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ISSUES OF INCREASING THE OPERATIONAL RELIABILITY OF EXISTING BUILDINGS AND STRUCTURES

Mirzaakhmedova U.A.
Fergana Polytechnic Institute
Email: mirzaahmedova@fer.uz (ORCID 0000-0001-5227-1089)

Abstract:
In the article, very important problems are the quality of existing buildings and structures, their reliability, durability, durability, durability. Information is provided on measures to eliminate damage and raids caused by deformations in buildings and structures in operation, to improve the reliability of buildings.

Keywords: reliability of buildings, durability, operation process, service life, economic efficiency, maintenance of buildings in good condition.

Аннотация
В статье очень важными проблемами являются качество существующих зданий и сооружений, их надежность, долговечность, долговечность, долговечность. Приведены сведения о мероприятиях по устранению повреждений и налетов, вызванных деформациями в зданиях и сооружениях, находящихся в эксплуатации, по повышению надежности зданий.

Ключевые слова: надежность зданий, долговечность, процесс эксплуатации, срок службы, экономическая эффективность, содержание зданий в исправном состоянии.

Annotatsiya
Maqolada mavjud bino va inshootlarning sifati, ularning ishonchliligi, pishiqligi, mustahkamligi, uzoqqa chidamliligi kabi juda muhim ahamiyatga ega bo‘lgan muammolarini keltirib o‘tilgan. Foydalanilayotgan bino va inshootlarda deformatsiyalar tufayli sodir bo‘ladigan shikastlanish va latlarni bartaraf etish, binolarni ishonchliligini oshirish uchun chora – tadbirlari ko‘rilishi xaqidagi ma’lumotlar keltirilgan.

Kalit so’zlar: binolarning ishonchliligi, uzoqqa chidamlilik, ekspluatatsiya jarayoni, xizmat muddatlari, iqtisodiy samaradorlik, binolarni yaroqli holda saqlash.

The quality of finished buildings and constructions, their reliability, durability and long-term durability is one of the most important problems of the country's economy. Social-economic, aesthetic, engineering, exploitation, project-technological aspects are embodied in it. These aspects are especially evident in the operation of buildings and structures, their compliance with regulatory requirements is of great importance during the period of use of the facility. Therefore, operation of buildings and structures is a more complex, multifaceted problem than their construction.

Until recently, the reliability of buildings and structures was understood as their operation without breakdowns, as a result of which the massiveness of the main structures was increased. At the same time, reliability is not only a technical meaning, but also an economic category, because as a result of increased operational reliability, the service life of buildings increases, the number of repairs decreases, and direct economic efficiency is achieved. [1,2].

Reliability is put into the calculation of strength, stability, hermeticity and the like during the design process. In this case, the coefficients connecting the properties of the materials with the working conditions of the constructions are accepted while keeping the construction in good condition. Reliability of buildings is ensured by the use of high-quality materials in its construction, strict adherence to work technology, and full compliance with project requirements.

In the process of operation, the reliability of buildings may decrease, because under natural influences, mainly atmospheric factors from the outside and various aggressive technological wastes from the inside, the structure wears out and gradually erodes. The task of the operation service is to develop and implement measures that ensure the maintenance of the intended parameters in the buildings during the given service period.

The preservation of building parameters, that is, their reliability, is greatly influenced by factors ranging from the compliance of the calculation scheme of many constructions to actual working conditions, to the quality of materials and the observance of their manufacturing technology. Consequently, the probability of reliability is derived from the fact that many of these factors have a random description.

The reliability of the building is evaluated by three main characteristics: the probability of working without damage (authenticity); longevity; repairability [3,4,5,6].

Longevity is mainly divided into two types: physical and technological or spiritual longevity. Physical durability depends on the physical and technical strength, hermeticity, heat and sound insulation of structures and other characteristics. Technological or spiritual longevity depends on the suitability of the building and the functional or technological processes taking place in it [7].

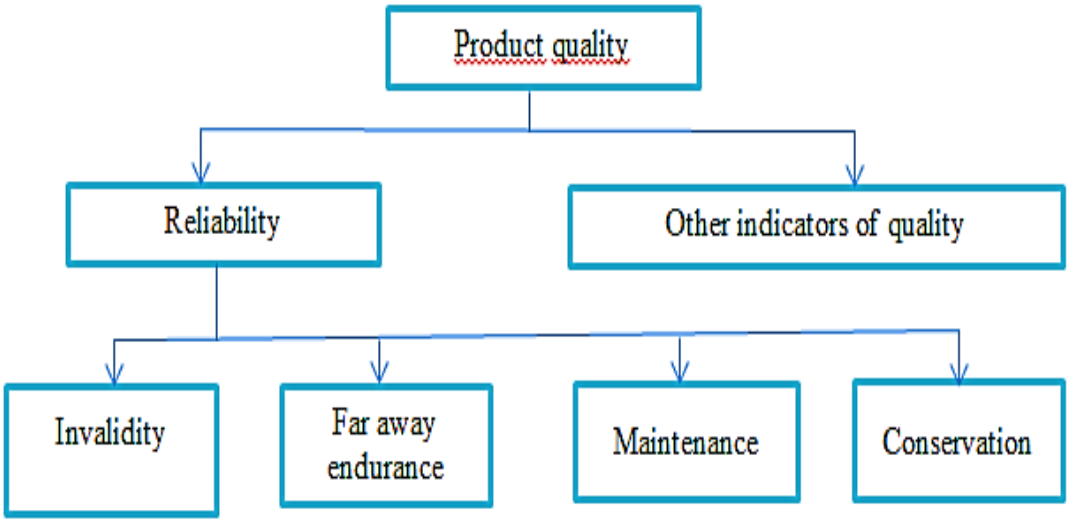
The service life of the building means the duration of its useful operation. Usually, the useful life of the elements of the building, its structure and equipment is not the same. When determining the standard service life of the building, the average service life of the main load-bearing structures, such as the foundation and walls, is accepted. In this case, the service life of some elements of the building may be 2-3 times less than the standard service life of the building.

It is necessary to completely replace such elements in order to be able to use them properly and successfully during the useful life of the building. For example, it is allowed to use wooden floors with a standard service life of 40 years and wooden floors with a service life of 60 years in residential buildings of the second capital group. Therefore, during the service life of this type of residential buildings, wooden partitions must be replaced at least once, floors at least twice. In addition, engineering structures with different service lives, consisting of various elements, have to be replaced several times. If the heating devices of the central heating system supply - radiators have a service life of 40 years, and the service life of water pipes is 30 years.

Standard service life is an indicator depending on the capital of the building and is determined in BSRs.

Thus, the main goal of research, assessment and restoration of reliability is to ensure the minimum cost of maintenance, technical operation and maintenance of buildings and structures during their service life[8,9,10,11,12].

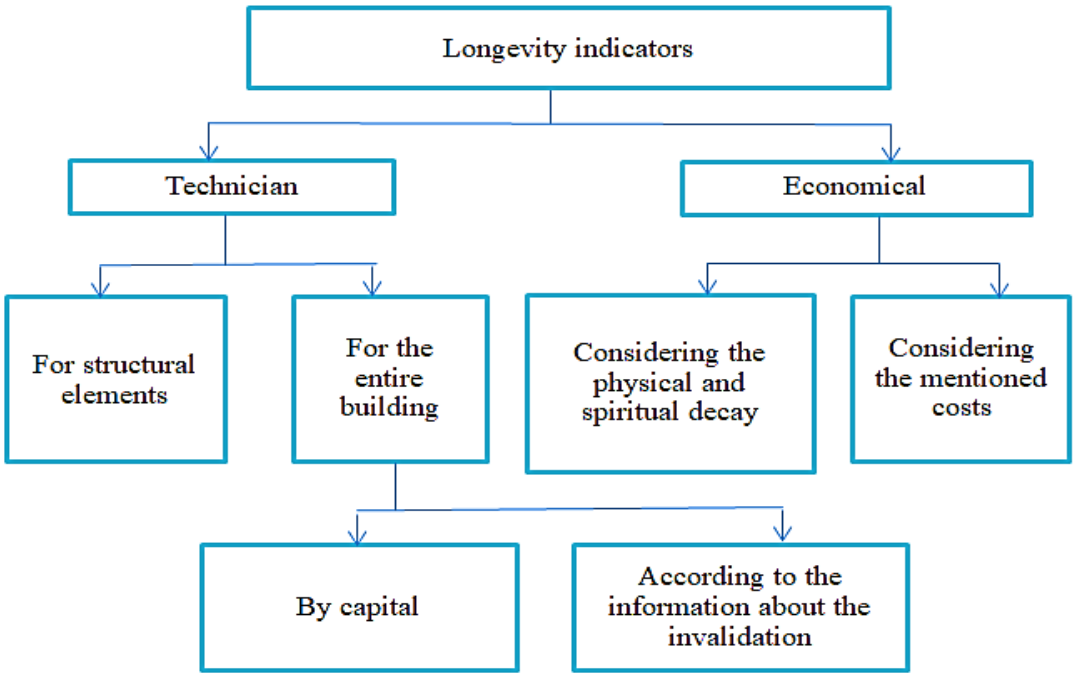
Reliability is the ability of a building to perform its tasks within a specified period of time under specific conditions of use. It is a complex property of the object, and according to its function and conditions of use, it includes the properties of serviceability, long-term service, repairability, and maintainability (Fig. 1).



Picture 1. The scheme of properties determined by the quality of the building.

It should be emphasized that the operational indicators of buildings are characteristics of the time factor, that is, time determines long-term durability indicators: it shows the service life and operation resources of structural elements and the entire building before repairs and demolition. Technical and economic indicators are taken into account when determining the service life of construction structures and the entire building (Fig. 2).

The reliability of the structure should not only be considered depending on its strength and priority, but should also be considered from the point of view of the possibility of maintaining this structure in a normal operational condition during the entire period of its use. Operational safety is the most important requirement for buildings and structures. Nevertheless, the reliability calculation of building structures is still performed in a unique way and is not included in BSRs [13,14,15,16].



Picture 2. Determinants of durability indicators.

The main factors affecting the reliability of building structures and buildings in general can be conditionally divided into three main groups: design, construction and use. The occurrence of defects in construction structures and even the cases of building accidents are now taken into account in many developed countries, where the high quality of construction and installation works is a decisive factor for the reliable operation of the building.

According to statistics, on average, 20-24% of accidents occur due to errors in projects, 18-22% due to errors in use, and 55-65% due to errors in construction [17,18].

Damages occurring in construction structures and the reasons for their reliability decrease during the design, construction and operation period were studied, and it was determined that the main factors affecting their reliability are as follows:

1. Failure to accurately consider specific production environment and operating factors during design.
2. Lack of accurate experimental data on the rate of decay of some construction materials and changes in their physical-mechanical properties during operation.
3. Low level of quality control of raw materials and materials supplied to factories producing construction structures, violation of product production regimes.
4. Inadequate author's control of the quality of construction and assembly works.
5. Violation of technical conditions during construction works.
6. Allowing deviations from project solutions.
7. In the assembly process, removing elements from the project position or installing them completely incorrectly, poor-quality execution of connections, lack of assembly ties.
8. Non-observance of technical conditions during construction works in the winter season.

9. Corrosion of installation details and joints made of metal, appearance of cracks in reinforced concrete elements (especially in objects whose construction has not been completed for a long time).
10. Absence of system of systematically planned - warning repair of used buildings.
11. Age of the building - wear and tear, strong physical erosion of load-bearing and barrier structures.
12. Violation of operating rules.
13. Long-term preservation of unfinished buildings. Inadequate protection of structures from the external environment during conservation [19,20].

It is shown that the reliability of both separate structures and the entire building increases when buildings and structures are operated on a scientific basis. Operation practice shows that as a result of technical operation, not only the level of reliability of the building is maintained, but also opportunities to increase it arise. Such an opportunity can be created in the field of design, construction and direct operation.

Factors that increase operational reliability of buildings and structures are:
- improvement of constructive schemes;
- enlarging and reducing the number of structural elements;
- use of durable materials and products;
- quality control of repair work;
- use of advanced technologies in repair;
- use of standard elements in repair;
- increase repairability;
- reducing the impact of production factors;
- protection of constructions from negative influencing factors of production;
- carrying out preventive works;
- training of qualified personnel for repair;
- to ensure timely and high-quality implementation of the system of scheduled and warning repairs of buildings.

The results of the research of operational reliability of buildings and structures allow defining the main directions of increasing reliability [21,22]. Modern methods of calculating building structures taking into account their reliability allow to assess the reliability of buildings taking into account the changes in the properties of construction materials.

In order to ensure the suitability of buildings and structures during the entire accounting service period, it is necessary to undergo technical inspections and inspections from time to time, timely elimination of defects, current and capital repairs, and high-quality technical service.

Timely complete elimination of defects identified as a result of technical inspection, restoration of load-bearing structures, ensuring their reliability, maintaining operational indicators of buildings and structures at the level of normative requirements, serves as a guarantee of their safe use for a long time [23,24].

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