ABSTRACT AND REFERENCES

CONTROL PROCESSES

USING SIMULATION FOR INVESTIGATION OF CNG VESSELS FILLING (p. 4-9)

Andriy Dzhus, Alexander Susak, Lesya Shkitsa

The problematic issues, which require special attention in implementing the CNG transportation technology for individual projects are considered. In each of the cases, the problem of the filling mode optimization is an important problem, related to the cargo system operation. At a certain stage, the filling process is accompanied by a sharp expansion and temperature change of gas that can cause equipment failure. According to the results of theoretical and experimental investigations of the process of filling tanks it is found that the temperature reduction of gas as a result of its sharp expansion is present in the initial short time point and is confirmed by icing of shutoff valves during experimental investigations. The overall effect of the gas temperature reduction is such that does not lead to the wall temperature reduction. With further filling of tanks, the temperature of gas and, consequently, their walls rises. The growth rate is determined mainly by the value of initial pressure in the tank. The simulation results at different initial conditions are confirmed by experimental results with high accuracy. The results obtained showed the possibility of using simulation to assess the impact of gas temperature change on the equipment operation during compressed natural gas transportation

Keywords: CNG transportation technology, transport vessel filling, simulation, gas temperature

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STRUCTURAL-PARAMETRIC OPTIMIZATION OF THE TECHNOLOGICAL PROCESSES FOR THE ASSURANCE OF PART'S SERVICE PROPERTIES (p. 9-16)

Vadym Stupnytskyy

Manufacturing application of the Product Lifecycle Management System (PLM) requires functional-oriented technology engineering production. The main feature of functionally-oriented process is application of a complex system qualimetric versatility indicator at the stages of pre-production. This will allow to significantly affect to the provision of working, exploitation, utilization, and other functional properties of engineering products. Method of structural and parametric optimization of functional-oriented machining products is described in the article. This method is based on an analysis of prognostic rheological modeling of the parts stress-strain and thermodynamic state in the process of formation. The formalization of recursive relations between structural and parametric results of technological preproduction planning and product's operating conditions will provide the best range of qualimetric indicators by the concurrent engineering facilities.

Qualimetric integral criterion of technical product is a objective function in making decisions about the optimal structure and parameters of functionally-oriented process. This parameter characterizes the wear resistance, fatigue strength, corrosion resistance and so most loaded surfaces of the product. The integral qualimetric criterion formed as a result of the analysis microtopography surface layer, residual stresses and strains in the formation of these surfaces.

The algorithm of the complex system qualimetric versatility indicator accounting for the engineering products in their potential or critical operation conditions as part of a machine or technological system is described in this article. This algorithm uses accounting heuristic weight coefficients, calculation of normalized local optimization criteria for the most commonly used in engineering practice working indicators

Keywords: multicriteriaoptimization, function-oriented technology, optimizationcriteria, Product Lifecycle Management

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IMPROVEMENT OF ORGANIZATIONAL AND TECHNOLOGICAL OPTIMIZATION SYSTEM OF ROUTING TRANSPORTATIONS OF CARGOES (p. 16-20)

Anton Kuleshov, Valeriy Kuleshov

Organization and optimization of forming consignor routes by various carriers, transport operators, by railways in cars taking into account the analysis is considered. It was found that the average gross weight of a block train on Ukrainian railways is lower than the economically sound weight, although it increased from 3225 tonnes to 3433 tonnes for the 2001-2013.

The model for determining cost savings in transportation of the route with bulk cargo from one consignor based on technical and economic comparison of transportation of route assignments during their planning is considered. It is shown that using the model allows to determine savings on operating costs when organizing the routes in hoppers from the Zolotnishino station of the Southern Railway to consignees in both international, and domestic traffic.

The proposed formation model allows to take into account car traffic flow fluctuations, power of infrastructure and sidings of consignors and consignees.

Keywords: unified freight car fleet management system, operator company, exit route

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MAIN ASPECTS OF ORGANIZATIONAL AND ECONOMIC MECHANISM FORMATION TO PROVIDE COMPETITIVENESS OF A MARITIME COMMERCIAL PORT (p. 21-25)

Valentin Chimshir, Anna Chimshir

The problem of forming organizational and economic mechanism, aimed at increasing the maritime port competitiveness in conditions of maritime freight market redistribution is considered in the paper.

To achieve this goal, research directions, such as evaluation of the port strengths and weaknesses, production base estimation, cargo base evaluation, port development priorities, market research, port external environment dynamics are determined.

The system of measures, aimed at improving the port competitiveness is defined.

The basic aspects of the organizational and economic mechanism of maritime port development, which includes providing sufficient facilities for cargo handling, achieving economic efficiency of port infrastructure development and international competitiveness of maritime port services, ensuring safe operation and development of maritime port infrastructure and maritime transport, solving social problems of maritime port infrastructure development are identified. Based on the selected aspects, the basic principles of forming the organizational and economic mechanism for enhancing the maritime port competitiveness, which includes creating modern, highly efficient facilities, improving tariff policy and organizational structure are defined

Keywords: commercial maritime port, organizational and economic mechanism, competitiveness, development, operation, efficiency, management

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THE INFLUENCE OF TARIFFS ON THE ELECTRIC POWER ON THE EFFECTIVENESS OF POWER TRANSFORMERS (p. 25-29)

Valeriy Kuznetsov

Energy saving on railway transport under a market economy is one of the priorities of scientific and technical policy of Ukrzaliznytsa. A very big impact on the profitability of the transport process has the dynamics of prices growth on power sources, and, in particular, on electricity.

It should be noted that the work on energy efficiency and reducing the cost of electricity, which was held on ukrainian railways during the existence of an independent Ukraine, despite a significant increase of electricity prices in recent years to keep the energy costs in total expenditures on transportation at the same level.

In this paper we show that the optimal coefficients of transformers calculated by unit costs are more than optimal transformers coefficients calculated on the base of coefficient of efficiency. It's found that the optimal load factor of power transformers inversely depends on the cost of electricity and the nominal power of the transformer.

Using of the rational modes of the transformers allow us to reduce the technological expenses to the electric power

Keywords: transformer, traction power supply system, load factor, energy saving

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ANALYSIS OF TRANSPORT SYSTEMS DEVELOPMENT FORECASTING METHOD (p. 29-34)

Petro Horbachov, Ganna Samchuk

Despite the availability of a large number of different methods for industrial sector forecasting, there is a shortage of methods that could provide a reliable fore-cast of the Ukrainian transport system development.

Forecasting the transport system development is particularly important for Ukraine as a country that has been at the stage of its economy reconstruction. Identi-fication of trends in the development of the transport industry allows making deci-sions that could contribute to the achievement of sustainable development goals of the entire nation.

Various methods of long-term forecasting have been analyzed and classified in the paper. The ForFITS Model developed by the United Nations Economic Commis-sion for Europe was chosen to forecast the transport activity to provide passenger transportation, energy use, and CO_2 emission in Ukraine.

On the basis of the existing trends, using the ForFITS Model we have made a preliminary forecast of the Ukrainian transport system development, which has re-vealed a high degree of dependence of the Model on the quality of the initial informa-tion and made it possible to develop a concept of rational forecasting horizon

Keywords: forecasting methods, sustainable transport systems, ForFITS Model, CO_2 emission

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WAYS OF INCREASING THE SAFETY OF SMALL ARMS EMPLOYMENT BY LAW ENFORCEMENT FORCES (p. 35-39)

Alexander Bilenko, Alexander Kirichenko

Various law enforcement forces play an important role in ensuring state law and order. The tasks of these forces differ greatly, ranging from national defense to protection of life, health and rights of individual citizens. The difference in goals and terms of their achievement is reflected in the ways of performing tasks and constraints, imposed in this case. The purpose of arms employment by the law enforcement forces is to stop an offense that prevents losses among law enforcement officers, hostages and other citizens, who are not participants in the events. Thus, law enforcement forces are armed with examples of small arms, which have been developed for the Armed Forces and have excessive values of the basic combat characteristics. This creates a risk of injuring shooters, hostages and other people, being in the firing direction that, considering the purpose of arms employment, will be the mission failure. Thus, ensuring certain acceptable level of arms employment safety is an urgent task.

Small arms employment safety indicators are developed using the firing theory methods. Based on the analysis of the causes of the risks of injury by the throwing element, ways of increasing the safety of small arms employment by the law enforcement forces are generalized. It is found that the existing scientific-methodological apparatus does not ensure development of practical recommendations on ensuring acceptable characteristics of the throwing element after a ricochet from the obstacle.

Relevant scientific task, which lies in defining the patterns of influence of the ballistic characteristics of arms and design characteristics of the throwing element on the firing task performance reliability considering restrictions on arms employment safety is formulated. Partial tasks and areas for further research are determined.

Keywords: law enforcement forces, ballistic coefficient, ricochet, small arms employment safety

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EXPERIMENTAL RESEARCH OF PASSENGER TRIP ROUTE CHOICE PROBABILITY (p. 40-44)

Nickolay Nefedov, Albert Awuah Jr.

Solving a challenging task of designing or improving the system of public passenger transport is impossible without predicting the distribution of passenger traffic over sections of the route network. For comparison of alternative passenger routes, in addition to the parameters within the known function of routes attractiveness, it is proposed to use the initial and marginal probability of choice as static parameters and the actual waiting time of passenger vehicles at a bus stop as a dynamic parameter. The initial probability of choosing the trip route is the probability of choosing this route when the actual waiting time is equal to zero. The marginal probability of choosing the route is the probability of choosing the trip route in case of the deficit of total capacity opportunities for all alternative routes, which determines the distribution of passenger traffic on alternative routes in proportion to their transport possibilities. Experimental data were obtained by a questionnaire poll of a fixed group of respondents in April and May, 2012. The group included 50 students, 25 workers and 15 employees, who had a choice of three routes.

There were processed 1468 questionnaires. According to the results of experimental data processing, it was determined that the regression models have the feature of power functions. In addition, for routes whose initial probability is smaller than the marginal one, the probability of choosing this route when increasing the actual waiting time increases. Statistical processing of the results of the experiment showed that the initial probability of choosing the route depends on the function of the attractiveness of the route at a particular bus stop

Keywords: city passenger transport, passenger, travel line, alternative routes, probability, waiting time, regression model

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DEFINITION OF DYNAMIC CHARACTERISTICS OF HOPPERS ON PERSPECTIVE TRUCKS (p. 45-50)

Evgenij Pysmenniy

Mathematical modeling of spatial vibrations of hopper on freight-car trucks of the 18-100 model and new trucks of the 18-1711 model, produced by OJSC "Azovmash" (Ukraine) was carried out.

The study was conducted to justify and correct the accepted engineering solutions in creating the truck of the18-1711 model. The process of finishing the new product design is long and largely depends on the correctness of taking design and engineering solutions.

As a result of the studies, it was found that using the spring group with the bilinear characteristic in the core stage of truck suspension significantly improved dynamic indexes of the considered hoppers. Assessing the benefits of the new truck of the 18-1711 model was made by comparing the main dynamic parameters. For a correct comparison of the hopper dynamic properties, identical perturbations (irregularities) for loaded and empty cars on the considered trucks were determined.

The obtained results are important for evaluating the hopper dynamic properties on straight and curved track sections

Keywords: dynamic indexes, truck of 18-1711 model, motion simulation, hopper

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TRANSPORTATION OF METAL PRODUCTS ON SCHEDULED CIRCULAR ROUTES USING PRIVATE LOCOMOTIVES (p. 51-55)

Mykola Berezovy

For increasing the competitiveness of railway transport compared to road transport in transportation of pipe workpieces between enterprises of pipe rolling cycle, the measures to reduce the active car fleet were developed.

There is a need to introduce a circular route traffic for the workpiece transportation on schedule and implement an exchange park of cars on the sidings to cars load with pipe workpieces for reducing the active fleet of cars. Advantages of using their own platforms for the pipe workpiece transportation were justified.

The performance indicators of the investment project to purchase and use their own locomotive with different buying cost, net present value, profitability index and internal form of income were defined.

The project profitability under condition of reforming the relevant normative legal and tariff base in Ukraine was determined

Keywords: pipe workpiece, route, schedule, private locomotive, car, exchange fleet

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FORMALIZATION OF THE PROCESS OF FREIGHT CAR FLEET MANAGEMENT OF OPERATOR COMPANY (p. 55-58)

Tatiana Bytko, Oleg Shander

The technology of freight car fleet management of operators company in the subsystems of UZ has been investigated and analyzed. It has been determined that the choice of the optimal plan of distribution of car operators according to the route of a freight car (schedule lines) mainly depends on the volume of cars being present at freight stations of railway network and their location in space and time. The topology variants of railway network has been analyzed using theory of graph taking into account all the above said. Relying on a systematic approach it has been proved, that the increase of railway transport competitiveness is possible at the expense of the provision of railway subsystem with invariance properties. The railway subsystem itself should be considered as a compromise between its stability and flexibility.Thus, optimization model which formalizes technological process of freight car fleet management of operator companies has been mode.

The objective of the given model is presented in the form of total operating cost and relevant set of constraints that takes into account technological conditions of route formation. The mode optimization model adequately reflects the terms of transportation process, ensures the reduction of transportation costs under the condition of satisfaction of clients' requirements and provides for the formation of automated technology of management of car fleet of different forms of ownership. Taking into account the theory of computational complexity, it is reasonable to choose heuristic method, based on mathematical apparatus of genetic algorithms, to obtain the optimal plan of car distribution according to the routes

Keywords: transportation process on railway transport, operator company, fleet of freight cars, mathematical model, automated management system

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