A new approach to the design of street furniture in Krasnoyarsk

P P Zvonareva¹, I V Filipskaya¹, I V Yangulova¹

¹Institute of architecture and design, Siberian Federal University, Krasnoyarsk, Russia
E-mail: zvono4ek2008@yandex.ru, ifilipskaya@gmail.com, yangirina@yandex.ru

Abstract. The article describes the trends in the field of small architectural forms and outdoor furniture in the public environment of Krasnoyarsk. The objects of study are outdoor furniture located in central and popular public places that shape the image of the urban environment. The article contains a study of street improvement in the city of Krasnoyarsk, which made it possible to assess the current state of furniture used in the city. The research methodology consists in conducting an Internet survey of respondents in the social network "VKontakte". The survey showed the advantages and disadvantages of existing furniture objects according to ergonomic, artistic, aesthetic, environmental and economic criteria. The collected material made it possible to determine changes in the approach to the design of outdoor furniture for public urban spaces, made it clear the feasibility of an integrated solution for environmental objects. The article demonstrates the design concepts of products with progressive design and improved qualities. The authors-developers propose a modern approach to the organization of public spaces and the design of products, taking into account the anthropometric and physiological characteristics of the population. They explain the use of modern materials in terms of ergonomics and ecology, such as wood-polymer composites, plywood, modified wood. The recommendations of the expert in the person of the chief architect of the city, in the design and implementation of such objects, were taken into account. The results of the analysis have both theoretical and practical significance and will be used in the improvement of urban spaces within the framework of the “Comfortable Urban Environment” program in Krasnoyarsk.

1. Introduction
Recently, the city is experiencing a new wave of renovation – rethinking public and business spaces. In Krasnoyarsk, as in any industrial metropolis, the urgent problem is the total problem of the improvement of public space and places for recreation of citizens. This problem is caused by the choice of non-ergonomic outdoor furniture, ineffective arrangement of objects, the absence of a number of functional elements, such as ballot boxes, lighting masts, bicycle parking. It is worth remembering that public spaces: parks, squares, squares are the best place for the implementation of interesting youth projects. Such projects give the city a new look, gradually introducing into it a modern, progressive, innovative solutions and ideas [3].

2. Materials and Methods
The objects of study are places for recreation, architectural forms, outdoor furniture located in squares in significant areas of Krasnoyarsk. The authors analyzed the needs of Krasnoyarsk residents, the
latest trends in the design and arrangement of public spaces in the city. For articles were selected results of the survey the most popular city places for recreation.

The research is based on the method of analyzing the results of public opinion polls, expert interviews, presenting conceptual questions and conclusions in professional communities at scientific conferences. Also, a technical examination of the quality of furniture and materials was carried out.

In Krasnoyarsk, attempts are made to improve the appearance of the city, it can be clearly seen how the shape of the central streets - Prospect Mira (Fig. 1). However, the location of urban objects and their layout calls into question their relevance among citizens. For example, benches are placed in large numbers in small areas, which is why half of them are not used. Obviously, people can rest “face to face” with such an arrangement of seating positions, which is contrary to ergonomics and a comfortable psychological atmosphere.

![Fig. 1. City center, Prospect Mira, Krasnoyarsk.](image)

The materials for furniture are often coniferous woods growing in the Krasnoyarsk Territory, but in the summer at elevated temperatures, such products secrete resin, which leads to damage to clothing and even injuries. Sculpture “Valentin and Valentina” - the territory of the former fountain is one of the well-known projects. The place has no public attractiveness to the extent that is possible, because the reconstruction of the layout is based on multiple duplication of similar forms of benches on the perimeter of the square, and some benches are located facing the road. (Fig. 2).

![Fig. 2. Sculpture “Valentine and Valentine”, Krasnoyarsk.](image)

3. Results

Objects in the examples are the result of an unsuccessful approach to the design. These examples did not take into account such factors as ergonomics, wind protection, lighting, a sufficient number of trash bins, rational use of materials.
To achieve a good result in the creation and improvement of outdoor furniture, one should take into account the principles of functional diversity, a comfortable environment for communication, harmony with nature in terms of ensuring the diversity of the visual appearance of the territory, the use of environmentally friendly and practical materials such as wood-polymer composite, birch plywood, modified wood [1].

The Internet survey has become an operational method for researching and identifying furniture disadvantages. The survey included questionnaires, data processing, and obtaining a graphic representation of the results. This method is an automated process, does not require material costs and saves time. The “VKontakte” social network with a target audience of about 100 people aged 19 to 40 was selected for the survey. The questionnaire was attached to the publication about the improvement in the city of Krasnoyarsk and consisted of four questions with the proposed answer options, and the interviewed audience could express their opinion (Fig. 3). This method is very popular on social networks and is highly effective.

Thus, it was possible to identify and understand what details of the arrangement of the existing park zones of the city of Krasnoyarsk cause dissatisfaction, as well as what primarily attracts people in places of street space. First of all, the respondents expressed a lot of complaints about the design and appearance of street furniture, city residents would like to see the objects modern and attractive. Secondly, there were remarks about ergonomic characteristics - sharp angles on the benches, angles of inclination of the backs that do not correspond to a comfortable rest, splinters and resin remain from poor-quality materials. Third, based on the existing need for waste sorting, the interviewed audience spoke about the need to install additional waste bins for plastic. Some of the respondents were dissatisfied with the irrational organization of space, the arrangement of benches, the lack of visors, and bicycle parking. Structural projects were also noted, if any parts break, repair and replacement are impossible, in such cases the dismantling of the entire structure and the installation of a new product are required, and sometimes due to lack of funding, the objects of street furniture are broken for several months.

Students of the Design Department of the Institute of Architecture and Design of the Siberian Federal University have developed projects to modernize and fill these public spaces with furniture, which creates a favorable psychophysiological atmosphere among the townspeople.

In the “Delta” project, attention is paid not only to filling the territory with furniture, but also to the development of the structure, layout of the area in the urban environment (Fig. 4). Since the square is a corner element of urban planning, this means that in the process of compositional planning, it is necessary to consider the factor of visitor movement. This problem reveals the main task - to captivate the visitor by providing him with an unobtrusive choice – “to go further or to give in to the enchanting image of the atmosphere and hide for a moment from the noise of the big city”.

The furniture in this project is a parametric design. The elements are modeled using the Rhinoceros program [4].

The seating position in the unfolded position is held together by a bar, which allows the vertical modules to take a stable position. When the elements are folded, the fold goes up, and the moving part takes a horizontal position. Then it is fixed with the same bar, already passed through the entire folded structure through the provided holes. Thus, the panel changes its functional role in the decorative on the condition of minimum costs of dismantling, in the project term. This solution makes it possible to make a few benches from one due to the transformation of the elements (Fig. 5).
### ARRANGEMENT OF THE STREET SPACE OF KRASNOYARSK

#### 1. WHAT PLACE (PARK, SQUARE) IN KRASNOYARSK DO YOU VISIT THE MOST FREQUENTLY? WHY?

| Place                                      | Percentage |
|--------------------------------------------|------------|
| Squares and recreation areas of the central streets | 47.26%     |
| Eco-parks, campings in the suburbs of Krasnoyarsk | 34.17%     |
| Other                                      | 18.57%     |

#### 2. WHAT ATTRACTS YOU TO REST PLACES IN KRASNOYARSK?

| Attraction                                      | Percentage |
|------------------------------------------------|------------|
| Improvement of the territory                    | 19.89%     |
| The opportunity to get together with family,... | 21.56%     |
| Calm, quiet environment                         | 13.47%     |
| Entertainment, a variety of activities          | 9.62%      |
| Work-out place                                  | 23.18%     |
| Other                                          | 12.28%     |

#### 3. WHAT DO YOU THINK ARE THE LACK OF EQUIPMENT FOR STREET SPACES FOR REST IN KRASNOYARSK?

| Lack of Equipment                              | Percentage |
|------------------------------------------------|------------|
| Uncomfortable benches                         | 22.51%     |
| Not enough space for a large company          | 10.84%     |
| No protection from wind, rain                 | 17.36%     |
| Not enough bike parking                       | 16.73%     |
| Obsolete forms of outdoor furniture           | 23.85%     |
| Other                                         | 8.71%      |

#### 4. WHAT SHOULD REST AREAS BE ORGANIZED? (WITHIN THE STREET SPACE)?

- **My answer**
  - 63%
  - 97 persons voted

**Fig. 3.** The results of the public survey
Fig. 4. The “Delta» project.

Fig. 5. The scheme of transformation and assembly of the bench.
The aesthetic qualities of objects are also very important. Benches can be composed in various compositions using a single line, which will help to create a unique image of the area, and the lights can be adjusted in height and inclination, which also provides additional configuration options. It is necessary to use environmentally friendly, affordable and durable materials - concrete, metal and wood as the main construction materials. (Fig. 6).

![Fig. 6. Outdoor furniture set “Resonance”.](image)

A distinctive feature may be the presence of a swing complex (Fig. 7). For the manufacture of such products, it is planned to use traditional and modern materials, such as metal, plywood and wood-polymer composite, which is growing in popularity as a structural material for outdoor facilities, it does not swell and does not require a protective finish [7].

![Fig. 7. Outdoor furniture for SFU public space.](image)

Outdoor furniture design should take into account the ergonomic and functional needs of the townspeople. This style of modern performance of small architectural forms is already conquering the parks and squares in the developing cities of Russia [5].

4. Discussion

In general, today the city of Krasnoyarsk is ready for transformation, for interesting design solutions that should satisfy the needs of the townspeople. According to the results of the survey, among respondents aged 19-40 years, the following problems of organizing public urban spaces were noted, such as a shortage or irrational arrangement of waste bins, outdated forms of objects, uncomfortable benches, an insufficient number of bicycle parking, irrational compositional solution of seating places for a large company, an overabundance of asphalt pavements, cheap furniture materials and a low
aesthetic component. It is worth remembering that public spaces such as parks and squares are an amazing place to implement interesting youth projects.

The results of this study will be used by the Department of Municipal Services in the implementation of measures within the framework of the "Comfortable Urban Environment" program operating in Krasnoyarsk, which provides improvement of public areas. Krasnoyarsk is preparing to celebrate its 400th anniversary, therefore, grants for the improvement of squares and parks for the installation of art objects and outdoor furniture are regularly held [6].

5. Conclusion

The problem of a competent approach to the design of outdoor furniture objects is increasing its relevance. Town planning departments are interested in the selection of high-quality samples of outdoor furniture, designed as a result of an integrated approach, which takes into account the color-texture solutions of materials, laws of rational composition and technology. They choose furniture that provides conditions for a healthy, comfortable, convenient life, both for an individual and for all residents of the city of Krasnoyarsk.

Recognizable outdoor furniture will become a hallmark. The city will acquire a recognizable appearance and will attract guests from other cities and countries.

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