

**Harun Mahmud**  
dotsent, Department of Reinforced Concrete and Stone Structures, MGSU  
**Ispandiyarova Ugloy Erkin kizi -**  
Assistant of the Department of  
"Construction of buildings and structures", DjizPI.  
**Isaev Rafael Albertovich**  
Jizzakh Polytechnic Institute, Student of group 210-21 "C B and S"

## USE OF ACHIEVEMENTS OF APPLIED PHYSICS IN CONSTRUCTION AND RELATED INDUSTRIES

***Abstract:** The article is devoted to the use of achievements of applied physics in construction and related industries. The industries where applied physics is used, what directions it has, and the role of applied physics in modern construction are considered.*

***Key words:** applied physics, construction, modern building materials, achievements, composite materials, energy efficiency.*

## ИСПОЛЬЗОВАНИЕ ДОСТИЖЕНИЙ ПРИКЛАДНОЙ ФИЗИКИ В СТРОИТЕЛЬСТВЕ И СМЕЖНЫХ ОТРАСЛЯХ

***Аннотация:** Статья посвящена использованию достижений прикладной физики в строительстве и смежных отраслях. Рассматриваются отрасли, где используется прикладная физика, какие направления она имеет, роль прикладной физики в современном строительстве.*

***Ключевые слова:** прикладная физика, строительство, современные строительные материалы, достижения, композитные материалы, энергоэффективность.*

Modern construction cannot be imagined without the use of the latest achievements of science, including physics. Physics is one of the fundamental sciences that studies various natural phenomena and properties of matter. In this

regard, the use of the achievements of applied physics in construction and related industries is of great importance for the development of these areas.

One of the main areas of using the achievements of applied physics in construction is the creation of new materials. For example, the use of composite materials can significantly increase the strength of structures, reduce their weight and improve thermal insulation properties. Also, thanks to the use of new materials, it became possible to create buildings with unusual shapes and designs.

Composite materials are a combination of two or more components with different properties that together form a new material with improved characteristics. The use of composite materials in construction can significantly increase the strength of structures, reduce their weight and improve thermal insulation properties.

Firstly, composite materials have high strength and rigidity, which allows them to be used to create structures that can withstand heavy loads. This is especially true for buildings and structures that require increased strength, such as bridges, skyscrapers and sports arenas.

Secondly, composite materials are often lighter in weight than traditional materials such as steel or concrete. This reduces the load on the foundation and supports of the building, which in turn can lead to lower construction costs. In addition, reducing the weight of the structure can reduce transportation and installation costs.

Finally, composite materials have good thermal insulation properties. They can effectively inhibit heat transfer, which helps maintain comfortable temperatures inside a building and reduce heating and air conditioning costs.

In general, the use of composite materials in construction makes it possible to create stronger, lighter and more energy-efficient buildings and structures.

Another direction for using the achievements of applied physics in construction is the development of new construction technologies. For example, the use of lasers for cutting metal can significantly speed up the process of installing

metal structures. And using robotic systems to assemble buildings can significantly reduce labor costs.

Lasers have long been used in the industry to cut metals, and this method has several advantages over traditional methods such as machining or plasma cutting. Here are a few reasons why using lasers for cutting metal significantly speeds up the process of installing metal structures:

1. High precision: Lasers provide very high cutting precision, which allows you to produce parts with minimal tolerances. This means that less time is spent on additional processing of parts after cutting.

2. Speed: Lasers are capable of cutting metal at high speed, which significantly speeds up the process of installing metal structures.

3. Multi-material capability: Lasers can be used to cut a wide range of materials, including steel, aluminum, copper and others.

4. Safety: Laser cutting is a safe metal processing method as it does not require contact between the tool and the material.

5. Cost-Effective: Although the initial investment in laser equipment may be high, it proves cost-effective in the long run due to its high operating speed and low operating cost.

All these advantages make the use of lasers for metal cutting one of the most effective and fastest ways to install metal structures.

In addition, advances in applied physics are used to create new methods for quality control of construction work. For example, the use of ultrasonic waves makes it possible to detect hidden defects in concrete and other materials.

Ultrasonic waves are widely used in non-destructive testing (NDT) to detect hidden defects in various materials, including concrete. This method is known as ultrasonic testing and is based on the principle that sound waves travel at different speeds depending on the properties of the medium through which they pass.

When ultrasonic waves encounter a defect in a material, such as a crack or void, they change their speed and direction of travel. This change is recorded by

special sensors and converted into electrical signals, which are then analyzed by NDT specialists.

When using ultrasonic testing to inspect concrete, the sensors are usually placed on the surface of the concrete element. Ultrasonic waves are then directed into the material, passed through it and reflected back to the sensors. By analyzing the received signals, specialists can determine the presence and location of defects inside the concrete.

This method is especially useful for detecting hidden defects that cannot be seen visually. It also allows inspection without destroying the material, making it ideal for use in construction and other industries where maintaining the integrity of the object is important.

It is important to note that the quality of ultrasonic testing results depends on many factors, including the quality of the equipment, operator experience and testing conditions. Therefore, it is important to contact qualified specialists to carry out such checks.

Thus, the use of the achievements of applied physics in construction and related industries is of great importance for the development of these areas. New materials, technologies and quality control methods make it possible to build more reliable and cost-effective buildings, as well as increase the efficiency of builders.

#### **Literature:**

1. Испандиярова, У. Э., & Исаев, Р. А. (2023). Рост промышленного и жилищного строительства в нашей республике, актуальные вопросы, стоящие перед строителями. *Science and Education*, 4(4), 413-420.
2. Ablayeva, U., & Normatova, N. (2019). Energy saving issues in the design of modern social buildings. *Problems of Architecture and Construction*, 2(1), 59-62.
3. Вайнштейн, Л. А. Применение лазеров в строительстве / Л. А. Вайнштейн // Строительные материалы. - 2009. - № 7. - С. 8-12.

4. Горшков, В. С. Роботизация в строительстве / В. С. Горшков, А. В. Кочетов, Е. А. Петров // Известия Южного федерального университета. Технические науки. - 2016. - № 11. - С. 10-17.
5. Кузнецов, О. А. Инновационные материалы и технологии в современном строительстве / О. А. Кузнецов, В. А. Рыбалкин // Вестник Московского государственного строительного университета. - 2012. - № 2. - С. 12-17.
6. Леонтьев, А. В. Применение ультразвука в строительстве / А. В. Леонтьев // Научное обозрение. - 2014. - № 11. - С. 10-14.
7. Малинин, А. Н. Применение композитных материалов в строительстве / А. Н. Малинин, Д. А. Кудряшов // Вестник Казанского технологического университета. - 2011. - № 14. - С. 184-188.