

## RESTORATION OF ARCHITECTURAL OBJECTS' STUCCO DECOR: UKRAINIAN EXPERIENCE

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### Abstract

*The article is devoted to the restoration of stucco decor on facades and in the interiors of architectural objects. The stylistic features of stucco decor of the second half of the 19th and early 20<sup>th</sup> centuries are analyzed. The procedure for work is described, which begins with the examination and cleaning of parts from whitewash, dirt, and paint. A separate technology for removing glue and lime, paint, and oil layers has been developed. After cleaning, the lost stucco fragment is "plastered" using gypsum mortar, from which the restored fragments are modeled. To restore plaster parts of a complex profile, such parts are first made in a soft material, and then a mold is removed from this model, according to which the plaster addition is cast. For the mold, you can use gypsum or formoplast (synthetic elastic material). The part cast in the mold is attached by gluing to the base using thermoplastics dissolved in organic solvents or water-alcohol solutions of PVA dispersion. If the gypsum part is large, it is attached to the base with nails. During the manufacturing process, the gypsum stucco decor is subject to protective and decorative treatment, which consists of three stages: priming, patination, and waxing.*

**Keywords:** Restoration; Stucco decor; Architectural object; Ukraine

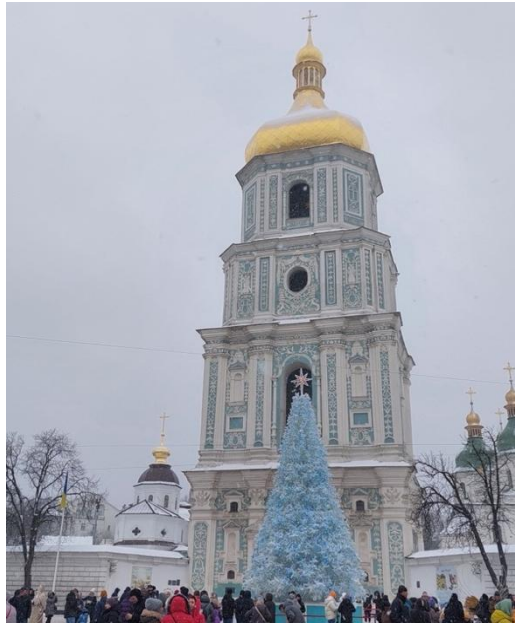
### Introduction

The problem of restoration of so-called architectural decor has always been one of the aspects of restoration activity. If we analyze the practice of restoring stucco decor in Ukraine, it is worth noting that a large amount of stucco decor is located on the facades and in the interiors of Renaissance (if we are talking about Western Ukraine), Baroque, Classicism, Eclecticism, and Art Nouveau objects. The Ukrrestavratsiia Corporation has accumulated experience in reproducing stucco decor and has developed appropriate technologies. Stucco decor traditionally adorned both secular and religious objects, where it had not so much aesthetic as sacred significance. It is worth mentioning here the architectural, phytomorphic, geometric, and teratological decor of the Ukrainian Baroque era churches. The facades of cathedrals and bell towers were decorated with orders and had complexly profiled cornices of great extension,

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which were combined with ornaments in the form of flowers, leaves, and sometimes angels' figures. The moldings of window and entrance openings were also complexly profiled and decorated. A lot of stucco decor instead of traditional sculptures in Catholic Baroque distinguishes the Cossack Baroque of the Hetmanate (Fig. 1).



**Fig. 1.** Stucco decoration of the St. Sophia Monastery bell tower.

It is worth noting that the preservation of stucco decor has always been a problem, as it was primarily lost because of numerous repairs, reconstructions, unsuccessful restorations, and changes in the function of the object. At the same time, even if the facade decor is more or less preserved, the decor in the interiors of historical buildings is in a much worse condition (Figs. 2-4).



**Fig. 2.** Fragment of the facade of a building at 15 Arkhitektora Horodetskoho Street in Kyiv.



**Fig. 3.** Crowning stucco decor of the house at 15 Arkhitektora Horodetskoho Street in Kyiv.



**Fig. 4.** Smoothing the original decor of the stairwell in the house at 21 Yevhena Chykalenka Street.

That is why when reproducing lost elements of stucco decoration, either similar elements are used on the same object (for example, if a stucco detail or mascarons), or analogues are used, or stucco elements are reproduced according to archival photographs or drawings.

The war, which has been ongoing in Ukraine with varying intensity since 2014, has increased the amount of destruction, especially in the east and south of Ukraine. It is already possible to predict a large number of historical sites that need to be rebuilt and restored. The problem is that the information needed for restoration mainly concerns known sites, while in the regions, there is often no information about how the site looked before the war, and there are no

relevant drawings, measurements, or photo recordings (Figs. 5, 6). The most difficult task will be to recreate sites in a state of ruin.



**Fig. 5.** The St. George's Church in the village of Oleksandro-Shulytne, in the Donetsk region, destroyed on August 4, 2023



**Fig. 6.** Ruins of a village church in the Mykolaiv region.

The source base was processed in the following areas:

– general issues of cultural heritage protection – articles by *P. Spiridon and I. Sandu* [1],  
*P. Spiridon et al.* [2];



- publications dedicated to architectural styles – articles by *D. Chernyshev et al.* [3], *M. Dyomin and Y. Ivashko* [4];
- restoration aspects – articles by *P. Gryglewski et al.* [5], *Y. Ivashko et al.* [6–8], *M. Orlenko and Y. Ivashko* [9], *M. Orlenko* [10], *M. Orlenko et al.* [11], and *I. Sandu et al.* [12];
- publications highlighting the impact of war on cultural heritage – articles by *S. Belinskyi et al.* [13], *Y. Ivashko et al.* [14–19], *T. Kozłowski et al.* [20], *A. Nadolny et al.* [21], *A. Pawłowska* [22];
- problems of professional education of art historians and restorers – articles by *P. Gryglewski et al.* [23], *D. Kuśnierz-Krupa* [24];
- monographs devoted to the Art Nouveau style in Ukraine [26] and the reliability of the restoration of Art Nouveau stylistics in historical objects [27].

The study of the source database revealed the following. The topic of stucco decor, its stylistics, and problems of preservation and restoration was considered mainly in the general context of restoration or the characteristics of a certain style (for example, neo-Gothic or modern) [25]. This problem will also become acute during the post-war restoration of monuments.

The purpose of the study was to focus attention on the stylistic features and restoration technologies of stucco decor.

The objectives of the study were as follows:

- to characterize the stylistics of stucco decoration in Kyiv in the second half of the 19<sup>th</sup> and early 20<sup>th</sup> centuries;
- to present the technologies for restoring stucco decor, which have been accumulated by specialists of the Ukrrestavratsiia Corporation;
- to describe examples of restoring stucco decor.

## Materials and Methods

The study is aimed at analyzing the practical experience of restoring damaged stucco decoration on facades and in interiors. The method of art historical analysis allowed us to characterize the stylistic features of the stucco decoration of Kyiv of the second half of the 19<sup>th</sup> and early 20<sup>th</sup> centuries, which is the most widespread today in the historical buildings of Kyiv and at the same time less protected from unprofessional repairs and destruction, since most of the objects are privately owned. The method of comparative analysis allowed us to analyze style trends, and the method of photo fixation became the evidentiary basis for the conclusions.

Restoration descriptions of technologies were given following the selected research methods, such as the method of comparative analysis and the method of system analysis, since restoration activities are a kind of complex system that functions on the principle of “cause-consequences-methods of elimination.” The study is based on the practical experience of the Ukrrestavratsiia Corporation in the field of restoration and reproduction of plaster stucco decoration. An important component is the method of photofixation, which complements the text part.

## Results and Discussion

### *Stylistic features of stucco decoration in Kyiv in the second half of the 19<sup>th</sup> and early 20<sup>th</sup> centuries*

Gypsum stucco decor has been used in Kyiv buildings since the Baroque era, but it became widespread starting in the second half of the 19<sup>th</sup> century. The interiors of Kyiv houses

from the historicism-eclectic era of the second half of the 19<sup>th</sup> century and the modernist era of the early 20<sup>th</sup> century show that stucco decoration was actively used both on facades and in interiors; stucco details decorated not only the walls and ceilings of apartments but also the main staircases.

Y. Ivashko, in her monograph “Modern in the Architecture of Kyiv,” reduced all types of architectural stucco decor of the second half of the 19<sup>th</sup> and early 20<sup>th</sup> centuries to the following groups [26, p. 126]:

- decor using elements of the order system (cornices, columns, pilasters, and their fragments);
- anthropomorphic decor (female and child heads, atlantes and caryatids, mascarons, multi-figure bas-reliefs) (Figs. 7, 8);
- zoomorphic decor (decor with images of animals, birds, and insects);
- teratological decor (decor with a fantastic combination of flora and fauna, chimeras, and dragons);
- phytomorphic decor (decor using plant motifs, individual flowers and flower garlands, plants with leaves, and wreaths);
- geometric decor (decor with geometric figures);
- heraldic decor (decor with coats of arms and monograms of the owners).



**Fig. 7.** Fragment of the facade at 14 Zahorivska Street.



**Fig. 8.** Bas-relief “Triumph of Phryne” on the facade of a house at 4 Museum Lane in Kyiv.

She reduces the anthropomorphic decor of Kyiv to the following types [26]:

- decor in the form of full-length male, female, and child figures;
- decor in the form of half-figures;
- decor in the form of mascarons, depicting male, female, and child heads.

It should be noted that the anthropomorphic decor in Kyiv houses was not made of stone but of plaster or cement.

The phytomorphic decor of Kyiv is reduced by Y. Ivashko to the following types [26]:

- images of individual flowers, flower garlands;
- images of stylized stems;
- images of stems with thorns and stylized leaves.

She notes that phytomorphic decor was actively used in the form of individual flowers, flower garlands, or wreaths and intertwinings of stylized plant shoots. In addition to flowers and stems, architects used motifs of leaves and stems with thorns. An example of stucco zoomorphic decor in Kyiv Art Nouveau houses is the house at 23 Velyka Zhytomyrska Street (Fig. 9).



Fig. 9. Bas-relief of a lion on the facade of a house at 23 Velyka Zhytomyrska Street.

A comparative analysis of stucco decoration on the facades and interiors of Kyiv houses of the historicism-eclecticism and modern eras indicates the commonality of decorative trends; the most widespread in Kyiv of the modern era were phytomorphic and anthropomorphic decor, while zoomorphic and teratological decor were less common [26]. The facades of Kyiv houses looked decorative due to the significant saturation of their surfaces with decorative elements. In one house, there were types of decor of different styles; for example, on the facade, it could be stucco decoration of the modern era, and in the interior, most often, typical plaster decor of historicism-eclecticism. This is explained by the fact that, unlike European objects of the Art Nouveau era, Kyiv Art Nouveau was mainly a “facade style,” not expressed in either the planning or the decoration of the interiors, which were typical of commercial housing of the late 19<sup>th</sup> century [26].

We have deliberately limited ourselves to the analysis of the stylistic features of the stucco decoration of Kyiv objects of the second half of the 19<sup>th</sup> and the beginning of the 20<sup>th</sup> centuries, since they are the most numerous. If we talk about the functional purpose of Kyiv objects with stucco decoration, then in the Baroque era these were church buildings – cathedrals, churches, bell towers, refectories, cells, and a few palaces, educational institutions, and military offices. In the times of classicism and the Empire style, these were also church buildings, palaces, educational institutions, and administrative institutions, but starting from the second half of the 19<sup>th</sup> century, the practice of decorating residential buildings with stucco decoration became a mass

phenomenon (Fig. 10). In the most expensive residential buildings, stucco decoration was used to decorate both apartments and the main staircase and lobby (Fig. 11).



**Fig. 10.** The central part of the facade of the tenement house at 19 Bulvarno-Kudriavska Street.



**Fig. 11.** Lobby fragment of the Moroz's tenement house at 61/11 Volodymyrska Street.

### ***Cleaning plaster stucco decoration from paint***

Restoration of stucco decoration is a complex process. The work is preceded by inspection and cleaning of stucco details from layers – dirt and paint layers that have changed the relief of the decoration. During the preliminary inspection of the plaster decoration, the state of its preservation is studied: the integrity of the structure and strength. Externally, the fragment may look whole, but with light pressure it may fall apart, and then it must be removed.

If we talk about the list of actions when restoring emergency stucco decoration, it includes removing later layers (whitewash, layers of glue, emulsion, and oil paint) and contamination, repairing damaged fragments, and supplementing lost parts with materials of similar or close to the original composition.

According to the developed procedure, paint layers are not removed directly from the surface of the plaster. Otherwise, the sanded layer of plaster can be lost, and the shape of the stucco fragment can be changed. Not all layers are removed down to the plaster, even if the element was not sanded but was only painted over the plaster. In this case, all layers are removed up to the original paint layer.

The technology for cleaning adhesive and lime stains from plaster parts is different.

Removal of adhesive and lime paints occurs in the following sequence. First, the paint layers are washed away with water and then removed using brushes and scrapers. The strength of the whitewash is determined separately. To remove weak whitewash, scrapers, stacks, and metal spatulas are used for cleaning. To remove strong whitewash, it is first soaked in water and



then cleaned without touching the plaster layer, and after cleaning, the part is washed with water using stiff bristle brushes.

Oily layers are removed in the following sequence. Oily layers are removed with alkaline pastes or washes. The alkaline paste has the following composition: 5kg of sifted chalk and 5kg of lime dough, which is diluted to the consistency of a putty mass with a 20% solution of caustic soda. The paste is applied in a layer 1–2mm thick. Within 0.5–1.5 hours, it softens the old coating so that it can be removed with a spatula. After cleaning the surface with a spatula, the surface of the part is washed with water and a 2% solution of acetic acid and wiped with a dry cloth. To avoid damage to the plaster, it is not recommended to clean the oil paint mechanically.

Film coatings from the surface of a plaster stucco part are removed by chemical washes applied with brushes, followed by manual removal of the softened layers. About 200g/m<sup>2</sup> of wash is used to remove the paint layer. Additionally, a compress made of a rag soaked in wash is applied to the area to be cleaned; the compress is covered with plastic wrap and left for 0.5–1 hour, after which the softened layers are removed with a spatula. The remains of the wash are removed with a rag and wiped with white spirit. This operation can be repeated until the layers of oil paint are completely removed.

### ***Restoration of lost plaster stucco decoration***

To restore lost fragments of plaster stucco decoration, the so-called “plastering” is used. This technology includes applying a plaster solution to the damaged parts of the part, from which the restored fragments are modeled. To slow down the hardening process, 0.3 parts of lime dough are added to the plaster.

All restored areas are cleaned to resemble the authentic parts as closely as possible.

There are certain features when restoring plaster parts of a complex profile. Such parts are first made in a soft material, and then a mold is removed from this model, on which the plaster addition is cast. For the mold, you can use plaster or – and this is more convenient – synthetic elastic material, Formoplast. The elastic mold is additionally fixed with an external plaster “casing.” The use of synthetic material for the elastic mold simplifies the molding of parts, since there is no need for complex and time-consuming work on the manufacture of a piece of plaster mold.

After casting, the part is fed to the previous place for gluing. All excess parts of the gypsum mass are removed. The part cast in the mold is attached to the base by gluing using thermoplastics dissolved in organic solvents or water-alcohol solutions of PVA dispersion. If it is necessary to fill large gaps between the fragments that are being joined, gluing is carried out on a liquid gypsum solution with the addition of 20–25% of PVA dispersion to the water intended for cleaning the gypsum. The surfaces to be glued are pre-moistened with water or a diluted adhesive solution of 10% PVA dispersion to improve adhesion and reduce dehydration of the applied gypsum.

In some cases, when eliminating defects in hollow castings, gypsum mortar is used to increase the thickness of the walls from the inside, filling hollows and large cracks.

If the plaster part is large, it is attached to the base with nails, and to prevent corrosion, the nails are made of brass, stainless steel, and fiberglass. Holes are drilled under the nail in directions perpendicular to the area of the fracture. In this case, the total length of the holes should slightly exceed the length of the nail, and the diameter of the drill should be 5-7mm larger than the thickness of the nail.

The nail is fixed in one of the holes using a filler-thickened adhesive mass or plaster. The fracture surface to be glued is temporarily covered with a polyethylene film with a hole for the nail, and a connecting fragment is applied to properly fix the nail.

The attached fragment is temporarily fixed until the nail is fully fixed. Then, having removed the film, the opposite hole for the nail is filled with the same reinforcing material. After that, the final gluing is carried out.

After drying, the restored plaster part is covered with a 30% solution of iron or copper sulfate and a 10% solution of barium sulfate to give the plaster greater strength.

### ***Protective decorative coatings for stucco decor***

During the manufacturing process, gypsum stucco decor is subject to protective and decorative treatment, which consists of three stages: priming, patination, and waxing. Priming consists of the deepest possible impregnation of the gypsum with drying oil, glue, or shellac, sometimes with thinly diluted oil paint to seal the gypsum surface and reduce porosity, as well as create a strong base for bonding with the subsequent paint coating.

Patination is a variety of decorative methods for imitating materials and is performed with liquid oil and adhesive paints and bronze, aluminum, and copper powders on varnishes of various chemical compositions.

Waxing is the final stage, which is performed with beeswax diluted in turpentine (which is sometimes mixed with soap), stearin, or paraffin. Waxing is aimed at giving the surface water-repellent properties. Sometimes, after waxing, the still-dry surface is sprinkled with pigments, graphite, or talc.

In rooms with dry plaster, it is recommended to use oil paint with wax (paste paint) following the color passport for painting gypsum stucco.

After final sanding, the surfaces are primed with diluted oil paint and painted the first time with oil color and the second time (face painting) with pasty oil paint.

Composition of glue-oil putty:

- animal glue – 2.5kg;
- drying oil – 0.4kg;
- chalk – 7.8kg.

Paint oil color:

- thickly grated zinc whitewash – 1.0kg;
- dry zinc whitewash – 0.5kg;
- turpentine – 0.5kg;
- siccative – 0.5kg;
- wax – 0.1kg;
- natural drying oil – 0.025kg;
- pigments – to the desired color.

900g of turpentine is poured into the melted wax while stirring.

The dry whitewash is ground together with the remaining turpentine and drying oil. The wax solution in turpentine is poured into the thickly grated whitewash, and the resulting mixture is thoroughly mixed. The pigments are additionally soaked in a small amount of turpentine.

Wax coatings are characterized by hydrophobic properties; however, organosilicon water repellents are more durable, and their use has advantages in the following cases:

- when it is necessary to preserve the matte surface of the stucco decoration, which previously did not have a protective finish;
- in the presence of hidden damage, if they can appear during waxing;

– when restoring wax coatings - as modifying additives (in an amount of 1–2% to the wax used).

Of the organosilicon water repellents, 5% solutions of polyorganosiloxanes and polyorganosiloxanes in organic solvents (toluene, xylene, acetone, or a mixture thereof) are most often used. This group of polymers, along with hydrophobic properties, also has reinforcing properties.

## Conclusions

The decoration of buildings with plaster stucco decor was inherent in various architectural styles that took place in Ukraine. If we talk about the period of high baroque as the apogee of the decoration of church facades, then these were traditionally white details against the background of a plastered white wall. The main feature of the so-called “Cossack baroque” from the European baroque was fundamentally different decoration techniques, hereditarily associated with folk art. Such decor was mainly folk-style in nature, as were the murals and icons in the interiors of churches. However, the number of brick churches of the Baroque era on the Right Bank of Dnipro is inferior in number to the number of buildings of the second half of the 19<sup>th</sup> and early 20<sup>th</sup> centuries. In addition, a significant number of churches and cathedrals were destroyed during the so-called “militant atheism” and in the post-war years.

The authors focused on the period of the second half of the 19<sup>th</sup> and the beginning of the 20<sup>th</sup> centuries, since it was during this period that the facades of apartment buildings were massively decorated. Based on the analysis of the types of stucco decoration of Kyiv houses, the predominance of phytomorphic and anthropomorphic decor of various types was revealed. However, the decor of different styles could be combined in one house, for example, modernism on the facade and eclecticism in the interior.

Restoration of stucco decoration is a complex process. The work is preceded by inspection and cleaning of stucco details from layers – dirt and paint layers that have changed the relief of the decoration. During the preliminary inspection of the plaster decoration, the state of its preservation is studied: the integrity of the structure and strength. Externally, the fragment may look whole, but with light pressure it may fall apart, and then it must be removed.

Restoration of plaster stucco decoration is a complex process consisting of several stages: cleaning of layers (but not to the plaster layer), additional plastering, and applying a protective coating. Separate technologies have been developed for different types of layers. Thus, in the presence of adhesive and lime paints, they are washed with water before firing with brushes and scrapers. Instead, oil paint layers are removed with alkaline pastes or washes to soften the coating and subsequent removal with a spatula, after which the surface is washed with water and a 2% solution of acetic acid and wiped with a dry cloth. Oil layers are not removed mechanically to avoid damaging the plaster. To remove film oil coatings, chemical washes are used that are applied with brushes, with subsequent removal of the softened layers manually. If necessary, a compress can be applied from a cloth soaked in the wash, after which the softened layers are removed with a spatula. Remove any remaining detergent with a cloth and wipe with white spirit.

The technology of “plastering” the lost parts of a stucco part consists in applying gypsum mortar to the damaged area to simulate the loss. If the part has a complex profile, it is first made in a soft material (plaster or, better, formoplast), and then a mold is removed from this model, according to which the gypsum addition is cast.

After removing excess parts of the gypsum after casting, the part is prepared for gluing to the previous place. Gluing is carried out using thermoplastics dissolved in organic solvents or water-alcohol solutions of PVA dispersion, and in some cases on a liquid gypsum solution with the addition of 20–25% PVA dispersion to the water intended for cleaning the gypsum.

Large-sized stucco fragments are fixed to the base with nails made of brass, stainless steel, and fiberglass, having previously drilled holes for the nail in directions perpendicular to the area of the fault, observing the requirement of a slight exaggeration of the length of the holes to the length of the nail.

The restored parts are covered with protective decorative coatings in three stages: priming (impregnation of gypsum with drying oil, glue, or shellac, sometimes with thinly diluted oil paint), patination (imitation of the material with liquid oil and glue paints and bronze, aluminum, and copper powders on varnishes of various chemical compositions), and waxing (the final stage with beeswax diluted in turpentine (which is sometimes mixed with soap), stearin, or paraffin).

In this case, it is necessary to maximally observe the preservation of the stylistic unity of the historical object when reproducing.

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