



Modular Low-Rise Residential Buildings as an Innovative Direction in Modern Construction in Uzbekistan

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Abstract: The article examines the issues of the development of modular low-rise housing construction in Uzbekistan. The main features and prospects of development in a dry-fire climate, the pros and cons of modular low-rise housing construction are considered. The use of modern innovative technologies in modular housing construction.

Keywords: modular houses, wooden houses, dry-fire climate, low-rise housing, construction, retail areas, warehouses, cabins, containers.

The first modular houses can be considered small wooden houses that were used by nomads in the 12th century, in England and Scotland. When moving to territories suitable for cattle breeding, the nomads needed to quickly and without unnecessary problems put up a dwelling, and that is why they used several ready-made elements that they connected to each other to build a house. A significant advantage of these houses was the possibility of transporting them: every time there was no time or opportunity to find materials and reassemble the elements, and it was necessary to settle in a new place as soon as possible.

Despite the fact that modular housing technology has been around for hundreds of years, it found its widest application only in the late 19th and early 20th centuries, when people first appreciated the advantages of prefabricated buildings. The homeland of modular houses is considered to be the USA, where the need for rapid development of territories at the beginning of the 20th century became the impetus for the development of modular housing [1].

Initially, due to the lack of trust in prefabricated buildings, most of the buildings were created for industrial purposes: retail areas, warehouses, cabins and so on. It was only a few decades later that this technology was first used for the construction of residential buildings, but there was no scaling of modular housing construction at that time.

Studying the needs of people, taking into account the development of technologies, equipment and materials, the technology of building modular residential buildings has been constantly improved and modernized, until it has found wide application among the population.

For the first time, the increased demand for modular houses and buildings occurred in the 40-50 years of the last century, when there was an urgent need to eliminate the consequences of World War II and rebuild destroyed cities. It was at this time that distrust of prefabricated buildings was destroyed, and they began to appear and be used everywhere.

Of course, the main reason for this demand is the time of construction, affordable cost and the possibility of transportation. In post-war conditions, this became the main criterion for choosing construction technology, and entire districts and cities had to be built up and rebuilt. At the same



time, buildings made of block containers began to be widely used: It was an ideal and inexpensive option that solved the problems of placing specialists at enterprises, construction sites or in remote areas [2].

For the first time modular houses in Russia were used at the beginning of the second half of the last century in the development and development of remote areas where it was necessary to build railways, establish infrastructure and industry in remote regions of the country.

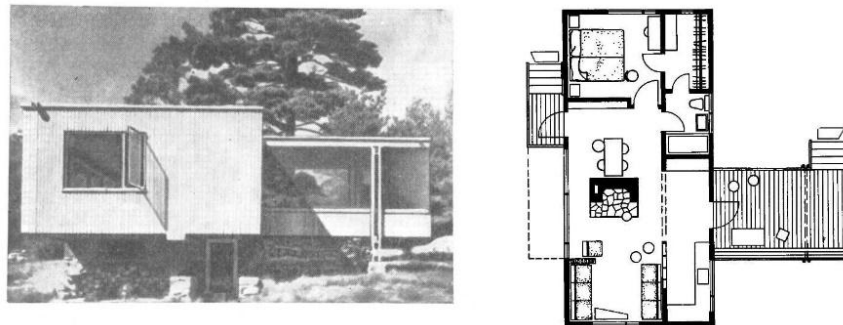


Fig.1. The first modular low-rise residential buildings

In the 21st century, the evolution of modular construction has continued. This technology has also arrived in Uzbekistan. At first, it was treated with suspicion, but gradually all its advantages were appreciated. Especially in combination with modern insulation materials, which made it possible to create structures with excellent thermal insulation characteristics. Thanks to this, turnkey modular houses began to be ordered not only as seasonal housing — projects appeared for comfortable year-round living even in dry, hot and cold climates.

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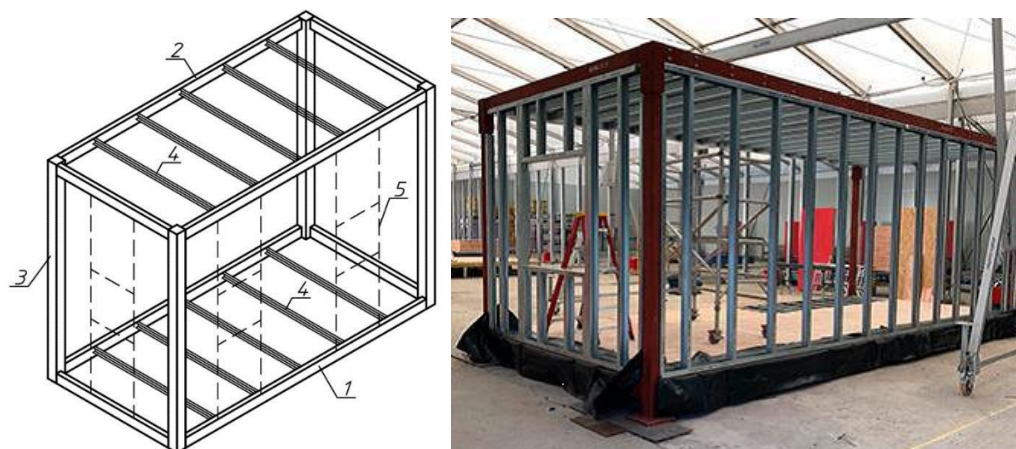


Fig.2. Typical frame of the module with support columns: 1 — lower horizontal frame; 2 — upper horizontal frame; 3 — column; 4- flooring beams; 5 — wall fence (if necessary).



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In the 80s and 90s, the demand for a modular house began to decline: typical projects, a small selection of styles and planning options, as well as the lack of individuality in the house repelled people who wanted to have a unique and different house.

In the 21st century, modular housing received a second life: now modular houses are considered one of the most technologically advanced and modern types of buildings that have many advantages.

One of the types of prefabricated buildings – a block container is a separate box used on construction sites, geological sites and oil and gas production sites to solve household problems [4].



Fig.3. Modern modular residential buildings

To explain the "second life" of this type of house is as follows: now everyone has the opportunity to create their dream home based on a modular. If earlier it was possible to create a unique project only individually and at a high price, now many companies offer all kinds of options for creating your own ideal home.

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The events of the last few years (the transition to remote work and the trend of moving out of town) have rehabilitated the type of separate housing.

But now we are not talking about an old-style cottage, but about eco-friendly, practical and affordable housing. Modular houses are modern modular blocks with built-in infrastructure, built in one day[5].



Fig.4. Innovative modular residential buildings

The word "modular" does not mean the type of building, but the method of its construction.

Now there are a huge number of modular houses on the market for every taste. Different styles, any area, the choice of the number of floors and the possibility of developing an individual planning solution combined with affordable cost, short construction time and high quality distinguish modular houses from other offers and make them one of the most popular options for suburban real estate.

For use in seismically hazardous areas, preference was given to prefabricated buildings with earthquake resistance. The lightness of the design allowed them to be installed on a flat surface without pouring the foundation. In areas where the cold climate prevailed, severe frosts helped to survive stove heating and insulation. The roofs withstood the load from a thick layer of snow due to reinforcement with metal structures.

Over time, the comfort level in the trailer-like temporary buildings has significantly increased. This made it possible to use them as residential buildings for employees at construction sites and in mining sites. This made it possible for prefabricated buildings to spread even wider [6].

Each of the modules includes several common elements (ceiling, floor, walls, windows), as well as communication systems (electricity and water) and built-in furniture.

Advantages	Disadvantages
Extremely short construction time, amounting to a maximum of 2.5 months (manufacture + installation).	A modest choice of architectural solutions, relatively small dimensions of the premises.
The absence of construction debris on the site.	The need for installation of supply and exhaust ventilation (as in any frame house).
The possibility of dismantling, transportation and assembly at a new location.	The design life is not too long — about 50 years.
The availability of a guarantee for the main structures and systems of the house (usually 12 months for communications	



Advantages	Disadvantages
and decoration and 5 years for load-bearing and enclosing structures).	

Conclusion

The essence of modular buildings is a quick and simple way to build a house using modern technologies using innovative materials.

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