ОРГАНІЗАЦІЯ, УПРАВЛІННЯ ТА ЕКОНОМІКА В БУДІВНИЦТВІ

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UPDATING OF THE METHODOLOGICAL BASIS OF THE ORGANIZATION OF CONSTRUCTION TO PROVIDE THE EUROPEAN REQUIREMENTS FOR THE ORGANIZATIONAL AND TECHNOLOGICAL RELIABILITY OF CONSTRUCTION PROJECTS

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The current article discusses the background and the main aspects of the need to modernize the modern paradigm of organizational and technological planning of construction process, it's changes in accordance with the current understanding of providing comprehensive reliability of construction projects realization as a flowcharacteristic set of key indicators of a project.

Keywords: organizational and technological reliability, construction project, rejection process, parametric evaluation

Introduction

The newest theory of reliability develops as a means of solving current and completely new challenges that arise in the process of the emergence, development and updating of technical, organizational, economic and management systems. Numerous practical methods for ensuring the reliability of various types of systems and functional design at the stage of their design, creation and operation are developed.

In the generally accepted understanding of the theory, the concept of "reliability" considers as the ability to perform a particular task or, as a probability of performing a particular function or several functions during a given period in the existing conditions, i.e., as an exclusion of failure of execution of project actions.

All three of the above categories have a time profile and indicate the need to maintain an operative state only for a specified time, indicating the expediency of maintaining and supporting an effective state only in certain, defined calendar terms. Also, "reliability" additionally has a probabilistic characteristic, which indicates the ability to provide the desired result, but not to guarantee its achievement. Therefore, since reliability is a probability, statistical characteristics are used to evaluate it.

Overview

Concerning the features and unique properties of building production, the reliability of construction processes is characterized by technological and organizational measures for its provision. A considerable number of works are devoted to the development of the methodological basis of organizational and technological reliability (OTR) of building processes and projects of the construction industry, among which Russian scientific school Gusakov A.A. should be mentioned, and Ginzburg A.V. [1], in fact in which in 1972 Gusakov A.A. for the first time, the term "organizational and technological reliability" for the construction industry was proposed. OTR was considered as the ability of organizational and technological solutions to achieve the desired result of construction production in the conditions of random perturbations inherent in construction, as a complex stochastic system [2].

Another aspect of the complexity of the issue of modern organizational and technological support for construction is, that lately, the sharp complication of construction production systems leads to an increase in the number of parameters and elements of construction projects (suppliers, performers, materials, technical equipment, etc.), which, according to one from the key laws of the theory of reliability, reduces the reliability of the whole system in geometric progression in proportion to the number of calculated parameters and elements.

Task formulation

The main key difference of organizational and technological reliability in construction from the reliability of other complex technical systems is that the reliability of construction production is characterized primarily by the reliability of the results of activities, when the reliability of technical systems is considered as the reliability of the functioning of technical elements and components of these systems. That is why, unlike most of the complex technical systems considered by the general theory of reliability, building production systems are characterized by incomplete, but partial failures (crashes in construction and related processes, usually in violation of calendar terms and cost of construction), which are eliminated in the process of functioning of the system.

The purpose of this goal has determined the need to address the following research objectives:

a) to reveal the specific procedural nature of the deficiency of "organizational-technological reliability (OTR) of construction on the basis of biosphere compatibility", by identifying the advantages and disadvantages of existing concepts and methodological approaches to detecting the level of OTR, taking into account the proper coordination of the content and evolutionary trajectory of this definition with a theoretical basis and the practice of organization of construction, as well as contemporary ideas on biosphere compatibility in construction;
b) the formation of methodological and analytical requirements for the introduction and construction of tools for the organization of construction and organizational and technological support of construction projects on the basis of biosphere compatibility.

Main points of the research

The complexity of such nature and type of failures is that the system parameters are significantly deviating from the design, but to determine the magnitude of these deviations, the mathematical methods of the said theory of reliability are unacceptable. And the number and variety of characteristics, parameters, elements and components of a construction project that require consideration at the stage of substantiation and development of project documentation and project proposals explains that building systems are much more complex technical systems, and thus require specialized methods and models of analysis, evaluation and provision of OTR construction projects.

Reliability prediction combines:

- creation of a proper reliability model (see further on this page)
- estimation (and justification) of input parameters for this model (e.g. failure rates for a particular failure mode or event and the mean time to repair the system for a particular failure)
- estimation of output reliability parameters at system or part level (i.e. system availability or frequency of a particular functional failure)

Reliability engineering is a sub-discipline of systems engineering that emphasizes dependability in the lifecycle management of a product. Dependability, or reliability, describes the ability of a system or component to function under stated conditions for a specified period of time. Reliability is closely related to availability, which is typically described as the ability of a component or system to function at a specified moment or interval of time.

Reliability is theoretically defined as the probability of success as the frequency of failures; or in terms of availability, as a probability derived from reliability, testability and maintainability. Testability, maintainability and maintenance are often defined as a part of "reliability engineering" in Reliability Programs. Reliability plays a key role in the cost-effectiveness of systems.

Reliability engineering deals with the estimation, prevention and management of high levels of "lifetime" engineering uncertainty and risks of failure. Although stochastic parameters define and affect reliability, reliability is not (solely) achieved by mathematics and statistics. You cannot really find a root cause (needed to effectively prevent failures) by only looking at statistics. "Nearly all teaching and literature on the subject emphasize these aspects, and ignore the reality that the ranges of uncertainty involved largely invalidate quantitative methods for prediction and measurement."

Reliability engineering relates closely to safety engineering and to system safety, in that they use common methods for their analysis and may require input from each other. Reliability engineering focuses on costs of failure caused by system downtime, cost of spares, repair equipment, personnel, and cost of warranty claims. Safety engineering normally focuses more on preserving life and nature than on cost, and therefore deals only with particularly dangerous system-failure modes. High reliability (safety

factor) levels also result from good engineering and from attention to detail, and almost never from only reactive failure management (using reliability accounting and statistics).

The objectives of reliability engineering, in decreasing order of priority, are:

1. To apply engineering knowledge and specialist techniques to prevent or to reduce the likelihood or frequency of failures.
2. To identify and correct the causes of failures that do occur despite the efforts to prevent them.
3. To determine ways of coping with failures that do occur, if their causes have not been corrected.
4. To apply methods for estimating the likely reliability of new designs, and for analysing reliability data.

The reason for the priority emphasis is that it is by far the most effective way of working, in terms of minimizing costs and generating reliable products. The primary skills that are required, therefore, are the ability to understand and anticipate the possible causes of failures, and knowledge of how to prevent them. It is also necessary to have knowledge of the methods that can be used for analysing designs and data.

Biosphere compatibility in the narrow sense is understood as the ability of technologies for utilizing used materials to ensure that there is no re-contamination of the environment, in a broad sense, such as the functioning of the technosphere, in which the equilibrium of natural processes is not disturbed.

In domestic practice, to assess the degree of danger of the impact of anthropogenic factors on the environment, the maximum permissible exposure levels, the standards of discharges to water facilities and emission standards into the atmosphere are used. The criterion for assessing the environmental safety of the combined impact of sources is the maximum permissible concentrations determined by sanitary rules and norms.

When solving urban problems for the assessment of bio-sphere compatibility, an integral indicator is introduced, which is a function of the relative parameters of a clean (contaminated) biosphere and contamination parameters from the technosphere with maximum concentrations that allow development.

Thus, OTR is the ability of organizational, managerial, and economic decisions to ensure with a given probability that the planned result of the functioning of the construction process is obtained in the stochastic conditions of the project implementation, which is inherent in the construction industry. The basis of the OTR is the ability of such decisions to link the implementation of construction processes, in case of occurrence of deviations, ensure their functioning. In this case, the key indicators of the implementation of construction processes should not exceed the design values.

According to the International Standards (EN 1990: 2001 / Eurocode - Basis of structural design), the reliability of building structures is considered as a combination of safety, suitability for normal operation and durability. Safety is considered as the property of a building object to remain operational for a specified period without a potential threat to the life and health of people.

Conclusions

The transition to biosphere-compatible construction in Ukraine should be considered as an important strategic perspective, which will affect the reformation of the content and architectural, constructive, technical and organizational-technological standards of construction, where as the main constituent element of the construction system is the production-technological module, which represents a set of groups Processes, combined technological sequence and functional purpose, aimed at the creation of building structures, construction and technological elements s and engineering systems.

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ОНОВЛЕННЯ МЕТОДОЛОГІЧНОГО ПІДГРУНТЯ ОРГАНІЗАЦІЇ БУДІВНИЦТВА ДЛЯ ЗАБЕЗПЕЧЕННЯ ЄВРОВИМОГ ЩОДО ОРГАНІЗАЦІЙНО-ТЕХНОЛОГІЧНОЇ НАДІЙНОСТІ БУДІВЕЛЬНИХ ПРОЕКТІВ

Київський національний університет будівництва і архітектури

У статті розглянуто передумови оновлення сучасної парадигми організаційно-технологічного планування будівельного виробництва, її зміни у відповідності до сучасного розуміння забезпечення комплексної надійності, як мультиплікативного потоку множини ключових показників проекту.

Ключові слова: організаційно-технологічна надійність, будівельний проект, відмова, процес, параметрична оцінка.

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ОБНОВЛЕНИЕ МЕТОДОЛОГИЧЕСКИХ ОСНОВ ОРГАНИЗАЦИИ СТРОИТЕЛЬСТВА ДЛЯ ОБЕСПЕЧЕНИЯ ЕВРОПЕЙСКИХ ТРЕБОВАНИЙ К ОРГАНИЗАЦИОННО-ТЕХНОЛОГИЧЕСКОЙ НАДЕЖНОСТИ СТРОИТЕЛЬНЫХ ПРОЕКТОВ

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В статьи рассмотрены предпосылки обновления современной парадигмы организационно-технологического планирования строительного производства, ее изменения в соответствии с современным пониманием обеспечения комплексной надежности, как мультипликативного потока множества ключевых показателей проекта.

Ключевые слова: организационно-технологическая надежность, строительный проект, отказ, процесс, параметрическая оценка.

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