



FAILURE ANALYSIS OF TYPE R FREIGHT WAGONS ON THE SERBIAN RAILWAY NETWORK

Student: Dragana PANIĆ¹

Mentor: Jovan TANASKOVIĆ² [0000-0002-2936-5535]

Abstract – The subject of this research is to investigate the occurrence and characteristics of failures of Type R freight wagons operating on the railway network of the Republic of Serbia. The type "R" wagons are four-axle flat wagons with high payload capacities, designed for the transport of heavy general cargo and containers. The research is based on failure and maintenance records provided by national company "Serbia Cargo", comprising 2,427 recorded failure events collected during the period from January 1, 2021, to April 26, 2024. The study applies statistical data processing, classification methods, and data visualization to identify dominant failure patterns and assess the reliability performance of the analysed wagon fleet. An analysis of failure causes, frequencies, and categories was conducted, with particular emphasis on the identification of the most failure-prone components and systems. Failures were classified according to their type, location of occurrence, and time of occurrence, enabling a comparative assessment of failure frequencies across different years and maintenance locations. The main findings of the analysis show that the majority of failures are related to technical malfunctions, indicating that the technical condition and maintenance system are the most critical segments. Besides the insights provided into the reliability characteristics of Type R freight wagons, the obtained results can also contribute to improved organization of preventive maintenance planning, aiming to reduce life-cycle costs of this type of wagon.

Keywords – freight wagons, type R wagons, failure frequencies, maintenance, analysis, classification of failures

¹ SIQ DOO Belgrade, Cara Dušana 266, 11080 Belgrade, Serbia, e-mail: dragana.panic@siq.si

² University of Belgrade Faculty of Mechanical Engineering, Department of Rail Vehicles, Kraljice Marije 16, 11120 Belgrade, Serbia, e-mail: jtanaskovic@mas.bg.ac.rs

