

*Michał Batko, Jarosław Konieczny, Anna Butor:* **Risk Assessment of Using a Contactless Method for Railway Surface Inspection as Alternative for Staff Inspection of Infrastructure**

Railway infrastructure managers are obliged to check technical condition of infrastructure in order to maintain safe traffic. Usually this is done using conventional methods and tools or directly through the inspections made by the technical staff. Technological development which is currently being experienced indicates the availability of new measurement methods that can be used to monitor the condition of railway infrastructure. However, the introduction of new methods for monitoring the infrastructure is usually a change affecting safety, which requires an assessment of the significance of the change for the maintenance of the required level of railway traffic safety. The authors assessed the significance of the change in the method of infrastructure monitoring and related risk assessment as a result of the use of the contactless method of checking the railway surface as an alternative method to staff inspections. Additional control measures or preventive measures for potential threats have also been indicated.

Keywords: staff inspection, infrastructure monitoring, UAV

*Marcin Garbacz:* **Estimating the Uncertainty of the Result for Tests of Resistance to Environmental Conditions on the Example of the Method of Resistance to Neutral Salt Mist According to EN ISO 9227 / ASTM B117**

Environmental laboratory tests are one of the most frequently performed tests to evaluate materials used, among others, for the construction of rail vehicles. The requirements of the EN ISO/IEC 17025 standard for research laboratories, particularly when evaluating the compliance of materials with the specified requirements, impose on laboratories the need to consider the results of final measurements along with the uncertainties of these results. Due to the complexity of the physical and chemical processes occurring during environmental tests, determining the sources of uncertainty of the measurement result can be very complicated. The article presents one of the methods of estimating the complex uncertainty for environmental tests on the example of corrosion tests using the NORDTEST TR 537 concept of uncertainty estimation. The article presents an exemplary method of uncertainty estimation based on a set of empirical data obtained in an accredited Laboratory for Testing Materials and Structural Elements of the Railway Institute with the use of within-laboratory reproducibility and method bias. Examples of uncertainty estimation depending on the type of tested objects (metal details and paint coatings) and the method of their evaluation after corrosion tests (quantitative and qualitative methods) are presented. The article also briefly presents the possibilities of interpreting and processing the obtained data as part of the control carried out inside the laboratory on the basis of a simple statistical tool such as Shewhart control charts and the Ishikawa diagram for the method of determining corrosivity in salt chambers, identifying important factors influencing the measurement uncertainty and at the same time showing the complexity the entire research process.

Keywords: neutral salt spray, control charts, within-laboratory reproducibility, inter-laboratory reproducibility, bias, metal workpieces, paint coatings

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***Marek Graff: Modern infrastructure and rolling stock solutions in the agglomeration rail transport on the example of the Line 2 of the Warsaw Metro***

The extension of the second line of the Warsaw Metro (M2), running from east to west, is currently under construction. The opening of sections in the eastern and western parts of the line has been carried out in 4 stages, successively handing over sections of 2–3 stations each. The section currently under construction is the last section of the 2nd line in the south western part, which also includes the construction of the Karolin technical and holding station (STP Karolin). The Varsovia trains delivered by Škoda, whose styling is similar to the Inspiro trains from Siemens, which have been in service on the Warsaw metro for several years, have been acquired for the rolling stock of the line. The construction of the metro was disrupted by the SARS-Cov-2 coronavirus pandemic (2020–2022) as, alongside a delay in the completion date or the delivery of rolling stock, it caused an increase in the price of materials and labor costs, forcing the parties (City Hall of Warsaw, contractors) to revalue the contract

Keywords: metro, Warsaw, second line, Škoda

***Małgorzata Ostromecka: Ionising Radiation in Non-destructive Testing, Part 1  
Types of Radiation used for Radiographic Testing – Basic Properties and Mechanism of Image Recording***

Electromagnetic radiation, which is a special example of the electromagnetic field, has been present in the universe since its creation. Examples of radiation include radio waves, X-rays, and visible light. Depending on the frequency of the emitted electromagnetic wave, it can be ionising or non-ionising. Ionising radiation, due to its ability to penetrate matter, is often used in many areas of life. In industry, it is used for diagnostic purposes, e.g. in radiography.

Keywords: ionising radiation, non-destructive testing, industrial radiography

***Iwona Wróbel, Bogusław Bartosik, Piotr Gondek, Beata Piwowar: Transport Solutions and Indicators in Smart Cities – Part I***

The subject of the article is the analysis of solutions and applications of modern information and communication technologies (ICT) in urban centers and the measurement of transport quality indicators, taking into account the requirements of the ISO 37120 standard:

Sustainable cities and communities – indicators for city services and quality of life.

The article consists of two parts. In part I of the article, the subject of smart cities was introduced, including the functioning concepts of smart city. A description of the shaping of urban spaces and the quality of life in the smart aspect was made, taking into account the issues of sustainable development. The characteristics of the ISO 37120 standard, used to measure the level of services and living conditions in cities, are presented. The basic and auxiliary indicators in the field of city services and quality of life, including those related to transport, were presented. Polish cities that received the smart city certificate were listed. At the end of part I, there was a review of experiences and solutions that improve mobility that operate in selected cities around the world and in Europe.

Keywords: smart cities, quality of city services, ISO 37120 standard, urban transport, quality indicators in transport