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Glasrestaurierung

Bereits vor 350 Jahren war man sich bewusst, „die Erfindung des Glaßes als eines ungemein nuetzlichen Wercks" anzusehen. Vom Fenster bis zum Trinkgefäß: Glas ist eines der wichtigsten Produkte unseres Alltags. So groß wie die Vielfalt der Glasprodukte sind auch die Möglichkeiten seiner Restaurierung.

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Abb. Detail of a schaft piece from the chandelier in the Gobelizimmer

Conservation and Restoration of two Glassarmchandeliers from Schloss Eutin

Eutin Castle and Its Cultural History

For over 800 years, the castle complex was an important center of Northern European history, first as a episcopal and later as a grand-ducal residence. The Eutin Castle Foundation is dedicated to the preservation and research of this listed monument ensemble. This includes the castle, its art and cultural-historical valuable collections, the extensive castle gardens, and the kitchen garden.

The castle museum conveys to visitors through its magnificent furnishings and extensive portrait collection a vivid impression of courtly life at the time.[1] Among other things, the castle houses a collection of the highly varied chandeliers. Of these, eleven, significantly shape the appearance of the interior rooms through their individuality

The earliest preserved objects are two glass-arm chandeliers from the middle of the 18th century with Bohemian provenance, whose conservation will be described in the further course of this article. Furthermore, the castle contains the following chandeliers from the late 18th and early 19th centuries: a ceiling lamp, a chandelier from the Saxon Royal Mirror Factory in Dresden, a glass-arm chandelier from England, and one designed by architect Karl Friedrich Schinkel (1781–1841). Four other chandeliers, which were added later to the knights' hall and the Wedgwood room, were made

Abb. 2 Kronleuchter im Gobelinzimmer vor Bearbeitung (Inv. Nr. 03071)

Abb. 3 Kronleuchter im Tapetenzimmer vor Bearbeitung (Inv. Nr. 02455)

in Vienna around the middle of the 19th century by J. & L. Lobmeyr in the style of Maria Theresa lustres.

Condition and Documentation of the Chandeliers

In 2023, the castle's curator, Dr. Sophie Borges, identified a significant threat to several of these chandeliers. Some ornaments were no longer safely fixed due to corrosion of the wiring, and in other cases the stability of the objects was questionable. Before measures for securing, restoration, or long-term conservation could be undertaken, the current condition and damage had to be documented and assessed. Some provenances and cultural-historical classifications were incomplete, and it appears that the chandeliers have never been professionally conserved.

First, I, as a conservator and museologist, together with Dr. Käthe Klappenbach (former curator of the Chandelier Collection at the Prussian Palaces and Gardens Foundation Berlin-Brandenburg and author of fundamental/groundbreaking literature on the history of chandeliers[2]), conducted a preliminary examination and scholarly classification of the chandeliers, including their art-historical significance, origin, materiality, construction, and condition. Subsequently, the necessary and desirable measures were comprehensively outlined, including the individual work steps for conservation and restoration as well as the documentation of the objects. Long term, the extensive planned restoration project on the historical chandeliers will secure a collection of regional and cultural-historical significance. It serves to preserve the chandeliers and supplements research on chandeliers in general.

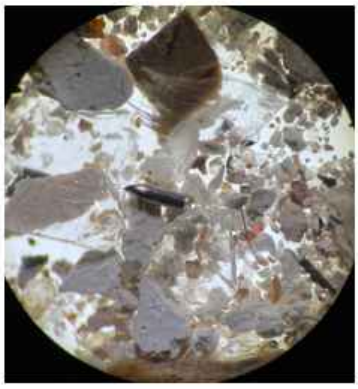

Abb. 4 Mikroskopische Aufnahme der gesicherten Materialreste

Abb. 5 Holzkuchen mit Vertiefungen für die Aufnahme der Glasteile

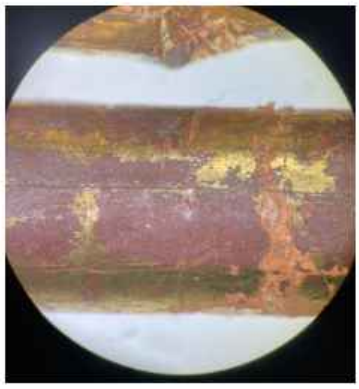

Abb. 6 Vergoldetes Papprohr unterm Mikroskop

Abb. 7 Arbeitsplatz im Gobelinzimmer

Abb. 8 Eines der verlängerten Schaftteile

Abb. 9 Verlängertes Schaftteil im Einsatz

Early History of Glass-Arm Chandeliers

Until the end of the 17th century, it was possible to manufacture chandeliers from metal frames with glass or rock crystal ornaments as well as with inserted or hanging hollow glass beads or glass elements. This was the only way that the weight of the arms could be supported.

Only after 1670, thanks to the addition of stabilizers such as chalk, lime, or lead, was it possible to create a glass with which stable chandelier arms could be manufactured.[3] This made the use of metal arms obsolete. With this development of the material, the more affordable glass-arm chandeliers could be produced, which made them accessible to a broader audience. Because of their transparent appearance, they fit aesthetically into many rooms. During the day, the chandeliers reflected sunlight, and at night they gave celebrations with candles a special brilliance. First and foremost, they illuminated themselves and not the surrounding space.

The earliest known evidence of their production comes from the "Italian glass factories" founded in 1679 by glass merchant Ludovica Savonetti-Fremel, who came from a Venetian glassmaking family.

Abb. 10 Schaft der Krone im Tapetenzimmer: vorher (links) und nachher mit ausgetauschten Glaselementen aus dem Fundus (rechts)

Abb. 11 Glasblatt am Kronleuchter und im Abformungsprozess auf Silikon umgeben von Plastilin und Gips

In the glass factories she operated in Dessau and Electoral Saxony, the manufacturing of glass-arm chandeliers was first officially documented at the end of the 17th century.[4]

These luminaires, assembled using a modular system, were somewhat fragile, but damaged parts could be relatively easily replaced. As a consequence, only a few chandeliers of the time still exist in their original condition. When replacement was not possible, they were removed from their original context and stored in attics or furniture rooms, through which their history, context and former value were lost.

Fortunately, this is not the case with the chandeliers dealt with here. They provide unique insights into the glassmaking craft of their time.

Restoration of the Chandeliers

In August 2025, the extensive restoration project of ten of the eleven chandeliers in Eutin Castle began. The work included disassembly, cleaning, stabilization, rewiring, restoration, reassembly, and brief documentation. In the context of this article, the conservation and restoration of the two Bohemian glass-arm chandeliers will be treated in detail, beginning with the chandelier in the Gobelin room (Fig. 2).

Here hangs a glass-arm chandelier (Inv. No. 3071) with twelve glass arms in two tiers, with a height of 109 cm, and a diameter of 89 cm. It was probably manufactured around 1750 in Bohemia and is in good condition, although some pendants are missing and there are other minor losses.

Due to corrosion, breakage, and instability of the wires, a conservational cleaning was necessary and also including a rewiring of all connections. The arms of the chandelier are freely formed and have three fused glass loops to which various pendants and pressed glass leaves are attached. For the manufacture of the pendants, the hot glass mass was pressed into metal molds. For molds with floral patterns, little additional work was needed; pendants with geometric shapes had to be subsequently ground and polished in order to achieve good light reflection.

In addition to the twelve glass arms with fused candle sockets and matching drip pans, sixteen twisted small horns are inserted into the wooden cake, which is covered by a glass bowl gilded on the inside. Various spherical and baluster-shaped, ribbed hollow glass parts form the shaft and finial.[6]

The glass-arm chandelier in the Tapestry room (Inv. No. 02455) shows similarities to the chandelier in the Gobelin room but differs in its formal language (Fig. 3). It was probably also manufactured in the middle of the 18th century in Bohemia, has six glass arms and twelve downward-turned small horns (or bishop's staffs), to which pressed and ground elements alternate. This chandelier has a height of 105 cm and a diameter of 81 cm. Here too, the arms and horns are freely formed, equipped with candle sockets and glass loops to which brush-molded and faceted, ground pendants are attached. The shaft parts consist of blown spheres and other hollow glass elements.

It is striking that two parts stylistically do not match the rest of the chandelier: In the middle of the shaft there is a hollow glass sphere with a diamond pattern, which is rather of English origin, as well as a ribbed solid glass element that also is not of Bohemia n origin (Fig. 10). In addition, three small horns and two ornamental parts are missing. During restoration, fragments of two of the missing small horns were found in different locations and rejoined. The minimal losses were closed with individually made silicone molds and epoxy resin to ensure stability.

Since the arms of the glass-arm chandeliers are only inserted into the wooden cake, special care is required during handling. Sometimes it is advisable to remove the chandeliers directly from the ceiling using auxiliary tools. For these two chandeliers, the decision was made to remove the individual parts first before the shaft was taken down. In this way, they could be selectively removed, labeled, and laid out in the correct sequence.

Most damage to objects occurs during handling, which is why particular caution is necessary with these fragile objects. Before removing the arms and small horns, a detailed plan for the sequence and procedure was discussed. The area below the hanging chandelier was secured with fabric and the scaffold stabilized. From the scaffold, the inserted parts were selectively and carefully removed and placed on a table.[7]

After a visual inspection of the glass condition and stability, the ornamental parts were methodically removed from the glass arms and small horns. Cleaning was carried out with a surfactant-free cleaning agent (Triton X 100) and water, followed by rinsing with deionized water to neutralize the surface and remove all residues and contaminants. Minimal wax residues could be removed with petroleum ether. From the dried and laid-out surfaces, any remaining moisture could escape.

During the cleaning of the wooden cakes and gilded glass bowls, various traces, deposits, splinters, and material residues came to light (Fig. 4). In the process, residues of plaster, wood, glass, metal, gold, sand, dust, paint, fiber, and a few particles not yet identified could be secured for later determination within future scientific research.

The wooden cake, presumably made of beech, which consists of several glued layers, was cleaned dry with brushes to avoid any introduction of moisture. The individual insertion spaces are marked with Roman and Arabic numerals/numbers on the wooden cake to ensure exact assignment of the glass parts (Fig. 5). It was apparent that each glass element only fit at a specific location and was not arbitrarily interchangeable. In the middle of both wooden cakes is a flat iron with a thread and two holes for fixation. The thread allowed secure support for the wooden cakes on the shaft.

In the glass-arm chandelier from the Gobelin room, it only became apparent after disassembly that the iron shaft is covered with gilded cardboard tubes (Fig. 6). This causes the light reflections to appear more golden and the object optically gains in preciousness. It is indicated that a more cost-effective gilding method was used here. Typically, the process is carried out so that the substrate, for example wood, is first provided with a white primer (plaster or glue-chalk ground) and then the poliment is applied, followed by gilding. In this case, however, a simpler oil gilding may have been used, in which the cardboard was painted with a color similar to poliment and then gilded.[8]

In both chandeliers, shaft parts were visible that remain hidden when assembled. Although they appear inconspicuous, they are crucial for stabilizing and positioning the hollow glass shaft parts. Generally shaft parts have openings on two sides through which they are guided over the shaft. These openings are straight-edged and the diameter is not adapted to that of the shaft. This often creates considerable play between the shaft and glass, which in turn can cause damage to the glass

and impairs the optical straightness of the shaft. In this case, the shaft parts can hang askew and no longer be centered. Figures 8 and 9 show that these shaft parts, hidden when installed, are tapered and extended both upward and downward. These extensions have smaller openings that fit more closely to the shaft. The outer diameter of these extensions better matches the different diameters of the openings of the hollow glass shaft parts. This results in a tighter fit and better centering on the shaft, thereby significantly reducing the likelihood of damage. The special design of these shaft parts testifies to very thoughtful and innovative construction.

After these parts were identified, cleaned, documented, and recorded, we could address the incorrect shaft parts. In the depot collection, we discovered two matching shaft parts. This made it possible to replace the sphere with the diamond pattern with a slightly smaller, smooth sphere, while the solid, ribbed shaft part was exchanged for a smaller sphere (Fig. 10).

Despite the good condition of the two chandeliers, some ornamental parts are missing. Since ornaments from this period are hardly available anymore, it is difficult to replace them with original parts. As an alternative solution, I created copies with epoxy resin as part of my restoration work. The initial form was supplied by the existing ornamental parts from which casts were then made. This process involves casting an original ornament with silicone and plaster. A suitable epoxy resin is then poured into the resulting negative mold to create a positive impression of the original (Fig. 11). This can be post-processed if necessary. Although the process is time-consuming and labor-intensive, the effort is often worthwhile. For the viewer, the reproductions are not easily recognizable due to the height of the hanging chandelier, but they fill the gaps and contribute significantly to the aesthetic perception of the object.

After the conservation work on the shaft, it could be reassembled. Molton inserts served as a buffer between the gilded glass bowls and the wooden cake. Subsequently, the individual glass ornaments were wired according to their position based on historical models and reattached at their original position. Flexible stainless-steel wire of 0.4 mm and 0.6 mm thickness was used for this. All pendants were correctly aligned, and the cut or patterned side was turned inward. This maximizes light refraction, makes best use of the light reflection effect, and brightens the room during the day. Before hanging, all glass arms and small horns were assigned a position number. The fine numbering was done in an inconspicuous location with acrylic paint and with a transparent coating (Paraloid B-72). The shaft was then rehung to the ceiling and the individual parts of the chandelier were systematically returned in reverse order (Figs. 12, 13).

Abb. 12 Gobelinzimmer chandelier after conservation & restoration

Abb. 13 Tapetenzimmer chandelier after conservation & restoration

About the Author

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Footnotes

[1] Cf. Sophie Borges: Eutin Castle and Its Gardens, Kiel 2023.

[2] Klappenbach, Käthe: Chandeliers with Ornaments of Rock Crystal and Glass as well as Glass-Arm Chandeliers until 1810, Berlin 2001 (Collection Catalogs of the Art Collections Applied Art Lighting Fixtures/Prussian Palaces and Gardens Foundation Berlin-Brandenburg) and Klappenbach, Käthe; Hartmann, Eric; Kropmanns, Birgit: Chandeliers of the 17th to 20th Centuries from Brass, "Bronze Doré," Zinc Casting, Porcelain, Wood, Antler, Amber, and Glass, 1st Edition, Regensburg 2019 (Collection Catalogs of the Art Collections/Prussian Palaces and Gardens Foundation Berlin-Brandenburg).

[3] For detailed information see Klappenbach, Käthe: The "Glass Crowns." Glass-Arm Chandeliers from European Glass Furnaces, in: Cremer, Annette C. (ed.): Glass in the Early Modern Period: Production, Use, Significance, Analysis, Preservation, Heidelberg: Heidelberg University Publishing,

2022 (Court Culture Interdisciplinary (HKI) – Writings and Materials of the Rudolstadt Working Group on Residence Culture, Vol. 6), pp. 451-479. Link to the article: https://heiup.uni-heidelberg.de/catalog/book/821/chapter/14194 (25.01.2026).

[4] See footnote 3.

[5] Pendants (French): Umbrella term for all parts hanging on a chandelier.

[6] Shaft finial: Arrangement of various perforated vase- or baluster-shaped glass parts on a silvered metal rod.

[7] Sincere thanks to Dr. Sophie Borges for her support during disassembly and return of the chandelier.

[8] Sincere thanks to master gilder Anja Isensee for her explanations of this type of gilding.