
Adam Dąbrowski, Szymon Klemba: **Possibilities of Increasing the Role of Railways in the Public Transport System of the Urban Functional Area of Olsztyn**

This article presents the possibilities of increasing the role of railways in the public transport system of the Urban Functional Area of Olsztyn. First, the proposed extent of the rail service, the assumptions for the new transport offer and the principles for the development of the rail timetable were outlined. Taking into account the current state of the infrastructure, the feasibility of implementing the basic transport offer (10 pairs of trains per day) and its further development in the future was examined for each direction of transport, and graphical timetables were drawn up and presented, based on the assumption of cyclical departures (i.e. clock-face schedule for train departures). Part of the article is also devoted to measures in the area of bus transport in terms of organisation and infrastructure, which, if taken, would make it possible to better integrate it with the railway system. Taking into account the observations and conclusions in the previous chapters, the proposed investment activities involving the railway infrastructure necessary to implement and improve regional rail services, as well as a broader perspective on further investments enabling the development of the transport offer and increasing rail accessibility in the Urban Functional Area of Olsztyn, are presented. The main conclusion of the analyses carried out is the confirmation of the feasibility of implementing a cyclical timetable in the area under study for the assumed base number of connections.

Keywords: rail transport, public transport, integrated transport system, cyclical timetable

Marek Graff: **Vectron as an Example of a Modern and Versatile Electric and Diesel Locomotive for Passenger and Freight Transport**

The Vectron locomotives are a Siemens proposal covering locomotives dedicated to both passenger and freight traffic, capable of operating under a wide range of supply voltages (multi-system, single-system, etc. versions are offered), on both normal and broad-gauge track. A diesel version was also designed for operation on non-electrified lines. The Vectron locomotives are a variant of the Eurosprinter ones, developed in the early 1990s and enriched by the operation experience acquired, both on the German or Austrian railway network and in other EU countries (acceptance to operate as part of the liberalization of the common market). To date, circa 1,500 Eurosprinter locomotives have been sold, primarily in Europe and also in the USA, where they are operated in moderate climate, and both the Mediterranean one and the cold Scandinavian winters.

Keywords: electric locomotives, multisystem voltage locomotives, Vectron, Siemens

Krzysztof Polak: **Indicator Method of Assessing Acoustic Impact of Railway Vehicles**

The following article constitutes an attempt to solve the problem of the interpretation of results based on a comparison of measured values to permissible values. When exceeded limits are observed, the recipients of acoustic analyses (mainly non-specialists) are frequently uncertain as to how to interpret the results. At the moment, there is no unambiguous way of defining acceptable, alarming or unacceptable values of noise but an original indicator methodology, which allows a clear and easy interpretation of the results obtained, has been

proposed. The suggested noise load factor (NLF), based on measurements of physical quantities, enables conducting a broader assessment of the nuisance of noise originating from railway vehicles.

Keywords: noise, environmental impact assessment, acoustic impact

Henryk Sanecki, Tomasz Czauderna: Model of a Drive System for Low-Floor Trams with a Four-Linkage Coupling

The article describes the structure and principles of operation of a drive system used in some low-floor trams. The system consists of electric motors, gear transmissions as well as hollow shafts and four-linkage couplings causing the wheels to move. During the study, a dynamic model was built and the parameters needed to carry out a simulation were determined. NGT6 low-floor tram wagons operated by MPK S.A. Cracow were used as examples of existing vehicles. Due to the lack of available data, part of the work was devoted to determining mass moments of inertia of drive system components using an experimental method of torsional vibrations of a string. In subsequent chapters, a mathematical model was developed and a tram start-up simulation was performed based on specific parameters of the individual system components. Some of the results were presented in the form of graphs.

Keywords: tram riding simulation, mathematical model of dynamics, start-up, mass moments of inertia, method of torsional vibration of string

Grzegorz Stencel: New Technological Solutions to Improve Rail Passenger Services Based on the Example of the In2Stempo and ExtenSive Projects of Shift 2Rail

There is a reason why it is said that stations are the business card of railroads. In the IN2STEMPO and ExtenSive projects, re-search work is looking at solutions to improve the passenger experience at stations. This article presents the scope of research carried out within the projects, including the development of more effective tools for crowd management at high-capacity stations, but also on new methods of designing stations and their elements taking into account the latest architectural trends. An important issue is also a problem still troubling the staff of many railroads, that is, improving accessibility from the platform to the train. Rail services, by their universality, should take account of the extensive opportunities offered by information technology. This applies to the complete process of passenger service, from purchase of a ticket to arrival at commercial outlets and the journey itself. The article also outlines the principles of the ExtenSive project, which is a continuation of previous work aimed at developing both passenger applications and software for transport operators, which at the end of the day will enable the provision of transport services of the highest standard. This paper presents the results of the analysis so far on the eve of the projects' completion, and identifies possible applications of the results of the work carried out.

Keywords: rail passenger services, Shift 2Rail, Horizon 2020