



## Advanced Engineering Days

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### Investigation of stone deterioration in Gaziantep Historical Gümrük Inn

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Cite this study: Ay, İ., Dal, M. & Ergin, Ş. (2023). Investigation of stone deterioration in Gaziantep Historical Gümrük Inn. *Advanced Engineering Days*, 8, 52-55

#### Keywords

Stone Deterioration  
Gaziantep  
Historical Gümrük Inn  
Type of Deterioration

#### Abstract

In traditional stone structures, the strength value and durability of the stone are important in terms of transferring the structure to future generations. It is important for the structures to determine the deterioration and causes of the deterioration on the surface of the stone as a result of climatic and external factors and to offer solutions. In this study, the deterioration of the Historical Gümrük Inn in Gaziantep is discussed. In this context, the deterioration was visually examined, classified and analyzed as physical, chemical, biological and anthropogenic. It is aimed that the data obtained from the study will be the basis for the conservation projects to be carried out in the coming years.

#### Introduction

Stone material has been used in different areas and purposes throughout human history. Stone material is preferred more than other main construction materials because it has features such as chiseling, drilling and processing. It is also frequently used due to its low cost compared to other construction materials [1].

The durability and strength properties of stone materials are important for traditional stone structures to survive longer and to be passed on to future generations. Stone materials are used in different areas of human life. Apart from main construction products such as load-bearing walls, columns, slabs and facade elements, they are also preferred in different areas [2, 3].

The stone material used in traditional stone buildings deteriorates on the stone surface as a result of internal and external factors [4-6]. It is important for the structures to detect the stone deterioration, to investigate the causes and to take measures against deterioration [7, 8]. It is aimed that the data obtained from the studies will lead the academic studies and conservation projects to be carried out on this building in the coming years.

#### Material and Method

In this study, stone deterioration in the Historical Customs Inn located in Şekeroğlu Neighborhood of Gaziantep was investigated. The deterioration was visually analyzed and recorded by photographs. The two-story and single courtyard inn serves as a museum today. The building, which does not have a proper position due to the location of the building, was built of black and white cut stone. In this study, the deterioration of the inner courtyard and facade walls of the building were examined, identified and classified [9]. According to the classification, deterioration is analyzed in four groups: physical, chemical, biological and anthropogenic [10].

#### Results

When the stones used in traditional stone structures are exposed to climatic factors, natural factors and human influences, degradation occurs on the stone surfaces. These degradations change the petrographic

properties of the stone. In some cases, the deterioration of stone surfaces also causes other deterioration [11, 12]. Detection of deterioration in natural stones is important in terms of taking precautions and transferring them to future generations [13, 14]. In this context, in this study, stone deterioration occurring in Gaziantep Gümrük Han was identified, classified and analyzed. The deterioration is categorized as physical, chemical, biological and anthropogenic deterioration.

Surface losses that occur on stone surfaces as a result of changes in the petrographic properties of the stone as a result of internal and external factors are called physical deterioration. Capillary cracks, fragment breaks, surface abrasions, cuts and joint losses can be given as examples of physical deterioration [15]. The physical deterioration observed in the Historical Gümrük Inn structure is shown in Figure 1.



**Figure 1.** Physical deteriorations in Historical Gümrük Inn

The deterioration of stone surfaces as a result of climatic and atmospheric factors such as temperature and humidity is called chemical deterioration. Crystallization, salinization, discoloration and foliation are the types of chemical deterioration [16]. The chemical deterioration of the Historical Gümrük Inn is shown in Figure 2.



**Figure 2.** Chemical deteriorations in Historical Gümrük Inn

The degradation of the stone surface as a result of the reaction of biological substances with the stone surface is called biological degradation. Algae growth, plant growth, plant accumulation are types of biological degradation [17-18]. Biological degradation in the historical Gümrük Han structure is shown in Figure 3.



**Figure 3.** Biological deteriorations in Historical Gümrük Inn

Anthropogenic deterioration is the deterioration that occurs as a result of the damage caused to traditional stone structures consciously or unconsciously by humans [19]. Incorrect restoration practices, misuse, neglect and wear and tear are the types of anthropogenic deterioration. The types of anthropogenic deterioration in the Historical Gümrük Inn structure are shown in Figure 4.



**Figure 4.** Anthropogenic deteriorations in Historical Gümrük Inn

## Conclusion

This study focuses on the deterioration observed in Gaziantep Historical Customs Inn. The deterioration was identified by visual analysis and categorized and analyzed. Physical, chemical, biological and anthropogenic deterioration were observed.

The data obtained in the study is intended to form a basis for both academic studies and future restoration projects. In addition, this study is important in terms of taking the necessary measures to ensure the survival of traditional stone buildings for a longer period of time.

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