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### ***Marek Graff: Factors Influencing the Use of Regional Rail Transport Based on the Example of the Lubelskie Voivodeship***

*Summary.* Railway reconditioning, i.e., infrastructure repairs and purchases of new rolling stock plus reconditioning of in-service vehicles in the Lubelskie Voivodeship, has been successfully implemented for several years, with the advent of EU aid funds. The first investment project was the construction of a short railway line (< 4 km) to an airport near Lublin, carried out as part of preparations for EURO 2012 (the line has been used since late 2012), i.e., the European Football Championship organized by Poland and Ukraine. Further investment projects soon followed, including the electrification of the LK 68 Lublin – Stalowa Wola, the reconditioning of the LK 7 Warsaw – Lublin, and the rebuilding of Lublin Główny station. Other efforts included the revitalization of LK 30 Łuków – Lublin and work on LK 72 Zamość – Hrubieszów. Further, the reconstruction of the stations in Biała Podlaska, Małaszewicze, and Terespol was completed, together with the reconditioning of the LK 2, playing a vital role in freight connections with Russia and Belarus. However, the importance of this railway line has significantly decreased after February 2022 (due to Russia's invasion of Ukraine). The Broad-Gauge Metallurgical Railway Line (LHS) has been revitalized, and its importance in communication with Ukraine has significantly increased. However, the metropolitan railway connecting Lublin with Chełm and Zamość as well as the district cities of Puławy, Kraśnik, Parczew, and Lubartów has not been launched (a concept for a Lublin region metropolitan railway is under development).

*Keywords:* Lublin, Eastern Poland Programme, Kolej+ Programme, reconditioning, LK 7, LK 68, LHS

### ***Ireneusz Mikłaszewicz, Robert Bińkowski, Jakub Michalik, Michał Szymański: Determination of the Susceptibility of the Rail Running Surface to Cracks***

*Summary.* The article presents one of the main types of rail defects – cracking – and the factors that influence its size. A new test method was used, involving pressing a 60° cone into a prepared rail section. It was found that the forming surface crushing of the material caused by the load, as well as the driving dynamics of the rolling stock, is the reason for the formation of *head checks* on the rail surface. Additionally, it was observed that the structure of the layer of the rail running surface has a significant impact on the formation of cracks. A method was proposed to determine the susceptibility of the rail running surface to rail defect formation using the  $W_p$  coefficient.

*Keywords:* rail head check, running surface, susceptibility coefficient

### ***Jarosław Moczarski: RFID Technology in Railway Traffic Management and Signaling – Simulation Tests on an Experimental Track***

*Summary.* RFID technology is increasingly used in various industries. This is because it makes it possible to identify and locate moving objects and facilitates the automation of processes and their control. Digitisation of information allows its rapid processing and transfer between different levels of decision-making. Experiments carried out by the author on the test stand's experimental track have confirmed the advisability of using RFID (*Radio-Frequency Identification*) technology in rail transport, both in the area of freight management and in train traffic control. Simulations have shown that an RFID system makes it possible to detect moving rolling stock, check the continuity of a train and determine where the train ends. It locates and identifies trains, railcars and cargo, and allows automatic train traffic control by displaying appropriate signals on automatic block signalling systems. Together with a vision system, it detects dangerous shift of transported loads. The research results can be used as a basis for experimental implementation and verification of the applied solutions in real operating conditions.

Keywords: RFID technology, modelling and simulation, rolling stock location and identification, signalling

### ***Krzysztof Polak: Environmental Impacts of High-Speed Rail. Part 1: Acoustic Impacts***

*Summary.* This article describes issues related to the environmental impact of vibrations generated by high-speed rail. It indicates the most important legal regulations concerning the impact of vibrations on buildings and people in the buildings as well as the main sources of vibrations generated by high-speed rail. The negative impact of vibrations on various elements of the environment (people, buildings, animals) in the stage of construction, operation and decommissioning of high-speed rail is determined. The most common ways of minimising that type of impact are outlined.

Keywords: vibrations, high-speed rail, environmental impact of high-speed rail

### ***Izabela Tarka, Danuta Milczarek, Aneta Świetlik: Materials and Products that do not Meet Fire Protection Requirements but Are Permitted for Use in Rolling Stock Due to Functional Necessity***

*Summary.* Ensuring fire safety in rolling stock is related to the use of materials and products that meet the required fire properties presented in particular in the EN 45545-2 standard. However, there are situations in which the fire protection guidelines cannot always be met due to other requirements, e.g. those related to the safe use of the material or component or its functionality in the vehicle. This paper outlines the principles enabling materials/products to be approved for use in rolling stock in such cases, based on the functional necessity of their application according to clause 4.7 of EN 45545-2. The possibilities of approving components under this clause should be subject to thorough analysis to ultimately determine the risk of their use, in accordance with the principles of the Common Safety Method relating to risk evaluation and assessment.

Keywords: fire safety, specified materials, risk evaluation and assessment