WORLD OF TRANSPORT AND TRANSPORTATION
Vol.15 (2017), Issue 3

Features of Cyclical Development of Automotive Industry

Gavrilenko N. G.

Pp 6 – 15

The transport complex of the country creates conditions for economic growth, delivers cargo and employees to the places of production of goods and services, acts as a powerful catalyst and serves as an effective means for solving geopolitical tasks. The article contains the theoretical foundations of cyclical development of the economic objects of the industry. The regular connection between the dynamics of periodic recessions and the rise of the economy and indicators of vital activity of motor transport is shown, the complete life cycle of the system's existence and the so-called long cycle with duration of 40–60 years are presented in detail. The innovation factor is determined at the same time as a key factor in development of road transport. Accordingly, the intensity of the evolutionary process of upward and downward waves of the long cycle is estimated.

Keywords: road transport, economy, cyclic development, evolution, innovations.

The Absolute First Central Moment of Random Variables

Gusev A. I.

Pp 16 – 29

The geometric, Poisson, and binomial distribution laws are considered in the article. For each of them an analytic formula of the absolute first central moments is derived, which allows us to find the average distribution zone. The work is of a fundamental nature and can be used in studies on probability theory, in applied problems where these distribution laws are present.

Keywords: random variable, distribution laws, mathematical expectation, dispersion, root-mean-square
deviation, moments of random variables.

Fuzzy Numerical Probability Analysis of Rail Fastenings Reliability

Krakovsky Yu. M., Davaadorzh Batbaatar

Pp 30 – 39

As a probabilistic model for calculating reliability of rail fastenings, a triangular distribution with two parameters, the maximum and the most probable, is

used. Fuzzy numerical probability analysis with the use of simulation modeling suggests that experts, using statistical and expert information, can numerically estimate the maximum value of the operating time, and for the second value (mode) may offer only the interval of its change. This is the most realistic situation in practical applications in conditions of uncertainty in the initial data. The algorithm of fuzzy analysis, which is approved on the basis of expert information, is proposed.

Keywords: rail fastenings, reliability indicators, numerical probability analysis, simulation modeling.

Social Significance of Transportation Speed

Macheret D. A.

Pp 40 – 52

The article assesses the influence of speed of transportation on formation and development of human society. It is shown that the emergence of modern high-speed transport has led to cardinal social changes, namely to acceleration of urbanization, intensification of interregional and intercontinental migration flows, improving the quality of life. It is noted that directions and intensity of spatial displacements of people can be regarded as a social indicator aggregating individual ideas about attractiveness of certain places of residence. To quantify the spatial and temporal accessibility, the concept of «territory of isochronous accessibility» was introduced, and for socioeconomic assessments it was suggested to use a set of indicators as population size, gross domestic product, and the volume of production of services within the isochronous availability territory. Further acceleration of transportation speed implies both an increase in speed of transportation by different modes of transport, and elimination of time losses at the «junctions» between them, which should be supported by the development of multimodal logistics.

Keywords: transport communication, speed, society, humanity, urbanization, migration, space-time accessibility, territory of isochronous accessibility.

Evolutionary Patterns of Logistics

Mirotin L. B., Baginova V. V., Fedorov L. S.

Pp 56 – 62

The article is based on the results of long-standing research conducted by the authors in the field of logistics. It contains provisions and conclusions reflecting the evolution of the development of the concept of logistics in the last 25–30 years, since traditional approaches have radically changed and transformed from the basic concepts associated with supply chain management to understanding of priority logistics tascs as of managing of consumers' demand chains under market conditions. Today the logistics approach must be implemented through the social purpose of human action. At the same time the engineering aspect of modern logistics, which is

based on process-resource and network technologies, is becoming increasingly important.

Keywords: logistics, intralogistics, evolution, logistics methodology, information, services, network technologies, logistics management, integrated process, network-centric management.

Hyperloop: technical risks and prospects

Smirnov A. V., Egoshin S. F.

Pp 64 – 82

The article is devoted to the technical analysis of Hyperloop high-speed land transport project, interest in construction of which has increased significantly recently. The basic technologies are briefly considered, with the help of physical calculations the basic design characteristics are specified. Technical risks are identified, some of which may affect the initial configuration of the project, while others call into question the very possibility of its implementation. The carried out researches allow to give the conclusion about expediency of the further work on creation of high-speed transport system Hyperloop and to formulate a list of priority research tasks which are necessary to be realized for the project becomes successful.

Keywords: Hyperloop, vacuum overpass, shuttle, high-speed transport, transport systems of the future, new technologies, technical risks.

Diagnostics of the Road Condition Using an Unmanned Aerial Vehicle

Grigorenko N. I., Yanchuk E. E.

Pp 86 – 92

Along with growing requirements for durability, reliability and safety of roads and their infrastructure, tools to control technical conditions of roads are being improved, involving operation of unmanned aerial vehicles that help to monitor the road infrastructure with the help of aerial photography. The authors of the article introduce a method of continuous automated monitoring developed by them, which is implemented in Moscow region. The wide functional capabilities of the UAV are confirmed for a number of diagnostic and technological tasks.

Keywords: automobile road, geotechnical monitoring, diagnostics of roadway, infrastructure, geomass, unmanned aerial vehicle, aerial photography.

Modernization of Heat Supply System of Railway Stations

Dmitrenko A. V., Gaitrov M. Yu.

Pp 94 – 102

The article considers the need to modernize the heat supply system of railway stations within the framework of the main guidelines of the energy strategy of the Russian Federation until 2030. The main park of boiler rooms is equipped with the aged machinery that by some features does not meet the standards of environmental friendliness, safety and efficiency. The article presents the main indicators of boiler rooms of a new type. The comparative analysis of the characteristics of the new and former boiler rooms as of an energy complex is suggested. The conformity of the proposed indicators to the guidelines of the energy strategy of the Russian Federation and subsequent innovations is determined. One of the conclusions of the authors is that in addition to replacing the equipment, it is necessary to conduct decentralization of the station's heat supply system.

Keywords: energy efficiency, operating costs, steam boilers, reserve fuel, fuel oil, diesel, block-modular boiler rooms, efficiency.

Experiment with Sliding of Locomotive Wheel Sets

Novoseltsev P. V., Gordeeva A. A., Kuptsov Yu. A.

Pp 104 – 110

Experimental studies presented in the article have revealed that the unevenness of movement of the individual parts of the train during its driving along the rails leads to appearance of shocks that could cause sliding. The peculiarity of the proposed method of controlling the situation is that the absolute motion of the locomotive with respect to the fixed system is determined, its speed is set, according to the change of which sliding is calculated, since just decrease in speed when driving in traction mode indicates the occurrence of deviations.

Keywords: railway, locomotive, wheel, rail, tangential traction force, speed, acceleration, inertia force, drag force, absolute and relative sliding speed.

Vacuum Train: Finding a Niche in the Passenger Transportation Market

Nesterov S. B., Vorobiev I. A., Kondratenko R. O.

Pp 112 – 121

The necessity and profitability of creating a transport system with speeds that are multiples of 1000 km / h (up to 6000 km / h) is constantly being discussed by the world scientific community. Today, the only way to increase the speed of rail transport to such values is seen in replacing the wheel-rail system with a magnetic suspension system and replacing the natural environment with an artificially created

one, in which the aerodynamic resistance for transport will be small. The article considers the niche of the transport market, which can be occupied by a vacuum train in a competitive struggle with highspeed and air transport.

Keywords: vacuum train, comparative analysis, competition, niche search, maglev, air transport, railway transport, high-speed trains.

Financing of Companies with Syndicated Loans

Tarasov A. A.

Pp 122 – 131

The article analyzes the features of syndicated loans for transport companies. The purposes for which borrowers from the transport sector raise funds, and the requirements for provision of financial and information materials within the transaction are considered. The key stages of the process of attracting a syndicated loan and functions of its main participants are presented, while the success of the project is determined as the consistency of the results with the objectives of the operation and the set deadlines.

Keywords: economy, financing of transport companies, syndicated lending, debt market, corporate finance, transaction conditions, financial management.

Advantages of Ballastless Track Design for Large Transport Objects

Tsypin P. E., Razuvaev A. D.

Pp 132 – 138

The article assesses the possibility of using a ballastless (or slab) track design (BTD) in implementation of large transport facilities in the city. BTD is the only alternative to a traditional track on ballast. Such an option has a number of advantages, but at the same time, certain shortcomings that restrain its mass application today. Based on foreign experience and comparison of two designs (track on ballast and BTD), taking into account costs for repair and current maintenance, the authors offer their understanding of economic arguments and benefits derived from operation of the ballastless track.

Keywords: railway transport, track superstructure, ballastless structure, high-speed traffic, costs, payback, economic effect.

Analysis of Technical and EconomicIndicators of Sources of Own Generation of Energy on Railways

Samarov K. L., Strenalyuk Yu. V.
Pp 142 – 146

The stages of the system analysis of technical and economic indicators allowing to compare the efficiency of renewable solar energy equipment are

described. It is shown that the introduction of solar installations as an additional source for a power supply system for non-traction and non-transport consumers (for equipment of information and computer complexes of railways) will make it possible to reduce energy costs and reduce construction of power transmission lines. The authors of the article are sure that the situation in the energy pricing policy makes an objective assessment of the energy payback of the solar installation construction particularly important.

Keywords: railway, system analysis, solar energy, solar installations, energy payback.

Design of High-Speed Combined MotorRoads and Railways

Dydyshko P. I., Kuzakhmetova E. K.

Pp 152 – 159

The article considers the problems of construction of high-speed combined motor roads and railways in Russia. The design of these objects requires special attention, since the object itself is a complex transport system, each element of which requires increased operational reliability. Therefore when designing combined roads a full accounting of natural and man-made impacts on engineering structures is required. On the basis of the studies, recommendations are given on the methodology of design works and geological surveys, the question is raised about the need to update the accompanying legal framework.

Keywords: high-speed combined roads, engineering and geological surveys, design, construction, highway, railway, transport system.

Evaluation of Passenger Satisfaction with Public Transport Services

Pokusaev O. N., Ovsyannikov M. L., Shaklein A. G.

Pp 160 – 173

Based on existing domestic and European standards of quality assessment, the article justifies the approaches to improving the work of public transport. The authors' method of analyzing factors, which affect the characteristics of the transport service of the population and the satisfaction of passengers with the services of suburban electric trains and the metro, is demonstrated. The data of the conducted surveys allow to argue a step-by-step scheme of improvement of the expected quality in the quality system, which is achieved through conscious quality, and that in turn is regulated by realized quality. The level of the latter is determined by the impact on operational and infrastructural factors.

Keywords: public transport, suburban electric trains, underground, quality of service, passenger satisfaction.

Low-Density Lines: State and Optimization Options

Vakulenko S. P., Kolin A. V., Evreenova N. Yu.

Pp 174 – 180

The methodology and methods of the conducted research are based on the system analysis and scientific generalization of domestic and foreign experience in operation and maintenance of lowdensity railway lines. At the same time, not only the current state in this sphere of transportation is evaluated, but also suggestions are made with regard to optimizing processes using technical re-equipment strategies, changing technologies, stimulating demand through organization of new types of service, and use of forms of public-private partnership.

Keywords: management strategy, low-density railway lines, cost-effective operation, freight and passenger transportation, optimization, methodology, differentiation of destination.

Road Network and Waste Problem

Naiman S. M., Medvedev V. B., Mingaleev N. Z.

Pp 182 – 186

The authors of the article systematize the processes of waste generation of the motor transport complex throughout the life cycle of the constructed and operated road. At the same time, variants of land, underground and aboveground lines, solid and liquid waste types, as well as factors affecting their quantitative indicators, and the features of the most waste-generating activities related to the road industry are differentiated.

Keywords: road network, transport enterprises, construction, reconstruction, operation, waste.

Lean Manufacturing Technology and Minimization of Losses from Accidents

Krasikov N. Y.

Pp 188 – 195

In railway sector there are many dangerous destabilizing factors. One of the most common problems is collision of a train with a vehicle which is stuck on or entered out of driver’s negligence into a railway crossing. In the article methods of minimization of losses from this type of accidents are considered. They comprise construction of tunnels and overpasses at the intersections of the railway and the road, use of a 3D-laser radar to warn the locomotive crew about the stuck transport. In addition, it is possible to use web cameras, the image from which, using a router installed within 4–5 km far from the crossing, is transferred to the train driver’s cab

on a separate display in advance to see the stuck vehicle and to have time to take emergency braking measures.

Keywords: lean manufacturing, safety factors, railway crossing, emergency situation, visual perception, 3D-laser radar, web camera.

Human Factor Influence on Train Brake Equipment Reliability

Manuilov N. I.

Pp 196 – 204

The article considers the human factor influence on trouble-free operation of brake equipment of trains. The study was carried out by an analytical method, based on the statistics of equipment failures, assessment of implementation of the current rules for railway rolling stock maintenance. The problem of the lack of an effective device for diagnosing the brake network of a train, which would provide control over its integrity and density in the course of traffic and during stops, is revealed. At the same time, it is also necessary to reduce time for measuring density of the brake network, the train to automate this process.

Keywords: railway, traffic safety, braking equipment, train brake network density, reliability, human factor.

Reduction of Emergency Risks with the Help of Intelligent Video Surveillance Systems

Zhuravleva L. M., Bogachev A. P., Yatskivsky N. V.

Pp 206 – 212

The article considers the use of intelligent video surveillance systems as an additional measure to ensure the safety of train traffic on dangerous sections of railways (crossings, tunnels, complex terrain, etc.). It is proposed to use the resources of the fiber-optic transmission network and the frequency range of train radio communication for organization of communication channels, provided that the existing equipment is modernized.

Keywords: railway, traffic safety, video surveillance, high definition, video analytics.

On the Issue of Training and Certification of Scientific Personnel, Ph.D. Students and Master's Students

Mazur S. F.

Pp 214 – 220

The article attempts to resolve some problems of improving the quality of training and certification of scientific personnel for higher education, as well as

master's students in the legal specialty. The objective preconditions of the process of improving the university practice are shown in conditions when the obvious contradictions of the Bologna education system are becoming more acute, thus seriously worsening the qualification level of specialists, the continuity of the curricula and the transparency of the knowledge offered in the training process. The author pays special attention to means of formalizing the evaluation of the quality of scientific works, their originality and reliability.

Keywords: Bologna system, higher education, master's studies, bachelor's studies, certification of scientific personnel, Ph.D. studies, «Antiplagiat» system, preparation of theses on legal specialty.

Intertype Relationship within the Crew

Malishevsky A. V.

Pp 222 – 233

The results of experiments conducted by the author from 2004 to the present with professional pilots and students of the University of Civil Aviation are analyzed. The purpose of the study was to test the possibility of using a socionic model of intertype relationships using the theories of V. V. Gulenko and G. A. Shulman to evaluate the effectiveness of interaction in a two-member crew of an aircraft. As a criterion, the data of indirect sociometry are used. Statistical criterial dependencies are given. The article continues the previously started topic (see World of Transport and Transportation, 2014, Iss. 5 and World of Transport and Transportation, 2016, Iss. 1).

Keywords: civil aviation, crew of an aircraft, interaction of pilots, intertype relations, sociometry, management of crew resources.

Internationalization of Study and Teaching: Innovative Trends

Freitag Kornelia

Pp 234 – 238

The article is devoted to the experience of the organization of interuniversity cooperation and partnership, internationalization of study and teaching on an innovative basis. Ruhr University Bochum is known not only in Germany for its commitment to advanced educational technologies, its desire to develop international relations, and to cultivation of joint training programs with foreign partners, to which MIIT has been belonging for severa l years. The author comments on internationalization of educational programs, mobility of students and teachers, exchange of researchers and their contacts at the beginning of a career. At the same time, the problem of the linguistic environment and its importance for the success of teaching and research activities within the walls of the university are also noted.

Keywords: university, training, research, internationalization, interuniversity cooperation.

«Simplifiedly Stop Remarkably Stop Sensitive Stop»

Grigoriev N. D.

Pp 240 – 246

Petr Nikolaevich Rybkin is «the first radio operator», «the grandfather of the Soviet radio operators», the closest colleague of Alexander Popov. It was Petr Rybkin who, in March 1896, with the help of the Morse code, transmitted the first radiogram in the world – «Henry Hertz». In May 1899, together with another assistant of Popov, D. S. Troitsky, he opened the possibility of perceiving radio signals with human ear. Based on this discovery, a radio receiver with a handset for receiving radio signals was developed.

Keywords: audition of radio signals, wireless telegraph, electromagnetic waves, radio receiver, coherer, detection.

In Rain, Heat and Cold the Traffic Schedule is Needed

Sotnikov E. A.

Pp 252 – 256

REVIEV OF THE BOOK: Levin, D. Yu. Organization of car flows on railways: Monograph. Moscow, Training and Methodological Center for Education in Railway Transport, 2017, 443 p.

Fundamental work describes the history, current state and prospects for development of organization of car flows, which is regulated by a plan for formation of trains. The tasks of calculating the formation plan of various categories are formulated in great detail. Various modes of the process of accumulation of trains are considered. Market conditions require new criteria, this fact is reflected in the settlement standards. The theory of calculating the formation plan has passed a long way of development, but modern conditions require new methods for calculating the formation plan. At various stages of development of railways, the attitude to the routing of cargo transportation changed. In the conditions of cars' privatization the criteria of routing efficiency have changed. The market conditions left also their mark on various features of organization of empty car flows. The increase in the share of group trains is hampered by the shortage of marshalling tracks. The proposal of the author to introduce the centralized traffic control of organization of car flows is of great interest.

Keywords: organization of car flows, empty car flows, centralized traffic control, car-hours, plan of formation, sender routing, group trains.