IK RAILWAY RESEARCH INSTITUTE (IK)

Advanced Rail Technologies

# NEWSLETTER

*October, November, December 2019*, No. 19

ISSN 2449-6049

IN THIS ISSUE



## *Editor's*

**Marek Pawlik** – *Deputy Director for Railway Interoperability, Railway Research Institute*

Member States of the EU are closing the implementation of the fourth railway package. The deadline is quickly approaching as it has been pointed for implementation into national law not later than 16 June 2020. Nearly two thirds of the Member States are still working pointing to significant difficulties regarding the implementation of the **EU Railway Safety Directive** (2016/798) and **EU Railway Interoperability Directive** (2016/797), which are establishing safety as one of the essential requirements. They are, however, legally pointed only as the recasts of the previously binding and already implemented directives. The real challenge regarding safety for the railway systems, which is new and needs to be implemented in everyday practice is associated with another directive also established in 2016 by the same European Parliament – “Directive (EU) 2016/1148 of the European Parliament and of the Council of 6 July 2016 concerning measures for a high common level of security of network and information systems across the Union” – **EU Cybersecurity Directive**.

The Cybersecurity Directive is applicable not only for banking and financial systems, but also for energy and water facilities as well as health sector as well as for transport with subdivision into air, rail, water and road transport. Cybersecurity Directive, regarding rail transport, refers to infrastructure managers and railway undertakings as the potential operators of the essential services. **PKP Polish Railway Lines as well as some passenger and freight rail transport service providers are already pointed as operators of the essential services, and have to identify and secure cyber-risks not only for them, but also for their clients and for the society**.

All over Europe railway companies have to establish cooperation with national Computer Security Incident Response Teams (CSIRTs) which are due to generate, receive and utilize notifications of cybersecurity related incidents. It is important to know that for such incidents borders between countries and between technical branches nearly do not exist. Moreover the scope of technical solutions which may be affected is not limited to information technologies (IT), as transport similarly do other technical branches widely utilizes programmable and electronic equipment for operational technologies (OT), for instance: controllers, diagnostic equipment, intruder and fire detection systems. As both IT and OT systems utilized by railway companies, which may be affected by cybercrime, have to be identified, analysed and protected. The Railway Research Institute has established cooperation with NASK national research institute, supervised by the Ministry of Digital Affairs, and legally appointed in Poland as the CSIRT for all civil technical branches, which are pointed by the directive as the ones vulnerable to cyber-attacks.

EU Cybersecurity Directive is not a recast. Moreover cybercrime is a relatively new challenge for railway companies which started utilizing electronic and programmable solutions assuming using closed communication systems and now face challenges associated with quick evolution of electronic and communication systems and technologies. Long life cycles of railway technical solutions have always been supporting safety e.g. regarding construction durability, but it is a challenge in case of IT and especially in case of OT due to changes in surrounding technical environment. The Railway Research Institute has decided to pick up the gauntlet and support infrastructure managers and rail transport service providers especially in identification of cyber-risks as well as defining and implementing appropriate cyber-measures.

*mpawlik@ikolej.pl*

## Conference „Modern Technologies and Management Systems for Rail Transport 2019”

The 18th Polish National Scientific and Technical Conference „Modern Technologies and Management Systems for Rail Transport 2019”, organized by the Polish Association of Engineers and Technicians of Transportation, Department in Kraków, was held in Zakopane on 4–6 December 2019. The topic of the Conference covered modern technologies in the design, construction, maintenance, diagnostics and operation of rail infrastructure and rolling stock for transporting people and goods. The conference gathered over 600 participants, including such important persons as the President of the Office of Rail Transport, presidents of railway managerial boards, representatives of scientific and research institutions.
Sixty-four speeches were made, including scientific, technical and research presentations. The Directors and employees of the Railway Research Institutes also contributed to the presentations, i.e.:


Photo: www.sitk.org.pl

– Andrzej Massel, Deputy Director for Research Studies and Projects: “Railways of Central and Eastern Europe – 30 Years after Transformation”
– Marek Pawlik, Deputy Director for Railway Interoperability: “Challenges to Implement the 4th Railway Package into National Law and Practice” as well as “Systemic Evaluation of Rail Safety – Methodology of the Assessment for Transport Systems”
– Jan Raczyński: “Technical and Operational Opportunities to Employ High-Speed Lines for Freight Transport”
– Magdalena Kycko, Paweł Gradowski: “Modernisation of Railway Control-Command and Signalling Devices in Areas for which the ‘EC’ Verification Is Issued for the Control-Command and Signalling Subsystem”
– Jerzy Cejmer, Adam Dąbrowski, Krzysztof Ochociński: “Tests of Gravel Ballast Stabilisation with the Use of Binding Resin on the Railway Research Institute’s Test Track in Żmigród and PKP Polish Railway Lines’ Tracks”
– Grzegorz Stencel: „Operational Conditions Related to Rails Maintenance”
– Przemysław Brona, Robert Kruk, Beata Piwowar: “The Concept of Connecting Vysehrad Group Countries with a New High-Speed Line Services”
– Iwona Karasiewicz: “The Role and Importance of Human Factor in Railway Incidents Analysis.”

## Elections for the new term of office of the International Rail Research Board (IRRB) UIC

On December 31, 2019, the term of office of the IRRB UIC chairmanship expired. IRRB is one of the UIC bodies, whose task is to support railways and research units in the field of research and innovation in rail transport at the global level, including fostering the scientific community in identifying research issues aiming at the best use of research potential and innovation.
The results of the new elections were announced at the UIC General Assembly meeting on December 11 in Paris. Director of the Railway Research Institute, Dr. Eng. Andrzej Żurkowski was re-elected as the Vice Chairman of the IRRB (term 2020–2022).

The Railway Research Institute attaches great importance to work in the international area. We are pleased to be able to effectively support the work of UIC in the field of research and innovation.


## 6th Congress for Transport Development

The 6th Congress for Transport Development under the motto “Infrastructure as a Foundation of Polish Economy Development” was held in Wieliczka on 19–20 November 2019.
On the first day of the congress, the participants had an opportunity within a study trip to get acquainted with PKP Polish Railway Lines’ investments i.e. construction of passenger train stop Bronowice, reconstruction of a viaduct over Grzegórzecka street in Cracow as well as building passenger train stops Kraków Zabłocie and Kraków Podgórze.


Photo: www.klasterluxtorpeda.pl

Discussions and exchange of opinions took place on the second day within 7 thematic panels:
– Infrastructure as a foundation of Polish economy development,
– What after 2020? Thus a new EU perspective,
– Strategy of ITC development for railway,
– National system of logistic support – Poland as a leader of the region,
– Rolling stock in the Accessibility Plus Programme,
– Electromobility and eco-friendly solutions in transport,
– Employee needed immediately.

Andrzej Massel, Deputy Director for Research Studies and Projects representing the Railway Research Institute was invited to participate in the Rolling Stock in the Accessibility Plus Programme panel. He raised the problem of the necessity to prepare rolling stock adjusted to infrastructure requirements and at the same time ensuring accessibility to all groups of travellers.

Agata Pomykała and Jan Raczyński from the Railway Research Institute also participated in the congress.

# Tests of Rolling Stock Adaptation to the Requirements of Persons with Reduced Mobility Needs

**Marceli Lalik**
*Senior Engineering and Technical Specialist, Rail Vehicles Department, Railway Research Institute*

Technical Specifications for Interoperability (TSI) relating to providing access to railways for persons with reduced mobility (PRM) have been in place for over 10 years. In 2014, PRM requirements in TSIs were updated and in 2017 European standards set in series of EN 16584, EN 16585, EN 16586 standards were released.
Early verification of project documentation is an essential factor in the process of carrying out tests correctly. Basing on this verification, interdependent PRM requirements can be assessed, for instance, clear visibility of information presented on internal displays for seated passengers.

**Doors and boarding aids**
Vehicle tests and assessment on the vehicle – platform contact point are carried out, among others, in order to check the position of the vehicle floor and steps towards the platform edge, the height of handrails against the first boarding step of the vehicle, the height of door opening devices against the platform or the use of onboard boarding aids. Consequently the requirements of EN 16585-2, EN 16586-1 and EN 16586-2 standards have to be taken into account, whereas the vehicle assessment due to the analysis of, first of all, dimension interdependencies is essentially based on the project documentation.

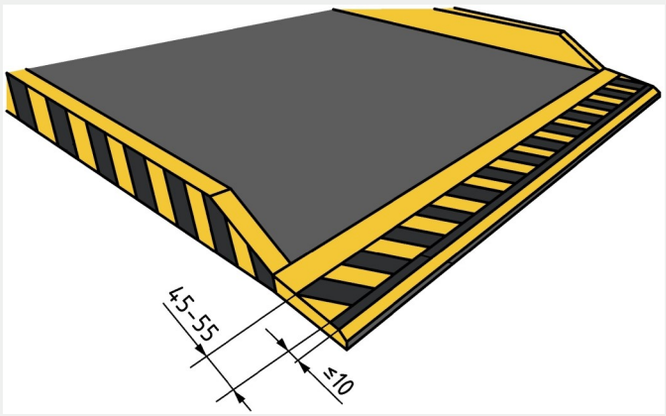


*Fig. 1. Example of use of contrast on boarding aid*

**Wheelchair spaces and priority seats**
EN 16585-2 standard defines, among others, obstacle free access routes for wheelchairs and priority seats. The wheelchair space is checked in three dimensions: minimum height measured from the floor, minimum width and length, verified against the backrest structure of the wheelchair. The measurement of the distance from the wheelchair space to the call for aid devices which have to be placed at wheelchair spaces poses a challenge.
Measuring the clear space around priority seats refers to the width of the seat, its height from the floor, minimum distance in front of seat and minimum height over the priority seat.

**Universal toilet**
A universal toilet (UNI) is a toilet designed to be used by all passengers including all categories of PRM. The tests and assessment of the UNI toilet is based on EN 16585-1 standard. The space inside the toilet compartment to enable a wheelchair as defined to be maneuvered to a position adjacent to and in front of the toilet seat is essentially based on the project documentation. The toilet is tested in reference to the proper horizontal handrails on each side of the toilet seat, call for aid device, height of opening and closing door elements, the toilet access door minimum clear useable width, accessibility and marking of control devices. If a baby-nappy changing table is fitted in the universal toilet, then its position from the floor, its design to prevent a baby from inadvertently sliding off, ability to take a minimum weight of 80 Kg are checked.


*Fig. 2. Universal toilet*

**Actuation forces**
Vehicle accessibility for persons with reduced mobility requires limiting forces used in order to activate or use a specific element of the vehicle equipment. The magnitude of these forces depend on the place where they are used and during measurements they should not exceed 15 [N] in case of the door control devices, 20 [N] in case of manually operated door control devices and other control devices inside the toilet compartment, 25 [N] for the baby-change table to put it into the stowed position, 30 [N] in case of activating call for aid device and 60 [N] in case of interior manual doors.

**Contrast**
Many elements and areas in the vehicle, such as: handholds, handrails, door controls (in the form of pushbuttons, handles, door handles), call for aid device, visual information, outside color of the entrance door, color of the floor next to the entrance door, edges of the steps, elements of boarding aids, control elements, as well as the toilet seat and lid must contrast with the surrounding surface. Test conditions and contrast assessment are contained in EN 16584-1. For example, for known, predetermined and generally available light reflectance values (LRV), Annex A to the standard specifies how to assess the contrast of a specific element against the surrounding surface.

mlalik@ikolej.pl

# Role and Importance of Human Factor in Analysis of Railway Events

**Iwona Karasiewicz**
*Quality and Certification Center, Safety Assessment Coordinator, Railway Research Institute*

One of the main tasks imposed on infrastructure managers and rail operators in connection with the implementation of the Railway Safety Directive [1] was their assumption of responsibility for the safety of the railway system. These entities were obliged to implement safety management systems built on the basis of a number of elements, which may include, among others, a requirement to develop procedures to ensure that accidents, incidents, near misses and other hazardous occurrences are reported, investigated and analyzed, and that necessary preventive measures are taken.
In order to present railway events as an important element of the railway system functioning, Figure 1 presents the scale of railway events that took place on the Polish railway network in 2007–2018.

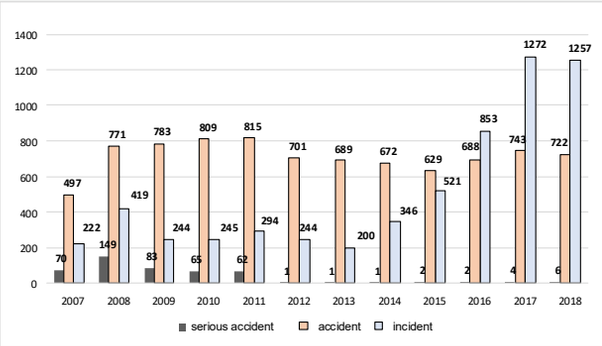


*Fig. 1. Railway events in 2007-2018*
*Source: The author's own study based on [3]*

Each of these events has consequences which may include:
– losses in infrastructure and rolling stock,
– train delays,
– fatalities and seriously injured people (data presented in Figure 2).

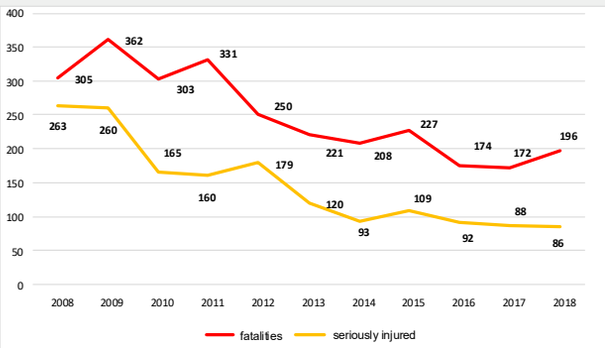


*Fig. 2. Victims of railway events in 2008-2018*
*Source: The author's own study based on [3]*

Any irregularities in the proper performance of each of the elements of the event analysis process presented in Figure 3 may contribute to determining the wrong causes of events, and thus developing inadequate or incorrect preventive measures. The correctness of the above activities depends on the qualifications of employees performing these tasks.

Safety monitoring on the European level – ERA (CSI, CST).
Legend: ERA - Union Agency for Railways, CST- Common Safety Targets, CSI – Common Safety Indicators.

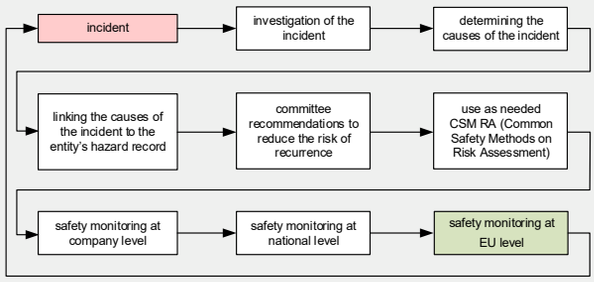


*Fig. 3. Diagram of railway event analysis*
*Source: The author's own study*

## Qualifications of employees investigating railway events

The analysis of railway events is carried out by railway committees appointed by the infrastructure manager, operator or siding manager or the State Commission for the Investigation of Railway Accidents (PKBWK) which is the National Investigation Body. Persons investigating railway incidents must prove that they have the required qualifications. However, they are not the same for each of these people. A member of the PKBWK can be a person who:
a) is a Polish citizen and enjoys full public rights,
b) has full legal capacity,
c) has not been punished for an intentional crime,
d) meets education requirements.
Pursuant to the provisions of Art. 28 a of the Rail Transport Act [4], the State Commission for the Investigation of Rail Accidents may include specialists in the field of:
a) rail operation,
b) design, construction and maintenance of railway lines, junctions and railway stations,
c) railway protection, control and communication devices,
d) railway vehicles,
e) railway electrical power engineering,
f) transport of dangerous goods by rail.
Specialists in a respective field are persons with university education, appropriate qualifications and at least five years' experience in a given field. Membership in PKBWK expires upon death, or in case of non-compliance with the requirements referred to above or resignation submitted to the Chairman of the PKBWK.
In the case of persons who are members of railway commissions appointed by individual employers, national laws and regulations of the national infrastructure manager do not specify the exact requirements to be met by these persons. Pursuant to § 10 of Ir-8 [2], employees with high qualifications and professional experience are entitled be appointed to participate in the work of the railway commission. Qualification requirements and the manner of obtaining them can be specified by each head of the organizational unit.
Considering the heterogeneity of qualification requirements, it is worth looking at the training system for these people. National regulations and internal regulations of the national infrastructure manager do not indicate the scope of training to be carried out by members of railway commissions, nor do they specify the conditions to be met by the trainer. The national infrastructure manager pointed out, however, that such training should take place once a year and is organized by the employer.

## Role and Importance of Human Factor in Analysis of Railway Events

**Postulates to improve the analysis of railway events**

1. Development of uniform qualification requirements for members of railway commissions operating at railway operators, infrastructure managers and railway siding managers.
2. Development of the programme and scope of compulsory training for members of railway commissions.
3. Developing qualification requirements for trainers raising the qualifications of persons working in railway commissions.

**Summary**

An in-depth analysis of rail events is gaining significance as the number of passengers and goods increases. The quality of the railway event analysis depends on the qualifications of members of the railway commissions and the Members of the State Commission for Investigating Railway Accidents. The effectiveness of actions taken by infrastructure managers and railway market entities, the State Commission for Investigating Railway Accidents and the President of the Office of Rail Transport depends on the correctly conducted analysis of events. The higher the effectiveness of the actions taken, the higher the level of safety on the railway network will be.

**Bibliography**

1. DIRECTIVE 2004/49/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 29 April 2004 on safety on the Community's railways and amending Council Directive 95/18/EC on the licensing of railway undertakings and Directive 2001/14/EC on the allocation of railway infrastructure capacity and the levying of charges for the use of railway infrastructure and safety certification (Railway Safety Directive).
2. Instruction on proceedings in cases of serious accidents, accidents and incidents in rail transport Ir-8. The instruction introduced by Resolution No. 686/2016 of the Management Board of PKP Polskie Line Kolejowe S.A. of July 12, 2016.
3. Annual report on the activities of the State Commission for the Investigation of Railway Accidents for 2007–2018, https://www.gov.pl/infrastruktura/raporty, electronic access on 30.09.2019.
4. Act of 28 March 2003 on rail transport (i.e., Journal of Laws of 2019, item 710).

*ikarasiewicz@ikolej.pl*

## Standards and Quality of Railway Transport Services in the Legislation of the European Union

**Iwona Wróbel**

*Engineering and Technical Specialist Railway Track & Operation Department, Railway Research Institute*

The basic legal acts related to aspects of standardization and quality of services in passenger transport by rail, in force in the Community countries of the European Union are the following:

- **Regulation (EC) No 1370/2007 of the European Parliament and of the Council on public passenger transport services by rail and by road**

As regards standards and quality of services, the competent authorities were authorized to freely set qualitative and social criteria in order to maintain and raise standards in relation to public service obligations. Quality standards, which are required by the competent authorities in accordance with national law, must be included in the tender documents and public service contracts. In addition, it was specified that the amount of compensation should include efforts for efficiency and quality of services.

- **Regulation (EC) No 1371/2007 of the European Parliament and of the Council on rail passengers' rights and obligations**

The main assumption of the document is to strengthen passenger rights and to increase the quality and efficiency of rail passenger services in order to increase the share of rail transport in relation to other modes of transport. Passengers are entitled to the minimum level of applicable standards for rail transport services. They concern, among others: transport contracts, travel information, tickets, seat reservations, liability for delay, cancellation and loss of connections, assistance provided to disabled persons and persons with reduced mobility, consideration of complaints.

An important issue addressed in the document is the definition and monitoring of service quality standards for connections. Service quality standards are defined by railway undertakings and they implement a quality management system to maintain a high level of service. Railway undertakings are required to publish a report on the implementation of their quality standards. Annex III to the regulation specifies the obligatory scope of service quality standards. These are: information and tickets, punctuality of services, and general principles to cope with disruptions and cancellation to service, cleanliness of rolling stock and station facilities, customer satisfaction survey, complaint handling, refunds and compensation for non-compliance with service quality standards, assistance provided to disabled persons and persons with reduced mobility.

- **Commission Regulation (EU) No 1300/2014 on the technical specifications for interoperability relating to accessibility of the Union's rail system for persons with disabilities and persons with reduced mobility**

From the point of view of the availability of rail transport for people with reduced mobility, functional and technical specifications are specified, including parameterized standards and values for:

– "Infrastructure" subsystem in the scope of: parking, obstacle-free route, doors and entrances, floors surfaces, highlighting of transparent obstacles, toilets and baby-nappy changing facilities, furniture and free-standing devices, ticketing, information desks and customer assistance points, lighting, visual information: signposting, pictograms, printed or dynamic information, spoken information, platform width and edge of the platform, end of the platform, boarding aids on platforms, level track crossings at stations;

– "Rolling Stock" subsystem in the scope of: seats, wheelchair spaces, doors, lighting, toilets, clearways, customer information, height changes, handrails, wheelchair accessible sleeping accommodation, step position for vehicle access and egress, boarding aids.

The presented legal acts have been included in the project implemented in the Railway Track and Operation Department "Analysis of public service efficiency indicators for rail passenger services".

*iwrobel@ikolej.pl*

# Research on Measurement of Electromagnetic Fields Generated by Electric and Diesel Powered Rolling Stock

**Krzysztof Ortel**
*Research -Technical Specialist, Railway Traffic Control and Telecom Department, Railway Research Institute*

The widespread use of axle counter based train detection systems by various railway managers has highlighted problems of these devices' immunity to interferences generated by rolling stock. Another related aspect is also equipping of rail vehicles with electric and electronic complex structure devices. The experience of many railway managers shows that modern vehicles can cause disturbances in the axle counters' operation. Therefore the standardization activities on the European level have been ongoing for many years in order to unify and simplify procedures related to placing in service particular rolling stock types on the European railway network.

In compliance with the provisions contained in the ERA/ETRMS/033281 document, PN-EN 50592:2017-04 and PN-EN 50617-2:2015-12 standards, measurements of magnetic fields generated by rolling stock should be carried out with a standardized-size antenna (length 15 cm, width 5 cm and height 5 cm) independently for the three measuring layers: X, Y, Z.

The Railway Research Institute has measurement equipment that meets the binding European requirements for this type of research. The measuring equipment comprises (Fig. 1):

- portable laptop computer with data processing and archiving software,
- two measurement antennas,
- three oscilloscope cards,
- two TNB modules with built-in impedance transformers,
- USB hub with external power supply,
- test leads.


*Fig. 1. View of the magnetic field test stand (laboratory)*

The measurements were carried out for the basic operational states of the traction locomotive (startup, braking, driving at a constant speed) and for the cases of the absence of the vehicle near the measurement antennas (the so-called background measurement).

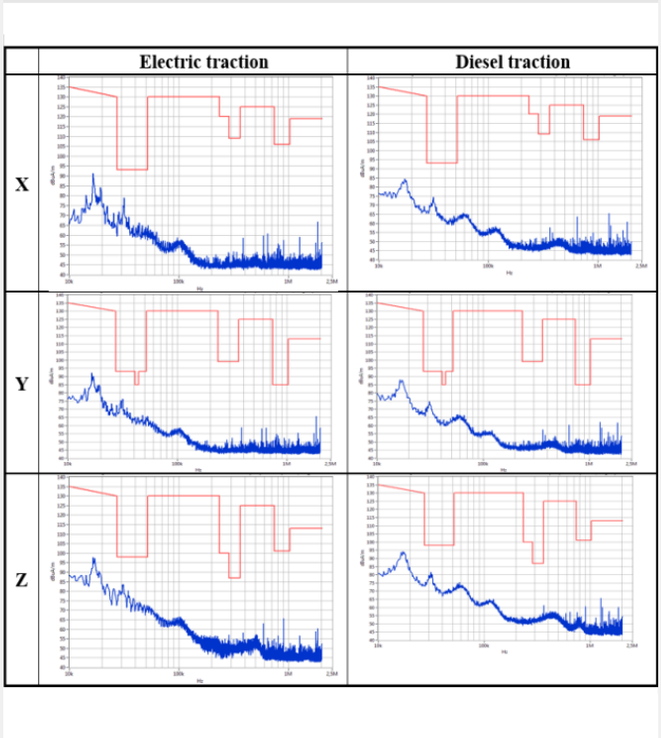


*Fig. 2. Magnetic field strength in the X, Y, Z layers recorded i n the track during a start-up of a diesel-electrical locomotive*

Figure 2 shows the magnetic field strength recorded during the start-up of the locomotive in the electrical and diesel traction The red colour indicates the limit values of magnetic fields compliant with the requirements of the ERA/ETRMS/033281 document and the standard, while the measured values are shown in blue.

The examples of test results confirm that they are different for the same traction vehicle for runs in electric and diesel traction. This proves the necessity to perform measurements of the impact of magnetic fields emitted by diesel-electric traction vehicles both in the electric and diesel traction, as they constitute an essential point of electromagnetic compatibility tests for rolling stock running on railway tracks equipped with train detection devices.

*kortel@ikolej.pl*

# Modernization of Control-Command and Signalling Devices for which a Certification of EC Verification Is Issued for the Control-Command and Signalling Subsystem

**Paweł Gradowski**
*Railway Traffic Control and Telecom Department*

In the time of rail transport dynamic development due to many rail investments, some problems concerning the rail investment implementation are beginning to be noticeable. They relate to obtaining the certificate for placing in service of structural subsystems.
Most investments are co-financed by EU funds and they are mainly aimed at increasing speed on railway lines while maintaining or improving the level of safety. Apart from the modernization of railway lines with accompanying infrastructure, energy networks and devices, railway lines are being equipped with ERTMS/ETCS Track-side Subsystems. According to the European Union's and national law all upgraded railway lines require certification. For railway lines equipped with ERTMS/ETCS systems which have undergone certification and have been placed in service, activities are undertaken in order to improve operational parameters of railway infrastructure in relation to adjacent lines. Therefore it is necessary to assess the influence of implemented investments on already mounted ERTMS/ETCS systems with the binding certificate of EC verification and those which received or are waiting for placing in service certificate issued by the President of UTK (Railway Transport Office).
The area of command-control and signalling is divided into four parts: the basic layer of command-control and signaling, track-side part of the superior layer, train detection system and radio communication.
The basic layer comprises the train detection system on tracks and turnouts as well as level crossing protection systems. It is assessed according to national and EU law in reference to train detection systems. The superior layer is based on a safe digital data transmission acquired from the basic layer and transmitted to vehicles by digital communication channels.

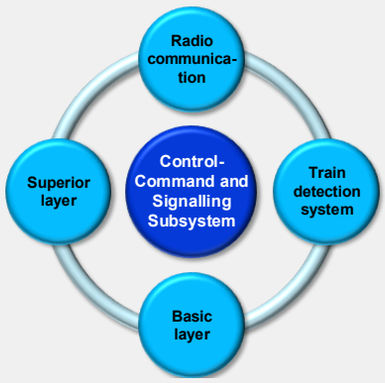


*Fig. 1. Areas of command-control and signaling subsystem - track-side systems*

The superior layer is presented in the European Union as an interoperable solution entirely defined by the EU law. This solution was named European Rail Transport Management System – ERTMS. Each part of the system usually undergoes separately the certification process and placing in service as well. Along with the increasing amount of modernized railway infrastructure, situations will be more and more often encountered in each structural subsystem when the certification process has been completed and documents confirming placing in service have been issued whereas on the contact point of work done there will be introduced a change of a definite infrastructure element which, among others, will guarantee the improvement of railway system's operational parameters.
Such situations are connected with the execution of specific work in particular areas (See Fig. 1) of the certified subsystem

**Magdalena Kycko**
*Deputy Head of the Quality and Certification Centre*

and the necessity to obtain the new certificate of placing into service, which in turn demonstrates the need to connect correctly the changed areas with unchanged parts assessed in the certification process. Nevertheless, most contractors try to avoid this by the application of 402/2013 regulation provisions and admitting that the implemented change is insignificant. Looking at the whole system's functioning, such an approach could negatively impact the safety level due to the fact that in the whole command-control and signalling subsystem the results of introduced modifications in the whole subsystem are not verified after the implementation of changes.
An example of such a situation is, for instance, the investment comprising Legnica – Węgliniec – Bielawa Dolna section for which the certificate of EC verification for command-control and signalling subsystem had been issued and thus the certificate of placing in service had been obtained – inclusively for the basic layer, system, ETCS and GSM-R detection. Then the execution of other projects was decided in order to improve the operational parameters of the railway line in question, which related to, among others, the construction of a bridge over the Nysa Łużycka thus changing the track layout at Bielawa Dolna level junction as well as electrification.
The requirements relating to the bridge reconstruction are closely connected with the mentioned goals and expected results. Not only do they refer to the engineering structure but also to accompanying sectors – command-control and signalling including.
In compliance with the law in force, for the bridge design and the accompanying works, the infrastructure manager requires to obtain the certificates of conformity and the declaration of conformity for the elements of substructure, drainage, railway embankments as well as ITC devices and systems.
On other railway lines with control-command and signalling subsystem placed in service there is being introduced, for example, a change in the location of balises. Seemingly a trivial change such as moving the balise further may seem an insignificant change. However, from the technical point of view such a change in location results in significant changes. Apart from a global correction of location for the entire system, changes are required, among others, in the software of the moved balises, connecting them with other elements of the system, distances in movement authority or software data in radio block centres (RBC). Unfortunately in the tender materials of the investment, which introduce changes in the system already placed in service, there is no correlation between the projects and there are no regulations to specify who and when is to check and assess the changes being implemented as well as their impact on the whole control-command and signalling subsystem, and, first of all, on the safety level.

*pgradowski@ikolej.pl*
*mkycko@ikolej.pl*

## Railway Research Institute's Seminar Programme in 2020

| | |
|---|---|
| **14 January 2020** | |
| M. Sawicka, MSc Eng.<br>K. Tchórzewski, MSc Eng. | FRMCS - Future Railway Mobile Communication System |
| **10 March 2020** | |
| M. Lalik, MSc Eng. | Changed TSI PRM – Challenges for Rolling Stock Manufacturers and Users |
| **28 April 2020** | |
| M. Gołębiewski, MSc Eng. | Photometric Parameters of Indicators Displayed on the Railway |
| **12 May 2020** | |
| A. Rojek, PhD Eng. | High-Speed Circuit Breakers at Traction Substations |
| **16 June 2020** | |
| K. Polak, MA | Building a Test Track for Hyperloop Technology at Railway Research Institute's Premises |
| **20 October 2020** | |
| K. Bednaruk, Eng.<br>A. Aniszewicz, MSc Eng. | Metrological Control of Wheelsets on Rail Vehicles |
| **17 November 2020** | |
| A. Chojnacki, MSc Eng. | Tests and Diagnostics of Vehicles in Running Safety Aspect |
| **15 December 2020** | |
| Ł. Antolik, MSc Eng.<br>I. Mikłaszewicz, Eng.<br>D. Kowalczyk, PhD Eng. | Characterization of Contact-Fatigue Defects of Rails in order to Optimize Rail Diagnostics Using Ultrasonics |


Photo: IK

## Assistant Professor Degrees awarded to two employees of the Railway Research Institute

As a result of the review of the set of 17 publications under a common title "Railway transport safety study from risk analyses and technical safety up to arising method for determining safety, security and cybersecurity functional integrity levels" completed with a monograph entitled "Railway safety and security functional reference model built on data transmission based systems", and assessment of his professional, didactic and organizational achievements, the Scientific Council of the Civil Engineering and Transport, by Resolution No. 6/I/2019 dated 26 November 2019, awarded assistant professor degree, in the discipline of Civil Engineering and Transport, to doctor engineer Marek Pawlik (orcid: 0000-0003-3357-7706), the deputy director for railway interoperability of the Railway Research Institute.

As a result of the review of the monograph entitled "Research on the impact of wireless data trans-mission technology on the positioning of vehicles in rail transport", and assessment of his scientific achievements, the Council of the Faculty of Transport of the Warsaw University of Technology by Resolution No. 476/IX/2019 dated 26 September 2019, awarded assistant professor degree, in the discipline of Civil Engineering and Transport, to doctor engineer Andrzej Toruń (orcid: 0000-0002- 7333-2079), the chief of the Railway Traffic Control and Telecom Department of the Railway Research Institute.

**Editors:**

Dr Renata Barcikowska, Editor-in-chief
Jolanta Cybulska-Drachal
Izabella Grzegrzółka
Jolanta Olpińska
Małgorzata Ortel
Andrzej Szmigiel

**Contact:**

**IK - Railway Research Institute**
**04-275 Warsaw, Poland**
**www.ikolej.pl**
**E-mail: ikolej@ikolej.pl**