Specifics of wooden housing construction in Irkutsk

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Abstract. Irkutsk is the capital of Eastern Siberia and it can also be called the capital of wooden architecture. Many wooden buildings are of unique cultural and artistic value. Special originality and uniqueness of the city of Irkutsk gives the distinctive wooden architecture. The uniqueness and uniqueness of modern Irkutsk is that to this day it has preserved wooden houses that have come down to us almost unchanged. For a long time, different styles were used in the construction of wooden houses: baroque, classicism, modernism, art nouveau, eclecticism. An interesting fact is that the listed architectural styles in Irkutsk have never been used in their pure form, and samples of the decor of wooden buildings were interpreted by Irkutsk masters independently, which led to the birth of the original original architecture. Some of these technologies are still popular today, for example, decor technologies: relief ornament; slash; overhead; oriental decor. The art of building from wood in Irkutsk has its own specifics, taking into account the nature of the material and construction techniques. The expressiveness of wooden architecture is achieved by simple geometric shapes, natural wood texture, such as pine, larch, oak, fir, and others. Construction techniques are determined by socio-economic and climatic conditions. In Siberia, there have long been two structural systems of buildings – log and frame, which are still used today.

1. Introduction

Irkutsk is a unique Siberian city that still has the original wooden architecture of the 17th and 19th centuries. The decorative decoration of wooden houses is an original monument of the city's artistic culture. Irkutsk was built exclusively of forest felled with an ax. The wooden decor of Irkutsk houses included different styles: Siberian Baroque; classicism; neo-Russian style; oriental and modern [1]. It is important to note that each of the listed styles differed in its own shape and color.

Irkutsk craftsmen used original techniques and techniques in wooden house construction that have no analogues in other cities. Due to the increased interest in the historical heritage of wooden housing construction, leading architects of Irkutsk recreated the original house structure with the help of restoration work.

If in the European part of Russia wooden houses often imitated stone ones and were decorated with stucco, in Irkutsk all the details were made of wood, often in the technique of three-dimensional carving [2]. Wooden houses were sometimes built according to model designs, but Siberian craftsmen reworked them, adding original ornaments and patterns, making a lot of effort to make the carved pattern unique. The wooden carvings on the houses made a fabulous, fantastic impression [3].

2. Research questions
The wooden architecture of Irkutsk is filled with a festive sense of peace, love of life, and positivity. Siberian craftsmen have reached a high level in decorating wooden houses with sawn carvings, which were the main decoration of the house (figure 1).

![Figure 1. Cutting thread.](image1)

The secret of the cutting thread is that it was made according to the original pattern, which was never repeated. A pattern was stenciled on the board, then holes were drilled in the right places, where a narrow saw was inserted and they were connected to the desired pattern according to the drawing [4].

For a long period in Irkutsk, wooden buildings in their total mass prevailed over stone ones. In 1823, out of 1645 houses, 1592 were wooden, in 1836, out of 1958 houses, 1906 were wooden, and in 1876, out of 3918 houses, 3830 were wooden. After a fire in 1879, 1930 wooden houses were built [5].

At the end of the 19th century, log houses were decorated with carvings and airy wooden lace (figure 2).

![Figure 2. Lace house.](image2)

It was believed that patterns, ornaments and lace perform a protective role and are a kind of magical protection of the house and owners from magic and evil forces [6]. Ornaments covered not only houses, but also fences, wooden furniture in the house. Wood carving required a high level of skill and experience from the Carver, and it gave the house an elegant look.

Until the nineteenth century, most wooden buildings in Irkutsk were distinguished by a strict style, this is due to the fact that the first cities in Siberia were originally built on the principle of prisons, since the city was located on the river Bank [7]. Since wood was the main building material in Siberia, houses
were built from large logs, at least 30-40 centimeters long, and they were cut with an axe, and the roof of the house was high (figure 3).

![Figure 3. 130-th quarter.](image3)

In the 19th century, thanks to the influence of European cities in Russia in Irkutsk, log houses began to be sheathed with narrow boards that imitated stone; a special color in such houses was created by Windows that had Baroque decorations – elastic curls going to each other, between which a carved bouquet of flowers was placed [8]. Wooden Baroque stucco was executed in the technique of blind carving, which is more ancient and time-consuming in comparison with sawn carving. In Irkutsk house carvings, a place of honor is occupied by Baroque window frames, such a variety and perfection of execution can not be found in any city. The large upper plank of the platband was often decorated with original artistic ornaments, and the platband itself was painted white (figure 4).

A striking feature of the local architecture is the presence of shutters at the Windows, which were used for protective purposes against robbery and hooliganism. The shutters were also decorated with carvings (figure 5).

![Figure 4. Baroque platbands](image4) ![Figure 5. The shutters of the house](image5)

At the end of the 19th century, Irkutsk wooden architecture began to use the neo-russian style, based on the contrast of an open log house with openwork cut carvings (figure 6).
Irkutsk has always been famous for wooden house construction and architecture. In 1879, a large fire occurred in the city, which destroyed the Central part of the city, only a small part of the wooden houses remained, some of these buildings were recognized as unique monuments of wooden architecture [9]. Part of Irkutsk had to be rebuilt, new wooden buildings almost reproduced the decorative decoration of the houses that were damaged by the fire. In the future, the numerous construction of houses made of wood had to be abandoned, precisely because of fire safety [10].

Taking into account the rich architectural and historical heritage of the city of Irkutsk, the city administration took measures to preserve and restore wooden buildings. For this purpose, the historical quarter was recreated in the city center, which was named the 130th quarter. It presents the variety of wooden buildings of the early 18th and late 19th centuries; shows the evolution of wooden architecture [11]. All houses are decorated with wooden openwork carvings and ornaments that reflect the unique flavor of the old wooden Irkutsk. Of the 56 historical wooden houses, 30 are unique. the best Irkutsk architects worked on their restoration (figure 7).

Today, the construction of wooden houses in Irkutsk is in great demand, despite the high price of building materials, many people prefer environmental friendliness and natural materials [12]. The tree has the ability to pass steam, so in such houses a favorable microclimate is created, which is useful for health, since the air is saturated with natural coniferous aroma has medicinal properties [13]. Most often, now for the construction of a wooden house, a bar or a rounded log made of coniferous wood is used [14]. Today in Russia, we can observe the activation of wooden housing construction, the construction of wooden houses and offices continues on the basis of two main structures: log and frame (figure 8).
3. Materials and methods
Wooden housing construction is experiencing a rebirth in Irkutsk, because at the present stage of development it can satisfy the most refined tastes.

The paper uses general scientific methods of cognition: induction and deduction, moving from the abstract to the concrete, analysis and synthesis, explanation, analogy, comparison.

4. Results
It is determined that the construction of wooden houses in Irkutsk has its own characteristics related to the specifics of the architectural heritage and modern projects that contain the idea of environmental friendliness and energy conservation.

5. Discussion
The construction industry of Irkutsk is undergoing significant changes related to the solution of environmental issues and wooden housing construction, which will be successfully implemented with the help of strict state control.

6. Conclusion
Due to the rich historical experience of wooden housing construction, Siberians, namely, residents of Irkutsk, certainly prefer log construction of houses, even despite their higher price compared to the frame structure. For the construction of log cabins, planed and rounded logs are used, of which the best quality is considered to be hand-made planed logs with a diameter of 25 to 40 centimeters. Such houses have high thermal characteristics and do not require additional insulation, which is especially important due to the harsh climate of Siberia. In Irkutsk, round logs are also used in wooden housing construction, despite the fact that they cannot compete with planed logs either in thickness or in the quality of construction connections. They are also used, but mainly for the construction of country houses with seasonal residence.

Unfortunately, in Russia, one of the most forest-rich countries, wooden housing construction occupies only a tenth of the market share. In Europe and America, projects for the construction of wooden houses have been developed in relation to wooden house construction, which contain the idea of environmental friendliness and energy saving. For example, the project «Wooden Europe» was developed with state support, on the basis of which by 2021 the share of housing made of wood should be at least 80% [15].

Share of wooden houses in the total volume of low-rise construction in %:
- USA – 80%;
- Canada – 80%;
- Finland – 80%;
- Japan – 45%;
- Russia – 25%;
- United Kingdom – 14%;
- Germany – 14%.

It should be noted that among the residents of Irkutsk, the most popular are houses made of solid wood. Despite the high cost and a significant share of manual assembly, their share is 70% of all wooden housing construction in Irkutsk (figure 9).

Figure 9. Wooden house, built in 2018.

The main difficulties of wooden housing construction in Irkutsk are the lack of qualified construction specialists with many years of practical experience. This fact affects the timing and quality of construction. The reliability of some construction companies that do not comply with contractual obligations and engage in fraud is also questionable. In this regard, many Irkutsk residents began to trust construction companies less.

In September 2020, President Vladimir Putin noted that Russia will monitor the development of housing construction using ready-made home kits, and legal barriers for citizens who have the opportunity to build their own homes will also be eliminated. To solve this problem, special attention will be paid to the human resources potential of the construction industry.

The traditions of old wooden architecture with houses decorated with unique carvings remain popular in Irkutsk among the local population today.

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