Energy and Sustainability in Museums. The Plant Refurbishment of the Medieval Building of Palagio di Parte Guelfa in Florence

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ABSTRACT

This paper presents a performance-based design of a HVAC plant and controller system of the "Palagio di Parte Guelfa" Palace, a medieval building converted into a museum in the city of Firenze. Transient simulations to evaluate the internal microclimate conditions during the year for the building and the different system plant were carried out. A comparison between the indoor microclimatic parameters obtained and the values suggested by the standards on protection and conservation of historical works of art, suggested a non-invasive and reversible plant system solution. The Museum of Historical Football building portion is the case study. The proposed plant, a constant air flow system coupled with radiant panels dry mounted above the existing flooring, was simulated throughout the year under transient conditions to evaluate its energy performance. This solution ensures indoor temperature and humidity values suitable for the conservation of works of art and visitor comfort. It is an example of a possible course of action for a plant refurbishment in a historic building converted into a museum, located in climatic regions characterized by high thermal and solar loads. The present paper concerns the study of an integrated and reversible architectural-plant solution proposed: reversibility of the proposed system is understood as the possibility for the present conditions being easily restored.

Keywords: Energy Efficiency; Retrofit Solution; Conservation; Museum; Reversible Plant Systems