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AVERAGE WEIGHT CALCULATION OF A FREIGHT TRAIN

Baturin, Alexander P.

pp. 6 – 13

Average weight of freight trains is an important indicator of the use of the existing tonnage rating, power of traction means and defining, in terms of given volume of traffic, size of freight trains movement on sections of railway lines. This indicator plays a leading role in technical and economic calculations, but methods, which are used, provide a basis to seek corrective options. The author offers his interpretation of the well-known formula that is used for selecting optimal tonnage rating of freight trains (characterized by full-length and full-weight) and bases his calculations on certain assumptions. With the help of a modified formula difference of the calculated average weight of about 2.3% is achieved.

Keywords: freight train, average weight, calculation formula, optimal weight standards, theoretical basis of calculations.

RUNNING IN OF CYLINDRICAL SURFACE OF CENTRE PLATE UNITS OF CARS

Voronin, Nickolay N., Voronin, Nickolay. N. (Jr.), Zin Aye Min (Myanmar)

pp. 14 – 21

This article presents an algorithm and its description to determine wear in center plate units of cars and rail tanks. It is shown that in the beginning of operation contact area has a small length, and with the growth of the car`s distance run, wear of cylindrical surfaces occurs and its size increases. At the same time the method of calculating the respective quantities and source data, numerical analysis of wear of rubbing parts of the structure is demonstrated. The calculations took into account that when the oil was transported, rail tank returned empty, and their own results show that wear of center plate units' surfaces depends on the contact pressure distribution and gaps between center plate and center pad.

Keywords: railway, rail tank, car, tribology, centre plate units, cylindrical surfaces, contact pressure, numerical analysis, calculation methodology.

STRUCTURAL LEVELS OF INTERREGIONAL TRANSPORT SYSTEMS

Tararychkin, Igor A. (Ukraine)

pp. 22 – 33

A method for determining structural levels of interregional transport systems, algorithms and quantitative criteria to establish the composition and number of structural levels have been developed. It is shown that, in general, interregional transport system can have three levels (local, regional and interregional), and optimization of its operation should be carried out sequentially at each of these levels, taking into account proposed mathematical tools.

Keywords: transport, system, components, structure, interregional level, clusters, structural analysis, method, optimization.

STRUCTURAL OPTIMIZATION OF INTEGRATED AUTOMATIC CONTROL SYSTEMS

Popov, Alexander P.

pp. 34 – 40

A distinctive feature of the structuring of the network mathematical models is the use of available spectrum of weighting values of anti-symmetric connected graphs' nodes. Reflected mathematical objects make it possible to build an ordered structure of relations between full paths of network graph, which is described with an oriented graph- tree. And it provides, in turn, the ability to effectively solve the numerical problems on the models. Represented structuring process helps to get efficient search algorithm for full paths. This kind of algorithm contributes to the realization of a new method of a structural optimization

Key words: ACS, network model, structuring, graph, digraph, graph-tree, contour, group, optimization, mathematical model, algorithm, differential.

IGNITION SYSTEM WITH ADAPTABLE CONVERTER

Sarbaev, Vladimir I., Garmash, Yury V.

pp. 42 – 45

Starting of cold car internal combustion engine often becomes a problem. To ensure a consistent spark formation, certain conditions and efforts are required,

including the choice of optimal operation of accumulator batteries, voltage indicators. This article provides general approaches to solving related tasks and evaluates the results of experimental studies of the ignition system when it is powered by an adaptive converter of electric energy pulse parameters at low temperatures.

Keywords: internal combustion engine, car, ignition system, low temperatures, accumulator batteries, field research, pulse adaptive converter of electric energy parameters.

MEASUREMENT OF TRANSFORMER WINDINGS RESISTANCE

Grigoriev, Nickolai, D.

pp. 46 – 49

The article contains a theoretical rationale and describes the method of separate measurements of total, active and reactive resistance of transformer windings. Linear currents and voltages are measured, as well as power in the short-circuit experiment of a three-phase two-winding transformer or group of three identical two-winding single-phase transformers. From the values of the three phase power, average linear voltage and current values of short circuit resistance are calculated in delta and wye connection schemes of supply windings. Parameters of total, active and reactive resistance by short-circuit of any winding of multiwinding three-phase and single-phase transformers can be defined similarly, turning them into supply windings.

Keywords: single-and three-phase, two-and multiple winding transformers, supply winding, total, active and reactive resistance, delta and wye connection.

PACKET VOICE TRANSMISSION IN MOBILE NETWORKS

Gorelov, Georgiy V., Kleptsov, Gleb I., Popov, Ivan L.

pp. 50 – 55

In the article the authors represent problems and resources of packet voice transmission in mobile networks on rail transport. It is proposed to extend the research methods of transmission quality by using the data link layer of IEEE 802.11 standard for analysis of systems introduced in railways with DMR standard.

Keywords: rail transport, mobile networks, packet voice transmission, transmission quality, process standards, analog system, digital system, the communication range.

DIAGNOSING LOCOMOTIVES ACCORDING TO ONBOARD MICROPROCESSOR SYSTEM DATA

Melnikov, Viktor A

pp. 56 - 62

The article deals with the diagnostic process automation on the basis of software with the use of data received from microprocessor systems installed on locomotives. The peculiarity of the approach under review is the use of the results of monitoring of locomotives' technical condition for the accumulation of statics, which allows predicting the expected level of risks and planning corrective actions. The objective of the proposed project is, to provide timely prevention of faults, creating preconditions for objective analysis (operational control) and identifying certain trends.

Keywords: railway, locomotive, technical condition, monitoring, on-board microprocessors, prognosis, prevention.

ECONOMY OF BOTTLE NECKS

Macheret, Dmitry A.

pp. 64-75

Traffic jams significantly increase the uncertainty and risks for commodity owners and passengers negate the key advantages of modern transport such as speed, regularity and urgency. Congestions on the roads essentially contradict the objectives of transport, worsen the business environment, reduce the quality of life, lead to the loss of the most precious resource – time. The reason for traffic jams is a chronic lack of offer and demand balance, long-term shortage due to failure of the market mechanism of pricing on services of road and rail infrastructure. As a result losses are suffered by the whole society, and the investment attractiveness of transport infrastructure and its advanced development, required for high economic dynamics, cannot be achieved. To avoid this, the dependence of the cost, necessary to provide infrastructure services from the intensity of demand and its timely change in accordance with market conditions should be ensured. The article presents the model, developed by the author, which determines a reasonable level of fees for the use of transport infrastructure.

Keywords: transport, traffic jams, bottle neck, economy, infrastructure, uncertainty, risks, infrastructure's use costs, rational model of payment.

DEPRECIATION AND INPUT OF FIXED ASSETS ON THE RAILWAYS

Volkov, Boris A., Gudkov, Pavel A.

pp. 76 – 83

Despite the increased financing volume of railway transport investment, the level of deterioration of its rolling stock and infrastructure hardly reduces. One of the reasons hindering the development of railways in Russia is the lack of depreciated assets even for simple reproduction, and therefore an adequate flow of investment is required to solve the problem of replacing the old fixed assets with the new fixed assets. To justify the additional financial resources it is necessary in this case to provide an accurate reassessment of both original and the current market price of fixed assets, which are on the balance sheet. But above all, it is required to find methodological approaches, appropriate to the tasks, to achieve reliable monitoring of threshold quantities, as well as balance of reproduction and renewal of fixed assets, increase in productive possibilities capacity of the sector in general.

Keywords: railway transport, investments, deterioration, input of fixed assets, depreciation, revaluation, innovations.

SELECTION OF COASTAL TERMINALS FOR STORAGE OF LIQUID FUEL

Lyashenko, Anton N.

pp. 84 – 91

The article provides an analysis of costs of liquid fuel storage at port and coastal terminals involved in freight transportation. Among other things, it gives estimation of selection of tanks' rational volumes, payback period of buffer tanks construction, cost of storage for one ton of crude oil, fuel oil, diesel fuel per day, transportation of such goods in autumn-winter and spring-summer periods on certain routes. Moreover, on the basis of indicators of terminals of Russian coastline most appropriate criteria and their operating conditions are named by adding as a link in the supply chain, which is based on lower costs and delivery period.

Keywords: logistics, economics, transportation, fuel, seaport, coastal terminal, storage, costs, costing, payback.

NOT ONLY LIKE BALLS IN THE BEARING

Zhuravlev, Anatoly B.

pp. 92 – 103

Each of the traffic problems is closely linked to the economy, its needs and development prospects. Somewhere transport priorities coincide with market conditions, and somewhere they are in conflict with the interests of the producing industries and regions (megacities), consumer expectations. In the published polemical notes not everything is equally convincing, but the issues involved are relevant and have a universally significant character.

Keywords: transport, transport market, economic benefit, investment, region, metropolitan area, electrification, energy intensity of the economy.

DEVELOPMENT OF CLUSTERS' COORDINATION SEGMENTS WITH SECTORIAL FOCUS

Cherniy, Sergey G., Logunova, Natalia A.

pp. 104 – 115

The article examines economic approaches and structural characteristics of strategic potential of the cruise industry; the correlation has been found out and clustering of its components by blocks of individual capacities combining functional, reproductive and resource criteria has been carried out. Taking into account the hierarchical level of the formation of industry capacity (national, regional, sectoral, local), rational forms, methods and tools of managerial influence on the process of its functioning as an integrated system are investigated in the aspects of expert analysis of a case type.

Keywords: tourism business, economics, strategy, investment potential, resources, cruise operators, cruise industry, decomposition, expert assessment, precedent.

MODEL FOR SELECTION OF INVESTMENT PROJECTS

Beryakov, Sergey N.

pp. 116 – 122

The article is devoted to peculiarities of formation of the comprehensive investment project in accordance with the development strategy of «Russian Railways». The mathematical model of project selection is described, which

comprehensively considers the current state of a company and future directions for its functioning, resource and financial support for the planned reforms and the risks of adverse events.

Keywords: railway, integrated investment project, human resources, development strategy, net present value, profitability index, internal rate of return, payback period, selection model, financial feasibility, resource feasibility.

INFORMATION IN THE STRATEGY OF SHIPPING COMPANY

Bulov, Anatoly A., Sokolov, Sergey S., Novoselov, Roman Yu.

pp. 124 – 133

The article deals with mathematical models of strategic management of a shipping company in international transportation. Modeling guidelines make it possible to estimate the efficiency of the structural elements of the management system and individual transport units. The article provides an overview of functional capabilities of created infoware that is designed to automate the process of identifying main indicators of management activities and construction of resulting graphs.

Keywords: transport, shipping company, strategic management, model, information, performance indicators, automation of administrative processes, international cargo transportation.

SERVICE MAINTENANCE OF TRACTION ROLLING STOCK WITH LIFECYCLE MANAGEMENT

Evseev, Dmitry G., Scherbakov, Cyril G.

pp. 134 – 139

Repair depots, being a part of the Russian Railways' system, cannot independently fully provide satisfactory condition of the locomotive fleet in accordance with modern requirements. In this situation, it is required to modify the maintenance system to achieve the greatest efficiency. In this case, the base should be a service maintenance system of traction rolling stock (TRS) with the ability to manage the lifecycle. It is this version the authors evaluated, investigating not only corporate motivation, but also common approaches to the organization and preparation of maintenance. In particular, the authors consider the value of information resources, modernization of locomotives at certain stages of the life cycle, as well as cost factors of the whole complex of maintenance and repair work in the operation of TRS.

Keywords: railway rolling stock, locomotive, service maintenance, maintenance, life-cycle management.

ON THE PROSPECTS OF DIAMETRIC COMMUTER RAIL ROUTES DEVELOPMENT IN MOSCOW AGGLOMERATION

Kolin, Alexey V., Muleev, Egor Yu.

pp. 140 -147

The article considers the prospects of implementation of diametric commuter rail routes in Moscow railway junction. It is shown that under existing infrastructure and technological limitations creation of Belarussky-Gorky diameter not only improves the quality of transport services, but also optimizes the volume of transport work of rolling stock, helps to reduce costs and layover time.

Keywords: railway transport, commuter rail traffic, route network, optimization of traffic schedule, diametric route.

PROSPECTS OF ULAN BATOR RAILWAY

Baljir, Munkhdelger (Ulaanbaatar, Mongolia)

pp. 148 – 155

As of 2013 the total volume of freight traffic on the JSC «Ulan Bator Railway» has reached 21 million tons, which is 1.5 times more than in 2009. According to current projections, the current volume of freight traffic will increase by about three times in 2020 and will reach 45.1 million tons. With intense development of the mining industry of Mongolia and transportation of its products to China track facilities and infrastructure in general are in a critical condition. There are many «bottlenecks» on the main track. All these factors constrain the use of available capacity of new locomotives, limit their speed, and reduce weight of trains and axle load. To ensure prospective traffic volumes JSC «Ulan Bator Railway» should carry out technical modernization.

Keywords: Transmongolian main line, Ulan Bator railway, freight flow, semi-automatic blocking, automatic blocking, carrying capacity, estimated capacity, technical station, technical modernization.

TRENDS IN THE DEVELOPMENT OF TRANSIT: FROM SEA TO OVERLAND ROUTES?

Chumlyakov, Cyril S.

pp. 156 – 161

International transit as a unique form of transport services' export is of particular importance for the country. Priority is the development of international economic relations between Europe and Asia, with a tendency of further growth. The author explores the competitive space of transit traffic through Russian transport communications. Comprehensive analysis of various trends and options for long-term predictions allowed the author to determine potential cargo flows on overland corridors of the Russian Federation, currently directed by maritime routes bypassing its territory. Special importance of rail transport in ensuring the development of foreign economic relations and international trade has been justified, need to create new overland transport corridors has been actualized.

Keywords: transport infrastructure, development strategy, international trade, international transit traffic, transport corridors, maritime routes, overland routes, prediction, possible alternatives.

NETWORK MODELS OF RISK MANAGEMENT

Andreychikov, Alexander V., Maslova, Ksenia A., Lelyanova, Susanna V.

pp. 162-174

The article contains multiple criteria model developed on the basis of analytic networks method (ANM) and the description of this intelligent system for risk management, developed on its basis.

ANM can be used to solve a wide range of decision-making tasks. It allows working with difficultly formalizable, multicriteria problems with mutual influence of criteria and alternatives. ANM is the development of a method of hierarchies' analysis and provides estimates of priority of all elements of network structure with respect to the intended target in the presence of mutual influences and feedbacks.

Intelligent system, developed on the basis of the method of analytic networks includes a database, a set of procedures for processing expert preferences, as well as block of methods of statistical analysis for extracting knowledge. Knowledge in the system is used to solve problems of forecasting, to identify the relationship between criteria and other elements of the problem, as well as expert judgments to check for consistency.

The example under consideration shows analytical multicriteria risk assessment model related to output of different kinds of artificial fiber for products used in transport industry.

The network analytic model for risk assessment was built with participation of professor O.Andreychikova.

Keywords: transport company, infrastructure, intelligent system, risk management, network models, analysis, assessment, forecast.

METHODS TO PREVENT ICING ON SYSTEMS OF CURRENT COLLECTION OF URBAN ELECTRIC TRANSPORT

Kalinichenko, Anatoly Ya., Kovalev, Alexey A., Kardapolov, Andrey A.

pp. 176 – 183

The harsh climate of the country imposes stringent requirements for all structures of equipment operated on rail transport. One of the adverse events is the formation of ice, fraught with increasing mechanical load on the structural elements of traction network, breach of electrical contact between the wire and the current collector, followed by arcing and burnout of trolley lines. Deicing on trolley lines and power lines is made by electrical, chemical and mechanical means. There are some negative aspects in the application of these methods: annealing danger, damage and deformation of wires, high energy consumption, low productivity, incomplete removal of ice. Many scientists deal with improvement of deicing methods with varying success throughout the time of electrification of railways. On the basis of performed tests the authors propose the use of a special durable coating to inhibit the formation of ice.

Keywords: railway, urban electric transport, ice, contact wire, electrostatic method, aluminum silicate.

ANALYSIS OF EXPLOSION HAZARDOUS AREAS WHILE FILLING TANK-WAGONS WITH OIL CARGOES

Struchalin, Vladimir G., Ponomarev, Valentine M., Navtsenya, Vladimir Yu.

pp. 184 – 191

In the article the authors esteem the likelihood of accidents› emergence during the use of tank-wagons with highly inflammable and flammable liquids. Calculation data of explosion hazardous areas sizes are given, which are formed during loading (bulk) operations. The authors provide an analysis of relevant parameters for different environments. Additionally, options are considered to strengthen measures to prevent emergency situations caused by ignition of vapors of liquids, contained in tank-wagons, as well as prevent the presence of a potential source of spark formation.

Keywords: transportation of dangerous goods, tank-wagons, flammable liquids, explosion hazardous areas, spark formation, emergency situations, prevention of threats.

CONFIDENTIAL REPORTING SYSTEM FOR AIR ACCIDENTS' PREVENTION

Novoselskiy, Andrey V.

pp. 192 – 196

The article deals with the organization of voluntary confidential communications designed to prevent accidents in the civil aviation. The author, considering the conditions of functioning of the system, emphasizes the importance of analyzed method of hazards' identification of flight operations. There is an attempt to show the prevention of air accidents on the basis of confidential communications in the form of a multi-stage technology that can provide a result in the implementation of the proposed options.

Keywords: air safety, state aviation, voluntary reporting, accidents' prevention, system technology.

COMPETENCY ASSESSMENT OF SPECIALISTS BY EMPLOYERS

Karapetyants, Irina V., Silina, Elena C., Fortygina, Ekaterina A.

pp. 198 – 209

Three-year project TEMPUS provided for organization of network of Tuning centers in Russian universities. It afforded ground for development of methodological guidelines to form general and professional competences at universities. MIIT during joint actions of European and domestic specialists undertook, in particular, establishment of uniform standards for training programs on ecology, environmental engineering and surveys on these topics of the target groups, including employers, graduates and students. Research findings, presented in the article, introduce expert estimations of competence problems for practice, priority attention is given to opinion of employers of transport sector (JSC Russian Railways), and demonstrated findings intend mainly focus on their obligatory interaction with specialized departments and university teachers.

Keywords: university education, professional competence, university graduates, employers, labor market, TEMPUS project, competence-based approach, training of specialists.

DISTRIBUTION OF MANAGEMENT AREAS AND FUNCTIONS OF OPERATING PERSONNEL

Kattsyn, Dmitry V., Kokurin, Iosif M., Kovalev, Constantin E.

pp. 210 – 219

Need to reconstruct the electric centralization of train station creates a problem of rational distribution of functions and management areas between station operators, which requires not to exceed the rate of workload of personnel and to ensure the best conditions for technological operations. Complexity of the problem is exacerbated by the lack of theoretical and practical methods of quantitative assessment of results of alleged use of various options for solving the problem in order to select the best of them. The article contains a summary of the adjusted method of quantitative assessment of station officers' workload at train stations at different ways of organizing their work places and different volume of movement based on the algorithmic description of the contents of the personnel's labor.

Keywords: railway, train stations, traffic management areas, algorithms, functions, operating personnel, workload calculation, methods of organization.

GAMIFICATION OR MYSTIFICATION?

Alchebaev, Maxim A., Gaydukov, Alexander M.

pp. 220 – 228

Today, authors select from the set of definitions referred to gamification their own interpretation, but the essence of the teaching method remains the same. Another thing is the task to make the use of game elements and approaches for non-gaming tasks the most natural and useful part of the curriculum in preparing specialists in different fields. The article is devoted to this problem and provides answers to many questions concerning ways to avoid banal imitation or mystification of true significance of gamification on any of the described levels of educational practices (including Corporate University of JSC «Russian Railways»).

Keywords: training, vocational education, curriculum, business interests, knowledge, games, gamification, personal development, corporate university.

ON THE HISTORY OF THERMOVISION MONITORING OF GROUND ENVIRONMENT

Lievin, Boris A., Inkov, Yuri M., Ovcharov, Igor V.

pp. 230 – 237

The rapid development of opto-electronic, computer, aviation technologies opens up new opportunities to improve both train safety and labor productivity on the railways. Unmanned aerial vehicles equipped with means of machine vision become indispensable assistants, especially in emergency situations. To choose the right technical solutions it is useful to consider the history of this scientific direction.

Keywords: transport, aerial reconnaissance, machine vision, unmanned aerial vehicles.

MULTIPLICATION OF DRIVING FORCES

Grigoriev, Nickolay, D.

pp. 238 – 245

Alexander Stoletov went down in history as the founder of one of the scientific schools of Russian physicists, played a prominent role in creation of the theory of photoelectric effect and photometric control, establishment of a wonderful community of electricity and light, study of electrical phenomena in rarefied gases. By his example he trained and involved in science a whole galaxy of scientists, engineers, approved themselves in various fields of electrical engineering, achieved excellent results when transporting electricity over long distances, the construction of electric motors, electric lamps and electronic tubes, solar batteries. Multifaceted activities of professor of Moscow University A. G. Stoletov is shown in the article with an obvious desire to confirm priorities belonging to him, and the publication itself is devoted to the 175th anniversary of the great scientist.

Keywords: physics, electrical engineering, Stoletov, electromagnetic system, electric motor, laws of the photoelectric effect, electronic tube, solar battery.

THREE IMAGES OF ONE RAILWAY STATION

Pinskaya, Nadezhda P., Stolbova, Irina D.

pp. 246 – 251

The article is devoted to the history of Sochi and Adler railway stations, evolution of building tasks and transport infrastructure in modern architectural

environment. In connection with the Olympic Games in Sochi in 2014, the value of architectural and functional characteristics of the objects for the Black Sea metropolitan city has increased dramatically. Analysis of options for the design decisions of the railway station in Adler provides an opportunity not only to compare embodied architectural and construction images, but also to assess trends in the development of transport integration strategy.

Key words: history, railway station, city, transport infrastructure, urban construction correlations, multifunction links and service.

OPEN MEANING OF HIDDEN NEEDS

Usmanov, Boris F.

pp. 256 – 260

The review of the book:

Andreychikov, A.V., Andreychikova, O. N. System analysis and synthesis of strategic decisions in innovative sphere: Concept designing of innovative systems. Tutorial [Systemniy analiz i sintez strategicheskih resheniy v innovatike: Kontseptualnoe proektirovanie innovatsionnyh system: Uchebnoe posobie / Russian title: Синтез стратегических решений в инноватике: Концептуальное проектирование инновационных систем: Учебное пособие]. Moscow, LELAND, 2014, 432 p.

ABSTRACT. The reviewed book deals with the approaches, methods and computer-aided tools applied for solving the tasks of concept designing of technical innovations and innovative organizations. The importance of the problem within the strategic management issues is explained through the necessity to teach the students and staff of organizations the methods of development and production of competitive industrial goods. The author of the review underlines the theses that the use of system approach is especially important at initial stages of development of technical decision concerning engineering of new technics and technology. The described approach allows designing strategic innovations for preventive implementation that provides for competitive advantages in forthcoming periods.

Key words: innovative engineering, strategic decisions, concept designing, system approach, demand, needs, technical innovations, human factor, innovative organizations.