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Conservation and Restoration of a Figurative Sculpture Standing over a Porcelain Vase in Niavaran Palace Complex

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ABSTRACT

A large number of decorative vases found in museums, palaces, and private collections are made of porcelain. Some are valuable and precious since they are crafted either partially or entirely, considered as having higher artistic value. In spite of cultural and historical value of such porcelain and ceramic artworks as well as their fragile nature, most of the studies conducted so far are in connection with industrial ceramics. The present paper is focused on investigating the conservation and restoration of an artistic porcelain vase. The case study was carried out on a ceramic vase, belonging to Sahebgharaiyeh Palace, built in Qajar era (1794-1935), as part of Niavaran cultural and historical complex. For this purpose, the sculpture on the vase was finely molded. The half-destroyed sculpture was recreated and was identical to others. The results indicate that specific conservation and restoration process can be effective in repairing ceramic vases as well as preserving its artistic and historical value.
KEYWORDS: Porcelain conservation, porcelain restoration, molding figurative sculpture, Qajar dynasty, Qajar figurative tiling, Sahebgharaniyeh Palace

INTRODUCTION

Niavaran cultural and historical complex is a historical palace, situated in the northern part of Tehran, Iran with a 9000 m^2 area. It is traced back to a garden in Niavaran, Tehran [1]. Presently, it is comprised of five monuments, considered as museums, including, Niavaran Palace Museum, Ahmad Shahi Pavilion, Sahebgharaniyeh Palace, Jahan Nama museum and a private library, and other cultural, historical and natural attractions including the Blue Hall, a Private Cinema, Jahan Nama Gallery, and Niavaran Garden. The quadrilateral design of the palace and its interior traditional design are inspired by Iranian history and accompanied by an application of modern design and technology. Its decorations have also been inspired by the pre- and post-Islamic arts [2].

First, Fath-Ali Shah (1772–1834), the second king of Qajar dynasty, ordered to design and plant a pleasant Garden with a small house as a resort. Then Mohammad Shah (1808 – 1848), the third king of Qajar dynasty, placed an order to start building a bigger house, taking the first steps towards the construction of Sahebgharaniyeh. Following his death in 1851, Naser Al-Din Shah (1831–1896), the fourth king of Qajar dynasty, ordered Haj Ali Khan Hajeb Al-Dole to construct a luxury building in Sahebgharaniyeh Palace [3], including Shah-Neshin (alcove), Korsi-Khaneh, bathroom, Sofreh-khaneh (dining room), tea-house and bar [2]. The palace constructed by Naser Al-Din Shah in the garden was originally referred to as The Niavaran Palace and was later renamed to Sahebgharaniyeh Palace [1], as shown on

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Figure 1: Front View of Sahebgharaniyeh Palace (© Leila Farahbod)

Among Iranian kings, he was the first one traveled to Europe while the previous kings had never been to Europe [4]. As a result of his journey, arts and architecture of Iran underwent a lot of changes as he was influenced by European art. For example, figurative bodies were rarely used in Islamic arts, on the other hand it seems numerous figurative elements and even naked pictures which had never been used in arts in Iran suddenly started to appear in paintings, tile works, sculptures and other works of [illegible] ing his trip to Europe. **Error! Reference source not found.** and 1 illustrate figurative tiling in the bathro[illegible]ebgharaniyeh Palace. Also, all around the complex is surrounded by walls decorated with brick and stone-works, each having tile work in their middle part, as shown on Figure 4.

Figure 2: figurative tile available in bathroom of Sahebgharaniyeh Palace (© Leila Farahbod)

Figure 3: figurative tile in bathroom of Sahebgharaniyeh Palace (© Leila Farahbod)

Figure 4: Part of the palace yard, with figurative tiling in the middle (© Leila Farahbod)

Figure 5: A closer view of figure 4, figurative tiling (© Leila Farahbod).

Following the Naser Al-Din Shah's demise, Mozafar Al-Din Shah (1853-1907) made some changes in the building and destroyed part of harem. Another point related to the yard of the palace is that he signed the constitution of Iran in that yard. The palace was renovated following the overthrow of Qajar dynasty and under the ruling of Pahlavi I [2]. Under Pahlavi II, the second floor of Sahebgharaniyeh palace played host to the secretary room, dentist room, meeting room as well as the waiting room for the foreign missions and also personal office of Mohammad Reza Pahlavi, as shown on Figure 6. The restored and unrestored vases can be seen in the left and right corners of the room, respectively. As the vase under study was vulnerable to damages caused by transportation, it was decided that it should not be moved to the workroom, but be kept in the room and restored therein.

Figure 6- Mohammad Reza Pahlavi's office (©Farahbod)

Under Pahlavi II, some changes were made in the complex, including the addition of the royal school to the Niavaran Palace building. At that time, all of the buildings of the complex were demolished, excluding Sahebgharaniyeh palace and the Niavaran Palace building. It is noteworthy that Mohammad Reza Pahlavi and his family were living there for some months of the year and it was their last place of residence before abdicating the throne [3].

Not only are the exterior and interior architectures of Niavaran Palace Complex glorious and impressive but also the entire area of the walls around the complex are decorated with brick and tile works. There are several tile works in the middle of each brick-work wall. Floral decorations as well as birds may generally be found as the main theme of these tile works [5].

DISCUSSIONS

There are six steps in a conservation or restoration project including: historical data collection, conducting comparative studies, collection of artistic data, methodology, pathology, and conservation and restoration operation. These steps are described as follows:

Collecting Historical Data

There was less historical data about the object registered by No. 422 in Sahebgharaniyeh museum, so it was required to collect information from different sources to gain more data for this study. A fine clue in documents of Sahebgharaniyeh was the point that the museum keepers asserted that the vase had been brought from Dresden, Germany. The conducted studies revealed that in

his second journey to France in 1878, a pair of vases had been gifted to Naser-Aldin Shah as confirmed by museum authorities. Therefore, the vases have been kept in the museum since Qajar dynasty.

Conducting Comparative Studies

By perusing the vase, a special trademark was noticed on the lid and the body of it, as illustrated on Figure 7. The mark consists of a pair of crossed swords on a black and white background. Further investigation showed that this mark is comparable to Meissen trademark as shown on Figure 8.

Figure 7: Trademark of Meissen on vase body (© Leila Farahbod)

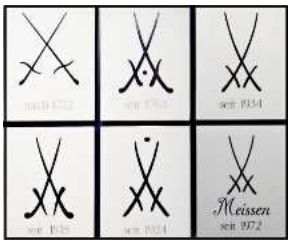

Figure 8: Trademark of Meissen over the years (©www.meissen.com)

Meissen porcelain or Meissen china is the first European hard-paste porcelain that was developed from 1708 by Ehrenfried Walther von Tschirnhaus. Production of porcelain at Meissen started in 1710 and attracted artists and artisans to establish one of the most famous porcelain manufacturers under the name of “Staatliche Porzellan-Manufaktur Meissen GmbH” which is still engaged in business. Its trademark logo, the crossed swords, was designed in 1720 in order to introduce its products to the world. The crossed swords mark is one of the oldest trademarks all over the world. It was the dominant style in European porcelain market until 1756 [6]. The rarity and expense of Meissen porcelain meant that it could be initially bought only by the upper classes. Meissen took orders from elites of Russia, France, England and other European countries. Rich people of Europe accumulated large collections and when a wealthy class emerged in the United States, affluent families like Vanderbilt started gathering their own collections. Many of these collections then found their way into the world's great museums [6]. Naser al-Din Shah who received a pair of porcelain vases, as a gift, refused to ment 173 me of Queen Victoria of the United Kingdom (1819-1901) in his memoires due to the religious atmosphere of the country ime [4].

The Meissen trademark has undergone some changes over the years. For instance, the mark carved on the vases that were gifted to Naser-Aldin Shah is one of the oldest trademarks ever used by Meissen Co. The Saxony Swords mark also appears on all other products and vases of Meissen. The company has other trademarks like "K.P.M" and "A.R" or "M.P.M" but the Saxony Swords is the only sign which has been used for more than 275 years on the products of the company. In most cases, the swords are in a dark blue color crossed in a white background. In production process, the mark is manually painted on products using a blue color, then it is put in the kiln in order to be coated by glaze. Next, it is removed from the kiln and finally put into the kiln once more [3].

Collection of Artistic Data

As presented in Figure 9, the vase has a height of 104 Cm and maximum diameter of 45 Cm. Although it is a large vase, there are several fragile attachments to it, such as angels, flowers, and leaves. There are ten half-naked or nude sculptures of angels on different parts of the vase, whose faces are similar to each other. Two angels are on the lid and two in the middle part of the vase just next to the Meissen logo, pointing the importance of the trademark. On the upper side of the vase, there are four slightly larger angels seated two by two and against each other, as shown on Figure 10.

Figure 9- Vase image before restoration (© Leila Farahbod)

Figure 10-Position and profile of damaged angel (© Leila Farahbod)

A wide variety of shapes and colors used in flowers and leaves are of primary importance. The other feature may be attributed to the lack of similar flowers or leaves. Nevertheless, the work can be considered as unity, making it a combination of excellence, diversity, colorfulness, and fragility.

Methodology

In this section, experiments and crafting methods for creating such a vase are described. To put it in a nutshell, the kind of porcelain material used in the vase is identified through the XRF method. Then the process stages, attaching adjunct parts, and the drying process are explained. The kiln temperature used in the past was found using the XRD experiment. Finally, ornament and glazing methods are described in this section.

XRF Method

X-ray Fluorescence (XRF) experiment has proved to be a powerful and reliable technique able to provide immediate answers related to cultural heritage objects [7]. Monochromatic X-rays were generated by an X-ray tube and bombard a very small piece of the specimen. The characteristic X-rays were collected by a detector and used to identify the elements in the specimen as well as to calculate how much of each element exists in the sample [8].

For the purpose of this paper, some specimen from the broken parts of the angel sculpture were collected by a sharp blade about half cubic centimeter in length and used in XRF technique. The aim is to identify the place of the vase among different porcelain products. As shown in Table 1, SiO_2 and Al_2O_3 were the most frequently used substances in the vase, with the percentages of 65% and 27%, respectively. This information makes us able to classify the vase as a hard porcelain white-ware.

Table 1: XRD results of (ıse (© Leila Farahbod)

Philips-XRF/UniQuant Analysis Report
Customer name: .....
address: .....
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http://www.uniqu

C:\UQ5\USER\1480Rh\JOB\JOB.088
Sample ident = Ceramic
Farahbod

Compound	Wt%	StdErr	El	Weight%	StdErr
SiO2	65.67	0.24	Si	30.70	0.11
Al2O3	27.07	0.22	Al	14.33	0.12
K2O	4.20	0.10	K	3.49	0.08
CaO	0.787	0.039	Ca	0.563	0.028
Na2O	0.761	0.038	Na	0.565	0.028
Fe2O3	0.597	0.030	Fe	0.418	0.021
PbO	0.242	0.012	Pb	0.224	0.011
MgO	0.152	0.011	Mg	0.0916	0.0068
SO3	0.138	0.007	Sx	0.0552	0.0028
TiO2	0.123	0.006	Ti	0.0739	0.0037
P2O5	0.0642	0.0044	Px	0.0280	0.0019
Rb2O	0.0353	0.0018	Rb	0.0323	0.0016

KnownConc= 0 REST= 0 D/S= 0.200
Sum Conc's before normalisation to 100% : 67.2 %

Process Stages

The hollow slip casting method has been used in process stages. In the first stage of this method, a plaster mold was obtained from the main form of the vase body without any attachment. After that, the raw materials were prepared and gradually poured in the plaster mold. Then, these substances were absorbed into the mold wall forming a thin layer. After a while, the thin layer became gradually thicker. Those materials not absorbed into the vase body were removed from the vase and again, new substances were poured into the mold. Again, the substances were stuck to the thicker layer, losing their water and thus shrinking. Due to the occurrence of shrinkage, it was separated from its initial plaster mold, thus forming the vase body. Base of the vase was separately formed using the same technique. These two parts were internally attached to each other using a cylindrical metal rod passed through the base and body. In the end, the rod was internally fixed to the vase, creating an integrated object from two separated parts using a glue.

Attachment of adjunct parts

There are some angels in different sizes located in different parts of the vase. Two couples of angels are seated on the upper body. Each couple of angels at opposite corners are identical. One of the angels broken and only its body under the waist remains undamaged was restored and conserved to appear similar to its pair. Moreover, a number of damaged flowers and leaves of the vase was also restored and further details of the procedure of restoration process is explained in other papers.

Drying Process

In drying process, the vase might have been dried in a place without any airstream and only a wet cloth was used. The air conditioner was set on a constant temperature in order to avoid allowing any airstreams to flow through the workshop.

XRD

The XRD experiment was carried out at the same kiln temperature by which the original vase had been dried. The aim of the XRD method[1] is to determine qualitative and semi-quantitative characteristics of minerals as well as type of composition or phase of the material [9]. The XRD experiment is able to characterize the composition of material [10].

According to the results obtained, kaolin was transformed into Mullite and Quartz compositions under the certain temperature. Mullite is formed in temperatures above 1200-1400ºC [11], and Quartz is crystallized in temperatures above 870ºC [12]. As a results of the XRD experiment, Mullite and Quartz are formed at 1050-1400ºC. On the other hand, XRF shows hard porcelain as a kind of ceramic which anneals below 1350-1450ºC. The final analysis of the results of both XRD and XRF experiments shows that the optimum annealing temperature for porcelain is 1400 ºC. Following the sampling process, the specimens collected were tested at the University of Science & Technology laboratory, Iran.

[1] X-Ray Diffraction

Ornament and Glazing Methods

At this stage, the processes had simultaneously been carried out using manual art and then the vase was probably annealed in the kiln. At first, all of the glazed colors except for gold were painted on the vase using a brash and then annealed in the kiln. Next, the golden parts had been painted and annealed again in the kiln because it requires higher temperatures [3].

Pathology

Damages on Chinese antique are categorized into four groups: external physical and mechanical, deterioration of adjunct parts, and inappropriate restoration in the past, and finally damage from contamination of material on the surface.

Physical and Mechanical Damages

Objects made up of China are highly resistant to temperature tolerance. Because China are considered more fragile, it fails to resist crack and fracture. Particularly, if its weight is high and its adjunct parts are discernible, it is more likely to break [3].

Physical and mechanical damages are the most obvious as compared to other damages since it can frequently occur due to inappropriate handling. One of the main four angels seated on the upper of the vase is already broken, as shown on Figure 10. Moreover, there are three other angels, each having generally two wings, among which three wings had been broken and missing. Also, the vase has many broken and missing flowers, leaves and stems.

Damage to Adjunct Parts

As aforementioned, different parts of the vase are connected to each other, leaving a thin line on the intersection area. To conceal the thin line, it is covered by a piece of fabric. The fabric had become dilapidated due to temperature changes in the past.

Previously Inappropriate Restoration

Taking a precise look at the angel located in the left side of Figure10, it is obvious that there is a narrow line of resin between body and head of the angel making sense an uneven edge over the broken part. This has caused an undesirable yellow color to be created on the angel on the one hand, and has made the two separate parts of the angel not to fit each other, on the other hand.

Contamination on the Surface

The entire surface of the vase was covered with a thin layer of contaminants and dust inside the inner parts of the angels, flowers, stems and leaves. Because the museum is located in the traffic-involved areas, air pollution would be excessive and seriously pose a threat to precious artworks in the museum.

Restoration Operation

This stage includes three sub-stages, including cleaning of superficial contamination, removal of previously inappropriate restorations, and finally restoration and conservation of physical damages, each of which will be discussed in the following.

Removal of Superficial Contamination

A mixture of water and a slight percentage of soap was cautiously used as a solution along with a piece of fabric to remove superficial contamination from the vase. Then, a cotton swab for cleaning porosities within the flowers was used. Sometimes, a solution of ammonia can be used for the removal of dusts or any contamination [3].

Modification of Previously Inappropriate Restoration

The detached head of an angel seated on the upper part of the vase was improperly linked to its body by former mender, which is indicative of a yellow curve line around its neck, as shown on Figure10.

To refit and modify it, a syringe containing acetone was used to detach the head in several steps: First, having removed the glue, second, the two parts were washed and cleaned, and then reattached, using Paraloid[2] B72 15%. After the restoration, there was no sign of yellow line around the neck of the angel. The head precisely fitted the body.

Restoration and Conservation of Physical Damages

The Anastilosie method was used for the restoration process. That is, a technique applied to restore the object to be very image of the original one [13]. One of the angels was damaged and broken at the upper body. The intact angels used as a model for the molding process by which the broken part was restored [3]. During molding process, plasticine paste, in orange color was used to cover those parts of the intact angle which not needed to be molded and aimed as a base for molding, as shown on Figure11. The

[2] Paraloid B72 is some kind of strengthening material that is used as glue f nd glass, and it is sometimes used to stabilize paintings or painting on ceramic. Naturally, it is solid and can be solved in Acetone, Toluene and Thin 1, 2004).

angel was surrounded by a piece of cardboard in a cylindrical shape to form a wall for the molding material and the gaps in the cardboard were covered using adhesive materials as paper adhesive tape, as shown on Figure Figure **12**.

Figure 11: Covering existing parts of angel by plasticine (© Leila Farahbod)

Figure 12: Making a cylindrical wall using a sheet of cardboard (© Leila Farahbod)

Some silicon (TLM715-725) and an adequate amount of the relevant hardener were mixed and poured into the cardboard cylinder in order to start the molding process. It took long time for silicon to harden requiring, in this case, 8 hours to turn into a solid polymer [3]. After this period of time, plasticine and cardboard were removed from around the angle, as illustrated on Figure 13.

Due to the existence of many adjunct parts in the angel's body including its wings, it was necessary to choose the best angle for cutting the mold. Therefore, the mold was cut in three parts using a surgery knife, without causing any damage to any parts of the sculpture, as shown on Figure 14.

Figure 13: Molding the sculpture (© Leila Farahbod)

Figure 14: Cutting the mold from the best angle (© Leila Farahbod)

The three remaining parts were attached to each other using plastic bands. It should be noted that no gap or deformation in the structure of the mold to happen. Next, a polyester resin mixed with an adequate percentage of hardener to prevent air bulbs from forming was slowly poured into the mold. After a short period of time, the mixture continued to solidify and the angel sculpture was then formed, as shown on Figure 15. To link the formed sculpture to the remaining part of the body, three holes were carved on it. Metal bars were fixed in the holes. The hands of the angel were crafted on two bars using Chinese flower paste[3] and the bar passing through its body was embedded into the remaining body. It should be noted that the wings of the angel were separately made and attached to it. The inside of angel was filled with cotton to prevent it from becoming overweight. Using polyvinyl acetate resin, the upper half angel was attached to the remaining body as shown on Figure17. The angel was then carefully polished by the use of an electrical polisher, as shown on Figure18.

[3] Chinese flower paste is flexible and shatterproof that is made by a cup of polyvinyl acetate added to half cup of starch corn flour mixed with ten drops of glycerin and pounded for a long time. Then, the obtained material is heated in a pan [illegible] perature and lubricated by a small amount of Vaseline. There is no need to turn over the paste, so after a few minutes it is taken out of pan and pounded [illegible] paste should be kept in a cold place to cool off slowly before getting proper for use (Farahbod, 2004)

Figure 15: Connecting bars in the holes (© Leila Farahbod)

Figure 16: Crafting wings of the angel (© Leila Farahbod)

Figure 17: Attaching upper half to body of sculpture more daintily (© Leila Farahbod)

Figure 18: Using electric polisher to form the angel (© Leila Farahbod)

A bouquet of flowers was crafted using Chinese flower paste and placed on the hand of the angel, similar to other angels, as shown on Figures 17 and 18. At final stage, the crafted angel was painted with the same colors, but a little brighter used for other angels, so that the visitor can easily distinguish the crafted angel from other original angels as shown on Figure 20.

Figure 18: **Sculpture before painting process from the front view (© Leila Farahbod)**

Figure 19: Painted and completed angel sculpture from the front view (© Leila Farahbod)

Figure 20 and 22 show the sculpture prior to the restoration process and the side view of the restored one, respectively. Although John Ruskin (1819–1900) believed that antiques and artworks should remain untouched out of any restoration, here an attempt is made to distinguish the restored angel from other ones, so that visitors and experts can easily recognize the difference.

Figure 20: Side view of angel before restoration showing the lack of two wings (© Leila Farahbod)

Figure 21: Side view of angel after restoration showing creation of two wings (© Leila Farahbod)

Conclusion

From art's standpoint, Qajar dynasty was distinguished from other preceding ruling systems in Iran for making the substantial changes to the pattern design. An explosion of the use of figurative human design and beauty of nature, such as flowers and plants was made, which has not been seen in previous ruling eras. Before Qajar era, the use of human figure design in art was uncommon, as well as flowers were represented as traditional symbolic design.

Over Qajar dynasty (1785-1925 AD), Iranian kings, especially Naser Ald-in Shah was more interested in traveling Europe. This resulted in changes of Iranian arts. As Iran expanded its relation with western countries, many new objects were introduced and imported to Iran. More depictions of natural and figurative human body design can be seen in paintings, photographs, tile works, and ceramic arts since then. In one of Naser Ald-in Shah's travel to Europe, two luxury vases were bestowed to him. The vases were created by Meissen, the first porcelain manufacturer in Europe. These vases have been subjected to damages missed as well as some of their segments were missed. This paper is aimed to restore and rebuild the broken angel in six steps including historical data collection, conducting comparative studies, collection of artistic data, methodology, pathology, and conservation and restoration operation. Each of steps were described in details and then the restoration and conservation operational processes were explained and illustrated in different sections.

This study concluded with significant results which would preserve the value and preciousness of the vase. By using Anastilosie methods, more historical objects can be restored. The importance of this study is due to the recreation of a broken angel which upper part of its body was lost. This is done regarding the similar existing intact angels of the vase.

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