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PJSC «UKRZALIZNYTSIA»
Regional branch «Donetsk railway»

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IN LUHANSKAYA REGION

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IMPROVED METHODS DEFINITIONS SCHEMES CIRCULATION LOCOMOTIVE

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To increase competitiveness in the market of transit transportation, the JSC Ukrainian Railways needs to improve its strategic railway directions (international corridors) by using an acceleration technology in the traffic handling process for certain specialized railcar traffic. Under such conditions, traffic schemes for traction resources are built not in a general conjunction with all types of railcar traffic but for various specific railcar-traffic groups. The analysis of the practices of independent shipping companies in the railways worldwide allows making a conclusion that when such companies can choose a route for their own railcar traffic in the network with the possibility of traction provided by locomotive depots of different types of ownership, this individual approach to the choice of traction supply for various railcar traffic under the condition of private traction and transportation rights will become increasingly used for traffic on the Ukrainian railways. Thus, the present study suggests formalizing this approach at the level of tactical planning.

The research is aimed at improving the methods of determining the schemes of locomotives' circulation in the railway network of Ukraine under the accelerated handling of individual railcar traffic in view of its technological peculiarities.

To achieve this goal, it is necessary to do the following task:

– to develop a mathematical model to determine a rational scheme of locomotives' circulation within a railway network with the possibility of finding the weight of trains on the railcar traffic route, the circulation schemes for locomotives with regard to deploying the fleet of different series at a network site, and the scheme of locomotive crews' operation [1].

Depending on the role in providing traction service, technical train stations are divided into stations with the main depot, with a turnover depot or a site of locomotives' turnover, and with a change point for locomotive crews [2].

To display the spatial availability of stations with fixed and transit locomotive depots, the set V can be divided into the following subsets: vertices V1, which simulate those stations that have the main locomotive depot

V1⊂V; vertices V2, which denote those stations that allow a turnover of locomotives V2⊂V; and vertices V3, which reflect those stations where there is a point for changing locomotive crews V3⊂V.

The choice of a traction haul from the station with the main locomotive depot is always limited by the series of an assigned fleet of freight train locomotives (for example, VL82m, VL11, 2EL4, etc.), which is essential for calculations.

To solve the complex problem of traction, it is necessary to determine the weight standard for a freight train of each railcar flow k to specify the speed, the rolling stock length, the number of trains on a railway route and, consequently, the arrangement of traction servicing of railcar traffic.

Given that a traction arrangement is built for each individual railcar flow k, the costs of moving the rolling stock and performing station operations can be calculated only for the route direction of a particular railcar flow, which makes it possible to fully evaluate the effectiveness of the selected option and to simplify calculations. Refusal to calculate costs for the opposite direction can be explained by the immutability of these costs, as the locomotive fleet, after the main technological process of transporting, can be used for servicing local traffic volumes N_s^{aft}, which in turn will cover the cost of its turnover in the predetermined pattern. However, it is important for the calculations to take into account the condition of a deviation from the constant costs in the reverse (unloaded) direction due to the presence of expenses for a reserve run of locomotives in the absence of the required number of local trains for a specific number of locomotives returning from the turn-around sites after servicing the railcar traffic k and after sending such locomotives to return-point sites. The described peculiarity is important to consider when choosing a rational scheme of servicing the traction at a site of a railway network.

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