

Renata Barcikowska: **Selected Sources for Financing Research Based on the Railway Research Institute's Activity: a Case Study**

The problem of financing research in Poland is a multifaceted, complex, and still current topic. This article attempts to approach the issue from the perspective of institutions benefiting from the funds allocated for research and development, such as the Railway Research Institute. The research methods used in the article are the analysis of source materials and a case study.

Keywords: research institutes, research funds, projects, research and development

Marek Pawlik, Wojciech Rzepka: **Railway Transport Products Conformity Proving Principles Applied on the European Market and in Poland, Survey Over Sources of the Requirements and Overview of the Railway Research Institute Formal Authorisations**

The paper starts with a presentation of the conformity proving principles, which are utilized all over the European Union as a basis for the common market. Then, it shows how these principles are being applied in the case of railway transport, taking into account European and national requirements. It describes European requirements applicable before and after implementation of the fourth railway package. It also shows different complementary requirements. The paper ends with a short overview of the Railway Research Institute test capabilities and formal authorisations.

Keywords: conformity proving, railway transport, interoperability, safety

Waldemar Szulc, Marek Fiedziuk: **Research Capabilities and Significance of a Test Track for Railways**

The article presents the reason behind the creation of a testing plot, its tasks and research capabilities as well as the significance of the test track for railways. The track system and structures are described in terms of testing.

Keywords: research, railways, infrastructure

Ireneusz Mikłaszewicz, Jakub Siwiec: **Testing Internal Mechanical Stresses in Flash-butt Welded Rail Joints**

The paper presents the results of internal stress tests in rails and flash-butt welded rail joints. Stress patterns were tested in rail joints just after flash-butt welding, as well as after fatigue tests. Stress tests were performed using the destructive strain gauges based test method. Stresses emerging in rails and in rail joints were compared for the steel grades R260 and R350HT. Stress measurements were performed in accordance with the requirements of PN EN 13674 1:2011+A1:2017.

Keywords: mechanical stress, rail joints, strain gauges, fatigue test

Rostyslav Domin, Yurii Domin, Ganna Cherniak: Estimation of Stability of Railway Flat Cars with Various Types of Running Gear Against Derailment

Issue related to ensuring safety of technical operation of flat cars for high speed containerized transportation by way of using new types of running gear is considered in the paper. Because of principal drawbacks of widely used bogies of freight cars possible use of axle box suspension bogies is considered for the equipment of high speed flat cars. Taking into consideration highly efficient application of mathematic simulation for the determination of dynamic performance of railway cars appropriate computer models were developed for the estimation of the conditions related to ensuring safe motion of flat cars. It was revealed as result of the simulation that in case of stability of wheelsets against derailment condition of safe operation of a flat car equipped with axle box suspension bogies is satisfied at travel speeds up to and including 150 km/h whereas safe travel of a flat car equipped with conventional bogies is ensured at travel speeds up to but 100 km/h. This conclusion gives bases to recommend equipment of flat cars for high speed containerized transportation with axle box suspension running gear.

Keywords: containerized transportation, flat cars, dynamics of movement, computer simulation, safety of high speed traffic

Władysław Koc: Transition Curves on Railway Roads in Terms of Feasibility

The work first addressed the issue of accepting limit values for kinematic parameters on railway roads, demonstrating that it is appropriate to maintain the same rules for all types of transition curves. Then, the prevailing opinion about the reason for the limited scope of application of the so-called smooth transition curves was confirmed. These curves have one major disadvantage – very small values of horizontal ordinates (and ordinates of the gradient due to cant) in the initial region, in practice often impossible to implement and then maintain. The main part of the work was devoted to the determination of a new form of transition curve, which – in contrast to the commonly used clothoid – is characterized by a gentle curvature in the area of entry into the circular arc. A clear advantage of this curve (from the implementation point of view) over the smooth transition curves of the Bloss curve was demonstrated.

Keywords: railway, timetable, schedule, conductor teams

Andrzej Wolff, Jacek Kukulski: Numerical and Experimental Analysis of the Heat Transfer Process in a Railway Disc Brake

Whether railway brakes are effective or not substantially depends on the thermal condition of the disc brake and friction linings. An effective research method of the heat transfer in brakes is computer simulation as well as experimental testing on a full-size dynamometric test bench. A 2-dimensional, axisymmetric numerical model of transient heat conduction in the railway brake is presented. Relevant boundary conditions concerning heat generated in the brake and dissipated to the environment are used. The problem is solved with the use of the finite element method. The experimental test and simulation results related to intensive braking of the train from 320 km/h to a halt are preliminary compared. The approximate values of maximum temperatures at the end of braking are obtained – ca. 500°C with a certain divergence of temperature profiles during the process under consideration. It is advisable to further develop research concerning this problem.

Keywords: dynamometric test bench, heat transfer in brakes, simulation investigations

Roksana Licow, Franciszek Tomaszewski: Identifying Rail Running Surface Defects by Means of Vibroacoustic Signals

The article presents the concept of a method to identify the most common defects occurring on the rail running surface using vibroacoustic signals. The article provides a description of rail defects, such as: squat, running surface defect and wheelburns. It covers the methodology adopted in the conducted research and the results of analyses of recorded signals for the technical–operating conditions occurring on railway lines no. 213 Reda – Hel and no. 131 Chorzów Batory – Tczew. The presented results of vibration and noise measurements concern recorded signals for defective track sections and for control track sections. The conducted synthesis of research findings proves the legitimacy of developing a method involving the use of vibration signals for the purpose of diagnosing the rail running surface, and indicates an opportunity to take advantage of vibroacoustic signals to evaluate the condition of other elements of track superstructure.

Keywords: vibroacoustics, vibration signals, rail defects