Kamil Hajduk: **Low Noise Barriers – New Perspectives For Noise Protection in Railway Transport** (Niskie ekrany – skuteczna ochrona przed hałasem w transporcie kolejowym)

Noise is a harmful phenomenon, polluting the environment and negatively affecting the health of people ex-posed to high noise levels. The main source of railway noise is rolling noise, which affects all types of trains. In Poland, the main way to reduce railway noise is the construction of high noise barriers that degrade the land-scape, require wider railway embankments and obscures views of train passengers, while there are many other ways of limiting it. The most interesting solution, which is developed in Europe are low acoustic barriers. They have a number of advantages and comply with Polish regulations.

Keywords: noise, railway, noise barriers, the investment process, innovation, start-up, research and development, ecology

Władysław Koc, Cezary Specht, Piotr Chrostowski, Katarzyna Palikowska: **Universal Design Method of the Track Axis Adjustment with the Use of the Satellite Measurements and Optimization** (Uniwersalna metoda projektowania regulacji osi toru z wykorzystaniem pomiarów satelitarnych i optymalizacji)

In the article the limitations of applied in our country track axis adjustment methodology related mostly with the accuracy in determination of the existing track shape has been discussed. As an alternative, the authors indicate the innovative method developed by an interdisciplinary scientific team (Gdansk University of Technology and Polish Naval Academy / Maritime University in Gdynia) which has been developing since 2009. The essence of that method is the technique of mobile satellite measurements. The mentioned measurement technique was an inspiration for developing new analytical methods of design of geometric layouts and formulating principles for modern method of the axis adjustment design. In the analytical designing method the individual elements of the geometric layout are defined in the form of mathematical equations. These equations implemented in the computer program allows for generating subsequent variations of the route without any restrictions for the number of these variants. Calculating of the geometric parameters of the investigated layout occurs in the optimization process by the use of Particle Swarm Optimization PSO and Genetic Algorithm. Since the process has a multi-criteria character, the proper establishment of weights of each criterion is required. The main criteria used in the study are: minimizing lateral movements of the track and maximizing the speed of trains.

Keywords: railway track, geometric layout, satellite measurements, design, optimizing of variant choice, computer aided design

Paweł Komorski, Bartosz Czechyra, Tomasz Nowakowski: **Possibility Simplify the Procedure of Tram Noise Monitoring from Viewpoint of Automation Analytical Process** (Możliwości uproszczenia procedury monitorowania hałasu tramwajowego z punktu widzenia automatyzacji procesu analitycznego)

The article presents the results of analysis carried out for automatization of analytical procedures for tram noise monitoring. The primary analytical procedures were developed based on the ISO 3095:2005 standard. However, it was decided to develop own research methodology. Due to, that fulfillment of all the requirements in strict urban area is impossible.

The analysis of sensitivity symptom to different averaging data condition changes is presented in the comparative study. Also the possibility of its application in the vibroacoustic monitoring system of trams is proposed. There are the two main aims of the study. Firstly, checking the extent to which, the time before and after the passage of the vehicle through the measurement point, has an impact on the calculation of the exposure sound level A (SEL), on selected tram. Secondly, ensure if obtained characteristics can be considered as own, assigned to the type of vehicle. The study presents a part of research carried out in the Department of Rail Vehicles of University of Technology in Poznan, in terms of comprehensive description of the interaction of light rail vehicle – track in a highly urbanized environment. In this range, the crucial becomes an analysis of vibroacoustic activity of the tram, which is presented here.
Keywords: tram, acoustic measurements, noise monitoring system, rail vehicles

Michał Migdal: **Synthetic Track Twist Index** (Syntetyczny wskaźnik oceny wichrowatości toru)

The article outlines the assessment of t rack twist by using the synthetic track twist index and possible pros and cons its applications by infrastructure manager. Description of index was preceded by analysis current requirements for the track twist evaluation, which is one of the most important factors affecting the safety against derailment.
Keywords: twist, diagnostics of the track, track geometry quality, measurement vehicles

Ireneusz Mikłaszewicz, Dariusz Kowalczyk, Jacek Boruciński: **Effect of Production Process on the Quality of the Rim Rail** (Wpływ procesu produkcji na jakość obręczy kolejowych)

We analyzed the technological process of the production of railway tyres wheel sets of freight cars, as well as materials research conducted impact of the cooling process aft er rolling the tyres in the bottom of the refrigerant, and in the still air in the production hall. Th e study was conducted based on the requirements contained in the UIC 810-1: 2003 [4], PN-84 / H-84027/06 [6]. Also made possible the calculation of stresses in the tyres of existing finite element FEM. It concluded that the production process used for the good quality of railway tyres cooling and the proposed adjustment does not affect the quality of the finished product.
Keywords: tyres, tyres production, cool manner

Mirosław Jan Nowakowski: **Influence of Changes in Allowable Values of Geometric and Kinematic Parameters on Modernization Flexibility of Track Layouts** (Wpływ zmian dopuszczalnych wartości parametrów geometrycznych i kinematycznych na podatność modernizacyjną układów torowych)

Adaptability of a given railway line section to change of service speed is known as its modernization flexibility. Any speed increase potential stems from a combination of existing geometrical layout plan, space constraints and limit values of geometric and kinematic parameters. Changes of these limits directly influence calculations of vital geometric track characteristics: minimal radius, cant and transition curve length (of gradient due to cant).
In recent years, geometric and kinematic limit values were defined in PN-EN 13803–1:2010 norm and updated in an ordinance published in Dziennik Ustaw 2014 pos. 867 and in Id-1

Technical Conditions. It was revealed that in context of single curves, changes in regulations offer less gains than expected. This is because of decreased limit value of acceleration change. For given section, the deciding factor for shortening travel time is localization of curves with no modernization flexibility. For track connections, changes in limit values of accelerations usually do not effect in increased travel speed, because of constraints imposed by railway signalization and required width of space between running tracks.

Keywords: flexibility of modernization, track geometry, kinematic parameters

Łukasz Pasieczyński, Norbert Radek: **Application of the Anti-graffiti Coating System for Rail Vehicles and Testing of its Selected Properties** (Badanie wybranych właściwości systemu powłokowego „antygraffiti" dla pojazdów szynowych)

The article presents and discusses the maintenance problems of rolling stock. Paper highlights the widespread act of vandalism in the form of graffiti painting on trains. The article presents solution to remove graffiti: their advantages and disadvantages. The paper presents results of laboratory tests of anti-graffiti coating system. The article presents tests results in accordance with standards and internal laboratory procedures. The paint system properties were examined after the conditioning period.

Keywords: graffiti removing, antigraffiti coatings, mechanical properties of coating, railway industry

Wojciech Sawczuk: **Selected Issues Operation of Modern Brake Systems of Railway Vehicles** (Wybrane zagadnienia eksploatacji układów hamulcowych współczesnych pojazdów szynowych)

Disc brakes, because of numerous advantages in comparison to a traditional air block brake, are more and more often utilized in passenger carriages and other railway vehicles. Stable and constant (in the whole speed range) coefficient of friction μ, of amount: μ=0,35 is a basic advantage of disc brake systems [9]. Long exploitation of disc brake systems, excluding wear of the friction pads showed that with braking at a very high speed or braking in short time periods, faster wear of friction surface occurs. Micro heat cracks appear on the disc surface, which enlarge radially at consecutive brakings.

Keywords: brake disc, exploitation, wear

Mirosław Siergiejczyk, Jerzy Chmiel, Adam Rosiński: **Modeling the Level of Security Three Generic Peripheral Protection Systems on the Example of Rail Objects** (Modelowanie poziomu bezpieczeństwa trójrodzajowych systemów ochrony peryferyjnej na przykładzie obiektów kolejowych)

The primary purpose of using peripheral protection systems of railway objects is to increase the level of security. Because the transport system is classified into the critical infrastructure, it requires special protection. Therefore, the authors analyzed the tri-generic peripheral protection system. To accomplish it there is analyzed process crossing the border of the protected area by unauthorized persons. This has enabled the graphically presentation of

occurrence of the situations, as the relations in the system of the periphery protection. Then the system of peripheral protecting is described by the set of equations Kolmogorov-Chapman equations. As a result, it is possible to estimate the numerical level of security of the applied solutions of peripheral protection systems.

Keywords: security, modeling, peripheral protection

Grzegorz Stencel: **Evaluation of Running Surface of Rails by Measuring Corrugation** (Ocena powierzchni tocznej szyn na podstawie pomiarów falistości)

The article outlines the basic defects in the running surface of rails. Classification was based on the experience of railways in Poland and other European railways. Measurement techniques and the observation surface of the rails were characterized. Examples of measurement results were presented. On the basis of the presented measurements of corrugation analyzes the possibilities of using the results to assess the running surface.

Keywords: rail corrugation, running surface defects in rails, rail measurements

Andrzej Wolfenburg: **Synthesis of Electronic Axle Counter Direction Detector** (Synteza detektora kierunku do elektronicznego licznika osi)

In the paper the full formal synthesis of direction detection unit to the electronic axle counter has been presented. All the possible axle movements over the detection point heads were considered. Only NOR and NAND elements were utilized, as they are more resistant against interferences. The correct graph of states for the automata was shown. Some notices regarding constriction of this unit using a microprocessor were given as well as a simulation program for such a solution has been mentioned.

Keywords: axle counter, direction detection unit synthesis, anticoincidence pulses unit

Małgorzata Zubielewicz, Grażyna Kamińska-Bach, Agnieszka Królikowska: **Test Methods of Coating Systems for Long-term Corrosion Protection** (Metody badań systemów powłokowych do długoletniej ochrony przed korozją)

The test methods for the selection of suitable coatings for corrosion protection are discussed. Taking into ac-count the methods comprising corrosion resistance to individual corrosives, such as salt spray and humidity, as well as the methods including cyclic conditions, for example: salt spray / wet / dry / UV / low temperature. Modern anticorrosive coating systems should be subjected to long-term laboratory tests under the influence of various factors affecting their durability. The results of these studies will allow to choose optimal protective systems for long-term corrosion protection.

Keywords: anticorrosive coatings, protective properties, test methods