

ABSTRACT

Keywords: Heritage buildings conservation, interior microclimate, thermal comfort, energy efficiency, historic temples.

The subject of the research undertaken is the identification of problems and determinants of improving the comfort of the environment of historic temples, taking into account the needs of users and conservation requirements.

As a result of growing demands from the faithful regarding the comfort of using temples, we are witnessing the widespread introduction of technical solutions for shaping the internal environment in terms of improving thermal comfort and air quality. This change in physical parameters inside, occurring suddenly in relation to the time of existence of the monument, affects all elements of the building and works of art inside. The way this influence requires research and analysis to determine threats to the substance of the monument and preventive methods. Due to the specificity of the way temples are used - their discontinuous use, increased volume, and also a structure devoid of thermal shielding function, the internal environment in a unique way for buildings, depends on the climatic conditions of the location.

The changes currently being introduced in the way temples are used, consisting in the installation of systems for shaping the internal environment such as heating and ventilation, in historically unheated objects, in interaction with the influences of the region's climate are the cause of phenomena unfavorable for the durability of the monument from the field of physics, which has been thoroughly researched and described by Dario Camuffo. The need to protect the substance of the monument requires knowledge of these processes and taking into account preventive methods in the construction and conservation process, and in particular the introduction of a standard of design work, including the execution of preliminary microclimate research. This also requires a change in the current conservation practice, which, based on the paradigm of maintaining the existing state to the maximum possible extent, limits actions to designated works with the rest of the building elements "in the existing state", without analyzing the investment needs of the entire object. Meanwhile, all elements of the building are in a common environment - internal air and in the case of forced change of its parameters, it affects all elements. The installation of technical systems requires the installation of a number of devices and pipes, which may be associated with the need to carry out accompanying conservation works. Previously carried out works may require re-execution or prevent proper installation of the installation for economic reasons.

The temples of the researched region, historically not equipped with heating and without effective thermal protection, do not currently provide favorable conditions for the development of

religious life. The development of a project to improve user comfort requires the identification of needs. Researching the parameters of the interior microclimate allows determining the existing state in terms of thermal comfort, which is the basis for design decisions, allowing for the design of effective and energy-efficient solutions.

The research problem is therefore the lack of inclusion in the design and conservation process of proven methods of identifying threats to the durability of the monument substance resulting from the impact of the internal environment and methods of identifying needs in terms of improving user comfort and the possibility of carrying out investment works. The installation of internal environment regulation systems in temples is associated with the need for analysis in terms of energy efficiency, translating into economic and ecological conditions of using the object.

The dependence of the durability of the monument substance on the state of the internal environment confirms the state of existing knowledge presented in the work, with a special description of processes concerning wooden elements.

The research covered historic temples from the Białystok region, in locations with similar climatic conditions, in two types of construction - wooden and brick. Long-term measurement studies of four temples were carried out. Analyses of the collected data were performed in terms of the impact of internal environmental conditions on the durability of the monument and the identification of thermal comfort needs. An attempt was made to analyze energy efficiency.

The results of the work authorize the need to include in the design and conservation process the issue of the impact of the internal environment due to its wide impact on the monument. The invaluable value for the design process of the obtained measurement data characterizing the interior environment, which are the basis for designing energy-efficient technical solutions, economically and ecologically balanced, was established.