

## Construction of a mechanized moving platform for human service

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### ABSTRACT

The purpose of the article is the construction of a mechanized mobile platform for serving people, which is caused by the need to increase the safety of the operation of such technical means, in particular, in the case of the need for mass customer service. The methodology is based on creative approaches. The methods of construction is a synthesis of technical solutions, simulation modelling. Research results. Construction was determined that the safety of the operation of mechanized moving platforms, which are intended for the transport of people in the field of tourism, depends on effective approaches to the design and components of the technical system in the form of a moving platform, its structural components, elements of its mechanism and the drive system as a whole, which with the optimization of technical indicators the stability of the overall system, the smoothness of movement and braking of the platform, the optimization of the materiality of the structure in total allow to have a qualitative effect on improving the safety of human operation.

*Key words: human service, mechanized equipment, platform, energy recovery, sustainability.*

### 1. INTRODUCTION

Platforms that are used as attractions can also be considered objects of study. This paper examines the process of developing and constructing such a platform, taking into account groups of people with limited mobility or children of preschool age. For this, a requirement was established to design the platform itself as low as possible to the ground surface and with a minimum number of stairs.

### 2. MATERIALS AND METHODS

In addition, for the effective design of the technical components of the generalized system, modern means of simulation modelling were used, including parametric design, 3D modelling, kinetostatic analysis, and structural synthesis.

### 3. RESULTS AND DISCUSSION

During the development of a mobile platform for maintenance, the authors proposed a constructive solution of the mechanized mobile platform (Fig. 1). The proposed mobile platform is intended for use during mass cultural events. The mechanized moving platform is part of a more complex system that forms a carousel attraction. The entire carousel attraction has a weight of 3500 kg, an overall diameter of 7 m, and a height of 4,5 m. The mechanized moving platform has a diameter of 7 m, weight 2100 kg, height of the platform 0,35 m, drive – 5 kW, power from, maximum rotation speed – 1 m/s. The central rack has the following parameters: diameter of 2,1 m, weight 200 kg, height of the platform 2,75 m. The carousel cover has the following parameters: diameter of 7 m, weight 1000 kg, height of the platform 1,35 m.

During the design of the mechanized moving platform and the carousel as a whole, the advisor on creating an accessible environment for people with special abilities, disabilities and other groups with limited mobility was taken into account [4-9].

The carousel is designed with one step for convenient and safe descent or ascent to the platform, the frame and structure of the carousel is shown in Fig. 1.

The mechanized moving platform (Fig.2) consists of 5 sections, among which one is drive section, the others are driven. The sections are assembled into a single structure and connected to the power drive. Due to the structural refinement of the supporting wheel, the moving platform has a low height of 300 mm. The carrying capacity of one such wheel is 700 kg.

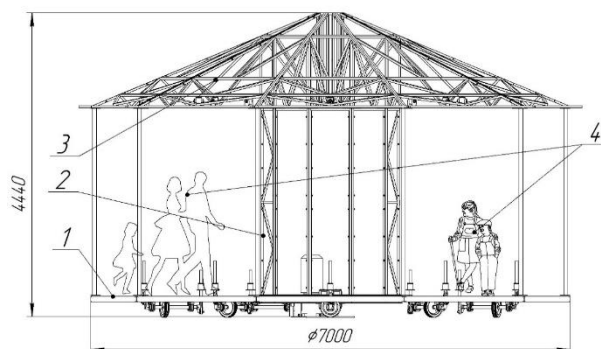


Figure 1. Construction of the carousel attraction with inclusive access

An important operating condition is ensuring the safety of both staff and visitors. For this purpose, it is necessary: to identify the predicted danger, dangerous events and situations caused by mechanical, electrical, chemical (from raw materials, materials and other substances), thermal (thermal) influence, radiation, water environment, as well as violation of ergonomic requirements and other reasons. Take measures to reduce the risk of accidents and emergency situations [5-9].

The stability of the carousel attraction is an important aspect that affects the safety of its operation. This includes the ability of the attraction to withstand various loads arising during its operation, without the risk of collapse or other dangerous situations [6].

To ensure the stability of the carousel attraction, several key factors must be taken into account.

**Construction:** The base of the carousel must be strong and stable to withstand the weight and movement of the attraction. The upper part of the support frame is used to support and mount the superstructure, which rotates along with the rotary table [5].

**Installation:** Correct installation of the attraction is important for its stability. This includes the correct location of the attraction, as well as the installation of all its components according to the manufacturer's instructions [5].

**Maintenance and inspection:** Regular maintenance and inspection of the ride helps to identify and correct any potential stability problems in the early stages. This may include checking the condition of the materials, joints, base and other important components of the ride [5].

**Safety:** It is important to ensure that all safety standards and procedures are followed, including the use of appropriate safety equipment and regular safety training for staff [7].

**Personnel training:** All persons participating in the operation of attractions, depending on their duties, must be trained and know the basic technical characteristics, structure and rules of safe operation and maintenance of attractions [7].

These steps will help ensure the stability of the carousel attraction and make it safe to use. In order to ensure the safety of the amusement equipment, the identification of predicted danger, dangerous events and situations caused by mechanical, electrical, chemical (from raw materials, materials and other substances), thermal (thermal) influence, radiation, water environment, as well as violation of ergonomics requirements must be carried out and other reasons [7].

To ensure the stability of the carousel, it is proposed to create a balancing mechanism of automatic action, a movable counterweight.

A movable counterweight is installed under the platform and due to the movement of the load will stabilize the attraction. The system is automatic without operator intervention.

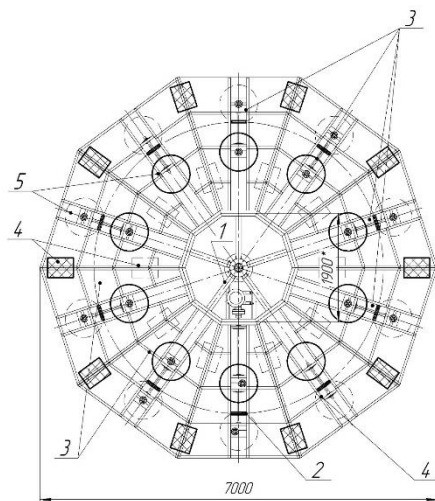


Figure 2. The principle of operation of the carousel stability maintenance system due to the movable counterweight: 1 – central base; 2 – drive section; 3 – moveable section; 4 – moving counterweight; 5 – mass loading places.

The stability of the carousel is the ability to resist external loads, including the gravitational forces of the weight of visitors on the ground, as well as the component parts of the carousel, inertial forces that prevent the system from destabilizing and moving the supporting part of the carousel relative to the ground base.

The stability of the carousel can be characterized by the coefficient of stability where is the moment of all the forces holding the carousel; is the moment of all the forces contributing to the destabilization of the carousel.

#### 4. CONCLUSIONS

The construction of mobile platforms for serving people is an actual direction that solves the needs of people in various directions, in particular, the organization of cultural and mass events.

In the course of construction, the geometric, mass, and inertial indicators of the components of the moving platform for serving people were obtained.

For a moving counterweight, it is necessary to optimize the inertial and speed parameters taking into account the parameters of the platform as a whole.

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