VARNISHES ON BAROQUE CHURCH FURNISHINGS: IN SEARCH OF A SUITABLE CONSERVATION APPROACH

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ABSTRACT
This paper deals with the conservation of exquisitely veneered altars of south German eighteenth-century monastery churches. The concepts applied were the result of years of inter-disciplinary collaboration among conservators, scientists, art historians and architects. Of prime consideration during their development were the theological, liturgical and use requirements of the owners. The result was a variety of conservation treatments customized to the objects being treated. For this paper, three very different case studies have been selected, for which justifiable concepts were developed only after extensive consideration and discussion. In one case, an original coating was replicated from the analysis of surviving fragments, while in the second case the original coating was replicated only on abraded and faded areas. In the last case, non-original varnish was surface cleaned but left in situ, since it was impossible to separate it from the original surface. In no instance do they represent an ‘ideal solution’, as each one is embedded in its context.

ZUSAMMENFASSUNG

INTRODUCTION
In south Germany, with its plethora of art treasures, caring for ecclesiastical furnishings, e.g., choir stalls, pews, confessionals, pulpits, and altars, has a long tradition. As a consequence, a great number of finely-veneered eighteenth-century altars have been preserved in Bavarian parish, convent and monastery churches. The discussions about appropriate conservation and restoration concepts for these objects were formed by very heterogeneous criteria, including:

- the relationship between the furnishings and the church setting
- the interaction of veneered altar architecture and painted polychrome sculptures, carved ornaments, paintings, reliquaries, etc.
- contemporary sources on the object and the history of its making [1–3]
- the technical characteristics of the original
- the object’s conservation history
- the results of scientific examination of the original and of the subsequent alterations
- historical and liturgical requirements
- the dialectic between the technically possible and the ethically responsible.

Due to the variety and number of contradictory views to be considered, several years often pass between preliminary examinations and the drawing up of comprehensive treatment proposals with respective funding. For this reason, the following case studies will focus only on one important area: the interaction between conservation, scientific and liturgical criteria as applied to surface treatments. The preliminary examinations and sample preparation are presented in a condensed form to give an overview with examples.

A CASE STUDY OF TOTAL RECONSTRUCTION OF A VARNISHED OBJECT: THE DOMINICAN CONVENT CHURCH IN BAD WÖRISHOFEN

Historical background
The Dominican convent church in Bad Wörishofen was built from 1719 to 1723. In addition to prominent artists such as Dominikus und Johann Baptist Zimmermann, the Dominican monk Valentin Zindter was commissioned as cabinetmaker for all the unpainted wooden furnishings of the convent, Fig. 1.

Technical details
Collaboration with other artists, such as altar-makers, cabinet-makers, sculptors and polychrome painters, produced a work of art of exceptional quality where the individual elements form a seamless whole. Special optical effects were created with, for example, gold, silver, composition or copper leaf decoration. These effects were also achieved through the use of veneered and gilded mouldings, sections of the entablature that were often offset, or with raised and sunk coffers, and intricate marquetry, sometimes engraved, sometimes shaded using a hot sand technique. Selected woods, such as ebony, padouk or ash burl were employed, as were colour-backed horn, pewter and brass to produce so-called Boule work [4].

Original surface decoration
The entire object was covered with a coating of transparent varnish which greatly influenced its appearance. However, as a consequence of later treatment, that historical varnish had been lost. Only remnants were to be found hidden under carved appliqués. Wherever the original varnishes used in less accessible

Fig. 1 Veneered altars in the Dominican convent church in Bad Wörishofen in Lower Allgäu, final state.
areas escaped the massive efforts of church painters in 1957, they were examined [5] and showed the following peculiarities:

- the wood surfaces were saturated with glue
- the original varnishes, based on sandarac, amber, larch turpentine and colophony, were applied in two layers, the first thin and the second very thick
- both layers of varnish were intensely coloured with yellow dyes (usually gamboge)
- the yellow of the top layer was more intense than that of the thin layer directly on the wood: sometimes, the addition of red dyestuffs (dragon’s blood) was very noticeable in the top layer.

These (reddish-) yellow coloured varnishes, so-called gold varnishes, were originally used to cover all the surfaces of the interior furnishings in Bad Wörishofen. This applies not only to the wooden surfaces but also to the iron surfaces of the chancel screen, where a yellow-dyed shellac-based spirit varnish was used. Thus, the Bad Wörishofen gold varnishes are of two kinds: wood varnishes and metal varnishes.

Conservation history

The archives of the Dominican convent only mention that work was done on the church in 1862, 1886, 1893 and 1906. Details such as practices and products were not recorded. Scientific analyses indicated oil varnish remains, namely an older, intensively boiled linseed oil varnish (boiled at about 250−300°C), and a more recent coating of a technical linseed oil varnish boiled at a lower temperature (about 150°C). These oil varnish layers, now with ‘alligator’ cracking, gave the furnishings a dark brown surface — typical of many nineteenth-century and early twentieth-century restorations.

In 1957, after a fire in the church, the entire interior furnishings were thoroughly overhauled. Little attention was given to re-attaching the marquetry. If treated at all, it was nailed back. The lost parts were filled with chalk putty. It may be assumed that at this time all the layers, i.e. the original and the subsequent treatment, were still present on all intact surfaces. Nonetheless these surfaces were stripped, unfortunately with very rough tools, and then covered with an extremely thick layer of paraffin wax.

When conservation was begun, this wax coating was still sticky, and a lot of dust and soot had accumulated on it over the years. Moreover, the wooden surfaces had faded considerably. The once highly varied colours of the various veneers were now relatively uniform, Fig. 2. The now-darkened paraffin coating intensified this effect.

Deciding on an approach

To all concerned, the aforementioned condition was unacceptable. Following extensive study of the marquetry technique and the coatings, a series of test sites for consolidation techniques was first prepared, with replacement of missing sections, cleaning of the surfaces and new varnishes. It was agreed with the owners that the surface of the three altars and the pulpit should receive a coating that closely resembled the preserved remain of the original.

The previously identified remains of the spirit varnish informed varnish selection. Its composition with regard to ingredients and their amounts, degree of dilution, the application and finish were tested on samples. After several samples had been tried out on reference pieces in the conservation workshops of the Bavarian Department of Monuments and Sites, further trials were conducted on the original. Comparison in situ with the preserved surfaces settled the issue.

Conservation treatment [6]

First, the paraffin wax was removed using white spirit. The final step was to restore the intensity of the intrinsic colour of the veneer by adding 5% linseed oil to the white spirit. With the exception of the Boulle sections, all the surfaces were pre-treated with a glue solution. Finally, based on the analyses, a coat of varnish composed of sandarac dissolved in alcohol was applied. Dragon’s blood and gamboge were added to obtain a slight reddish-yellow tone to come as close as possible to the historical gold varnish. In order to produce a varnish with a low surface tension, mastic was added instead of the identified but inferior colophony. Larch resin, which is no longer commercially available, was specially made by boiling larch turpentine balsam in a water bath [7]. After two or three applications, the surface was smoothed. A mastic varnish was applied only to the Boulle marquetry, in order to delay oxidation of the metal veneer. After completion, the visible success of this approach was indisputable. The grain and colouring of the various veneers radiated an unimaginable intensity. This was brought about on the one hand by the ability of light to penetrate the top layer of the wood veneer and on the other hand by the reddish-yellow tone of the varnish, which intensified the veneer’s intrinsic colour. The unusual effect of the resulting lustre accentuated the architecture of the altar and the pulpit as well.
bear exquisite marquetry by the renowned Franconian cabinet-makers Franz Anton Thomas and Servatius Brickard. The altars and all the other interior furnishings such as the pulpit, confessional, oratories, chancel screens, etc., were created in 1733.

Technical details

The altars and the pulpit are primarily veneered in walnut, the coffer-fillings with linden burl wood. In addition there is marquetry made from pewter, mother-of-pearl, brass, horn and stained woods. Many of these inlays are refined with blackened engravings, or shading using a hot sand technique. The importance of this church is further emphasised by the gilding of the sculptures and the carved ornaments, the latter nearly always corresponding with the red polychromed areas. These red areas consist of red-painted surfaces on a chalk ground and gold leaf covered by a red lustre coating. This dominant red/gold scheme is carried forward in the varnish on the wood surfaces.

Original surface decoration

The discovery of different varnish systems brought to light a barely-noticed chapter in Baroque polychrome painting. Due to their great sensitivity to light, the tinted, transparent wood varnishes had faded in the course of time and were forgotten. Moreover, as a result of rigorous nineteenth-and twentieth-century restoration methods, it is extremely rare that furniture from earlier periods still bears the original transparent wood varnishes. The furnishings of St Getreu church, however, are unequivocal proof that the masters who made the altars intentionally used golden- and red-toned varnishes. All the walnut veneer had been coated with a gold varnish and the linden burl wood veneer with an intense, almost dark red varnish. With regard to the latter, it may be assumed that the goal was to imitate tortoise-shell, as the burl conveys a similar light and dark pattern, especially when coated by an intense red-coloured varnish.

Further examination showed that different varnishes were used on different veneers: varnishes on the burl wood veneer were tinted red while those on regular veneer were not tinted. The red colour was due to an additional reddish-brown layer applied directly on the burl veneer. Gas chromatography-mass spectrometry analyses of this thick layer directly on the veneer showed it to be shellac (stic lac). Those parts of shellac that dissolve easily in alcohol had been previously removed. Thus, the remaining shellac was not readily soluble in alcohol, but contained a high amount of shellac wax.

The red colouring of the varnish could be traced back to the natural lac dye in the shellac. It had survived only in covered, hidden areas. Exposure to light had destroyed the red dyestuff, and the red varnish had faded to such a degree that it could no longer be differentiated from the uncoloured areas.

Conservation history

Over the years, two restorations had been conducted, both focusing on the sculptures and the marquetry. The last was in 1955. According to an invoice, parts of the varnished surfaces were “dusted, washed, impregnated with wax and polished”, in the course of which the coatings on the tabernacle of the high altar were completely removed and given a shellac-like coating. More decisive was the first restoration, dating probably to 1870–1871, when the original varnish was covered with a coating that now looks dark brown. Varying layer thickness led to a very uneven appearance.

Analyses revealed that these varnish coatings consisted of boiled linseed oils, Fig. 4. On areas with little exposure to light, the camphor-soluble part of the linseed oil varnish and to clean the surfaces, but to no avail, as in all the cleaning trials the enhanced ability of light to penetrate only brought out the layers of grime more starkly.

Conservation history

The owner wanted to have the nineteenth-century coating removed, and to restore the original colour scheme as far as possible. Nonetheless, at the beginning attempts were made to retain the linseed oil varnish and to clean the surfaces, but to no avail, as in all the cleaning trials the enhanced ability of light to penetrate only brought out the layers of grime more starkly.

Deciding on an approach

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The cleaning trials did not lead to any satisfactory results. Because of the grimy appearance of the linseed oil varnish coating and encouraged by the relatively intact surface of the original varnish, it was decided to conduct tests to remove the linseed oil varnish.

First attempts at cleaning showed that the second coating reacted to polar solvents, which can be explained by the manufacture of boiled linseed oil varnish: adding oxygen during boiling leads to increasing polarity [5, pp. 162−163, 173−181]. This observation led to further testing with solvent gels to which various alcohols had been added to test for their effect on strength, action time, method of application, etc. [8]. The areas with very intensive shrivelling presented the biggest problems, as they did not allow the solvent gel to act on the surface. Despite these difficulties, the varnish was removed successfully from the sample surfaces using a propan-2-ol gel Fig. 5 [9].

Another problem for deciding on an approach was that, as had been discovered early on, the colouring and layer thickness of the original varnish varied, and was dependent on the extent of exposure to light. Moreover, there were visible traces of abrasion, which indicated that mechanical treatment had occurred in at least some areas prior to application of the linseed oil varnish. In view of these different aspects, two approaches were discussed: retaining the dark brown shrivelled linseed oil varnish with all the disadvantages for the marquetry described above, or removing the linseed oil varnish to expose the surviving original varnish, albeit altered or thinned in various ways.

After extensive discussion, a second approach was adopted. After removal of the linseed oil varnish, the original effect of the coloured varnish on all the important architectonic surfaces was to be restored to obtain the former unity between altar architecture, sculpture and carving.

Conservation treatment
Carbopol- and Ethomeen-based propan-2-ol gels were employed to remove the linseed oil varnish. The gel–oil varnish mixture was first wiped off dry and then cleared with solvents. The recipe was: 3 g Carbopol, 30 ml Ethomeen, 100 ml propan-2-ol and 25 ml distilled water. As using white spirit for removal led to an emulsion effect, due to mixing with the aqueous components and the oil remains, a few drops of propan-2-ol were added.

The areas to be coated were covered with a separation layer of isinglass. For the gold varnish, a varnish composed of mastic, larch turpentine resin and sandarac dissolved in essential oil was used instead of the historic tinted oil varnishes (amber varnish, copal varnish), and stick lac was used for the areas requiring a red varnish over the gold varnish. The scientific analyses and testing made it possible to judge how the original varnish would react to certain solvents and binders. Thus, it was certain that the new measures would be reversible.

In this way, it was possible to make the marquetry visible again while retaining the altered, but nonetheless original, varnish. At the same time, the areas that had been previously reduced by mechanical abrasion could be evened out in their appearance and an overall uniform gloss was created. By restoring approximately the original colouring, the originally intended correspondence to
the polychromed areas was reinstated. Parts where the linseed oil varnish had shrivelled less badly, or which were in a fairly good state after the removal of the second coating were left, as long as they were optically integrated.

A CASE STUDY OF CONSERVATION OF ORIGINAL AND SUBSEQUENT COATINGS: THE SCHUTZENGELKIRCHE IN STRAUBING

Historical background
Building on this former Franciscan monastery church commenced in 1706. Some of the altarpieces were by prominent artists, such as Johann Evangelist Holzer, Johann Caspar Sing and Cosmas Asam. However, the identity of the artists responsible for the veneered interior furnishings of the Schutzengelkirche (Guardian Angel Church) in Straubing remains unknown. Exact dating is also not possible. Only comparison of the style indicated that the altars had been created in the early eighteenth century and had been transformed into rococo style in the middle of that century, Fig. 6.

Technical details
No costs were spared on these veneered furnishings. The massive format alone is unusual: the high altar is 13 m high. The elaborate marquetry on the altars is proof of the importance of these furnishings. For example, the enormous columns of the retable are inlaid with tiny bands of veneer made of extremely thinly-planed veneers. With its 39 large and small paintings, 17 reliquaries and 35 wax reliefs, the convertible tabernacle of the high altar is unique from today’s vantage point. An inventive construction allows viewing of 82 different variations, corresponding to the respective liturgies.

Original surface decoration
Cross-sections of the veneer surface almost always showed that there were two coatings. However, in many places the thickness of the original varnish directly on the wood varied greatly, Fig. 7. Thus, before the last treatment, the appearance must have been quite uneven.

Analyses also showed that there were two oil varnishes on parts of the high altar: a historical eighteenth-century amber varnish and a more recent resin varnish. Amber varnishes are gold-yellow transparent varnishes, which were primarily applied unpainted wood surfaces in the eighteenth century. The original varnish here, as encountered in many historical wood varnishes, had been diluted with colophony.

Conservation history
Unfortunately there is no longer any information available in the archives about the conservation history of these interior furnishings. The conservation approach, therefore, could only be based on the results of examination and scientific analyses. The first treatment that could be proved probably occurred late in the course of secularization in the twentieth century. The choir stalls were almost completely dismantled and the high altar was moved some metres to the east. Evidence for this massive undertaking consists of mechanical damages, and an inordinate number of nails that were hammered in at a later date to stabilize the altar construction. The consequence of moving was serious environmental damage: the rear of the high altar, for example, was now exposed to more light, leading to irreversible damage to the altarpiece, the polychrome painting and the wood and varnished surfaces.

Analyses of the materials indicate that the first treatment of the original, preserved surface did not occur until the early twentieth century. The entire high altar, with the exception of the tabernacle, received a coating of a modern, somewhat inferior (hardened colophony-based) resin varnish. The damage observed in the Schutzengelkirche is typical of this colophony varnish and is described in detail in the written sources. In this instance, the damage was not only due to the incidence of light but also to the thickness of the varnish layer as well as its solvent content. The new coating altered the appearance of the altar and the pulpit unfavourably: today the surfaces look browned and shrivelled to varying degrees. In some areas the varnish is brittle, respectively shrivelled and cracked, Fig. 8.

Deciding on an approach
First the tabernacle of the high altar was brought to the conservation workshops of the Bavarian Department of Monuments and Sites. Close collaboration with the related departments of paintings, sculptures, textiles and furniture and respective
scientists allowed optimum examination and work, yielding results that were decisive for the subsequent conservation of the entire furnishings.

In preparation, detailed surface examinations and tests were conducted on some of the side altars and on the high altar, focusing on two problems. Firstly the owner did not like the darkened and cracked twenty-century colophony varnish, as it dramatically impaired the effect of the sophisticated variety of veneers. Secondly, shrinking of the substrate had early on caused the thin hand-planed veneer, which was mainly located on the columns and on some mouldings, to detach from the wooden support. The colophony was applied without previously reattaching the loose veneer, which became partially embedded. Flattening and reattaching these areas was, therefore, extremely difficult.

For conservation as well as aesthetic reasons, all cleaning tests initially focused on removing this modern coating, naturally with the aim of preserving the original varnish. Selected tests were made at various locations based on three targets: testing removal methods and materials, and determining the required time for this; evaluating the state of the original varnish after removal of the new coating; and attempting to reattach the veneer before and after separating the varnish.

The first surface cleaning tests revealed that in general the state of preservation of the coating to be exposed was not homogeneous. Abrasives had damaged the original varnish before it was recoated. Moreover, its thickness varied considerably and therefore its appearance did too (c.f. Fig. 7). Furthermore the test surfaces treated in the course of the preliminary examination indicated insurmountable conservation problems in separating the varnish. The similarity of the two varnishes (amber varnish with a high colophony content and colophony-based resin varnish) made attempts at separation very problematic. The tests revealed that the more recent varnish was very difficult to dissolve due to the particular method of making it (hardened resin varnish); on the other hand the original varnish reacted readily to the solvent. Based on these test results, some slow-evaporating solvent gels were created, based on Ethomeen and Carbopol, to which methyl acetate, cyclohexanone, ethanol, xylene and polyvinyl ether, and also butyl acetate and propan-2-ol had been added. Mixtures of methanol and potassium hydroxide were also tested. All the tests were without success. It had therefore to be assumed that the original varnish would suffer dramatically if the top coating were removed.

Conservation treatment

For this reason, the owners were convinced to leave the twentieth-century varnish and only to clean the surfaces, with a dry or wet method, depending on conditions. During the testing, it was discovered that the saturation improved, for example, if a cotton tip soaked in propan-2-ol was rolled over the surface. But this measure could prove to be very detrimental. The veneered areas that could be flattened without damage were glued down. At the same time, delaminating varnish particles were consolidated. Not only the reattachment but also the subsequent cleaning improved the saturation of coatings, so that despite the browning of the twenty-century coating, the appearance of the exquisite veneer decoration was enhanced and made more visible. This conservative approach was also applied to the pulpit. The conservation of the wooden furnishings of the Schutzengelkirche is therefore an example of a preservation-based approach. This approach will not restrict future efforts based on different conservation concepts that may benefit from improved techniques.

CONCLUSIONS

The three case studies demonstrate that extensive knowledge of the original and its subsequent alterations can only be gained through the collaboration of conservators, scientists and art historians. The results of this inter-disciplinary collaboration form the basis for drawing up conservation proposals. These proposals, however, must also include the owners and other experts involved in the overall project to ensure successful implementation. The complex and difficult decisions arrived at in the three case studies presented were only possible through a close collaboration of all those involved. In no instance do they represent an ‘ideal solution’ as each one is embedded in its context. As the Straubing case study showed, it is also important to recognise and accept the limitations of present conservation practices.

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