СЕКЦІЯ: НОВІ МАТЕРІАЛИ, МІЦНІСТЬ І ДОВГОВІЧНІСТЬ ЕЛЕМЕНТІВ КОНСТРУКЦІЙ

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STATE OF THE PROBLEM OF STRENGTHENING REINFORCED CONCRETE STRUCTURES

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СТАН ПРОБЛЕМИ ПОСИЛЕННЯ ЗАЛІЗОБЕТОННИХ КОНСТРУКЦІЙ

When reconstructing industrial buildings, there is often a need to strengthen the structures and their individual elements. The reasons for this may be: increased load on the load-bearing elements due to the strengthening or replacement of structures located above (superstructure, reconstruction of premises); modernization of technological equipment in the reconstructed building; change of technological processes; operational wear (when the bearing capacity is lost due to the influence of vibration/dynamic loads, the influence of aggressive air and other factors); acquired structural defects resulting from improper use. Depending on the reasons that made it necessary to strengthen the structure, different reinforcement methods are used.

Today, there are many ways to strengthen reinforced concrete structures. In so oh well Time of Existing and ACT sob and strengthening of reinforced concrete structures meet all needs no modern user.

The purpose of this work is to analyze the state of the problem of reinforcement of reinforced concrete structures.

Today, the load-bearing capacity of building structures is used in two ways: traditional and non-traditional.

The traditional reinforcement of reinforced concrete structures can be accomplished, first, by modifications and structural design. This is one of the most effective methods, especially for bending elements. The essence of the method lies in the arrangement of additional structures, which redistribute the power flows to the less loaded elements of the supporting system of the structure [1].

Secondly, it is possible to increase the cross-sectional area by attaching of additional elements or artificial monolithic. The reinforcing element may be of the same material as the reinforced element or of other material. The method of increasing the cross-sectional area is relatively simple and economical. The disadvantages of this method are the risk of corrosion of the cast in concrete steel reinforcement and the destruction of concrete. The physical incompatibility of materials for repair with «old» concrete is based on the mismatch of their compressive strength, tensile, shear, modulus of elasticity, coefficients of temperature expansion [1].

Third, it is possible to change the stress state of the structural element. This method consists in the fact that in the stretched zone of the reinforcing element, the prestressing clamps are installed, and in the columns there are pre-stressed spacers [1].

Reinforced concrete structures by external reinforcement with prestressing reinforcing beams have been used as a construction method since the 1950s. The method of reinforcing structures, which involves the regulation of stresses, reduces the forces involved in the structure. The advantage of this method is that the gain can be carried out without unloading. The method of reinforcing structures, which involves the regulation of stresses, reduces the forces involved in the structure. Reinforcement of building structures in the traditional way is difficult or technically impossible in some cases and sometimes

ineffective.

An unconventional method include external reinforcement of building structures of buildings and structures with composite materials that exist in the form of paintings, nets and laminates, for example, carbon fiber. Their application allows to improve the seismic stability and bearing capacity of structures [2].

Exterior reinforcement, which involves bonding composite materials with carbon fibers and using special epoxy resins, has several advantages:

- you juice tensile strength;
- high modulus of elasticity;
- resistance to virtually all corrosive media - acids, alkalis and solvents;
- waterproof;
- Stability of structures in seismically dangerous zones; - connection with the structure only with the help of glue; - light weight, that is , a slight additional load on the structure ; - ease of installation that does not require special equipment; - the possibility of coating with paints, which makes it possible to completely hide the gain [2].

The main disadvantages:

- high cost of composite materials;
- the composite materials do not have plastic properties (the poor plastic properties of the composite materials do not contribute to the redistribution of stresses in the reinforcing structure) and their destruction is fragile;
- absence ness resistance to high temperatures am requiring extra protection systems strengthen fire prevention.

Due to the high cost of composite carbon fiber reinforcement, a number of countries are developing composite reinforcement. Such fittings consist of a bearing core of an angle of elastics covered with a basalt shell. Combined reinforcement is cheaper than carbon fiber reinforcement a, but has lower physical and mechanical properties. On the other hand, such reinforcement is several times better than steel reinforcement.

There are also combined methods for reinforcing reinforced concrete structures. This is a combination of various technological methods applied individually in a particular case.

By reinforcing reinforced concrete structures, it is possible to extend the life of buildings, eliminate or prevent an emergency situation, and prepare the structure for redevelopment or superstructure.

Analysis of the problems of strengthening of reinforced concrete building structures showed, that the problem is illuminated by modern researchers do not fully and there is great potential for developing new ways to enhance reinforced concrete building structures and improve existing ones.

Literature

1. Дорофеев В. С. Усиление железобетонных конструкций элементами внешнего армирования из высокоэффективных композитных материалов на основе высокопрочных волокон / В. С. Дорофеев, М. В. Заволока, Ю. В. Заволока, Ю. М. Заволока, Е. И. Рогачко // Вісник Одеської державної академії будівництва та архітектури. - 2014. - Вип. 55. - С. 101-111. - Режим доступу: http://nbuv.gov.ua/UJRN/Vodaba_2014_55_17.

2. Ovchinnikov I.G., Valiev S.N., Ovchinnikov I.I., Zinoviev V.S., Umirov A.D. (2012). Use the composites for strengthening reinforced concrete: 1. Experimental studies of the composites strengthening for flexural reinforced concrete structures. Naukovedenie, [online] 4, pp. 1-22. Available at: http://naukovedenie.ru/PDF/13TVN412.pdf (in Russian).