

## FAÇADE CONSERVATION OF AN EARLY 20<sup>th</sup> CENTURY APARTMENT BUILDING IN ISTANBUL

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### INTRODUCTION

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in Conservation.

Rehabilitation of historic buildings demand not only an understanding of current requirements and designation of appropriate contemporary uses to the buildings, but also a careful survey of history of uses, a thorough knowledge of the past construction materials and implementation techniques, as well as the intermediate forms of intervention in these buildings.

The task of rehabilitation requires therefore the collaboration of numerous specialists in distinct areas of study. The subject involves historians, architects, engineers, building scientists, chemists, materials experts and others, and all operations need to be based on coordinated work. As cases of such integrated implementation are not abundant, reporting and publication of such experience are highly valuable. The case of '*Maçka Palas*' provides sufficient evidence for the relevance of such an integrated approach to historic building rehabilitation.

The *Palazzo Matchka* as it was originally named, is a reinforced concrete apartment house constructed by the Levantine architect Giulio Mongeri who lived in Istanbul and was well-known with his 'Young Style' buildings. *Maçka Palas* was erected to serve the Italian Embassy for the accomodation of their guests and officials. With the foundation of the Turkish Republic however, as all of the embassies moved to the new capital Ankara, the embassy building

and its ancillary accomodation buildings in İstanbul were abandoned. The embassy building was purchased by the state to be used as a senior high school, whereas the *Maçka Palas* was bought by a Levantine citizen.

Between 1923-1990, the flats were rented by famous politicians, artists, and sportsmen who dwelled there for years (Figure 1). In 1994 the building was bought by the Doğu Holding, reconstructed and reused as the headquarters of its banking activities (Figure 2).

The design and use of materials also unravel an interesting history. After the second half of the 19th century, artificial stone mostly replaced the use of the natural stones in building. 'Revival' or 'eclectic' architectonic forms of the façades were produced either by using cast stone, or shaped by plastering techniques. During this period different techniques concerning artificial stone were used, based on cement binders with various coloured aggregates and dyeing components. Such formulae were enriched by means of inorganic and organic additives (Lewin, 1966; Pasley, 1997 / 1838; Vicat, 1997 / 1837).

After the invention of the Portland cement by Joseph Aspdin in 1824, cement was extensively used for the production of artificial stones. Various hydraulic cements were invented in Europe and USA in the following decades, which were patented in the building materials market of the 19th century. This has led to the establishment of many artificial stone workshops and factories in the first quarter of the twentieth century. Late 19th century and early 20th century housing architecture of İstanbul favoured the use of such artificial stones. The formulas for these artificial stones were imported by architects of European origin or of Ottoman ethnic minorities who were employed in İstanbul.

Artificial stone was manufactured either as cast stone to be used as masonry blocks, or plastering techniques were applied in several coats. Today artificial stone is an object of historical significance to be conserved, and the original recipes are scientifically investigated.

All of the plastic repairs in *Maçka Palas* were therefore preceded by scientific research, which included the characterisation of the original materials and the determination of their physical and mechanical properties. This meant to obtain the technical data for designing and preparation of mixtures for repair mortars. Qualified labor was necessarily employed for the repair works, as poor workmanship distorts the decorative forms into false images, and degrades historic buildings. The physical properties of the repair mortars such

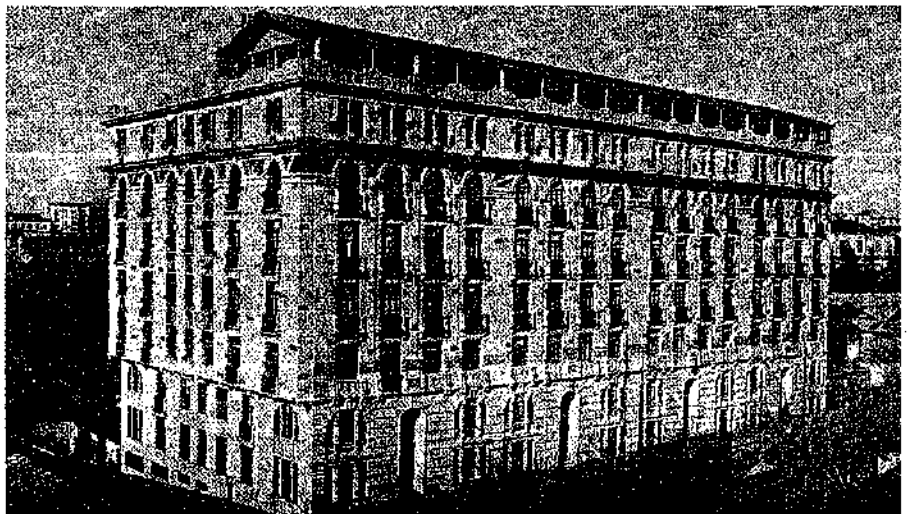


Figure 1. An old photograph of the Matchka Palace (Palazzo Matchka) in the first quarter of the 20th century.

as porosity, water absorption (by weight), coefficient of capillarity, drying rates, water vapour transmission, coefficient of linear expansion, as well as the mechanical properties should match those of the original components or parts to be integrated. Another concern here is that the repair mortar itself should not cause any chemical corrosion in the old fabric.

Architectonic forms of the façades of the *Maçka Palas* were designed and created using artificial stone. Ornamented artificial cast stone blocks were used in the walls, alternately with the brick courses. The ashlar imitations were formed using plastering techniques. The prevailing colour of the façade was obtained by using a pale grey cement as the binder mortar, most probably animal glue, turpentine, and mixture of yellow and red oxides were impregnated for repelling water and for general protection from weathering. Impregnation of this mixture has turned the colour of the façades into buff-grey. Balusters of the French windows were brownish pink due to the pigments which were used in the original recipe. Other decorative reliefs were creamy-white, yellowish brown or red in relation to the dyeing additives used. Also marble textures were created using painting techniques on plaster work for decorative purposes on the parapet walls of the windows.

#### STATE OF CONSERVATION OF THE ORIGINAL MATERIALS, DETERIORATION PROCESSES AND MORPHOLOGY

The ashlar imitations which were formed by means of plastering techniques were the prevailing surface of the entrance façade and they were in a good state of conservation. Plaster mortars were most probably masonry cement of approximately 300-400 dosage. High dosage cement used in the original recipe had apparently caused shrinkage cracks on the plaster surfaces. These cracks were inherited as an intrinsic cause of deterioration. Gypsum gauged masonry cement had been used in the original recipes. The high amount of the  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$  determined in the experimental work for the characterisation of the original samples can be correlated either to the gypsum additive or to the  $\text{SO}_2$  in the polluted air. Crust formations were observed on the sheltered areas such as the surfaces under the cornices, balconies or sills, even in the joints of the ashlar forms which were protected from rain water.



Figure 2. Matchka Palace after restoration.

Sulphur dioxide ( $\text{SO}_2$ ) in the polluted air is oxidised to generate  $\text{SO}_3$ , and in the presence of lead that originate from exhaust gases of vehicles reacted with the water vapour in the air to produce  $\text{H}_2\text{SO}_4$  aerosols, and consequently these reacted with the  $\text{CaCO}_3$  taking place within the construction materials. As a result, a salt crust where  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$  takes the major part is formed on the surfaces (Furlan and Girardet, 1988; Steiger and Danneceker, 1994; Reddy and Leith, 1994; Böke, Göktürk, Caner-Saltık, 1996).

Furthermore,  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$  dissolves in rain water at a slow rate and this solution is absorbed by means of capillary suction, so it is distributed to the surfaces homogeneously to form a thin and pale crust, as the particle pollutants are washed away with the mechanical effect of the rain water. On the sheltered areas of the façades, dry accumulation processes of  $\text{SO}_2$  was observed. In this case,  $\text{SO}_2$  was absorbed by the surfaces, and heavy metal ions which were deposited on the surfaces together with the particle pollutants acted as catalysts to oxidize  $\text{SO}_2$  to  $\text{SO}_3$ , and as a consequence, either  $\text{H}_2\text{SO}_3$  or  $\text{H}_2\text{SO}_4$  reacted with the  $\text{CaCO}_3$  were contained in the materials. Heavy gypsum crusts were formed after the dry the accumulation processes where the crust was darkened with the presence of dust and soot (Figures 3 and 4).

In this context, the crust formation and the dirt on the surfaces of the façades can be categorized in four groups:

1. Loose dust and soot on the surfaces which can be washed away with water mist.
2. The homogeneous pale thin crust formation of certain parts of the façades where  $\text{CaSO}_4 \cdot \text{H}_2\text{O}$  solutions are dispersed by the rain water.
3. Beginnings of crust formation in the relatively sheltered areas, which could be defined as transition zones to the encrustations.
4. The heavy crust formations on the sheltered areas of the façade as result of dry  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$  accumulation processes.

Chemical alteration of the plaster surfaces was initiated under the crusts and the dirt was integrated to their chemical composition. Whereas the loose dust and soot were superficial, and could be easily washed away in due course.

Corrosion of the wrought iron balusters of the French windows seems to have continued under the layers of paint. Iron armatures of the cast stone façade elements were extensively corroded and the internal stresses in the material, originating from the expansion of the rusty iron had caused cracks in the cast stone objects. Most of the iron armatures were exposed to the polluted air and they were severely deteriorated in the acidic medium. On the different parts of the façades, oil paints were applied on the artificial stone surfaces by users. Certain parts of the façades on the ground floor level were also painted to combat against graffiti.

## CHARACTERIZATION OF THE ARTIFICIAL STONES ON THE FAÇADES OF MAÇKA PALAS

### Visual Inspections:

Typical examples of the different kinds of artificial stones were sampled during the inspection of the building. The sampling locations in the building, and the experimental work carried out for their characterization could be described as follows:



**Figure 4.** Mapping of the deteriorations of the east façade.

**Legend**

**Diagnosis**  
(cleaning and repairs technique)

**Light Red:**  
Thick Crustations of Salt on Surfaces  
(chemical gel compression and micro-blasting)

**Thin Light Red:**  
Thin Crustations of Salt on Surfaces  
(chemical cleaning)

**Light Green:**  
Dense Accumulations of Dirt on Surfaces  
(chemical cleaning)

**Dark Green:**  
Thin Cracks on the Surfaces  
(plastic repairs and completion with special mortar)

**Dark Red:**  
Deep Cracks on the Surfaces  
(mortar applications imitating original materials)

**Solid Red:**  
Missing Surfaces  
(plastic repairs and completion with special mortar)

**Blue:**  
Cement Repaired Surfaces  
(removal of cement surfaces, plastic repairs and completion with special mortar)

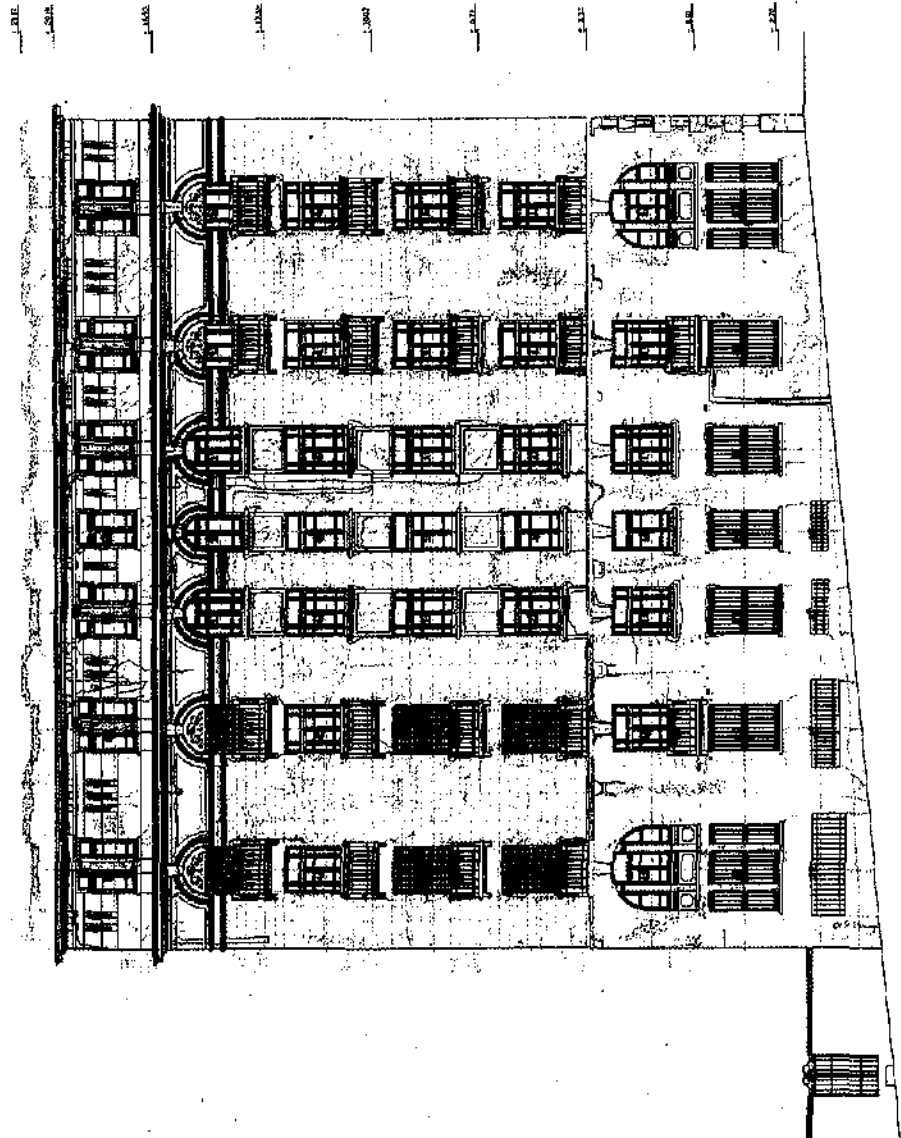
**Yellow:**  
(cleaning of crustations and gel compression)

**Light Brown:**  
Salt Formations on Surfaces  
(cleaning of formations and gel compression)

**Dashed Light Brown Lines:**  
Rust and Tar Stains on Surfaces  
(chemical cleaning)

**Purple:**  
Repainted Surfaces  
(chemical cleaning)

**Green:**  
Dirt Layers on all Surfaces  
(cleaning with water lances)



Sample 1. Artificial marble sampled from one of the ground floor window lintels is with grey coloured finishing coat applied on undercoat, with various coloured coarse aggregates, dirt accumulation observed on its surface. The sample exhibited excellent mechanical properties and durability.

Sample 2. Stone sampled from the ground floor door frame. Pale grey coloured sample which had similar aggregates with sample 1, dirt accumulation was observed on its surface.

Sample 3. Plaster finishing coat which was used to imitate ashlar forms. It had a mix design with the sample 2, the sample had a transparent layer on its surface.

Sample 4. Sampled from the parapet wall of one of the French windows. Brownish yellow sample with opaque white aggregates of 1-3 mm. mesh size, lesser red aggregates were observed. Dirt was deposited on its surface, deep penetration of iron stains are observed.

Sample 5. This is sampled from the core of the eaves moulding. Highly polluted whitish grey artificial stone which was composed of rounded cornered aggregates in cement paste is observed.

Sample 6. This was sampled from one of the plasters of the 5th. Floor. Reddish pink plaster finishing coat sample reveal aggregates of mesh sizes between fines and 2mm.

Sample 7. This sample from the finishing coat of the eaves moulding is black coloured and contain various coloured aggregates of different mesh sizes, between fines and 2mm. Its surface was covered with a creamy finishing layer of 1mm thickness, which was composed of fine aggregates in a white cement paste.

#### Experimental Work:

After overall observations and visual inspections, the samples were conducted to ignition loss, acid loss and sieving, qualitative analysis of water soluble salts, protein, saponifying and non-saponifying oil analysis tests, the results of which are given in Tables 1 and 2.

#### Microscopic Inspections:

The acid insoluble parts of the samples were separately inspected under a polarizing microscope (James Swift, double beam), the results for each sample are summarized below:

Sample 1. All aggregates were quartz, also negligible amount of volcanic minerals were observed. The aggregates which were smaller than 1000 mesh size were composed of clay, gypsum, feldspar and lesser amounts of coal dust originating from the cement. Medium sized aggregates of 1-2 mm and 3 mm were all quartz.

Sample 2. The aggregates were similar to those of the Sample one. In the medium sized aggregates, 3mm mesh size aggregates constituted the major part of sample 2. The gypsum ratio of the aggregates was slightly higher than others.

Sample 3. Aggregates were similar to those of the sample 2. Yet gypsum and feldspar ratios were higher than those of the sample 2.

Sample 4. Fifteen percent of the aggregates were quartz; 10% were black, and the rest were  $\text{Fe}_2\text{O}_3$  dyed gypsum and feldspar. Aggregates were generally fines. A negligible amount of 2mm mesh-sized grains was also observed.

Table 1. The results of ignition loss, acid loss and sieving tests.

Sample 7\* in Table 1 represents the sample 7 where the acid insoluble parts were free of the coal dust.

Table 2. Qualitative analysis of the water soluble salts and organic additives.

Samples 2\*, 5\* and 7\* of the Table 2 represent the surfaces of the samples 2,5 and 7 where dirt was deposited. Question mark implies that there was no need to conduct the relevant test on the sample.

Sample Nr.	Ignition Loss			Acid			Sieve Analysis				
	% Moisture	% 550° C	% CaCO <sub>3</sub>	% Soluble	% Insoluble	1000 μ	500 μ	250 μ	125 μ	<125 μ	
1	2.18	5.53	23.79	42.84	57.16	14.36	3.41	51.17	8.68	22.38	
2	4.14	6.00	15.60	42.10	57.90	2.80	2.42	67.08	6.13	21.56	
3	3.85	6.09	11.66	46.70	53.30	2.80	3.60	55.58	6.42	31.61	
4	0.79	5.65	78.31	83.21	16.79	7.14	2.75	36.82	12.25	41.03	
5	4.78	4.14	8.14	29.08	70.92	39.84	4.28	43.34	2.55	9.98	
6	2.00	6.70	67.13	79.90	20.10	4.15	2.59	30.55	13.51	49.20	
7	1.76	11.77	23.46	41.62	58.38	7.49	3.28	61.12	11.26	16.85	
7*	?	?	?	51.42	48.58	6.53	1.90	58.10	17.27	16.20	

Nr. of the sample	Water Soluble Salts				Organic Additives			
	Cl	SO <sub>4</sub> <sup>2-</sup>	CO <sub>3</sub> <sup>2-</sup>	NO <sub>3</sub> <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	Protein	Saponifying Oil	Non-saponifying Oil
1	+	+++	-	-	-	+	-	+
2	+	+++	-	-	-	+	-	+
2*	++++	+	-	-	-	?	?	?
3	+	++	-	*	*	+	-	-
4	+	+++	-	-	-	+-	-	-
5	+	+++	-	-	-	+	+-	-
5*	+++	+	-	-	-	?	?	?
6	+	+++	-	-	-	+	+	-
7	+	+	-	-	-	+	+	+
7*	+	+-	-	-	-	?	?	?



Sample 5. Aggregates were similar to those of the sample 1. Of the aggregates mostly composed of 1-2mm mesh-size however, 30-35% were 3-5mm sized, and lesser amounts of 6-8mm mesh-size aggregates were also observed. Aggregates can be accepted as non-sieved aggregates of the sample 1.

Sample 6. Aggregates were similar to those of the sample 4. Quartz was observed in minor amounts which can be considered as negligible. Pigments, especially hematite were detected in high amounts.

Sample 7. Ten percent of the aggregates consisted of coal dust. The rest was composed of different coloured quartz. Aggregates which were composed of mostly 1mm mesh-size contained negligible amounts of 2mm granules.

#### Petrographic Analysis:

Sample 1. The sample was mainly composed of quartz aggregates, besides quartzite, feldspar and quartzite groups in amorphous cement paste. Fifty percent of quartz shells was observed together with ten percent of shells. The aggregates were mostly fines and the coarse aggregates were detected in a negligible amount.

Sample 3. The aggregates were similar to those of the sample 1. Quartzites were slightly more than the sample 1.

Sample 4. Sixty to sixty five percent of the sample was composed of white marble aggregates which were mostly composed of 250-500 $\mu$  mesh-size, 5-10% of the crushed marble aggregates were 1-2mm mesh-size, also negligible amount of (2-5%) quartz was observed. Large amounts of pigments were observed in the cement paste.

Sample 6. 250-500 $\mu$  mesh-sized white crushed marble aggregates, similar to those of the sample 4 were detected. No coarse aggregates were observed. The quartz ratio was similar to that of the sample 4, and the aggregates can be defined as the sieved parts of the aggregates of sample 4, through the mesh-size 500 $\mu$ . Pigments were detected in large amounts in the cement paste.

Sample 7. Aggregates were similar to those of the sample 1. Fifty percent of this sample consisted of 250-500 $\mu$  mesh-sized quartz. A small amount of shells were also observed. The only pigment used was carbon black.

Based on the data mentioned above, the samples can be defined as follows:

Sample 1. 300-400 dose white cement and Portland cement was used as binder, with river sand aggregates. A protein, probably animal glue and a saponifying oil (turpentine) was impregnated to the surface.

Sample 2. Artificial stone of 250 dose cement, with binder elements was observed to be similar to those of sample 1. Sieved river sand was used as aggregates. The plaster finishing coat was impregnated with a protein and a non-saponifying oil.

Sample 3. Artificial stone made with 400 dose cement, and probably 10% gypsum gauged to the binder. The aggregates were similar to that of aggregates of sample 2. The finishing coat of the plaster was impregnated with a protein.

Sample 4. 250-300 dose cement binder was similar to that of sample 1, where 60-65% of the aggregates were composed of crushed marble. 10% of the aggregates were 1-2mm, the remaining part was 250-500 $\mu$  mesh-size. Pigments were heterogeneously distributed in the cement paste. No organic additives were detected.

Sample 5. The binder was 200 dosaged Portland cement. Coarse aggregates below 10mm mesh-size were used. The sample represented the core of the cast stone mouldings and sills. Only a protein was detected as an organic additive.

Sample 6. The sieved marble aggregates that could be defined as marble dust were 250-500 $\mu$  mesh-size. Large amounts of hematite distributed homogenously in the cement paste were detected. Protein was impregnated to the surface of the plaster finishing coat. The sample represented the reddish pink finishing coat on the pilasters of the 5th floor façades.

Sample 7. The binder was similar to the binder of sample 1, while aggregates were similar to those of the sample 2. In the cement paste, 10% carbon black was used as a pigment. The surface was treated with protein and a non-saponifying oil.

The dirt on the surfaces of the materials was composed of gypsum crust, dust and soot which can be correlated to the polluted air. (Cl<sup>-</sup>) salts were also found and analyzed, which may originate from the compositions of the original materials used.

## CLEANING

In the cleaning of the building, works upon findings depended on four different methods in an ascending order of intervention. The different surfaces were to be cleaned with distinct cleaning techniques, and were shown on the 1/20 scaled conservation project. Cleaning techniques employed are classified as follows:

### Water Mist:

Excessive water absorption of the plaster surfaces of the façades may lead to salt crystallisation cycles, and consecutively to surface erosion. Bearing in mind the problems of wetting-drying cycles and the water soluble salts, qualitative analysis of water soluble salts was conducted with the samples, and it was concluded that this problem was relatively negligible.

Whereas the freeze and thaw cycles are always more destructive, washing with water mist or water lances were not implemented during winter, and cleaning works were commenced in April 1997. The water mist could only help clean the loose dirt on the surfaces, and it was usually assisted with brushing to release the existing dirt. However, other problems such as efflorescences and iron staining may arise if materials are saturated with water. Therefore, washing should use minimum amount of water for a minimum period of time to clean the loose dirt on the surfaces. In this case intermittent atomized sprays and brushing was employed before washing with water lances using low pressures such as 2-5 atm.

### Chemical Cleaning:

The homogeneous thin crust which was generally observed on the façades of the building was cleaned with a solution of 10% ammonium bicarbonate in water. The solution was allowed 24 hours before use. It was applied to the pre-wetted surfaces to prevent deep penetration and to keep the chemical reaction fundamentally on the surface. The concentration of the solution was increased to 22% in water, where the dirt deposited on the surface was heavier and it was compressed with paper pulp.

At the surfaces where crustations were observed, cleaning was started by mechanical means, afterwards the following recipe was applied to the pre-wetted surfaces by brush applications:

Water: 10 l.  
EDTA (ethylene diamine tetra acetic acid): 250 g.  
Ammonium bicarbonate: 300 g.  
Teepol (a non-ionizing detergent, Shell): 50 g.

Afterwards the artificial stone surfaces were washed with ample water.

AB57 or Mora Poultrice:

Heavy  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$  crusts were cleaned by means of 'Mora Poultrice'. Prior to the commencement of the paste application, the heavy crust surfaces were cleaned mechanically using abrasion tools and partially saturated with water. The chemical composition of the proposed paste was as follows:

Water: 10 l.  
EDTA: 250 g.  
Ammonium Bicarbonate: 300 g.  
Teepol: 50 g.  
CMC (carboxymethyl cellulose): 600 g.

The ammonium bicarbonate and the EDTA (ethylene diamine tetra acetic acid, a chelating agent) facilitate the dissolution of calcium salts, (gypsum). Teepol is a non-ionizing detergent which reduces surface tension. The CMC gives the paste consistency which prevents the flow of the solution, which also keeps the chemical reactions at the surface. The ammonium bicarbonate, the EDTA and the non-ionizing detergent are added to water in the mentioned amounts and order, and CMC is added. The solution is stirred steadily to obtain a homogeneous paste. The amount of the CMC can be increased to obtain the desired consistency.

The paste packs which were applied to the crustations were covered with plastic wrap, and kept for a duration of 1-2 days. The contact time which was needed for the chemical reactions was determined on the test areas before commencing the works. After it was observed that the salt crust were dissolved, the poultrice was removed carefully by scraping with wooden scalpels, and the subject area was washed with ample water to eliminate the residues which may produce water soluble salts as by-products.

Micro-Blasting:

In the last phase of the cleaning, micro-blasting was considered necessary to remove the crust remains of the ornaments. This was performed with a narrow beam of grit, and with low pressure which could be graduated according to the desired cleaning effect. It is advisable to use quartz sand below 125 microns mesh-size.

Removal of the Oil Paint from the Artificial Stone Surfaces:

Paint removal was performed by using a methylene chloride paint stripper. It was observed that the reactions occurred mostly within 10 minutes. Afterwards, the stripped paint layers were brushed and particles were washed away with water.

Figure 5. Plastic repairs, fixation of the stainless steel armatures.



It was difficult to clean the pigments which were deeply penetrated to the pores of the plaster. In such cases, methylene chloride compresses were repeatedly used. After the paint had been scraped off, the surface was washed with ample water, using low pressures and warm water and a neutral pH soap. The stubborn oil paint stains were cleaned by micro-blasting.

#### Plastic Repairs:

All of the plastic repairs were performed strictly to follow the recipes given by the Historic Preservation Department and the Laboratory of Material Science of the Faculty of Architecture of Istanbul Technical University. The plastic repairs technique followed the procedures described below:

All of the decayed parts, including the highly corroded iron armatures were stripped and the corroded parts cut away until sound surfaces were found. The rusty armatures which were on the surfaces of the remaining sound parts were covered with an epoxy paint to prevent further deterioration. The cavities or remaining sound parts were washed with water and saturated with water to prevent dewatering of the repair mortars.

The repair mortar was placed in thin compact layers not exceeding 10mm thickness in any application. Each layer was allowed to dry before the application of the proceeding layer. Each layer was re-wetted before the application of the following layer. The repairs were finished directly to the required surface or profile to integrate the missing part. Micro-blasting was employed to obtain slightly eroded surface textures on the integrated parts. Steel trowels were used for the repairs of the artificial marble surfaces imitating the original technique. In cavities deeper than 50mm and extending 500m<sup>2</sup> surface area, stainless steel wires and armatures were fixed to the holes which were drilled on the sound surface. The shapes of the armatures varied from single pins, U forms to more complicated forms according to the form and mass of the integrated part (Figures 5 and 6). After drilling the holes, they were cleaned with pressured air and filled with Araldite Anchor Bond (epoxy resin, CIBA-Geigy) before embedding the stainless steel armatures. Mortar cover of 20mm was allowed for the reinforcements.

If large masses were to be reproduced or reintegrated, stainless steel rods of 6-8mm diameter were used for the reinforcements, and the reproduction mortars were cast into wooden mouldings. The original and the reintegrated parts were micro-blasted to obtain natural and matching surface textures.



Figure 6. Plastic repairs, wooden forms and the repair mortars.

#### Cleaning and Conservation of the Iron Balusters of the French Windows:

It was observed that the corrosion of the iron had also persisted under the layers of paint. Before starting with paint removal and repainting work, the colour analysis of the paint layers was conducted. The paint layers were identified respectively as lead paint, Nile green, Sherwood green, brown and dark blue. The old paint layers, the rust and the loose mill scale were flame-cleaned, which was assisted by wire brushing. Stubborn rusts were chemically cleaned by means of chemically neutral orthophosphoric acid, based within rust-removing solutions. Cleaned surfaces were immediately primed with a metal primer denying the possibility of re-rusting. Primed surfaces were painted with three coats of a metal paint, applied by brush.

#### Surface Protection and Painting of the Façades:

The interstices of the mouldings, the floors and the balusters of the French windows, together with the building's façades were insulated to prevent water percolation. Seepage of rain water was especially taken into consideration, since it was planned to paint the building using the dye-penetration technique with a silane-siloxane emulsion. The building's original colour was a yellow ochre-buff slightly mixed with hematite. A pale memory and a transparent pigments dispersed in a silane-siloxane emulsion (K501, Liquid Plastics Ltd., UK). The consumption rate was approximately  $0.3-1 \text{ l/m}^2$ . It is well known that the best consolidants for the silicate and silicious surfaces are alkoxy-silanes (Goins, Wheeler, and Wypyski, 1996).

The breccia marble imitations were re-painted with Silcabond (Liquid Plastics Ltd., UK) and metal oxide pigments, and artificial patinas were made using rasps and emery papers (Figure 7). Since the consolidant and the water repellent polymer films degrade in the course of time, it was aimed to repeat the water application of the repellents every ten years.



Figure 7. Breccia imitations.

## CONCLUSION

The conservation of the façades of 'Matchka Palace' was performed by a team of experts, composed of two architectural conservators, an architect and a conservation chemist. The cooperation between the scientists and the architectural conservators has vital importance for conserving the maximum possible extent of the original materials, and retaining the authenticity of the old fabrics. Experiments and conclusions of researchers who contribute to implementation in the conservation of historically significant buildings must be shared internationally. A good example for this in *Maçka Palas* has been the re-colouring of artificial stone surfaces by means of dye penetration using silane-siloxane emulsions, which is a new idea, and seems to be good alternative against gross re-painting of historic buildings with opaque paints. This is particularly of great relevance since new paints usually distort the authentic aura of the old buildings, and their overall historical context and especially the character of urban historic sites.

## İSTANBUL'DA YİRMİNCİ YÜZYIL ERKEN DÖNEMİNE AİT BİR APARTMANIN CEPHE KORUMASI

### ÖZET

Alındı : Mart 2000  
Anahtar Sözcükler: Mimari Koruma, Tarihi Yapıların Korunması, Cephe Koruma, Korumada Disiplinlerarası İşbirliği.

İstanbul'un 20. yüzyıl başı tarihinin önemli bir yapısı ve ilk betonarme apartmanlardan biri olan Maçka Palas, Levanten mimar Giulio Mongeri tarafından İtalyan Büyükelçiliği lojmanları olarak tasarlanmış ve inşa edilmiştir. Cumhuriyet'in kurulmasından sonra Büyükelçiliğin Ankara'ya taşınması ile bina, 1990 yıllarına kadar tanınmış politika ve sanat adamlarınca konut olarak kullanılmıştır.

İlk betonarme strüktür, tasarımlarındaki hatalar ve betonun zayıf dayanımlı oluşu nedenleriyle, cepheleri korunarak yıkılmıştır. Bina yüzeyinde kullanılan yapay taş işçiliği, aşında 19. yüzyılda yoğun olarak kullanılmış, özellikle çeşitli çimentoların bağlayıcı, farklı kumların, taş pirinç ve tozlarının agrega olarak kullanılması ile geliştirilmiş bir tekniktir. Özellikle 19. yüzyıl ve 20. yüzyıl başlarında kullanılan bu teknik, bina cephelerinde eklektik mimari formların canlandırılmasında kullanılmıştır. Binalarda doğal taş görüntüsü veren bu teknik, Maçka Palas cephelerinde inorganik, organik katkı ve renklendiriciler (pigmentler) de katılarak uygulanmıştır. Bu ve benzeri uygulamalar da 20. yüzyıl başlarında daha çok İstanbul'da çok katlı binaların erken örneklerinde ve daha çok kentte yaşayan Avrupalı mimarlar eliyle gerçekleştirilmiştir.

Bu makalede, söz konusu yapıda cephe koruması uygulamaları için gerekli malzeme ve teknik araştırmalar açıklanarak uygulama yöntemi anlatılmıştır. Bu tür yapılarda orijinal malzemelerin karakterizasyonu ve özellikle onarım harçlarında yer alan malzeme örneklerinin kimyasal, fiziksel ve mekanik özelliklerinin derinlemesine çalışılması gerekmektedir. Bina koruma işlerinde kullanılan onarım harçlarının, geçirgenlik, su emme, kapillarite katsayısı, kuruma oranı, su buharı geçirgenliği, çizgisel genleşme katsayısı ve mekanik özelliklerinin, özgün malzeme niteliklerini karşılması sağlanmalıdır.

Maçka Palas cephelerinin arkitektonik şekilleri, yapay taş kullanılarak tasarlanmış ve buna göre uygulama yapılmıştır. Süslü yapay taş blokları ve elemanları, kargir duvarda tuğla ile birlikte duvar örgüsünde kullanılabilir. Cephede elde

edilen taş imitasyon blokları sıva teknikleriyle şekillendirilmiştir. Cephenin orijinal rengi, aslında harç için kullanılan gri çimentodan kaynaklanmaktadır. Yapay taş karışımında hayvanlardan elde edilen zambak, terabentin, sarı ve kırmızı oksitlerin de kullanıldığı anlaşılmaktadır. Bu karışımın, dış koşullarda, iç yapıya kadar nüfuzu, cephenin genelde deve tüyü-gri renge dönüşmesine neden olmuştur. Binanın Fransız pencere-balkon parapetlerinde ise, orijinal karışımlara bağlı kalınarak kahverengimsi renk kullanılmıştır. Diğer dekoratif cephe kabartmalarında (rölyeflerde) krem-beyaz, sarı, kahverengi, ya da kırmızı renklendiriciler kullanılmıştır. Özellikle cephede mermer doku oluşturan bölgelerde boyama teknikleri kullanılmıştır. Bu tip durumlar özellikle pencerelerin parapet duvarlarında, dekoratif amaçlı, sıva üstü boyamalardır.

Yapının cephelerinde kullanılan suni taşların karakterizasyonu yapılarak, uygun onarım ve bütünleme harçları üretilmiş ve donatılı plastik onarım teknikleri uygulanmıştır. Yüzey erozyonu, kir ve kabuk nedeniyle suni taş cephede yok olmuş veya gizlenmiş formlar, boya katmanları altındaki özgün renkler, özenle araştırılarak formların ve renklerin restitüsyonu gerçekleştirilmiştir.

Binanın hemen tüm yüzeylerinde ortaya çıkan kabuklanma ve kirlenme dört ayrı grupta sınıflandırılmıştır. Bunlar:

1. Bütün yüzeylerdeki toz, karbon, kil partikülleri gibi suyla yıkanarak temizlenebilen serbest ve yüzeye kimyasal bileşime girmemiş kirler,
2. Yüzeydeki yaygın ince kabuk oluşumu,
3. Kabuk oluşumuna geçiş aşaması olarak düşünülen ve daha çok yüzeyin yağmur tarafından yıkanamayan konumlarında beliren, noktasal kabuk oluşumlarının gruplanmaya başlaması,
4. Korunaklı yüzeylerdeki kuru birikim yoluyla kalın kabuk oluşumu şeklindedir.

Yapay taş blokların niteliğinin belirlenmesinde yedi ayrı örnek alınmıştır. Bu örneklerde yapılan makroskopik gözlemler, deneysel çalışmalar, mikroskopik gözlemler ve petrografik analizler ile, yanma kaybı, asit kaybı, nüfuz etme, suda çözülebilir tuzların nitelik analizi, sabunlaşma ve sabunlaşma sürecine girmeyen yağ analiz testleri yapılmıştır.

Maçka Palas cephe koruma çalışmalarında kullanılan temizleme tekniklerini de dört grupta düşünmek olanaklıdır:

1. Atomize suyla yıkama,
2. Kimyasal temizleme,
3. Jel uygulamaları,
4. Mikro kumlama

Bu uygulamaların dışında yapının tüm yüzeylerinde plastik onarımlar ve bütünleme teknikleri ile kayıpların giderilmesi gerçekleştirilmiştir.

Silan-sloksan emülsiyonlarıyla birlikte pigment emdirme yoluyla renklendirme dünyada ilk kez bu yapıda uygulanmış bulunmaktadır. Bu yöntem, yapının ilk renginin opak boyalarla sonradan boyanarak örtülmesi yoluyla çevresel estetik sorunlarının yarattığı pek çok örnek durum için düşünülmeye değer bir seçenek oluşturmaktadır.

Sonuç olarak, koruma uygulamalarında disiplinlerarası ortak çalışma ve dayanışma teknik bir zorunluluk kadar, aynı zamanda etik bir gerekliliktir. Bu dayanışma olmaksızın yapılan bilinçsiz müdahaleler, özgün nitelik ve ayrıntıların yitirilmesine yol açar. Bu nedenle, önemli bina koruma çalışmalarında edinilen araştırma bilgi ve deneyimlerin yaygın yoluyla paylaşılması büyük önem taşımaktadır.

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