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CONCEPTUAL APPROACHES FOR DETERMINATION OF PRODUCTION AND TECHNOLOGICAL POTENTIAL IN TRAFFIC ROLLING STOCK PROJECTS

The article considers the problems of managing the efficiency of use of production and technological potential of rolling stock. It is investigated that in order to improve the efficiency of functioning it is necessary to determine the conceptual approaches of the components of the processes of maintenance and operation of rolling stock. This requires the use of technical means and methods of monitoring the technical condition of the wheelsets of the rolling stock.

It is investigated that the possibility of successful solution of one of the important tasks of the railway industry risk of improving the quality of repair and restoration works and prolonging the life cycle of rolling stock is possible by ensuring control over finished products and improving process management.

It is determined that the form of the concept of conceptual approaches to determining the essence of production and technological potential of maintenance and operation of traction rolling stock is a model of the life cycle of maintenance and development of its operation.

A detailed analysis of the advantages and disadvantages of existing methods of quality control of repair of wheelsets of railway rolling stock. Ways to increase the life cycle of wheelsets are considered. The mathematical model of a complex estimation of quality of repair of wheel pairs that will increase efficiency of operational work of a rolling stock and safety of transport process is offered.

The paper considers the components of conceptual approaches to improving the functioning of production and technological potential of the transport complex in the projects of traction rolling stock.

Keywords: *traction rolling stock, model, diagnostic methods, technical means. production potential, information technology.*

Introduction. Improving the production and technological processes of the primary links of the transport complex requires a focus on specific production conditions and economic ties that have been established. Today, the level of functioning of the transport complex in a market economy is largely determined by the efficiency of their production and technological potential. Production and technological potential has a complex structure that includes resource and functional components. For their effective use it is necessary to provide management on the basis of modern understanding of essence and definition of potential of the enterprise [1-3].

Therefore, a necessary condition for solving this problem is the study of conceptual approaches to the definition and essence of production and technological potential in the projects of traction rolling stock, its components.

The purpose and objectives of the study. The purpose of the study is to analyze the nature and determine the components of the production and technological potential of the processes of maintenance and operation of traction rolling stock.

Objectives of the study: 1. To analyze the problems of managing the efficiency of production and technological potential of traction rolling stock. 2. Investigate the model of the quality control process for the repair of wheelsets, which is based on quantitative indicators that characterize the technological process of repair in terms of workload and quality indicators. 3. Investigate the life cycle model of support and development of traction rolling stock. 4. To propose the components of conceptual approaches to the definition and essence of the production and technological potential of the transport complex in the projects of traction rolling stock.

Materials and methods of research. To study the effectiveness of the use of production and technological potential of the traction rolling stock of the transport complex, it is necessary to determine the conceptual approaches of the components of the processes of maintenance and operation of rolling stock. This requires the use of technical means and methods of input, interoperative and output non-destructive testing of the technical condition of wheelsets. Factors such as a significant percentage of worn-out rolling stock, increased repair quality requirements on the one hand, and the need to increase productivity on the other, require the development of new effective methods of non-destructive testing of wheelsets, components and rolling stock [5,6].

Currently, during the defectoscopy of the elements of the wheelsets of the rolling stock of railway transport, such control methods as magnetic powder, eddy current, ultrasonic control methods. However, with the various methods of non-destructive testing used in defectoscopy, there are still omissions of dangerous defects of wheel pairs (cracks in the disc, ridges and rims of the wheel, cracks in the middle, neck and insidious part of the axle) and quite often. The main reasons for the omission of defects are the low level of automation of the control process. In addition, the control process by the methods mentioned above requires prior preparation of the control surface, scanning of the entire monitored surface with sensors and time consuming [7].

Therefore, the creation of new conceptual approaches to methods of control and diagnosis of wheelsets is a necessary condition for improving the safety of trains and ensuring efficient operation at all stages of the life cycle of wheelsets of rolling stock. The creation of these methods is the basis for the development of an automated control system for wheelsets.

The modern technological process of repairing wheelsets as an object of control is characterized by the following factors: complexity, multifactorial, vague manifestation of causal relations in the organization of structural units of the industry, distribution of target functions in time and space, a wide range of materials, parts and components. are in constant contact with technological equipment. The main resources to increase the productivity of wheel pair repair are the modernization of repair quality control technology and the introduction of modern measuring equipment based on information technology and the development of a database of automated control systems for repair processes.

The use of control systems in the process of repairing wheelsets to ensure the control of finished products and increase the efficiency of process management opens the possibility [9] of successfully solving one of the important tasks of the railway industry risk of improving the quality of repair and restoration work Therefore, the form of the concept of conceptual approaches to determining the essence of the production and technological potential of maintenance and operation of traction rolling stock is a model of the life cycle of maintenance and development of traction rolling stock (Fig. 1)

During the study, the control systems of technological parameters mentioned above were analyzed, as well as the parameters of the quality of wheel pair repair in the technological process [4]. Based on the analysis, a mathematical model of the process of quality control of repair of wheelsets of rolling stock was proposed, which will increase the energy efficiency of repair [8,15].

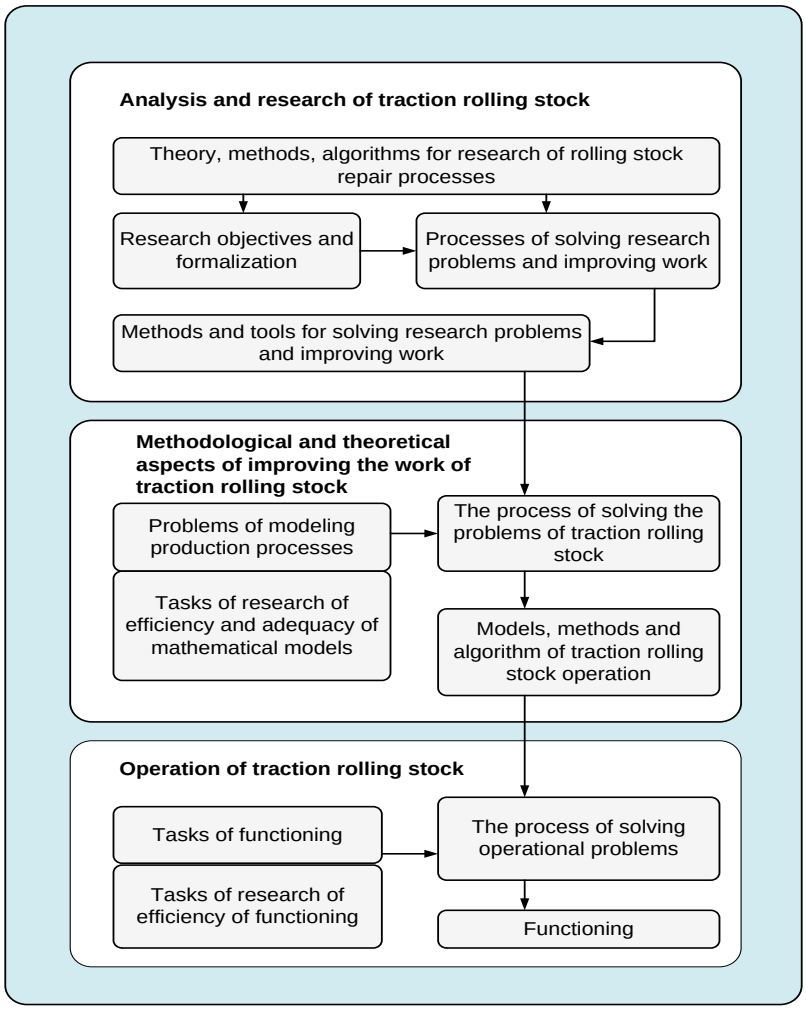

Fig.1. **Life cycle model of support and development of traction rolling stock operation**

This mathematical model of the process of quality control of wheel pair repair, based on quantitative indicators that characterize the technological process of repair in terms of volume of work and quality indicators. These indicators characterize the wheelset as a finished product in terms of its suitability for operating conditions and compliance of technical parameters of the wheelset to the requirements of regulatory and technical documentation, which is the basis of working condition [10,16].

The model is based on indicators of quality of repair, namely the law of distribution of random variables which characterize process of repair according to conditions of observance of technological discipline, qualification of workers and a technical condition of technical means.

$$F_i = \frac{(\sum_{j=1}^{n} \frac{h_z}{h_m})}{n} = \sum_{j=1}^{n} G_j/n, \quad (1)$$

where n – the number of operations;

h_m – normalized complex assessment of the j-th operation;

h_z – actual comprehensive assessment of the j-th operation;

$G_j -$ coefficient that takes into account the completeness of operations on the quality of repair of wheelsets of rolling stock. In practice, the coefficient depends on the type of operations performed during the repair of wheelsets.

The model of comprehensive assessment of the quality of repair of wheelsets and the life cycle model of support and development of traction rolling stock is the basis of the conceptual approach to determining the essence of production and technological potential of maintenance and operation of traction rolling stock. .

Based on this, the article investigates the components of conceptual approaches to improving the functioning of production and technological potential of the transport complex in the projects of traction rolling stock.

According to the first component of the conceptual approach of production and technological potential, it is proposed to understand the real volume of work provided that the full amount of resources, which characterizes the available capabilities of the transport complex [11-13].

The second component of the conceptual approach of production and technological potential is characterized as a system of economic relations that arises between economic entities of different economic levels to form a production result with the most efficient use of transport resources, the current level of technical means and methods of control and diagnostics of rolling stock.

According to the third component of the conceptual approach of production and technological potential is understood the potential volume of work performed, the potential of fixed assets. Potential opportunities for the use of material and labor resources. According to this component, the production and technological potential does not include information, investment and innovation economic resources that provide not only the use but also the development of production potential.

The fourth component means the amount of work in certain units of labor costs for a limited period of time the main potential of employees using existing production assets in two modes of operation and optimization of processes in the transport complex [14].

The fifth component of the conceptual approach of production and technological potential means the ability of the enterprise to perform the required amount of work for maintenance and operation of traction rolling stock.

When studying the components of conceptual approaches to improve the functioning of production and technological potential of the transport complex in the projects of traction rolling stock should also consider their main shortcomings, which should be avoided when defining this concept, which is the basis for further research.

Conclusions. The problem of management of efficiency of use of production and technological potential of traction rolling stock is analyzed. The mathematical model of the process of quality control of wheel pair repair, which is based on quantitative indicators that characterize the technological process of repair in terms of workload and quality indicators, is studied and proposed. The model of the life cycle of support and development of traction rolling stock operation is presented. The components of conceptual approaches to the definition and essence of the production and technological potential of the transport complex in the projects of traction rolling stock are proposed, which will increase the indicators of the main aspects of the production and technological potential.

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КОНЦЕПТУАЛЬНІ ПІДХОДИ ВИЗНАЧЕННЯ ВИРОБНИЧО-ТЕХНОЛОГІЧНОГО ПОТЕНЦІАЛУ В ПРОЄКТАХ ТЯГОВОГО РУХОМОГО СКЛАДУ

У статті розглянуто проблеми управління ефективності використання виробничо-технологічного потенціалу рухомого складу. Досліджено, що для вдосконалення ефективності функціонування необхідно визначити концептуальні підходи складових процесів технічного

обслуговування та експлуатації рухомого складу. Для цього необхідно застосування технічних засобів та методів контролю технічного стану колісних пар рухомого тягового складу.

Досліджено, що можливість успішного рішення однієї з важливих задач залізничної галузі ризику підвищення якості ремонтно-відновлювальних робіт та продовження життєвого циклу рухомого складу можливе за рахунок забезпечення контролю за випуском готової продукції і підвищення ефективності управління технологічним процесом.

Визначено, що формою концепції концептуальних підходів до визначення сутності виробничо-технологічного потенціалу технічного обслуговування та експлуатації тягового рухомого складу є модель життєвого циклу підтримки та розвитку його функціонування.

Проведено детальний аналіз переваг та недоліків наявних методів контролю якості ремонту колісних пар рухомого складу залізничного транспорту. Розглянуті шляхи підвищення експлуатації життєвого циклу колісних пар. Запропоновано математичну модель комплексної оцінки якості ремонту колісних пар, що підвищить ефективність експлуатаційної роботи рухомого складу та безаварійність перевізного процесу.

У роботі розглянуто складові концептуальних підходів до покращення функціонування виробничо-технологічного потенціалу транспортного комплексу в проектах тягового рухомого складу.

Ключові слова: *тяговий рухомий склад, модель, методи діагностики, технічні засоби. виробничий потенціал, інформаційні технології.*