СЕКЦІЯ 14 «ТРАНСПОРТНІ СИСТЕМИ ТА ТЕХНОЛОГІЇ ПЕРЕВЕЗЕНЬ»

IMPROVING THE EFFICIENCY OF RAILWAY STATION INFRASTRUCTURE UTILIZATION IN THE IMPLEMENTATION OF HIGH-SPEED TRAIN OPERATIONS

Shapoval Hanna, Lohinova Yuliia, Shapoval Anastasiia
Ukrainian State University of Railway Transport

The high-speed rail systems around the world are based on the use of modern technologies in various areas. The implementation of high-speed rail requires significant capital investments in the upgrading of railway infrastructure. The demand for high-speed transportation has highlighted the relevance of research on the possibility of utilizing existing railway infrastructure for this purpose. Its modernization allows for minimizing design costs, but at the same time requires justification for new technical solutions.

Currently, the issue of high-speed rail development in Ukraine is highly relevant. As a result, a number of programs aimed at increasing the speed of passenger trains have been developed. The implementation of these programs involves selecting railway lines as a whole, as well as individual sections. The selected infrastructure elements are planned to be reconstructed when implementing high-speed passenger train operations.

The aim of the research is to develop a comprehensive approach to improving the efficiency of railway station infrastructure utilization in the implementation of high-speed passenger train operations.

To achieve this, the following tasks need to be addressed:

Conduct research on the current experience, actual state, and future prospects of organizing high-speed transportation on railway lines.

Analyze the efficiency of using railway station infrastructure for implementing high-speed train operations.

Identify the peculiarities of conducting customs control in the conditions of implementing high-speed train operations, taking into account interoperability principles.

Develop proposals to improve the efficiency of using railway station infrastructure in the implementation of high-speed train operations.

Evaluate the economic effectiveness of the proposed project solution.

The development of high-speed transportation requires the creation of a unified European railway system that includes technical interoperability of infrastructure, rolling stock, and other subsystems. One obstacle to the development of high-speed transportation is the existence of railways with different track gauges in different countries. Currently, in Ukraine, railways with a gauge of 1520 mm are used, while the standard gauge for railway connections in most European Union countries is 1435 mm.

The existence of different track gauges creates inconveniences in passenger transportation, resulting in additional operations at border crossings. Different technological solutions are used at the junction of such tracks, such as rearranging wagons onto different bogies or using adjustable wheelsets. To reduce barriers between transportation systems in Europe and Ukraine, interoperability principles should be applied.

Servicing high-speed trains at border stations involves performing technical, customs, and border operations. Therefore, border stations are divided into separate zones for handling suburban trains, uncoupling and repairs, handling passenger trains, handling freight trains, handling detained wagons for investigation, as well as transshipment and inspection operations with wagons and containers.

For customs control purposes, a border checkpoint is constructed. It consists of track layout, a control post building, and an inspection area. It can have a sequential or parallel arrangement relative to the border station.

When choosing a design solution for the development of infrastructure for high-speed transportation, it is necessary to find an answer to the question: which railway stations should be included in the reconstruction plan in order to achieve the maximum reduction in travel time with the smallest capital investment.

The criterion for selecting a junction for inclusion in the reconstruction project is the cost of one minute of travel time reduction at the junction.

Applying this approach at the pre-project stage allows for making decisions that will enable the most efficient use of allocated funds for reconstruction while ensuring the established train speed.

To increase the efficiency of infrastructure utilization, it is necessary to choose the optimal option for the reconstruction of the railway station, taking into account its technical equipment and working technology.

The cost estimation for the reconstruction was based on the intermediate station of a transverse type. Implementation of high-speed train traffic requires reconstruction of both throats of the station.

For approximate calculations of the volume of reconstruction works, a method of typical schemes of reconstruction was applied, depending on the calculated length and location relative to the switch throats and displacement of main tracks. Implementation of the proposed project decision will result in changes in operating costs for high-speed trains.

Due to the increase in train speeds, it is expected that there will be changes in the costs of using station infrastructure. The proposed comprehensive approach will increase the efficiency of railway station infrastructure utilization when implementing high-speed train traffic.

РОЗБУДОВА ЗАЛІЗНИЧНОЇ МЕРЕЖІ 1435 ЯК ІНФРАСТРУКТУРНА ОСНОВА ІНТЕГРАЦІЇ УКРАЇНСЬКИХ ЗАЛІЗНИЦЬ ДО ЄВРОПЕЙСЬКОЇ ТРАНСПОРТНОЇ СИСТЕМИ

Вернигора Р.В., Гой В. О., Мікульшин С. Е.
Український державний університет науки і технологій

Vernyhora Roman, Hoi Vladyslav, Mikulshyn Stanislav Development of the 1435 railway network as an infrastructural basis for the integration of Ukrainian railways into the European transport system.

Summary. *The report discusses the prerequisites and plans for the implementation of infrastructure projects related to the expansion of the 1435 mm railway network across the territory of Ukraine. Ukrzalyznytsya plans to build about 1200 km of such tracks; the cost of the project is estimated at 4 billion USD.*

Внаслідок свого географічного розташування на перетині торгівельних маршрутів Україна завжди була своєрідним мостом між Заходом та Сходом, між Європою та Азією. Саме значний транзитний потенціал є однією з головних особливостей транспортної системи нашої держави. До 2014 р. основні транзитні вантажопотоки прямували через Україну територією російської федерації; при цьому значні обсяги транзиту (близько половини) транспортувались залізницею (у 2013 р. – 34 млн. т).

З початком російської агресії транзитний вантажопотік територією України суттєво скоротився; так, з 2013 р. по 2021 р. обсяги транзиту по усім видам транспорту (окрім трубопровідного) скоротились у 2,7 рази – з 68,9 млн. т до 25,8 млн. т, а залізничні транзитні перевезення за цей період впали втричі. При цьому Україна почала серйозно