

## REPRODUCTION OF TURKISH TRADITIONAL WALL-PAINTING USING CLOSE RANGE PHOTOGRAMMETRY, A CASE STUDY IN GAZIANTEP

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### PS 1, Various Working Groups

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#### ABSTRACT:

Wall-paintings are widespread used decorative elements in traditional Turkish architecture. They reflect cultural situation of the period they were made and enrich indoor space with their color, pattern and their history in paintings that is why they should be conserved. In restoration process of historical buildings, these indoor space elements should be provisionally documented and researched. As results of these researches structural condition of the paintings are made and according to these results intervention decisions are produced in decision making process. In this process, while some pictures are not being touched because of being in good condition, some pictures need to be restored. As result of deformation on the walls and pictures, some pictures need to be reproduced. In this study, photogrammetric researches and documentation of some wall-paintings of Gaziantep will be made with photometric techniques. Besides, scope of this study to get documentation with their original color and pattern by using laser scanner and to get orthophoto of these wall-paintings. The importance of orthophotos will be mentioned for reproducing the wall-painting on its original place or restoring them. In this study, importance of using photogrammetric methods in documentation of wall-painting as an architectural documentation will be highlighted.

### 1. INTRODUCTION

In recent decades there has been an increasing focus in all areas of conservation on an interdisciplinary approach. This has been especially true for wall paintings, where indeed a number of special factors make it essential: their physical and aesthetic unity with the architecture; their particular vulnerability, in that they constitute an extremely thin layer which is itself the interface between the support and the environment; the limitations on controlling potential agents of deterioration; and the scale and expense not only of intervention, but also of study and monitoring. (Park, Preusser,1991)

Anatolia which possesses thousands of years of cultural heritage is very important places. Anatolia has hosted many different civilizations and each civilization produced their cultural object within that time living conditions, technological capabilities and understanding of architecture. Today, serious studies are done about the documentation and restoration of cultural heritage of Anatolia. In parallel to researches in the academic society, documentation of the cultural heritage with use of modern techniques is getting increased. In parallel with this increase in Turkey nowadays, the use of modern techniques of documentation is not a prerequisite for conservation project in the specifications. Being observed the shortcoming of traditional methods, the importance of laser scanner and photogrammetry is comprehended. Even though the photogrammetric applications previously uncommon and only limited to academic circles, they have the ability to be used in common architectural offices today. For make appropriate restoration work, the most important requirement is to document of cultural heritage and to store this documentation as a digital media. In this way, restoration projects and intervention decisions could be sensitive. The correction of documentation directly affects the implementation's results. Hence, it is clear that, having used photogrammetric techniques will provide benefits when sensitive documentation is

necessary. Either laser scanner or photogrammetric methods provide sensitive measurements of indoor and outdoor spaces and provide to prepare correct restoration projects. It is not legislative necessity to use laser scanner and photogrammetric techniques in restoration project in Turkey. Except for special application, it is not also necessity documentation of artwork like sculptures, indoor decorations, ceilings, wall-paintings. However, it is not possible to get sensitive measurement and preparing restoration project of this kind of detailed special artworks without the using of photogrammetric and laser scanner techniques. In this study, the importance's of photogrammetric documentation of traditional Gaziantep houses' wall-paintings are examined in the context of conservation applications.



Figure 1 A wall-painting from Çatalhöyük, earliest settlements.

### 2. THE CULTURE OF WALL-PAINTING IN ANATOLIAN TRADITIONAL ARCHITECTURE

Mural painting tradition has been used in different methods in many civilizations which were established in Anatolia. Every civilization produced their painting with their technology condition and art mentality. Animal and human figures, which

were made a simple paint consist of crushed colored stones and water, are observed in the cave in Çatalhöyük where is one of mankind's earliest settlements in providence of Konya (6500 BC)(Figure 1). It is expressed in these wall-paintings about the social life. In Roman Empire's building's walls, there are a lot of mural paintings which are about the Gods' special stories and legends. In the Early Christian Age's carved churches' walls and then many historic churches' walls, Jesus and the Saints wall-paintings are observed in Anatolia (Imamoğlu,2009). Some carved church paintings in Kayseri/Değirmenderesi Valley and Saint Nicholas Church in Demre could be mentioned as examples(Figure2-3). They were used some decoration painting techniques composed of geometric and floral motifs in Early age of Anatolian Turkish architecture, particularly in mosques. While portraits and animal figures are forbidden in prayer spaces because of the necessity of structure within the Islamic faith, geometric and floral motifs are used in the Islamic architecture as decoration component. And also, particularly in Seljuk monuments, decorative tiles, painted with stylized human figures and floral motifs, were used as a continuation of Central Asia indoor space tradition. Like Seljuk monuments, geometric and floral motifs, images, and landscape paintings are locally observed in Ottoman Empire monument and houses.



Figure 2 Carved church paintings in Kayseri.

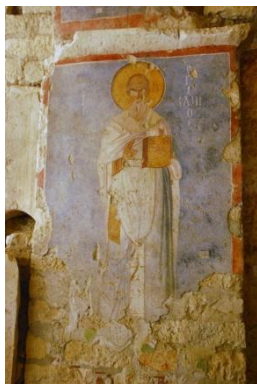


Figure 3 Saint Nicholas Church in Demre.

Use of wall-paintings in Turkish dwelling architecture began as decorative elements in Istanbul places and rich family's houses. Before the professional wall-painting production, simple wall decorations were used like simples cornices on walls and ceilings. After European Artist had come to Istanbul and had produced their artistic works, wall painting come up in Turkish architecture. Wall painting was spread in every province of Turkey. Wall painting on Topkapı Palace's Harem Block, could be considered an important example of Ottoman Empire periods prior wall painting art in Anatolia. In results of westernization

movements, some new decorations elements like corinthian column heads, recesses and overhangs surfaces, refractions, floral motifs, gilt as a baroque and rococo decorations were began to observe in Ottoman Architecture. Towards the end of the century, wall-painting which showed notable development in Turkish interior design, replaced traditional miniature which is gradually lose their effectiveness in interior decorations (Yılmaz,2008). Generally landscapes, urban scene, mosques, the city's major buildings, Bosphorus, a lot of tower were main wall- paintings objects. Wall-paintings, resumed in Turkish Architecture, miniature and hand-carved decorations were together used in space decoration.

### 2.1. Miniature

Miniature is a small painting, whether a book illustration or a separate work of art, intended to be kept in an album of such works. The techniques are broadly comparable to the Western and Byzantine traditions of miniatures in illuminated manuscripts. Miniature is similar painting but its techniques are different from wall painting. The Turkish miniature is based on the Middle Asia art traditions. Contrast of lights and shadow is not included, the back of the object are not overlapping, and back side objects can be drawn.

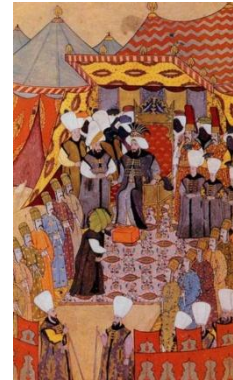


Figure 4 an example of Miniature drawn by Levni, famous artist in Ottoman period.<sup>1</sup>

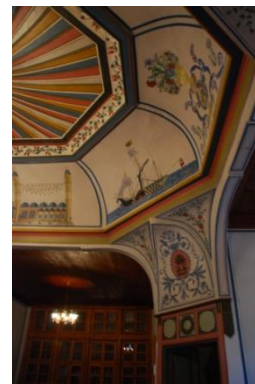


Figure 5 Hand-carved painting from province Karaman, Turkey.

### 2.2. Hand-Carved Decorations

In hand-carved decorations, design is drawn on semi-transparent paper, after that this paper is pierced by needles along the design's lines. Design is transferred on surface shaken coal dust with the buffer. Designs boundaries are drawn with thin brushes and in side of the design are filled with different colors. The

<sup>1</sup> [http://www.hatdergisi.com/minyatur\\_osmanli.htm](http://www.hatdergisi.com/minyatur_osmanli.htm)

most common usage is in the mosque's interior wall decorations.

### 3. TYPES OF WALL-PAINTINGS

#### 3.1. Surface Mount Wall-Paintings

Surface is plastered with lime mortar. Like hand-carved decorations, design is transferred on the plaster and artist is drawn his sketch on the plaster as if it was a canvas.

#### 3.2. Wooden Mount Wall-Painting

Wooden Mount wall-paint techniques are secondly widespread techniques than surface mount wall-painting. This technique is used inside of tomb decorations, special spaces' ceilings in mosques, and traditional houses' ceilings. Wood surface is covered with a paste for obtaining smooth painting area. After finishing the process of drawing, painted picture covered with a protective patina.



Figure 6 an example of surface mount wall-paints in Konya/Turkey



Figure 7 wooden mount wall-painting, Eşrefoğlu Mosque in Konya



Figure 8 an example of fabric and lather mount wall-painting (Baser, 2010).

#### 3.3. Marble and Stone Mount Wall-Painting

This technique is very similar to surface mount technique but its paints are oil paints and it contains some glue. Gold leaf could be use in marble mount wall-paintings.

#### 3.4. Fabric and Lather Mount Wall-Painting

This technique was mostly used in baroque and empiric styles in 17<sup>th</sup> century. It is drawn a leather surface which is stretched and then stacked on a wooden frame. It is painted with oil paints or powder paints.

### 4. GAZIANTEP TRADITIONAL HOUSES' WALL-PAINTINGS

Historical Gaziantep is geographically located in between Mesopotamia and the Mediterranean where ancient civilizations were founded. Thus it has a rooted past. This area has been a settlement place for societies for ages.



Figure 9 Gaziantep Locations in Turkey

Gaziantep has been very busy about the restoration implementation for ten years. Many houses and public buildings were restored by supports of non-government organization and government agencies. Especially Gaziantep Municipality supports to restoration of historical Gaziantep Houses'. A number of historical houses were documented and their restoration projects were prepared. Nowadays, restoration implementations are continued according to these projects. Most of this paper figures were taken while this project were being preparing for photogrammetric documentation of indoor space of this historical buildings.

Wall-paintings are generally preferred as decoration elements in wealthy family houses in Gaziantep. In regular houses, there are small sketches in order to reflect house owner's artistic sensitivity on walls and wall covers. Sea, ships, bridges, trains are most of main compositions of Gaziantep houses wall-paintings. Besides this, especially angle figures emphasize house owner's religious beliefs. And also paintings frames are very important decorative elements in the historical houses. Wall paintings sometimes are framed with arches with column, flower drawings, geometrical compositions and ivy leaves. Some of traditional house main hall, wall-paintings are so large and located on symmetrical walls (Kılıç,2007)(Taşdoğan,2008),

### 5. DOCUMENTATION OF WALL-PAINTINGS WITH CONVENTIONAL METHODS

An important situation is about the documentation of wall-painting is the physical condition of the image. Before photogrammetric and laser scanner techniques were used on conservation project, wall-paintings had been documented as a sketches with photograph supply. These techniques were

generally preferred for just give general information about the picture and documented object current situation when wall-painting physical conditions were so good. Because of wall-painting good conditions, conservation techniques are limited by cleaning their surface, stimulating of colors of painting and consolidation of wall where is wall-painting located on. If wall-paintings and historical building conditions were so good, laboratory working would not be necessary, and all interventions would be done by painting original locations. Amount of embrace of intervention to wall-paintings are getting increased parallel to deformation of wall-painting and their historical building.

Removal of paintings without degradation, providing of integrity of crashed wall-painting with appropriate techniques and reinforcement of wall are important interventions about the wall-painting conservations. Minimum damage about wall-painting is small surface cracks which are not fatal risk on wall or panel. It is possible to demolish or break down all walls and painting because of running water in the house.

In such situations, it is very difficult to get cracked parts and determining of missing part of paintings with traditional techniques. In traditional methods, drawings of cracked parts are combining on transparent papers for obtaining of main contours of wall-paintings. Old photos are very helpful to combine the parts. Missed parts area on the painting should be empty. It should be avoided to complete about the missing part based on estimation.

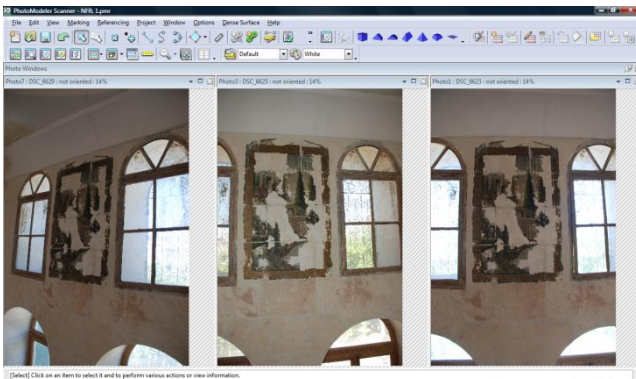


Figure 10 Photo Modeler Software for obtaining orthophotos.

Even though measuring the wall-painting with traditional methods has fairly difficulties, they are still used. Without using photogrammetric techniques measurement, integration of wall-paintings are not available in digital format. Appropriate color and patterns aren't made choice for integration of wall-painting in traditional methods. In traditional methods, integrated wall-painting isn't observed. Without observation of finished work in digital format, interventions on wall-painting might be caused some wrong applications.

## 6. DOCUMENTATION OF WALL-PAINTING WITH PHOTOGRAMMETRIC METHODS

The realization of an accurate and photo-realistic 3D model of a heritage is one of the most complete, adequate and flexible way to restoration project, to conserve data during the time. Photogrammetry should be used in all restoration applications as a contemporary technique (Korumaz &Korumaz,2010). Photogrammetry must be used all restoration project from regular projects to building details. Even if using of

photogrammetry is not widespread in Turkey where is very rich about the cultural heritage, in the near future, it will be used in very units of restoration projects (Gulec,Yakar,2006).

Especially damaged wall-paintings must be measured with laser scanner and photogrammetric techniques. It is necessary that photogrammetric and laser scanner techniques must be used reproduction and integrated of wall-paintings. Classic technique is not sufficient for measured based restorations and only photos in digital format in traditional techniques.

It is the best way in order to get wall-painting drawings is the orthophoto. This method is very productive and gives sensitive outcomes all figures, ornaments and details can be acquired from these orthophotos and they can be easily transferred to reproduction or documentation works. Architects generally insert these orthophotos to Restoration Software with their actual size and they edit.



Figure 11 An Example of Ortho photo for digital image processing.



Figure 16. A Lazarscanner example of Italy (Bonora V. at all,2003).

For documentation of wall-paintings, the most significant problems are difficulties in taking photographs and measuring sourcing from space, dimension and size. Especially in narrow

and low spaces it is difficult to set Total Station, Laser Scanner and to take photos. However, it is easy to study in wide spaces.

## 7. CONCLUSION

It is almost new to use Laser Scanner in architectural studies in our country. Because of the fact that using photogrammetric measurement is not obligatory in restoration projects, using and becoming widespread of modern technology in restoration and documentation projects is to be delayed. On the other hand it is commonly accepted that it is very difficult to measure of monumental buildings or architectural documentation of intensive building details or façades with pictures, writing or relief. This causes to research usage possibilities of new and modern technologies in architectural preservation and documentation process.

Photogrammetric surveys are not widely used in all restoration projects, even though it became widespread in last five years in our country. It is certain that use of the photogrammetry in all documentation and restoration projects will become widespread by noticing its importance and easiness in this field. In our country, the field which the photogrammetry is mostly used is building façades. However it is being done in different photogrammetric projects for plans, cross sections and different details of the buildings in order to document them.

3D visualization of wall-painting is best and deeper knowledge of the objects. With the advancement of software technology, it is today possible to recreate wall-papers in digital format. The 3D- and 2D-material represents an excellent and highly accurate documentation output of wall-paintings. The recent huge advances in digital camera technology mean that high quality digital images could be obtained. This will be very helpful for detailed picture of wall-paintings.

The software and computer equipment required for digital photogrammetry and laser scanner techniques. Restoration of wall-paintings is an inter discipliners works like, architect, conservation specializations, painter, photogrammetric and laser scanner specializations and picture restorer in digital format.

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