

Steel in Private Houses: Contemporary Uses and Prospects

One of the characters from Gianni Rodari's famous Tale of Cipollino, Godfather Pumpkin, dreamed of building himself a comfortable house somewhere near the Mediterranean Sea, so he bought one brick every year (the author of the fairy tale hailed from Italy). Godfather Pumpkin and his friends were preoccupied with thoughts about finding and buying bricks. But it takes more than one building material to make a modern private house. Many other things, including steel, are needed to build a comfortable and reliable dwelling.



So, how exactly is steel used in housing construction? When using concrete in the construction of a residential building, steel rebar is essential to reinforce the foundations and walls. This type of rolled steel product is also an indispensable part of reinforced concrete floor slabs. Huge amounts of steel fittings and other hardware are used to fasten boards, drywall and other materials in the construction of residential houses, dachas (summer homes), outbuildings and fences.

Another type of steel product often used to build modern houses is galvanised and pre-painted cold-rolled flat steel. It is used to produce metal shingles, profiled sheeting, guttering and other accessories.

Steel roofs are attractive, long-lasting and quite easy to install. When selecting metal shingles, a consumer must pay attention to the quality of the raw material – steel – as well as the zinc and polymer coatings. If a product is of low quality, the roof or fence paint may fade or peel off. Without a protective coating, steel will quickly succumb to the effects of corrosion in several years. In this case, new investments will be required to renovate the house and its steel structures.



Houses fully built of steel

There are already examples of private homes that are fully built of steel. Often, these are temporary dwellings, such as summer houses, or dachas. The history of steel houses in Ukraine dates to the 1980s and 1990s, when having a dacha in the countryside was not a fad but a necessity. Large enterprises and organisations built dozens of dacha cooperatives in the suburbs. This gave the happy dacha owners, who typically lived in apartment buildings, an opportunity not only to grow potatoes or sweet cherries with their own hands, but also to build a small house. These were not just brick and cinder block boxes. It was not uncommon (especially in coastal cities)

to use steel shipping containers for these purposes. Dacha owners decorated their dwellings, which often lacked windows or doors at the time, according to their own taste.

A lot has changed since then. Today, there are companies that build comfortable steel houses out of shipping containers or using steel-frame and modular construction technology. In such cases, the house frame is made of steel, the walls are made of sandwich panels or other insulating materials, and the interior design is no different from an ordinary masonry house. They have doors, windows and modern plumbing. The advantage of steel-frame houses over brick ones is that they are affordable, easy to install, easy to transport and reliable. Manufacturers provide a warranty of up to 50 years on a steel module. A spacious dwelling can be assembled like LEGO blocks.

But it is not just cost-effectiveness and simplicity that make steel so appealing as a primary building material. There are also stylish steel design solutions. Unlike concrete and timber, steel-frame houses make it possible to turn rather bold ideas into reality. Examples include suspended or arched houses, as well as high-tech buildings made predominantly of steel and glass. Customers receive vast open spaces in places where it is impossible to build a brick house because of the landscape or limitations in delivering and using building materials.

While it has long been common practice in Ukraine to use a certain amount of steel in the construction of private housing, steel-framed apartment buildings are still a rarity. Concrete and brick have traditionally been used as the main building materials for them. This has been driven both by regulations and construction traditions. But the world is changing and evolving. In 2018, a steel apartment building project was chosen as the winner of a competition for young architects, the Steel Freedom Architecture Festival 2018. The project became a reality two years later. The construction of a 120-apartment residential building, the main distinctive feature of which is its steel frame, commenced in Mariupol in October 2020. Metinvest Group is directly involved in the fabrication of the steel structures and construction, and its specialists supervise all stages, from steel production to assembly. Residents are expected to receive the keys to their apartments by 2020.

The benefits of using steel in construction

Customers are increasingly choosing houses that are made predominantly of steel. The popularity is boosted by new technologies that make it possible to build steel houses that are as comfortable as masonry ones. Steel has several advantages over brick, cinder block or cellular concrete in private housing construction, including speed of design and assembly, reliability and value for money. Prefabrication ensures safety and durability. For example, steel is stronger than concrete. For fire resistance, special coatings made from refractory materials have been designed to protect steel walls and load-bearing structures from the destructive effects of exposure to fire.



Detailed calculations show that significant savings in terms of both materials and construction technology can be achieved when building a house out of steel. For example, lighter house structures impose less stringent requirements for foundations.

And, of course, design matters. The properties of steel make it much easier to give a private house a unique appearance, in stark contrast to a standard cube or parallelepiped-shaped brick box.

Future of steel houses

A uniquely designed private house is one of the key requirements of a customer who does not want to live in an apartment. It is as relevant today as it was 100 years ago, when architects published their vision for the future of housing, including mobile globe-shaped houses and domed dwellings for living in space or under water.

Even a quick glance at such projects suggests that steel and glass were expected to be predominant materials, since it is practically impossible to build such a house out of concrete or brick for numerous reasons.

The 21st century imposed additional requirements for modern houses. Eco-friendliness and minimum environmental impact are key. Today, architects and building material manufacturers are working to create energy-efficient or passive houses and roll them out on a large scale. Such buildings consume as little energy as possible, creating a comfortable micro-climate. This concept was first introduced at Sweden's Lund University by Professor Bo Adamson in 1988. Since then, his idea has been supplemented and expanded.

One of the key additions to the concept that originated in chilly Sweden is not just to reduce energy consumption, but also to reuse primary building materials and reduce the use of non-renewable natural resources. One such material is rolled steel, which can be recycled and reused. Modern technology makes it possible to build a comfortable steel house anywhere in the world.

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