Domagoj TKALČIĆ, mag. ing. aedif.
University of Zagreb
Faculty of Civil Engineering
Kačićeva ulica 26
HR-10 000 Zagreb
Croatia
e-mail: domagoj.tkalcic@grad.unizg.hr

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ABSTRACT

PRESENTATION

PAPER

Domagoj Tkalčić is an assistant at the Department for Materials of the Faculty of Civil Engineering of the University of Zagreb.

izv. prof. dr. sc. Bojan MILOVANOVIĆ
University of Zagreb, Faculty of Civil Engineering, Zagreb, Croatia
Mergim GAŠI, mag. ing. aedif.
University of Zagreb, Faculty of Civil Engineering, Zagreb, Croatia

USING INFRARED THERMOGRAPHY TO DETERMINE THE EXCESSIVE MOISTURE IN EARTHQUAKE DAMAGED HERITAGE BUILDINGS

Even though moisture content or relative humidity are one of the basic physical properties of building materials, excessive moisture content in building materials often leads to structural damage and aesthetic changes in the material. This paper presents the results of a study investigating the use of infrared thermography (IRT) to identify and assess moisture in earthquake-damaged heritage buildings, specifically masonry wall assemblies. The IRT survey provides information about the surface temperature of a building's elements. By analysing buildings thermal patterns, it is possible to detect areas where moisture has penetrated and identify the source of the moisture intrusion.

Studied buildings are churches that are protected as cultural heritage. The churches are located in the area of Sisak and Petrinja, Croatia, near the epicentre of the magnitude 5,4 earthquake in Zagreb and the devastating magnitude 6,4 earthquake in Petrinja, which occurred nine months apart. The earthquakes caused significant structural damage to some of the churches. As a result, the moisture content in the building components increased and led to a deterioration in the material properties.

Moisture is a significant problem in historic buildings. Many of them have been listed due to the period in which they were built. Most of the used materials were well-suited to the prevailing environmental conditions of their time. However, over time, these materials have undergone gradual deterioration, leading to a decline in their water resistance and water absorption capabilities. Additionally, the performance of strengthening technologies is also influenced by the moisture content of materials, such as fiber-reinforced polymers (FRP) which are widely utilised to strengthen masonry structures from the outside. Nonetheless, some research proves that moisture has a significant impact on how long the link between FRP and substrate lasts. Both the mechanical characteristics and the bond behaviour of the component materials can deteriorate because of moisture. Furthermore, if one analyses shotcrete and its concrete-to-concrete interface bond, this bond must amongst others also withstand moisture changes for an extended period.