

using them to improve the functionality and reliability of robotic systems. It is expected that results of research will have significant practical significance for further development of robotics and automation.

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## **ENERGY-EFFICIENT TRACTION SYSTEM OF A LOCOMOTIVE WITH A MULTI-DIESEL POWER PLANT**

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*Abstract.* Research on the use of modern power plants on shunting locomotives has been analyzed. To reduce fuel consumption and the harmful impact on the environment, both hybrid and multi-diesel power plants are used.

*Keywords:* traction electric drive, energy efficiency, rolling stock, diesel, locomotive.

*Introduction.*

*Topicality.* The purpose of creating diesel locomotives with a multi-diesel power plant is to increase fuel economy, reduce harmful emissions into the atmosphere, and improve the working conditions of drivers. Therefore, this direction is considered attractive for deep modernization of diesel locomotives with the replacement of power plants, as well as on the basis of new technologies, equipment and control systems. This is relevant for Ukrainian railways.

*The object of research* is shunting locomotives.

*The subject of research* is the traction system of a shunting locomotive with a multi-diesel power plant.

*The purpose of the work* is the development and research of the energy efficiency of the traction system of a locomotive with a multi-diesel power plant.

*The objectives of the study* are to determine the rational structure of the traction system of a locomotive with a multi-diesel power plant; increasing the energy efficiency of the traction electric drive by using optimized electrical equipment; development of strategies for managing diesel generators and energy flows in the traction electric drive, taking into account operating conditions.

*The novelty* consists in the development of methods for creating an energy-efficient traction system of a locomotive with a multi-diesel power plant and the development of provisions for its management.

*Presentation of the main research material.*

Shunting is an integral part of the transportation process. JSC "Ukrzaliznytsia" uses diesel locomotives of the ChME3 series for shunting operations, the inventory of which is more than 1,200 units with 100% actual wear. For diesel locomotives that are in operation, there is a steady trend of increasing maintenance costs

Options for updating the fleet of shunting diesel locomotives are their complex modernization with re-motorization, as well as the purchase of new diesel locomotives. The application of these options allows improving the traction and energy characteristics of diesel locomotives, it is predicted that the cost of maintenance, repair and fuel and lubricants will decrease, which will ultimately ensure a decrease in the cost of transportation.

Taking into account the possibility of extending the service life of ChME3 diesel locomotives for 10...15 years, it is considered urgent to develop options for comprehensive modernization of these diesel locomotives to improve their traction and energy characteristics. One of the options is to create a locomotive with a power plant based on two or more heat engines or other energy sources. Therefore, it is considered appropriate to use on shunting diesel locomotives a power plant, the structure and parameters of which most correspond to the operating modes of the locomotive. In a number of works,

the expediency of using hybrid power plants in the modernization of the ChME3 diesel locomotive has been proposed and substantiated.

A possible option is the use of a power plant based on several diesel engines. Taking into account the fact that shunting locomotives are used for both types of work - both shunting and transfer - it is considered appropriate to conduct further research, the results of which will allow creating an efficient locomotive.

*Conclusions.* When modernizing locomotives, many diesel power plants are used, which ensures a reduction in fuel consumption and a reduction in harmful emissions into the environment. Such an energy installation may include energy storage devices. The research approach can be applied in the modernization of diesel locomotives for various purposes.

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## **ANALYSIS OF POWER PLANTS USED IN UNMANNED AIRCRAFT**

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*Abstract.* The purpose of the research is to improve the tactical and technical characteristics of commercial unmanned aerial vehicles (UAVs) by developing the engine with promising indicators. The research is based on current and future developments of both domestic and foreign manufacturers. One of the most important tasks in the development phase of a UAV is the proper selection of the power plants. It involves the selection of such a system which enables the best use of the characteristics of the airframe and produces appropriate thrust to meet all the tactical requirements for an unmanned aerial vehicle. Expected scientific and practical results: significant increase in autonomy and reliability of promising models of domestic UAVs, expansion of the range of their tactical, technical and operational characteristics