CERIS Civil Engineering Research and Innovation for Sustainability

Development and assessment of models for the durability and preventive conservation of historic plasterwork from the decorative elements of the Real Alcázar of Seville

Summary

Plasterworks are gypsum-based decorative elements characteristic of Muslim art, executed on walls, arches and vaults over more than nine centuries, creating various artistic styles and providing a relevant historical and patrimonial heritage. The natural ageing of the materials, associated with the incidence of degradation agents and mechanisms, naturally led to the appearance of several anomalies (Figure 1), which can occur in the plasterwork and in its fastening systems. In severe situations, their adherence to the substrate is compromised, leading to the detachment of fragments, thus jeopardizing the users' safety, with serious losses to the building's heritage value. In this sense, the plasterworks require the adoption of adequate and regular maintenance strategies. Nevertheless, Spanish monuments such as the Real Alcazar of Seville, present an extensive area of decorative plasters, and the establishment of a hierarchy of preventive conservation and intervention actions can be a very difficult task.

In this project, a methodology to evaluate the overall degradation condition of plasterworks is proposed (Figure 2). For this purpose, a set of plasterworks in the Real Alcazar, corresponding to different construction periods (XIV-XVI centuries), are analysed. Three models are defined, related to the estimation of plasterworks' durability (functional and physical service life), which intend to establish a ranking of preventive maintenance tasks and intervention actions, being possible to extrapolate the proposals to other buildings and materials.

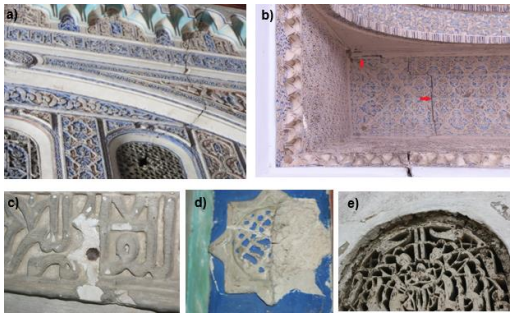

Figure 1. Examples of anomalies in the plasterworks of the Real Alcazar: a) Hall of the Ambassadors, with severe cracking and detachment of material; b) crack detection in plasterworks at Patio de las Doncellas; c) damage caused by rusted metal fixing; d) detachment; e) wear by water action.

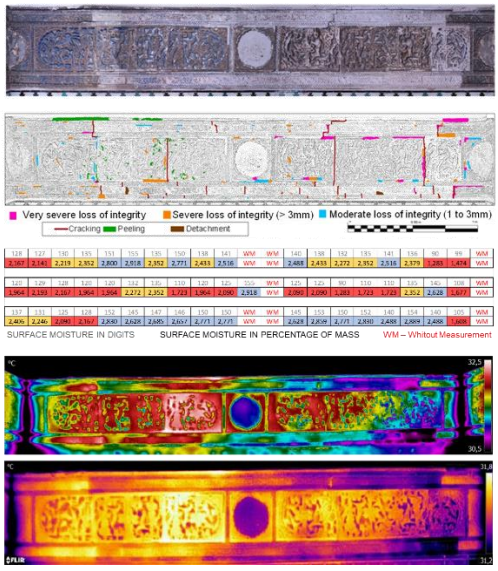

Figure 2. Assessment of the anomalies in a plasterwork of Patio de las Doncellas: mapping of the anomalies; humidity measurements made in situ; thermographic images.

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