

TO THE PROBLEM OF NUMERIC RESEARCH OF STRESS-STRAIN STATE OF A CLOSED – TYPE BUILDING

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The goal of the paper is an optimization of a structure of a prefabricated closed type building with timber round cross section columns. Design of the building consists of a foundation platform, walls and roofs that are made in the form of spatial plate-column structures and are united into a single closed fully - integrated system. Column, plate and beam elements are designed from timber materials and are connected into a single prefabricated structure on bolts using the system of shaped metal knot elements.

Column elements are fabricated from large pieces of plywood production waste, so called “pencils” provided with metal tips at the end. In the design diagram they are modeled as columns with standard features of pine tree wood.

Plate elements represent enclosing structures in the form of “sandwich” panels with profiled metal sheet coatings, plywood or shavings-oriented plates.

Numeric research of stressed-strained state of the suggested closed system was performed with the help of SCAD software, where calculations were carried out by the method of finite elements of spatial structures with the assigned design model task according to the principle “footing – foundation – upper building”.

As the method of the design model development can directly influence the results of calculations, it is important to create the most comprehensive model at this stage that corresponds to the operation of a real structure, initial information not having been complicated as far as possible. For simplicity, the authors consider one block of the building. The spatial closed block, being a part of prefabricated building can be modeled in different ways depending on the method of covering plates use. The ways are paid attention to in the paper.

An analysis and calculation of stressed-strained state has resulted in the choice of the plate-frame connection method, effect of plate involvement in the block operation, reduction in the number of junctions, as well as simplification and reduction in price of the junction structures at the expense of fewer elements being connected.

Keywords: closed-type building, grid frame, spatial system, fully integrated system, plate-column structure, plywood production waste, economical effect, low-rise building