UDC 692

SHIPPING CONTAINER ARCHITECTURE

ALENA KANASHENKA, VICTORIA MELEKHOVA
Polotsk State University, Belarus

The relevance of use of standard shipping containers as housing is considered. Advantages and shortcomings of container construction are analysed. The possibility of realization of a configuration of the building of any complexity from shipping containers is discussed. The features of cutting walls from containers are considered.

Non-conformism is often shown concerning attitudes of people to houses. An architectural variety of houses becomes wider and broader. Some buy for themselves huge houses from concrete or steel and glass with the purpose to emphasize the social status, or choose other, rather extravagant ways. The most unusual and economical of all options is the idea of making a house from shipping containers. Every year more and more people convert containers into houses. For someone the container is just a part of the house, and for someone all the house is to be found in one container [7].

It is difficult to say who was the first to realize the idea of the non-standard house by means of the written-off cargo containers. However the architect and artist from New Jersey Adam Culkin began to actively popularize it. He understood that the world resources of this material for creative work and construction are almost unlimited. Reduction of expenses and the economical relation to the territory also became an advantage of the new approach. Attracting friends and adherents, Adam created own architectural studio Kalkin and Co. The portfolio of the architectural studio contains about ten exclusive container houses and also the quick-house project which provides mass production of combined lodges with a possibility to order them by e-mail. Such designs of fast assembly have won the increasing popularity among people in various corners of the world who care for ecology, saving the means and do not wish to lag behind fashionable architectural trends [1].

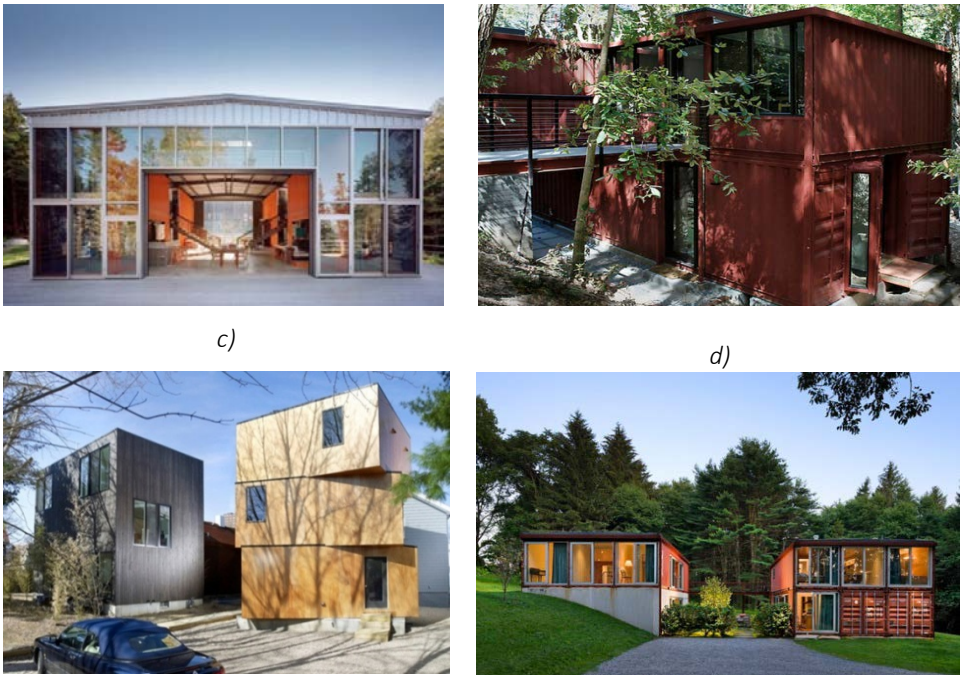
However many people are skeptical towards this invention. It is possible to say with confidence that a house built from containers is a full-fledged inhabited private house warmed both from within and outside, with all the necessary engineering networks and communications (heating, water supply, power supply, sewerage, ventilation), with any kinds of finishing indoors and a building facade, with the individual planning custom-made. In the heated house made from containers it is warm and comfortable all the year round. There is no special need to pay more for construction of a cottage. Standard shipping containers are relatively inexpensive. Marine used container size 5898 × 2352 × 2393mm can be bought for 1500 BYR. Marine used container size 12036 × 2350 × 2697mm can be purchased for 2400 BYR. It is very favourable, the container has a ready framework with a draft floor from plywood. Besides, it does not need the powerful base and a binding of the base. Expedient option of the base for a house made from a container is a column base. Concrete support can be superficial, or buried - in the form of usual cylindrical piles or piles with expansion below. The final choice like piles for the house from containers depends on the type of soil and land relief [8].

The main disadvantage of the container house is that in warm weather the house quickly heats up, and at low temperatures containers quickly lose heat. For this purpose first of all it is necessary to provide careful insulation inside or outside and also not to forget about ventilation. To make a shipping container warm the following advice will help [9]:

- Thermal insulation. Proper thermal insulation is the main condition for modular construction in a cold climate. For this purpose it is possible to use polyfoam, mineral wool, special panels and other modern heaters. At insufficient thermal insulation, it is impossible to keep the container house warm irrespective of how much money you spend for heating [9].
- Roof. The loss of heat through the roof is one of the most common cooling factors for a modular home. The best way to prevent this and prepare containers for a cold climate is to carefully insulate the roof. Here, roll or panel heaters, as well as insulating foam can be used [9].
- Window. If it is necessary to build a house from containers in a cold climate, it is very important to correctly calculate the optimal sizes and placement of window openings: windows are one of the main ways of losing heat. Scientists claim that one glass window can lose almost 10 times more heat than the same section of an isolated wall. This does not mean that the windows should be abandoned altogether, but their placement and size should be discussed with the architect [9].

A building from a shipping container can acquire absolutely any shape, thanks to the fact that the containers can be mounted in a variety of ways (fig. 1).

a) *b)*



c) *d)*

Fig. 1. Variants of container houses

Source: [1–4].

At the expense of the standard sizes and simplicity of design, installation of module containers is carried out in a short time which allows to bring the building into operation quickly. Module containers are placed close to each other, and then the gap between the containers is latched, in the colour of the main covering. Module containers can be located not only separately, but also be united in an integral design in the horizontal and/or vertical directions and consist of one two, three or four containers. It allows to create mobile offices, residential buildings, administrative objects. There is a huge variation of a relative positioning of containers. Some architects even put containers at an angle to the ground. However a simpler and more unusual option of configuration of two containers is their shift from each other.

The container differs from the room in the fact that it is possible to create any configuration from a container, it is possible to cut out from it separate parts and, using wood and glass, create the most unique rooms. It should be taken into account that cutting apertures weakens a container, in the investigation of what all apertures, for the purpose to increase durability, should be strengthened with metal structures. With the purpose to make the building spacious at minimal financial investments, the best option of configuration will be the use of two or more containers for construction with the formation of additional space between them (fig. 2).

a) *b)*

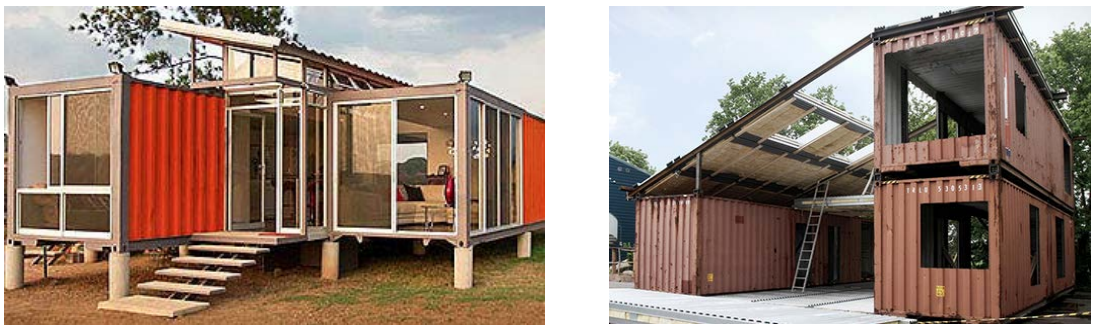


Fig. 2. Create additional space between containers

Source: [5, 6].

Based on the information above, we can draw the following conclusions:

- Container construction is a very promising direction in the development of construction in Belarus.
- Container houses can be comfortable and cozy for a person in any climate and at any time of the year.
- Construction of such building requires much less money than building a house of similar size from wood, brick or concrete.
- Containers are perfectly suitable for fast construction.
- Construction of buildings by traditional methods is much more difficult than construction of similar structures from containers.
- Containers can be easily adapted to the required type of planning and take the necessary form due to which fact it is possible to execute practically any architectural concept.
- By means of containers it is possible to create very spacious buildings.

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