

SUMMARIES

ARTICLES

Adrian Kaźmierczak, Jolanta Maria Radziszewska-Wo- lińska: Design Requirements for Railway Tunnels

As part of the project carried out by the Railway Research Institute entitled "Technical Standards – Detailed technical conditions for the construction of the railway infrastructure of the Central Railway Transport Hub – Design guidelines", a documentation was prepared, in which Volume III.2 Tunnels contains guidelines for undertaking works on designing new railway lines and their construction. The article describes aspects of the railway tunnels design taking into account construction requirements and issues significantly affecting the safety of use of these structures.

Keywords: tunnel systems, portals, fire safety of tunnels, evacuation, ventilation, rolling stock

Valeriy Kuznetsov: Modelling of the Dynamic Interaction between the Contact Line and Pantograph Based on the Finite Element Method

The use of high-speed electric rolling stock imposes increased requirements on the reliability of current collection. Special attention should be paid to the interaction of overhead contact line (OCL) with current collectors, therefore the development of tools for modelling the OCL interaction with current collectors is important. At present, there are plans to increase the speed of trains on certain sections of railway lines and the requirements for OCL design should be adapted for this purpose. This will enable the owner of the infrastructure to obtain appropriate parameters for the dynamic interaction of OCL and pantographs in accordance with the Energy TSI requirements. An effective tool for the development and improvement of power supply systems is the mathematical simulation of the dynamic interaction of pantographs and OCL. This paper presents an approach to the simulation of the dynamic interaction based on the finite element method.

Keywords: catenary, dynamic interaction, pantograph, simulation

Małgorzata Ostromecka: The Microstructure of Cast Iron and Its Evaluation during Microscopic Examination of Railway Products

Cast iron is one of the most widely used materials in mechanical engineering. This material is connected with the railways from the very beginning, as the first rails were made of iron. Currently, cast iron is mainly used in brake blocks, elements of locomotive engines, in weights that tighten the electric traction line, or in the anchors which are an element of fastening the rail to the

concrete sleeper. This is due to the relatively low cost of cast iron production, low melting point, good mechanical properties and relatively good machinability. The article describes the specifics of the material in the context of the structure of the material microstructure, the methodology of preparation and microscopic examinations and the evaluation of their results.

Keywords: cast iron, microscopic examination, sample preparation, graphite classification, visual analysis

Janusz Poliński: High-Speed Rail in China – Current Status and Development Prospects

This article presents the development of high-speed rail (HSR) in China. The length of the lines of the Chinese HSR network exceeds the volume of such lines in the rest of the world, which operate this means of transport. The article describes: the development of the HSR network in China, track infrastructure, slab track solutions, passenger rolling stock and passenger stations in terms of urban planning solutions with accompanying infrastructure. Attention was also paid to construction costs, research and business facilities, without which such rapid development of this mode of transport would not be possible in China. Knowledge in this field may help in the planned development of HSR in Poland, mainly connected with the Central Transport Hub.

Keywords: rail transport, high-speed rail, HSR in China

Łukasz Zawadka, Dominik Adamski: Functional Tests of Eurobalise Prototypes on the Test Track Centre of Railway Research Institute

The article presents functional tests of Eurobalise prototypes, which were carried out on Railway Research Institute Test Track Centre near Żmigród. Methodology of the research performed and the test schedule were characterized, on the basis of which the correctness of sending Eurobalise telegrams to the railway vehicle using the air gap was checked. The summary includes conclusions from the conducted research.

Keywords: conformity assessment, functional test, ETCS, eurobalise

RESEARCH INFORMATION

Włodzimierz Kruczek, Iwona Wróbel: Technical Standards for the Construction of the Railway Infrastructure of the Solidarity Transport Hub Developed at the Railway Research Institute

A contract for research and development services concerning technical standards for the railway component of the

Solidrity Transport Hub was signed in mid-2020 between the Centralny Port Komunikacyjny company and the Railway Research Institute. The information includes a description of the main stages of the project, as well as the characteristics of the design guidelines containing detailed technical conditions for the construction of the railway infrastructure, i.e. the accompanying investments ensuring that the future Central Transport Hub will be serviced and connected with other regions in Poland in the High-Speed Rail transport standard.

Keywords: technical standards, high-speed rail, rail infrastructure, systems and equipment, rolling stock

RECENT EVENTS

Janusz Poliński: Biometric Face Recognition – Approach in the World and Tests of the Face Pay System in the Moscow Metro

Biometric facial recognition is increasingly being used in public spaces. This technology, used around the world for providing security, is moving beyond this. However, this also raises justified concerns of invasion of privacy, resulting in legal restrictions to spread this method. Depending on the political system and the level of democracy, the method is developed without restrictions, with restrictions or even banned. Basic knowledge of the subject is needed to determine where Face Pay is used to pay for goods or services, as exemplified by the solution being introduced in the Moscow metro.

Keywords: intelligent video analysis, face image recognition and processing, Face Pay system, Moscow metro

Agata Pomykała: 1st International Workshop on High-Speed Rail Socioeconomic Impacts

The information synthetically describes the issues raised during the international scientific and technical conference on the social and economic aspects of high-speed rail (HSR), development conducted online by the International Union of Railways (UIC) and the University of Naples Federico II. In particular, the topics discussed at the conference related to the results of recent research, analysis and quantification of the effects of HSR investments on both the economy and society. The conference was actively attended by a representative of the Railway Research Institute, who presented the concept of the development of the HSR system in Poland.

Keywords: high speed railways, socio-economic aspects, scientific and technical conference, UIC

INFORMATION ON PUBLICATIONS

Andrzej Massel: Methods and Tools for Assessing the Use of Transport Infrastructure on the Example of Rail-

way Infrastructure Research of Central and Eastern European Countries in 1989–2019

The article characterizes a scientific monograph, published in December 2020 by the Scientific Publishing House of the Railway Research Institute, devoted to railway infrastructure in selected Central and Eastern European countries (Bulgaria, Czech Republic, Poland, Romania, Slovakia, Hungary). The publication proposes methods and tools that can be used to assess the use of transport infrastructure, including taxonomic methods and Data Envelopment Analysis (DEA). A new method of maximum speed use analysis is presented. New areas of application of many methods known from other scientific disciplines (e.g. economics, socio-economic geography, earth and environmental sciences) were indicated. A set of operating, demand and supply indicators for the study of railway infrastructure is defined. Similarities and differences in the condition of the railway infrastructure and the changes it underwent in the period 1989–2019 are shown. The way the railway infrastructure is used in the individual countries of Central and Eastern Europe shows the efficiency of the transport networks.

Keywords: railway infrastructure, research methods, railway authorities, European railways

Janusz Poliński: White Paper on Artificial Intelligence – a European Approach to Excellence and Trust

The information describes two documents signed by the European Commission on the use of artificial intelligence within the Union, i.e. the White Paper on Artificial Intelligence: a European approach to excellence and trust and the Report on the safety and liability implications of Artificial Intelligence, the Internet of Things and robotics. The documents propose necessary regulatory actions and initiatives related to the development of artificial intelligence as part of a digital strategy in innovation processes.

Keywords: artificial intelligence, innovation, EU legal regulations

Grzegorz Stencel: Monograph „Hazards in the Railroad Structure”

The presented monograph entitled “Hazards in the Railroad Structure” is a translation of the Polish version of the monograph published in 2017 entitled. “Hazards in The Track Superstructure”, the last book in the rich output of Professor Henryk Bałuch. It is a summary of sixty-five-year work related to railways. The publication contains practical knowledge concerning the railway superstructure, and in particular the recognition of hazards. As the author himself admitted, this knowledge also resulted from the experience of many closer and further co-workers, who willingly shared their thoughts

on the maintenance of the superstructure. The publication presents concepts and methods concerning risk assessment, classification and typology of defects in the railway superstructure with examples of formation of defects and damage defining the degrees of occurring hazards. The author also described methods of detection of hazards in the railway superstructure and their assessment, suggested ways of mitigation of hazards, including prevention of catastrophic hazards. He stressed the importance and the need to carry out research aimed at decreasing the occurring threats, presenting connections between various types of threats in the superstructure. The monograph is intended for people involved in transport safety issues, in particular railway engineers and technicians and academic teachers.

Keywords: railway superstructure, safety, hazards, risk

Iwona Wróbel: The Role of the Railway Research Institute's Test Track in Railway Rolling Stock and Infrastructure Research

The monograph contains the characteristics of the Railway Research Institute's test track loop in Żmigród and its use in

research of new technical and technological solutions for railway transport. The genesis of the research infrastructure and track parameters, as well as the equipment and potential of the test Track Centre of the Railway Research Institute for the purpose of testing railway infrastructure, rolling stock and electrical and command-control and signalling systems are described. Foreign (worldwide and European) research track infrastructure and planned investments for the implementation of innovative solutions are presented. The research potential of the test track in the field of railway vehicles, elements of railway infrastructure, traction network, systems and signalling devices is presented, as well as the scope and number of tests carried out in a quarter of a century of the Centre's operation. In the final part, plans for development of the research potential of the Żmigród Test Track for the needs of future priority research directions in the railway transport are presented.

Keywords: test track, rolling stock tests, railway infrastructure tests