

Ing. Jakub Marek, Ph.D.

**Brzdňý model ERTMS/ETCS a možnosti jeho optimalizace na úrovni aplikace
(The ERTMS/ETCS braking model and possibilities of its optimisation at the application level)**

This contribution is from the field of the railway control-command and signalling technology and deals with the European Train Control System known as ERTMS/ETCS which is currently being implemented on a large number of railway lines in both the Czech Republic and other countries. It provides the reader with information concerning a braking model that is used by ETCS to compute the braking curves and related supervision limits serving for complete supervision over the train running speed. Besides, the paper deals with possibilities of adaptation of this ETCS braking model through suitable settings of integrated correction factors. Their influence on the model is described and the paper outlines the way in which it would be possible to tune the ETCS braking model at the application level in such a manner that it can be considered as safe according to the current Czech legislation, and at the same time it can be less limiting in terms of the railway operation than the one which is set as the default solution in ETCS according to Baseline 3.

Ing. Pavel Kolář

Centrální dispečerské řízení (Central dispatcher management)

This article, dealing with central dispatching management, describes benefits of a proper organisation and arrangement of workplaces in the dispatcher hall of the central dispatcher workplace and outlines competencies of individual job positions, their interrelation and support. It defines and specifies advantages of the described arrangement of the dispatching hall and emphasises the synergy effect resulting from this arrangement. The article describes the equipment of the dispatcher hall intended for the support of the work of individual job positions in the dispatcher hall during the performing of tasks in the field of railway system operation and mentions related professions providing support for activities of the dispatcher hall.

*Ing. Petr Kačmařík, PhD. – Ing. Lubor Bažant, PhD. – Ing. Karel Veselý, PhD. –
Ing. Michal Pavel – Ing. Peter Gurník*

Družicová navigace pro bezpečnou lokalizaci vlaků (Satellite navigation for fail-safe train localisation)

The article summarises progress achieved in the use of satellite navigation (GNSS) as a primary source of information used for fail-safe train localisation. The article is based on the wide experience of AŽD Praha gained in the course of a number of national and international research projects (3InSat, SafeLOC, NGTC, STARS, Shift2Rail etc.). An overview of the projects is included and some significant results of these projects are discussed, incl. demonstration of their application in a signalling system for secondary lines. An impact of the railway environment (local influences)

on performance of the localisation system is discussed at a detailed level. It is explained there why correct addressing of local effects in a safe localisation estimation is a key factor for application of GNSS technologies in a fail-safe train localisation system.

Ing. Jiří Zmatlík, Ph.D. – prof. Dr. Ing. Otto Pastor, CSc.

Komparace EWMA a klasických Shewhartových regulačních diagramů při řízení dopravních a výrobních procesů (Comparison of EWMA and classical Shewhart control charts during the control of transport and production processes)

This article deals with comparison of classical Shewhart control charts and EWMA control charts which are able to identify even little changes in location and variability of production and non – production processes on the basis of the weights assigned to individual data items. The charts are associated with autocorrelation, which represents dependence of observations on several previous observations. The actual comparison of the charts is documented on the monitoring and regulation of a production process. Unlike EWMA control charts, classical Shewhart control charts are not able, with regard to lower sensitiveness and effectiveness (power), to identify small continuous and jump changes in process parameters.

Ing. Viliam Lábsky – doc. Ing. Josef Bulíček, Ph.D.

Koordinace spojů na společných úsecích v síťovém hledisku (Coordination of services on common segments in the light of a network approach)

The paper is focused on possibilities of how to coordinate time schedules of different line services on their common segments. The aim is to create so-called interspaces which can reduce subsequent time gaps between individual services of different lines (categories) on coordinated segments where it is suitable. The core topic of the paper is a network approach to this issue because coordination on one segment can have adverse impacts on coordination on other segments. The paper presents a designed model of network optimisation and its application in conditions of the urban public transport system of Pardubice. This model was designed as a result of a diploma thesis at the Faculty of Transport Engineering at the University of Pardubice. Possibilities of how to apply this method in the field of railway transport or in an integrated public transport system are presented and discussed as well.

Ing. Dobromil Nenutil

Kybernetická bezpečnost pro drážní systémy (Cybersecurity for railway systems)

A railway system can be perceived as a system of nested systems, each of them consisting of subsystems and components, which together provide the required functionality that guarantees safe and reliable railway operation. At present,

commercial of-the-shelf (COTS) products are used also in railway systems to the utmost extent at all its levels, which holds for identical communication protocols as well. A consequence is an essential increase in the number of vulnerabilities, which an attacker can use to attack the selected system, and the increase in the range of threats, which, when if actually occurring, can have a direct impact on safety. A substantial support to organisations in a systematic approach to assurance of cybersecurity is provided by standards. The article presents the standard under preparation, known as EN TS 50701: Railway applications – cybersecurity. It provides its brief characteristics and it deals at a more detailed level with risk assessment and the relationship between cybersecurity and safety. The EN TS 50701 standard is based on the IEC 62443 standard, which addresses cybersecurity in industrial control systems. That is why the article presents a brief description of that standard as well.

Ing. Jiří Zmatlík, Ph.D. – prof. Dr. Ing. Otto Pastor, CSc.

Metodika hodnocení účinnosti regulačních diagramů ve výrobních a dopravních systémech (Methodology of assessment of effectiveness of control charts in production and transport systems)

This article deals with a methodology of assessment of effectiveness and sensitivity of different types of control charts describing behaviour of production and non-production processes with the aim of ensuring foreseeable behaviour and statistical stability of the process. The assessment of effectiveness and sensitivity is based on power function, operational characteristics, run length distribution function with such characteristics as location and variance, expressed through average length run and length run standard deviation, which are derived with the help of mathematical means. Besides, the article is focused on philosophy of construction of the CUSUM charts and on the monitoring of CUSUM production processes with regard to a comparison between classical Shewhart control charts and CUSUM charts from the viewpoint of effectiveness (power) and performance (sensitivity). Finally, conclusions and recommendations for practical applications of these types of charts are presented.

doc. Ing. Libor Švadlenka, Ph.D.

O činnosti Dopravní fakulty Jana Pernera nejen v oblasti železnice (About activities of the Faculty of Transport Engineering, not only in the area of railways)

The Faculty of Transport Engineering remembered a quarter of a century of its existence last year. As one of the seven faculties of the University of Pardubice it provides comprehensive education in the field of transport. Its aim is to prepare specialists for both private and state transport organisations and enterprises, manufacturing, construction as well as business companies, research and design organisations, state administration and education spheres.

The Faculty is involved, in a significant extent, also in various projects of especially applied and institutional research, both in the Czech Republic and within the framework of international cooperation. Railway transport has a leading place in the activities of the Faculty.

Ing. Lukáš Fiala

Popis železniční sítě pro konstrukci jízdního řádu a řízení provozu (Description of a railway network for designing timetables and traffic management systems)

Information systems for railway traffic management and timetable planning cannot do without a data description of the rail network. The primary source of data for these systems is the KANGO dataset. This article describes basic principles of data description of a network, and some of the current problems resulting from its use by the continually growing number of different systems in the field of traffic management.

Ing. Michal Vítěz, MBA

Společný nákladní list CIM/SMGS v kontextu praxe společnosti ČD Cargo, a.s. (Common CIM/SMGS consignment note in the context of the practice of the joint-stock company "ČD Cargo, a.s.")

The paper provides information about current international railway transport law and about creation, development and use of the CIM/SMGS consignment note, with an emphasis on the experience of the ČD Cargo company.

Ing. Petr Nachtigall, Ph.D. – Ing. Jan Ouředníček, Ph.D.

Zajištění dohledu nad zastavením (snížením rychlosti) v ERTMS/ETCS v souvislostech (Assurance of supervision over stopping (speed reduction) in the ERTMS/ETCS system in various contexts)

The paper deals with implementation of the ETCS automatic train control system of level 2 in conditions of the railway infrastructure of the Czech Republic with regard to operational impacts which are brought by fail-safe supervision principles used at ETCS, as far as speed reduction or stopping functions are concerned. In a wider context it mentions the aspects on the ETCS part, when this system brings new principles, properties and associated influences on the existing transport environment, as well as characteristics and conditions on the existing operation part, in which ETCS is used. Also the possibilities of ETCS adaptation to conditions of the existing operation are discussed, together with possibilities of modifications on the part of the existing railway infrastructure for mitigation or complete possible elimination of operational impacts implying from the use of the ETCS system.



Vydavatelská a redakční rada NŽT

Nová železniční technika – recenzovaný odborný časopis navazující na dlouhou tradici československých železničních periodik

Ing. Danuše Marusičová – prof. Ing. Vlastislav Mojžíš, CSc.

Čest památce pana profesora Frýby (In Honour of Professor Frýba)