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ON IMPROVEMENT ENGINEERING SOLUTIONS OF CONSTRUCTION STRUCTURES

Development of effective building designs can be based on an integrated optimization approach, whose essence - which the design process is allocated all situations connected with the choice of the best design and engineering solutions, and each situation is, solved the task of finding the optimal solution. It is expedient to consider three levels of these situations: the first - is the choice of leading technical idea or principle of action for the implementation of the design features, the second - the analysis and selection of the best technical design of structures based on the idea of the first level, and the third - the optimization of the parameters of the best technical solution from the second level. Under the technical solution refers to the constructive design of the functional structure and physical principle of construction activities.

The greatest effect of an optimization problem of structures can provide the first and second levels, i.e. solution design and inventive problem with obtaining the inventive design. This is possible through the application of known physical effects and heuristic methods to search for new technical solutions, including the known methods of brainstorming (A. Osborne) synectics (William Gordon), morphological box method (F. Zwicky), a seven-time search (G.Bush), the theory of inventive problem solving - TRIZ (Altshuller, G.). The construction should be noted also systematization array of soft structures of hydraulic structures search to yield patentable solutions (B.N.Sergeev) A.N. Polovinkina work on the automated synthesis and optimization of structures retaining walls.

The improvement of technical solutions of building structures are considered on an example of production of new patentable technical solutions - utility model patents sheet pile - structures made of metal sheet pile, clamped at the bottom in the ground, intended to retain the soil in the prism of the collapse of the wall. Procedure for the preparation of the technical solution involves the transformation of the original pile of pile construction (prototype) on the basis of the recommendations of the library search methods. These techniques have been identified by analyzing the claims of various branches of engineering and construction, ranked by the frequency of their application and can be used to transform prototype alone or in combination, in manual mode or an optimized.

The most effective ones involve:

1. Change the shape of the design, to break the symmetry and vice versa, to go from straight to curved parts, from flat surfaces to spherical;

2. Connect to the prototype parts, components, taken from a set of topological types of parts;

3. Eliminate or make openings, cavities in the structure elements;

4. increase or decrease the number of simultaneously operating construction elements;

5. The split structure to pieces so that each piece was made from the most suitable material;

6. The use of thread rods, films, flexible shell, pneumatic and hydraulic design;

7. Divide design into parts manufactured, processed, transported each part separately, then collect all;

8. The split design to pieces, to prioritize the inclusion in the work of the individual parts;

9. Change the nature of functional connection between the structural elements to increase or decrease the degree of freedom of one element relative to the other.

Search piles technical a solution using these techniques is carried out by a qualified technician with the subsequent expert evaluation of compliance solutions obtained regulations and possible options for improvement of evaluation criteria (functional, technological, economic, etc.). In this known technical solutions and embodiments of the pile having patentability can be recorded. Formula utility model, which issued patent, include the following: "Sheet pile comprises a body and a connecting element, characterized in that the housing is formed as a wide piles, which in vertical section is polygonal shape in the form of an obtuse angle, while the connecting element in the form of a perforated sheet is attached with a small offset from the edges of the body ". The technical result is a pile of useful model is to reduce the consumption of materials and installation time. By converting the model of the sheet pile, obtained a positive decision on the new utility model. Formula utility model is as follows: «Sheet pile comprises a housing configured as a wide piles, which in vertical section is polygonal shape in the form of an obtuse angle and the connecting element, characterized in that the coupling element is a set of plates arranged in height of the pile with a certain and a step attached with slightly indented edges of the housing or as a set of reinforcement rods spaced pile height and pitch with some attached with slightly indented edges of the housing".

Our procedure will significantly improve the efficiency of solving the optimization problem and purposefully to search for new technical solutions of building structures.