

1. Review of Research and Challenges Concerning Rolling Stock

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pages: 93-109

Summary. Since the mid-20th century, there has been a continuous increase in societal demand for both passenger and freight transport. One of the transport modes undergoing constant development is rail transport. The advancement of rail systems, the need for their optimisation, and the requirement to ensure the highest level of safety have driven the ongoing modernisation of research methodologies. Since its inception, the Railway Research Institute has conducted extensive research on rolling stock. This article presents a review of the fundamental research methods implemented by the Rolling Stock Testing Laboratory. It discusses the procedures for conducting dynamic testing of vehicles, brake testing, derailment safety testing on twisted track, noise testing, and strength testing.

Keywords: rail vehicles, rail vehicle testing, vehicle dynamic testing, brake testing, safety testing, noise testing, endurance testing

2. Application of Point-Based Characteristics of Vibration Signals in the Detection of Railway Rail Damage

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pages: 111-121

Summary. This study investigates the application of vibration signal characteristics for the detection of railway track damage. The analysis focuses on vibrations generated by the bogie system during traversal of track sections under two distinct technical conditions. A comprehensive review of rail infrastructure and maintenance methodologies is provided, emphasizing the use of advanced diagnostic tools by track maintenance organizations. The research employs a point-based analysis of dimensional and dimensionless features of vibration signals. The results confirm the effectiveness of utilizing vibration signals recorded from a moving vehicle to identify track damage that may cause decrease of vehicle's exploitation period.

Keywords: vibroacoustic, railway traction, statistical analysis, dimensionless analysis, railway damage

3. Professor Albert Czeczott – the Founder of the Experimental Division

Andrzej Massel

pages: 123-131

Summary. The year 2024 marked the 100th anniversary of the establishment of the Experimental Division at the Ministry of Railways. The unit quickly gained an international recognition and it developed characteristics of 26 steam locomotives by 1938.

The continuator and heir to the tradition of the Experimental Division is the Railway Research Institute. The creator and long-term manager of the Division was dr inż. Albert Czczott (1873–1955), educated at the St. Petersburg Institute of Communication Engineers, an outstanding railway engineer, designer and researcher. Professor Czczott was the author of many methods for testing rail vehicles, which found application not only in Poland but also abroad. Dynamometer cars used in Poland were built according to his designs; he was also the originator of the idea of using steam locomotives-compressors.

Keywords: research, rolling stock, steam locomotive, measuring wagon, Experimental Division (Referat Doświadczalny), traction characteristics

4. Evolution of Turnout Technology and Construction Based on the “Album of Turnouts for S-type Rails With Spring Blades” from 1947

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pages: 133-139

Summary. Railway turnouts are the elements of the railway superstructure that have evolved the most in terms of design over the years. This has been influenced by the increasing speed of railway vehicles, automation and safety. Tests of that devices have been ongoing and will continue to varying degrees. They have led primarily to the standardisation of the design. The article refers to selected details of 1:9 and 1:10 turnouts based on the “Album of turnouts for S-type rails with spring blades” published in 1947, owned by the authors. The details of the various structural elements presented in the album are drawn at a scale of 1:1.

Keywords: railway turnout, technical documentation, railway turnout operation

5. Security Regarding Storage and Processing of Data, which are Relevant for Railway Transport Operation, in Case of Using Cloud Services

Marek Pawlik

pages: 141-160

Summary. There is no doubt that safety is one of the key prerogatives of the railway transport. This prerogative has gained presently a new dimension as a result of growing use of cloud services to support railway transport. The article therefore begins with defining and describing railway transport safety and cloud services, and then broadly describes railway security in the context of the use of cloud services.

Keywords: security, cloud services, data processing, railway transport

6. Scientific conference on 100th Anniversary of Railway Research and Development in Poland

Leszek Rafalski, Marek Pawlik, Renata Barcikowska

Pages: 161-166

Summary. On 26–27 February 2025, on the occasion of 100th anniversary of railway research and development in Poland, the Railway Institute organised open lectures and a scientific conference. On 26 February 2025, at the Warsaw Railway Museum (Stacja Muzeum), experts from the Institute held a series of lectures. The lectures covered the history and tradition of railway research in Poland, as well as contemporary research directions and future challenges in the field of railway transport. On

27 February 2025, a scientific conference organised by the Railway Institute on the occasion of the 100th anniversary of railway research and development in Poland was held at the Sheraton Grand Warsaw hotel.

Keywords: scientific conference, railway research, Railway Research Institute (IK)