Flattening in situ the gilt leather wall hangings

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Introduction

Reshaping the 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 become often 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.

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.

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 Waclaw 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 number of damages of the wall hangings could be noticed 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).

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°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 allowed establishing 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.

The next stage of work involved humidification tests on a representative fragment of the gilt leather. 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 answer 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 let to 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 taking place 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 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 hanged. 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).

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.

References

Fig.1. Gilt leather wall hangings decorating the Antechamber of the ‘Kurza Stopa’. State of preservation before conservation.
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.
Fig. 3. Damages of the edges of leather and canvas caused by faulty fixing of the gilt leather. State after surface cleaning.
Fig. 4. Humidification of the gilt leather wall hangings on the entire wall. On the floor, a data-logger recording changes in RH.
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.