature and humidity changes for these instruments, preventing them from going out of tune.

The best preserved examples of scorched leather are at Ham House. The house was richly furnished in the 1670s by John Maitland, 1st Duke of Lauderdale, Secretary of State for Scotland, and it appears to have had a large number of scorched leather covers from the inventory drawn up at the time of the Duke of Lauderdale's death in the late 17th century. Unfortunately most were dispersed in the in 1958 and acquired by other institutions including Colonial Williamsburg (3). The ones that survive are some of the most interesting examples of scorched leather covers as they include the ones made for the large celestial and terrestrial globes (fig. 3.) in the library and examples of scorched leather covers for a marquetry commode and a pier table.

Fig. 3. Globe cover. Ham House, UK.

Scorched leather is also found as seat and back upholstery on chairs and as cushion covers. These are


Figs. 4 & 4a. Chairs. Scotney Castle, Lamberhurst, Sussex, UK.

very rarely found as the leather would not have withstood that much wear, and would have worn more rapidly than other leather upholstery surfaces. Hardwick Hall has an example of a drop in seat with a scorched leather cover cut down and reused from a larger cover, and there are 4 interesting examples at Scotney Castle in Sussex (figs. 4&4a).

Some of the best preserved examples of scorched leather in a historic house setting are those in the Palazzo Chigi in Ariccia just south of Rome. This palace was the ancestral home of the Chigi family who between the 16-17th century produced 4 cardinals and a pope, Alexander V11. Many of the very fine furnishings and furniture were acquired during the papacy of Chigi (1655-67) and these were provided with purpose made scorched leather covers. The items covered with scorched leather include a billiard table and a set of 6 velvet chairs (fig. 5). An example of the same pattern used for the velvet covers is in the V&A Museum collection.

Fig. 5. Velvet chair with leather cover. Palazzo Chigi, Ariccia, Italy. See also fig. 1. This shows the same chair, but with the leather cover on the back as well.

Investigations into possible production techniques

In order to produce a ‘scorched' pattern onto a natural leather surface there are three ways in which this can be done namely:

1) by friction from rubbing
2) by a heat contact process
3) by block print transfer

Rubbing or Friction Process

In this process the flesh side of the skin is placed in contact with a mould and then rubbed on the grain surface. This will create a bruised appearance on the surface as the grain, where it is rubbed, will be compacted, polished and will appear darker.

Heat contact process

In this process leather is sandwiched between a flat heated metal plate, and a mould with the design cut in relief. The grain is to the flat metal plate and the flesh to the mould. The whole assembly is then placed under a press and the pattern in the mould transferred by heat.

There is one other heat contact process which needs to be mentioned which is the application of a pattern directly onto the grain surface using a heated metal mould. This would appear to be a potential method of transfer as contact of the grain surface with a heated mould will achieve a scorched pattern but, unless the plate just touches the surface, a stamped impression is bound to be created (this would produce a depression similar to that of blind tooling). This process would seem to be ruled out as in none of the scorched leather examples examined was there evidence of a depression on the grain side.

Print Transfer

Examination of 16-17th century Spanish and Italian gilt leather from the V&A collection shows that when embossing or stamping was not the principle method of imparting decoration a mould was used to transfer an inked design onto the silvered surface which was then worked up with hand tools, punches, paint and glazes.

The friction process is supported by the only technical description we have for scorched leather, the manuscript of Peder Månsson which is thought to date from about 1520 (4). Månsson describes a process for making "damaskflowers" on leather that is for making damask leather.

The process first begins with a wooden mould but he makes the point that it should be a negative or reverse mould, different from that used for printing the pattern onto gilt leather. A skin is then glued to the mould surface and the assemblage is then placed on a table fixed to the wall (fig. 6).

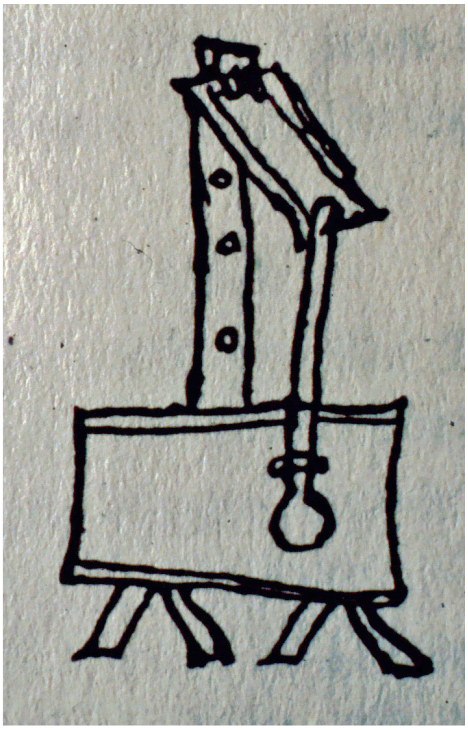

Fig. 6. Diagram of Månsson's table and box.

Against the wall stands a vertical post at the top of which projects a small chest able to move up and down on an iron bar. At the other end of the chest there is a wooden pole which has a smooth and very hard wooden ball attached at its other end. Weights are placed in the chest and the ball is rubbed up and down to transfer the impression of the mould onto the leather just as one would do a tracing.

When the skin has been rubbed water is smeared over the surface and a second rubbing carried out at the end of which "it should be shining and the roses or cut outs will be at the leather. Then after the polishing with the ball sew the pieces together so that you will get hangings or other objects which one needs to decorate the houses"

It is interesting that he refers to these as hangings as all the examples sited have been used as covers. It is possible that Månsson is describing a process for making repeat panels of scorched leather which could be used as a simpler and undoubtedly cheaper form of wall decoration than gilt leather, and that this was the principle function of damask leather at this time.

Experimental scorched leather

In order to determine which of these methods was likely to have been used to produce the extant examples of scorched leather, some practical tests were carried out using vegetable tanned sheepskin. To test the first method, using friction, the leather was stretched over an engraved wooden block (fig. 7) and using the broad rounded end of a wooden mallet, the surface of the leather was rubbed until the impression started to come through. This first method was found to be time consuming but did achieve a scorched effect. In comparison with historical pieces of scorched leather the edges were not so sharply defined, the rubbing leading to a more diffuse edge. The rubbing also led to a sharp impression on the flesh side but fine detail was difficult to achieve on the grain side (figs. 8&9).

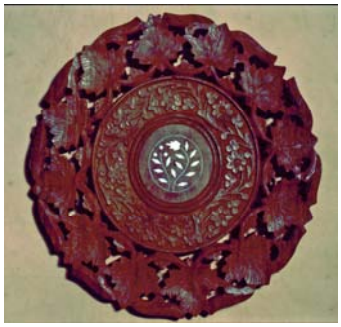

Fig. 7. The wooden block over which the leather was rubbed.

Fig. 8. The flesh side of the rubbed leather.

Fig. 9. The grain side of the rubbed leather.

The second method proved to be an even more unsatisfactory explanation of the technique for creating the scorched leather pattern. A piece of vegetable tanned sheepskin was placed flesh side down onto a wooden mould and a lining iron set at 150°C pressed down onto the leather and held for 10 seconds. All that was transferred using this technique was a very poor diffuse outline impression of the mould. Although there was an overall darkening of the surface it is doubtful that this could have created the patterns we see on scorched leather.

The third method of ink block transfer was the easiest to produce a pattern. A small wooden printing block was inked up, and by lightly stamping the block onto the leather surface the pattern on the block was transferred easily to the grain surface of vegetable tanned sheepskin. The impression was clear and well defined and most closely resembled the clarity of pattern seen on historic scorched leather.

If scorched leather was produced by either the friction or the heat transfer process then an impression on the flesh side is likely to be left after the completion of the process. In the majority of surviving examples of scorched leather an impression mark on the flesh side is evident which would then rule out the direct printing method.

One of the interesting aspects of the very good state of preservation of the examples from Chigi was the presence of a bright purple/red colour on the patterned surface. Examination of the colour revealed the presence of an organic red lake in an organic binder. Where the leather was worn and exposed, the organic red being fugitive was not present, and all that remained were the dark lines of the pattern. Interestingly there were other coloured surfaces seen on the Chigi samples and they exhibited gilt leather seamed edges, as do the tassels on top of the globe covers from Ham.

Conclusion

Scorched leather was a material which was used primarily as a protective covering for fine decorative surfaces such as textile covers, lacquer and marquetry. Being a resilient material it would have provided good protection against physical damage, and it would also have maintained a good microclimate for moisture sensitive surfaces.

The term scorched leather is used to describe a plain vegetable tanned sheepskin which has a simple repeat decorative pattern on its surface. The pattern is usually either floral or geometric. The pattern is not impressed into the grain but there is often a sharp corresponding impression on the flesh side. Where the scorched leather has a flesh side impression the technique used is likely to have been produced by a friction process similar to that described by Månsson. Where there is no apparent impression on the flesh side and where colour is evident on the surface a different process similar to block printing is likely to have been used. This latter technique, though similar in appearance to the flesh impressed scorched leather, is likely to have had more limited use judging by surviving examples.

The distinction between scorched leather and damask leather is not understood and the two terms have been used interchangeably historically to describe the same process, but it is likely that they would have described subtle difference in the technique of manufacture or use of this intriguing decorative material.

Acknowledgements

I would like to acknowledge the very generous assistance of my co-author Mariabianca Paris who provided all of the information on the scorched leather collection of the Chigi Palace, Ariccia, images and analysis of the leather. I would also like to thank Eloy Koldeweij who brought to my attention the Månsson manuscript during an interesting exchange of ideas about the scorched leather process.

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ANALYTICAL RESEARCH ON DATED SEVENTEENTH AND EIGHTEENTH CENTURY DUTCH GILT AND DECORATED LEATHER

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Introduction

The former Central Research Laboratory for Objects of Art and Science used to have a workshop for the restoration of gilt leather in the 1970's and early 80's. Conservation problems were solved, and at the same time literature research was done, and the manufacture of gilt leather on a small scale, according to old recipes and descriptions, was practised. More recently a project of cooperation between Dr. EIoy Koldeweij and the Netherlands Institute for Cultural Heritage started, in which the relation is to be established between the descriptions found in historical literature sources (the history of gilt leather) and the observations made by scientific examination of actual historic objects and samples. For that purpose seven pieces of decorated gilt leather were chosen:

1. Decorated leather from 'Het Delftsche Schouw', Leiden, dated 1649.
2. Decorated leather, 'Allegory on the four seasons', by J. Vrijberger, Amsterdam, dated 1660-70.
3. Decorated leather from the Town Hall, Nijmegen, made by Anthony Menso, dated 1722.
4. Signed decorated leather, 'Allegory Pallas Athena' by J. Gartavit, dated first half eighteenth century.
5. Decorated leather from Huis van Brienen, Amsterdam, dated 1729-1733.
6. Decorated leather from the Governors' room of the Evert Zoudenbalch house, Utrecht, dated 1742.
7. Decorated leather from the Governors' room of the Orphanage, Enkhuizen, dated 1742.

Analytical methods

With a variety of analytical methods such as: laser-microspectral analysis, scanning electron microscope with energy dispersive X-ray spectrometry, X-ray fluorescence spectrometry, and X-ray diffraction, chemical elements and compounds were identified in the cross-sections of samples. The organic red pigments were analysed by thin layer chromatography and high performance liquid chromatography. Fourier Transform Infrared Spectrometry was used for the identification of the golden varnish layers. Gas Chromatography-Mass Spectrometry was used to identify the binding media and the varnishes.

The results

From historical and literature study we know in which steps gilt leather was made and which materials were used. In the following these steps will be discussed, at first from the descriptions found in the literature sources, and secondly from the results of microscopic and analytical investigations.

Size layer

Literature study shows that the whole surface of a piece of leather is covered with a thin layer of egg-white or fish-glue. Fourgeroux de Bondaroy and Diderot & d'Alembert describe the use of gelatine thick as jelly, in two layers; the second layer can be applied after the first layer is completely dry.

The cross-sections made from samples of all the pieces of gilt leather did not show a thick nor a thin size layer underlying the silver. Under the microscope and in UV-light there is no discernable boundary layer between the leather and the silver. With the classical staining-tests, such as the indicators Fuchsine S and Amidoblack AB2, no red or blue colours were observed. Also with the UV-fluorescence stains, such as Fluorescein Isothiocyanate, there was no green-bluish fluorescence typical for proteins. Possible causes for not identifying the size layer could be there is no size layer, which is unlikely, or the material is applied so thinly that it is absorbed completely by the leather and so has become undetectable. Examinations done at the end of the sixties of the Mayor's Room in Maastricht show the same phenomenon, a silver layer directly on the leather. Examinations carried out on German and English gilt leather show clearly a thick size layer which gives a fluorescence and can be stained.

Silver

Normally, silver leaf, measuring 88 x 88 millimeters, was used, but also zinc leaf and tin leaf or alloys are mentioned. Fourgeroux de Bondaroy tells us that gold leaf was not used, because it is too expensive. The disadvantage of zinc leaf and tin leaf is that the beautiful golden gloss is lost within two or three years, and the colour turns to green. It seems that copper leaf was used in Paris. Alloys as 'similor' and 'tombak' could also be used, as they oxidize less rapidly, but they are more difficult to press. Similor is a copper alloy with a golden colour and has fantasy names like: similgold, Mannheimergold, schijngoud, semilor, spinsbek and pinsbek. Tombak is an alloy of copper and zinc (red brass) with less than 18% of zinc. Between 12 and 18% of zinc this alloy has a beautiful reddish golden colour.

Using X-ray fluorescence spectrometry and a scanning electron microscope with energy dispersive X-ray analysis, silver leaf was identified in all cases. The thickness of the silver leaf is between two and four micrometer, as measured with an ocular micrometer.

Coating layer

Fourgeroux de Bondaroy describes the purposes of a coating layer. Firstly it has to fill the pores of the silver leaf after polishing. Secondly it acts as a ground layer for the yellow-brownish gold coloured varnish and it protects the silver leaf against the oxidation of the element silver. The coating layer exists of a thin layer of gelatine, egg-white or fish glue. Diderot & d'Alembert warn against applying this layer too thickly, because then it can flake of. Craftsmen manufacturing gilt leather knew this risk, that's why they avoided it.

The coating layer was identified only in two cases: on the decorated leather from the Governors' room of the Evert Zoudenbalch house, Utrecht, and on the decorated leather from the Governors' room of the Orphanage, Enkhuizen, both dated 1742. The coating layer has a thickness of three to five micrometers. UV-fluorescence of the fluorescence indicator Fluorescein Isothiocyanate identifies it as a protein layer. The layers are too thin to distinguish whether it is gelatine, egg-white or fish glue.

Varnish layer

Fourgeroux de Bondaroy and Diderot & d'Alembert write that two varnish-layers have to be applied. The second varnish layer can be brushed on when the first is complete dry. In the 'Mechelse Secreetboeck' and in 'Dictionnaire portatif des arts & metiers' the same technique is described. The above mentioned literature gives a great variety of recipes for making a golden varnish. It is the most interesting aspect of making gilt and decorated leather. Scientific examination of the golden varnish layers can not be done in a quantitative way but only in a qualitative way. It is not possible to reconstruct recipes on the basis of scientific examination.

Microscopic examination of the varnish layer of the decorated leather from Het Delftsche Schouw, Leiden, dated 1649, shows only one brown transparent layer and consists of colofony, the red dye lac-lac and linseed oil.

The analysis of the varnish layer of the decorated leather, Allegory on the four seasons, from J. Vrijberger, Amsterdam, dated 1660-1670 also shows only one brown transparent layer; it is a mixture of colofony, mastic, a drying oil, and possibly sandarac.

Microscopically only one brown transparent varnish-layer has been observed in the decorated leather from the Town Hall, Nijmegen, made by Anthony Menso, dated 1722. It is a mixture of colofony and boiled linseed oil (stand oil).

Equally one brown transparent varnish layer is found in the signed decorated leather, Allegory Pallas Athena' of Gartavit, dated first half of the eighteenth century. The materials, copal varnish, some bitumen and linseed oil, are identified with FTIR and GC-MS.

The decorated leather from Huis van Brienen, Amsterdam, dated 1729-1733, has a thin varnish layer and contains colofony with linseed oil.

In the decorated leather from the Governors' room of the Evert Zoudenbalch house, Utrecht, dated 1742, also one varnish layer was observed. This piece of gilt leather has an overlap, so that it is possible to examine the golden varnish layer in a very well protected condition. Colofony with linseed oil was found.

The last piece of gilt leather from the Governors' room of the Orphanage, Enkhuizen, dated 1742 also shows one varnish-layer. It contains amber with boiled linseed oil (stand oil).

Paint layer(s)

After pressing the relief the decorations were painted with opaque and transparent pigments and dyes. Fourgeroux de Bondaroy tells us that the pigments were mixed with oil and turpentine. To let the oil dry quicker burnt umber or red lead (minium) was added. The painters / artists simply used the pigments available in their time.

On 'Het Delftsche Schouw' (1649) only a green colour was present and is analysed as verdigris.

The background of the 'Allegory of the four seasons' shows a light brown paint layer on the gold varnish containing lead white, chalk and brown umber mixed with a drying oil. The background may be over painted in a light blue colour. The pigments analysed in the overpaint are lead white, chalk, a little vermilion and perhaps a very little indigo.

The blue colour of the decorated leather in the Town Hall of Nijmegen is a mixture of lead white and indigo.

The signed decorated leather, Allegory Pallas Athena, shows red transparent flowers, green transparent branches and a brown background. The red flowers were painted with the red dyestuff cochineal mixed with linseed oil. The green branches consist of copper resinate mixed with lead white and linseed oil. The copper resinate layer has become brown on top. The brown background has been painted with brown umber, lead white, and a drying oil. The drying effect of brown umber could explain the cracks over the whole brown surface.

The decorated leather of Huis van Brienen has three colours: red transparent flowers, green transparent leaves and a grey background. The red is organic, and with high performance liquid chromatography it was analysed as cochineal. The green is verdigris. The grey background is of lead white mixed with charcoal.

The decorated leather from the Governors' room of the Orphanage in Enkhuizen, dated 1742, has green branches of verdigris, red leaves of the opaque vermilion, blue flowers of indigo mixed with lead white, a blue background of coarse indigo mixed with coarse lead white, a yellow background of orpiment and an orange background of realgar. All pigments were mixed with a drying oil.

The decorated leather from the Governors' room of the Evert Zoudenbalch house, Utrecht, dated also 1742, has black leaves containing an organic black pigment, green flowers of Prussian blue mixed with lead white and chalk and yellow flowers of lead white mixed with chalk. The binding medium was analysed as a drying oil. The cross-sections show however that the green flowers are blue and the yellow flowers are white. The green and yellow colours are obtained by the yellowing of the thick varnish layers.

Protection layer(s) (varnish)

The decorated leather, 'Allegory on the four seasons', by J. Vrijberger, Amsterdam, dated 1660- 1670, has a varnish layer on top of the paint layers which was analysed as mastic.

The decorated leather of the Governors' room of the Evert Zoudenbalch house, Utrecht, dated 1742, has a varnish layer which contains copal.

The decorated leather from the Governors' room of the Orphanage, Enkhuizen, dated 1742, has a varnish layer containing a mixture of mastic and dammar. It has been noted that dammar is a varnish used in the nineteenth century.

The other four objects do not have a varnish layer.

Conservation treatments on the surfaces

When the surface is getting dull, Fourgeroux de Bondaroy mentions to put on a layer of glue, turpentine, egg-white or gum Arabic. Diderot & d'Alembert write: when gilt leather is getting dull by time one can give back its brilliance with 'une couche de colle ou de blanc d'oeuf'. Also in eighteenth century bills of 'kamerbehangers' or 'goudleermakers' (craftsmen manufacturing gilt leather) there are reports to tidy up the 'goudleerbehangsels' by manner of applying varnish layers or a layer of wax. This treatment has been done to remove dirt and to get back the shiny character of the picture.

Traces of paraffin have been found by analyses on the signed decorated leather, 'Allegory Pallas Athena' by

Gartavit, dated first half of the eighteenth century and a wax is found on the decorated leather, 'Allegory on the four seasons', by J. Vrijberger, Amsterdam.

In the leather of the decorated leather of the Governors' room of the Evert Zoudenbalch house, Utrecht, dated 1742, with GC-MS analyses found neatsfoot oil. This product was added to the leather to improve the flexibility.

In the other pieces of decorated leathers no conservation treatments on the surface have been carried out. In the cross-sections one can observe only a dirt layer.

Acknowledgements

I want to thank my colleagues of the Netherlands Institute for Cultural Heritage for their help: Thea van Oosten and Suzan de Groot for the Fourier Transform Infrared Spectrometry analyses, Wilma Roelofs and Raymond Heesters for the Thin Layer Chromatography and High Performance Liquid Chromatography analyses, Peter Hallebeek for the X-ray Fluorescence Spectrometry and X-ray Diffraction analyses, Henk van Keulen for the Gas Chromatography-Mass Spectrometry analyses and Kees Mensch of Shell Research and Technology Centre Amsterdam for the Scanning Electron Microscope with Energy Dispersive X-ray Spectrometry analyses.

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ANALYTICAL ASSESSMENT OF THE CONDITION OF GILT LEATHER AND CONSEQUENCES FOR TREATMENT.

Pieter B. Hallebeek, The Netherlands.

Keywords

Wall hangings, gilt leather, analysis, conservation

Abstract

As most relevant parameters to assess the condition of gilt leather are the determination of acidity (pH) and differential number, soluble sulphate content, metals and total sulphate content, soluble nitrogen content calculated as ammonia, extractable fat content, shrinkage temperature and moisture content. By means of adaptation of conservation materials and methods the leather has to be stabilised for the future in accordance with the surroundings. The results of these measurements enable an optimum adjustment of conservation methods and materials to the requirements of the material, which may be different from place to place and largely depend on the condition of the leather at the moment of sampling. Emphasis is put on the methods for neutralisation of very acidic types of leather. According to the results of the measurement of pH, differential number and percentage ammonium sulphate a scheme has been devised to explain the connection between the results of the measurements and the conservation measures to be taken especially concerning neutralisation and application of a buffer in order to stabilise the leather as quickly as possible. A comparison is made between the advantages and disadvantages of two methods for neutralisation of very degraded, acidic, unstable leather.

Analytical methods

1. Microscopy
2.1. Determination of acidity (pH)
2.2. Determination of the differential number
2.3. Determination of soluble sulphate content
2.4. Determination of metals and total sulphate content
2.5. Determination of soluble nitrogen content as ammonia
2.6. Determination of extractable fat content
2.7. Determination of shrinkage temperature
2.8. Determination of moisture content

Results

Sam-ple	Degree of degradation	pH	Diff. No	So_4 tot % W	So_4 sol % W	Ammonia % W	Ts ^{O}C	Fat % W	Moisture % W
1.	XXXX	2.7	0.7	8.3	4.6	0.9	42.7	0.4	5.4
2.	XX	3.6	0.4	1.0	0.1	1.3	64.8	1.8	10.4
3.	XXXX	2.7	0.7	11.4	6.0	0.7	41.5	1.1	7.5
4.	XXXX	2.6	0.8	9.5	1.0	0.9	44.1	1.2	8.7
5.	XXX	3.3	0.5	3.8	3.7	1.2	52.6	0.6	5.7
6.	XXXX	2.5	0.8	10.9	0.7	0.5	46.5	0.7	7.1

xxxx = very high degree of degradation
xxx = high degree of degradation
xx = degraded, but still cohesion
x = slight degree of degradation

For all the samples:

- From the results of the measurements of pH, differential number, percentage ammonia and shrinkage temperature, the conclusion may be drawn that the state of degradation from all the samples is very high with the exception of sample 2.
- Sample 2 is a light coloured leather, probably from a later date and still in good condition.
- Although the results of the measurements from sample No. 5 indicate that the condition is not too bad, in reality the condition is only a few percent better than from the other samples.
- The leather has hardly any strength and locally there could be a need for impregnation
- The leather has to be neutralised
- A dressing has to be applied to raise the fat content.
- Application of a buffer is advisable.

It is advisable to apply a dressing (with organic solvent and no water) containing 3% neatsfoot oil and 2% lanolin in order to raise the fat content to 3%. All samples are in very dry state and in lack of lubricant and moisture. The total moisture content is too low. The ability of the leather to absorb and release water from the atmosphere will be improved by the application of lanolin, which also acts as a weak moisturiser. The organic solvent of the dressing could be white spirits, turpentine or kerosene, without aromatic compounds. Also the applied organic buffer (imidazole) has weak moisture attracting capabilities.

Microscopic examination of the samples reveals that there is a large degree of "red rot" present. This occurs especially on the boundary line between paint layer (the glue layer underneath the silver foil) and the grain layer of the leather. This makes the connection between the paint layer and the leather very weak; there is only leather dust present. This will be one of the main conservation problems to be solved, possible by means of partial superficial impregnation with a very diluted artificial resin (PVA). The rather low shrinkage temperature and high ammonia content are an indication that the leather is degraded to a large extent and after stabilisation of the leather total relining with a thin, but strong, synthetic fibre (nylon) will be difficult but may still be possible. The alternative is total impregnation, a difficult and irreversible treatment. The leather as a whole is not sound and in a very vulnerable and unbalanced state and before the leather is treated; any kind of physical movement can cause much damage. The leather fibres are in a very advanced state of degradation and very brittle and they break easily because of the lack of moisture and fat.

Correlation between analysis results and conservation treatments

2.A. pH 3.0 - 4.0
Differential number 0.6 or higher.
Percentage soluble sulphate between 0% and 5%.
Small amount of mineral acid still present. Neutralisation followed by application of a buffer sets pH on $\pm$ 5. The leather will be stable and there is no discoloration.

2.B. pH 3.0 - 4.0
Differential number < 0.6.
Percentage soluble sulphate between 0% and 5%.
No free mineral acid is present. Application of a buffer sets pH on $\pm$ 5. The leather will be stable and there is no discoloration.

3. pH between 4.0 and 5.0
Differential number < 0.6.
Percentage soluble sulphate < 5%.
No free mineral acid is present. Application of a buffer sets pH on 6 or 7. The leather is not stable and the connection tannins-proteins is broken. Discoloration caused by transport of tanning material may occur. No application of buffer.

4. pH $\pm$ 5.
Differential number < 0.6.
Percentage soluble sulphate > 5%.
Free mineral acid has been present (pH < 2.0) but hydrolysis and oxidation of the leather is completed and the leather contains free tanning materials. Application of a buffer sets pH on $\pm$ 7.0 and the leather will be further hydrolysed. Usually this type of leather is very degraded, no physical strength is left and impregnation is the only solution for survival. Application of a buffer is useless.

Comparison of two methods for deacidification

Ammonia vapour

Deacidifying leather with ammonia vapour is a very effective method for neutralising free sulphuric acid (pH value below 3.0). During the process ammonium sulphate, already present in the leather as degradation product, is formed. The excess of ammonia, which can raise the pH of the leather considerably during the treatment, evaporates, leaving the pH once again within the safe range: 3 - 6. This method cannot be used on leather coloured with types of dye and pigment that are permanently discoloured by ammonia. In such cases treatment of the leather can be restricted to buffering. Brass components, such as clasps and bosses, are corroded by ammonia and may discolour, with the "yellow" colour becoming darker. Although it is possible to remove this discoloration by polishing, it will also remove the natural patina. The discoloration of these kinds of metal components must therefore be weighed against the conservation of the leather.

Procedure

The objects should be placed in as small a space as possible. In practice a case that can be tightly sealed is used. Also a tent made from not too thin plastic sheet is applicable. A tray or saucer containing a layer of ammonia in water (15%) is placed on the bottom of the case. The objects are then set on a rack halfway up the case. The case should be so constructed that there is no danger for the objects coming into contact with ammonia, for instance as a result of the case being knocked over. Because ammonia irritates skin and bronchial tubes, gloves and protective measures for eyes, nose and mouth are necessary. After three minutes the objects should be taken out of the case and put in a fume cupboard, to allow the excess of ammonia to evaporate. After two weeks the objects are ready to undergo further treatment.

For the test ten strips of new leather, vegetable tanned and artificially aged and ten strips of naturally aged, acidic, historic leather are placed in a closed, glass vessel. The dimensions of the strips are 2x5 cm. The relative humidity inside the vessel is kept constant on 55% at 21^0C by means of a saturated solution of calcium nitrate. The twenty strips of leather are placed in the vessel without ammonia for a period of three days to acclimatise.

Buffer in organic solvent

Deacidification of leather can also be accomplished by means of application of a buffer solution. The effective compound (imidazole) will function as a deacidification agent neutralising the free acid present in the leather, while the actual buffering effect of the solution will be reached only at a second application with the same solution. A single application of the buffer solution with a double imidazole concentration must be advised against, because such a solution would be too alkaline and might therefore lead to damage of the leather. At higher pH values - and especially in the range between 3.0 to 4.0 - a (small) risk of free acid still being present should be taken into account. The fact that the pH value of leather containing free acid can still be higher than 3.0, may be caused by the presence of ammonium sulphate, formed during the degradation process as this salt will cause a pH of 5.5; the overall pH value of the leather may rise and thus, as it were, camouflage the presence of free acid. Ammonium sulphate concentrations in leather of 0.5 % and higher may already lead to this effect. Imidazole is a colourless substance that is applied to the leather in soluble form. In addition to its buffering properties, imidazole is also hygroscopic and thus acts as moisture retentive. Moreover, with metals such as iron and copper. imidazole forms insoluble salts, which prevent these metals - if they are present in leather - from acting as catalysts to accelerate degradation. How often buffering should be carried out depends largely on the environmental conditions the object is in after conservation.

Formula for the buffer solution:
860 gram odourless kerosene
120 gram isopropyl alcohol or ethanol
20 gram imidazole
As imidazole is not directly soluble in odourless kerosene, it must first be dissolved in isopropyl alcohol that has been heated to about 30^0C.; after that the odourless kerosene is added.

Ammonia treatment

At the start of the measurements a small glass vessel containing a solution of 15% ammonia in water is placed into the vessel. The parameters from the reference samples are measured and the first 5 minutes every minute a sample is taken out for measurement; for the following minutes at still greater intervals. Subsequently two series of samples are taken out of the vessel after 3, 15, 60 and 240 minutes. The first series is prepared for

measurement of the chosen parameters and the second series of samples is left outside the vessel for the excess of ammonia to evaporate and measurement.

Buffer treatment

A first series of samples is treated once. A soft brush is dipped into the buffer solution, taken out and the solution is applied to the backside of the leather. Normally the leather absorbs the solution immediately.

A second series of samples is treated twice following the same procedure. The first and the second treatment after each other without an interval. Directly after application the first samples are taken and consequently further samples each minute for the first 5 minutes and then at larger intervals as with the ammonia treatment.

Results of the measurements

Ammonia treatment

The initial pH is 2.9. During the treatment of three minutes the pH rises to a maximum value of 5.8. Out of the vessel the pH goes down gradually to 4.1 in 60 minutes. During the 15 minutes treatment the pH reaches a maximum of 7.5 and goes down to 5.7 in 60 minutes. During the 60 minutes treatment the pH raises to a maximum value of 8.8 after 35 minutes and remains constant. Out of the vessel the pH goes down to 5.9 in 240 minutes.
(See Fig. 1)

Buffer treatment

One treatment: the pH increases in one minute to a maximum of 6.4. Within 5 minutes the value decreases to 3.5 and remains stable till the end of the measurement. Two treatments: the pH increases in 3 minutes to a maximum of 7.7. Within 115 minutes the value decreases to 4.1 and remains stable till the end of the measurement.
(See Fig. 1)

Shrinkage temperature

As can be seen from the graph there is for both treatments hardly any influence from the neutralisation procedure on the shrinkage temperature. Just before the end of the first part of the test there is a tendency for the shrinkage temperature to drop slightly. This may be explained as the temperature lowering effect from the extra amount of ammonium sulphate, formed from sulphuric acid and ammonia on the shrinkage temperature. The difference between the initial value and the end value are actually inside the limits of accuracy for this particular measurement. (See Fig. 2)

DSC measurements

For both treatments T_d is respectively 57.9 and 58.7 at the start and 57.4 and 58.7 at the end of the measurement. The enthalpimetric variation, delta H is 25.6 and 24.3 at the start and 26.1 and 25.7 at the end of the measurement. Differences are all within the limits of accuracy. There is no negative or positive influence from both treatments on the measured parameters. Also the differences between enthalphy figures for artificial aged and natural aged leather are within the limits of accuracy.
(See Fig. 3)

Conclusions

Ammonia treatment

When acidic leather is neutralised for 15 minutes in ammonia vapour the pH reaches a value of 7.5, after approximately 10 minutes a value of 6.0 is reached. So for a period of 10 minutes the leather is outside the stable region, very short compared to the time the leather was outside the stable region due to hydrolytic degradation and formation of sulphuric acid. When neutralisation time is brought back to 3 minutes the pH reaches a maximum of 6.0, decreases from there and is never outside the stable region.

Buffer treatment

One treatment gives a difference in pH of 0.6 units, which is not much, but enough for neutralisation. With two treatments there is a difference of 1.3 units, causing already a buffering effect on the leather. A following

buffering treatment will not be necessary. For one treatment the pH is never above 6.5. For two treatments the pH is for a period of 10 minutes outside the stable region, which could cause a slight increase in hydrolytic degradation. Disadvantages of the method are that the quantity put on the leather is hard to control and due to the use of organic solvent there is a risk of discoloration and/or stiffening of the leather, depending on the degree of degradation and the applied vegetable tanning materials.

In general: the results of the measurements indicate that both methods could be used, both methods have there own advantages and disadvantages, but due to the possible side effects of the organic solvents, there is a slight preference for the three minute ammonia treatment.

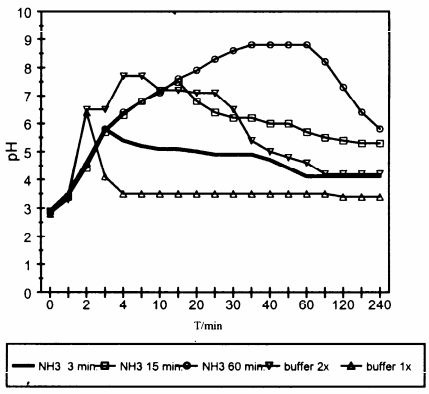

Figure1: development of pH value

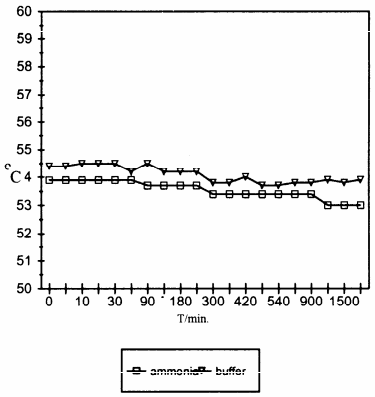

Figure 2: shrinkage temperature

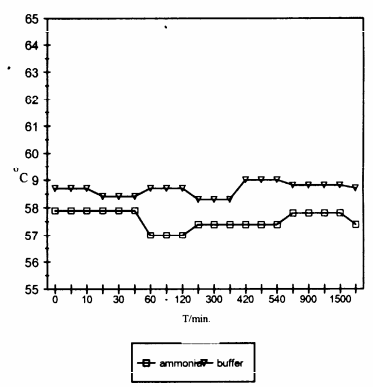

Figure 3: DSC measurements

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THE CONSERVATION OF LEATHER WALLHANGINGS AT THE ISABELLA STEWART GARDNER MUSEUM

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Introduction

In October 1997, the Isabella Stewart Gardner Museum began the conservation treatment of a suite of leather wallhangings that cover the walls of its Veronese Room. This project was made possible by a grant from the Institute for Museum and Library Services and by a gift from a generous private donor. This paper introduces the scope of the project and presents some recent investigations into these artifacts.

The leather wall hangings at the Gardner originate from a number of different groups. Isabella Gardner purchased all of them in several lots between 1897 and 1901. The lots were purchased from dealers in Paris, Venice and Rome (1). Gardner installed the hangings shortly before the opening of her Museum to the public in 1903. With some exceptions, all have remained as she installed them until today.

In order to understand some of the objectives of this project, it is necessary to note some of the special conditions of the Gardner Museum. Gardner, the museum's founder, was herself largely responsible for the design of her museum building and her inspiration was the Venetian palazzo. She died in 1924, and since that time the museum has observed two mandates set forth in her will. The first mandate is the prohibition against making any change in "...the general disposition and arrangement of any articles..." in the galleries at risk of the total dissolution of the Museum. Therefore, the collection is neither added to nor deaccesioned from. The second mandate is her adjuration that her collections be preserved "for the education and enjoyment of the public forever...".

Her will assuredly influences our conservation strategy at the Gardner. In the case of the Veronese Room leather, the objective was to treat and reinstall every piece of leather that Gardner originally installed at the turn of the century. The condition of individual leather artifacts in this gallery varied significantly. This was in part due to the different ages and provenances of the collection. It was also a result of different environmental and treatment histories experienced at the Museum. Although we intended for this conservation treatment to improve both the condition and the appearance of each hanging, we also accepted that there would be a degree of variation in the final appearance of these many pieces of leather. Modern replication of these hangings was not considered an option in this project. This was in part due to Gardner's will, but equally it was a result of our concern to display original 17th- and 18th century leather wallhangings. The Gardner is reportedly the only American museum that displays leather hangings of this period, and as such we provide a unique experience for our visitors. It was the very rarity of gilt leather in the United States that led us to look upon this project as a special opportunity to investigate and document the material and its degradation.

Coatings and Paint

Our investigation began with a group of wall hangings that Dr. Eloy Koldeweij has attributed from photographs as Spanish or Italian from the early 18th century. We could ascertain from examining the protected edges of these hangings, and from discussions with Dr. Koldeweij, that the appearance of the exposed surface had altered dramatically. Most significantly, the entire silver-colored background now appears very dark, and the original green paint is nearly black. In addition to substantial surface dirt and sooty grime, we also expected there might be a discolored varnish and corrosion of the metal. Examination under long wave ultraviolet light indicated the presence of a shellac coating in areas, as well as the presence of wax. In order to understand better the process of degradation in these panels, we initiated a series of analyses. Our areas of investigation were the following: to confirm the presence and composition of a surface coating, the presence of shellac, the composition of the paint binding medium, the identification of certain pigments, and the general stratigraphy of the decorative layers. These analyses were done in conjunction with conservation scientist Richard Newman at the Boston Museum of Fine Arts. The hangings were first examined with ultraviolet/visible light-induced fluorescence. Samples were then removed from different colored areas in order to examine the cross sections and for analysis by FTIR microspectrometry and gas chromatography/mass spectrometry (GC/MS), as well as light microscopy under visible and ultraviolet light.

Examination of the hangings under long wave ultraviolet light indicated the presence of shellac; there was a

strong orange fluorescence in specific areas of the decorative pattern of the hangings such as the golden-colored flower stems, the red and silver flowers, and, to a lesser degree, in the recessed areas of the stamped background.

Because we were gathering data from different areas of the hanging, and by means of a variety of techniques, we prepared a composite cross-sectional drawing that helps to illustrate what the combined analyses determined, shown in the following diagram. Fig.1.

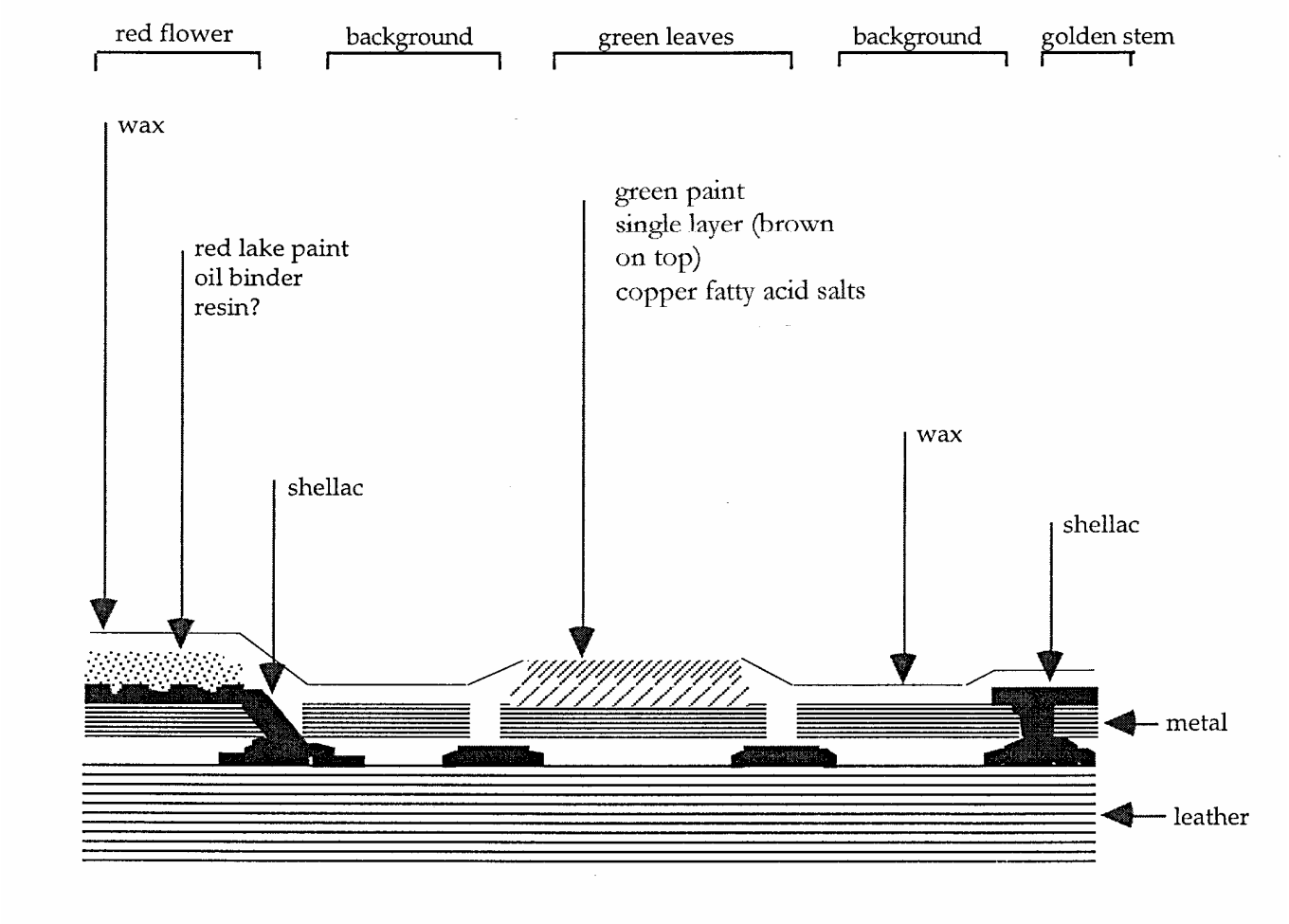

Fig.1. Cross-section of Painted Spanish /Italian Leather

The FTIR and GC/MS analysis did confirm the probable presence of shellac in the gold stems. The cross-section analysis indicated the presence of shellac under the red paint and under the metal leaf as well as absorbed into the leather. Examination of the cross sections indicated that the boundary between the red paint and the shellac beneath was blurred. and that there was some interaction between these two media. Ultraviolet light microscopy had also shown a faint green fluorescence in the red paint which may indicate the presence of a natural resin. However, the GC/MS analysis did not detect this. Analysis indicated only the presence of a drying oil and of pine resin. Pieter Hallebeek has suggested that the pine resin may correspond to residual cedar oil from a prior dressing. Of particular interest is the total absence of detection of any natural resin other than shellac despite the extreme sensitivity of the instrumentation used. In addition to a shellac varnish in the gold stems, we plan to investigate whether a colorant or dye is present in the shellac by means of high performance liquid chromatography (HPLC).

In the areas of the metal leaf in the background, the metal itself is extremely degraded in contrast to its better preservation where it has been protected by the gold and red glazes. FTIR indicated no coating in this background area other than beeswax. We have reason to believe that the wax was applied to the hangings in situ at the Gardner in the last 100 years because it is not present wherever the leather surface was protected, or overlapped, in the installation in the gallery.

The literature describing the manufacture of gilt leather suggests that in areas where the metal leaf was intended to appear silver colored, as in the background on these hangings, the initial varnish (in this case, shellac) would

have been wiped off the metal surface. The clean metal surface would then be coated with a glue or glair. This would explain the absence of detection of any resin coating on these areas of the metal as well as its severe corrosion. We may pursue further analysis of the presence of a glair layer. Unfortunately, the prognosis for the restoration of the metal leaf is poor.

Other areas of degradation in the surface decoration are the green-painted areas. The cross-section revealed no coating on this paint; it appeared instead as a single layer that is brown toward the top and contains bright green particles nearer the metal leaf at the bottom. FTIR analysis indicated that the green paint contains copper salts of fatty acids in an oil medium; it also detected both nondrying and drying oils.

Microscopic examination of the green particles revealed varied morphologies. Some of the particles appeared bright green and crystalline; they were strongly birefringent under crossed polars and had a refractive index and morphology consistent with verdigris, or copper acetate. Other particles appeared brown and amorphous, being largely optically inactive under crossed polars. Often, the green crystals were found mixed in and among the brown amorphous material. It appears initially that there is degradation of the mineral pigment, possibly into an organometallic with distinct optical properties. Pieter Hallebeek has suggested that in the presence of nondrying oils, fatty acids replace the acetate of the verdigris which is then volatilized. In terms of restoration, because it is the surface of the paint layer and not a protective coating that has degraded, there is no expectation to restore the green color.

Metal Leaf Characterization

A similar method of inquiry and analysis was pursued for the paint and varnish layers on a second set of hangings that Dr. Koldeweij has attributed as Netherlandish from the second quarter of the 18th century. The findings were comparable to those of the Southern European hangings shown previously. One area, however, in which the two groups differ significantly is in the composition of the decorative metal leaf. A number of samples from these two groups of panels were analyzed by proton-induced X-ray emission, or PIXE. This analysis was done by Dr. John Chervinsky at Harvard University. One of several advantages to PIXE analysis is that it is non-destructive and requires no sample removal. PIXE provides quantitative data for major and trace elements. The data are presented below.

Netherlandish Leather

Sample #1 (%)		**Sample #2 (%)**	
Ag	91.52	Ag	88.67
Cu	0.86	Cu	1.22
Pb	3.80	Pb	7.19
Ti	0.13	Ti	0.04
Zn	0.79	Zn	0.85
Mn	0.14	Mn	0.17
Br	0.35	Br	0.48
Fe	2.29	Fe	1.33

Spanish / Italian Leather

Sample #1(%)		**Sample #2 (%)**		**Sample #3 (%)**	
Ag	95.23	Ag	96,20	Ag	95.46
Cu	0.63	Cu	0.59	Cu	1.00
Pb	0.54	Pb	0.93	Pb	0.29
Ti	0.52	Ti	0.10	Ti	0.36
Zn	0.15	Zn	0.08	Zn	0.12
Mn	0.09	Mn	0.12	Mn	0.12
Br	0.17	Br	0.18	Br	0.19
Fe	2.58	Fe	1.62	Fe	2.35

The silver content in the Netherlandish hangings hovers close to 90%, and lead is present at 4 to 7%. The silver on the Southern hangings, on the other hand, is present in percentages of 95% or more, which is much higher than in the Netherlandish hangings and more consistent with coin silver composition. The lead in the southern hangings is present at levels less than 1%, which is significantly lower than in the Netherlandish hangings. The presence of lead in the Netherlandish samples may reflect the original method of extraction of the silver, such as a result of cupelation from lead ore.

We also analyzed the metal leaf from an altar frontal that Dr. Koldeweij had not yet had the opportunity to

attribute to a country or region of origin. We compared its silver composition to that of the other two groups: Netherlandish (North) and Spanish/Italian (South). Following is a graph showing the percentages of silver present in all the samples. The number of samples is too small for robust statistical analysis. However, a simple t-test (2) suggests that the likelihood that the southern samples and the northern samples belong to distinct populations (3) is approximately 80% based upon the lead levels, and it is approximately 90% based upon the silver levels. With a larger data group, silver composition analysis may be an additional diagnostic tool to be used in the characterization of gilt leather. Fig.2.

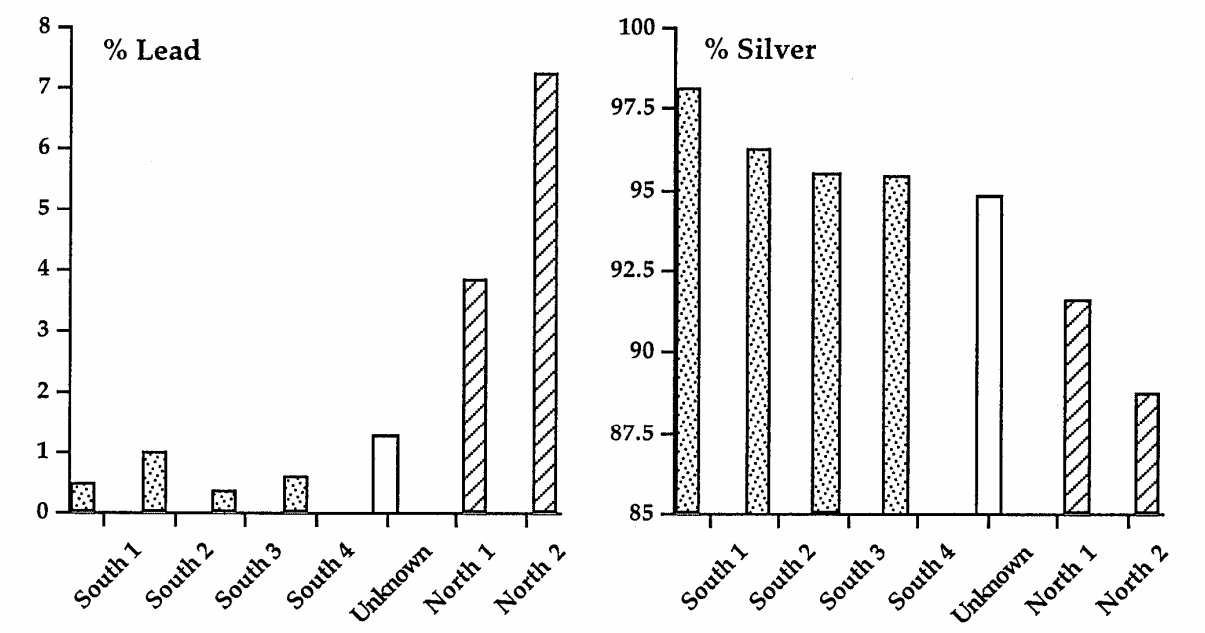

Fig.2. Lead and silver content of samples.

Silver Degradation

The silver in the Spanish/Italian hangings discussed previously is severely degraded wherever it is not covered by varnish or paint or by physical features of the installation, for example, wherever it was protected by an overlapping hanging or by the face plates of the wall sconces. In these protected areas, the silver appears bright and silver colored and probably reflects the condition of the leather when Gardner purchased it. We are in the preliminary stages of investigating the degradation of the silver. It appears that there may be at least two mechanisms of degradation: one, the mineralization of the silver and two, the destabilization of the silver corrosion products in the coating materials. There are a number of agents of degradation that need to be examined, including gaseous pollutants, photosensitivity of the silver compounds, the matrix of organic coatings, acidity, moisture, and the migration of silver compounds.

Gaseous pollutants have undoubtedly induced silver corrosion on these hangings. Only since 1996 has the Gardner Museum had a full climate control system which includes filtration of outside air with both activated charcoal and permanganate filters. Prior to climate control, environmental monitoring in the galleries detected the presence of sulfur and nitrogen compounds, ozone, and chloride ions consistent with the Museum's urban environment. The formation of silver oxide, silver sulfide and silver chloride has been detected on sample silver coupons exposed in the galleries. Moreover, there is the presumed presence of thiourea from the leather itself which in combination with the acidity of the leather can induce the destabilization of the silver sulfide.

Objects conservators have observed that silver sulfide appears to be moderately unstable in organic environments, such as in aromatic solvents. We have noted that when removing the beeswax coating from the areas of silver leaf, there appears to remain little or no silver on the leather. It is possible that residual silver compounds have migrated (or dissolved) into the organic coating. Using electron-beam microprobe analysis it may be possible to map the concentration of silver throughout the depth of cross-sections taken from these hangings, in order to determine where the silver might have gone, either into the coating or into the leather.

We also hope to confirm or dispel our perception that exposure to light has exacerbated the silver degradation. Photosensitivity of silver has been observed elsewhere in other gilt leather artifacts (4) however, we have yet to

find a discussion of the mechanism. The preservation of photographic materials seems likely to correlate, and we are pursuing discussions with experts at the Image Permanence Institute as well as with those in industrial chemistry. We anticipate reporting further on this in the future.

Climate at the Gardner Museum

In 1988, a comprehensive study of the Gardner's environment was undertaken in consultation with Dr Nathan Stolow and Susan Buck. At that time, measurements were taken to compare fluctuations in the dimensions and weight of three representative leather panels in relation to changes in relative humidity. An example of the recorded data follows in which the change in weight of three leather panels is graphed against the changes in relative humidity. The correlation coefficients (R-squared) for panels 1, 2, and 3, respectively, are: 0.730, 0.694, and 0.718, thus for all three panels approximately 70% of the change in weight can statistically be attributed to the change in humidity. Fig.3. At the time of the study, it had been observed that humidity-induced movement of the leather was visibly causing stress in the artifacts. They were buckling and pulling away from the nails which attached them to the walls.

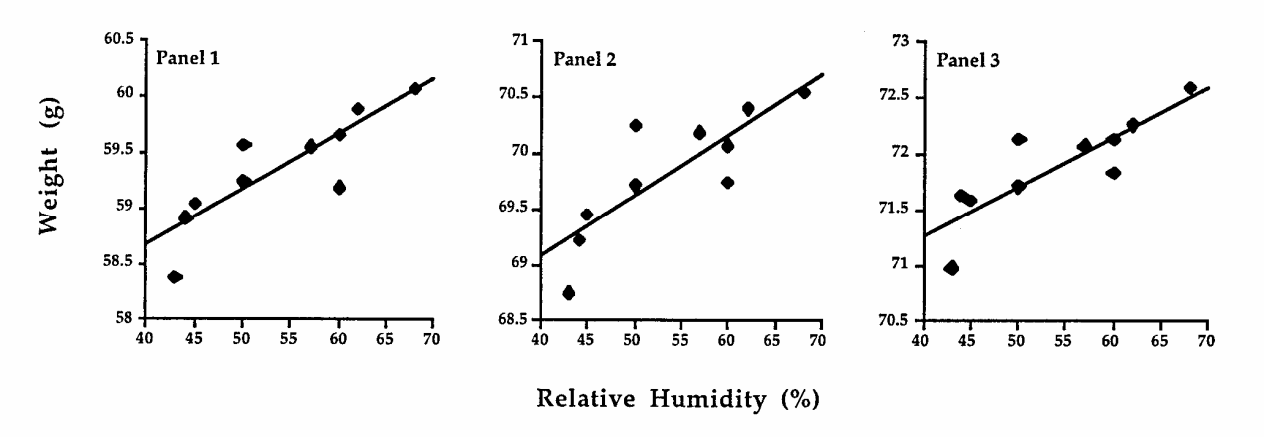

Fig. 3. Leather Panel Weight as a Function of Relative Humidity

Early in the 1990's planning began for the current project to conserve all the leather wall hangings in Veronese Room. At that time, it was determined that the project would not commence until the Museum's climate was stabilized. Climate control was installed at the Gardner in 1996 and the temperature and relative humidity in the Veronese Room is now very stable.

Documentation

In addition to conserving every hanging in this gallery, part of this project required the reinstallation of each hanging in its original location, There are approximately 300 hangings, individual panels, and fragments in this gallery. The relining and reinstallation of these hangings had to preserve the appearance of the current installation. Therefore, we have tried to establish and maintain a very high level of documentation of the existing installation. Because so much information is involved, the data are stored and managed in a database. A digital camera was used to document the installed leather on the walls of the gallery; installation data was then added directly to the digital images. Each leather artifact was assigned a project number which was superimposed on the digital image. The project number contains a code that indicates the artifacts position in the room. These digital images document the original arrangement of the artifacts on the wall and can be easily modified on the computer when new information is learned, for example during deinstallation.

The digital images also stored important information about the installation of each individual hanging, such as the perimeter of each artifact, the method of attachment to the wall, the presence of open seams and tears that would affect the deinstallation procedure, and the location and direction of overlaps. Additional information was noted and mapped out for each wall of the gallery, such as the locations of wall sconces, painting mounts, and architectural elements. Some of this information was critical for the reinstallation of the hangings. For example, the order of reinstallation was determined largely by the original overlaps. Finally, the digital images will help preserve the history of these hangings and document information that was lost in the new installation, such as the presence and location of nails.

A database was designed to record the condition, treatment and analysis histories for the 300 hangings. There were three primary objectives in designing the database. The first goal was to make the entry of data efficient and, to this end, both check-box and narrative formats were combined. Data that was uniform to a number of

artifacts could be copied and pasted in with ease. Another objective was to facilitate the cross-referencing of information; within the data base one can travel directly among different records within data fields. Finally, we wanted to design a data base that would make possible topical searches. In this software, any data field (and indeed any word within these fields) can be used to generate a search group. For example, one can search for all artifacts that have a particular tooling pattern, or insect damage, or that have an analysis history, etc..

Conclusion

In this first phase of the project a number of objectives were identified, including the characterization of materials used in the artifacts, the investigation into the agents and mechanisms of deterioration, and methods for documentation of the individual hangings and their installation. Preliminary observations were made regarding these topics and, in some cases, techniques were developed in response. The next phase of the project included further development of the investigation of these topics and the development of appropriate treatment methods for the hangings.

Acknowledgments

We are grateful to many colleagues for their participation in this project as formal consultants, or more informally as friends of the greater gilt leather community: Dr. Eloy Koldeweij, Pieter Hallebeek, Chris Calnan, members of the Northampton Leather Conservation Centre staff, and Alex O'Donnell. We are most grateful to their support thus far and have every hope for their continued involvement throughout the project.

Footnotes.

1) Fernand Robert in Paris, Consiglio Ricchetti and Moise della Torre in Venice , and the Galleria Sangiorgio in Rome
2) 2 tailed t-test assuming unequal variances in the two populations
3) likelihood that the two populations belong to groups with distinct means with distinct distributions
4) by D. Muller of the Rijksmuseum in a presentation at the 1986 ICOM-CC symposium on ethnographic and water-logged leather in Amsterdam

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FLATTENING IN SITU THE GILT LEATHER WALL HANGINGS

Jarosław Adamowicz, Roman Kozłowski. Poland

Introduction.

Reshaping leather objects is often a necessary component of their conservation. Though especially important for excavated leather, distorted during the burial, it is frequently carried out for any historic leather item to reduce deformation caused over the years by often inappropriate storage and handling. Flexibility of usually hardened and embrittled leather must be increased to permit reshaping. Ideally, any plasticising treatment should be reversible and should bring about no change in the leather appearance and composition. Sully (1992) reviewed various methods used in conservation to relax and reshape the leather, and found controlled humidification to be most effective in reshaping a variety of objects.

Gilt leather wall hangings often become curled, bulged or otherwise deformed. Their flattening is then an important step during the conservation both for aesthetic reasons, and to enable further repairs and treatments to take place. The present paper describes investigations and treatment of gilt leather wall hangings in several rooms of Wawel Castle in Cracow, Poland. The problems encountered during the conservation were especially difficult because of big surfaces of the gilt leather to be handled, backed on the canvas, and the necessity of carrying out the task in situ on the walls.

Fig. 1. Gilt leather wall hangings decorating the Antechamber of the ‚Kurza Stopa'. State of preservation before conservation.

The investigations and treatments described were part of a comprehensive restoration of the castle interiors. The works have been carried out between 1995 and 1998 by a conservation company AC Konserwacja Zabytków. The team of restorers was guided by the owners of the company, diplomaed conservators Edward Kosakowski and Aleksander Piotrowski.

Provenance, mounting system and condition of the Wawel gilt leather.

The gilt leather wall hangings displayed now in the rooms on the second floor of the northern wing and in so called 'Kurza Stopa' on the first floor, were commissioned in Venice around 1720 by August II the Strong, to decorate rooms of the Moritzburg Castle near Dresden. The hangings were preserved in Moritzburg until the beginning of the twentieth century when the owners of the castle removed a considerable portion of them from the walls. The gilt leather was sold and partially donated to the Wawel collection by an art dealer Szymon Szwarc who served as an intermediary in the transactions. Since 1930 the wall hangings from Moritzburg were reaching Wawel where they were used to decorate the rooms of the upper floor, devastated and stripped of the interior decorations when the castle was used as barracks by the Austrian army until 1911. In this way a collection of gilt leather wall hangings, in its size unique in Poland, was formed.

Fig. 2. Gilt leather curled and bulged. The soiling of the surface made interpretation of the ornaments and colours difficult. State of preservation before conservation.

The task was not easy, since leather panels from Moritzburg had to be mounted onto walls differing vastly in sizes from those in the previous location. They had to be supplemented with contemporary copies of the

historic panels to fill the areas for which not enough of the original material was available.

A great role in shaping the decoration was played by Wacław Szymborski who in the thirties restored the gilt leather purchased, and undertook to produce the replicas following the original technology of the gilt leather. Szymborski put together in a deliberate way historic leather with that produced contemporarily. An ornamental, carpet like decoration was thus formed, and it has become an historic object in itself linking two distant historic periods. An original mounting system, untypical for the gilt leather, was developed. Wooden frames were fixed to the walls onto which stretched flax canvas was nailed. The historic panels, together with the replicas, were glued to the canvas with the use of starch glue, and in some places with collagen glue. In this way a multi-layer 'sandwich', canvas-glue-leather, in many cases of considerable dimensions was formed (Figure 1).

A large number of areas of damage to the wall hangings could be seen after 60 years of their exposition in the castle rooms. In many places the canvas was torn from the frames so that loosened fragments of gilt leather were hanging unstretched, and consequently curled and wrinkled (Figure 2). The deformations have favoured further deterioration: accumulation of dust on the bulged areas, cracks and splits affecting especially the paint layer. The situation has been made worst by misguided interventions in the past when the detached leather - canvas sandwich was fixed back to the frame with the nails going through the gilt leather. The recurring detachment of the canvas has led to new damages of the leather (Figure 3).

Fig. 3. Areas of damage to the edges of leather and canvas caused by faulty fixing of the gilt leather. State after surface cleaning.

The observed deformations of the leather apparently result from uncontrolled microclimatic conditions in the rooms. The castle interiors are heated during the cold period of the year, which brings down the relative humidity (RH) to merely 45% on average. When heating ends, RH varies parallel to fluctuations of the climatic parameters outside. A systematic microclimatic monitoring in one of the rooms revealed that for many days in May and June humid air flowed from outside into the rooms, bringing about an increase of the RH in the interiors to 70 - 80%. It is well known that leather shrinks and expands during the fluctuations of the RH. The changes were easily noticeable when the wall hangings became stretched and hard on touch during the 'dry' winter season, and soften and slightly bulged in the bottom parts on the wetter days. Physical forces resulting from the leather shrinkage must have been large enough to disrupt the canvas from the frames, which has led to the leather deformation described.

The operation of flattening and mounting back the distorted leather was thus an important component of a conservation plan. The problem was aggravated by the need to release from the frames considerable fragments of the hangings in order to get access to the walls to modernize the electric and central heating installations. So for almost all walls some corrections of existing mounting and/or re-mounting of the detached leather were necessary.

From the very beginning it was assumed that the mounting and flattening technique chosen should conform to the principle of minimum intervention into the present state and arrangement of the hangings. It was decided to carry out the treatment in situ on the walls without removing the panels from the canvas support. A willingness to preserve the way the gilt leather was mounted and arranged in the 1930s, which has become a value in itself, played also an important role.

The humidification by water vapour was an obvious choice to relax the hangings. It seemed that almost no adverse effects of the treatment could be expected since wall hangings by the nature of their exposition have undergone prolonged periods of high humidity in their environment. No solvents, lubricants or plasticisers were considered, not only because they could adversely alter the condition of the leather, but also because their application would be possible only from the grain side covered with silver foil, varnish and paint. The humidification treatment was however preceded with investigations and tests aiming at assessment of the response of the leather to increased moisture content, and optimising practical details of the treatment itself.

Investigations and tests.

The optimum conditions of the gilt leather storage require not only a stable RH level. Also an absolute level of this parameter is important. According to van Soest et al (1985) and Hallebeek (1992) the optimum moisture content in leather should be between 10 –16%. Prolonged storage of the leather in drier conditions leads to a loss of water from the collagen fibre network and consequently to hardening and embrittlement of the leather.

In order to obtain information on the moisture uptake by the Wawel leather at various RH levels, samples were collected from different leather panels, both original from the eighteenth century, and the replicas produced in the nineteen thirties. The entire water vapour sorption isotherms were recorded gravimetrically for the RH range 0 - 95% with the use of a Sartorius vacuum microbalance at 20 ± 0.2^{o}C. Typically about 0.1 g of a sample was placed onto the balance and evacuated. The moisture was quickly released under vacuum and a constant mass was attained. Then RH was gradually increased by adding portions of water vapour and the corresponding mass increases of the sample were recorded.

The measurements established that the optimum moisture content in the material corresponded to the RH range in the environment between 55 – 70%. This is an important piece of information because it indicates the RH range which ensures optimum conditions for the long term preservation of the gilt leather. RH of 60% is generally accepted as a level above which mould growth on organic material can occur. So though the preferable RH levels are rather high they should not effect adversely the conditions of interior decoration and objects exhibited in the rooms.

Fig. 4. Humidification of the gilt leather wall hangings on the entire wall. On the floor, a data-logger recording changes in RH.

The next stage of work involved humidification tests on a representative fragment of the gilt leather. The north-east wall of the Antechamber in the ‘Kurza Stopa’ was chosen. Raising RH in the entire room was considered impossible because of possible adverse effects on other materials like gilt wood and oil paintings in the ceilings. A simple system has been developed for the controlled humidification of the gilt leather. First a layer of Hydrotex, was laid on the entire wall covered with the leather. Hydrotex is a waterproof textile impermeable to liquid water but permeable to water vapour. Next a layer of felt soaked with water was placed as a source of the water vapour. The Hydrotex-moistened felt sandwich was then covered with a polyethylene foil creating thus a humidification ‘tent’ (Figure 4).

The preliminary tests had to give answers to two important questions. First it was necessary to know after what time an equilibrium moisture content is established within the entire sandwich gilt leather-glue-canvas. It was obvious that the shortest possible time should be aimed at to minimise possible adverse effects of higher moisture content on the gilt leather especially on its outer paint layer. On the other hand a non-uniform distribution of moisture across the sandwich could have led to a lack of a uniform flexibility of system, and hence to an insufficient response, or physical damage on attempts to flatten.

In order to determine the timing of the necessary RH increase, climatic parameter changes inside the humidification ‘tent’ were monitored in the course of the treatment. MP-100 temperature - RH sensors from Rotronics were used. They were attached to a data logger which read the values every 60 seconds and recorded the 15-minute averages in the internal memory. The sensors were placed both on the external surface of the leather where water vapour was supplied through Hydrotex and behind the canvas (between the hanging and the wall) to monitor when the moisture would migrate to the rear side of the canvas support. Typically, an initial RH of 55% in the room interior, jumped to the level of 95% on a start of the humidification. The rear sensor registered only a slow increase of the RH. It took about 48 h until the saturation process of the hanging was completed and the RH values on the both sides of the hanging reached the same high value. Then after the flattening had been accomplished, a slow drying of the leather was carried out by controlled opening and closing the polyethylene tent. All layers of the ‘sandwich’ were kept on the wall in the course of drying, since they served as a buffer against a too fast evaporation of the moisture from the leather.

Visual assessments of the leather were done during the tests, with a special focus on possible darkening of the

leather, and the appearance of stains as a result of the solubilisation of substances contained in the leather. One can state unequivocally that no evident changes could be noticed, hence the aesthetic appearance of the object has not changed. More subtle changes, difficult to see on a dark and heterogeneous leather surface cannot be excluded.

Full scale humidification and reshaping treatments.

Where the canvas has become detached from the wooden frames, or where it had to be detached to get access to the walls behind, the edges had to be repaired. The gilt leather was gently detached from the torn and weakened canvas edges which were then cut away. A much wider new strip of flax canvas was sewn in with the use of a portable sewing machine (Figure 5). A certain excess of the canvas facilitated the stretching and served to produce a triple fold strengthening the edges. The entire surface of the canvas was repaired, tears sewn, the missing fragments patched (Figure 6). When all edges were repaired, the entire wall was humidified by hanging Hydrotex, moistened felt and polyethylene foil making use of pipes placed under the ceiling. After the desired humidification had been attained, the wall hanging was re-tensioned and the canvas was nailed to the frame (Figure 7). To avoid damages of the edges in the future, the nails were fixed into the frame through a strip of leather. Finally the detached edges of the historic leather were glued back to the canvas with the use of the starch glue. Then gradual drying took place (Figure 8).

Fig. 5. New strip of linen canvas machine-sewn after cutting off the damage edge.

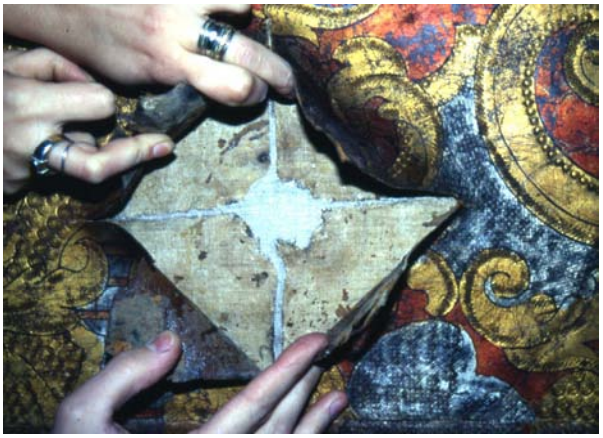

Fig. 6. Damage in the canvas support repaired with a patch. State of preservation before conservation.

Fig. 7. Fixing the linen canvas to the wooden frames attached to the wall – leather strips protect the edges of the canvas against potential damages by the nails.

Fig. 8. Gilt leather stretched and flattened. The state after the completion of the conservation works.

Conclusions.

The described humidification and reshaping treatment worked very well in all cases, though the leathers in different rooms differed in their properties and state of preservation. The most important practical observation is that gilt leather wall hangings must be exposed to high RH levels of about 90% for at least 48 h to get a marked effect on their flexibility. Hence the humidification should be preferably started during periods when the inflow of humid air has increased the RH in the leather environment, the humidification will then only add a little extra moisture to the object already moistened. The periods of low RH, i.e. period of heating in the cold season, should be avoided.

Finally one should stress the importance of the stable and appropriate climate in which the re-tensioned and repaired wall hangings are exposed. It is not easy and often impossible to secure constant high RH level of around 60% in the historic building visited by large number of people. However at least during heating period the temperature in the interiors should be kept as low as possible and air should be humidified to prevent the decrease of the RH.

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THE USE OF THE SUCTION-TABLE-TECHNOLOGY FOR THE IN-SITU TREATMENTS OF GILT LEATHER WALL HANGINGS.

Andreas Schulze, Germany.

Besides the very extensive conservation and restoration measures on the leather tapestries of the so-called "Damenbildniszimmer" of the castle Moritzburg near Dresden (1), it is also necessary to maintain continually the numerous other gilt leather wallhangings of the castle.

Very often we find mechanical damage on the tapestries, caused by visitors, especially around the doors, or by careless co-workers hanging paintings and so on. In spite the presence of security staff, some visitors find it irresistible to investigate with their fingers the smallest holes and loose panel corners, or even to remove small pieces of the gilt leather as souvenirs. As a result the damage increases very fast. Therefore it is part of our work programme to inspect the leather wallcoverings regularly, and to repair new damages without delay.

It would be unacceptable to remove the damaged panels in order to carry out these repairs. So we have developed an in-situ repair technique where a hole can be filled in with a patch, or tears and loose seams can be supported and glued from the flesh side of the leather. The hanging system of the gilt leather wall coverings in Moritzburg castle incorporates an air space of 5 to 6 cm between the wall and the back side of the leather. This makes it quite impossible to apply pressure from the front side of the leather to carry out any in-situ work.

The successful use of Suction-Tables for the conservation and restoration of the gilt leather wallhangings in the "Damenbildniszimmer" suggested a modification of this technology for works on the walls. Our suction-device is very simply. A stable box was equipped with a perforated plate, with a joining piece for a vacuum cleaner, and with a support for a tripod. It is possible to position the box anywhere on the wallhangings. The suction works from the front side and can hold the leather patches in place during the gluing process.

The working steps to close holes and tears are as follows (fig. 1):

- According to the shape of the hole, a piece of thin vegetable tanned leather is cut out and the edges of the patch are skived. The patch should be large enough that the edges overlap the hole by 8 to 10 millimetres.
- After the wetting-out of the leather and the application of the gelatinised parchment glue (2), the patch is put through the hole and fixed on the flesh side of the leather. Like a modern adhesive, the parchment glue adheres to the leather patch relatively quickly behind the hole.
- There is enough time to position a piece of thin filter paper, the box and to start the vacuum cleaner. After a few minutes, the vacuum cleaner should be turned off, the position of the patch checked, and any excess glue removed. After an additional 10 to 15 minutes under medium suction it is possible to remove the box, and to allow the leather to dry slowly.
- Normally we colour the fillings only with modified water colours. In most cases this is enough to make the damage nearly invisible. To fill large holes, it is better to use silvered leather and retouch the inserted pieces completely.

Using this method it is also possible to support and glue tears or loose panel edges from the flesh side of the leather. We have used this technique for small repairs in the gilt leather rooms of Moritzburg Castle for some years now, and in the case of smaller damages also for the conservation of the numerous gilt leather covered chairs of the castle. The in-situ repairs have nearly the same stability, flexibility and durability as those made on the leather panels which had been removed from the wall and treated on the suction table. As a result, the success of the in-situ treatments prevents the visitors from causing more damage.

Another possibility to use the Suction-Technology for the conservation and restoration of wallhangings in situ was briefly developed by one of our colleagues, Mrs. Elvira Kless (3). This apparatus is useful for objects which required more extensive conservation treatments, but with the impossibility of a removal of the tapestries from the wall because of too much interferences in the original substance. For this method it is necessary to loosen the bottom of the wallhanging, in order to push the 8 millimetre thick device into the space between the wall surface and the back of the tapestry (fig. 2). The apparatus consists of a support module with the electric equipment, of connecting segments for the transmission of the air-current, and of the perforated working-plate. With this it is possible to work in sections on the entire wallhanging. Till now this apparatus was not used on gilt leather, but with good success on painted canvas-wallhangings in the so-called "Fasanenschlößchen" near Moritzburg castle.

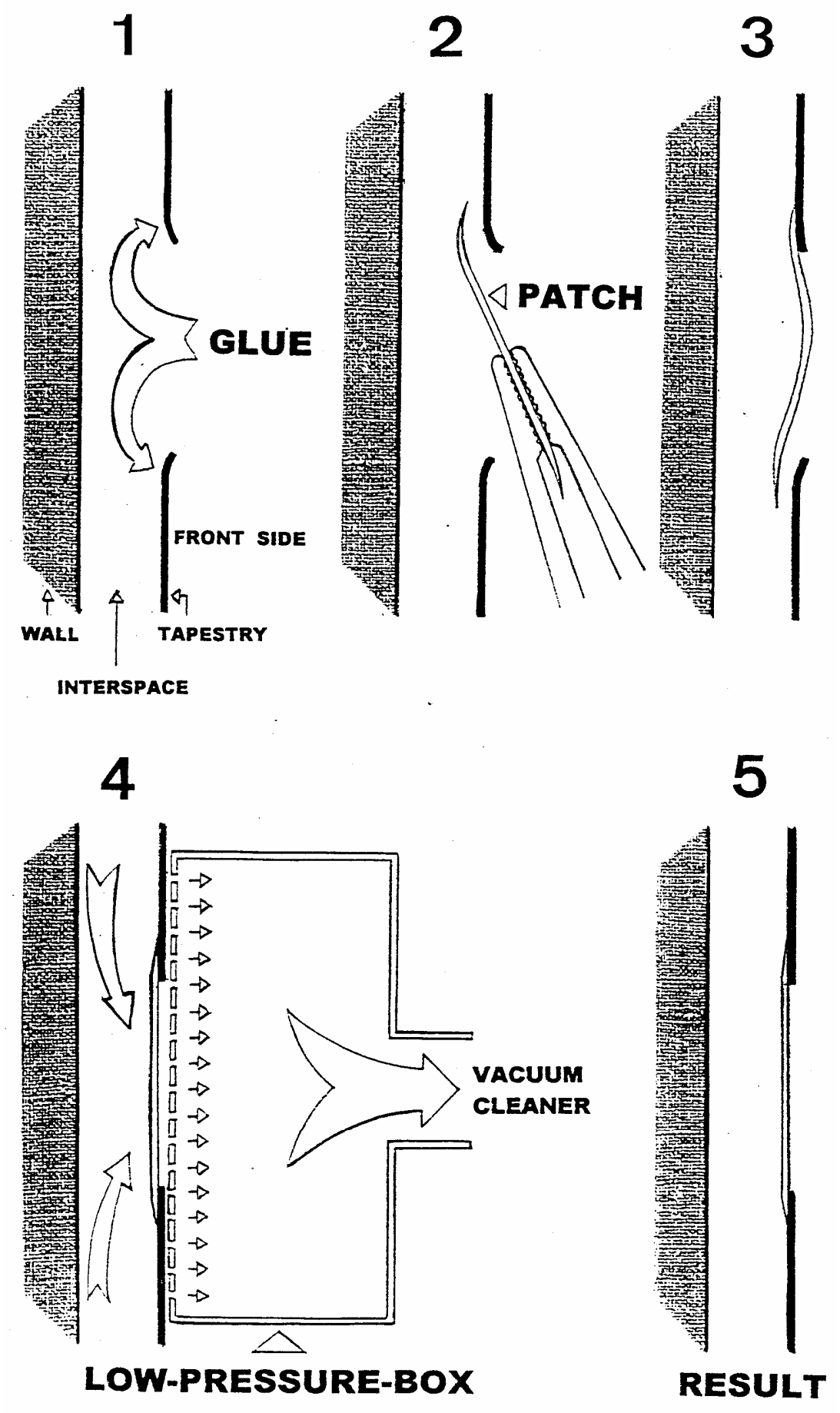
1
2
3
GLUE
PATCH
FRONT SIDE
WALL
TAPESTRY
INTERSPACE
4
5
VACUUM
CLEANER
LOW-PRESSURE-BOX
RESULT

Fig. 1

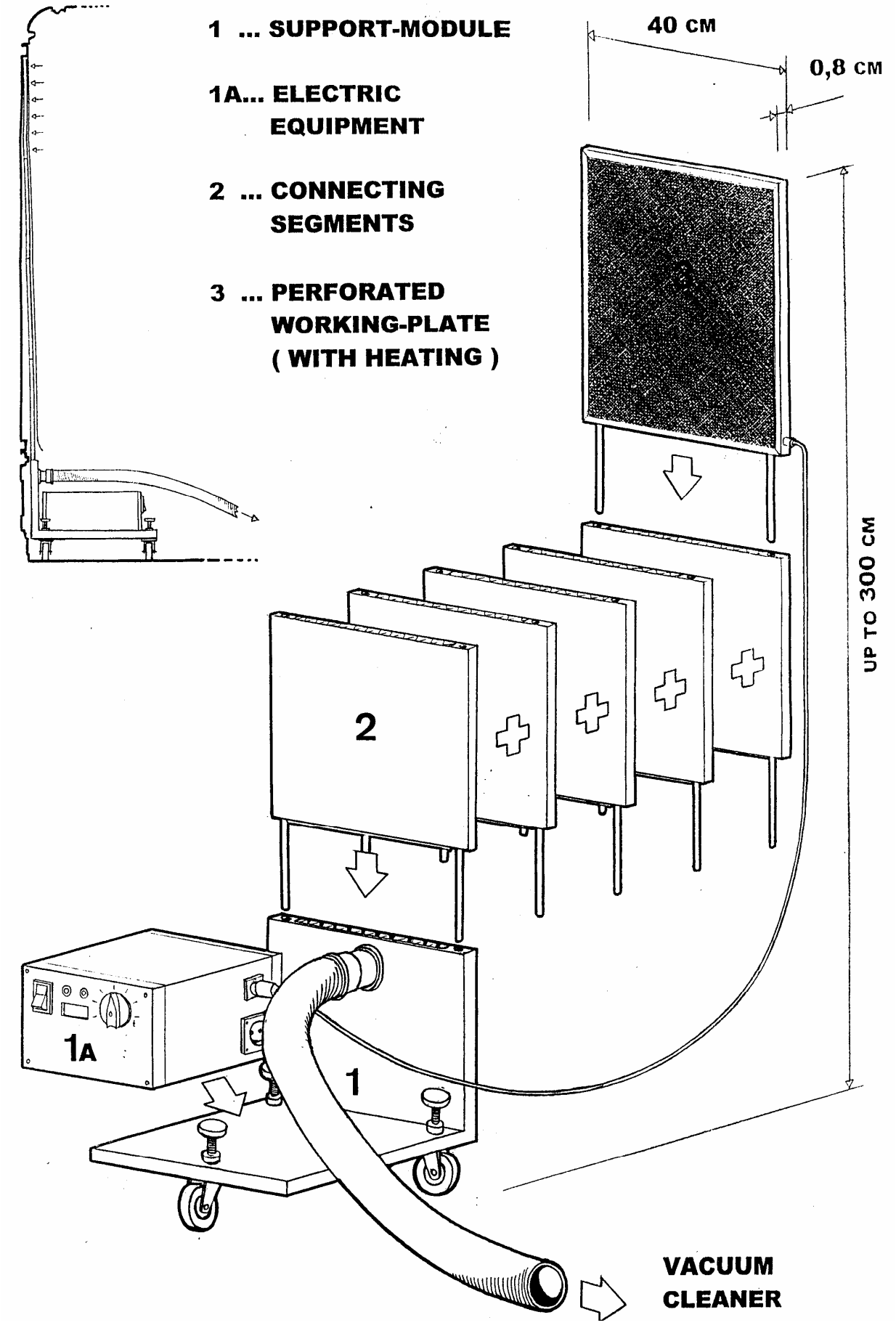
1 ... SUPPORT-MODULE
1A... ELECTRIC EQUIPMENT
2 ... CONNECTING SEGMENTS
3 ... PERFORATED WORKING-PLATE (WITH HEATING)
40 см
0,8 см
UP TO 300 см
3
2
1A
1
VACUUM CLEANER

Fig. 2

The described examples should explain some of the possibilities of conservation treatments on wallhangings in-situ, especially in the case of small mechanical damage. It is possible to minimise the amount of handling and intrusion to the object - and this is one intension of conservation and restoration generally. We can recommend to copy these methods for works in situ.

Notes and References:

1. see Post prints of the Leather-Group Interim-Meetings in Offenbach, 1989 (p. 171 ff) and in Amsterdam, 1995 (p. 26 ff)

2. parchment glue: bee honey: distilled water.
   1 : 1 : 9
   (mass-proportion)

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LEATHER HUNG ROOMS SURVIVING IN SITU

Anthony Mitchell, United Kingdom.

What interests me, as aesthete and curator, are the rooms hung with gilt leather which survive in-situ, and how to conserve them as living decoration. Very rare in England, surprisingly rare before the eighteenth century in the Netherlands where much of the tooled or embossed skins originate, some survive in Germany and in Italy. As it happens, working for the Trust in the West of England I have been concerned with three quite different and very interesting such rooms, two of which are well documented and in-situ.

Dunster Castle in the west part of Somerset was largely rebuilt for the Luttrell family by the architect Antony Salvin in the nineteenth century, when the series of six large painted and hand tooled leather hangings were then re-hung in the gallery. Made of joined calf skins or shaved cattle hides 35" long by 31" high, they depict the story *of Antony and Cleopatra* in large tapestry-like pictures with floral borders. The costume suggests a date of the mid - seventeenth century, but they may not have been made for the castle where they are first mentioned in the gallery in 1741, having no other provenance. Once thought to be unique in England, they are in fact similar to another seventeenth century set of five large panels, photographed in situ and sold from Walsingham Abbey in Norfolk in 1916, depicting *Esther and Ahasuerus,* whose present whereabouts is unknown. *The Soloman and Sheba* set at Lunéville, very sadly destroyed by fire since the conference, appear to be from the same area in Flanders, probably Malines? Early examples of this type of hanging ex situ are at the Musée de la Renaissance at Ecouen and at the Hotel Lambert in Paris, formerly at Ferrières. The Dunster Castle hangings were sent for conservation to Dr Van Soest on large rollers in the 1980's.

Kingston Lacy in Dorset was inherited in 1835 by William Bankes, traveller, collector and architect manqué. He did not complete his Golden or Spanish Picture Room until 1853 when he finally succeeded in creating the rich, sombre and harmonious setting he desired for his Spanish paintings. These were acquired in Spain in his youth and sent back to his father in 1815 before his first Nile expedition and his pioneering travels in Syria. The Venetian leather walls are hung with tooled (not embossed) gilt skins purchased from one of the Contarini palaces in 1849 and restored by Antonio Caldero in 1851, who also made additional skins the following year to make up the required quantity. All were shipped in the brig Marco Polo in 1853 together with a special varnish and instructions to the Captain. Then followed very detailed, measured plans for hanging them at Kingston Lacy - "I want the utmost precision in the dimensions", and they were to be fitted and stretched on battens "because I consider the air at the back to be an advantage". A hundred and thirty years later they presented a sorry sight. The bad varnish consigned to the Captain and no doubt further oiling and probably light, had both damaged and darkened them, except behind the pictures. Dr Van Soest treated the back of the skins for levels of acidity and animal fat but was pessimistic about the condition and appearance of the surface. Happily the Spanish canvases are large, so he hand-sewed the skins in a different order to hide the damaged ones behind the pictures, revealing only the good ones. Thus we were able to return this remarkable room to its original, (or its 19th century reincarnated) glowing beauty.

William Blathwayt (?1649-1717), Secretary at War and acting Secretary of State to our Dutch King William III from 1692-1704, built Dyrham Park during these same years and completed the furnishing of the house about 1704. The housekeeper's inventory of 1710 lists gilt leather hangings in two of the four rooms which were hung with leather but omits to mention them in the other two. The four leather hung rooms are all recorded in the 1742 inventory (1). Blathwayt's first post was in the Hague embassy of Sir William Temple in 1668. All his life he was familiar with Dutch taste and court fashion, reflected in his collection of Dutch paintings by artists such as Hondecoeter and Hoogstraeten, Delftware of which some forty pieces remain that were in the house in the seventeenth century, and leather walls (2). He witnessed the completion of the palace and garden at Het Loo in the 1690's, from his permanent apartment there, also hung with leather according to a later inventory, but no longer extant.

There were originally four rooms at Dyrham decorated with gilt leather hangings, of which one still survives, together with a quantity of loose skins of the same pattern from the other rooms. Some of these were applied to an earlier set of chairs and to a later screen.

1. Gilt leather Parlour: recorded in 1742.

2. Vestibule: still in situ, listed in the 1710 inventory (The East Hall). The embossed, silvered, varnished and painted skins are of the Bacchus and Ceres design, of which those at Grimbergen Castle, Humbeek are a mirror image, from the Rijsende Son factory of Martinus van der Heuvel, all measure 850 x 690 mm. Eloy Koldeweij has shown that he marketed his patterns by means of engravings, of which there is a set in the Victoria and Albert Museum (3). The frieze border is of another pattern, which also occurs as a mirror image in the Brouwershuis in Antwerp. Some loose skins of the border survive in good condition, measuring 640 x 380 mm. Blathwayt wrote instructions in a letter of 8 July 1702 to his agent Watkins: "This is very good Weather to putt up the Gilt Leather in the Vestibule if Mr Skelton's man comes time enough." Watkins replied: "As soon as Mr Skelton's man comes he shall take the first opportunity of Moist Weather for putting up the Gilt Leather Wch is thought most proper for that work." (Glos. Records Office D.1799 E.242)

3. Gilt Leather Closet: Recorded in 1742. Samuel van Hoogstraeten's View Down a Corridor, a perspective painting of 1662 seen by Samuel Pepys in London before it came down to Dyrham before 1700, hangs here. It shows a Dutch interior with a leather hung room at the end. Can anyone identify the pattern? Do leather hung walls appear in other paintings by this artist?

4. Great Room above Stairs: Listed in 1710 inventory. Blathwayt wrote on 5 July 170(?): "There are one hundred less seaven skins of Gilt Leather for the Great Room which are to be fitted up as soon as maybe and the opportunity of Wett Weather to be taken." (GRO D.1799 E.245) He later sent a Memorandum for Mr Williams (upholsterer): "The Gilt Leather in the Great Parlour very ill putt up and must be stretcht which can be done only in Wett Weather." (MS at Dyrham Park)

Christopher Calnan' s report on the leather hangings, dated July 1997, while confirming their conservation was not as urgent as in the case of those at Dunster and Kingston Lacy, draws attention to their darkening brought about by varnish oxidation, pigment alteration and tarnishing of the silver leaf. "The appearance of the panels is subdued and does not reflect the sumptuous gilded look that the room would have had originally." It may be possible to remove or reduce any later varnish over the original varnish, and it is most desirable to remove the leather strips unhistorically added over the joins between the skins in the 1950's when they were rehung. Tests will now be made on the loose skins from the Gilt Leather Closet, which if successful, will indicate the appropriate approach. As we have enough loose skins we intend to rehang the closet as the appropriate setting for Hoogstraeten's masterpiece.

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PREVIOUS RESTORATION - IDEAS FOR THE REDUCTION OF THE OVER-OILING OF 18th CENTURY GILTLEATHER TAPESTRY.

Jutta Göpfrich, Germany

Introduction.

Most leather conservators are familiar with the problems of improperly oiled leather. Little can be found on this topic in specialist literature, this paper describes the author's experience with this "sticky" problem.

In the castle Dyck which is situated in the Rheinland in Germany, a room is to be found which is adorned with gilt leather tapestry. Fig.1. This tapestry has become the victim of a succession of restoration attempts, which have not always been very successful.

Fig. 1. Gilt leather in Dyck castle. Section with the test square before treatment. On the left hand side there are a large dark oil stains on the wooden panelling.

Due to this previous restoration with neatsfoot oil and wax, considerable damage has been done to the decorative layer, as well as the leather. In 1974, ten years after the last restoration, restorers of the "Rhine historic monuments" discovered similar damage to gilt leather tapestry in two other castles in the Rhein area (Frens and Ehreshoven). A Vienna workshop had treated all these tapestries in the same manner. The paint layer of all three tapestries had become extremely sticky, and had begun to run down the tapestry in a beadlike discharge. In 1974 and 1980, Mrs. Masschelein-Kleiner and Mrs. Jägers examined specimens of tapestries from castle Frens. They discovered that the neatsfoot oil was the main cause for the damage, but no continuing restoration had followed. As a result of this neglect, the current owners of the castle had asked the German Leather and Shoe Museum for advice in June of 1993.

1.0. History, technology and history of its restoration.

1.1. History.

The gilt leather tapestry in castle Dyck originates in the Netherlands, and dates back to the first half of the 18th century (1700-1740). The owner of castle Dyck bought this tapestry from castle Tenking of the Netherlands around 1937.

We can conclude that this ornament must have been quite popular, as many well preserved examples exist in other collections. Such tapestry can also be found in the city museum of Mechelen, which is not far from Brussels.

1.2. Technology.

The structure of the paint technique found in the Dyck tapestry corresponds with the popular procedure of tapestry production of the 18th century. The following layers were applied to the leather: parchment glue, silver leaf, egg white, gold varnish, covering and varnishing oil paint, protective covers of wax and an unidentifiable varnish.

1.3. Restoration history.

As previously mentioned, the gilt leather tapestry from Dyck has a very eventful history of restoration.

Due to preserved restoration reports and bills, it could be proven which materials had been applied to the leather and the paint layer. These documents show that the tapestry had been fully restored several times. The first records are from 1937/38. Here, a restorer, Sommerfeld from Berlin, describes the poor condition of the gilt leather, and attributes this to earlier false treatment. He also mentions that the tapestry had become very hard. A very brittle covering of varnish had caused the varnished silver plating and the paint to flake off. Beside this, the paste residue on the back side had made the tapestry stiff and brittle. His restoration recommendations are interesting. The oily paste residue, and the brittle layer of varnish should be carefully removed. After the cleaning of the back of the tapestry, it was to be rubbed in several times with a "softening" vegetable oil! The front was then to be touched up, soaked and polished with turpentine wax. A bill from the following year proves that the procedure which I have just described, was carried out. Thus, the gilt leather had received its " first oiling".

Fig. 2. The dark coloured back side of the test square before treatment. Old canvas strips from a previous treatment are present.

Twenty six years later, in 1964, the tapestry received another such fateful treatment, which was carried out by the restoration studio "Vrani" from Vienna. The workshop Vrani also complained about the improper restoration of their predecessor in their report. The tapestry was, by this time, so seriously hardened through heat and humidity, that it had been torn through from top to bottom on every wall. The restoration attempt from 1938 also contributed to this damage, as they had restored it with bone glue and had sewn it together with a sewing machine without using a reinforcement. In order to treat the tapestry, they had to take it off the wall once again. The paint layer was cleaned with saddle soap. Defective areas in the leather were repaired with left-over pieces of the original tapestry. Then the original and the added materials were skived down. In order to be able to put up the tapestry on the wall later on, the seam on the back of the tapestry was glued with "Planatol" glue (which has a polyvinyl acetate basis), and 5 cm wide strips of textile, in a crosswise manner. Unfortunately, these strips had to be glued on top of old canvas strips which had remained from previous treatment. According to the report, the backs of the tapestries were afterwards soaked with neatsfoot oil in order to soften them. After the neatsfoot oil had been absorbed by the leather, it was soaked with a protective isolation consisting of bleached beeswax, thymol crystals, ethyl alcohol and neatsfoot oil. Fig.2.

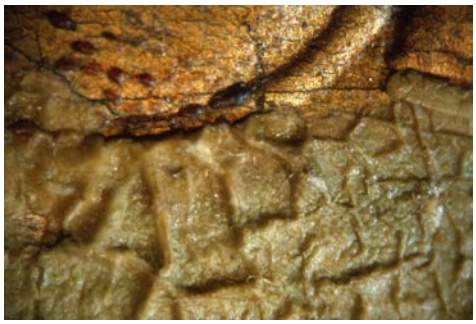


Fig. 3. Detail. The swollen and crumbling paint layer covering the gilt varnish. 12.5x magnification.

In some respects, the logical conclusions, that the hardened tapestries need to be softened in order to be treated, is also understandable today. Unfortunately this happened without their knowing about the interaction of the materials used with the leather and the decorative surface.

Fig. 4. Detail of test square with UV-fluorescence. Yellow fluorescence shows the over-oiled parts of the paint layer.

The neatsfoot oil used by previous restorers Vrani is an untreated saponifiable oil with a high percentage of unsaturated fatty acids. It belongs to a group of free extractable fats that do not dry, and it encloses the leather fibres without creating a chemical bond. Neatsfoot oil also tends to seep out of the leather when the temperature fluctuates. If the leather is strongly over oiled, and the flesh side is thickly isolated with wax, it is not surprising that the neatsfoot oil seeps through to the paint layer. Not only is it obvious that too much oil had been applied, in addition the type of oil was most unsuitable for the treatment. It has caused a permanent softening of the paint. Fig. 3&4

2.0 Damage assessment.

In 1993, when the author first took a look at the gilt leather tapestry from Dyck, the condition of the paint layer was still extremely sticky, Fig.5, and the tapestry was warped. There were also large dark oil stains on the wooden paneling. Fig.1.

The climatic situation was problematic because Dyck is a castle with a moat, and the room climate was not controlled. Mould was discovered on the back of the tapestry, this was probably also promoted by the excess neatsfoot oil.

Fig. 5. Detail. Running varnish and sticky conditions on the paint layer.

In order to find out if it was possible to restrict the tapestry's damage, a more exact picture of its condition had to be made. This occurred through the co-operation of painting and leather restorers, as well as chemists.

2.1 Preservation condition and leather examination.

The next step was to find out what condition the leather was in, and which oil compounds could be detected. The following examinations were made on samples of material.

1. pH-level and shrinkage temperature.
2. Microscopic evaluation of fibre cohesion.
3. Detection of neatsfoot oil and wax.

1. The pH-level still had normal value between 4.03 and 4.54. The difference rate had a value of 0.10, meaning that there are no harmful acids in the leather.

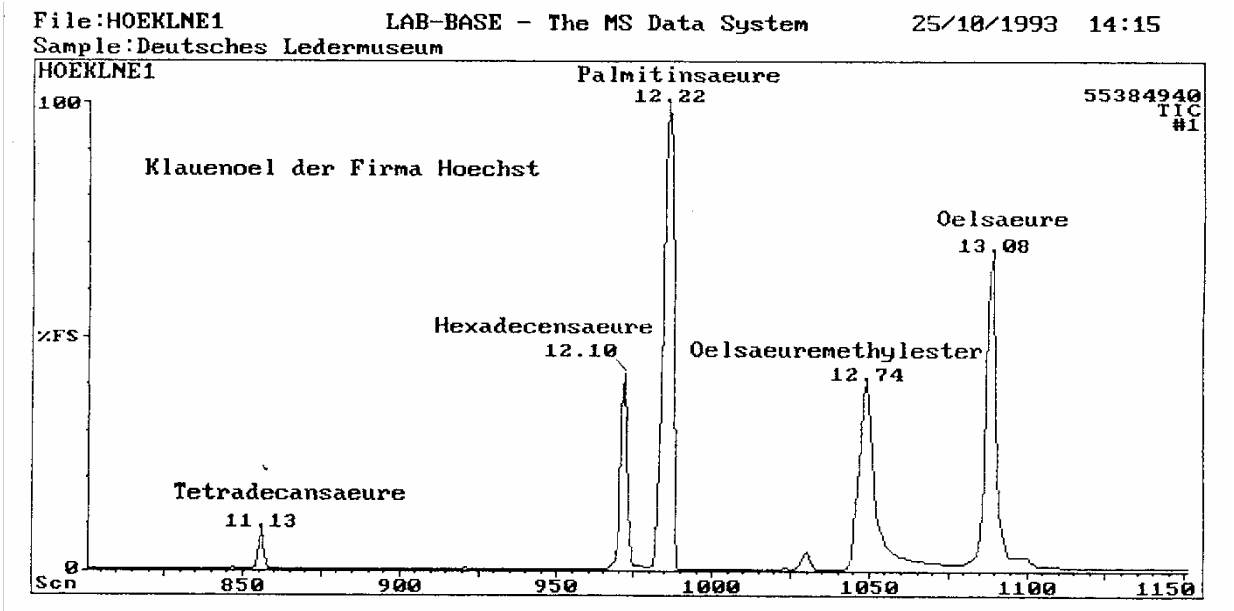
The shrinkage temperature of fibres which were taken from several different areas, was measured on the micro hot table. The test result was between 36 and 43 degrees Celsius, which means a definite deterioration of the vegetable tanned leather.

2. The testing of fibre cohesion through scrapings of the samples done with a scalpel and assessed under a microscope, resulted in a middle value as well.

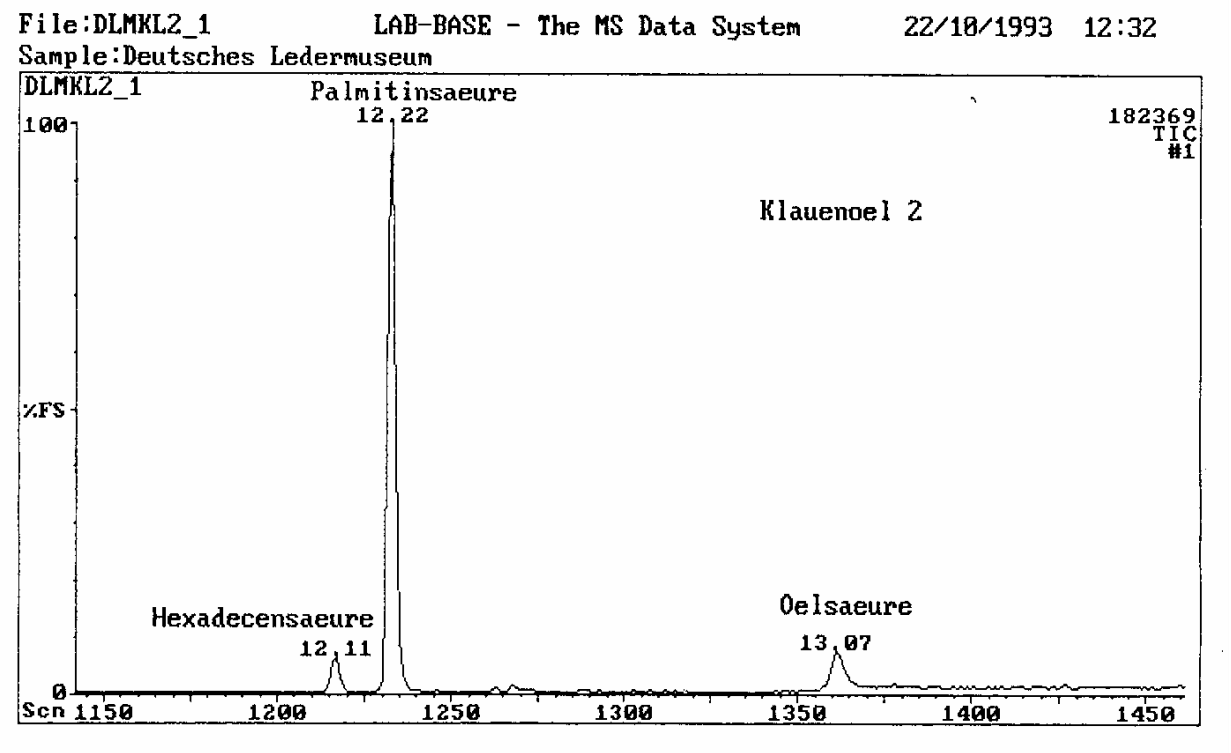
3. In order to find out which fat substances could be traced in the leather, two new neatsfoot oils were compared which came from different producers. The examination was carried out by Mr. Chmil from the Max-Planck-lnstitute in Mainz.

The neatsfoot oil in the tapestry was identified gas chromatographically and mass-spectroscopically, and the result was that it showed the same composition as the comparative neatsfoot oil. Graph 1&2. The octanic acid detected in the sample 10.84 minutes means that it has a shorter chain of carbonic acid, which can be attributed to an aging process. Graph 3.

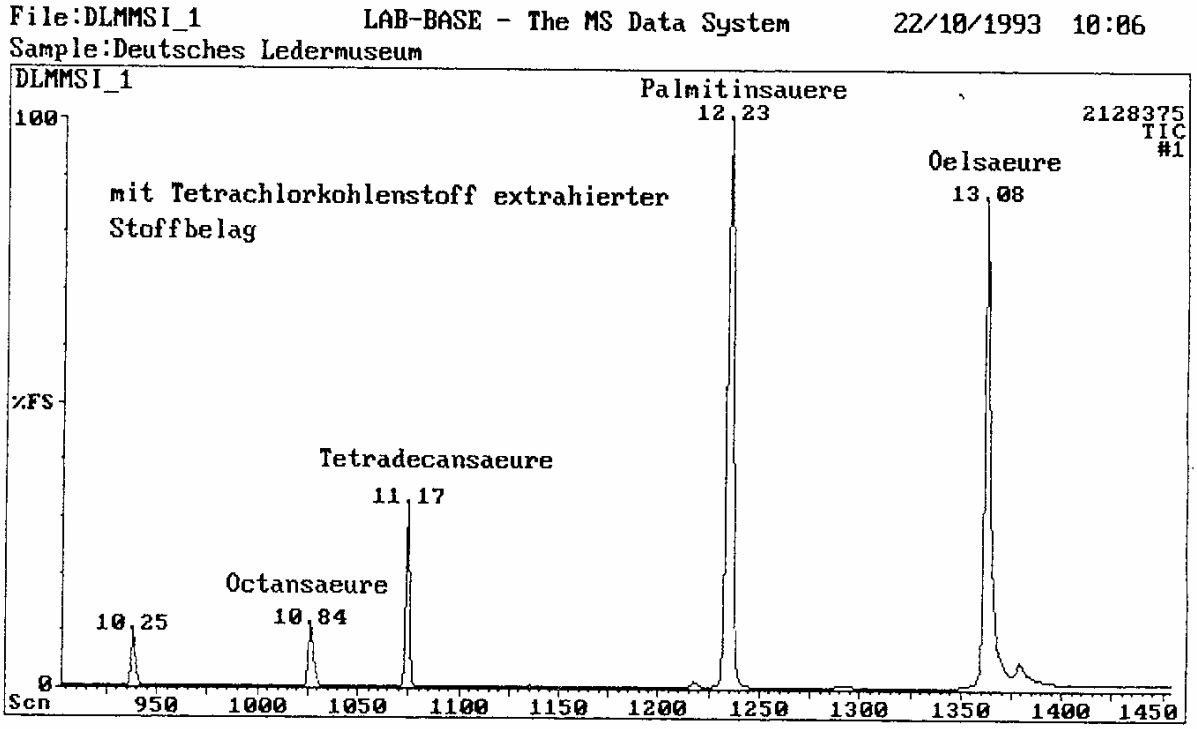
However, the substance appearing in the chromatogram with a retention time of 10.25 minutes could not be clearly identified. Further substances could not be identified. In the case of a wax admixture, long chained ethyl alcohols and hydrocarbons would have had to appear in the chromatogram. Graph 3.



Graph 1. Chromatogram of natural aged neatsfoot oil (Producer: Hoechst / Frankfurt).



Graph 2. Chromatogram of natural aged neatsfoot oil (Producer: Trumpler / Worms).



Graph 3. Chromatogram of the neatsfoot oil in the Tapestry.

2.2 Results.

We came to the following conclusions:

On the whole, the deterioration of the leather has begun. The greatest danger to the leather is the strong over-oiling. Because of this oiling, the collagen fibres are not able to absorb enough moisture from the air and will dry out and become brittle eventually. In such an advanced stage of deterioration, leather can not be regenerated. Based on the author's experience, the right amount of moisture (about 12 %) is the most important aspect in the

preservation of leather. It is better to oil too little than too much!

The leather has darkened considerably on its flesh side, due to the wax layer. This is also one reason for the drying out of the leather. In addition, the decay of the collagen and the fat is also assisted through the spores of mould.

2.3 Preservation condition and paint layer examination.

The examination of the paint layer was carried out by Mrs. Jägers and Mrs. Wiesmann- Emmerling . The following examinations were made:

1. Analysis of the paint layer and binder with microscopic cuttings under UV stimulation.
2. Detection of the distribution of neatsfoot oil in the paint layer with the help of UV-light.
3. Microscopic assessment of the damage.

1. First, the samples were examined under UV-stimulation. A total saturation of neatsfoot oil through all layers could be seen. The saturation was so complete, that the original binder of the paint could not be positively identified. The paint and bonding agent show an unusually uniform UV-fluorescence, so that it is not possible to differentiate between the blue-whitish fluorescent glue and the gold varnish, which has a yellow or yellow-green fluorescence. The sealing layer is made up of a yellowish varnish turpentine resin(?), which is probably not the original varnish.

2.+ 3. On first impression, we could already see that an extreme swelling had been caused by the neatsfoot oil which had soaked into the paint layer. Fig.3. Nevertheless, depending on the bonding agent, and distribution of pigment, differences can be detected. In the white mixed areas of the painting, the swelling, stickiness, and patch formation is particularly bad. This can be attributed to the fact that the white paint contains white lead as well as an admixture of plaster. The UV-tests show that this acts on the neatsfoot oil like an absorber, and so the white mixed parts are more fluorescent than larger parts of the gold varnish and of the red varnish. Fig.4.

The most important discovery here is that a drying of the paint has occurred, despite of its spongy condition. Indicators for this are the breaking up of the patches of paint, and the distinct wrinkling.

During the examination of the paint, we could see that there had been three attempts at restoration. Primarily, there were retouchings, but synthetic resin remains also showed that attempts had been made to fix the paint, and fragments of cotton fluff in the sticky paint layer indicated oil-removal attempts.

3.0 Conservation attempts and test restoration.

On the basis of the test results, oil and wax removal was attempted. The concept of conservation was to find suitable methods in order to reduce this wax and oil, without causing further damage to the original material. In order to do this, one square was taken out of the tapestry. Fig.2.

The work of Mr. Dick Muller which dealt with oil removal attempts using solvent solution baths on gilt leather from the Ryksmuseum of Amsterdam was known to us through an article (Maltechnik, 1/1987, 47ff.). I had the opportunity to see some pieces of the tapestries which had been treated this way, and I had to conclude, that they had darkened and hardened to a great degree. Therefore, we had to find another “solution” (method)!

3.1 Conservation attempts.

After testing the compatibility of suitable solvents with the paint layer, we wanted to test if a swelling, and a dissolving of the wax, was possible. This we did using solvent pastes together with a suction table. After the wax had swollen up, it was to be removed with a scalpel. As the German Leather /Shoe Museum had no suction table, these tests were done at the textile restoration workshop for Bavarian historic monuments, with the assistance of Mrs. Worch.

To prevent the paint layer from contact during the procedure, it was stretched into a wedge frame and fastened with nylon thread. The following solvent pastes were used:

1. Solvent pastes with “Klucel M” compresses under constant low pressure for one hour.
2. Wax paste which had been allowed one hour to work in.
3. Solvent gel with “Carbopol”. Applied with a paint brush. Taken off after two minutes.

Structure of the compresses used on the suction table.

• Paint layer
• Leather
• Crepeline
• Thin polyester wad, soaked in solvent paste
• Filter / papers

Fig. 6. Detail. On the left hand side the dark flesh side of the leather is covered with a wax layer. On the right hand side the lighter collagen fibres are seen after removing the wax. Magnification 12.5.

3.2 Results.

1. The wax layer was best swollen up with the solvent plasters consisting of a mixture of xylene/isopropyl alcohol and "Klucel M". Only on the borders there was a whitish edge. The paint layer on the front side became a bit softer at first, but hardened again after it dried.
2. The wax pastes hardly dissolved the wax at all, they only darkened the leather. This was therefore disqualified.
3. The solvent with "Carbopol" had no effect,

The administering of the paint layer with petroleum gasoline (50-70 degrees) caused little swelling of the paint and varnish. Combined with the suction below, at least a visual improvement of the shiny areas and the varnish discharge could be attained. Success in the flattening and strengthening of the paint could be attained with the suction table as well.

The best result was had with a strengthening solution consisting of "Plexisol" (acrylic resin from Röhm) dissolved in a 10 % dilution of gasoline (50-70 degrees).

Fig.7. The back of the test square after conservation.

3.3 Test restoration (removal of the wax).

The tests have shown, that with the help of solvent pastes on the suction table, the wax could be reduced, but not totally removed. We recognized the danger that the loosened wax could seep too far into the leather in spite of the suction, thus hardening deeper layers. For this reason, we decided to scrape off the wax very carefully with a scalpel. Fig. 6. In order to be able to work on the back side without damaging the paint layer, the piece of tapestry was stretched into a parchment frame. After the wax had been removed, the tapestry had relaxed quite well. Fig.7. We stitched the section of tapestry back into the whole with round needles.

The tapestry was now to be kept under close observation, as we were interested to see whether the removal of the wax layer would speed the drying process.

4.0 Conclusions.

The following briefly summarizes our conclusions. The work has shown that it is possible to achieve a reduction of wax and neatsfoot oil with the help of suitable solvent compresses on the suction table. A certain degree of oil removal and hardening of the sticky paint layer was possible. Nevertheless, we had more problems with the Dyck tapestry than we had anticipated because of the thick wax layer on the back side. The manual removal of wax was very time consuming, so that the cost of such a project on a larger scale would be quite high. The removal of wax in this way was very time consuming. It took us 42 hours to remove the wax from a tapestry square the size of 60 x 76 cm. This means, that if one were to treat the whole room of tapestry, it would take a total of two years.

It should also be considered that the covering of the seams with strips of fabric soaked in synthetic resin, would mean a great loss to the original substance.

Two years after our test restoration, the Dyck tapestry was inspected once more. The conclusion was that our prediction, with regard to the accelerated drying up of the paint layer after the wax had been removed, was correct. The test section was considerably less sticky than the rest of the tapestry.

Acknowledgements.

Mr. Knut Chmil (Dip.Chem.) for the scientific examination of the neatsfoot oils. Mrs. Prof. Dr. Elisabeth Jägers and Dr. Erhard Jägers for the advice and scientific examinations of the paint layer test sections. Mrs. Evelyn

Johnson for the translation. Mrs. Adelheid Wiesmann- Emmerling (Dip. painting restorer) for her Assistance, advice and examinations on the paint layer. Mrs. Marie-Theres Worch, for assistance, advice and disposal of the suction table. For their support: Dr. Hauber, Prof. Dr. René Larsen. Graf Peter- Wolff Metternich, Dr. Hans-Joachim Ràder, Dr. Simros, Dr. Renate Wente- Lukas.

Suppliers.

Plexisol P 550	Fa. Röhm, GmbH, Kirschenallee, 64293 Darmstadt
Polyestervlies	Kaufhaus M. Schneider, Frankfurt und Fa. Caruso, Garmstetterstr.38, 96237 Ebersdorf
Klucel	M Dr. Georg Kremer, Farbmühle, D-88317 Aichstetten /AlIgau
Carbopol	Kremer
Siedegrenzbereichsbenzin	Kremer
Mikrokristalines Wachs	Kremer
Xylene/ Isopropylalcohol	Kremer

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CONSERVATION OF A LEATHER ANTEPENDIUM

Laura Maria Chiotasso and Costantino Sarnelli, Italy.

Introduction

This case history regards a leather fragment discovered in 1989 in Caristo, a hamlet, which is no more than a few scattered houses near Santa Cristina, a village about twenty miles from Novara. The parishioners of Santa Cristina and the surrounding houses, called *casolari,* gather in the parish church which was built on the site of the original one devoted to the veneration of the Saint. It is to be pointed out that at the beginning of the XVI century the veneration of Santa Cristina of Bolsena spread into several areas of subalpine Italy. Caristo, or more properly Torre di Caristo, is one of these ancient *casolari.* It rises on a longobard settlement placed in the southern hills above Santa Cristina (1).

Towards the end of the 80's, thanks to the historical research conducted by Alberto Caione on the Santa Cristina parish church, interest was taken in presumed frescoes of the Caristo church (2). The Superintendence of Piedmont in answer to this strong interest decided to begin research and the survey brought to light XV century frescoes concealed under layers of paint and lime. Considering the historic and artistic importance of the Caristo frescoes it was decided to carry out a complete conservation of the church.

The leather fragment was found during the consolidation treatment on masonry. It was concealed under the ciborium as a mystical protection of the high altar stone. The fragment was the central part of an antependium commissioned by bishop Bascapè on the occasion of his pastoral visitation which occurred at the beginning of the XVII century.

The grain side of the leather is adorned with etched and gilded rhomboidal motifs which are a sort of hieratic background to a seraphic Virgin with Christ-child. The iconography of the subject is that of the *Mater Amabilis,* in which Mary, usually standing but sometimes seated on a throne, holds the Divine Child. The author uses a reference pattern earlier than the figurative canons of the end of Cinquecento. There is a miniaturist's manual skill that emulates the draughtsmanly and luministic fineness of the paintings in the Leonardesque style (3).

In spite of the pose of the Virgin and Christ-Child it appears more akin to the hieratic realism of the XV century, a perspective creating imposing figures and a static Christ Child suggesting his divine nature (4). This tradition is altered by an infusion of expressive force, and by a sharper focus in the detail that can be perceived in the sad gentle expression of the Virgin, and in the refined dignity of her gesture (5). The original workshop was almost certainly in northern Italy. The style and composition, which would seem an antithesis, recalls a pattern typical of Cinquecento Classicism (6).

During the XVI century Mannerism gave a particular impulse to the decorative arts and to the interest for materials. The so-called minor visual arts reached a sophisticated level of accomplishment, and they were closely involved with daily life. The production of ecclesiastic ornaments was such that their usage was governed by precise rules. In a few areas of northwest Italy bishops recommended the use of an antependium in gilded leather for the ferial days, and a silk one for holidays (7).

Description and Treatment

In the past the central part of the antependium was nailed to a wooden frame, like a canvas (approximately 37 by 47 cm.) smaller than the fragment. The lower side of the leather was roughly folded and the presence of nails had caused rust to form. The wooden frame and two leather patches stuck on the flesh side showed signs of old pest attack. The overall condition of the leather when we received it was poor. We had to use organoleptic methods to estimate its condition: some ductility and resilience were still present, while an increasing ageing process with short term climatic changes caused a decrease of flexibility. Cracks on the leather and flakes in the painting materials formed a pattern of tiny lines. The degree of acidity (pH 5*)* was in the correct range (8).

A mechanical damage, maybe due to careless handling, started from the upper right area and finished in the lower left side fortunately avoiding the Virgin's image. Medium size lacunae were present along the edges. There

was a strong deformation caused mechanical traction, particularly in the central part of the leather.

According to the Works Director, the conservation had to be a compromise between the object itself, its exhibition and its future preservation.

Prior to any treatment the removal of previous alterations and restorations was necessary: the wooden frame and the patches stuck on the flesh side. From the start, the importance of thorough cleaning was clear before any attempts at softening and reshaping the leather could be carried out.

The grain side, after tests, was cleaned of loose dust and ingrained dirt using pads of OZ (a sort of latex rubber). This product is generally used for cleaning paper, paints, and other kinds of rough but fragile surfaces. For our purposes, the result was satisfactory and only a slight abrasion was sufficient to remove dust and dirt. It is to be pointed out that this treatment was not effective in other cases, and its cleaning power varied according to the quantity and the nature of dirt. The depressions in the leather, the etched motifs which were hard to reach, and the more fragile areas were cleaned by Archival Aids dry cleaning powder. Gentle brushing was used to assist cleaning and then most of the dirt was removed with a protected micro vacuum cleaner nozzle. On the flesh side only a squirrel's hair brush was used. In this case the treatment with powder was possible because the lack of porosity in the leather prevented the cleaning agent from penetrating the surface.

Surface pH readings suggested humidification could be safely undertaken. Humidification was carried out to soften the leather and prepare it for reshaping.

Various treatments normally used were tested to determine which method would soften the leather and maintain the original appearance. A variation of DLM 4060 (sorbitol, Lipoderm N, Lipoderm SA and distilled water) was used (9). Colours and gold were not affected by this fat emulsion.

After cleaning and reshaping, Paraloid B-72 was chosen to consolidate (10). Areas of the flesh side with powdery sections were consolidated with applications of 10% Paraloid (diluted in acetone) while the delaminating sections were reattached with 50% Paraloid.

To avoid any attempts of mechanical traction, caused by the strong deformation, it was necessary to line the leather on the flesh side. Lining was achieved by applying a reinforcing polyester gauze. Since lining is an invasive technique, it must be used on very damaged or degraded leather. The long-term preservation of the specimen depends on the success of this treatment. The polyester gauze was bonded with a PVAC emulsion (Mowilith DMC2). In this specific case DMC2 was chosen for its easy application and its ageing characteristics in dark lighting (11). Besides the polyester gauze we tested other materials. Nylon net proved to have no sufficient mechanical strength while the use of new leather and non-woven fabric involved a high increase in thickness in order to obtain a satisfactory resistance to the mechanical traction. On the contrary the polyester gauze showed a good resistance to mechanical tractions with a minimum increase in thickness.

To achieve visual continuity the Works Director decided to retouch only the craquelure present on the faces of the Virgin and the Christ-Child, while a mixture of powdered leather and Paraloid was used to repair the tears.

Conclusion or a reconsideration of treatments normally used at the end of the 80's

If where the appearance of an object undergoes some variations, conservators must strive to preserve the integrity of the object and balance the needs of differing and sometimes conflicting viewpoints. In our case the antependium had been commissioned, produced and used in the manner for which it was intended. Then a part of it had undergone a rough change, and it had been modified and reused.

The wooden frame on which it had been nailed, although not specially made for this purpose, gives evidence of the transformation from an ecclesiastic ornament to a holy image. A venerated image because only an act of faith could guide the hands of the person that carefully hid the painting under the ciborium. Thanks to this reuse the antependium fragment has not been destroyed, and has not been the prey of some antique dealer's private vandalistic operation. Thanks to this conservation, the artifact has reacquired its value as a holy image, not in a museum, but in the church of its origin.

Treating not a museum object but an object of worship and therefore one periodically used, to avoid damages during handling, the fragment has been mounted on a wooden panel lined with Melinex and covered with a calfskin. A new wooden frame proved inadequate after tests, because of irreversible traction in the leather. Instead the wooden panel offered major conservative guarantees and it was also a structure easily understood by

the lay purchaser.

Six years later the leather fragment, although it has not been kept in a climatically controlled environment, is in a good condition. As far as we can tell, the method used has not created problems, and this is supported by the fact that the church is kept clean, that there are minimal climatic variations and minimal lighting. It must be underlined that passing a final judgment is difficult after only six years, and that only periodic controls will tell, and then, only if no changes occur in the environment where the object is kept.

Acknowledgements

The authors would like to thank Dr. P. Venturoli, inspector of SS.BB.AA. of Piemonte who assisted them as works director. We would also like to thank A. Caione, Santa Cristina historian and Don Luciano Lilla, parish priest of the Santa Cristina church for suggestions and helpful discussions. The chromatic integrations were realized by Tiziana Carbonati, Via Venezia 16, 28040 Dormelletto (NO). This paper is dedicated to the memory of A. Caione.

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THE CALLENDAR HOUSE LEATHER. CONSERVATION, RESTORATION OR WHAT?

Theo Sturge and Ian Beaumont, United Kingdom.

Introduction.

Callendar House in Falkirk, Scotland, had been left derelict for several years before it was decided in the 1990's to carry out extensive restoration of the whole house. One room had 18 panels of late 19th century gilt leather. The leather was moulded, and the design was highlighted with a translucent red pigment applied to the background. The finish of the yellow varnish over the silver had been distressed during manufacture to give an aged effect. This appears to have been carried out with a water soluble medium (size ?) and dark pigment applied with a course brush in diagonal strokes. The red background was painted over this. The leather was tacked around the edges onto large timber panels, which then fitted into frames around the walls. The building had been insecure, and the leather had been heavily vandalised, with less than half remaining. The best pieces were reputed to have been used in peoples houses around the town. The room was to be used for functions, and a high level of finish was required. In consultation with the client, it was decided that there was just enough usable leather to make up seven panels, and that the rest would be replaced with new gilt leather made using traditional methods. This paper examines the methods used by the Leather Conservation Centre during the conservation of the original leather.

Condition of the leather.

The leather varied widely in its condition. The amount of leather remaining on the panels varied from small scraps to those which were virtually complete. In addition, the condition of the leather varied considerably. Some areas where still quite robust and flexible, whilst the worst were very badly cracked and distorted, and the leather was crisp and brittle. In these areas if significant pressure was applied to the leather it just broke up into small fragments. Some of the leather could be readily detached from the boards, but the more fragile areas could only be removed with great difficulty. Fig. 1.

The surface was quite heavily soiled, and where it was coming away from the boards the back was soiled too.

Fig. 1. (left). Leather on the wall prior to treatment.
Fig. 2. (above). Pieces detached from boards and laid out in approximate position prior to assembly.

Treatment.

A purist conservation approach was not acceptable to the client. The initial question was could we replace it all so that they would have a smart room for functions. The option of conserving the leather in its existing positions on the panels, and then gap filling, was not acceptable as it would not have had a uniform enough appearance. Instead, it was decided that the existing leather should be brought together and made up into seven panels, and that the other panels should be made up from new leather replicated to match the original.

The leather had to be flattened before it could be worked on. Areas of leather that were detached from the boards were humidified in a chamber using an ultrasonic humidifier. They were then dried and flattened on a low pressure table. Leather that could not be removed from the boards was humidified using a semi-permeable membrane and damp blotting paper. Cleaning methods included Wishab sponges, saliva, alcohols and ammonia. These last two were used very cautiously and sparingly as they had the potential to cause considerable damage. The Wishab sponges worked very well, particularly on the backs.

Much of the leather had been attached to the boards in the past using a water soluble adhesive. Only some was strong enough to be removed. Some pieces of leather were treated on their boards while others were detached and treated separately. Where the leather could not be fully removed, but areas needed support, these were backed with 34 gsm Reemay, a non-woven polyester fabric, attached with an acrylic dispersion mix, Lascaux 498HV and 360HV in a 3:1 ratio. This was tucked behind the damaged areas, and then the adhesive was inserted. This held the edges together as well as holding it down on the board. Where the adjacent leather was not stuck to the board, and it was felt to be inappropriate for the inserted leather to fixed directly to the board, silicone paper was put behind the Reemay and then removed once the adhesive was dry. Reemay is white. To reduce the possibility of it being visible in any gaps it was toned with a dilute wash of Winsor and Newton artists' quality acrylic paint prior to use. Sandbags were used to hold the leather flat as it dried.

Some of the panels were built up from leather taken from a variety of panels and assembled away from the board. Fig. 2. The leather had to be cut to fit it together. As far as possible, the cuts were made along the lines of the design so that they would not be readily visible. Fig. 3. The leather was mounted onto polyester sail cloth with the Lascaux acrylic dispersion mix used above. The leather was very sensitive to water and rapidly expanded on application of the adhesive. This made it impossible to line up the fragments accurately. Instead the bond was made by solvent reactivation. Initially a single coat of adhesive was applied to the back of the leather. This made it distort, but it was possible to keep it flat by drying it between sheets of silicone release paper with sheets of blotting paper over the silicone paper. The sandwich, with the leather in the middle, was allowed to dry with a lightly weighted board over it. Once dry it was readily handled and stayed flat. It was also easier to cut and trim in this state. The sail cloth was prepared by applying two generous coats of adhesive with a paint roller as used for painting walls in a house. This gave an even distribution of adhesive, and avoided the lines with high and low points left by a brush.

Fig. 3. Sections from various panels brought together to make up a missing section.

Fig. 4. Applying solvent to reactivate the Lascaux acrylic adhesive on the sail cloth.

The actual bond was made using solvent re-activation. At that time the Leather Conservation Centre still had some 1,1,1 trichloroethane available, and this was used for much of the work. When this ran out, xylene was used instead. Because the original varnishes used on the leather were soluble in polar solvents, less toxic solvents such as acetone or alcohol could not be used. Initially, it was thought that a light spray of solvent on the surface of the adhesive would give a bond. In practice, it was necessary to flood the surface of the adhesive with solvent to the point where the acrylic went into solution. Fig. 4. When the leather was laid down, and the surface gentle pressed into place with a roller, the dissolved adhesive moved and took the shape of the back of the moulded leather. This gave a bond over as much of the back of the leather as possible, rather than just the high points where there was initial contact. For this to happen a fairly thick layer of Lascaux was required so that there was enough present for it to flow. When handling large areas it was necessary to put silicone release paper between the leather and the sail cloth. This allowed the bond to be made a section at a time. As each piece was secured the next piece of paper could be taken out to do the next area. The solvent, unlike water, does not affect the leather, and it remains dimensionally stable throughout the process. Obviously, there are significant health and safety issues and full protective equipment should be worn, including gloves and a respirator. The work space should also be very well ventilated.

Damaged areas were replaced either with spare leather from other panels, or with replica pieces moulded from Beva 371 to which pigment had been added. Because the pattern on the leather was a repeating one, it was possible to take a mould from an area which was in good condition using silicone rubber. The rubber used was Otoform K2. This is a fast curing rubber used to take impressions of people's ears so that hearing aids can be made to fit exactly. It sets rapidly so does not penetrate the leather. However, it may leave a very small amount of oil on the surface of the leather which has to be removed with a solvent such as xylene. The Beva filler was made by warming Beva 371 so that it was liquid, adding a small amount of dry earth pigment to colour it, and then pouring the mixture out onto silicone paper to dry. When dry it is usually distorted and needs to be ironed flat between two sheets of silicone paper. To cast it into the mould, it was cut up into small pieces which were piled onto the surface of the Otoform mould. It was covered with silicone paper, and a domestic iron was used to melt it into the mould. Once cold it was peeled away. It is tempting to just lay a sheet of solid Beva over the mould and iron it, but this tends to give bubbles, if it is in small pieces this lets the air out. A tracing on Melinex was then made of the hole to be filled, along with a drawing of the design on the adjacent leather. This was then placed over the cast Beva, with the design on the tracing matched to that on the Beva. A scalpel is used to cut it out, cutting through the outline in the Melinex. It is then bonded into place with the Lascaux mixture. The fill was painted with a combination of artists' quality acrylic paints and water colours. The gold colour was replicated with gold, mica based artists' acrylic paints.

The Beva filler was also used to fill small areas of damage. This was melted directly into place with a heated spatula.

Inpainting was carried out with Winsor and Newton water colours and silver pan. Because much of the leather had been repositioned, some toning in of parts of the original leather surface had to be carried out to give an acceptable overall visual appearance. This was mainly required where leather was taken from narrow panels and used for wider ones. Here, the edges had been covered and were still very bright, and had to be toned to match the surrounding areas. The finished leather was given a very thin coat of Paraloid B67 in white spirit, applied with a brush. Fig. 5.

Fig. 5. An assembled panel. Note how the colour varies, particularly at the edges of sections which have been taken from narrower panels. These areas were toned down with watercolours to give a more uniform appearance.

The replacement leather for the other eleven panels was made in Poland. See paper by Kozlowski and Adamowicz.

Discussion.

The treatment of this leather has led to some rather adverse comment because it cannot be seen as pure conservation. However, had the work not been done in this way the remaining leather would probably have been disposed of, and the whole room would have had replica applied to the walls. On this basis, the rather drastic treatment may be seen as the lesser of two evils. To have carried out pure conservation would not have been acceptable to the owners. The room would not have been suitable for the purposes to which it was to be put.

Health and safety.

The solvent reactivation of adhesives involves the use of quite large quantities of solvent, especially when used on large projects such as this. All solvents should be treated with respect, and good fume extraction is essential.

Materials.

Lascaux acrylic dispersions. www.lascaux.ch

Beva 371. Most conservation suppliers. Lascaux make a similar material, Heat-Seal Adhesive 375. www.lascaux.ch

Art restoration polyester sail cloth 00169A. Richard Hayward and Co. Sold by Heathcoat Fabrics www.heathcoat.co.uk/marine.html

Otoform-K2. Dreve Otoplastik GmbH. www.dreve.com

Reemay, non-woven polyester textile. www.preservationequipment.com

Sympatex, a substitute for the semi-permeable membrane used. www.preservationequipment.com

Wishab sponges. www.lascaux.ch

Acknowledgements.

The authors are grateful to the Council of the Leather Conservation Centre and to Falkirk Council, the owners of Callendar House, for permission to publish this work.

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THE CONSERVATION OF GILT LEATHER UPHOLSTERY: A PRACTICAL STUDY.

Lina Falcao, Portugal.

Introduction

This paper will focus on the treatment of the gilt leather upholstery of three Portuguese chairs from a group of six in the Sintra National Palace.

Fig. 1. One of the chairs before treatment.

Description

Sintra National Palace (1) has in its collection a set of two chairs (inventory numbers 3089, 3091) and four armchairs (inventory numbers 3081, 3083, 3086 and 3095) upholstered with unusual gilt leather. Dating from the late seventeenth century, these chairs structurally follow the main features of Portuguese seating furniture of the period: walnut wooden structure, back in the shape of a scrolled medallion or cartouche which is separated from the seat and turned column form legs with a very elaborated front rail (testeira, in Portuguese) (2). But instead of the usual dark embossed leather upholstery, the backs and seats are covered with embossed gilt leather. Gilt leather upholstery is rare in Portugal, at the present time just a few cases are known, which emphasizes the importance of its conservation. This gilt leather brings another interesting aspect, an unusual "embossing" technique.

Embossed gilt leather

The back and seat upholstery are made of vegetable tanned leather 3-5mm thick. The entire grain layer was silvered (tin foil?), and then it was varnished and painted. The decorative pattern is a well known design of Daniel Marot (1661-1752): a symmetrical composition of a central palmette flanked by birds, flowers, and grapes framed by scrolling strap-work and vegetable motifs (3). The leather was not moulded, instead a thick white ground was used to bring out the design. This was probably because it was too thick to mould. The background was a traditional golden colour created with a yellow varnish over the silver leaf. The design was painted with oil colours over the thick white ground. The leather was attached to the wooden structure with decorative brass nails. Fig. 1.

Condition

The leather was in sound condition, except in the folded areas where some fibres had ruptured, and tears were found. This had occurred where the leather was fixed to the seat rails and back uprights and rails. In these areas deep cracks in the grain layer were detected. pH measurements were carried out on small samples of corium fibres, the pH value ranged from 4 to 4.5.

The main damage was observed in the decorative layers. This was mainly caused by the day to day use of the furniture, and by the different reactions of layers to environmental changes. Use caused tensions between the decorative layers of the gilt leather resulting in substantial losses and cracks in the white ground and paint layers. The decorative pattern was indiscernible in some areas. The damage to the leather on the seats was worse than that on the backs. Loss of adhesion between the white ground and silver leaf, and disintegration of the white ground were problematic in some areas. Another problem was the loss of the characteristic golden sheen, now brown, probably due to silver oxidation and varnish ageing. However, under the brass nails the original golden effect could be observed. Fig. 2.

Fig. 2. The undamaged golden appearance seen under the nails.

Treatment

The treatment strategy for the gilt leather sought to conserve the leather and the decorative surfaces, and preserve the aesthetic integrity. This was done by stabilising the silver and paint layers,

reinforcing the folded areas of leather where necessary, and restoring, as far as possible, the gilt leather pattern decoration to improve its appearance and make it easier to interpret.

Surface loose dust was removed by careful brushing. Some organic solvents were tested. Swabbing with a very diluted ammonia solution proved to be effective to remove soil in the background where silver leaf had been lost. The soiling in the painted surface was removed with white-spirit (Cepsa®16-18% aromatic) and an isooctane+isopropanol (50:50ppv) mixture. Fig.3.

Fig. 3. The seat during conservation.

For the consolidation of the paint layers two treatments were used: 1% Klucel G in ethanol (ppv) was applied to consolidate the silver leaf to the leather. 10% Paraloid B72 in xylene was used for the paint layers.

Cracks and small losses in the paint layer were filled with Polyfilla® paste. The gap filling also helped to consolidate the paint layer. Inpainting was carried out with artists' quality acrylic paint by Winsor & Newton®.

To back small splits along the folded areas, a commercial polyester organza was used. This was attached with Beva371® Film to the flesh side of the leather with a heated spatula. Very small gaps in the grain layer were filled with Beva 371® Film set with a heated spatula.

A surface finish of a thin layer of microcrystalline wax was applied and then polished with a soft cloth. Fig. 4.

Fig. 4. The finished chair.

Acknowledgements

The author would like to thank IPPAR- Sintra National Palace for permission to publish this paper, and Theo Sturge for his help with the text.

Materials

Beva 371®Film, Klucel G, microcrystalline wax, Paraloid B72: Agar, Av. Camelias 92, Vigo. www.agaragar.net
Organic solvents: Vaz Pereira Lda, Rua da Madalena 157, 1100-319 Lisboa. www.vazpereira.pt
Polyfilla® Paste: Local DIY stores.
Winsor and Newton acrylic artists' paints: Local artists stores.

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REPLICATION OF GILT LEATHER - RECONSTRUCTION OF THE DECORATIONS FROM CALLENDAR HOUSE, SCOTLAND.

Jarosław Adamowicz, Roman Kozłowski. Poland

Introduction.

This paper describes the replication of the nineteenth century gilt leather wall hangings of the Callendar House in Falkirk, Scotland. The replication was part of a comprehensive conservation and reconstruction of the gilt leather decoration in the interior of the house which was carried out by the Leather Conservation Centre in Northampton, UK. A detailed report on this conservation was presented to the same ICOM CC conference and is published by Theo Sturge and Ian Beaumont in this volume.

The copies of the Callendar House leather had to represent accurately the specific design, relief, silver leaf decoration, and paint colours of the original. The darkened 'aged' appearance, a result of the degradation over the past 100 years, had to be reflected in the copies as they should form a new harmonious decoration of the room rather than demonstrate and document the original appearance of the leather when freshly manufactured. The replicas were produced following the historic technology of the gilt leather. The process is presented on a series of photographs which provide a systematic progression through key stages of the manufacturing process.

The process.

Fig. 1. Original gilt leather wall hangings decorating the Callendar House in Scotland. The original way of mounting the leather on wooden panels placed on the walls is shown.

Fig. 2. Relatively well preserved fragment of the original gilt leather. The darkening and soiling of the surface degraded during the exposure to light and air contrasts with the area originally preserved in the upper part of the leather which was protected by the frame.

Fig.3. A flexible silicone rubber mould is taken from the original leather to produce a negative impression of the rich and intricate relief pattern embossed in the leather.

Fig. 4. Plaster of Paris was cast into the silicone rubber mould and the positive impression obtained was re-worked, corrected and made complete. This re-worked plaster cast served to produce the new moulding plate of epoxy resin reinforced with Duraluminum powder, shown in the illustration. The material provided necessary high strength which could withstand high pressure during the leather embossing process.

Fig. 5. The vegetable tanned calf leather stretched on the wooden frame, moistened, and coated with a thin layer of the parchment glue, is covered with leaves of metallic silver.

Fig. 6. The silvered leather coated with a thin layer of the golden varnish prepared by melting together colophony and asphalt. The substrate is ready to be moulded.

Fig. 7. The silvered and varnished leather with a relief produced from the moulding plate under the pressure.

Fig. 8. A thick layer of golden varnish rich in asphalt is laid with strokes of wide brush to produce a characteristic ‘aged’ appearance of the original.

Fig. 9. The red colour is introduced locally.

Fig. 10. The final appearance of the replica is compared with a fragment of the original leather used as a model.

Fig. 11. Strips of the replicated gilt leather mounted on wooden frames of the size originally used in the Callendar House are ready to be dispatched to Scotland.

Fig. 12. The replicas mounted in the interior of the Callendar House. The large panel on the right is replica, and the three smaller ones on the left are original.

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ABSTRACTS.

The following is an almost full set of abstracts for the conference. The index on page 3 gives the page numbers for those published in full.

HISTORICAL AND TECHNOLOGICAL DEVELOPMENT OF GILT LEATHER PRODUCTION

LA FABRICATION DU CUIR DORÉ: HISTOIRE ET TECHNIQUE

Eloy F. KOLDEWEIJ, The Netherlands

ALL THAT GLITTERS IS NOT GOLD: SOME TECHNICAL ASPECTS OF THE PRODUCTION OF GILT LEATHER

Research in various Dutch sources as archives, libraries, and picture-libraries has produced much information about gilt leather workshops, the way they were organised, and the gilt leather they produced. By combining these data with the gilt leather which has survived, many conclusions can be drawn. Information about the various ways this material was produced and sold, even as how and where it was used.

In this lecture a short overview will be given of the production in The Northern Netherlands, this in relation to the various other countries where it was produced. Also a lot of attention will be given to various technical details which can be found in the historical sources, even as to some aspects which can be learned from the actual pieces of gilt leather.

TOUT CE QUI BRILLE N'EST PAS OR: QUELQUES ASPECTS TECHNIQUES DE LA PRODUCTION DU CUIR DORÉ

La consultation de différentes sources néerlandaises provenant d'archives, de bibliothèques et d'iconothèques, a fourni une quantité importante d'information sur les ateliers de fabrication du cuir doré, la façon dont ils étaient organisés, et le cuir qu'ils produisaient. On peut tirer beaucoup de conclusions en combinant ces données avec celles obtenues à partir de pièces en cuir doré qui ont survécu, ce qui permet notamment de mieux connaître les différentes façons dont le matériau était produit et vendu, et même comment il était utilisé.

Cette communication présentera un bref aperçu sur la production du cuir doré au nord des Pays-Bas, qui seront comparés à d'autres pays également centres de production. Une grande importance sera donnée aux différents détails techniques qu'on peut trouver dans les sources historiques, ainsi qu'à l'enseignement que l'on peut tirer des pièces en cuir doré encore existantes.

Erik DUVERGER, Belgique

GILT LEATHER PRODUCTION IN ANTWERP AND BRUSSELS IN THE 17TH CENTURY.

Kings and peers have shown interest in gilded leather on several occasions. For example, at the end of the XVth century the Portuguese king Dom João II had sent to the court of Louis XII muchos guadamecies I affombras que in Francia no ce han. We are not always well informed about the production in the Southern Netherlands in the XVlth century, but we may know more about it than is obvious at first sight. In the course of centuries, Mechelen was the most important centre, although data from before the mid-XVIlth century is rather scarce. We can also put forward the names of gilt leather manufacturers in Antwerp and Brussels at the beginning of this century. We would like to unravel these problems. We will also pay attention to the importation of gilt leather in the Low Countries during this period. As a matter of fact was there a grown interest of the rich bourgeoisie in mural decorations and table naps made of leather.

LA PRODUCTION DU CUIR DORÉ À ANVERS ET BRUXELLES AU XVII^{ème} SIÈCLE

Rois et nobles ont plus d'une fois marqué leur intérêt pour le cuir doré. Nous pensons par exemple au roi portugais Dom João II qui à la fin du XV^{ème} siècle fit envoyer à la cour de Louis XII muchos guadamecies i

alfombras, que en Francia no se han. Nous ne sommes pas toujours bien informés sur la production des Pays-Bas méridionaux au XVI^{ème} siècle, mais nous en savons plus qu'au premier abord. Dans le courant des siècles Malines fut le centre le plus important bien que les données datant d'avant la moitié du XVII^{ème} siècle soient plutôt rares. Nous pouvons également avancer des noms de fabricants de cuir doré anversois et bruxellois du début de ce siècle. Nous voulons approfondir ce problème. L'importation du cuir doré aux Pays-Bas durant cette période retiendra également notre attention. En effet l'intérêt de la riche bourgeoisie pour des revêtements muraux et des tapis de table en cuir s'était fortement accru en ce temps.

Stéphane IPERT, **Agnès SIRVAJEAN, France**

PRODUCTION OF GILT LEATHER IN PROVENCE IN THE XVIIIth AND XIXth CENTURIES

Nowadays, the presence of a relatively important number of items or wall sets made of gilt leather in churches, museums and castles in Provence assumes the existence of a major production centre in the area during the XVIIIth century.

This communication intends to estimate the bibliographic and archivistic sources that exist in the area; the relevance of the available information will be checked, in order to provide a better understanding in the field of gilt leather manufacturing. The main production workshops will be identified and spotted, while the knowledge of particular productions, and the connection between gilt leathers and specific manufactures will be a matter of debate.

The topic of gilt leather production in the XIXth century will be discussed to check the sufficiency of documentary sources, and to appraise the decline of this production, given that XIXth century leather items seem to be rare in the area.

LA PRODUCTION DES CUIRS DORÉS EN PROVENCE AUX XVIII^{ème} ET XIX^{ème} SIÈCLES

La présence de nos jours d'une quantité relativement importante d'objets ou de tentures murales en cuir doré dans les églises, les musées et les châteaux de Provence atteste d'un centre de production important dans la région au XVIII^{ème} siècle.

Cette présentation a pour objet de faire le point sur les sources bibliographiques et archivistiques existantes dans la région; il s'agira de voir dans quelle mesure les informations disponibles sont pertinentes pour aider à une meilleure connaissance de la production de cuirs dorés. Les principaux ateliers de production seront identifiés et localisés alors que l'état de la question sur la connaissance des productions spécifiques et sur l'attribution des cuirs dorés à telle manufacture sera discuté.

La question de la production des cuirs dorés au XIX^{ème} siècle sera abordée pour voir si les sources documentaires sont suffisantes et tenter de faire le point sur le déclin de cette production sachant que les éléments de cuir du XIX^{ème} siècle semblent rares dans la région.

Pierre-Yves LE POGAM, France

TECHNIQUES OF MAKING: A WAY OF SOCIAL AND CHRONOLOGICAL DISTINCTION FOR LEATHER CASKETS OF THE XVth CENTURY ?

In all the fields of art history, there are intricate links between the evolving techniques of making of the works and social needs which modify them or are modified by the market. It is the case for leather caskets, whose very large production during the XVth century impels us to distinguish some groups with very distinctive features, and which, notwithstanding, have not been really classified yet, according to their quality, their types, or their chronology.

A first group, rather well studied and well located in the chronology, is made up of caskets of the beginning of the XVth century. They possess a rich iconography, mainly profane, achieved in the technique of chased, polychrome and gilded leather. The links between the quality and difficulties of the techniques, the level of luxury, and the social rank of the patrons, can easily be guessed at.

This method of making is interrupted after c. 1420. Nevertheless, the production of leather caskets increases, as attests the amount of preserved works. But the techniques are radically new. One finds out only engraved

decoration, sometimes painted and gilded, with three types of ornament: a vegetal one, inscriptions, and heraldic devices. The customers are surely larger than before, because of the mass-production feasible with this less complicate technique and because of this standard decoration. This new technique and this larger diffusion explain themselves in the context of the discovery and growing success of a new artistic medium, the wood and copper engraving. Moreover, this last one is probably the origin of numerous models for the caskets, as it is for many other fields of artistic activity since the second quarter of the XVth century.

In this way, in the bigger group just named, appears a distinct one, more luxurious, which probably answers to the desire of richer patrons to separate themselves from ordinary clients. These larger caskets present a rich iconography, surely inspired by prints, whose models nevertheless have not been really identified.

The universal use of the engraving technique has another result, the growing size of the objects. Besides the caskets, from around 1500 exists a group of chests, covered with engraved and painted leather, which look like enlarged caskets of the third group. This novelty is the obvious result of the replacing of the chasing techniques, which would not have permitted the making of such objects, by the engraving ones.

LES TECHNIQUES DE FABRICATION: UN INDICE DE DISCRIMINATION CHRONOLOGIQUE ET SOCIALE DES COFFRETS EN CUIR DU XV^{ème} SIÈCLE ?

Il existe dans tous les domaines de l'histoire de l'art une interaction complexe entre les évolutions techniques qui régissent la production des objets et la demande sociale qui infléchit celle-ci ou se laisse inversement influencer par le marché. Cela vaut par exemple pour les coffrets en cuir dont la production, extrêmement importante tout au long du XV^{ème} siècle, oblige à reconnaître une série de groupes aux caractéristiques bien différentes, mais qui n'ont guère été classés entre eux, en fonction de leur qualité, de leur typologie ou de leur chronologie.

Il y a ainsi un premier groupe, relativement bien étudié et bien situé dans le temps par rapport au reste de la production. Il s'agit d'une série de coffrets que l'on peut situer au début du XVe siècle, à cause de leurs caractères stylistiques. Ces coffrets présentent en effet une abondante iconographie, surtout profane, réalisée dans une technique de cuir repoussé, polychromé et doré. On saisit facilement la coïncidence entre la qualité et la complexité des techniques de fabrication, le niveau de luxe ainsi obtenu et le rang social des commanditaires.

Cette technique cesse d'être employée après 1420 environ, semble-t-il. Pourtant la production de coffrets connaît un accroissement numérique certain, que traduit le nombre d'objets conservés. Mais, la technique de fabrication a désormais radicalement changé. On ne trouve plus désormais qu'un décor gravé, occasionnellement peint et doré, et dont le répertoire se limite à trois types d'ornements: le décor végétal, des inscriptions et des motifs héraldiques ou para-héraldiques. Le public visé est certainement bien plus large, ce qui correspond à la fois à la possibilité d'une production sérielle qu'offre cette technique moins raffinée, et à la banalité du répertoire décoratif. Cette volonté de diffusion très large, de même que la technique employée, se place bien entendu dans le cadre de l'apparition et du succès grandissant d'un nouveau « média » artistique, la gravure sur bois et sur métal, qui en outre fournit peut-être des modèles aux coffrets comme à bien d'autres domaines de l'artisanat, à partir du deuxième quart du XV^{ème} siècle.

C'est ainsi que se dessine à l'intérieur de notre définition un petit groupe de coffrets plus luxueux, qui répondent probablement à l'envie d'un groupe de commanditaires plus huppés de se distinguer des clients ordinaires. Il s'agit de coffrets d'assez grande taille, dotés d'une iconographie à nouveau abondante et probablement inspirée par l'estampe, mais dont les modèles n'ont pas encore été bien identifiés.

Une autre conséquence de l'utilisation désormais universelle de la gravure, c'est l'augmentation de la taille des objets concernés. Au-delà des coffrets apparaissent autour de 1500 des coffres recouverts de cuir gravé et polychrome, formant un groupe relativement homogène qui est comme l'agrandissement des coffrets précédents. On comprend bien que cette innovation typologique est une conséquence de l'abandon du bas-relief, qui n'aurait pas permis la réalisation de tels objets, pour l'aplat gravé.

Christopher CALNAN, United-Kingdom, Mariabianca PARIS, Italy

SCORCHED LEATHER - AN UNCOVERED DISCOVERY

Scorched leather is a material which rarely exists in collections but was once an important component of furniture from XVIIth century onwards. The history of the material, its manufacture and use will be discussed and examples illustrated. The examples of scorched leather will be drawn from the home countries of the two speakers.

The leather is usually made from sheepskin which is vegetable tanned. The decorative pattern is applied by either the application of a heated metal plate applied by stamping or by rubbing the leather over a mould. Most examples of scorched leather receive no further decorative treatment but some examples of painted designs have been found. The scorched leather was usually made to drape or cover an object and would be made in the same way of a case cover. The seams were covered with stitched piping which was often of gilt leather.

« SCORCHED LEATHER » - À LA DÉCOUVERTE D'UNE COUVERTURE

Ce type de cuir est un matériau très rarement présent dans les collections, mais qui en son temps, à partir du XVII^{éme} siècle, fut un élément important de mobilier. L'histoire du matériau, sa fabrication et son utilisation seront illustrées par des exemples provenant des pays d'origine des deux orateurs.

Le cuir est généralement fabriqué à partir de peau de mouton tannée végétalement. Le motif décoratif est obtenu soit par impression en appliquant une plaque en métal chauffé, soit en frottant le cuir sur un moule. Dans la plupart des cas le cuir ne reçoit aucun autre traitement décoratif ultérieur, mais il existe quelques exemples portant des dessins peints. Ce type de cuir était généralement utilisé pour draper ou couvrir un objet, comme on le ferait d'une housse. Les coutures étaient agrémentées d'un passe-poil souvent fait de cuir doré.

Marina L. REGNI and Sibylle PINO, Italy

RESEARCH ON GILT LEATHERS IN ITALY: LOCAL USE AND CONSERVATION TECHNIQUES

Decorative leathers were produced and widely used throughout the country. These artistic skills were developed mostly from the XVIth to the XVIIIth century when it came into fashion for interior decoration. 'Regional' styles were produced by the craftsmen for decorating and using gilt polychrome leather.

Examples of altar frontals and wall-hangings from Northern Italy (Veneto, Friuli) are described. Hand-tooling is especially emphasized with an attempt of a codification of the decorative shapes of punches. Interesting fragments of gilt leather were also found as original book covers or to strengthen the spine of archival bindings for dated manuscript documents. Finally, three different approaches to conservation treatments are briefly discussed.

LES RECHERCHES SUR LE CUIR DORÉ EN ITALIE: USAGE LOCAL ET TECHNIQUES DE CONSERVATION

Des cuirs décoratifs ont été fabriqués et largement utilisés dans tout le pays. Les techniques artistiques se sont développées principalement du XVI^{éme} au XVIII^{éme} siècle, quand apparut la mode de la décoration intérieure. Des artisans ont produit des styles « régionaux » pour la décoration utilisant du cuir doré et polychrome.

Des exemples de devants d'autels et de tentures murales provenant d'Italie du Nord (Vénétie, Frioul) sont décrits. L'accent est particulièrement mis sur le travail à la main, dans une tentative de codification de la forme décorative des poinçons. Des fragments intéressants de cuir doré provenant de couvertures originales de livres, ou ayant été utilisés pour renforcer le dos de reliures d'archives pour des manuscrits datés, ont également été retrouvés. Enfin, trois différentes approches de traitements de conservation seront brièvement discutées.

ANALYTICAL TECHNIQUES

ANALYSES

Dominique DE REYER, Sandrine PILBOUT, Nicole DENNEBOUY, Monique MONNEROT, France

ANALYSIS OF GOLD THREADS FOUND IN MEDIEVAL TEXTILES

Gold threads found in Medieval Textiles (XIth-XIVth centuries) usually consist of strips of animal substrate (membrane, leather, vellum or parchment) that were gilded on one side, wound around a core and then woven. They were produced around the Mediterranean sea. Because of the freedom with which motifs and patterns moved from Middle East to Italy and Spain, iconographical and technical textile analysis does not offer sufficient evidences to determine the origin of the threads. Comparative studies regarding the manufacturing techniques of

them have to be investigated. Based on the results of scientific examination, the history of preparation techniques can be outlined more precisely. The elemental composition of the metal surface of gold thread are analysed by energy dispersive X-ray spectrometry. The animal organic substrate can be examined in order to specify the origin and the identity of the treated skins used as leather and parchment, or the gut membrane. Access to ancient DNA provides the opportunity to study the genetic material of animal substrate and identify the species used for the production of the strips. DNA from these substrates has been successfully amplified and sequenced using primers within the mitochondrial I-rRNA gene. The sequence of the chosen fragment is suitable for differentiating cow, goat, sheep and pig. Questions about the manufacturing techniques are raised by the results obtained.

ANALYSE DES FILS D'OR UTILISÉS DANS LES DÉCORS DES TEXTILES MÉDIÉVAUX.

Certains textiles médiévaux (XI^{éme}-XIV^{éme} siècles), se distinguent par l'utilisation dans leur décor de fils « d'or de Chypre ». Ces fils métalliques sont constitués d'une lamelle organique dorée (baudruche, parchemin, cuir) qui s'enroule autour d'un fil textile. Si l'on veut tenter de proposer pour ces soieries aux décors apparentés des origines et des datations de plus en plus précises et fiables, il ne faut pas seulement se baser sur leur analyse typologique et stylistique mais développer la connaissance des techniques de fabrication de ces fils d'or.

Les récents développements de la biologie moléculaire nous permettent d'appréhender l'étude des matériaux organiques du passé, transformés par l'homme. La technique d'amplification de l'ADN par la réaction de polymérisation en chaîne (PCR) est un outil moléculaire qui permet d'aborder la reconnaissance des espèces animales par une approche moléculaire. Un outil moléculaire est développé qui permet d'identifier de manière spécifique le mouton, le boeuf, la chèvre et le porc (le gène de l'acide ribonucléique de la grande sous-unité du ribosome I-rRNZA de l'ADN mitochondrial est utilisé comme gène marqueur). L'outil est appliqué pour analyser la lamelle organique de fils d'or prélevés sur des textiles médiévaux.

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2002, Studies in Conservation n° 47 "les lamelles des fils métalliques organiques dans les textiles médiévaux: approche méthodologique de leur origine biologique".

Matthijs de KEIJZER, in cooperation with Eloy KOLDEWEIJ, The Netherlands

THE ANALYTICAL RESEARCH OF SOME DOCUMENTED PIECES OF GILT LEATHER

Seven fragments of gilt leather wall hangings have been chosen for an extensive analytical research program. Most of these pieces are from Dutch origin, and all of them are documented one way or another. It is known where they hung, and all, except one, can be dated by archival documents.

All these fragments have been examined microscopically by making cross-sections. A variety of analytical methods, such as Scanning Electron Microscope with Energy Dispersive X-ray analysis (SEM-EDX), High Performance Liquid Chromatography (HPLC), Thin Layer Chromatography (TLC), Gas Chromatography-Mass-Spectrometry (GC-MS), Fourier Transform Infrared Spectrometry (FT-IR), X-ray Fluorescence Spectrometry, Lasermicrospectral analysis (LMA) and microchemical analysis (spot-tests), have been used to identify the different products, (varnishes, dyes, binding-media, metal and pigments) for making gilt leather.

D'ANALYSES DE QUELQUES PIÈCES DOCUMENTÉES EN CUIR DORÉ

Sept fragments de tentures murales en cuir doré ont été choisis pour un programme extensif de recherche analytique. La plupart de ces pièces sont d'origine néerlandaise, et toutes sont documentées d'une manière ou d'une autre. On sait où elles étaient accrochées, et à une exception près, elles peuvent être datées par des documents d'archives.

Des examens au microscope ont été pratiqués sur des coupes transversales de tous ces fragments. Une variété de méthodes d'analyse incluant la microscopie électronique à balayage couplée à l'analyse en spectrométrie de rayons X (SEM-EDX), la chromatographie liquide haute performance (CLHP), la chromatographie sur couche mince (CCM), la chromatographie en phase gazeuse couplée à la spectrométrie de masse (CG-SM), la

spectrométrie infra-rouge à transformée de Fourier (IRFT), la spectrométrie de fluorescence X, l'analyse microspectrale laser (LMA), et l'analyse microchimique (spot tests) ont été utilisées pour identifier les différents produits (vernis, teintures, liants, métaux et pigments) qui entrent dans la fabrication du cuir doré.

Christopher CALNAN, United-Kingdom

TECHNICAL INVESTIGATION OF GILT LEATHER FROM THE V&A MUSEUM

In 1995 a technical investigation was begun on a selected number of panels belonging to the V&A Museum into the methods and materials used to produce gilt leather. The investigation was part of a project to catalogue the collection funded by a grant from the Getty Institute.

One of the reasons for the examination was to identify materials and techniques of production which might contribute towards the characterization of gilt leather from particular periods and countries. Analysis consisted of an examination of all the samples for animal types, a selective examination of the decorative layers (metal leaf, paint and varnish), and a limited examination of tannin type.

The presentation will describe the results of the analysis and highlight the main differences in technique between different countries of origin.

EXAMEN DE LA COLLECTION DE CUIRS DORÉS DU V&A MUSEUM

En 1995 une enquête technique ayant pour but de définir les méthodes et les matériaux utilisés pour la production du cuir doré a été entreprise sur un certain nombre de panneaux appartenant au V&A Museum. Cette investigation faisait partie d'un projet subventionné par l'Institut Getty destiné à établir le catalogage de la collection.

L'identification des matériaux et techniques de production qui peuvent contribuer à la caractérisation du cuir doré appartenant à une période ou à un pays particulier, était l'une des raisons de cette enquête. Les analyses ont consisté en une identification de l'espèce animale de tous les échantillons, un examen sélectif des couches décoratives (couche métallique, peinture, vernis), et un examen limité du type de tanin.

L'exposé commentera les résultats de l'analyse et mettra l'accent sur les différences qui existent entre les techniques de différents pays.

Pieter B. HALLEBEEK, The Netherlands

ANALYTICAL ASSESMENT OF THE CONDITION OF GILT LEATHER WALL HANGINGS AND CONSEQUENCES FOR TREATMENT

Discussion about the results of the chemical and physical examination of samples of gilt leather in different condition taken from three different objects. A relevant choice of parameters has been made and the data from the measurements of this parameters give information concerning the degree of degradation and consequences for the conservation methods, materials and restoration.

As most relevant parameters to assess the condition of the gilt leather are chosen: the determination of acidity (pH) and differential number, soluble sulphate content, metals and total sulphate content, soluble nitrogen content calculated as ammonia, extractable fat content, skrinkage temperature and moisture content. By means of the adaptation of conservation materials and methods the leather has to be stabilized for the future in accordance with the surroundings. The results of these measurements enable an optimum adjustment of conservation methods and materials to the requirements of the material, which may be different from place to place and largely depend on the condition of the leather at the moment of sampling. Emphasis is put on the methods for neutralization of very acidic types of leather.

One specific case concerns the examination of gilt leather treated repeatedly in the past with wax. From the results of the examination one may conclude that there is a connection between the state of degradation of the leather and the presence of wax on the surface. The presumption is that the uptake and release of moisture by the leather is disturbed by a solid layer of wax followed by accelerated degradation of the leather. All samples in this particular case are in very dry state and have lack of lubricant and moisture.

According to the results of the measurement of pH, differential number and percentage ammonium sulphate a scheme has been devised to explain the connection between the results of the measurements and the conservation measures to be taken especially concerning neutralization and application of a buffer in order to stabilize the leather as quickly as possible.

ESTIMATION PAR L'ANALYSE DE L'ÉTAT DU CUIR DORÉ DE TENTURES MURALES ET LES CONSÉQUENCES POUR LE TRAITEMENT.

Une discussion sur les résultats de l'examen chimique et physique d'échantillons en cuir doré présentant différents états de conservation prélevés sur trois objets est présentée. Un choix approprié de paramètres a été fait et les résultats des mesures fournissent des informations sur le degré de détérioration, avec pour conséquence le choix de méthodes de conservation et de traitements de restauration.

Parmi les paramètres les plus adaptés pour estimer l'état de détérioration, les suivants ont été choisis: détermination de l'acidité (pH) et de l'indice de différence, du contenu en sulfates solubles, métaux et sulfates totaux, du contenu en azote sous forme ammoniacale, en graisses extractibles, et mesure de la température de rétraction et du taux d'humidité. Grâce à l'adaptation des matériaux et des méthodes de conservation, le cuir peut être stabilisé pour bien réagir dans le futur à son environnement. Les résultats des analyses permettent un ajustement maximum des matériaux et des méthodes de conservation aux exigences du matériau cuir, qui peuvent être différentes selon l'emplacement et qui dépendent beaucoup de l'état du cuir au moment du prélèvement. L'accent est mis sur les méthodes de neutralisation des cuirs très acides.

Un cas particulier concerne l'analyse d'un cuir doré traité de façon répétée dans le passé avec de la cire. Des résultats des analyses on peut déduire qu'il y a une relation entre l'état de dégradation du cuir et la présence de cire à la surface. L'hypothèse avancée est que les échanges d'humidité avec l'environnement sont perturbés par la couche solide de cire, ce qui entraîne une dégradation accélérée du cuir. Tous les échantillons dans ce cas particulier sont dans un état très sec en raison du manque de lubrifiant et d'humidité.

Selon les résultats des mesures de pH, de l'indice de différence et du pourcentage en sulfate d'ammonium, un schéma a été établi pour expliquer la relation qui existe entre eux, et pour prendre les mesures conservatoires nécessaires, et particulièrement en ce qui concerne l'application d'un tampon pour stabiliser le cuir le plus rapidement possible.

Jana DERNOVŠKOVÁ, Hana DOLEJŠI, the Czech Republic

TESTING OF THE INFLUENCE OF LUBRICATING UPON HISTORICAL VEGETABLE TANNED LEATHER

Lubrication is a very often discussed problem in conservation of leather. The ideas of using lubrication were: improving physical and mechanical properties of leather, creating barriers against pollutants, improving appearance. The objections to lubrication are an unacceptable change of appearance (especially of the very degraded or light leather), support of microbiological attack, forming of spews on surface, oxidation of fat and stiffening, softening original decoration and discoloration, collecting dust and so on.

For trials were used the following lubricating mixtures:
1 - Mixture VUK containing refined lanolin, Japan wax, Neatsfoot oil, Preventol O extra, white spirit
2 - Lubricating mixture British Museum (BM)
3 - Lubricating mixture containing fraction α -olefins, number of carbon 20 - 24
4 - Lanolin

Lubrication was applied by using a coating on new sumach tanned leather (n°1) and three historical vegetable tanned bookbinding leathers (n°2,3,4). The following parameters were used to describe the state of the leathers: shrinkage temperature, pH, tensile strength, elongation, amount of tannins, fat, ash. SEM shows an empty structure of these historical leathers with considerably increased volume of empty space, their fibres being broken and loosened.

Influence of lubricating upon leather.

Watching the application all the leathers became darker after lubrication. Shrinkage temperature did not change significantly. The tendency to preserve acid attack was evident. The results of tensile strength tests, elongation and flexibility show sometimes antagonistic. The synthesis of the results was very difficult, because laws are not obvious.

Lubrication of a new leather resulted in increasing tensile strength in case of VUK, BM, but decreasing elongation. The structure became more rigid. The sorption of water vapour was lower at lubricated leather. In the case of leather 2 the value of tensile strength reached only 1/3 of value of new leather and slight differences are not substantial. Elongation did not change very much by lubrication. The sorption of water vapour was decreased after lubrication by VUK and olefins. Lubricating did not help to improve flexibility. In case of leather 3 the elongation was increased in all cases. But lubrication did not cause higher flexibility. It was observed increasing of sorption of water vapour in all cases and this state stayed after ageing. The cause is not clear. It seems to be something like opening the structure. Leather 4 was stabilized by lubricating, especially by VUK mixture. The elongation was also slightly increased. This leather significantly improved its flexibility in case of lubrication by VUK, BM and olefins. Like in previous case the sorption was increased.

Conclusions

We did not observe the influence of lubricating mixtures on better mechanical properties of historical leather in every case (strength, elongation, flexibility). The lubrication appears like a certain barrier, aesthetic treatment and stabilizing treatment. One must have in mind also experience. To them I have come across problems with very degraded leather with damaged grain side very often. I recommend slight lubrication in case of leather in good state. The mixture with olefins can create a white coating and deposit on surface of leather. It was found that other conservation treatment is necessary for improving mechanical properties, e.g. retanning, filing structure of leather or impregnation.

ÉTUDE DE L'INFLUENCE DE LA LUBRIFICATION SUR LE CUIR ANCIEN TANNÉ VÉGÉTALEMENT

La lubrification est une question souvent discutée dans le domaine de la conservation du cuir. Le but d'un tel traitement est d'améliorer les propriétés physiques et mécaniques du cuir, de créer une barrière contre la pollution, et d'améliorer l'aspect. Par contre les objections à la lubrification sont une modification inacceptable de l'aspect, (en particulier dans le cas de cuirs très dégradés ou de couleur claire), une vulnérabilité à l'attaque microbiologique, l'apparition de repousses grasses en surface, l'oxydation de la graisse entraînant un raidissement, un affaiblissement [softening] de la décoration d'origine et son changement de couleur, la facilité de fixer la poussière, etc.

Nous avons testé les formules de lubrifiants suivantes:
1 - mélange VUK contenant de la lanoline raffinée, de la cire du Japon, de l'huile de pied-de-boeuf, du Preventol O extra, du white spirit
2 - formule du British Museum (BM)
3 - mélange contenant des fractions d'oléfines α (20-24 carbones)
4 - lanoline

Les lubrifiants ont été appliqués sur un cuir neuf tanné au sumac (n°1) et sur trois reliures anciennes en cuir de tannage végétal (n°2,3,4). Les cuirs ont été testés grâce aux déterminations suivantes: température de rétraction, pH, résistance à la traction, élongation, quantité de tanins, graisses, cendres. Des observations en microscopie électronique à balayage ont montré une structure lâche des cuirs anciens, avec une augmentation de volume importante due à des espaces vides, les fibres étant cassées et affaiblies.

Influence de la lubrification sur le cuir

Après l'application des lubrifiants, les cuirs deviennent plus foncés. La température de rétraction n'est pas modifiée de façon significative. La tendance à protéger de l'attaque acide est évidente. Les résultats des tests mécaniques, résistance à la traction, élongation et flexibilité sont quelque peu contradictoires, ce qui en rend la synthèse difficile, les tendances n'étant pas évidentes.

La lubrification du cuir neuf augmente la résistance à la traction dans le cas de VUK, BM, mais en diminue l'élongation, et la structure devient plus rigide. La sorption de vapeur d'eau est plus faible quand le cuir est lubrifié. Pour le cuir n°2, la valeur de la résistance à la traction n'atteint que le 1/3 de celle du cuir neuf (et de petites différences ne sont pas substantielles). L'élongation n'est pas beaucoup modifiée par la lubrification. La sorption de vapeur d'eau diminue après traitement par le mélange VUK et les oléfines. La lubrification n'augmente pas la flexibilité. L'élongation du cuir n°3 est augmentée dans tous les cas, sans pour autant que la flexibilité soit améliorée. On a observé également une augmentation de la sorption de la vapeur d'eau, propriété qui persiste après vieillissement. La raison n'est pas claire, cela pourrait être dû à une modification de la structure qui devient plus ouverte. Le cuir n°4 est stabilisé par la lubrification, particulièrement avec les mélanges VUK, BM, et les oléfines.

Conclusion

Nous n'avons pas observé d'amélioration des propriétés mécaniques des cuirs anciens par l'application des mélanges de lubrifiants. La lubrification semble cependant être un traitement esthétique et stabilisant, avec un certain effet barrière, mais dont l'application nécessite de l'expérience. J'ai trop souvent rencontré des problèmes avec des cuirs dont la fleur est particulièrement dégradée. Je recommande une légère lubrification dans le cas de cuirs en bon état. Le mélange d'oléfines peut créer un léger dépôt blanc à la surface du cuir. Il apparaît que d'autres traitements de conservation sont nécessaires pour améliorer les propriétés mécaniques, telles que retannage, remplissage de la structure, ou imprégnation.

Richard MOROZ, Stefan WÜSTENBECKER, Germany

CRACKS IN PAINT LAYERS IN LEATHER TAPESTRIES

The deterioration of paint layers in leather tapestries is a serious problem. The first stage is the development of fine cracks and through their propagation into major cavities to the final stage - peel off. The problem is also the development of the paint layers cracks into the leather surface.

This talk will look at ways of documenting cracks which can be used to monitor deterioration and to establish the suitability of particular conservation treatment. There are essentially three methods which can be used to document cracks namely:

1/ description - written documentation
2/ 2-dimensional recording by drawing or by scanning the surface by camera
3/ 3-dimensional profilometric recording mechanically or by laser technique

Of these three methods the most informative was founded to be 3-D documentation. Using this technique it is possible to measure the profiles which can be analysed by computer. The method records the width and area density of cracks and also will analyse their depth. In the next step will be look to find the correlation between the depth of cracks and lack of strength of the leather.

The comparison of documentation of cracks in several periods can give a look in the velocity of cracks development to correlate changes in deterioration of the paint layers with different conservation treatments.

CRAQUELURES DANS LA COUCHE PICTURALE DE TENTURES EN CUIR

La détérioration de la couche picturale des tentures en cuir est un problème sérieux. Le premier stade est le développement de fines craquelures, qui se transforment ensuite en cavités importantes, pour aboutir, au stade final, à l'écaillement. Le problème est aussi celui de la propagation de ces craquelures vers la surface du cuir lui-même.

Cette communication présentera les différentes façons de documenter les craquelures, que l'on peut utiliser afin de contrôler la détérioration et déterminer si un traitement de conservation particulier est approprié. Il existe essentiellement trois méthodes:

1/ description - documentation écrite
2/ enregistrement en 2-D par le dessin ou la numérisation de la surface à l'aide d'une caméra
3/ enregistrement profilométrique en 3-D, mécaniquement ou par la technique du laser

De ces trois méthodes, celle qui apporte le plus d'informations est la documentation 3-D. Grâce à cette technique, il est possible de mesurer les profils qui peuvent être analysés par ordinateur. On enregistre la largeur et la profondeur des craquelures, ainsi que leur densité. La prochaine étape consistera à établir une corrélation entre la profondeur des craquelures et le manque de résistance du cuir.

Le suivi des craquelures au cours du temps peut donner un aperçu de la vitesse à laquelle elles se développent, et permettre d'adapter un traitement de conservation à l'évolution des détériorations de la couche picturale.

Dorota JUTRZENKA-SUPRYN, Halina ROSA, Anna RYBACKA-HANCZEWSKA Poland

THE RESEARCH ON THE APPLICATION OF SILICONE FOR THE ART LEATHER RESTORATION

Silicone has been widely used in the leather industry. They have been applied on different process stages such as: tanning, oiling, impregnation and finishing. It is known that silicates have been also successfully used in stone and wood conservation. Some tests on adopting them to the leather conservation were carried out. Successful use of the silicates in so many fields has been an inspiration for described research.

The aim of the research was to check the possible use of different silicate products at an angle of their use in leather impregnation which improve properties of many deteriorated leather objects. Improvement of impregnated leather was inspected by following characteristics: better elasticity, none optical changes, increase of durability, but most importantly the silicates will stabilize the leather in different climate conditions.

Different Wacker-Chemie silicate products were selected for test: Silicone emulsion E-10, Silicon oil L654, impregnate Si-Finish WS 80 M, and Polish products: Silicone emulsion Silteks EP-34 with Siltex CI-4 catalyst and the mixture of silicone oils with catalyst. Modern light calf, vegetable tanned and antique leather object were the test material. Four impregnation methods were applied, two in lower pressure condition. All samples were tested for moisturizing, permeability, absorption and hygroscopicity. Temperature of shrinkage was measured as well as deformation of samples in climate fluctuation cycle.

Applied silicate products very little changed the colour either new or antique leather samples. They improved physical properties of tested old leather samples and increased the shrinkage temperature. The increase of water resistance was quite big. The results obtained were almost always multiplicity of the control samples test results. Likewise the hygroscopicity test water vapour absorption from 100 % RH environment was in case of impregnated leather samples even 35 % lower than in case of control samples. Tested materials have greatly affected the behaviour of leather samples in different climate control cycles. Deformations of impregnated leather samples had often no so drastic course and furthermore after the climate fluctuation cycles in normal, initial conditions had the tendency for deformation resistance.

RECHERCHES SUR L'APPLICATION DES SILICONES POUR RESTAURER LE CUIR

Les silicones sont des composés largement utilisés dans l'industrie du cuir. Ils sont appliqués à différents stades de la fabrication tels que tannage, nourriture, imprégnation, finissage. Il est [par ailleurs] connu que les silicates sont utilisés avec succès pour la restauration de la pierre et du bois. Quelques tests destinés à les adapter à la restauration du cuir ont été entrepris, le succès de leur utilisation dans de nombreux domaines ayant inspiré la recherche décrite ici.

Le but de cette recherche était de trouver les produits les mieux adaptés à l'imprégnation du cuir et ainsi améliorer les propriétés des objets en cuir détériorés. Afin d'évaluer l'amélioration apportée par l'imprégnation, on a pris en compte les caractéristiques suivantes: meilleure élasticité, aucun changement optique, augmentation de la durabilité, et plus important encore, la propriété qu'ont les silicates de stabiliser le cuir aux variations climatiques.

Différents silicates provenant de Wacker-Chemie ont été sélectionnés pour les tests: Silicone emulsion E-10, Silicone oil L654, impregnate Si-Finish WS 80M, ainsi que des Polishs: Silicone emulsion Silteks EP-34 avec un catalyseur Siltex Cl-4 et un mélange d'huiles silicones avec catalyseur. Les expériences ont été réalisées sur du cuir moderne de veau tanné végétalement et sur du cuir ancien. Quatre méthodes d'imprégnation ont été utilisées dont à plus faible pression. Sur tous les échantillons, des mesures d'humidité, de perméabilité, d'absorption et d'hygroscopicité ont été réalisées. La température de rétraction a également été déterminée, ainsi que la déformation des échantillons sous l'influence de fluctuations climatiques.

Les produits à base de silicates qui ont été testés changent très peu la couleur du cuir, neuf ou ancien. Ils améliorent les propriétés physiques du cuir ancien et augmentent la température de rétraction. L'amélioration de la résistance à l'eau est importante. Dans l'ensemble, les résultats sont bien meilleurs que ceux des témoins. Ainsi l'absorption de vapeur d'eau dans une atmosphère contenant 100% d'HR est pour les échantillons imprégnés de 35% inférieure à celle des témoins. Les produits testés affectent grandement les cuirs dans les différents cycles de variations climatiques. Les déformations des cuirs imprégnés sont souvent beaucoup moins importantes, et de plus, après les fluctuations climatiques, quand les échantillons sont remis en conditions normales, ils conservent une certaine résistance à la déformation.

Magda SOUCKOVA, Czech Republic

INFLUENCE OF THE ENVIRONMENT HUMIDITY AND OF WATER USED IN CONSERVATION TREATMENT ON EXTERNAL PROPERTIES OF LEATHER AND PARCHMENT

Effect of water to leather bindings and parchments - both in the form of value limits of relative humidity of climate (RH) or of its oscillation, and in that of a direct contact of liquid water to the material during conservation treatment - influence their dimension and are reflected in their becoming hard and fragile as well as in a greater mechanical stress in manipulation with an object.

Dimensional changes of physical properties in dependence on relative humidity and on direct soaking of model vegetable tanned leather and parchment bindings were studied in a research project of the Ministry of Culture of the Czech Republic, 'Stopping of Degradation of Historical Leather Bookbindings, Parchments and Other Leather Products caused by Water Effects'. The Project was solved by the staff of the Department of Conservation and Preventive Care of the National Library of the Czech Republic and by the TOMA joint-stock company in Otrokovice (the former Leather Research Institute).

The research was focused on effects of the RH upon the humidity of materials mentioned above and changes of their dimension, on comparing the effect of a single (i.e. unrepeated) change of RH with that of a repeated one reflected in the area and in physical properties of materials as well as the effect of water used in conservation treatment upon changes of dimension and physical properties.

It was found out that in case of low RH values the humidity of both materials decreases to the same value. When the RH values are higher the sorption of parchment steeply increases in comparison with the sorption of vegetable tanned leather. A change of the area of parchment is comparable with that of leather in humidity sorption, while a change of thickness is different - that of parchment is ten times higher than that of leather. The change of area of both materials caused by a single change of RH becomes greater when the changes of RH are greater. Physical properties of the studied materials were not clearly affected with the change of RH, either the single or the cyclic one.

It was found out that the more the studied materials are soaked, the higher is their area contraction after their drying. The increase of the content of water causes a greater flexibility of both materials and lowers their beginning toughness, in case of parchment also its tensile strength decreased compared with leather.

On the basis of acquired results in the second part of the project, several methods were proposed, which are now verified in practice.

INFLUENCE DE L'HUMIDITÉ ENVIRONNANTE ET DE L'EAU UTILISÉE DANS LES TRAITEMENTS DE RESTAURATION SUR LES PROPRIÉTÉS DU CUIR ET DU PARCHEMIN

L'eau, qui peut se trouver à la fois sous forme d'humidité relative, HR, (valeurs limites et variations), et sous forme liquide au cours de traitements de restauration, influe sur les dimensions du cuir des reliures et celles du parchemin. Le phénomène se traduit par un certain raidissement de ces matériaux et une fragilité plus grande qui entraîneront de plus fortes contraintes mécaniques lors des manipulations.

Une étude a été entreprise dans le cadre d'un projet de recherche du Ministère de la Culture Tchèque, sur les changements dans les dimensions et les propriétés mécaniques se produisant dans des éprouvettes de cuir tanné végétalement et de parchemin, sous l'influence des variations de l'humidité relative et de l'immersion totale. Ce projet, qui s'intitule: "Prévention de la dégradation causée par l'eau aux reliures en cuir, aux parchemins et aux autres objets anciens en cuir", a été mené par l'équipe du Département de conservation et de soins préventifs de la Bibliothèque nationale de la République Tchèque et par la société TOMA d'Otrokovice (ancien Institut de recherche sur le cuir).

La recherche a été centrée sur l'influence de l'HR sur le contenu en eau des matériaux mentionnés ci-dessus et les changements qui en résultent dans les dimensions et les propriétés mécaniques, comparant l'effet d'une variation unique de l'HR à une variation multiple, en cycles. Les effets de l'eau utilisée au cours de traitements de restauration ont également été étudiés.

Il est apparu que dans le cas de faibles valeurs d'HR, le contenu en eau des deux matériaux diminue de façon identique. Quand l'HR est élevée, la sorption du parchemin augmente beaucoup plus brusquement que celle du cuir tanné végétalement. La modification de surface du parchemin, en sorption toujours, est comparable à celle du cuir, alors que le changement d'épaisseur est différent: l'épaisseur du parchemin est dix fois plus importante

que celle du cuir. Pour les deux matériaux, la modification de surface causée par une variation unique de l'HR est d'autant plus importante que la variation est forte. Les propriétés mécaniques des matériaux étudiés ne sont pas clairement affectées par la variation d'HR, qu'elle soit unique ou cyclique.

On a également observé sur les matériaux étudiés que le retrait dimensionnel après séchage est d'autant plus important qu'ils ont été longuement trempés. L'augmentation de leur contenu en eau entraîne une plus grande flexibilité qui s'oppose au début de rigidification, et dans le cas du parchemin, provoque une perte de la résistance à la traction, contrairement à ce qui se passe pour le cuir.

Sur la base des résultats obtenus dans la seconde partie du projet, plusieurs méthodes (de conservation) ont été proposées qui sont actuellement mises en pratique.
CONSERVATION

Roy THOMSON, United-Kingdom

THE CONSERVATION OF GILT LEATHER WALL HANGINGS: AN INTERNATIONAL SURVEY

In 1995 the Leather Conservation Centre was asked to undertake an investigation into approaches to the conservation of gilt leather wall hangings in the care of the National Trust. Funding for the project was provided by a grant from the Leathersellers' Company of the City of London.

Initially an examination was made of a representative range of wall hangings in the National Trust collections. These included the leather at Dunster Castle, Waddesdon Manor, Kingston Lacy and Oxburgh Hall. Particular attention was paid to evidence of past restoration and conservation treatments.

Visits were then made to sites where conservation work has been carried out on gilt leather hangings in the recent past. These included rooms and museum displays in Bruge and Zele in Belgium; Venice, Ariccia and Rome in italy; Offenbach, Moritzburg, Munster and Rheine in Germany; Arles in France; Amsterdam, Leiden and Apeldorn in Holland and Krakow and Torun in Poland. In addition, properties and museums in England not in the care of the National Trust were visited. These included the Victoria and Albert Museum and Hatfield House. Where possible, these visits were made with the conservators who actually carried out the treatments and I would like to express my thanks to all those who gave up their time and shared their experience and knowledge with us.

Topics examined included the physical, chemical and aesthetic criteria to be taken into account when examining and treating gilt leather; methods employed for removing previous repairs; cleaning, relaxation and consolidation treatments; repair methods; the desirability of and systems used for lining gilt leather; infill methods; the need for deacidification and chemical stabilisation procedures; remounting systems; and lubrication and surface coating methods.

The results of these investigations are to be gathered together in a report which will be published. As expected, it has not been possible to define any one "best method" for the repair and conservation of gilt leather wall hangings. It has, however, been possible to draw up a set of criteria which should be taken into consideration when approaching the problems associated with any given wall hanging and to discuss the methods made by different conservators to overcome these.

LA CONSERVATION DES TENTURES EN CUIR DORÉ: EXAMEN DE LA SITUATION SUR LE PLAN INTERNATIONAL

En 1995 Le National Trust a demandé au Leather Conservation Center d'entreprendre une enquête sur tout ce qui concerne la conservation des tentures en cuir doré qui sont sous la responsabilité du Trust. Ce projet a été subventionné par la Leathersellers' Company (guilde des négociants en cuir) de la Cité de Londres.

Dans un premier temps, une série représentative de tentures des collections du National Trust a été examinée. Elles incluaient celles de Dunster Castle, Waddesdon Manor, Kingston Lacy et Oxburgh Hall. L'attention a été particulièrement portée aux traitements antérieurs de restauration-conservation.

Des visites ont également été faites dans des centres où des travaux de conservation avaient été récemment réalisés. Il s'agit en particulier de salles ou d'expositions à Bruges et Zele en Belgique; Venise, Arriccia et Rome en Italie; Offenbach, Moritzburg, Munster et Rheine en Allemagne; Arles en France; Amsterdam, Leyde et Apeldorn en Hollande; Cracovie et Torun en Pologne. Des propriétés ou des musées en Angleterrre qui ne sont pas sous la responsabilité du National Trust ont elles aussi été visitées. Elles comprennent le Victoria & Albert Museum et Hartfield House. Dans la mesure du possible, ces visites ont été faites avec les restaurateurs en charge

des traitements, et je voudrais exprimer mes remerciements à tous ceux qui ont donné de leur temps et partagé leur expérience et leurs connaissances avec nous.

Les points considérés incluaient les caractéristiques physiques, chimiques et esthétiques qu'il faut prendre en compte quand on examine et traite le cuir doré; les méthodes employées pour éliminer des réparations antérieures; le nettoyage, la relaxation et les traitements de consolidation; les méthodes de réparation; l'avantage du doublage et les systèmes utilisés; les méthodes de comblage des lacunes; la nécessité de désacidifier et d'utiliser des procédés de stabilisation chimique; les systèmes de remontage; et les méthodes de lubrification et de traitement de surface.

Les résultats de ces recherches ont été rassemblés dans un rapport qui sera publié. Comme on pouvait s'y attendre, il n'a pas été possible de définir "la meilleure méthode" pour la réparation et la conservation du cuir doré de tentures. Il a été possible en revanche de dégager des critères qui devraient être pris en considération quand on approche les problèmes posés par la conservation d'une tenture murale, et de discuter les méthodes qui sont utilisées par les restaurateurs pour les surmonter.

Jan WOUTERS, Belgium

CONSERVATION OF GILT LEATHER IN BELGIUM

Antwerp, Brussels and Mechelen were famous centres of gilt leather production in the XVIIth and XVIIIth centuries. Many collections were inventoried. Most of them are not present anymore at the original location. The composition of these objects is complex. Specific problems arise from the combination of individual panels into large, heavy-weight wall-hangings.

At KIK/IRPA was established some time ago a group of people concerned with gilt leather conservation. This group can rely upon the analytical activities of the laboratory of KIK/IRPA and the experience in gilt leather conservation gained previously by DUODECIMO.

For each project is set up a program, to be executed in phases and involving the following items: detailed description after visual inspection of the actual condition at the present location; transport of the leather to the workshop; full chemical analysis of the leather, complemented eventually by paint layer and specific phenomena; analysis and selection of conservation materials (leather, facing, lubricant, consolidant); conservation treatment; transport of the leather to its location; report.

The general outline of the conservation process and typical problems occurring during analysis, materials selection and conservation will be illustrated with examples.

LA CONSERVATION DU CUIR DORÉ EN BELGIQUE

Anvers, Bruxelles et Malines étaient des centres réputés de production de cuir doré aux XVII^{ème} et XVIII^{ème} siècles. De nombreuses collections ont été inventoriées, mais la plupart ne se trouvent plus dans leur lieu d'origine. La composition de ces objets est complexe. Des problèmes spécifiques dus à l'assemblage de panneaux individuels en grands et lourds panneaux muraux apparaissent.

Un groupe de travail réunissant des personnes concernées par le cuir doré a été constitué il y a quelque temps au KIK/IRPA. Ce groupe peut s'appuyer sur les recherches analytiques menées au laboratoire du KIK/IRPA et sur l'expérience acquise par DUODECIMO en conservation du cuir doré.

Pour chaque projet, un programme qui doit être exécuté en plusieurs phases est mis en place et tient compte des points suivants: description détaillée après inspection visuelle de l'état présenté par la pièce sur son lieu actuel; transport du cuir à l'atelier; analyse chimique complète du cuir, éventuellement complétée par celle de la peintures et des phénomènes spécifiques; analyse et sélection des matériaux de conservation (cuir, bordure, lubrifiant, consolidant temporaire de surface); traitement de conservation; retour du cuir à son emplacement; rapport.

Les grandes lignes du procédé de conservation et les problèmes spécifiques survenant au cours de l'analyse, de la sélection des matériaux et de la conservation seront illustrés par des exemples.

Barbara MANGUM, Valentine TALLAND, Mei-An TSU, Dianne FULLICK, USA

THE CONSERVATION OF LEATHER WALLHANGINGS AT THE ISABELLA STEWART GARDNER MUSEUM

In 1997, The Isabella Stewart Gardner Museum initiated a two-year project to conserve gilt leather wallhangings which upholster the walls of its Veronese Room Gallery. This project is supported in part by a grant from the Institute for Museum and Library Services and by a generous private donor. The purpose of this paper will be to report to date on the investigation of the condition of the leather, its prior treatment, and proposals for its current treatment.

At different times in the 1950's through the 1970's the Museum's conservation staff attempted the conservation of all the hangings in the Veronese Room Gallery. In both cases, less than one-eighth of the room's panels were actually conserved. The projects were terminated for the following reason: one, in the absence of climate control, the hangings continued visibly to deform and degrade even after conservation treatment, and two, the magnitude of the project exceeded the capacity of the Museum's staff.

In 1987-89, in consultation with Conservation Scientist Dr. Nathan Stolow, the conservation staff designed a study to measure dimensional changes and weight gain/loss in response to changes in ambient humidity in the Museum. At the same time, Dr. Paul Whitmore and Eugene Farrell, Conservation Scientists, characterized a white efflorescence on the surface of some of the leather hangings as free fatty acids. In 1992, Dr. Eloy Koldeweij provided attributions for the leather wallhangings regarding period of manufacture and country of origin.

In 1995-96 the Museum completed the installation of climate control in all its galleries. Following the installation of climate control, the museum received funding for the treatment of its Veronese Room wall hangings. In 1996, the condition of the leather supports were investigated by Conservation Scientist Pieter Hallebeek who analyzed 18 samples from representative hangings to determine pH, sulphate and soluble nitrogen content, shrinkage temperature and soluble fat content.

In 1997, two additional staff conservators were hired exclusively for the Veronese Room Leather conservation project. Since that time, the conservators have carried out further investigation into the condition of the leather, analysis of the paint and binders, designs for cleaning, lining and reinstalling the hangings, and other studies.

LA CONSERVATION DE TENTURES MURALES EN CUIR AU MUSÉE ISABELLA STEWART GARDNER

En 1997, le musée Isabella Stewart Gardner initia un projet de deux ans destiné à conserver les tentures en cuir doré qui tapissent les murs de la « Veronese Room Gallery ». Ce projet est subventionné en partie par l'Institut « Museum and Library Services » et par un généreux donateur privé. Le but de cet article est de faire le point sur l'état du cuir, son traitement antérieur, et les propositions de traitement.

A plusieurs reprises, dans les années 50 jusqu'aux années 70, l'équipe de conservation entreprit la restauration de toutes les tentures de la « Veronese Room Gallery ». En fait, moins du huitième des panneaux de la pièce fut restauré. Les projets durent 'arrêter pour les raisons suivantes: d'une part l'absence de contrôle du climat, les tentures continuant visiblement à se déformer et se dégrader même après le traitement de conservation, d'autre part l'ampleur du projet, qui dépassait la capacité de l'équipe du musée.

En 1987-89, après consultation auprès du Dr Nathan Stolow, scientifique spécialiste en conservation, l'équipe de conservation conçut une étude pour mesurer les changements dimensionnels et les variations de poids en réponse aux variations de l'humidité environnante dans le musée. En même temps, d'autres scientifiques, le Dr Paul Whitmore et le Dr Eugene Farrell, caractérisaient une efflorescence blanche sur la surface de quelques-unes des tentures comme étant des acides gras libres. En 1992, le Dr Eloy Koldeweij attribuait aux tentures une période de fabrication et un pays d'origine.

En 1995-96, le musée achevait l'installation du contrôle du climat dans toutes ses galeries, et recevait des fonds pour le traitement des tentures murales de sa « Veronese Room ». En 1996, l'état de conservation des supports en cuir fut étudié par le scientifique spécialiste en conservation Pieter Hallebeek qui analysa 18 prélèvements représentatifs des tentures pour déterminer le pH, le contenu en sulfates et en azote solubles, la température de rétraction et le contenu en graisses.

En 1997, deux autres restaurateurs furent engagés pour travailler exclusivement sur le projet de conservation de

la « Veronese Room ». Depuis ce temps, les restaurateurs sont allés plus avant dans leurs recherches sur l'état du cuir, les analyses de la peinture et des liants, et autres études, ainsi que dans leurs projets de nettoyage, doublage et réinstallation des tentures.

Elizabeth ANTOINE, Nicole DELSAUX, Alain RENARD, France

THE HUNGARIAN-STYLE 'TARGES' OF THE NATIONAL MUSEUM OF THE MIDDLE AGES

The National Museum of the Middle Ages possesses an important collection of defensive arms: nine shields, pavises or " targes ", presenting complex conservation problems resulting from their structure. They have a support of either wood or cardboard. These are covered on two sides with polychromed leather, applied on a preparation that has fabric imbedded in it in some cases. These nine shields entered into the collections in the middle of the XIXth century, eight having been bought in 1854, at the sale of the arms of the Prussian collector General Eduard von Peucker. In 1993 a profound study of the collection was launched, still in its early stages, for the better understanding of the collection and for guidance in the restoration/conservation of these artefacts.

Our current stylistic and historical study of these shields leads us to think that two of them are very likely later than the medieval period. These later examples indicate their manufacture for symbolic and decorative use until the modern period. With their analysis, the later shields will provide rich information on the technical evolution of a centuries-old tradition.

Regarding the techniques for the fabrication of such shields, there is not much literature. Because of the use of complex materials (wood, leather, metal leaf, and pictorial paint layer) we have advised that further analyses be conducted before any interventive treatments are conducted. Two of the pieces presently being studied and restored will be presented at the meeting. The conservation work is carried out at the Service de Restauration des Musées de France.

An area of damage on one of the later " targes " (CL. 2384) reveals the substrate's internal stratigraphy of wood, leather or hide, and a foundation of vegetal fibres and mineral charge, underneath the preparatory layers and polychromy. This has inspired us to be interested in examining the entire collection to develop a comparative account of stratigraphy, accompanied by a series of analyses of materials. The leather (or a material resembling) is nearly always present in the assemblages that make up the " targes ", but its stratigraphic location varies in different cases.

The most ancient « targe » of the collection (Cl 2386) is also that which is in the most disturbing state of preservation. The problem presented is that of consolidation of a matte pictorial layer on a leather support. The leather itself is in a good state and displays a high quality finish. The paint layer is lifting overall: deep cracks, paint losses where either a red preparation or a white preparation are visible, cleavages between the various layers of polychromy. Having a core of cardboard covered with leather, this shield was decorated using a paint with a probably proteinaceous binder. The preparation, composed by an initial layer rich in iron oxide and clay and a second layer containing calcium carbonate, is thick. The polychromy, equally thick, includes such pigments as malachite, orpiment, lead white, and a copper-containing blue pigment. A varnish, now oxidized was applied to the surface. It was necessary to find a consolidant compatible with the leather, the red preparation, and the chipping pictorial layer, for readhering powdering matte paint and for consolidating areas of cleavage between paint layers.

LES TARGES À LA MANIÈRE HONGROISE DU MUSÉE NATIONAL DU MOYEN-ÂGE: DE LA PARADE AU DÉCOR ?

Le Musée National du Moyen Age possède une importante collection d'armes défensives: neuf targes et pavois présentant des problèmes complexes de conservation liés à leur composition: âme de bois ou de carton recouverte de cuir sur une ou deux faces, de toile et de polychromie. Les neuf pièces sont entrées dans les collections au milieu du XIX^{éme} siècle, huit d'entre elles ayant été achetées en 1854, à la suite de la vente à Bruxelles de la collection d'armes d'un amateur prussien, le général Eduard von Peucker. Depuis 1993, une étude approfondie de la collection a été lancée, visant à une meilleure connaissance de ces objets peu étudiés et à une restauration d'ensemble des pièces.

L'étude stylistique et historique en cours nous conduit à penser que deux de ces " targes " sont vraisemblablement postérieures à la période médiévale. Ces exemples attestent l'existence d'un usage symbolique et décoratif de ces objets qui semble s'être poursuivi jusqu'à l'époque moderne. L'analyse de ces pièces tardives sera donc riche d'enseignements sur l'évolution technique à l'intérieur d'une tradition séculaire.

Sur le plan technique, la littérature concernant les procédés de fabrication des targes est peu abondante. La complexité des matériaux mis en oeuvre (bois, cuir, feuille métallique, couche picturale) nous a amené à agir avec prudence et à multiplier les analyses avant toute intervention. Deux des pièces en cours d'étude et de restauration seront présentées à cette réunion. Les travaux de restauration sont effectués au Service des Restauration des Musés de France.

Un accident sur une des " targes " tardives (Cl. 2384) a permis d'en révéler la stratigraphie interne, associant le bois, le cuir ou la peau, les fibres végétales et le minéral sous la forme des couches de préparation et de polychromie. Il nous a donc paru intéressant d'examiner l'ensemble de la collection pour développer une stratigraphie comparée, accompagnée d'une série d'analyses d'identification des matériaux. Le cuir (ou un matériau s'en approchant) est pratiquement toujours présent dans les montages qui constituent les targes, mais de manière hétérogène dans ses localisations structurelles et stratigraphiques ainsi que dans ses aspects de surface.

La targe la plus ancienne de la collection (Cl. 2386) est aussi celle qui présentait l'état de conservation le plus inquiétant. Le problème était celui du refixage d'une couche picturale mate sur un support cuir. Le cuir lui-même est en bon état et présente des finitions de grande qualité. La couche picturale présente un état de soulèvement généralisé: craquelures profondes, soulèvements laissant apparaître par endroits la préparation rouge ou la préparation blanche, clivages entre les diverses couches de la polychromie. Constituée d'une âme en carton recouverte de cuir, cette targe est décorée d'une polychromie dont le médium est très probablement protéinique. La préparation, composée d'une première couche riche en oxyde de fer et argile et d'une deuxième couche de carbonate de calcium, est épaisse. La polychromie, épaisse également, comporte des pigments tels que la malachite, l'orpiment, le blanc de plomb et un bleu au cuivre. Un vernis oxydé a été posé en surface. Il était nécessaire de trouver des produits de refixage compatibles avec le cuir et la préparation rouge et permettant de consolider les écailles de la couche picturale, refixer les pulvérulences et les clivages entre les différentes couches de polychromie.

Mara NIMMO, Mariabianca PARIS, Lydia RISSOTTO, Italy

TENSIONING GILDED AND PAINTED LEATHER. PART 2A: FIRST VERIFICATION OF SUPPORTING STRUCTURES WITH ELASTIC TENSIONING

The study continues on controlled tensioning of antique gilded and painted leather artefacts in the context of the joint research project of the 'Leather' Section of the ICR and the Department of Mechanics and Aeronautics (DMA) of Rome University - 'La Sapienza'.

An automatic monitoring system was applied to the two experimental structures for elastic tensioning (produced in the preceding phase of the project) on which two eighteenth-century gilded leather altar frontals were mounted (see paper given at the ICOM-CC Edinburgh conference, 1996). The measuring system was set up for continuous recording of the thermohygrometric parameters of the environment and the dimensional characteristics of the leather when undergoing variations in RH and T.

The measurements, which were taken for a year, will make it possible to evaluate the two supporting structures in terms of their efficacy in compensating for dimensional variations in the two altar frontals, as well as to collect data of interest on the mechanical behaviour of antique decorated leather.

LA TENSION DU CUIR DORÉ ET PEINT. PARTIE 2A: PREMIÈRE VÉRIFICATION DES STRUCTURES DE SUPPORT SOUS TENSION ÉLASTIQUE

L'étude sur le contrôle de la tension appliquée à des objets anciens en cuir doré et peint, menée dans le contexte du projet de recherche commun à la section "cuir" de l'ICR et au Département de Mécanique et Aéoronautique (DMA) de l'Université "La Sapienza" de Rome, a été poursuivie.

Un système de contrôle automatique a été installé sur deux structures expérimentales destinées à produire une tension élastique (préparées dans la phase précédente du projet) et sur lesquelles deux devants d'autel en cuir doré du XVIII^{éme} siècle avaient été montés (voir la communication présentée à la conférence de l'ICOM-CC à Édimbourg en 1996). Le système de mesure a été prévu pour un enregistrement en continu des paramètres thermohygrométriques de l'environnement et des caractéristiques dimensionnelles du cuir quand il subit des variations en température et HR.

Les mesures, qui ont été relevées pendant un an, permettront d'évaluer l'efficacité des deux structures de support à compenser les variations dimensionnelles des deux devants d'autel, ainsi que de collecter des données

importantes sur le comportement mécanique du cuir ancien décoré.

Roman KOZLOWSKI, Jaroslaw ADAMOWICZ, Poland

FLATTENING *IN SITU* THE GILT LEATHER WALL HANGINGS

The present paper describes investigations and treatment of gilt leather wall hangings in several room of Wawel Castle in Cracow, Poland. Due to the unfavourable microclimatic conditions in the rooms, the gilt leather has become curled and bulged. In many places the forces resulting from a periodic shrinkage of the leather have led to its detachment from the walls. Their flattening was then an important step during the conservation both for aesthetic reasons and to enable further repairs to take place. The problems encountered were especially difficult because of an untypical mounting system adopted in 1930, when the decorations were placed on the walls. Wooden frames were fixed to the walls onto which stretched flax canvas was nailed. The leather panels were glued to the canvas forming a multi layer « sandwich », canvas-glue-leather, of considerable dimensions.

From the very beginning it has been decided to carry out the treatment *in situ* on the walls without removing the leather from the canvas support. In this way minimum intervention into the present state and arrangement of the hangings could be assured. Humidification by water vapour has been chosen to relax the hangings. The humidification treatment was preceded with investigations and tests. Water vapour sorption isotherms were recorded gravimetrically for the relative humidity range 0-95 % with the use of a vacuum microbalance. They revealed that when the relative humidity is increased to 90 %, the moisture content in the leather reaches as much as 20-30 %. In this state the leather swells, becomes relaxed and supple. The same measurements have shown that the optimum moisture content in leather of between 10-16 % is attained for the relative humidity range between 55-70 %. Hence 60 % relative humidity in the environment should ensure optimum conditions for the long term preservation of the gilt leather.

A simple system has been developed for controlled humidification of the gilt leather. First a layer of Hydrotex, a waterproof textile impermeable to liquid water but permeable to water vapour, was laid on the entire wall covered with leather. Next a layer of felt soaked with water was placed as a source of the water vapour. The Hydrotex-moistened felt sandwich was then covered with a polyethylene foil creating thus a kind of humidification « tent ». Air parameters changes were monitored inside the humidification « tent » during the preliminary test treatments. The relative humidity-temperature sensors were placed both on the external surface of the leather where water vapour is supplied through Hydrotex and behind the canvas to monitor when the moisture would migrate to the rear side of the canvas support. It has been determined that about 48 h is necessary until a saturation process of the hanging was completed. This is thus the shortest possible time ensuring a uniform distribution of moisture across the leather-canvas sandwich and hence a uniform flexibility of the system. A visual assessment of the leather during the initial tests has not revealed any darkening of the leather nor appearance of stains as a result of the solubilisation of substances contained in the leather.

The full scale humidification and reshaping treatments took then place. Where the canvas has become detached from the wooden frames the edges had to be repaired. The gilt leather was gently detached from the torn and weakened canvas edges which were then cut away. A much wider new strip of flax canvas was sewn in with the use of a portable sewing machine. A certain excess of the canvas facilitated the stretching and served to produce a triple fold strengthening of the edges. When all edges were repaired, the entire wall was humidified by hanging Hydrotex, moistened felt and polyethylene foil. After the desired humidification had been attained, the wall hanging was re-tensioned and the canvas was nailed to the frame. To avoid damages of the edges in the future, the nails were fixed in the frame through a strip of leather. Finally the detached edges of the leather were glued back to the canvas with the use of the starch glue. Then gradual drying took place.

The described humidification and reshaping treatment worked very well in all cases, though the leathers in different rooms differed in their properties and state of preservation. The most important practical observation is that gilt leather wall hangings must be exposed to high relative humidity levels of about 90 % for at least 48 h to get a marked effect on their flexibility. Hence the humidification should be preferably started during periods when the inflow of humid air has increased the relative humidity in leather environment, the humidification will then only add a little extra moisture to the object already moistened.

APLANISSEMENT *IN SITU* DU CUIR DORÉ DE TENTURES MURALES

Cet article décrit les recherches et les traitements entrepris sur des tentures en cuir doré de plusieurs salles du château Wawel de Cracovie en Pologne. Du fait de conditions climatiques très défavorables dans les salles, le cuir s'est déformé. En beaucoup d'endroits, les forces qui résultaient des rétractions périodiques du cuir ont

provoqué son détachement du mur. Leur aplanissement est devenu une étape importante de la conservation, à la fois pour des raisons esthétiques et pour rendre possibles des réparations ultérieures. Les problèmes rencontrés étaient particulièrement difficiles à résoudre à cause du système de montage atypique adopté en 1930, quand les décors furent placés sur les murs. Les panneaux de cuir avaient été cloués sur des toiles de lin, elles-mêmes clouées sur des cadres en bois fixés au mur. L'ensemble formait un "sandwich" multi-couche, toile-colle-cuir, de dimension considérable.

Il a été décidé dès le début d'effectuer le traitement *in situ* sur les murs sans déposer le cuir de son support en toile, ce qui permettait d'intervenir le moins possible sur les tentures. L'humidification par vapeur d'eau a été choisie pour la relaxation, ce traitement ayant été précédé de tests. Les isothermes de sorption de vapeur d'eau ont été établies par gravimétrie avec une microbalance sous vide, en travaillant entre 0 et 95% d'HR. Elles ont révélé qu'en augmentant l'humidité relative jusqu'à 90%, le contenu en eau du cuir atteint 20 à 30%. Dans cet état, le cuir gonfle, se détend et devient souple. Ces mêmes mesures ont montré que la teneur optimale en humidité de 10-16% du cuir est atteinte pour une humidité relative de 55-70%. Donc 60% devraient assurer les conditions optimales pour une conservation à long terme.

Un système simple a été développé pour contrôler l'humidification du cuir. Une couche d'Hydrotex, textile imperméable à l'eau mais perméable à la vapeur d'eau, a d'abord été étendue sur la totalité du mur couvert par le cuir. Puis une couche de feutre imbibé d'eau, servant de source de vapeur, a été installée. Pour finir le sandwich Hydrotex-feutre humide a été recouvert d'une feuille de polyéthylène, créant ainsi une "tente" d'humidification. Les changements des paramètres thermohygrométriques dans la "tente" d'humidification ont été suivis durant les tests préliminaires de traitement. Des capteurs HR-T ont été placés à la fois sur la surface externe du cuir, là où la vapeur d'eau est fournie à travers l'Hydrotex, et derrière la toile, afin d'enregistrer le moment où l'humidité atteindrait l'arrière du support en toile. On a pu déterminer qu'il fallait 48 heures environ pour que le processus de saturation soit terminé. Ceci représente le temps minimum requis pour assurer une distribution d'humidité à travers le sandwich cuir-toile et par là une flexibilité uniforme du système. L'observation visuelle du cuir durant les tests initiaux n'a révélé aucun assombrissement du cuir ni l'apparition de taches qui auraient pu résulter de la solubilisation de substances contenues dans le cuir.

On a pu alors entreprendre la série complète des traitements d'humidification et de remise en forme. Là où la toile s'était détachée des cadres en bois, les bords devaient être réparés. Le cuir doré a été détaché avec précaution des bords déchirés et affaiblis de la toile, qui devaient être coupés et éliminés. Une bande beaucoup plus large de toile de lin neuve a été cousue avec une machine portable. Un surplus de toile a facilité la tension et a servi à produire un triple renforcement des bords. Quand tous les bords ont été réparés, le mur entier a été humidifié en suspendant le montage Hydrotex, feutre mouillé, feuille de polyéthylène. Après l'obtension de l'humidification désirée, la tenture murale a été retendue, et la toile clouée sur le cadre. Pour éviter de futurs dommages des bords, les clous ont été fixés sur le cadre à travers une bande de cuir. Enfin les bords qui avaient été détachés du cuir ont été remontés avec de la colle d'amidon. Puis le séchage graduel a pu avoir lieu.

Le traitement d'humidification et de remise en forme décrit ici a bien fonctionné dans tous les cas, malgré la diversité des propriétés et de l'état de conservation des cuirs des différentes salles. L'observation pratique la plus importante est que le cuir doré de tentures murales a pu être exposé à des taux d'humidité relative élevés, d'environ 90%, pendant au moins 48 heures, pour obtenir un effet marqué sur leur flexibilité. Cependant, un tel traitement d'humidification devrait plutôt être entrepris à des périodes où l'humidité environnante est élevée, ce qui augmente celle du cuir, car le traitement ajoute alors peu d'eau en excès à un objet déjà humidifié.

Andreas SCHULZE, Germany

THE APPLICATION OF THE "LOW PRESSURE" TECHNOLOGY IN THE CONSERVATION OF GILT LEATHER WALLHANGINGS *IN SITU* - A REPORT ABOUT OUR EXPERIENCES

Besides the very extensive conservation and restoration measures on the leather tapestries of the so-called 'Damenbildniszimmer' of the castle Moritzburg near Dresden it is also necessary to maintain continually the gilt leather wallhangings in the numerous rooms of the castle. A lot of smaller damages (holes, tears, losses bindings) are caused by the visitors especially around the doors. Self evident it would be unacceptable to remove the tapestries for such repairs. Because of an interspace between the surface of the wall and the leather it is impossible to use any pressure from the front to refill holes or to close tears.

The gratifying results using Low-Pressure-Tables for the conservation and restoration of the removed gilt leather wallhangings suggested a modification of this technology for the work *in situ*. For that reason we developed a very simple device. Working from the front it allows to glue leather-patches with parchment glue behind holes or

tears and to fix loosed bindings between the panels on each place of a wallhanging. The adhesion is then obtained with the low-pressure box, still working from the front. Compared with the results of the treatments on traditional suction tables the refillings in situ have nearly the same stability, flexibility and durability. Another implement was briefly created by one of our colleagues, Mrs Dipl.-Rest. Elvira Kless, for the conservation of objects with the necessity of more extensive treatments. The suction device is working in the interspace behind the tapestries, so it is necessary here to loosen the bottom of the wallhangings from the frames. Till now this apparatus was used very successfully on painted canvas-wallhangings in the so-called 'Fasanenschloßchen' near Moritzburg-castle.

L'APPLICATION DE LA TECHNIQUE "FAIBLE PRESSION" À LA RESTAURATION IN SITU DE TENTURES EN CUIR DORÉ - UN RAPPORT SUR NOS EXPÉRIENCES

Des mesures importantes ont été prises pour la conservation-restauration des tapisseries en cuir de la « Damenbildniszimmer» (chambre du portrait des dames) du château de Moritzburg près de Dresde, mais il a été nécessaire également d'entretenir de façon continue les tentures en cuir doré des nombreuses pièces du château. De nombreuses petites détériorations (trous, déchirures, fixations détachées) sont causées par les visiteurs, et particulièrement autour des portes. Bien évidemment il serait inacceptable de déposer les tentures pour de telles réparations. À cause de l'espace qui existe entre la surface du mur et le cuir, il est impossible d'appliquer une pression sur les tentures pour combler les lacunes et réparer les déchirures.

Les résultats satisfaisants obtenus en utilisant une table à faible pression lors de la restauration du cuir doré après dépose nous ont suggéré de modifier cette technique afin de l'adapter à un travail *in situ*. Nous avons donc développé une installation très simple qui permet, en travaillant par l'avant, de coller des pièces de cuir à l'aide de colle de parchemin derrière les trous ou les déchirures, et des fixations lâches entre les panneaux, l'adhésion étant obtenue avec l'appareil à succion, toujours depuis la surface. Comparés aux résultats des traitements sur table à succion traditionnelle, les comblages in situ ont presque la même stabilité, la même flexibilité et la même durabilité. Un autre équipement a été mis au point par l'une de nos collègues, la restauratrice diplômée Elvira Kless, pour la restauration d'objets qui nécessitent des traitements plus étendus. L'appareil à succion travaille dans l'espace qui se trouve derrière la tenture, de sorte qu'il est nécessaire dans ce cas de détendre le fond de la tenture de son cadre. Jusqu'à présent cet appareil a été utilisé avec beaucoup de succès sur les tentures peintes de la "fasanenschloßchen" (petit château aux faisans) près du château de Moritzburg.

Ulf LEIJON, Sweden

GILT LEATHER EXPOSED TO UNHEATED CONDITIONS INDOORS AT SKOKLOSTER CASTLE, SWEDEN

No abstracts available

Tony MITCHELL, United-Kingdom

THE GILT LEATHER WALLHANGING AT DYRHAM PARK

No abstracts available, but the full paper s published.

Henk VAN SOEST, The Netherlands

RESTORATION AND CONSERVATION OF THE GILDED LEATHER OF THE MUSEUM PLANTIN-MORETUS IN ANTWERP.

In 1975 the curator of the museum commissioned the Partnership for Restoration and Conservation of Gilded Leather to restore and conserve the gilded leather as found in the museum's acquisitions. Starting with the Justus Lipsius Room, the Office, the Bedroom, the Adjacent Room, the Rubens Hall, the Archives and the Salon, in the course of about two decades, all the gilded leather had been duly and properly taken care of. The methods and techniques used for the completion of this project were based on the research and findings of the working group on leather conservation of the former 'Central Research Laboratory for Objects of Art and Science' in Amsterdam.

This unique working group was established in 1969 and consisted of several conservation scientists, an art historian and a conservator (the author himself). In turn, the Partnership for Restoration and Conservation of

Gilded Leather was founded in 1973 in The Hague (Kazernestraat 88a, 2514 CW, the Netherlands) and is being run from the start until now, by Mrs. P. van Soest-Hendriks and Mrs. W.S. Janse.

RESTAURATION ET CONSERVATION DU CUIR DORÉ DU MUSÉE PLANTIN-MORETUS À ANVERS

En 1975, le conservateur du musée demanda à l' "Association pour la restauration et la conservation du cuir doré" de prendre en charge le cuir doré acquis par le musée. Ainsi, durant une période d'une vingtaine d'années, en commençant par la salle Julius Lipsius, puis le bureau, la chambre-à-coucher, la chambre adjacente, le hall Rubens, les archives et le salon, tout le cuir doré a été traité. Les méthodes et les techniques utilisées pour réaliser ce projet étaient basées sur les recherches menées par le groupe de travail sur la conservation du cuir de l'ancien "Laboratoire central de recherches sur les objets d'art" d'Amsterdam.

Ce groupe de travail unique établi en 1969 était composé de plusieurs scientifiques spécialistes en conservation, d'un historien d'art et d'un restaurateur (l'auteur lui-même). Quant à l' "Association pour la restauration et la conservation du cuir doré", elle a été fondée en 1973 à La Haye (Kasernstraat 88a, 2514 CW, The Netherlands), et elle est dirigée depuis le début par Mesdames P. van Soest-Hendricks et W.S. Janse.

Jutta GÖPFRICH, Germany

PREVIOUS RESTORATION - IDEAS FOR THE REDUCTION OF THE OVER OILING OF XVIIIth CENTURY GILT LEATHER TAPESTRY

Due to previous restoration with neatsfoot oil and wax, considerable damage has been done to the decorative layer and the leather. In 1974, 10 years after the last restorations, restorers of the Rheinisches Denkmalamtes discovered the same damage to gilt leather tapestry in three castles in the Rhein area. Considerable swelling was caused through the soaking of the ‘dressing’ neatsfoot oil starting from the leather side, through to the paint layer. A total softening, an intense stickiness, and a beadlike discharge of the separated paint layer and varnish was the result. In the past, several exemplary scientific tests have been done, although no continuing restoration has followed. As a result, the castle owner had asked the German Leather/Shoe Museum for advice in June of 1993.

The aim of our conservation was to find a way to reduce the neatsfoot oil and wax without damaging the original. Methods to protect the paint layer were to be worked out as well. Through the teamwork of painting, textile and leather restorers and chemists, a more precise idea of the current condition and causes of the damage could be assessed. The analysis covers to the following areas:

- identification of paint layer composition, the bonding agent, the neatsfoot oil and the wax with scientific methods.
- visual and chemical tests of the damaged paint layer and leather, for example the penetration, distribution and concentration of the neatsfoot oil in the gilt leather.
- climatic situation.

The neatsfoot oil, which totally soaked the paint layer, now acts as a permanent softening agent. Contrary to all expectations, it was proven that a drying process in the paint layer had occurred. On the basis of these tests, several experiments have been carried through on a section of tapestry, in order to try to reduce its oil and wax content with different solvent pastes on the suction table. In addition, the compatibility of various solvent mixtures with the gilt leather was examined. A success was achieved with several of the solvent pastes, but the thick wax layer on the flesh side of the leather handicapped the even reduction of the leather’s oil content. The wax was removed with a scalpel, and the section of the tapestry was sewn back into the ensemble. Continued observations need to be made in order to see the final results and also to clear up any further questions. It remains to be seen if our predictions, for example that the treatment accelerates the drying process of the paint layer, are confirmed.

ESSAIS PRÉALABLES POUR RÉDUIRE LE SURGRAISSAGE D'UNE TENTURE EN CUIR DORÉ DU XVIII^{ème}SIÈCLE

Des dommages considérables ont été causés à la couche décorative [de cette tapisserie] ainsi qu'au cuir lui-même par des traitements antérieurs avec de l'huile de pied-de-boeuf et de la cire. En 1974, 10 ans après les dernières restaurations, les restaurateurs de la Rheinisches Denkmalamtes ont découvert les mêmes dégradations sur des cuirs dorés dans trois châteaux de la région du Rhin. La migration de l'huile de pied-de -boeuf à travers le cuir jusqu'à la couche peinte avait causé un gonflement important. Il en résultait un ramollissement complet du matériau, un toucher extrêmement collant, et la séparation de la couche de peinture et de son vernis, avec formation de gouttelettes. Plusieurs tests scientifiques ont été réalisés mais qui n'ont été suivis d'aucun traitement

de restauration continu. En conséquence, le propriétaire du château [où se trouve la tapisserie] a demandé conseil au musée allemand du cuir et de la chaussure en juin 1993.

Notre but était de trouver un moyen de réduire le contenu en huile de pied-de-boeuf et en cire sans endommager l'objet. Des méthodes destinées à protéger la couche picturale devaient également été développées. Une équipe de travail réunissant des restaurateurs de peinture, de textile et de cuir, ainsi que des chimistes, a pu déterminer de façon plus précise l'état de détérioration et les causes du dommage. Les analyses ont couvert les points suivants:

- identification de la couche picturale, du liant, de l'huile de pied-de-boeuf et de la cire par des méthodes scientifiques
- tests visuels et chimiques pour évaluer la dégradation de la couche picturale et du cuir, comme par exemple la pénétration, la distribution et la concentration de l'huile de pied-de-boeuf dans le cuir -
- situation climatique

L'huile de pied-de-boeuf, qui a complètement détrempé le cuir, agit maintenant comme un agent permanent d'assouplissement. On a pu montrer qu'un processus de séchage s'était produit dans la couche de peinture, ce qui était contraire à toute attente. Sur la base des tests réalisés, des expériences ont été entreprises sur un prélèvement de la tapisserie pour réduire le contenu en huile et en cire en utilisant différents solvants sur table aspirante. La compatibilité des différents mélanges de solvants avec le cuir doré a également été examinée. Un certain succès a été obtenu avec plusieurs des solvants, mais la couche épaisse de cire sur le côté chair du cuir s'opposait à une réduction homogène du contenu en huile. La cire fut retirée avec un scalpel, et le prélèvement testé recousu sur la tapisserie. Des observations continues doivent être faites pour connaître le résultat final et aussi éclaircir certaines questions qui peuvent se poser ultérieurement. Il reste à voir si nos prédictions se confirment, notamment le fait que le traitement accélère le processus de séchage de la couche picturale.

References.

This paper has been published elsewhere. See:

Mara Nimma, Mariabianca Paris, Lidia Rissotto. Tensioning gilded and painted leather. Part 2: First verification of suppoting structures with elastic tensioning, in Preprints of the ICOM-CC Triennial Meeting, Lyon, 29 August-3 September, 1999, vol.II, 697-701.

Laura CHIOTASSO, Costantino SARNELLI, **Italy**

CONSERVATION OF A LEATHER ANTEPENDIUM

During the consolidation treatments on masonry of the Santa Cristina church in Caristo, a village about thirty miles from Novara, a leather fragment of exquisite workmanship was found by A. Caione in 1989. It was concealed under the cyborium as a mystical protection of the high altar stone. The fragment was the central part of an antependium ordered by bishop Bascapè on the occasion of his pastoral visitation occurred at the beginning of the XVIIth century. The grain side of the leather is adorned with carved and gilded rhomboidal motifs which are a sort of hieratic background to a seraphic Madonna with Christ-child in a style peculiar to the late Mannerism.

In the past someone nailed up the leather fragment, as a canvas, on a wooden frame (approximately 37x47 cm) smaller than the fragment. The lower side of the leather was brutally folded and the presence of nails had caused rust to form. This arrangement was probably an alteration of the XIX-XXth century.

The overall condition of leather when it was received was poor. There were still present some ductility and resilience while there was a total absence of flexibility. A dry environment caused probably the grain detachment and with it the fall of parts of gold and pigments. A large tear started from the upper right area and it stopped in the left lower side avoiding fortunately Madonna's picture. *Lacunae* of medium size were present along the edges and some of them were the result of old pest attack.

Prior to any treatments was the removal of previous alterations or restorations i.e. the wooden frame and two sort of leather patches stuck on the flesh side.

The grain side of the fragment was cleaned of loose dust and ingrained dirt using pads of OZ (latex rubber). The depressions in the leather or the carved motifs which were hard to reach and the more fragile areas were cleaned by Archival Aids dry cleaning powder. Gentle brushing was used to assist cleaning and then most of the dirt was removed with a protected micro vacuum cleaner nozzle. On the flesh side only a squirrel's hair brush (*vaio*) was

used.

An emulsion of sorbitol, Lipoderm N, Lipoderm SA and distilled water was used to soften the leather. Colours and gold were not affected by this fat emulsion. After reshaping, areas of the flesh side with powdery sections were consolidated with applications of 10 % Paraloid B72 (diluted in acetone) while the delaminating sections were reattached with 50 % Paraloid.

To avoid any attempts of mechanical traction caused by the strong deformation, the leather fragment was lined on the flesh side with a gauze of polyester which was bonded with a PVA emulsion (DMC2). The gauze of polyester showed a good resistance to mechanical tractions with a minimum thickness.

After the necessary chromatic integrations the leather was fixed onto a wooden board lined with Melinex then covered by new leather in accordance with the requirements of the exhibition and the works director.

Acknowledgements

The authors would like to thank Dr. P. Venturoli, inspector of SS.BB.AA. of Piemonte who assisted them as works director. We would also like to thank A. Caione, Santa Cristina historian and Don Luciano Lilla, parish priest of the Santa Cristina church for suggestions and helpful discussions. Chromatic integrations were realized by T. Carbonati, Dormelletto (NO). This paper is dedicated to the memory of A. Caione.

CONSERVATION D'UN DEVANT D'AUTEL EN CUIR

Durant les travaux de consolidation de la maçonnerie de l'église Santa Cristina à Caristo, un village à environ 50 km de Novara, un fragment de cuir finement travaillé a été trouvé par A. Caione en 1989. Il était caché sous le cyborium, en guise de protection mystique pour la pierre du maître-autel. Le fragment était la partie centrale d'un antependium commandé par l'évêque Bascapè à l'occasion de sa visite pastorale au début du XVII^{éme} siècle. Le côté fleur du cuir est décoré de motifs rhomboïdes gravés et dorés formant une sorte de fond hiératique à une Vierge à l'Enfant dans le style particulier du maniérisme tardif.

Dans le passé le fragment de cuir avait été cloué comme une toile sur un cadre en bois (d'environ 37x47 cm), plus petit que le fragment. Le bord inférieur du cuir avait été plié sans précaution, et la présence des clous a entraîné la formation de rouille. Ce montage est certainement une transformation datant du XIX^{éme}- XX^{éme} siècle.

À la réception, le cuir était en très mauvais état. Il possédait encore une certaine malléabilité et une certaine élasticité, mais il manquait totalement de flexibilité. Le détachement de la fleur et avec elle d'une partie de la dorure et des pigments avait probablement été provoqué par un environnement trop sec. Un large déchirure s'étendait depuis la partie supérieure droite jusqu'à la partie inférieure gauche, évitant par chance le portrait de la Madone. Des lacunes de taille moyenne étaient présentes le long des bords, quelques-unes provenant d'attaques anciennes d'insectes.

Avant tout traitement, il fallait retirer les transformations et restaurations antérieures, c'est-à-dire le cadre en bois et deux pièces de cuir collées sur le côté chair.

Le côté fleur du fragment a été nettoyé de sa poussière, en utilisant des gommes de latex (OZ) pour les saletés incrustées. Les dépressions dans le cuir ou les motifs gravés difficiles à atteindre, et les parties plus fragiles, ont été nettoyés à sec avec de la poudre "Archival Aids". Un léger brossage, pour aider au nettoyage, a été suivi d'une micro-aspiration avec embout protégé, qui a éliminé presque toute la poussière. Sur le côté chair du cuir, on a seulement utilisé une brosse en poil d'écureuil (*vaio*).

L'assouplissement du cuir a été obtenu avec une émulsion de sorbitol, Lipoderm N, Lipoderm SA, eau distillée. Les couleurs et l'or ne sont pas affectés par cette émulsion grasse. Après remise en forme, les parties pulvérulentes de la couche chair ont été consolidées par application de Paraloid B72 à 10% (dans l'acétone), tandis que les parties délaminées étaient refixées avec du Paraloid à 50%.

Pour éviter toute possibilté de traction mécanique due à la forte déformation, le fragment de cuir a été doublé sur le côté chair d'un voile de polyester fixé avec une émulsion de PVA (DMC 2). Le voile de polyester est suffisamment résistant, tout en ayant une épaisseur faible.

Après les nécessaires réintégrations chromatiques, le cuir a été fixé sur un panneau de bois doublé de Melinex puis recouvert de cuir neuf, pour répondre aux exigences des expositions et à celles du directeur de travaux.

Remerciements

Les auteurs voudraient remercier le Dr P. Venturoli, inspecteur de SS.BB.AA. du Piémont, qui les a assistés en tant que directeur de travaux. Nous voudrions également remercier A. Caione, historien de Santa Cristina et Don Luciano Lilla, prêtre de l'église Santa Cristina, pour leurs suggestions, et discussions utiles. Les réintégrations chromatiques ont été réalisées par T. Carbonati, de Dormelleto (NO). Cet article est dédié à la mémoire de A. Caione.

Theo STURGE, Ian BEAUMONT, United-Kingdom

THE CALLENDAR HOUSE LEATHER, CONSERVATION, RESTORATION OR WHAT ?

Callendar House in Falkirk, Scotland had been left derelict for several years before it was decided to carry out extensive restoration of the whole house. One room had 18 panels of late XIXth century gilt leather. The leather was moulded, and the design was highlighted with a translucent red pigment applied to the background. The finish of the yellow varnish over the silver had been distressed during manufacture to give an aged effect. This appears to have been carried out with a water soluble medium (size ?) and dark pigment applied with a course brush in diagonal strokes. The red background was painted over this. The leather was mounted on large timber panels which then fitted into frames around the walls. The building had been insecure, and the leather had been heavily vandalised with less than half remaining. The best pieces were reputed to have been used in people's houses around the town. The room was to be used for functions and a high level of finish was required. In consultation with the client, it was decided that there was just enough usable leather to make up seven panels along one wall and that the rest would be replaced with new gilt leather made using traditional methods. This paper examines the methods used during the conservation of the original leather.

The leather varied widely in its condition so a variety of treatments had to be used. The leather had to be flattened before it could be worked on. Areas of leather that were detached from the boards were humidified in a chamber using an ultrasonic humidifier. They were then dried and flattened on a low pressure table. Leather that could not be removed from the boards was humidified using Gor-tex and damp blotting paper. Cleaning methods included Wishab sponges, saliva, alcohols and ammonia. Much of the leather had been attached to the boards in the past using a water soluble adhesive. Only some was strong enough to be removed. Some pieces of leather were treated on their boards while others were detached and treated separately. Where the leather could not be fully removed, but areas needed support, these were backed with Reemay, a non-woven polyester fabric, attached with an acrylic emulsion mix, Lascaux 498HV and 360HV in a 3:1 ratio. Where the panels were built up from leather taken from a variety of panels and assembled away from the board, they were mounted onto polyester sail cloth with acrylic emulsions, the actual bond being made using solvent activation. One of the panels on the wall where the leather was to be retained was exchanged for a panel in better condition from another wall.

Damaged areas were replaced either with spare leather from other panels or with replica pieces moulded from BEVA 371 to which pigment had been added. This mixture was allowed to dry out to give a solid material. This was cast, using heat, into silicone rubber moulds made on the surface of the original leather, cut to fit, and painted to match. Smaller areas of damage were filled with BEVA applied directly with a heated spatula.

Inpainting was carried out with Winsor and Newton water colours and silver pan. Because much of the leather had been repositioned, some toning in of parts of the original leather surface had to be carried out to give an acceptable overall visual appearance. This was mainly required where leather was taken from narrow panels and used for wider ones. Here, the edges had been covered and were still very bright and had to be toned to match the surrounding areas. The finished leather was given a very thin coat of Paraloid B67 in white spirit, applied with a brush.

The replacement leather for the other eleven panels was made in Poland.

THE CALLENDAR HOUSE LEATHER, CONSERVATION, RESTAURATION, OÙ ENCORE?

Callendar House à Falkirk en Ecosse avait été laissée à l'abandon plusieurs années avant qu'il ne soit décidé de procéder à la restauration de la maison entière. Dans l'une des pièces se trouvent 18 panneaux de cuir doré de la fin du XIX^{ème} siècle. Le cuir avait été moulé et le dessin renforcé à l'aide d'un pigment rouge translucide appliqué sur le fond. Le vernis jaune posé sur la couche d'argent avait été travaillé [distressed] pendant la fabrication pour donner un effet vieilli. Il semblerait que cela ait été fait à l'aide d'un medium soluble dans l'eau

(colle ?) et de pigment foncé appliqué avec une brosse par des mouvements en diagonale. Le rouge du fond avait été peint par dessus. Le cuir avait été monté sur de grand panneaux de bois encadrés et fixés sur les murs. Les bâtiments n'étant pas gardés, le cuir a été lourdement dégradé par vandalisme, et il en reste moins que la moitié. On suppose que les plus beaux fragments ont été utilisés dans diverses maisons des environs. La pièce contenant les 18 panneaux devant être remise en fonction, un travail d'un haut niveau était requis. En accord avec le client, il a été décidé qu'il y avait juste assez de cuir pour refaire sept panneaux sur un seul mur, et que le reste serait remplacé par du cuir doré neuf, mais préparé selon des méthodes traditionnelles. Cet article présente les méthodes utilisées pour la conservation du cuir d'origine.

L'état de conservation du cuir était très variable, et différents traitements devaient donc être mis en oeuvre. Il fallait tout d'abord aplanir le cuir avant que tout travail n'y soit effectué. Les parties du cuir qui étaient détachées des panneaux ont été humidifiées dans une chambre à humidification ultrasonique. Elles ont ensuite été séchées et aplanies sur une table à faible succion. Le cuir qui ne pouvait être déposé des panneaux a été humidifié à l'aide de Goretex et de papier-buvard mouillé. Les méthodes de nettoyage incluaient l'usage d'éponges Wishab, de salive, d'alcool et d'amoniaque. Une grande partie du cuir avait été fixée dans le passé sur les panneaux à l'aide d'un adhésif soluble dans l'eau. Seule une petite partie était suffisamment résistante pour être déposée. Quelques pièces de cuir furent traitées sur leurs panneaux, tandis que d'autres étaient détachées et traitées séparément. Quand le cuir ne pouvait pas être déposé entièrement, mais que des parties nécessitaient un renforcement, celles-ci ont été doublées avec un non tissé en polyester, le Reemay, fixé avec un mélange d'émulsions acryliques, 498 HV et 360 HV de Lascaux dans la proportion de 3:1. Quant aux panneaux reconstruits à partir du cuir d'origine provenant d'une variété de panneaux assemblés, ils furent montés sur une voile de bateau en polyester avec des émulsions acryliques, le joint étant obtenu à l'aide d'activation de solvant. L'un des panneaux du mur où le cuir devait être maintenu fut échangé contre un panneau en meilleur état provenant d'un autre mur.

Les endroits abîmés ont été remplacés par du cuir récupéré sur d'autres panneaux, ou par des pièces répliques moulées à partir de BEVA 371 à laquelle un pigment fut ajouté. En séchant, ce mélange durcit et donne un matériau solide. Il est coulé à chaud dans un moule en silicone fabriqué sur la surface du cuir d'origine, coupé à la mesure et peint à la teinte. Les petites surfaces endommagées ont été remplies de Beva appliquée directement à l'aide d'une spatule chauffante.

Les retouches de peinture ont été faites avec des aquarelles Winsor et Newton et du *silver pan.* Comme la plupart des pièces avaient été repositionnées, quelques retouches de couleur dans les parties d'origine durent être effectuées pour que la vision d'ensemble soit acceptable. Ceci était surtout indispensable aux endroits o˘ le cuir provenait de panneaux étroits et était utilisé pour en couvrir de plus larges. En effet, les bords qui auparavant étaient recouverts apparaissaient plus clairs, et devaient être teintés pour s'accorder avec les tons environnants. Pour finir, le cuir a reçu une fine couche de Paraloid B67 dilué au white spirit appliquée à la brosse.

Le cuir de remplacement pour les autres panneaux a été fait en Pologne.

Lina P.B FALCAO, Portugal

THE CONSERVATION OF GILT LEATHER UPHOLSTERY

The treatment of two pieces of gilt leather set as seat and back upholstery of a Portuguese chair, from late XVIIIth century, is discussed. A brief description of upholstered chair, gilt leather technique introduces to gilt leather condition. Leather looks sound condition except folded areas - areas where leather is fixed to chair, as seat rail and uprights. Extensive lost of painting and silver leaf (especially seat), painting cracks, lost of adhesion painting/leather and soil accumulation were the major problems to solve. For this treatment both gilt leather pieces were removed from chair. Cleaning, painting surface fixing, infilling and inpainting are described.

LA CONSERVATION D'UNE GARNITURE EN CUIR DORÉ

On décrit le traitement des deux cuirs dorés qui garnissent l'assise et le dossier d'une chaise portugaise de la fin du XVIII^{ème} siècle. Avant l'explication de l'état de conservation, on décrit la chaise garnie et la technique du cuir doré. Le cuir était bien conservé, exception faite aux plis - zone où le cuir est fixé à la chaise: les traverses de l'assise et les montants du dossier. Les principaux problèmes à résoudre ont été: la perte de la peinture et de la feuille d'argent (surtout dans l'assise), la craquelure profonde dans la peinture, la perte de l'adhésion de la peinture au cuir et l'accumulation de poussière. Pour ce traitement les deux cuirs dorés ont été déposÈs de la chaise. On décrit le nettoyage, la fixation de la peinture, le rebouchage, etc... .

Trini GENIS, Spain

RESTAURATION AND CONSERVATION OF A TAPESTRY MADE ACCORDING TO THE GUADAMECIL TECHNIQUE - GILT LEATHER

Technical material **:** lambskin
Period : first half of the XVIIIth century
Dimensions **:** 370 x 350 cm
Coming from **:** Burdeos Castle

Description:

The Guadamecil has accumulated dirt which hides its original colour. The Guadamecil is joined to a linen material which covers the back. The leather and the material are nailed at the top and bottom to a very thick leather which at the same time is nailed to a wooden strip which acts as a support. The material, probably linen, has some very thick threads and the weft is compact. It is very dirty, stained and with insect remains. Because of the rusty nails which perforate all the top and bottom, the leather has holes, cracks, creases and is dry in parts.

Each nail means a hole in the leather and the edge is affected. On the two sides, although there is no wooden strip, the leather is also cracked and full of nail holes. The top right corner is completely loose from the rest of the Guadamecil, and the left is creased, torn and crushed. What is more there are really long cracks all over the surface. Some of these cracks have been joined by sewing, which even if joining the two parts, has made more holes at the sides of the tear. Because of the cracks, scratches and bangs, the silver has become detached in some areas, mainly at the sides and so in these points the leather can be seen in its natural state.

Figures. The leather before and during treatment.

In the illustration the most important tears are shown, and in the photographic archives there is a follow-up of each one.

Conservation-restoration process

Disinfection of dirt on flesh part.
Cleaning by suction of flesh and grain side.
Cleaning on the flesh and grain side with Guadamecil grease.
Washing the linen material with chemical products.
Unnail the two sides of the wood and the material which is at the back. The flesh side of the Guadamecil is freed of old pieces. Then the support is begun to be consolidated: the threads which sew some of the tears with leather which do not fit in with the Guadamecil.
With Guadamecil grease, the leather is moistened and lubricated, always on the reverse side.
The conservation-restoration is carried out by parts, because of the large dimensions of the work.
The leather is flattened using foam and small bags of sand, so as to protect the reliefs.
All the tears, holes, cracks and loose pieces are strengthened.
The gaps are bevelled on the flesh side and are reintegrated with new also bevelled leather so that it has the same thickness. This has an illusionist integration using the same technique as the Guadamecil.
Reinforcing all the weak points and fitting strips.
Fixing the polychrome.
Reintegration of film of gold and polychrome on certain punts where the leather is new.
Final protection layer.
Assembly to wooden strips and cloth.

Conclusion.

The piece was in a poor state, but not irreversible. The general dirtiness on the leather hid its original colour. At the same time, the breakages, cracks, tears, creases, gaps and loose parts threatened the piece on a short term basis.

With this intervention the Guadamecil has improved both in stability and in aesthetics increasing its durability, but always respecting the original.

RESTAURATION ET CONSERVATION D'UNE TAPISSERIE FAITE SELON LA TECHNIQUE DU GUADAMACIL - CUIR DORÉ

Matériau technique: peau d'agneau / mouton
Époque: première moitié du XVIII^{ème} siècle
Dimensions: 370 x 350 cm.
Provenance: un château à Bordeaux

Description:
Il s'agit d'une grande pièce de guadamacil faite de diverses peaux de mouton biseautées et collées pour former une grande tapisserie . Elle est recouverte de feuilles minces d'argent, d'un vernis jaune, elle est marquée au fer avec 15 poinçons différents. Elle est ornée d'oiseaux, de jarres, de fleurs et de guirlandes, sur un fond de palais d'influence chinoise, et polychrome. Le cuir est tanné avec des tannins naturels et décoré avec de la peinture à l'huile

Examen visuel et diagnostic:
La saleté est visible sur toute la surface du guadamacil qui présente une couleur blanchâtre. Il y a aussi des taches de graisse et de cire. Tous les bords sont fragiles, avec des trous et des craquelures dus à la grande quantité de clous d'attache. Les coins sont également en très mauvais état. La totalité de la surface présente des fissures longitudinales importantes . Une intervention faite pour réunir les déchirures de la pièce est visible au revers. Dans quelques endroits où la feuille l'argent s'est détachée, on aperçoit l'état naturel de la peau.

Restauration:
- Nettoyage et désinfection
- Hydratation et lubrification
- Aplanissement
- Biseautage
- Colmatage des trous et des fissures/ déchirures
- Renforcement des parties faibles
  et application de bandes

Fixation de la polychromie

Conservation:
- Conditions ambiantes indispensables:
- Humidité relative constante à 60%
- Température: 18°C
- Éviter les changements brusques
  de température et d'humidité
- Eclairage: 50 lux maximum
- Eviter le contact des acides
  et de la feuille dorée
- Laque brillante
- « Réintégration » de polychromie

Véronique MONTEMBAULT, France

CONSERVATION OF A COPTE BASKET MADE OF PLANT FIBRES COVERED WITH GILDED LEATHER.

In 1929, the Musée du Louvre acquired a plant fibre's basket covered with gilded leather. The item has been restored in the past, but this operation now appears to be inadequate, and the museum asked for a new intervention.

As the object is very brittle, we first recorded on a drawing the location of the different pieces. Working only with this document, we found the original location of the pieces.

The leather was then taken into pieces and the fragments were sewn on a non-woven polyester fabric, which respected the outline of the basket. This doubling is just fixed around the basket and so the assembling is easily reversible.

RESTAURATION D'UNE CORBEILLE D'ÉPOQUE COPTE EN CUIR DORÉ.

Une corbeille en fibres végétales tressées recouvertes de cuir doré, acquise par le Musée du Louvre en 1929, fut une première fois restaurée. Cette intervention s'est montrée aujourd'hui inadaptée et une intervention nous fut demandée.

Etant donné la grande fragilité du cuir, un premier travail de relevé des fragments en place a permis de restituer graphiquement leurs positions originelles et de replacer ceux qui s'étaient détachés.

Après démontage, les différents éléments ont été cousus sur une bande de non tissé en polyester, adaptée au profil de la corbeille, et simplement refermée autour de celle-ci, permettant ainsi d'obtenir un montage très facilement reversible.

REPLICATION - MODERN MANUFACTURE

COPIE - FABRICATION MODERNE

Jaroslaw ADAMOWICZ, Edward KOSAKOWSKI, Roman KOSLOWSKI and Aleksander PIOTROWSKI, Poland

REPLICATION OF GILT LEATHER - RECONSTRUCTION OF THE DECORATIONS FROM CALLENDAR HOUSE, SCOTLAND.

Destruction of the important part of the gilt leather wall hangings in one of the rooms of the Callendar House in Scotland has led the conservation team to the concept of gathering together all remaining original leather to fill one of the room's walls and reconstructing the decorations on the remaining three walls. A visitor should have an impression of what the room originally looked like. Hence specific requirements had to be met by the gilt leather replicas. They should be manufactured according to the original historic gilt leather technology, but their appearance had to conform with an aged and darkened character of the original exhibited in the same room. Hence effect of « ageing » had to be introduced at subsequent stages of the replica manufacture.

Calf leather used for the replication was vegetable tanned material with very good ageing properties. The leathers were skived and glued together in strips about 250 cm long and 67 cm wide. The strips will be skived joined together side by side in the room to fill the panels on the walls. The leather strips were stretched on the wooden frames, moistened, covered with a thin layer of the parchment glue and silvered using leaf silver. When the leather was dry, the silver was covered with several layers of the asphalt - colophony golden varnish. The varnish layer had to be « aged » by adding pigments. It was also applied with a brush in a way producing pattern of stripes characteristic of the aged original. When the varnish layer was dry the leather was ready to be moulded.

The relief pattern of the original leather was first reproduced in a silicon rubber. Then a gypsum cast of the relief was obtained and reworked in hand until all features were sharp and distinct. Then a gypsum cast with a contra-relief was obtained, the features of the pattern were deepened and corrected. The final printing-plate was cast using epoxy resin mixed with aluminium powder to increase the mechanical resistance. The leather was dampened and laid gilt-side down on the printing plate. The upper side was covered with felt, then the relief was obtained by operating a hydraulic press. The strip fixed on the frame had to be moved and positioned precisely for next printing, since several complete designs had to be printed to cover the entire strip. Once the leather had dried, the design was permanently fixed.

Finally the impressed design was covered with a red paint based on the same asphalt - colophony binder as varnish (the relief remains gold). Darker colour was used locally to imitate the darkened appearance of the original.

The project has not been completed yet. First replicas are being mounted in Scotland.

COPIE D'UN CUIR DORÉ PROVENANT DE CALLENDAR HOUSE EN ÉCOSSE ET RECONSTRUCTION DU DÉCOR

La destruction d'une partie importante des tentures en cuir doré dans l'une des pièces de Callendar House en Écosse, a conduit l'équipe de conservation à concevoir un montage rassemblant tous les morceaux qui restaient du cuir original pour couvrir l'un des murs de la pièce, et à reconstruire les décorations sur les trois autres murs[1].

Ce montage devrait permettre au visiteur d'avoir la perception du décor d'origine. Les copies devaient donc répondre à des exigences spécifiques. Il fallait qu'elles soient préparées selon la technique originale de fabrication du cuir doré, mais qu'elles aient aussi un aspect vieilli et sombre pour être conformes à l'original exposé dans la même pièce. En conséquence un effet de « vieillissement » a été introduit à certains stades de leur fabrication.

Le cuir de veau utilisé pour les copies est tanné végétalement, et présente une bonne stabilité au vieillissement. Les cuirs ont été biseautés et collés ensemble en bandes de 250 cm de long sur 67 cm de large. Les bandes biseautées ont ensuite été assemblées pour recouvrir les panneaux du mur, étirées sur les cadres en bois, mouillées, recouvertes d'une fine couche de colle de parchemin et argentées avec une feuille d'argent. Après séchage du cuir, l'argent a été recouvert de plusieurs couches d'un mélange d'asphalte et de colophane, ou vernis jaune. La couche vernie a ensuite été « vieillie » par ajout de pigments appliqués à l'aide d'une brosse de telle sorte qu'une trame de rayures caractéristique de l'original y soit reproduite. Après séchage du vernis, le cuir était prêt à être moulé.

Le dessin en relief du cuir original fut d'abord reproduit sur une plaque de silicone. Puis on prépara un moulage en gypse du relief, qui fut retravaillé à la main jusqu'à ce que toutes les caractéristiques soient nettes et distinctes. Puis un contre-moulage en gypse fut préparé, lui-aussi dûment corrigé et creusé. La plaque avec l'impression finale fut moulée en utilisant une résine époxy mélangée à de la poudre d'aluminium pour en augmenter la résistance mécanique. Le cuir fut ensuite humidifié et couché sur la plaque d'impression, le côté doré étant placé sur celle-ci, et, après avoir recouvert la partie supérieure d'un feutre, on obtint le relief à l'aide d'une presse hydraulique. Il a fallu déplacer chacune des bandes fixées sur le cadre et la positionner très précisement pour l'impression qui devait suivre, car plusieurs dessins complets devaient être imprimés pour couvrir une bande entière. Une fois le cuir sec, le dessin est en effet fixé de façon permanente.

Finalement le dessin imprimé a été recouvert d'une peinture rouge dont le liant est le même mélange asphalte-colophane que celui utilisé comme vernis (le relief restant doré). Une couleur plus sombre a été donnée localement pour imiter l'apparence sombre de l'original.

Le projet n'est pas encore terminé. Les premières répliques sont en cours de montage en Écosse.

Lut & Frederic POPPE, France

WHAT IS LUTSON

In the late 80's Lut and I started recreating ancient gilded leather. First Lut did a lot of research in libraries, archives, museums etc. In this period we had the opportunity to buy an old press of French make a « Verlar ». This cast iron press was heated and developed a huge amount of pressure.

The size of the press was quite small about 50 cm by 60 cm, this forced us to reduce the scale of the original designs. When we thought we had enough information we set to work. Clay was used for the sculpture of our first patterns, moulds and counter moulds were made of plaster, the negative mould went to the foundries where a brass or bronze mould was to be cast. These first moulds we made are still used in our workshop and probably last for ever, though they are very heavy to handle and foundries were not keen to cast any bigger designs. Therefore we started making our own moulds. Sculptures are made in wax, moulds in resin.

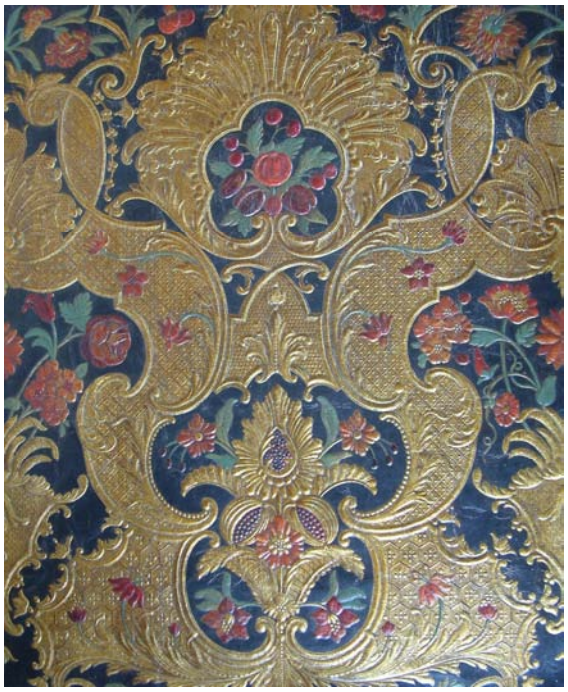
The first panels we made were of sheep skin 'Basanes' sealed with glair, silver leafed, gild varnish was meanly made of shellac, paint and antiquating was made of oil paint. Very soon our panels turned dark some lost all gilding in few weeks time. We tried to seal the silver leaf in different ways but all effort was useless, looking back on this problem I wonder whether it is possible that the tanning material is at the origin of the sulphating of the silver ?

Anyway we swopped to aluminium leaf but not for long, because working with a heated press allowed us to use a metallic printing foil results were so good that when we used properly only experts can see the difference.

We also tried several different leathers so we worked for a while with vegetal tanned cowhide, goatskin and more. We now work for years with a vegetable tanned calf hide that is used mainly for orthopaedic matters. Technically all the rest stayed pretty much the same. Originally we wanted to stay as close as possible to the technique used by our fellow craftsmen of few centuries ago, in the end practical matters and economical rules changed this goal, we are happy to be able to do as good as we can.

Lutson leathers are used as tapestries, as framed decorative items, or to upholster chairs and stools by decorators to embellish the homes of a happy few, world wide, so at least the way the leathers are used stayed the same through the centuries.

In 1993 we supplied the Metropolitan Museum N.Y with three panels to upholster one dining room chair from the N.Y apartment of Mr Cornelius Vanderbild. This end XIXth century chair is now exposed in the America Wing of the Museum. This was the first and only time our leathers have been used by restorers as a complementary item in a restoration project.



Three examples of Luston leather. Left: Moncla gold blue, above: Marot border, right: Rose and tulip border.

CE QU'EST LUTSON

À la fin des années 80, nous avons Lut et moi lancé un projet destiné à recréer le cuir doré ancien. Tout d'abord, Lut a fait des recherches dans les bibliothèques, archives, musées, etc. Puis à cette époque, une occasion s'est présentée d'acheter une vieille presse de fabrication française de la marque "Verlar". Cette presse, quand elle est chauffée, peut développer une très forte pression. Sa taille assez petite, 50 x 60cm, nous a obligés à réduire le format des dessins originaux. Pensant avoir assez d'information, nous avons alors commencé notre travail.

Nous avons utilisé de l'argile pour sculpter nos premiers modèles, les moules et les contre-moules étaient faits de plâtre, et pour les moules négatifs, un moulage en laiton ou en bronze a pu être obtenu dans une fonderie. Ces premiers moules fabriqués dans notre atelier sont encore utilisés, et dureront probablement longtemps. Cependant ils sont très lourds à manipuler, et aucune fonderie n'ayant accepté d'en fabriquer des modèles plus grands, nous avons fabriqué nos propres moules. Les sculptures sont faites dans la cire et les moules avec de la résine.

Les premiers panneaux ont été fabriqués avec de la peau de mouton ou « basane », recouverte de blanc d'oeuf, d'une feuille d'argent, d'un vernis jaune à base de gomme laque, de peinture, et l'aspect vieilli a été obtenu avec une peinture à l'huile. Nos panneaux sont très vite devenus foncés, et certains perdirent même leur doré en quelques semaines. Nous avons alors essayé de recouvrir la feuille d'argent de différentes façons, mais sans résultats, et je me demande maintenant s'il se pourrait que la matière tannante ait pu être à l'origine de la sulfuration de l'argent.

Nous avons donc remplacé l'argent par l'aluminium, et le travail avec la presse chauffante nous ayant permis d'utiliser une feuille métallique pour impression, les résultats obtenus furent excellents. Si la technique est correctement réalisée, seuls des experts peuvent faire la différence. Nous avons également essayé plusieurs types de cuirs, et ainsi travaillé pendant un certain temps avec de la peau de vache, de chèvre et autre, tannée

végétalement. Nous utilisons maintenant depuis des années de la peau de veau tannée végétalement qui trouve des applications dans le domaine orthopédique. Pour le reste, et particulièrement du point de vue de la technique, rien n'a pratiquement été changé.

À l'origine, nous voulions rester aussi près que possible de la technique utilisée il y a quelques siècles par les artistes, mais à l'usage, des considérations pratiques et des règles économiques ont changé cet objectif. Nous sommes cependant heureux de pouvoir faire de notre mieux.

Les cuirs de Lutson sont utilisés dans le monde entier pour en faire des tapisseries, des objets décoratifs encadrés, des sièges tapissiers, ou tout autre objet décoratif destiné à embellir les intérieurs de quelques heureux, et en somme, leur fonction est restée la même à travers tous ces siècles. En 1993 nous avons fourni au Metropolitan Museum de New-York trois panneaux pour recouvrir une chaise de salle-à-manger de l'appartement new-yorkais de Mr Cornelius Vanderbild. Cette chaise de la fin du XIX^{ème} siècle est maintenant exposée dans l'aile américaine du musée. Ceci a été la première et unique fois où nos cuirs ont été utilisés par des restaurateurs comme objets complémentaires dans un projet de restauration.