Summaries – Problemy Kolejnictwa issue 200

Damian Dratwa: **Longitudinal Sectioning of Overhead Contact Lines in Stations on Single-Track Lines**

The length of standard gauge rail lines under the management of PKP Polskie Linie Kolejowe S.A. is 18,522.503 km, including 11,940.509 km of electrified lines. In order to ensure reliable power supply to the electric traction, as well as to ensure that work can be carried out when the voltage on the overhead contact lines is switched off or as a result of a break-down, sectioning is used. By electrically sectioning the overhead contact line, specific sections of it can be switched off. The impact on station capacity as a result of a power outage in the overhead contact line depends on how the sectioning is performed. This performance is not strictly defined in the case of stations on single-track lines, where the sectioning of the overhead contact line is done in different ways. The article analyses the impact of longitudinal sectioning on the possibility of running trains by electric traction, using the example of two sections of single-track railroad lines No. 15 and No. 16.

Keywords: overhead contact line, longitudinal sectioning, station capacity, track closures, maintenance of overhead contact line

Marek Graff: **Factors Determining the Development of Rail Passenger and Freight Transport on the Example of the Podkarpackie Voivodeship**

The availability of EU funds for the modernization of infrastructure, including railways (infrastructure renovations and rolling stock purchases) has led the local authorities of the Podkarpackie Voivodeship to acquire diesel-powered rolling stock initially and later electric, too. Renovations of the railway network are – on the one hand – carried out by the infrastructure owner Polskie Linie Kolejowe (PLK), which is managed centrally, and – on the other hand – more complicated due to costs as well as legal and procedural issues (the need to comply with EU law). Thus, for example, the modernization of LK 91 Kraków – Rzeszów only began in 2011; for comparison, the first diesel vehicles were purchased by the Marshal's Office of the Podkarpackie Voivodeship in Rzeszów in 2004, and electric vehicles in 2013. As more vehicles were acquired (by mid-2023 the number – including those ordered – was 49) and the infrastructure was renovated. Then it was decided to launch a Suburban Agglomeration Railway (PKA), connecting Rzeszów with towns located up to 50 km from the capital of the Podkarpackie Voivodeship via the existing railway infrastructure. A comprehensive modernization of Rzeszów Główny Station is underway now including renovation of the station building. Also, due to the proximity of the border with Ukraine, the modernization of the eastbound railway lines and border stations of PLK and UZ (1435 + 1520 mm) started a few years ago. Aft er the Russian invasion of Ukraine in February 2022, they proved to be much needed given the need to transport refugees and international aid to Ukraine.

Keywords: Podkarpackie Voivodeship, PLK, PKA (Suburban Railway in Podkarpacie), Jasionka Airport

Władysław Koc: **Basic Variants of the Analytical Method of Designing Track Geometric Layouts**

The article presents (and extends) the basic assumptions of the analytical method for designing track geometric layouts. The individual elements of the layout (straight sections, circular arcs and transition curves) are described using mathematical equations and connected with each other while maintaining the condition of tangent compliance. The method covers various design cases: a symmetrical case, with transition curves of the same type and the same length, an asymmetrical case, resulting from different types and lengths of transition curves, as well as methods

of designing compound and reverse curves. The work presents a detailed design procedure for the typical, most common case in which the transition curves are symmetrical in relation to the circular arc. Two basic variants differing in the location of the local coordinate system are considered. In the standard (universal) variant, the location of the beginning of the system in the PL-2000 system is not known and is determined only in the final phase of the procedure. Due to this, some interpretation problems may arise. In the case of a symmetrical geometric layout, these difficulties can be avoided thanks to the introduced modification consisting of locating the origin of the local coordinate system at the intersection of two main directions of the route. The article presents computational algorithms for both discussed variants. T e benefits of the introduced modification are illustrated by the presented computational examples.

Keywords: railroad, analytical design method, modification of the local coordinate system, calculation algorithm, sample geometric layouts

Andrzej Massel: Key Issues Related to Permanent Way in the Work of Professor Henryk Bałuch

Marek Pawlik: Overview of the Areas of the Railway Research Institute Activities

Railway transport employs mechanical, pneumatic, electrical, electrotechnical, relay, and electronic programmable solutions, as well as hydraulic, optical and laser-based solutions for the construction and everyday exploitation of various infrastructure and rolling stock functionalities and for supporting and documenting both operation and maintenance. The safe and reliable operation of railways depends, to a significant extent, on the proper interaction of the various technical and procedural solutions. It is based on normative documents, approval procedures and rules regarding handling technical, operational and organisational changes. The article presents the railway system's technical complexity as well as types and formal constraints of the normative and legal documents defining technical and procedural requirements, using both of them as a background for showing the Railway Research Institute's areas of activities from technical competencies and research facilities used in approval processes to involvement in the development of normative documents.

Keywords*:* railway infrastructure, railway rolling stock, approval processes, normative documents

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

The article discusses issues related to acoustic impacts generated by high-speed railways. It indicates the most important legal regulations concerning noise in railway transport and characterises the main sources of noise generated by high-speed railway lines. It attempts to determine the negative acoustic impact on various elements of the environment during the construction, operation and decommissioning of a high-speed railways. Furthermore, it also outlines the most frequently applied solutions to minimise this impact.

Keywords: noise, acoustic impact, high-speed railway, environmental impact of high-speed railway

Artur Rojek: Electrical Endurance of DC Switching Devices

The article focuses on the electrical endurance testing of direct current switching devices, such as high speed circuit breakers, switch disconnectors and contactors. It presents the normative requirements for these tests and provides sample results obtained during testing conducted in the electrical laboratory of the Department of Electrical Power Engineering at the Railway Research

Institute. The most commonly tested switching devices have nominal voltages of 900, 1800, and 3600 V DC, with nominal cur-rents of up to 6.5 kA. The article also discusses phenomena and hazards that may occur during electrical endurance testing.

Keywords: electrical endurance, high speed circuit breaker, switch disconnector, contactor, DC breaking

Artur Rojek: Change of the Electric Traction Power Supply System in Poland From 3 kV DC to 25 kV AC

The article compares the 3 kV DC and 25 kV AC railway electric traction power supply systems. Both systems were characterised, including their requirements in terms of power supply to traction substations, system losses and the influence of the choice of system on the parameters of railway traffic.

Keywords: electric traction power supply system, 3 kV DC system, 25 kV AC system, energy losses, catenary

Łukasz Zawadka, Dominik Adamski: Research Issues Regarding the Impact of a Rolling Stock on a Trackside Train Detection Systems Devices

The paper characterises the operation and basic components of track occupancy devices that are currently used on the PKP PLK S.A. network. Furthermore research methods of measurement of railway vehicles impact on track circuits and axle counter systems as well as wheel set axle impedance measurement that are performed in Railway Research Institute were described. Examples of measurement results were presented for each of the described methods.

Keywords: track circuits, axle counters, interference, magnetic fields, EMC

Andrzej Zbieć: Aerodynamic Phenomena Caused by the Passage of a Train. Part 6: Other Influences. Summary of Series

This series of articles describes the aerodynamic phenomena caused by the passage of a train, characterising the effects that a train running at high speed has on itself, other trains, trackside objects and people. This impact can be of two types – generated pressure and slipstream. Apart from the literature analysis, the author's research is also taken into account. The sixth part of the series describes mixed aerodynamic impacts on people, as well as other types of impacts, and summarises the entire series.

Keywords: rolling stock, high speed railways, aerodynamic phenomena