

Features of Application of Some Methods of Non-Traditional Technology to Improve the Functional Quality of Low-Rise Construction Objects

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Abstract

Introduction: This research is based on the scientific hypothesis about a gradual decrease in the scope and scope at the application in traditional technological methods for the formation functional quality at low-rise construction objects. The subject of this research is productive and reproductive directions for architectural activity, which are characterizing the features of traditional and non-traditional methods at practical implementation composite solutions in architectural systems. The relevance for their research is related to the analysis aspects the application in non-traditional methods manufacturability for restoration (increase) functional quality level for a material objects architectural activity, that are in operation, without changing their initial functional purpose.

Materials and methods: A systematic analysis factors and aspects for application of techniques and means in innovative technological effectiveness, generalization and synthesis at relevant and verified information materials.

Result: As a result of this research, the main types influence factors and aspects for architectural activity were identified that determined the features of reducing apology for the spread traditional technological methods for the formation the architectural systems in low-rise construction. The features of the influence the adaptability property on the composition in low-rise construction object are considered. The analysis of the features in this use at non-traditional (innovative) techniques for the development and practical implementation in composite solutions are considered. The features for techniques aimed at improving the functional quality at construction projects, which are characterized by the state (period) the operation of their life cycle is considered. It has been established, that promising techniques of unconventional manufacturability, can significantly expand the possibilities for architectural creativity (while maintaining the canonical approach to architectural composition) to form a new level for quality architectural systems.

Conclusion: The current state of architectural science allows (in most cases) to establish the required quality through the use non-traditional methods for forming the functional quality in architectural systems. The study examined the main aspects and influence factors that determine the choice at techniques for non-traditional manufacturability, as a competitive way to increase functional quality in traditional and non-traditional types of architectural systems in low-rise buildings and structures.

Keywords: Low-rise objects; Architectural systems; Compositional solutions; Influence factors; Technological aspects; Traditional and non-traditional technological features; Productive and reproductive activity; Functional quality

Introduction

One of the obvious features of modern architectural activity (domestic and foreign experience) is the use of not only traditional, but also alternative (or non-traditional) methods of architectonic representation and technological implementation of structural and building systems of low-rise construction objects [1-4].

The formation of objects of material nature in the format of low-rise construction (development) is carried out in two main directions:

- A. Reproductive activity, as a form of objective ensuring maximum compliance with experience and results of previous studies, confirmed by good practice (typical, for example, of buildings and structures of cultural and historical significance or traditional architectural systems).

- B. A productive line of activity, as a form of the subjective way of a new, innovative solution to the same traditional compositional problem, using non-traditional tectonic, artistic and technological techniques.
- C. A productive direction of architectural activity involves the use of techniques and means of non-traditional (innovative) technological effectiveness of the formation of building products (architectural systems of low-rise buildings) that enable [5-9].
- D. Expand the range of possible compositional solutions for low-rise construction projects of various functional purposes.
- E. Reduce the level of tangible and intangible (cost, duration and complexity) of design, construction and operating costs.
- F. Minimize the amount of environmental load from the operation of construction projects.
- G. Increase resistance to external factors and conditions of harmonious interaction with the surrounding artificial and natural environment.

The use of non-traditional technological methods is shown for theoretical and practical application for the vast majority of mandatory periods of the life cycle (design, manufacture, erection, operation) of architectural (constructive) systems of low-rise buildings and structures. Technological innovations are competitive (in relation to traditional types) means of innovative organization of architectural space. Expediency and rational scope are determined on the basis of a holistic, scientifically based doctrine, the general

concept and particular principles of ensuring the functional quality of low-rise buildings [10-12].

The architectural system of a low-rise building can be represented as an object of targeted design and management of functional quality indicators that correspond to a certain stage of its life cycle. A meaningful extension of the life of the operation (one of the mandatory life cycle periods) and/or an increase in the indicators of functional quality is such a reflection of the support of the material and/or intangible value of the considered low-rise construction object, which is not provided for by the initial design decision. A sufficiently large number of low-rise buildings for various functional purposes of the past historical eras (pre-industrial, industrial and the beginning of the post-industrial periods) have retained their material and intangible features to date and are able to adapt to modern conditions, improve functional quality and further use [13-15].

Figure 1 presents the characteristics of the initial state and design decisions (using techniques of unconventional manufacturability and changing the initial spatial composition) to improve the functional quality of a low-rise housing stock [16]. As part of a systematic approach to designing and renovating a residential property, a qualitative change was made in the conditions for ensuring the comfort and safety of life processes by: eliminating fixed defects and damages; device structural elements that provide the established parameters of energy efficiency; rational placement of internal engineering systems and technological equipment; repair and restoration of the functional quality of external engineering networks.



a) initial state



b) implementation of design solutions

Figure 1: Improving the functional quality (renovation) of a residential property, the city of Leinefelde, Germany.

Among the aspects that determine the nature and extent of the application of techniques of non-traditional manufacturability are cultural-historical (urban); functional, artistic and emotional, economic [17-20].

The "canonical" methodology of architectural composition, combined with innovative (non-traditional) techniques of

manufacturability, allows us to solve the complex problem of improving the functional quality and synergistic display of the internal content of the architectural image through the organization of interaction of a new design solution, functional structure and artistic-figurative expressiveness.

Conclusion and Discussion

Composition techniques are formed by the course and results of the development of architecture (architectural science and practice) and relate to traditional methods of providing indicators of the functional quality of construction products (within the framework of the reproductive direction of architectural activity). The feasibility of developing the field and the scale of application of traditional technological methods for the formation and improvement of the functional quality of low-rise construction projects is determined by numerous and diverse factors: social, economic, psychological, cultural and historical. It can be argued that the reason for the gradual abandonment of the use of traditional technological methods and operations (during the formation of low-rise construction objects) in favor of innovative materials, structures and technologies is promoted by the requirements for the growth of consumer (functional) quality of construction products while reducing the cost of completed construction projects.

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