

Conservation of Boulle-marquetry discussed in examples of Paris tall clock cases

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Technical changes of the clock works and their influence on the development of the furniture bronzes

With pendulum clocks, have works whose motion is regulated by a pendulum. The pendulum was invented in 1657 by Christian Huygens. With the pendulum, clockworks achieved an until then unknown precision. Christian Huygens, who was a member of the in 1666 established Academie Royale des Sciences, dedicated his publication "Horlogium Oscillatorium" on the theory of the pendulum oscillation to Louis XIV. The latter had this work printed It is one of the most significant in the technical development of clocks. Before the invention of the pendulum clock works were mainly manufactured by gold-silver and black smiths. The clocks were movable and could be placed anywhere in the room. The case for a pendulum clock however was mostly produced by cabinet makers. They had to abide by the measurements of the clock face and the length of the pendulum and its amplitude as it was supplied by the clock maker. Pendulum clocks are not movable. They have a fixed location in the space and are a novelty in the interior architecture. The shift in clock case manufacturers from metal workers to cabinet makers had in my opinion also an influence on the applied bronzes in furniture. Even on early tall case clocks one finds purely decorative bronzes, which could also be interpreted as a remnant of the metal case. During the second half of the 17th century the furniture bronzes develop from solely functional hardware to purely ornamental bronzes. The change in the occupational group that manufactured clock cases in my opinion never has had enough attention, with regard to the development of furniture bronzes.

Boulle Marquetry

This type of marquetry, consisting mainly of metal, turtle and sometimes veneers and other materials, was named after Charles Andre Boulle (1642-1732). In 1672 he became "ebiniste, ciseleur, et sculpeur du roi" and therefore from that time on did not have to abide by the guild regulations. We know from three inventories that approximately one third

of the production of his shop, one of the biggest in Paris, consisted of clock cases. This leaves one to suspect that he had a role in the development of the form and appearance of the cases. Besides Boulle, there were a number of ebinistes known for the production of turtle and brass marquetry work. Bernard I. van Risamburgh, Alexandre-Jean Oppenordt, Pierre Gole, Jean Pierre Latz and others.

The development of the clock case with Boulle marquetry

- Religieuse (fig. 1): The shape of the pendulum clock case was in the beginning very similar all over Europe. On them we also encounter Boulle marquetry. In the beginning the marquetry consisted of turtle shell and pewter, than of turtle pewter and brass and at the end of the 17th and in the 18th century of turtle and brass. For sections the following materials: copper, silver, mother of pearl, ivory, bone and horn on a colored ground have also been utilized.
- Tête-de-poupée (fig. 2): from 1680. Was often covered with Boulle marquetry.
- Louis XIV (fig. 3): clocks on a wall or floor pedestal.
- Louis XV (fig. 4): until 1755/60
- Pendulum clocks of the 19th century: Copies of the 17th and 18th centuries are known, however we find mainly interpretations of 18th century clock cases. The case and the motives in the marquetry have changed to a 19th century interpretation.

Four different forms of Boulle marquetry can be distinguished:

- Premier partie - back ground of turtle shell with brass ornamentation.
- Contre partie - back ground of brass with turtle ornamentation
- Effect a double jeu - 1 and 2 mixed
- Polychrome - back ground of brass, turtle and horn underpainted with color as ornamentation.

The materials turtle shell and brass

Turtle shell:

The material was precious in the 17th, 18th and 19th centuries and was used only by a few specialized ebinistes. It is a hornlike material

that can be deformed with heat and hot water. It takes a fine polish and is fairly resistant. The structure and color is for each type of turtle manifold and can be very different. It can be compared with walnut veneer, that looks very different as American- French or German walnut or as burl wood veneer. Like wood one has to pay attention to grain direction, color and structure in turtle shell. Unlike wood, turtle shell cannot be stained. The application of a retouching on turtle influences its depth and transparency.

The different types of turtle shell:

- *Eretmochelys imbricata*: Hawksbill turtle; Torture imbriquee; Caret; Echte Karettschildkroete (fig. 5).

The shield has a red-brown to black flame pattern of a thickness of 1.5 to 4 mm. The shield reaches a size of 90 cm. This type was considered the most beautiful and was the most expensive. It was used from the 17th till the 20th century and applied on a red, gold and black ground.

- *Caretta caretta*: Loggerhead turtle; Caouanne; Unechte Karrettschildkroete.

The shield has a dark-brown to honey yellow striped to cloudy pattern with a thickness of 1 to 2 mm. The shield reaches a size of up to 110 cm. The material is brittle and has a tendency to chip and delaminate. It is less dense and more difficult to work as the Hawksbill turtle. It was used with a dark, black underpainting in the 17th and 18th century. On Paris clocks of the 19th and 20th century I have so far never seen this type of turtle. Qualifying I would like to state that objects of this period are seldom offered to me for treatment. According to my inquiries up till now Loggerhead turtle was not traded in Paris after the W.W. II. Therefore it disappeared from memory. Out of sight out of mind. It has been mentioned by Roubo⁴ and Tardy⁵ and also in the in 1985 published book of Pierre Ramond⁶. However this has not contributed to the knowledge of art-historians or conservators. I do not know of any German or French book on furniture or clocks in which the distinction is made between the hawksbill and the loggerhead turtle. To my astonishment I never encountered any knowledge of the loggerhead turtle in various shops in Paris, specialized in Boulle marquetry. Replacements are always made with hawksbill turtle. In future treatments one should be aware of this faulty restoration material that has been used over the last

decades. In England the loggerhead turtle as material is also unknown.

- *Chelonia mydas*: Green turtle; tortue verte, tortue franche; Suppenschildkroete.

The material is clear to dark-brown with a black mostly ray like pattern. The shield has a thickness of 0.3 to 1.5 mm and it reaches the size of up to 150 cm. It was used in the 19th and 20th century over a red, black and gold ground.

For reasons of economy, turtle was sometimes replaced by ebonized pear wood on back boards and the inlaid bottoms and although seldom also on the sides of the case.

- Brass.

The brass of the 17th century had a somewhat higher copper content than that of the 18th century and is therefore slightly more reddish tone. The 18th century brass has a similar composition and tone as brass nowadays. Brass can differ in hardness. When it is bent it will to a degree take its former shape. The harder the brass is the higher the spring tension will be. For replacements on bent surfaces one should always pick brass that is as soft as possible.

Note: In German translations of French sources and furniture books one reads often about turtle/copper intarsia. This is a translation error. In the 18th century copper was called *cuivre rouge* and brass was called *cuivre jaune* whereas in day to day language "*cuivre*" was used in reference to brass.

Some damage and conservation aspects in Boulle marquetry

In the following I would like to restrict myself to the turtle/brass marquetry in Paris' clocks of the first half of the 18th century that have a dark under-painting. The examples were conserved for private customers and because of that they are functional objects.

Lets look at a cut-out of a turtle brass marquetry: We see dark underpainted turtle next to brass. Both materials have a high gloss surface. In the brass one recognizes the saw direction there where the saw had to be turned. In the saw kerfs in the leaves one can measure the thickness of the saw-blade used. In the engraving one can see whether or not the marquetry has been sanded down before. Because of it having been worked over repeatedly the engraving can be partially or completely removed. The quality of the engraving differs considerably from one object to another. It is filled with a black filler. In

between the turtle and the brass the saw kerf has been filled with a black matte material. By a lack of lustre it enhances the bordering highly polished materials. Besides these visual materials the underlying paint under the turtle should be saved. By the patina of the turtle shell I mean the change of color of the under-painting and the structure changes of the turtle.

For the restoration of a Boulle object the following conservators should be responsible for the different materials:

- for the construction and the blind wood the furniture conservator;
- for the brass the metal conservator;
- for the turtle the objects conservator;
- for the colored ground the painting conservator.

Boulle marquetry in France is always treated by furniture conservators, in Germany mainly by furniture conservators but occasionally also by metal- or objects conservators.

Damage and conservation possibilities

As is the case with all treatments it should be mentioned here that there are no overall valid recipes for the conservation of Boulle marquetry. Every damage has to be examined itself and an adequate method for treatment has to be found.

Because of the combination of hygroscopic (wood, turtle) and non-hygroscopic (brass, pewter) materials, these objects are highly prone to damage caused by changes in climate. The climatological conditions of the future environment should be carefully checked and the object should be climatized to these conditions before any treatment is undertaken. The environment of the shop will have to be adjusted to these conditions. Much damage is shrinking damage of the blind wood, this can be worsened by a poorly chosen wood and construction methods in which wood sections with a different grain direction are butt joined and glued together. Due to the shrinkage of the wood the brass marquetry will be pushed out of its too small bed and pushed up. On average one half to three quarters of the metal and one quarter of the turtle will be detached. If one is lucky the shrinkage is only slight and the brass can be fitted down again by removing the filler in the saw kerfs (fig. 6). However in most cases the brass parts are too large and here the dilemma starts: What to do with the excess of brass?

I would like to suggest a few possibilities: One possibility would be to remove the turtle and recompose the parts and glue the whole back. Unfortunately it is not possible to remove the turtle together with its underpainting. The original underpainting the filler and the paper on which the painting is applied will always be lost. For me the underpainting is very important because it is part of the patina of the turtle shell. If possible this should be saved. Cutting away the excess of brass contradicts the conservation axiom, that everything should be saved. But it is often the intervention that causes the least loss in material. As far as is possible, I cut along the engraving lines or there where two separate parts meet with a saw blade of appropriate thickness to remove an excess of material. This is not feasible in large areas of brass without engraving, as is found in pedestals. Here one can file the upper or bottom border evenly. In doing so the saw outline of the edge is obviously lost. In most cases this trimming by filing is not possible since ornaments are cut out in the brass surface that do not line up anymore. In these cases I remove the excess of metal from the removed section by making angular undulating cuts. After regluing the sections the edges of the cuts are smoothed with a steel burnisher. This intervention if executed skillfully is hardly visible. One has to realize however that on a polished brass surface that should not be worked over even the tiniest imperfection will be visible.

A further possibility, which I often use there where small sections of brass are torn out and bend by routine maintenance is as follows: In order not to remove still firmly attached brass, which would mean loss of glue and filler and possible small chips of turtle at the same time, I separate the detached and deformed section of the brass in a spot where the brass is still firmly glued down. To do this I use a goldsmith's circular saw blade of a thickness of 0.1 mm and a diameter of 20mm. mounted in a flexible axle. The cut is made in a spot that is as unobtrusive as possible. For a lasting restoration the reshaping of the brass section is one of the most important procedures and it should be executed with extreme care. Bent brass should be reshaped, following the surface of the blind wood exactly so it can be glued back without any tension. This is often very tedious work. Hammering will expand the metal and it will not fit anymore. Very hard brass with a high spring tension and without

engraving I temper in order to soften it and make it more pliable. I temper it in an oven for a half hour at a temperature of 450°C and leave the oven to cool off slowly. In doing so one achieves a maximum softness of the brass without damaging it. The common practice of heating the metal until cherry red with a torch harbors the danger of overheating the very fine sections. Also it will cause uneven tempering of the metal because of the different dimensions in different places. I only temper engraved parts in exceptional cases, because it will result in the loss of the original black kit in the engraving.

Replaced brass is engraved. In the case of museum pieces where the recognizability of restorations is valued I engrave somewhat lighter than the original engraving.

The damage caused by restorations that have been executed in an unskilled manner are often larger and more difficult to undo as damage caused by shrinkage. In this presentation I do not want to address the problems caused by the application of modern glues. In the 19th century during restorations brass was often reattached by means of many brass pins (fig. 7). Nonetheless these parts are pushed up as a whole because the movement of the wood is directly transferred to the brass. The layer of glue can in these cases not function as a buffer zone that evens out the forces. I secure such parts in which the brass pins are sanded level with the surface and the head polished by gluing the surface. I remove the parts and clip off the pins in the back. the remains are filed level and peaned very careful. More difficult is the case where the brass is nailed back with escutcheon pins. The brass has been deformed because of that and it expanded around the nail heads. It will not fit in its bedding in its present form and size. By careful bending the piece level (sometimes this is only possible after the excess of the material has been cut away) the section will be reshaped. Tempering the metal can simplify this work. Subsequently the nail hole is drilled out and a brass plug is inserted and peaned. If the parts have expanded considerably only recutting or filing the edges will help to fit the piece in again.

Some methods for cleaning brass surfaces

- Removed brass parts are immersed in Komplexon II which binds the oxidation and subsequently thoroughly washed.

- Electrolytical cleaning on the object: With a 9 volt battery and sodium hydrocarbonate(NaHC3). The anode is connected with the object and the cathode is wrapped with cotton which is soaked in sodium hydrocarbonate and then applied to the metal. Through electrolysis the oxide will dissolve.

- Mechanical removal of the oxidation by polishing. I use for this purpose a home made polishing cloth. Polishing paste is applied on a piece of cloth which is rubbed on a piece of wood until nothing rubs off anymore. I then use the cloth to polish the Boule marquetry.

- Polishing the Marquetry with oil and diamantine or trippel.

In the two last procedures the turtle is polished as well as the brass.

When the marquetry has been sanded or rubbed with steelwool, the highly polished surface does not exist anymore and the turtle has lost its depth. On re-polishing one has to be careful that as little as possible material is lost.

Gluing down dark underpainted turtle is normally less problematic as the laying down of brass. The original pigmented protein glue is in most instances still completely present. In laying down colored or with leafgold underlayered turtle great difficulties are often encountered; I do not want to discuss this here.

For gluing I use Rabbitskin glue of the firm Kremer, that I adjust according to the encountered problems:

To improve the elasticity I add 5-15% sorbit, a sugar complex. resembling original recipes with honey, of course with a precisely defined material.

The original pigmentation of the protein glue is normally charcoal powder, that often turned brown upon aging. I mostly prepare three glue-pigment mixtures in a descending black-brown scale.

In case of unevenness of the blindwood that cannot be filled with filler I add micro glass beads to the glue to improve its bulk. When I need good creep resistance, I add some alcohol to the glue.

After gluing the work should stay in clamps at least for 24 hours.

Coating the work is also a difficult decision!

and therefore in its appearance. The same hold true for turtle. A matte surface is out of the question, because that would eliminate the depth of the turtle shell. A surface protection is however necessary because one deals with functional pieces that will be touched. Without protection of the surface one will see within no time oxidized fingerprints on the brass. I prefer one brush coat of orange shellac to which I add a retarder to prevent streakiness.

Information on Boulle marquetry-conservation in literature:

As mentioned before one type of turtle shell has been lost also in the literature. In the German literature one only encounters articles on the conservation of Boulle-work written by conservators without experience in this field - caution should be taken with the offered information. The French do have much experience in restoration of Boulle marquetry, but on average I would not recommend the published methods because their use damages in many cases the original material.

Unfortunately I can neither recommend the last publication of the international conference in Dresden!⁷ Here a treatment is published in which the complete marquetry was removed and in which the underpainting of the turtle was lost.

In the study of articles on the restoration of Boulle marquetry and books on the subject one does not necessarily end up with well rounded and acceptable methods that will hold up to future standards.

Wooden objects with Boulle marquetry are rare outside of France. Unfortunately there are many furniture conservators that hope to gain prestige by restoring an object decorated with Boulle marquetry. In order to treat objects correctly one needs to be thoroughly experienced in the field, have an expert knowledge of the materials and their technical and historical uses, but first and foremost a specialized manual experience and skill. I hope that this presentation has sensitized you in reference to the many problems of the conservation of Boulle marquetry.

Translated by Cornelis L. van Horne.

1. J.A. Roubo, *Le Meneusier Ebiniste*, p. 384, L'Ecaillie, 1772
2. Tardy, *La Pendule Francaise*, 1e Partie - La Pendule Louis XIV, L'Ecaillie
3. Pierre Ramond, *La Marqueterie*, p. 90, L'Ecaillie
4. B. Consedine, M. Jamet, A. Ostrup, *The conservation of two pieces of Boulle Marquetry in the Collection of the J.P. Getty Museum*, ICOM Committee for Conservation, 9th tri-annual meeting, Dresden 1990

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fig. 1 Religieuse mit Boulle-marqueterie;
Messing als Hintergrund, Zinn und
rotunterlegtes Schildpatt als Einlage.
Paris, um 1680
Uhrwerk: Balthazar Martinot



fig. 2 Tête-de-poupée mit Boulle-marqueterie;
Zinn als Hintergrund, Messing und
rotunterlegtes Schildpatt als Einlage.
Paris, um 1690
Uhrwerk: Isaac Thuret

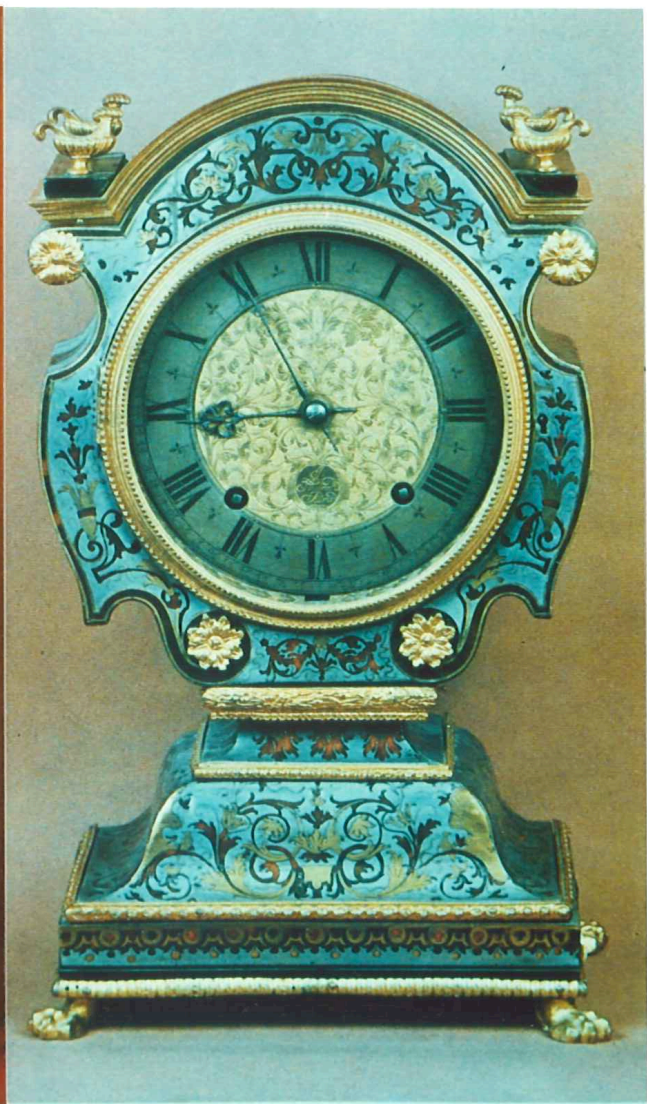


fig. 3 Pendule Louis XIV
Marqueterie aus dunkel unterlegtem Schildpatt
der unechten Karettschildkröte und Messing.



fig. 4 Pendule Louis XV
Marqueterie aus dunkel unterlegtem Schildpatt
und Messing. Uhrwerk: Ferdinand Berthoud



fig. 5 Acht Schildpattplatten von echten Karettschildkröten mit unterschiedlichen Färbungen und Strukturen (Grösse ca. 20-30 cm)

