

Transparent Restoration - Abstract

This research investigates the application of structural glass in restoration and conservation practices in order to highlight and safeguard our built heritage; a distinguishable, yet discreet approach. Current restoration treatments with traditional materials bear the risk of conjecture between original and new elements, while the ambition to enhance the structural integrity of the endangered structures, often results in visually invasive and irreversible solutions that can impair the authentic image of the monuments. In this context, glass could be the answer to this on-going debate between restoring and preserving, a promising restoration solution able, on the one hand to consolidate the historic buildings and on the other hand to reveal their stratification. The transparency of glass enables the simultaneous perception of both the original and ruinous state of the monument, giving a material and immaterial appearance that relates the structure to both the past and the present setting.

As a case study, the research focuses on the design of a novel glass addition in the degraded façade of an old tower in Greece. The innovative contribution of this restoration approach lies in the development of a completely reversible system, complying with the conservation guidelines suggested by the Venice Charter. To avoid any permanent bonding between the two structures, dry connections are proposed between glass and the historic matter. Solid cast glass units are suggested, in respect to the existing construction technique and aesthetics of the original limestone masonry, to reinforce the monument by replacing the missing parts. To ensure the overall stability of the façade, the cast glass units follow an interlocking geometry sparing the necessity of permanent, adhesive connections. Moreover, the high stiffness and compressive strength of glass result in a lightweight glass wall of minimal thickness that ensures the desired structural consolidation without burdening the monument.

Different interlocking systems have been explored to conclude to the optimum shape. As a proof of concept, the interlocking units have been cast in the TU Delft Lab and a small prototype has been made. The aesthetic value of this solid cast glass interlocking masonry is articulated with glass elements resembling to the original stone texture, while at the same time allowing for the perception of the surroundings. To evaluate the degree of cooperation of the units, testing in shear has been performed, manifesting the potential of the system as a compatible and elegant design tool for the preservation of our heritage.