

V.V. PEREGUDOV, Dr. Eng., Prof., Head of Department, Kryvyi Rih National University
 Y.V. PEREGUDOV, Ph.D., Researcher, LLC "Kryvbasproject"
 A.O. ROMANENKO, Ph.D.; Mine surveyor engineer of the rock movement monitoring,
 "CGZK" PJSC; Student of Group 122-23-1-M, Technical University "Metinvest Polytechnic" LLC
 O.V. ROMANENKO, Dr. Eng., Deputy Chief Engineer, SE "DPI "Kryvbasproject"

ANALYSIS AND IMPROVEMENT OF THE METHODOLOGY FOR TRACTIVE CALCULATIONS OF OPEN-PIT RAIL TRANSPORT

Currently, in the Krivoy Rog iron ore basin, an integrated approach is used for transporting mining mass, which includes a combination of road-rail and conveyor transportation. The report is dedicated to the analysis and improvement of the methodology for traction calculations of open-pit railway transport.

The main guideline for conducting efficiency calculations of railway transport is the Norms of Technological Design for Mining Enterprises with Open-Pit Mining of Mineral Deposits [1]. This key document establishes standards and methodologies for calculations necessary in the mining transport industry.

It is important to note that at the moment the website <http://www.kipdiit.dp.ua>, referred to in the Norms of Technological Design for Mining Enterprises with Open-Pit Mining of Mineral Deposits [1], is unavailable. According to these norms, the specified website contained ready-made Microsoft® Office Excel tables with embedded formulas for solving various tasks, such as traction calculations and others related to the calculation of technological indicators of railway transport operation. Simultaneously, the mentioned norms [1, pages 204-220] include a detailed description of the structure of these Microsoft® Office Excel electronic tables.

Traction calculations for industrial open-pit railway transport have been studied previously [2-3], however, the most detailed methodology for such calculations is provided in Appendix B of the Norms of Technological Design for Mining Enterprises with Open-Pit Mining of Mineral Deposits [1, pages 204-220].

After conducting the analysis, a detailed explanation of the construction of the traction calculation algorithm was provided, errors were identified and corrected, and adjustments were made to the methodology for conducting effective traction calculations for industrial quarry railway transport using the MS Excel spreadsheet software. Specifically, the algorithm for calculating specific train resistance was improved, allowing traction calculations to be performed, taking into account the type of track (fixed, movable) on the track sections (the calculation formulas now include the coefficient $K_{mun.k}$, which determines the type of track, where $K_{mun.k}=1$ for fixed track and $K_{mun.k}=1.3$ for movable track).

The scientific novelty lies in the detailed analysis of traction calculation algorithms for industrial open-pit railway transport, as described in the current Norms of Technological Design for Mining Enterprises with Open-Pit Mining of Mineral Deposits. After thorough analysis, shortcomings and inaccuracies were identified in the mentioned methodology. It was determined that the calculation example provided in the current Norms of Technological Design was executed incorrectly. Therefore, recommendations, adjustments and corrections were made aimed at improving the algorithm for calculating the traction of industrial quarry railway transport.

The practical significance of these studies lies in the fact that the improved methodology can be utilized as a powerful tool in the process of designing and conducting research to perform effective traction calculations in the field of industrial open-pit railway transport using the MS Excel spreadsheet software. This ensures a practical and efficient approach to achieving accurate and reliable results when performing the specified tasks.

References

1. SOU-N MPP 73.020-078-2:2008 Normy tekhnolohichnoho proektuvannia himycho-dobuvnykh pidpriemstv iz vidkrytykh sposobom rozrobky rodovysheh korysnykh kopalyn. Chastyna 2. Vidkryti hirnichi roboty. Tom 1. (2008) Ministerstvo promyslovoi polityky Ukrainy.
2. Sakharov P. A. Tyahovi raschety dlia uchastka zheleznoi dorohy : ucheb.-metod. posobie / P. A. Sakharov, S. Ya. Frenkel; M-vo transportu i kommunikatsii Respub. Belarus', Belarus. hos. un-t transportu. - Gomel : BelGUT, 2016. - 107 s.
3. Horobchenko O. M. Transportni systemy i tekhnolohii: Zbirnyk naukovykh prats Derzhavnoho universytetu infrastruktury ta tekhnolohii/ Hol. red. O. M. Horobchenko. Kyiv: DUUIT, 2020. Vyp. 35. – 229 s.