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P R A C E N A U K O W E - P O L I T E C H N I K A W A R S Z A W S K A . T R A N S P O R T

ISSN: 1230-9265 vol. **129**
DOI: 10.5604/01.3001.0014.3086 2020

Influence of the new investment task implementation on the certificated control-command and signalling subsystem

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Abstract. In the era of dynamic development of rail transport caused by the implementation of many railway projects, some problems related to the implementation of railway investments are beginning to be noticed, which refer to obtaining a permit for placing in service of structural subsystems. Most of the investments are co-financed from EU funds, and their main goal is to increase speed on railway lines with the same or improved safety level. In addition to the modernization of railway lines with accompanying infrastructure, devices, and power grids or railway traffic control devices, railway lines are equipped with trackside ERTMS/ETCS systems (European Rail Traffic Management System/European Train Control System). All modernized railway lines are subject to a certification process following European and national law. Concerning lines equipped with ERTMS/ETCS systems, which have already been certificated and accepted to operation, some actions are taken to improve the operational performance of the railway infrastructure. For this reason, it is necessary to assess the impact of investments on ERTMS ETCS systems already installed, which have a valid EC verification certificate and have received or expect an authorization for placing in service issued by the Office of Rail Transport. The article presents selected railway investments introducing changes in already authorized control-command and signalling subsystem whose impact was analysed, referring to the change of safety level.

Keywords: certification, control-command subsystem, signalling subsystem, authorization

1. Implemented investment processes

In recent years, an increase in the number of implemented railway investments, which also include modernization of the control-command and signalling subsystem has been noticeable. Following the Directive [6], the structural subsystem for control command and signalling - trackside equipment has been defined as "all trackside devices necessary to ensure the safety and control of the movement of trains on the network".

Article citation information:

Gradowski, P., Kycko, M. (2020). Influence of the new investment task implementation on the certificated control-command and signalling subsystem, WUT Journal of Transportation Engineering, 129, 49-61, ISSN: 1230-9265, DOI: 10.5604/01.3001.0014.3086

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Received 17 October 2019, Revised 9 June 2020, Accepted 21 June 2020, Available online 9 July 2020.

The definition of the control-command and signalling subsystem can also be presented in practical ways, as a system that, in all operational conditions, should ensure safe control of railway traffic, in particular, to prevent head-on train collisions, collisions at turnouts, over speeding, and so forth.

However, according to Act of Law [25], the railway traffic control-command and signalling system is defined as "equipment necessary to ensure safety and control of train traffic on the railway network together with devices to ensure communication and software of control devices."

PKP Polskie Linie Kolejowe SA is currently implementing the National Railway Programme [23] worth PLN 66 billion. It is the most significant investment program in the history of Polish railways. As part of these works, there will be 9000 km of modernized tracks, and the speed will be increased at 8500 km of them. For comparison, in the previous budget perspective (2007–2013), investments worth PLN 19.5 billion were carried out on the railway within seven years, which is only about 30% of the value of investments that are planned in the current financial perspective.

The scope of current tasks includes a whole range of railway investments, including increasing the maximum speed on railway lines and increasing the level of safety. Within the rail traffic control-command and signalling sector, there are more and more investments that aim to introduce new, interoperable, A class systems, both in the area of management and control command railway traffic, as well as communications using digital bandwidth.

According to the provisions [15] submitted in July 2017 to the European Commission, as an amendment of the National ERTMS Implementation Plan in Poland [14], it is expected that 2480 km of railway lines will be equipped with the ERTMS / ETCS system until 2023 (including already equipped sections). By 2030, this number will more than double, exceeding 6549 km. In the following years (up to 2050), according to the assumptions [5], it is planned to equip the ERTMS / ETCS system with further 1 500 km of railway lines.

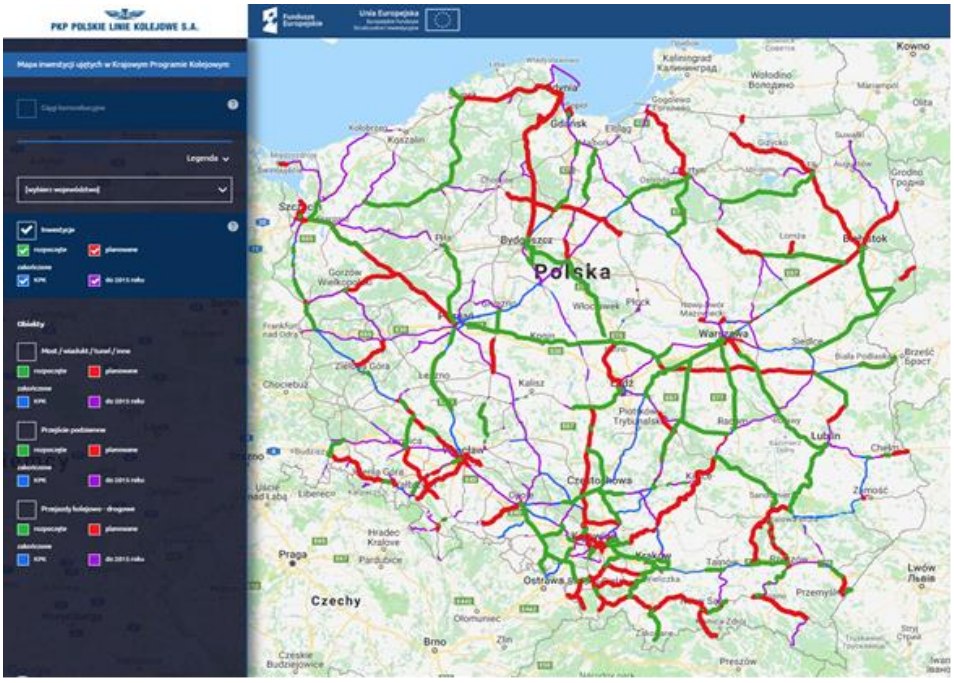

Fig. 1. Map of investments carried out by PKP PLK SA (source: [16])

For the ERTMS/GSM-R system, by the end of 2023, it is planned to complete the implementation of the GSM-R network development project at 13600 km of railway lines, what, combined with the investments implemented so far, will contribute to covering almost the entire railway network in Poland by this communication system.

Using the above drawing (fig. 1), it is possible to illustrate the scale of railway investments carried out simultaneously. These investments have a different scope of modernization covering one or more structural subsystems, and for their execution, different contractors are responsible, who in the area of the control-command subsystem install railway traffic control-command and signalling devices of various manufacturers. Each such investment is subject to a separate process of obtaining authorization documents being the basis for applying for permission to place in service, which means that the integration of railway control-command and signalling systems between railway lines, which have been modernized under various investment processes, is not easy. The majority of errors related to the requirement of not obtaining authoritative documents for cooperating control-command and signalling systems built under various investment processes appear at the stage of creating tender documentation. Document [10], which is dealing with formal legal issues, covers other conditions of railway investment implementation. However, these are not all areas of assessment as, for instance, documents [1], [12], [13], [17], contain references to the analysis of risk identification in rail investment processes. Nevertheless, none of these and other available documents raise the problem of introducing changes in certified investments and how the introduced changes affect the integration of railway control-command and signalling systems, and thus broadly understood safety.

Due to the fact that many investments are currently being carried out, there are more and more investments that interfere with the already authorized control-command and signalling subsystem. The article presents several such investments that, through works in control-command and signalling devices, introduce changes in checked and approved subsystems. The purpose of the article is to analyse selected investments in terms of their impact on the safety of the rail system and to present a problem that is ignored in investment processes. The research method that was used in work is an expert analysis based on the experience and knowledge of the authors of the article and the persons with whom these issues were consulted.

2. Process of obtaining placing in service

The process of placing in service is mainly intended to confirm that the subsystem or product meets the safety requirements. However, the formal and legal safety requirements of control-command and signalling systems have been defined in a general way in Directive 2004/49/EC of the European Parliament and of the Council of April 29, 2004 [5] and executive acts as well as in Technical Specifications for Interoperability (TSI), and in detail in the Commission Implementing Regulation (EU) No. 402/2013 [3], amending Regulation 2015/1136 [4] and CENELEC standards.

Regulation 402/2013 [3] defines the approach regarding the common safety method (CSM) for risk analysis and actually describes the safety assessment process for assessing the significance of a change. Risk assessment and significance analysis are finished by issuing an independent safety assessment report by recognized assessment bodies (AsBo). A description of how to approach CSM and how to analyse the significance of the change

was provided by the Office of Rail Transport (UTK) in the guide [24]. A similar document describing the approach to CSM was presented by ERA in the document [9]. However, CENELEC standards base the approach to safety on the process of systematic safety management and on the creation of the so-called proof of safety. The provisions appearing in the basic standards regarding the safety of railway control-command and signalling devices, such as PN-EN 50126 [7] and PN-EN 50129 [8], impose an obligation to carry out a risk analysis, which in relation to the design, production and operation of railway control-command and signalling devices is an essential element. In the processes of certification and placing in service, safety-related requirements are also checked and compliance with the requirements described, among others, in CENELEC standards.

The authorization for placing in service is not a physical admission for operation. This is a document authorizing the operator or infrastructure manager to make a decision for starting a vehicle or subsystem operation after incorporating a new vehicle or subsystem into the safety management system. Only railway vehicles and structural subsystems for which the President of UTK issued permission for placing into service can be operated by railway managers and railway operators.

Each subsystem can only be placed in service when it is designed and installed in such a way that meets the essential requirements for interoperability and compatibility with the existing railway system, as a part of it, while the included interoperability constituents are installed and used properly [11]. Obtaining permission for placing into service, according to the letter of the applicable law [25], [22], requires the submission of a complete set of documents.

One of the key documents to be submitted is an EC verification certificate issued by an authorized notified body with competence for the subsystem under evaluation with respect to new approach directives (including control-command and signalling subsystem [2]). The carried out certification process is aimed at confirming the fulfilment of the essential interoperability requirements in the considered interoperability constituent or structural subsystem. Positive verification results allow issuing the EC certificate of conformity for the constituent and for the subsystem, the above-mentioned EC verification certificate.

At this point, however, it should be noted that the document issued refers to the subsystem. While assessing the overall subsystem, not one but four assessments must be performed as part of the assessment. The first of such assessments (completed with a certificate) is the verification of railway control-command and signalling devices included by the assessment as elements not covered by the TSI. The second assessment that results in the certificate being issued is the verification of the elements related to the train detection, as described in the TSI. The next two assessments refer to elements related to Class A systems, i.e., elements connected with train control as well as radio communication and data exchange. For these assessments, as a rule, two separate certificates are issued, which for the entire subsystem are usually jointly consolidated by the certificate of EC train control verification or as a separate certificate combining the four verification processes described above.

The appropriate certificate obtained by the applicant authorizes the contractor or manufacturer to issue the appropriate EC declaration of conformity or EC declaration of verification, confirming the acceptance by the issuer of the confirmation on its own responsibility that the products supplied by them comply with the European requirements. This declaration is another important document submitted together with the application for placing it into service to the President of UTK.

Additionally to the application, other documents should also be produced in an independent, parallel to the certification process, which, using the provisions [3], obliges as part of the subsystem assessment to conduct risk evaluation and assessment and obtain a report of common safety methods.

With the increasing amount of modernized railway infrastructure, some situations will be more often encountered, in each structural subsystem, for which the certification process has been completed, and documents confirming placing into service are already issued, and at the point between the works carried out, a specific infrastructure element will be changed, which among other things, guarantee the improvement of operational parameters of the railway system. This kind of situation is connected with the execution of specific works in the certified system and with the necessity of obtaining a new placing into service, which also indicates the need to repeat the certification process. At this point, a question arises whether such situations should take place at all. If the whole process of obtaining an authorization for placing to service should be repeated, what is the range for recertification?

Among other things, in order to avoid the need to repeat the process of placing to service, the contractor using the provisions of Regulation 402/2013 [3] assumes the position that their change in the railway system is not significant (according to [3]). In many cases, from the technical point of view, such an assessment result is right because similar solutions are commonly used, but when looking at the whole subsystem, this result negatively affects the level of safety because the subsystem is not verified after applied changes.

Examples of such investments for which there is a change or addition of elements of the railway infrastructure after certification process and receiving a document for placing in service, are presented in the following chapter.

3. Examples of investment tasks carried out in a certificated control subsystem

In order to show the impact of the new investment task implementation on the already certificated control subsystem, various investment processes were analysed in terms of the changes they introduce in the subsystem and the risks associated with it. The result of the analysis is presented on the basis of the following investments.

3.1. Construction of a new bridge over the Nysa Łużycka

The proper condition of the track system, as well as the condition of engineering structures, determine proper parameters of the railway line. An example of a project that improves the parameters of engineering structures operated on railway lines is the investment task: "Modernization of the E30 railway line, Stage II section Bielawa Dolna – Horka: Construction of the bridge over the Nysa Łużycka and electrification" [18] (Figure 2). By implementing this investment task, the infrastructure manager intends to achieve the following objectives: achieving the possibility of introducing double-track traffic and achieving compatibility with equipment operated on the DB Netz railway network.

This task consists in the construction of a railway border bridge over the Nysa Łużycka between Horka and Węgliniec for 130470 km of the river current, 13424 km of railway line No. 295 Węgliniec – Bielawa Dolna, along with the electrification of the line from the place

of electrification end (track 1 km 13315, track 2 km 13384) to the contact point of the overhead contact line managed by the Polish and by the German infrastructure managers. Works performed by PKP Polskie Linie Kolejowe SA will include:

– construction of a border bridge over the Nysa Łużycka river, located on an extensive international freight route (Transport Corridor C-E30) within the Pan-European Transport Corridor No. III,
– changing of the track system from single track to double track (in the track of a dashed line, figure 2),
– adaptation of external control-command and signalling devices to the double-track system at the Bielawa Dolna junction post together with the change of application in the system of computer control command and signalling devices at this station and Węgliniec station as well as building additional devices included in the control command and signalling subsystem,
– reconstruction of ITC cable and fiber optic line,

installation of a traction network over the new track alignment to the point of contact of the PKP Polskie Linie Kolejowe SA and DB Netz traction network.

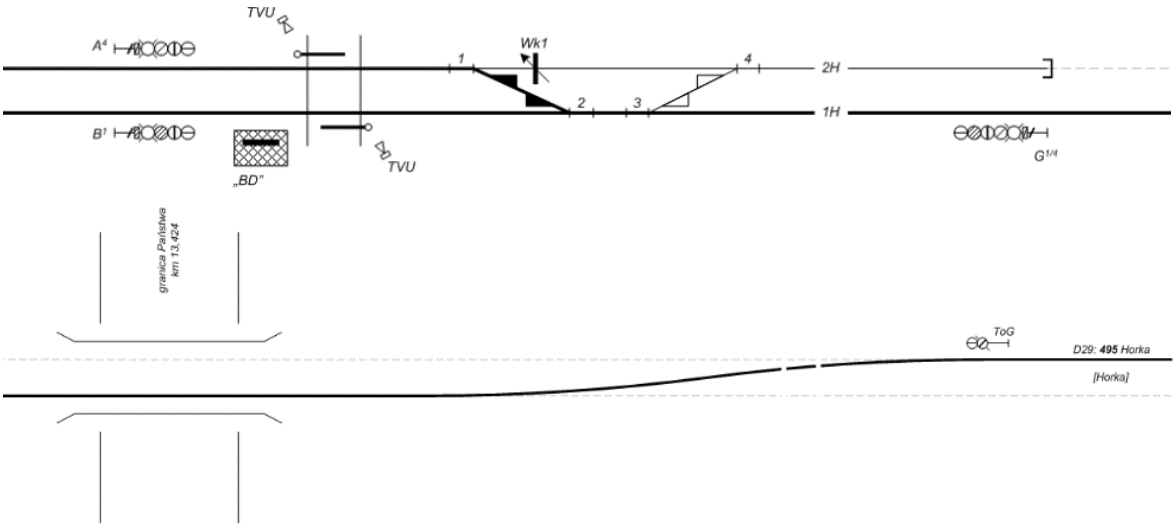

Fig. 2. Part of the Bielawa Dolna junction post alignment under modernization (source: [21])

As mentioned earlier, the railway line number 295, was one of the first lines on which the ERTMS/ETCS level 2 was completed (completion of works in December 2016). The tender for the implementation of this task was announced after obtaining intermediate EC verification certificates at the design and development stage and carried out along the entire test line, which tests at the final tests stage in November 2015 confirmed the meeting of the essential requirements. After obtaining the final EC verification certificate, the entire pilot line received the authorization of the national safety authority on March 3, 2016 [26], which gave the infrastructure manager a legal basis for transferring it to commercial operation.

In the new investment task (bridge construction), the records verify how the contracting authority (infrastructure manager) refers to the connection of these two investment projects and issues related to certification, i.e., certification of the redevelopment of the engineering facility, linking the new bridge with the changed track system and adapted traffic control

devices, with the need to re-certify changed elements (Węgliniec station and branch Bielawa Dolna), assessed in the certificated ERTMS/ETCS level 2 system on the section Legnica – Węgliniec – Bielawa Dolna. In the order documentation, individual provisions characterize a general description of the subject of the order, including:

- preparation of project documentation to the extent necessary for the preparation and execution of construction works,
- obtaining, on behalf of the ordering party, a building permit or notification of works, in accordance with the requirements of the construction law,
- obtaining water and legal permit on behalf of the ordering party,
- execution of construction works on the basis of project documentation, with geodetic and geotechnical support to the extent necessary for the proper performance of these works,
- obtaining a permit for the use of the facility on behalf of the contracting authority.

The order includes the following tasks:

- construction of a new bridge facility with accompanying works, including demolition of an existing facility - in a phase option in two phases, with traffic in a single track,
- reconstruction of the rail traffic control command and signalling devices on the Bielawa Dolna – Horka section in the necessary scope in connection with the railway bridge construction project, including the construction in two phases, with traffic in a single track,
- construction of a traction network, as an extension of the existing network to the point of contact of the PKP PLK SA and DB Netz traction network along with accompanying works, including changing the section cabin's location,
- reconstruction of the ITC cable and construction of a fiber optic line from the newly located section cabin to the power supply container of ITC units located at the station containers of the Bielawa Dolna junction post.

In the Functional-Utility Program of the project, the ordering party only informs in the telecommunications part about the works related to the ERTMS/ETCS level 2 and GSM-R system development, covered by a separate contract. It is only one piece of information in the entire document regarding other works on the railway line No. 295. The Ordering Party informs only about works related to the ERTMS/ETCS level 2 and GSM-R development.

The provisions of the requirements for bridge reconstruction are closely related to the mentioned goals and expected results. Not only do they refer to the engineering facility, but also to the associated sectors - inter alia to the railway traffic control-command and signalling equipment industry. In accordance with binding law, for the bridge project together with accompanying works, the infrastructure manager requires obtaining compliance certificates and declarations of conformity for the substructure and drainage elements, embankments as well as telecommunications equipment and systems. In detailed provisions, the ordering party does not indicate the need to obtain a reconciliation of the bridge project being carried out with other projects.

3.2. EC verification of the structural subsystem control for completed projects

Starting from the indication in [14] railway line Legnica – Węgliniec – Bielawa Dolna as a pilot line, on which the first ERTMS/ETCS system will be built, analysing tenders appearing on the website [20] of the infrastructure manager, one can have the impression that this

line has been accumulating the systems over the next three years. Not counting the first tender concerning the development of the ERTMS/ETCS system, which in March 2016 was authorized by the national safety authority [26]. In November 2015, the tender for modernization of the railway bridge mentioned in the previous sub-section was announced. The next procedure regarding this line was announced in July 2018. Analysing the provisions of the last tender procedure, which as a starting element indicates the reference to the entire tender documentation for the modernization of the railway bridge, in its provisions, it indicates the need to conduct a comprehensive assessment of the control-command and signalling subsystem, which has not been certificated as part of certification related to works on the bridge. However, detailed provisions indicating the scope of works do not refer to the verification whether the built-up of new rail traffic control command and signalling equipment had an impact on the authorization decision received in 2016 regarding the permission for placing in service the ERTMS/ETCS system on the railway line Legnica – Węgliniec – Bielawa Dolna.

3.3. Revitalization of railway line 283 on the section Zebrzydowa – Żagań

As shown in figure 1, many investment projects are carried out in Dolnośląskie Voivodship (south-western part of Poland). Referring to the railway line, that was described in the above two subsections, the next project is the revitalization of the tangent line to this line.

According to the provisions [19], the subject of the contract is the design and revitalization of railway line No. 283 on the section from km 60399 to km 104917 in the range of superstructure and track bed, engineering facilities, level crossings, platforms, power engineering, rail control-command and signalling in relation to radio and wired communication. In addition to the necessary design documentation together with all the work related to the development of the documentation, the entire subject of the contract includes the performance of all construction work in accordance with the scope of the contract together with the work related to the performance of such works and the assessment of the compliance of the structural subsystem infrastructure and control-command and signalling - trackside equip-ment in accordance with the scope orders at every stage (design, construction, final tests).

The works carried out regarding control-command, and signalling devices are related to the scope of works of the track industry and the location of newly created track systems. The final effect of these works is to be a uniform control-command and signalling system for the section of railway line No. 283 from Żagań station and the possibility of trains' entry and exit from and to the section of the line to the stations Żagań and Zebrzydowa. The installed control-command and signalling devices are to have full functionality and ensure bi-directionality of all route tracks, tracks created after track works, as well as newly created ones and existing sidings.

Referring to the connections of this project with the built-in ERTMS/ETCS system on the base section, the works to be carried out at Zebrzydowa station become crucial in the conducted analysis. As part of this work, the following will be carried out:

- adding a two-directional line block on railway line No. 283,
- replacement of applications at Zebrzydowa station and at LCS Bolesławiec, including new devices,

– when replacing turnouts, after completing track works, the installation of three new drives together with new beds and control and point rods,
– if the scope of work requires a change in the configuration of the ERTMS/ETCS level 2 system (especially concerning the entry to the area of full supervision from railway line No. 283 to Zebrzydowa station resulting from the change of location of the entry signal and maximum speed), appropriate changes should be introduced to the configuration and balises' software and RBC Bolesławiec software.

In reference to the project described above, comparing individual documentations related to carrying out modernization, it is already noticeable that a condition of conformity assessment has been made, including structural subsystem control-command and signalling - trackside equipment. However, in relation to the last subsection required to perform the works, there is no indication of the need to carry out updates (for devices that have UTK authorization) of documents approved by the authorization, which are changed by subsequent works, violating the provisions of the EC verification certificates.

4. The effect of next project changes on the already been certificated subsystem with respect to the acquired approval

According to strategic documents [14] approved by the government of the Republic of Poland, the company PKP Polskie Linie Kolejowe SA, as the infrastructure manager, is the entity responsible for implementing on its railway network the European Rail Traffic Management System (ERTMS), including the implementation of the European Train Control System (ETCS) and the Global System of Mobile Radio-communication (GSM-R). In the last ten years, the infrastructure manager has made several implementations of both systems, for which, among others, in 2016, based on the UTK (Office of Rail Transport) authorization [26], it was possible to commission the ERTMS/ETCS level 2 equipment, built on the section Legnica – Węgliniec – Bielawa Dolna (sections of railway lines No. 275, 282 and 295).

On subsequent railway lines, the implementation of the ERTMS system is based on project documentation, which, among other things, defines how the balises are to be built at the characteristic points of the infrastructure. Such guidelines in a rather coarse manner were adopted in the approved and submitted to the European Commission, in order to develop an ERTMS implementation plan, a document describing the National ERTMS Implementation Plan in Poland [14]. This document identified and indicated, among others, that the ETCS system will use single balises and balise groups consisting of at least two balises. Depending on the location, balises and a single balise will be used. A group of at least two balises must be used in the area of entry to the equipped line and exit from the equipped line. Such a group must also be built in the middle of the block headway (train spacing) on the route. A group of at least two balises can also be connected to may be connected with the distant signal. Single balise must be installed at the switches (construction start of the turnout and at the level of the shunting limit signal for both tracks), at entry signal, exit, and direction indicators, and at the indicator the limit of the shunting area. These guidelines, along with the distances set out in the project documentation, can be referred to as reference values for subsequent railway lines.

In addition to the above-mentioned method of deployment of ERTMS/ETCS system devices, respecting the developed balises software, coders (LEU) or radio control center (RBC) and considering physical and software connections of railway traffic control-command and

signalling equipment, the evaluated implementation after submitting legal documents, obtained the relevant documents of placing in service from the national safety authority.

With regard to the full control-command and signalling subsystem, it should be remembered that such a document does not refer to one certificate, but to the compilation of carried out assessments, i.e., for control-command and signalling devices not included in the TSI, train detection devices, GSM-R and ETCS devices as well as the documentation created as a result of the subsystem assessment process relating to the risk evaluation and assessment and the prepared report on the safety assessment.

The infrastructure manager, as part of the supervision, commissions the performance of modernization works aimed at strengthening the role of railway transport in the integrated transport system of the country. After completion, these works will have an impact on the achievement of the objective of maintaining the technical parameters of the modernized railway lines, as well as their improvement on the remaining lines by eliminating maintenance backlog. Such works are the modernization of the railway bridge. However, in their scope, it was reconstruction and adaptation of external traffic control command and signalling devices to the double-track system at the Bielawa Dolna junction post together with the change of application in the system of computer control devices at this station and Węgliniec station together with additional devices included in the control subsystem. Lack of indications in the tender materials regarding the certification in the changed elements of rail traffic control command and signalling devices forced the railway infrastructure manager to announce a separate procedure, which was only related to this scope. In both tender procedures, there is no correlation between the introduced changes with regard to the system architecture as well as the software versions included as part of the authorization for placing in service.

For many people, in spite of defining the alignment of balises in [14], a seemingly trivial change consisting of moving a balise by some distance, maybe an insignificant change, but from the technical side, such a change of location entails significant technical changes. In addition to the global location correction for the entire system, it has to change, among other software of carried balises, linking these balises with other system elements, distance in the driving permission, or data in the software of the radio control center (RBC). Individual elements of the system, as well as the whole subsystem, are subject to the assessment process carried out by the notified body, which ends with the issuance of the EC verification certificate. Obviously, one can look for "alternative solutions" to allow the revised area to be taken out of your placing in service, including the EC certificate of verification.

For such a technical approach, the question arises whether the area has been defined correctly and who will certify that the required level of safety has been maintained at the limit of exclusion, as well as for the area not excluded? With the increasing length of railway lines on which the ERTMS/ETCS system is implemented, one should be aware of the organizational consequences that will be visible in the tender materials, the lack of correlation between projects or projects and the actual situation in the field, knowing about the need to apply for authorization of placing in service of entire equipped railway lines.

5. Conclusion

The assessment of structural subsystems is multi-level and multi-faceted. At the level of individual products, the interoperability constituents, as well as structures and equipment

designed to conduct railway traffic, are assessed. At the level of subsystems, structural subsystems co creating railway lines are assessed. Finally, for the entire investment - modernization or construction of the railway line, or modernization - priced and assessed risk of introducing unacceptable threats into the railway system. At the same time, at each level, it is necessary to take European requirements into account defined in the TSI and Polish requirements [11].

The conclusions presented above result only from the technical analysis of the provisions contained in the tender materials and do not take into account the correlation with the interpretation of the provisions of the applicable principles of the Safety Management System (SMS) with the infrastructure manager. Individual documents describing the requirements cited in the example tender procedures implemented on the railway network managed by PKP Polskie Linie Kolejowe SA relate only to the work to be carried out as part of a specific procedure.

In the aforementioned project, for all new solutions, the Ordering Party defines the need to obtain documents required by law, i.e., to perform conformity assessment and obtain certificates and declarations of conformity for specific subsystems or types of equipment. However, at the same time, there is no reference in specific parts of the cited documentation relating to work that must be performed additionally in other subsystems, also in the control-command and signalling subsystem. The control-command and signalling subsystem, and more specifically, the ERTMS/ETCS system, may have a key role here, as the work being carried out under a specific tendering procedure results in the correct adaptation of particular parts of the trackside equipment of the system.

Every change in the system in a certified system or subsystem should end with the process of recertification of the changing area. At this point, the risk of losing the authorization documents becomes of key importance for the infrastructure manager. It is possible to minimize this risk by placing the obligation to include in the tender materials proper information on the requirements for link modification within various subsystems in internal requirements.

In case the given subsystem has already placed in service issued by the President of UTK, the situation becomes more complicated. Looking at the presented examples, e.g. of bridge construction (change of the track alignment, addition of devices and changes in traffic control command and signalling applications, without changes in the ERTMS/ETCS system) from the technical and legal point indicates that the issued certificate and the acquired placing in service is invalidated despite additional certification of complex rail traffic control command and signalling devices, the verification of which did not refer to the changes introduced by this extension, affecting the configuration changes for which the ERTMS/ETCS system was certificated. An analogous situation is likely, also, in case of the revitalization of the railway line tangent to the line referenced in the analyses.

It must also be believed that the situations described above are identified in the Safety Management System and that for the risk evaluation and assessment that is per-formed for technical changes in the structural subsystem in situations where there is a violation of EC verification certificates or authorizations for placing in service, the result of the assessment will be demonstrated that the implementation of such projects in relation to other subsystems is a significant change and has an impact on the safety of the railway system.

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Wpływ realizacji nowego zadania inwestycyjnego na scertyfikowany podsystem sterowanie

Streszczenie. W dobie dynamicznego rozwoju transportu kolejowego spowodowanego realizacją wielu inwestycji kolejowych zauważa się pewne problemy z realizacją inwestycji kolejowych, jak i problemy z uzyskaniem dopuszczenia do eksploatacji podsystemów strukturalnych. Większość realizowanych inwestycji jest finansowana z środków unijnych, a ich głównym zadaniem jest zwiększenie prędkości na liniach kolejowych przy utrzymaniu jak największego poziomu bezpieczeństwa. Oprócz modernizacji linii kolejowych z infrastrukturą towarzyszącą, urządzeń i sieci elektroenergetycznych czy urządzeń sterowania ruchem kolejowym, linie kolejowe wyposażane są w urządzania przytorowe systemu ERTMS/ETCS. Wszystkie modernizowane linie kolejowe zgodnie z prawem europejskim jak i krajowym podlegają procesowi certyfikacji. W stosunku do linii wyposażonych w systemy ERTMS/ETCS, które zostały już scertyfikowane jak i dopuszczone do eksploatacji, podejmowane są działania mające na celu polepszenie parametrów eksploatacyjnych infrastruktury kolejowej. Z tego też względu konieczna staje się ocena wpływu realizowanych inwestycji na zabudowane już urządzenia systemu ERTMS/ETCS, które posiadają ważny certyfikat weryfikacji WE oraz dopuszczenie do eksploatacji wydane przez Prezesa UTK.

Słowa kluczowe: certyfikacja, podsystem sterowanie, zezwolenie na dopuszczenie do eksploatacji.