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AND TRAFFIC SAFETY IN TRANSPORT"

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SELFSYNCHRONOUS PROCESSORS IN TRANSPORTATION SYSTEMS

Asmankina A., Loria M.
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In synchronous charts a developer dealt with separate signals the changes of which took place synchronously in all chart, at selfsynchronous approach there is not synchronization between separate events in a chart. Necessity to control the order of passing information through the modules requires additional vehicle expenses: introduction of additional markers of information, synchronization of signals of separate blocks. The tasks of synchronization processing data can be decided both by the developer at creation part and by the special programmatic facilities on the stage of synthesis - from its high level description in special language of description of apparatus, intended for description of selfsynchronous charts.

In difference from synchronous approach, where all events in a digital chart submit a single time signal, in a selfsynchronous chart every petticoat block synchronizes the work with nearby blocks due to watching of moment of completion of calculations. A selfsynchronous processor is a digital computing device, not requiring the central generator of clock rate and chains, supporting distribution of general external time signal. Such processors are expended by less energy as compared to synchronous.

Selfsynchronous processors began to create in 1950th. There are two going near realization of selfsynchronous charts, and more precisely to the methods of moments determination of completion of calculations: direct determination (such charts are named strictly selfsynchronous) and indirect estimation, for example, by a delay line proper the worst case - kvaziselfsynchronous. Because these charts do not determine the moment of completion of calculations directly, they allow to take into account external terms (feed, temperature) and parameters of technological process only, but does not take into account the processed information.

At planning of internal function boxes of selfsynchronous processors a requirement falls off in their synchronization between itself. If information does not act on the entrance of function boxes, calculations are not produced. Thus blocks consume minimum energy, necessary for the maintenance of switch ability of transistors for an exit from the sleep mode. Distributing of the productivity and energy consumption at implementation of tasks sequence is as a result optimized, that is explained possibility of management tension of feed of kernel and absence of external time signal.

Creation of selfsynchronous processor is implied by careful approach as from the side of radio electronics and software.

Let me to present you an example of the simplest strictly selfsynchronous chart. Its basis are asynchronous catches and indicators completions of transient, which form asynchronous registers together. A chart works as follows. In the initial state all lines of information are speysers N is able, and outputs of indicator blocks - in a state of logical «1», that talks that asynchronous catches are ready to accept information. At a receipt on the entrance of information chart - D they pass through G-triggers of the first asynchronous catch and further act on the entrance of combinational circuit and first indicator. The presence of information on the indicator entrance will cause switching of his output in the state of logical «0», that shows the willingness of the first asynchronous catch to accept speyser. At his receipt on the entrance of chart it will not be able to get through the first asynchronous catch, because an output of the second indicator is in a state of logical «1», and the first asynchronous catch saves the previous state on an output.

After it the time, equal to the delay of passing signals through a combinational circuit, information appear on its output. In order that information got through the second asynchronous catch, it is necessary, that a a signal that is given on the second catch was «1», showing that next part of chart is ready to accept information. If this condition is executed, information will pass the second asynchronous catch and will cause switching of the second indicator. It will let the first catch to skip the state of speyser through itself, what will result in switching of the first indicator. When the state of speyser will get through a combinational circuit, it will act on the entrance of the second catch, which, while a signal that is given on the second catch is «1», will save on the output comings before given.

In short, we are trying to provide a programming environment in which no knowledge other than that of the target system is required and where system engineers will be freed from any detailed knowledge of the machine that will perform the signal processing functions.

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THE METHANOL CONVERSION AUTOMOBILE REACTOR

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Most forecasts on the development of energy and transport mention that piston internal combustion engines will in future keep playing a leading role on the transport. Predominant types of the power plant vehicles are the internal combustion engines (ICE) using oil fuel. The main consumer of gasoline and diesel fuel is the road transport.

When using the oil rationally, it will remain the most important source of energy for a long time. However, its resources are not limitless, and now one needs to search for some other alternative sources of raw materials for the production of motor fuels, which himmotological properties enhance the engine's efficiency and reduce the toxic emissions of the exhausted gases [1]. The use of methanol as the primary fuel and gasoline additive has confirmed the effectiveness of its impact on the operation of engines [2]. However, it revealed such drawbacks of methanol as: difficulty in starting a cold engine, vapor locks in the power supply system at increased temperatures, the complexity of a homogeneous mixture in the cylinders, increased engine wear and reduced oil life [3]. It is possible to overcome the above mentioned drawbacks by using the method of hydrogen gas through methanol conversion on board the vehicle with the utilization of the exhaust gases heat (EG) [4-7].

The main objective of the tests was to determine the thermal characteristics of the automotive methanol conversion system developed at the Chair of ICE of the East Ukrainian National Volodymyr Dahl University [8-10].

The research problem is to determine the dependence of the degree of methanol conversion on the temperature, exhaust flow, and engine operation. To assess the technical and operational characteristics of the reactor (fig. 1) of the automotive conversion of methanol [11] one need to know the amount of disposable exhaust heat to heat the reaction chamber to the optimum temperature of the catalyst at a given flow of methanol.

Experimental data have shown that the methanol conversion reactor is extremely inertial. Thus, the heating time of the reaction chamber with the idling engine to the temperature that ensures the conversion of 65% with the methanol consumption of 2 kg/h, varies from 15 to 20 minutes.

The further tests have shown a low degree of conversion (50%), that's why an autopsy of the reactor reaction chamber was performed. The need for visual control of the catalyst was explained by the presence of a significant amount of methanol conversion products (MCP) catalyst dust. Catalyst wear took place in the area of the exhaust gases inlet, characterized by high temperatures and significant dynamic effects from exhaust flow, resulting in vibration.

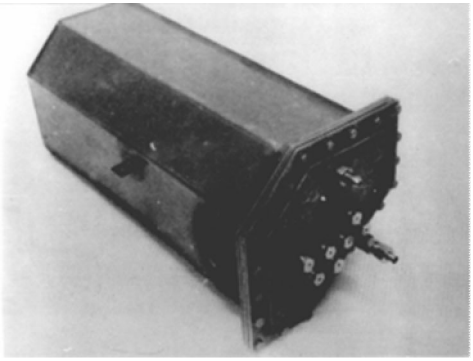

Fig. 1. The general scheme of the methanol conversion reactor

When the engine is stopped and the main feedline of the MCP is switched off, and when the reactor is cooled, the pressure in it is lower than the atmospheric one which results in creating conditions when air and moisture get into the reaction chamber and further poisoning of the catalyst if there is no proper tightness.

During the experiment a qualitative picture of the heat exchanges between the engine's EG and the reactor reaction chamber has been obtained, as well as some features of the behavior of the catalyst of intermetallic compounds when heated by exhaust gases heat have been identified. Thus, it was found that when the catalyst was activated and trained, and when it worked for 6 hours as a bench engine (with vibration, changed heat flows), its abrasion occurred.

This leads to the effect that the catalyst is constantly taken away from the reaction chamber to the MCP and the need to install the filters with pores of at least 4…6 mm at the reactor outlet.

The developed supply system of the MCP engine provides only a partial conversion of methanol and can be a source of on-board hydrogen-containing additive to the traditional fuel [12].

This additive is an effective way to improve the dynamics of combustion in gasoline engines, because of the homogenizing of the hydrogen, gas and air mixture, where the hydrogen acts as an igniter (promoter). It provides an efficient engine operation with a deep depletion of the fuel and air mixture and a sharp reduction in toxic emissions. The greatest impact on the workflow has a relatively small additive MCP 25 ... 30% by weight in the total fuel. The savings of the mixed fuel (by weight) at low loads of the engine amounts in this cases 17 ... 35% compared to gasoline [13].

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ULTRASONIC INFLUENCE ON MELT CONVECTION

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Crystal growth by crystallization methods accompanies composition inhomogeneity [1]. Dopant inhomogeneity influences on electrophysical properties of semiconductor single crystals [2,3]. The growth striations are a hardly removable inhomogeneity in semiconductor crystals [4]. Silicon single crystals are the main semiconductor material applied in electronics. Growth striations in silicon substrates decrease electrophysical parameters of semiconductor nanostructures in integrated chips. It is theoretically proved and experimentally shown that the striations in the single crystal are formed by convective flow in the melt. Therefore, convection suppression during the crystal growth prevents appearance of the striations.

The effect of ultrasound on semiconductor crystal growth promotes the decrease of component inhomogeneity. Moreover, ultrasound at a high frequency creates the growth conditions of the single crystals without dopant striations. In this method ultrasonic waves introduce in the melt by the waveguide during crystal growth process [4]. Ultrasonic energy dissipates in the waveguide, melt and on the boundaries of piezotransducer-waveguide-crucible-melt at wave distribution from a piezotransducer to the solid-liquid interface of growing crystal. The sound absorption coefficient is important parameter defining the effect of ultrasound on the substance. This coefficient was determined for some semiconductor melts and had very small value. Ultrasonic waves pass greatest distance in the waveguide during crystal growth process. The waveguide temperature along axis can change from 50 °C in a piezotransducer to 1500 °C in the melt for the present growth conditions of the single crystals. Therefore, the determination the dissipation of ultrasonic energy in the waveguide has scientific and practical interest. In this paper we present the results of an investigation on

ultrasound absorption in the waveguides at high temperature and a frequency.

The acoustical and strength properties of the waveguides should not change considerably for ultrasound introducing in the melt at high temperature. Such materials can be the high-temperature metals and some not crystalline materials. Therefore, we selected for our investigations following materials: the wolfram, molybdenum, vanadium, graphite and a fused silica. We are considered these metals as the polycrystals in the calculation of them the ultrasound absorption coefficient. The graphite also has crystal structure, but high purity graphite, using in the crystal growth technology, has the porosity. It should be noted that the waveguides of these materials had 300-mm length and heated only at one end for the introduction of ultrasonic waves in the melts contained in Czochralski crucible during crystal growth process.

The ultrasound absorption coefficient increases in the metals unequally with the temperature increase to 1500°C. The wolfram has greatest value of the ultrasound absorption coefficient, which increases by a factor 5 times with the temperature increase. This coefficient in the wolfram has the large values due to large coefficient of heat conductivity and less the coefficient of heat capacity. Additionally, the wolfram has the large density and problems in the waveguide production. The vanadium has the ultrasound absorption coefficient less by a factor 20 times than in the wolfram and increases by a factor 2 times with the temperature increase. However, the strength properties of the vanadium considerably decrease at high temperature as it has the melting temperature only 1890 °C. The ultrasound absorption coefficient in the molybdenum also increases by a factor 2 times with the temperature increase, but this coefficient has the values large by a factor 10 times and Young's modulus large by a factor 3 times than in the vanadium. The results of these calculations indicated the best acoustics properties have the vanadium. It can be noticed that the vanadium has the principal feature consisting in the decrease of strength durability at high temperatures. Therefore, the vanadium can to recommend using for the waveguides, which to be applied for insignificant loading. In our case the waveguide must to have the high acoustical and strength properties for loading more 200 kg of the melt in the crystal growth conditions. For these conditions the molybdenum is the most prospective, possessing higher the acoustics and strength properties than the wolfram and vanadium, respectively.

The ultrasound absorption was investigated experimentally in the fused silica and graphite waveguides at frequencies of 0.83 MHz and 0.72 MHz, respectively, which were used in crystal growth process [4]. The ultrasonic signal of 30 V moved on the piezotransducer-source from the ultra-

sonic generator. An ultrasonic signal on the piezotransducer-receiver in these experiments had less value because ultrasound had dissipated in the waveguide and on the piezotransducer-waveguide-piezotransducer boundaries. The ultrasound dissipation on the boundaries not changed as the temperature in these regions was less 60 °C. Therefore, the decrease of an ultrasonic signal on the piezotransducer-receiver decreased with the increase of the ultrasound absorption in the waveguide. It is known that the fused silica has high acoustical properties due to insignificantly absorption of ultrasound and this allowed reaching 24 V signal of ultrasonic vibrations on the piezotransducer-receiver. The processing of ultrasound absorption in the fused silica waveguide is observed for the temperature more 1000 °C and it coolly increased for temperature more 1100 °C. It was observed experimentally in GaAs crystal growth process that the fused silica crucible starts form changing or to be softened at the temperature near 1100 °C. This structure reorganization be confirmed the strain point 1070 °C and transformation temperature 1130 °C [3]. Such changing of the structure decreases the strength and acoustic properties of the fused silica.

The ultrasound absorption in the waveguide influences on the ultrasound intensity introducing in the melt. The ultrasonic waves must have greatest intensity for the suppression of convective flow in the melt. The ultrasound intensity in the molybdenum decreases on 1%, in the graphite not changes and in the fused silica sharply decreases by a factor 2 times for heating to the temperature more 1000 °C.

The ultrasound absorption increases in the materials with the increase of a frequency. In fact, the dependence of the ultrasound absorption coefficient on a frequency in the molybdenum waveguide is indicated that this coefficient increases at the temperature 1500 °C by a factor 50 times with increase of a frequency from 0.15 MHz to 4 MHz. However, the ultrasound absorption coefficient for the molybdenum has low value. Therefore, the intensity in the molybdenum waveguide decreases only a few percent with the increase of a frequency of ultrasound.

The results of these calculations and experiments indicated that the molybdenum has higher the acoustics and strength properties than another investigated materials for the temperature to 1500 °C and can be recommending for application in the waveguides.

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FEATURES OF THE SOURCES OF EUROPEAN UNION LAW AND THEIR IMPORTANCE DURING LABOR LEGISLATION OF UKRAINE WITH EUROPEAN LABOR STANDARDS

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European integration course of Ukraine's development is the leading vector in the Ukrainian present. It determines systemic transformation and reformation of all socially important areas of our country. These systemic changes should not occur randomly, but within a legal framework and the legal support of European integration course policy of Ukraine. One of the most important components of the modernization of the legal principles of efficient Ukraine's European integration implementation is the approximation of the Ukrainian laws to the European Union laws (hereinafter - EU), which involves the process of Ukrainian laws and other regulations alignment with the EU law or acquis communautaire.

According to the Law of Ukraine "On State Program Adaptation of Ukraine to the European Union"from 18 March 2004 r. Number 1629-IV priority component of the integration process Ukraine to the European Union is the adaptation of Ukraine's EU legislation. In turn - a decisive direction Ukrainian foreign policy[1].

This program covers the main aspects of the legislation adaptation process: the implementation stages and the objectives of the first stage of the program, sequence of the adaptation process, institutional mechanisms and powers of the Verkhovna Rada of Ukraine and the Cabinet of Ministers of Ukraine. Annual action plans are developed to implement it. As of today, seven such plans have been approved. They include a list of measures, mainly on the development of draft laws (specifying the relevant EU regula-

tions and responsible executive bodies) and support of their adoption by the Verkhovna Rada of Ukraine[1].

These main results of approximation under the National Program on Approximation of the Ukrainian Laws to the EU laws were evaluated quite positively by the Coordinating Council of Ukraine for Approximation of the Ukrainian laws to the EU laws at the CMU [2]. For Ukraine, the social development of EU law, based on the rule of law is of particular interest. Social sphere is a shared legal regulations of the European Union and member states. "General jurisdiction" means the preservation of the Member States of the right to receive social legislation, but so far, "in which the Union has not followed its competence."

Achievements of European labor law justify, in a market economy, the expansion of labor law on public relations which content the professional activity. This approach ensures the existence of well-developed social security system. In any case, EU membership or association with the EU a significant impact on the content of national legislation. Distinctive feature of the Association Agreement between Ukraine and the EU is that of the country required the implementation of internal reforms, legal, social and economic, that allow to fulfill contractual obligations. In our opinion, the reform of the national social legislation should begin with the reform of the labor legislation.

Adapting of labor laws Ukraine to the EU legislation should form: in a deep study of the EU regulatory framework in order to define the prerequisites of certain legal institutions and norms, as well as the tasks they are called to solve; comparative analysis of EU regulations and existing national standards, taking into account national and social background of EU standards; working out proposals on bringing national legislation into line with EU norms; directly lawmaking activities; forming law enforcement practices etc[3].

From the analysis of scientific researches and the legislative practice made a conclusion about absents in preset time real activity of adaptation the Ukrainian labor legislation to EU standards. Unfortunately, most labor standards which are in force in Ukraine, was launched in the last century, and the fact that some of them now meet European requirements, primarily the historical coincidence of circumstances, objective and subjective reasons. However, it is clear that a lot of work processing regulations of labor law and social security law starts now that the European prospects of Ukraine have acquired specific circuits. But, the direct transfer of the rules (especially in relating to social security), due to the lack economic basis, currently seen virtually impossible.

In this case seen the appropriate selective borrowing of some prospective elements of legal regulation of labor which are common in foremost European countries and can be easily implemented and act soon law system in Ukraine. These elements are: the use of obligatory written form of employment contract; refusal of work books and spreading the use of identification code in support of employment (professional) experience; recession from the concept of «dismissal under norm» towards the termination of the employment relationship solely, by the will of the parties; providing a larger range of social and economic guarantees in case of termination of the employment contract by the employer; support for strengthening collective bargaining in large economic entities; providing state economic incentives to employers in creating additional workplaces etc[4]. This will not only improve the implementation of labor relations in our country, but also will help to form the pro-European outlook in the society, and create a kind of foundation for the further implementation of the policy of Ukraine's integration into the EU.

The solution to the problem of preventing discrimination in the sphere of labor is complicated by the presence of elements of differential regulation of conditions of labor activity, which is a natural, acceptable and legitimate. Differential humiliating attitude is discriminatory when it is unjustified, than the criterion, the use of which is to carry out the legal differences between people is prohibited by law. Our country has chosen the path of comprehensive legislation aimed at preventing and combating discrimination in all spheres of life. Law of Ukraine "On Prevention and Combating Discrimination in Ukraine" defines the forms of discrimination, establish a mechanism to ensure the prevention and combating of discrimination and its scope that extends to the labor relations. For some time the provisions of the Act had a number of shortcomings: in the definition of terms; in the list of attributes, which prohibited discrimination; on the forms of discrimination and so on. However, the question of solving the problem of adjusting of labor legislation, banning discrimination, for European standards remains open.

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PROVIDING REDUCTION OF LIFE-CYCLE COST OF RESOURCES DEFINING ELEMENT OF THE GONDOLA– MANHOLE COVER WITH A FUNDAMENTALLY NEW DESIGN

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Manhole covers of railway freight gondolas are important resource defining elements, their carrying capacity determines the safety of the cargo. It should be noted that the design of the manhole cover of the modern gondola, which is operated by the railways of 1520 mm is not fully comply with the requirements strength and wear resistance.

A brief history. The first manhole covers were 6 mm metal sheet with a tightening in the form of ribs 8x70 - such an arrangement does not provide sufficient rigidity. In 1936 steel sheet (6 mm) received six ribbed, side edges reinforced corners 75x75x8. In later years the number of corrugation was increased to 9. Design «КВ3» with the low-alloy steel instead of «Ст. 3». with a reduced thickness of 5 mm, formed the "usual" image of the manhole cover with 6 corrugations and strapping. Then came the construction of Uralvagonzavod (sheet of 4 mm, edit profile of strapping), it became the most popular model in the mid-20th century. The modern concept of hatch covers used «КВ3» and Uralvagonzavod and the thickness of the sheet 5 mm [1].

It is necessary to increase the rigidity (to prevent the emergence of gaps) and durability to create the manhole cover rail freight gondola with a new quality.

We conducted a patent search of existing developments and found several interesting-looking structures. Fig. 1 - 4 show their schemes and brief descriptions.

The authors are developing a fundamentally new design three-piece manhole cover of railway gondola, the rigidity of which is provided with two corrugated sheets of various widths.

The top sheet in this case may be an indicator of wear. 3D model of the structure shown in Fig. 5.

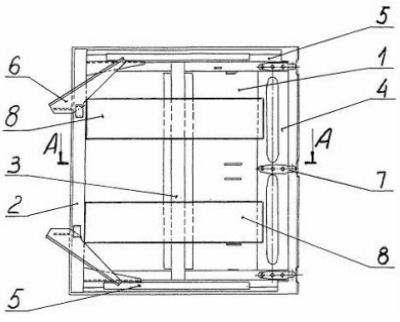

Fig. 1. Prestressed design [2]

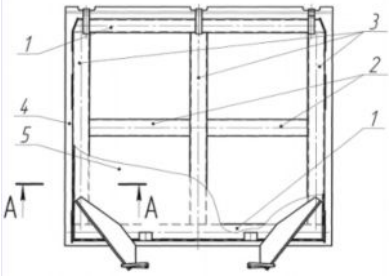

Fig. 2. Manhole cover with cross strapping [3]

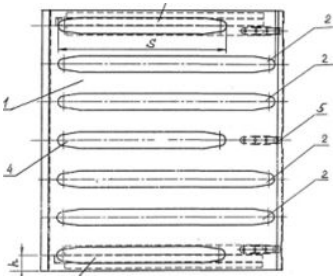

Fig. 3. Manhole cover with a variety of corrugations [4]

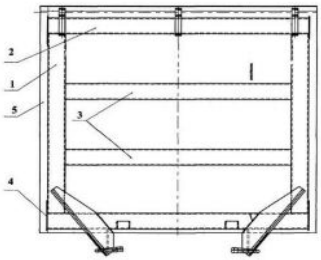

Fig. 4. Manhole cover with a flat sheet and reinforced strapping [5]

Also, the authors carried out a number of promising developments:

- prestressed and predeformed manhole cover in order to reduce the stresses and deflections under load;

- manhole cover with additional stops in that clog some of the material is unloaded and the remaining third to unload the cargo to that huddled

in stops than reduced abrasion hatch. Diagram of a method of reducing the wear is shown in Fig. 6.

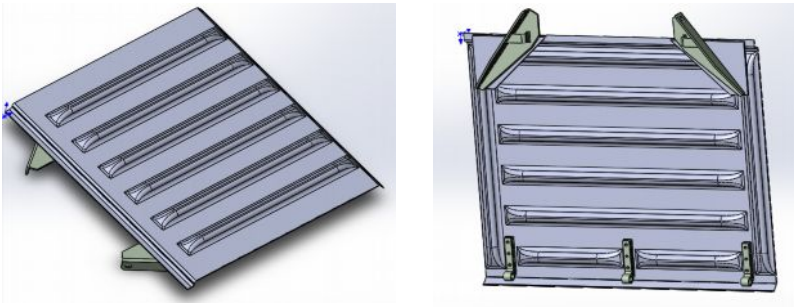

Fig. 5. Three-piece manhole cover of railway gondola

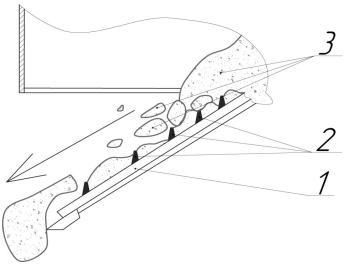

Fig. 6. A method of reducing wear (1 - manhole cover, 2 - stops, 3 - cargo)

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CONCEPTION OF CREATION OF CONTROL SYSTEM COUPLING OF NEW GENERATION

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The aim of the Ukrainian Railways to ensure high-speed traffic and the increasing traction of locomotives require modernization of the existing rolling stock and developing advanced systems to improve efficiency, energy saving, traction and braking characteristics of locomotives.

One of the advanced systems mentioned above is the sand system, which is designed to improve the cohesion coefficient of wheels and rails and reduce the probability of skidding. Study of the sand systems designs and their work allowed to identify the main shortcomings that affected the locomotive and the road economy, and also negatively affect the environment. Given these shortcomings, the authors have developed, tested and brought to the model samples two promising directions control traction rails: 1 – modernization of the existing sand system that will allow jet-abrasive effect on the surface of the rolling element, wherein a pulse shape to adjust the performance is used and, thus, reduce the consumption of abrasive material up to 3-7 times, depending on the operating conditions; 2 – to clean the railways with the brand new dry ice granules supplying system.

Obvious advantages of the second direction contribute to increasing its spread as in the industrial sector as in the service sector. Cleaning with dry ice granules surfaces of wheel and rail from a "third body" has the following advantages: dry ice is environmentally friendly solid phase of carbon dioxide (CO_2) with a temperature of -79°C, owing to these unique properties after contact with surfaces it heats up and sublimates (evaporates) into the atmosphere, does not require disposal of "secondary waste"; dry ice granules do not damage the surface, which after sublimation of the granules remain dry, which reduces the coefficient of friction due to the presence of water and does not affect sensitive electrical equipment.

The efficiency and intensity of cleaning with dry ice granules is provided by three effects: mechanical – compressed air flow with the dry ice granules impacts the surface at a speed of about 100 m/s, performing the removal of impurities; heat – heat exchange between the surface and the ice granules causes a intensive local cooling and fragility of contamination, causing thermal shock; freeze – formed through the cracks the dry ice granules penetrate into the layers of dirt and sublimate in them into more than 400 times expansion after fast change of the phase state, thereby forming a rarefaction wave and there is a complete separation of contaminants.

The feasibility of using dry ice granules is confirmed by the performed laboratory tests, analysis of basic and applied research, which shows that when cleaning surfaces covered by oil pollution, this method is most effective.

The authors have obtained patents for utility models and inventions of Ukraine in developed research areas. The search of scientific and industrial organizations for joint research, prototyping and participation in grants is conducted.

INCREASED RELIABILITY AND SAFE OPERATION OF TRAINS USING OF INNOVATIVE TECHNICAL SOLUTIONS IN HEAVILY LOADED TRIBOLOGICAL CONTACTS "RAIL TRACK - ROLLING STOCK - CONTACT NETWORK"

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In market conditions of economic development an important factor in any industry is to save resources while achieving maximum impact use of technology and systems. The economic benefits and traffic safety in rail transport largely depends on the efficiency of interaction of elements in the "rail track - rolling stock - contact network" [1].

During operation of rolling stock are constantly faced with the problem of wear of the working surfaces of the wheels, brake pads and linings current collectors (fig.1). Wear this irreversible process that leads to mandatory replacement of these elements and increasing resource costs. In addition the profile wheels is largely dependent on the dynamics of rolling stock, track impact, smoothness and implemented thrust. From the efficiency of interaction with wheel brake pads or disc depends on traffic safety and on the profile of the surface of the lining - the effectiveness of taking electricity from the contact network.

a) b)

Fig. 1. Wear of the wheels (a) and the linings current collectors (b)

Solving the problem of reducing the wear of the working surfaces of the system "track, rolling stock - contact network" requires a comprehensive approach and taking into account the multifactorial effect on the system. Each footprint "wheel-rail", "wheel-block", "brake disc - pad", "trolley - contact network" has some resource that should be taken into account and predict the design and technical operation of vehicles. On this depends the operation efficiency of the whole system "track, rolling stock, the contact network." The methods of use of these resources include patented solution:

- Increasing resource bandages bogies through the use of new technology replacing the position of bogies in a wheelchair during the operation and, thus, extending the period of operation before regrinding;
- Reduce wear on the working surfaces of brake components by cooling the contact areas air supply, which descends into the bellows of the brake cylinders during braking; decrease in the resistance movement of trains on the establishment of a shape-memory plates on the brake discs for closing the vents when driving the rolling stock and the opening of their braking (fig. 2) [2];
- Lifetime extension pads using two current collectors working surfaces.

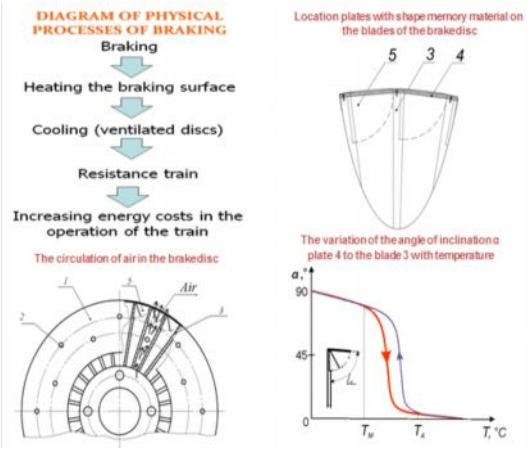

Fig. 2. Technical solutions to reduce the energy consumption of trains

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THE CONCEPT OF ADAPTIVE AND VARIATION IMAGE OF RAILWAY FREIGHT WAGON WITH A MULTI-FUNCTIONAL MODULES AND DIAGNOSTIC SYSTEMS WITH A VIEW TO MINIMIZING THE COST OF LIFECYCLE

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In the "White Paper" EU Transport 2011 says that by 2030, 30% of road freight transport over a distance of 300 km will be transferred to rail-

ways or will be achieved an increase in freight railroads doubled as compared to 2005. The increase in the volume of freight traffic by rail necessitates the establishment of rolling stock, which will ensure maximum effectiveness of its work under the conditions of security. A key role in solving the above problem playing creating a new generation of freight cars and related diagnostic systems and composite cargo modules. The implementation of the above is possible only when the development of fundamentally new methods of design and technical execution of their component units.

The main purpose of the work to create the concept of a new generation of freight cars using variational-adaptive method to the planned transport cargo through the development of innovative multi-functional modules and system diagnostics (cargo and vehicle-parts). At present, the current approach to the creation of freight wagons mentally exhausted and did not meet the requirements of the participants of their life cycle. The task can be solved by creating an equal stress, elastic-damping and prestressed bearing elements of the modules of the body and chassis of freight cars.

The aim is to develop a concept of a new generation of freight cars using variational-adaptive method to the planned transport cargo through the development of innovative multi-functional modules and system diagnostics (cargo and vehicle-parts).

The object of the study is to validate the concept of a new generation of freight cars and diagnostic systems.

The subject of study is a multi-functional modules (body, bogie, avtotormoznogo coupler and equipment) freight cars and the corresponding passive monitoring system.

As general concepts and ideas can be identified:

- orientation on the idealistic approach to the development of technical systems;
- development new forms of structural schemes and their elements modules freight cars, aimed at forming properties;
- development of the technical solutions which reduce the level of accumulation of fatigue stress by identifying and eliminating redundant links in the design and research of new methods for their use;
- multi-material and multi-functional areas to create innovative designs;
- development of freight cars models based on innovative principles: equal stress, elastic-damping, pre-directional voltage;
- creating of variations of the image that allows you to store, expand and efficiently use large fund existing and prospective, patentable technical solutions for modules wagons.

The general approach and methodology. When the project will use the following theories and methods of the theory of technical systems to create an idealistic-directed concept development of freight cars, their building blocks and components; the theory of the creation of multilevel hierarchical systems and value analysis in the study of component modules and their components; methods of linear and geometric programming when solving optimization problems; methods of dynamics and durability of machines in studies of stress-strain state; as well as the author of the theory, methods, and approaches the creation of innovative means of transport.

TECHNICAL RISKS ASSESSMENT METHODS ANALYSIS

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The definition of technical risk assessments is based on the results of monitoring the technical state of facilities, statistics on failures and accidents, a comprehensive analysis of production processes, as well as on the results of the simulation of dangerous events and situations, their impact on the performance of the system.

Technical risk is the probability of failure of object of technical risk, i.e. equipment, vehicles, devices, computing equipment, communications equipment, and damage or destruction of production buildings, constructions and transmission devices, which can lead to negative economic consequences in the form of direct and indirect losses (material, human, financial) from the manufacturer.

Monitoring of the technical risk is the observation during the past period or in the present to predict the further development, for making informed management decisions and measures on elimination of the undesirable factors and consequences.

Analysis of technical risks is widespread in industrial enterprises and design organizations, primarily performed by technical specialists. The results of this analysis are limited to estimating the reliability parameters.

Practical significance of the research risk increases with the use of holding together both technical and production management analysis. Technical and management analysis of interrelated in the justification of business plans, monitoring their implementation, in the system of production man-

agement in conditions of uncertainty to solve tactical and strategic tasks that are associated with forecasts of potential losses and develop actions to minimize them.

The variety of used methods requires their classification as at the stage of forecasting, as at the stage of settlement of losses due to equipment failures. The most common approach in classification is the division of all methods into two groups: qualitative and quantitative. At the same time, the development of mathematical methodologies and software that are used when making decisions has become increasingly complex, and the assignment of any of the modern methods to one of the specified groups in its pure form are impossible.

Each of these groups may contain a combination of both quantitative and qualitative analysis procedures.

In the suggested classification of research methods of technical risk, the sign of the first level is the complexity of the evaluation object, i.e. the possibility or impossibility of detail that plays an important role in the study of technical risks. On this basis methods can be divided into two groups (Fig. 1): general (experimental statistics) and analytical.

General (experimental statistics) method involves the assessment of technical risk as a whole. There are several varieties of this method: experimental, statistical, graphic, and rating. The general method involves the establishment of a risk assessment for an individual object (machine, process, etc.) in the whole data, which are obtained from internal reports, statistical reference books, information about similar objects, opinions of specialists or experts.

Analytical methods are based on the partition of the object into its constituent elements, a detailed study of factors and situations of risk that affect the occurrence of a risk event and the magnitude of possible losses and ways to minimize them. Quantitative and qualitative risk assessment can be used separately or together depending on the available time and budget required in a particular assessment.

The main analytical methods of analysis are standard statistical methods. They contain standard procedures implemented in popular computer programs and apply the mathematical tools of probability theory. The main tools of these methods are: the probability of occurrence of random variables, mathematical expectation, variance, standard deviation, coefficient of variation, probability distribution.

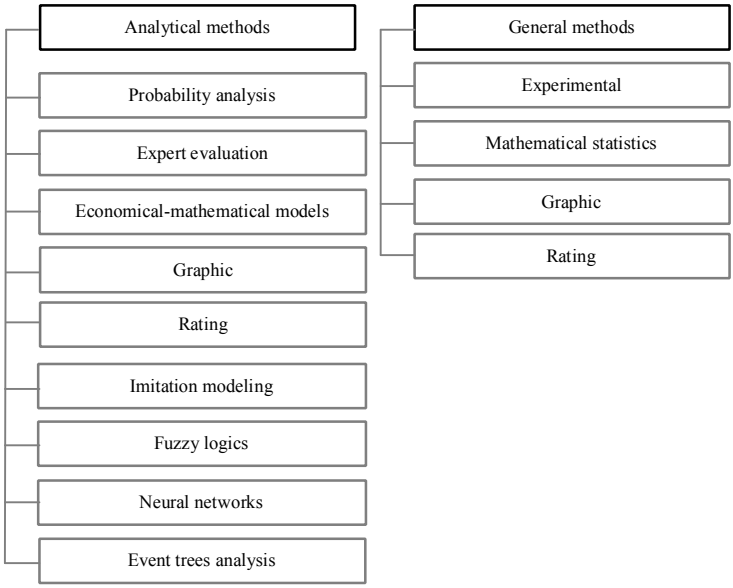

Fig. 1. Methods of technical risk assessment for technical systems

To examine the relationships between economic indicators and factors are used different mathematical-statistical methods: correlation, regression, variance, factor, covariance, cluster analysis, principal components, production function, matrix methods, etc.; methods of economic Cybernetics and optimal programming: methods of system analysis, computer simulation, linear programming, nonlinear programming, dynamic programming, convex programming, etc.; methods of operations research and theory of decision making: graph theory methods, the method of trees, methods of Bayesian analysis, game theory, Queuing theory, methods of network planning and management.

Not all of these methods may find direct application in the analysis of technical risks, since the main results adequately predict the economic impact can be achieved by using special financial instruments, however, some of their elements are already used.

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TO DETERMINE THE MOTIVES OF INCREASE OF MOTOR ACTIVITY OF STUDENTS OF VNU NAMED AFTER. DAHL IN THE COURSE OF EMPLOYMENT PHYSICAL EDUCATION

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The definition is motivated by the increase of motor activity of students of the East-Ukrainian national University named V. Dahl in the process of physical education classes. Gurjiy Oleg Victorovich.

Summary: Analyzed the motivation to attend physical training of students of the East-Ukrainian national University named V. Dahl. Based on the analysis of the survey, presented and discussed the characteristics of motivation. It is shown that the dominant motive is aimed at improving your physique. [2,4].

Students were asked four blocks of the motives prompting them to physical education classes in high school.

In block «Health» for the vast majority of students with the most significant are the motives of the desire to strengthen (42%) and health (28%).[8].

In the structure of «Social motives» are the motives of obtaining credit in the subject (54%), communication (17%) leisure (25%), obtaining additional knowledge (4%).

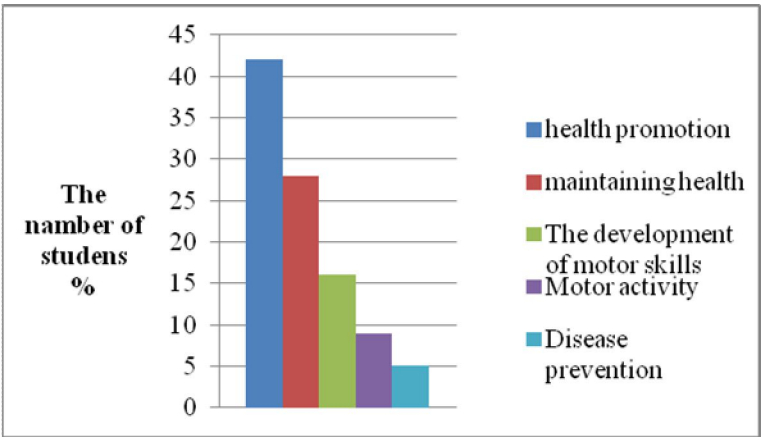
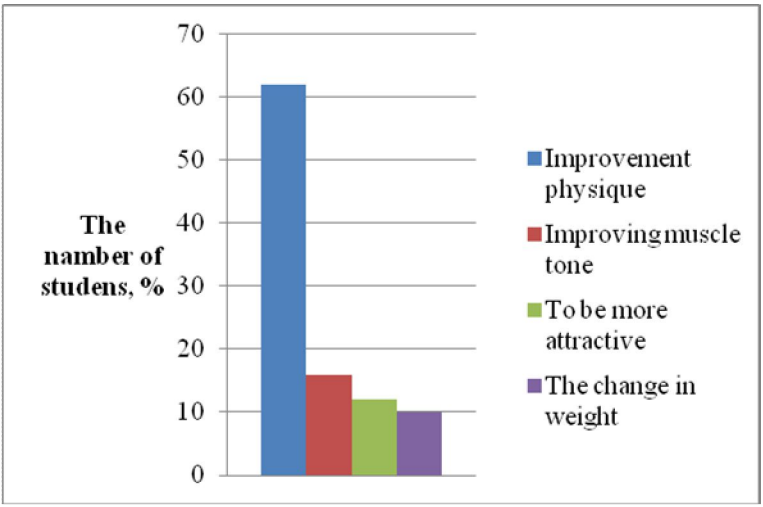


Fig. 1. The Motive Of "Health"

In block motifs «Sporty» the vast majority of students the main purpose of the exercise see improvement body (62%). To improve your muscle tone wishing to 16%.



The results of the survey showed that the answers to the «Emotional motives» as follows: the pleasure of occupations (47%), good mood during

and after class (32%), stress (15%), add confidence (6%). It should also be noted that male students view classes on physical education as the way to restore not only physical, but also mental health. [1,3,5].

Analysis of the results of the survey allows to identify priority motivation for students to exercise. The dominant motive is aimed at improving his physique (42%). In the second place the tune of "health promotion" (34%), followed by social (16%) and emotional (8%) motifs.

Conclusions :On the basis of the data of the survey results, which identified positive motivation of students to employments by physical education in higher education depends on the desire to look athletic, the promotion and maintenance of health, of positive emotions. The study of motivational sphere of students gives the opportunity to identify ways of correction of the physical condition and to form preconditions for the emergence of needs, the satisfaction of which is most favorable to their health and physical perfection. [7,8].

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FEATURES OF STRUCTURED AERO MIXTURES PROCESSES IN PNEUMATIC TRANSPORT PIPELINE BASED ON THE SYNERGISTIC CONCEPT

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The new conceptual approach to the study of the processes in the pneumatic pipeline, considered as an open system, submitted to the general laws of synergy, enables us to justify the phenomenon of self-regulation and self-transference of mass transfer in the material wire. Movement of homogeneous and heterogeneous flows is presented as a process of self-organization of collective bonds, determining the effective coefficients of impulse, power and mass transfer. In this case the regulation is carried out through the control parameters, which are taken as the Reynolds number, the Froude number, the Raleigh number and the Taylor number. Investigation of the processes occurring in pneumatic conveying of bulk materials is advisable to carry out on the basis of a common approach to the problem of predictability, based on the idea of partially determinate processes that allow dynamic prediction for limited time intervals.

The motion of the gas material flow in the pneumatic pipeline, which is equipped by an additional air duct, is being analyzed (Fig.1).

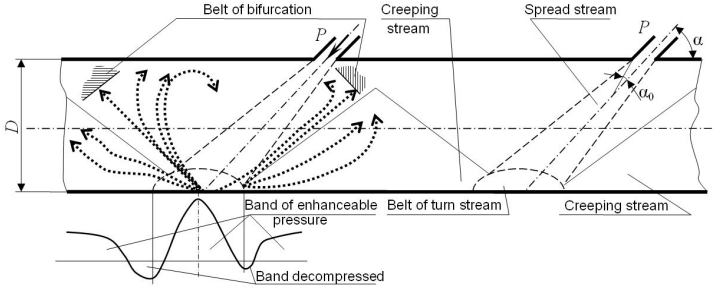

Fig.1. The scheme of formation of vortex structures with the emergence of bifurcation zone in pneumatic transport pipeline

Considering the formation of vortices creeping stream in the general movement direction, it is noticed that the direction of the vortices in the transition from the bottom surface to the top surface passes through the unstable vortex area. In certain place the vortices are being developed in opposite directions. A similar picture occurs in the creeping stream with back-

ward direction. The direction of each vortex in this area can be modified without making significant changes in the geometric dimensions of the pipeline and dynamic flow properties. Therefore, the direction of vortices motion in this area can be regarded as equiprobable. From the point of view of the theory of dynamical systems, this transition is the bifurcation between two states: a state of rest and "convective" state.

The formation of individual vortices and the system is being analyzed. The appearance of the vortex embryo in the local area is defined as "attracting set." Therefore, all of the local fluctuation originated areas should be taken as the future vortices growth centers. Further growth and dynamics of these areas are defined by the substance flow of the external environment. Accepting the hypothesis of elementary volumes heritage, the growth of the vortex as a whole can be explained. With the growth of the vortex the process of the so-called “swelling” of vortex embryo area takes place, which carries self-similarity in a short period of time, and it makes it possible to describe this fact as a fractal structure with a certain rational dimension. If the basic time "sticking" is denoted by τ, the desired dimension can be estimated not geometrically, but as the Hausdorf dimension.

From the point of view of I.Prigogin, when the system evolves and reaches the point of bifurcation, the fluctuation causes the system to choose the branch, where the further evolution of the system will take place. Similarly is being carried the scheme of vortex structures formation with the emergence of bifurcation areas in the pneumatic transport pipeline with the structured aero mixtures movement modes.

For the autonomous independent of time system is valid

$$\frac{dX_i}{dt} = f_i(\vec{X}, \lambda), \tag{1}$$

where $\vec{X}$ – vector with projections, $X_1, X_2 \ldots X_N, f_i$ – function evidently not dependent on time, λ – the quantity describing the internal and external system conditions.

Among the system solutions (1) there occur the solutions describing the stationary states

$$\frac{dX_i}{dt} = f_i(\vec{X}, \lambda) = 0. \tag{2}$$

The solution of system (1) are the points in the stationary phase space. Dividing the left and the right sides of the system (1) when i ≠ 1 in equation (2) for i=1 results

$$\frac{dX_i}{dX_1} = \frac{f_i(\vec{X}, \lambda)}{f_1(\vec{X}, \lambda)} = \Phi_{i1}. \tag{3}$$

The solution of the equation system (3) gives the phase trajectory in space. Changing the parameters λ in equation (1) causes the nature of the decisions change. There appear (disappear), new particular points. Stable particular points become unstable, and vice versa, etc. At that, the form and location of the trajectory in the phase space is changing. If the structure of the phase trajectories does not change, the solution is structurally stable. If the structure of the phase trajectories changes, the solution is unstable. The value of the parameter $\lambda = \lambda u$, at which the qualitative picture of the trajectories drastically changes, is being critical or bifurcational and the points are being bifurcational accordingly. (Fig.1.).

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TRANSPORT AS A DESAISIV FATOR IN TOURISM

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Tourist industry is completely dependent on transport, its safety, speed and service provided by the tourist during his travel. For organizers and travelers are important relationships with transportation organizations, in particular knowledge of the rules of interaction with them in terms of service, discounts and incentives on the sale of transport services.

Let's explain transport connection with the development of tourism and define the crucial role of the first:

• Transport existed as a separate branch of the economy before the emergence of demand for tourism and transformation in a social need;

• transport can operate separately and independently from tourism, while the reverse is not possible;

• tourism is heavily dependent on the state and functioning transport system than passenger transport by tourist development;

• evolution of transport has created the basic conditions for the "liberation" of tourist transport dependence - the only paradox that became a reality with the advent of private cars and improved individual parameters of the transport system.

The modern world transport system has achieved exceptionally high degree of mass tourism and the democratization movement. Today transport has virtually no barriers to organizing visits to any corner of the planet. Moreover, within a day you can overcome any distance on the globe.

However, one should note unturned depending on the system "tourism - transport".

Today, tourism is one of the main factors that determine the demand for passenger transport in the world. This conclusion is based on the following circumstances:

• In recent decades the predominant growth marked tourist trips compared to trips, with not committed by tourist purposes;

• there was a clearly expressed trend of continuous increase in the relative proportion of stops in the tour as part of its overall length;

• revenues from tourism trip that is an incentive for passenger transport are increasing;

• the share of transportation costs in total budget tourist trip in our time ranging from one-quarter to two thirds [1, p. 164].

Thus, the high growth rates of tourist travel, a significant proportion of total traffic, increase the mobility of tourists a direct impact on transport.

As part of the international community concrete result of this impact can be considered in the following perspectives:

Firstly, there is the growing number of individual components of the material base of all types of passenger cars, which are adapted to meet the needs of tourists, going ships and aircraft building heavy-duty cars and double-decker buses; ability to pass on sanitary buildings and transportis increasing; in tourist centers new and reconstructed existing airports and railway stations, sea and river pier are creating.

Secondly, there is the qualitative improvement of rolling stock and fixed transport facilities. Focusing on the needs of tourists leads to changes in the transportation system, which consist mainly in increasing technical and operational speed of passenger vehicles, reducing travel time, improved interior quality and service vehicles, improving their designs to meet the requirements of tourists (empowering visual inspection , limiting engine noise, vibrations, accommodation facilities in the cabin), ensuring increased safety measures.

Thirdly, improved organization of transport operations and services. As a result of the increase of tourism stream came to life new forms of tourism which require the introduction of innovative organizational methods, forms and means. Thus, in many countries there are successfully operating independent transport organizations whose sole activity is serving tourists in the journey; also, special transport unit in the structure of most tourist businesses. The pronounced trend is the establishment of close links between transport and tourism organizations to achieve optimal coordination of their efforts in serving tourists. Reorganisation and redevelopment of transport companies were increasingly occur depending on the conditions of the tourism market. In addition, development of new tourist destinations and regions always lead to organizational changes in the territorial redistribution passenger transport routes. Growth of tourism stream brought to life the use of such forms of service as combined transport services in formulas "train + car", "train + bus + boat", "plane + car", "ship + aircraft" and so on. Frequent and various actions to encourage tourists and special events in borders of transport tariff policy, which main goal is to attract customers to a particular mode of transport, the formation of new tourist flows and their efficient redistribution of classification and seasonality [2, p. 28-29].

So, given the close link Transport and Tourism we identify with the term "tourist transport". However, the interpretation of this definition is complicated, above all, the fact that public passenger transport simultaneously transports both tourists and ordinary passengers. In addition, people as objects passenger transport is not formally be any distinction - tourists and regular passenger transport services consume the same. The difference is only in the motif of consumption that often remains invisible because no external manifestation. It applies only to transportation facility, that certain rights, and transportation to the subject of travel motive is not significant.

Therefore, it is appropriate to define the term "tourist transport" as a separate and independently specialized type of passenger transport service is only for tourists when they travel or stay outside the place of permanent residence.

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GROUND OF NEW PRINCIPLE OF IMPROVEMENT OF COUPLING IN A CONTACT «WHEEL-RAIL»

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Rail transport in Ukraine plays an important role in the development of the national economy and ensures the leading position in the world economic system. For its development is needed to increase savings of energy and operational resources, increasing the throughput and carrying capacity of the railways, the reduce natural resources consumption and waste management.

It's well known that the most important indicator of the traction and performance of the locomotive is implemented by the traction force depending on cohesion coefficient of wheel and rail, which varies depending on the presence of "third body" at the contact surfaces, weather and climatic conditions. For better traction all over the world using sand, which also pollutes the upper track structure, increases the wear of wheels and rails increases the resistance to movement.

To reduce the probability of occurrence of skidding wheelsets, as well as address the shortcomings inherent in the sand system of locomotive is proposed to apply the cleaning of the surface of wheels and rails from various contaminants by cleaning with dry ice pellets, with no need to extract and prepare the sand, the rail surface is not disturbed and the negative impact on the environment doesn't appear.

The advantages of cleaning with dry ice pellets are equipment usage and customization, absence of secondary waste, the possibility to obtain pellets from secondary raw materials without violation of the contacting surfaces of wheel and rail equilibrium roughness.

Cleaning with dry ice pellets is an alternative to far from perfect sand supply method, or other movable materials used on locomotives in the various countries of the world.

The usage of the proposed technology for increasing and stabilizing the coupling of the system "wheel-rail" allows to considerably reduce waste of natural resources (sand) that infest the prism ballast and rail-sleeper lattice, which adversely affects the drainage of moisture.

At the moment of contact of the pellets with the surface of the wheel or rail they are sublimated (evaporated) and return to the atmosphere. CO_2

has no smell and color, does not conduct electricity and is not flammable, is a secondary product of other production processes.

Currently, the technology of cleaning with dry ice pellets is difficult due to the high cost of the equipment for production of pellets and their storage. Therefore, it is necessary to develop the required elements of the system of production, storage and supply of dry ice pellets that will achieve a high economic effect.

THE AUTOMATED TRANSFER GAUGE SYSTEMS AS THE BASIS OF ENSURING THE COMPETITIVENESS OF RAIL TRANSPORT IN UKRAINE

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Connection between East and West is the priority for a new EU infrastructural strategy from 2014 to 2020 with finding allocation of EUR 250 billion. Its basis is transformation of national transport systems of the Union into a united Trans-European Transport Network (TEN-T). Creation of such a transport network will optimize transportation process in the EU countries, which is a sub-objective of the global continental objective aimed at creation of the ground transport corridor Europe-Asia, Western Europe-China, the advantages of which in delivery time are evident. Currently almost the whole goods turnover (99%) between the EU and Asia-Pacific region is fulfilled through the sea transport. Currently (2013 data of the WTO [1]) the EU exports goods at a cost of $2,3 trillion and imports at a cost of $2,23 trillion. China is the second buyer of the European export (next to the USA) and the main exporter on the EU market. Unlike highways and air links, which theoretically can connect any countries, railways have track structure with the corresponding gauge, and carriages have axles of certain width, on the both ends of which wheels are fastened, ensuring contact between a wheel and a rail and preventing a carriage from transition from one gauge to the other. In such a way, the process of crossing of interstate borders complicates, and technical compatibility of railway systems of different world countries is absent, resulting in more expensive railway transportations.

Presently there are 4 various ways, applied on border crossing points between countries with the 1435 mm gauge and the 1520 mm gauge:

a) transferring of freights (or passengers) from one train, using the 1520 mm gauge on the train, exploited on the 1435 mm gauge – time losses from 12 to 14 hours;

b) removing of bogies (using special cranes) takes, at least, 4 hours;

c) wheelsets changing – e.g. change speed is 8 wheelsets per an hour in Spain, using special tunnels and mechanisms;

d) using of variable gauge wheelsets and automatic gauge changeover system (AGCS) – time losses are absent; speed decreases to 15 km/h during the transition period of the way changing, but a train does not stop.

Introduction of AGCS increases cargo and passenger traffic and thus revenue from transportation of goods and passengers by rail. One of the main advantages of this system is that the freight wagons with mixed composition, such as containers, bulk cargo, liquid (liquid), and the passenger can cross the border quickly, using the same equipment. For cargo transportation does not require an overload or change coaches, it avoids the additional processing power and reduces the risk, which may have serious consequences for the carriage of dangerous goods. In addition, it significantly reduces the loss of stolen and damaged goods. However, now there is no sufficiently effective, reliable and technologically AGCS design that would work in the transition 1435/1520 mm, which is strategically important for the railway transportation East-West..

Currently there are developed seven automatic gauge change systems: TALGO system, RAFIL/DBAG system, SUW 2000/PKP system, BRAVA (CAF) system, train with a variable gauge (GCT)/Japanese system, bogies with a variable gauge - 09 EV, Bulgarian automatic gauge change system [2 - 8]. The Polish automatic variable gauge axle system SUW 2000 is one of three currently operating European automatic variable gauge axle systems of railcars, which differs from other similar systems (German Rafil and Spanish TALGO) by its versatility. SUW 2000 enables transition of the rolling stock to three variants of gauges, existing in Europe, in any order (1435-1520, 1435-1668, 1435-1520-1668 mm); however, it has its disadvantages. The greatest technical problems are connected with collet sleeves, which keep wheels on an axle in one of two positions. During the exploitation process, some segments of spring sleeves do not stand loading and fall off. It may lead to impossibility of blocking of the wheelset while changing the track gauge. [9 - 11].

Scientists V.Dahl EUNU (Ukraine) developed a series of designs of the RCP, which are both improving existing designs SUW 2000 and has essentially new design. The ideas underlying designs:

- the need to isolate the petals a collet sleeves in case of breaking of the prevention and getting a broken petals between the groove and the adjacent lobes, which would eliminate the blockage and increase the reliability of the RCP and traffic safety;

- the need to introduce into the design of a collet sleeves elastic element, which will increase the thickness and strength of the petals without reducing their amplitude bending, allow for the dispersion of impact loads on the collet while wagging, as well as prevent the development of fatigue damage metal petals collet sleeves;

- reduction in weight and overall size of the RCP through the use of a blocking element, instead of two, which have a negative impact on the dynamics of the wheel-rail interaction and prevent the establishment of the traction motor, respectively, which will reduce complexity of the design, increase manufacturability, reliability and traffic safety;

- the use of physical effects to the locking mechanism (electromagnets (the design has very small dimensions compared with other RCP Its dimensions are almost the same as that of the conventional Unified wheel sets of this type, characterized by high reliability: unauthorized unlatch wheels without the use of electricity is not possible due to the centrifugal force of inertia); the effect of changes in the aggregate state of the locking elements, namely, melting under the influence of an electric current (the design has very small dimensions, unified with the designs of standard wheel sets, distinguished by high reliability, wear locking elements is virtually absent); the principle of thermo (widely used in cutting and drilling machines) cold shank drill does not pass into the cartridge, however, when heated chuck electric current chuck expands and increases the diameter of the hole after the drill premises hole chuck cools and reduces the diameter of the hole than provides the necessary tightness, and efforts to stabilize the tool ; hydraulic lock - flow of liquid from one cavity to another - no fatigue fracture, deformation and wear of the retainer (incompressible fluid), the small size of the weight and size.

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THE MAIN DIRECTIONS OF THE IMPROVEMENT OF TRANSPORT SERVICES FOR TOURISM

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Improvement of transport infrastructure of tourism services could positively affect tourism as a whole, significantly increase the number of customers, develop new forms of tourism, to provide new transport accessibility of tourist areas and contribute to the economic development of the country and regions.

The effectiveness of further development of Ukraine's economy depends on the normalization of the services sector, an important part of which is the tourist industry. Tourism called the phenomenon, system, a new way of social and cultural interaction and cognition. At present, the international tourism (travel and passenger transport) accounts for 30% of global services exports and 6% of total exports of goods and services. Tourism as an export category ranks 4th in the world after the export of fuel, chemicals and food at the same time - the spot in many developing countries.

State and prospects of development of tourist industry of Ukraine totally dependent on transport and its ability to provide quality transportation main consumers - tourists. When building relationships transport and tourism should occupy the main place innovative technologies, implementing them without the consent of their appropriateness between carriers and tour operators would not be effective. Inconsistency in the quality of transport services for travel with international standards on safety, comfort, value and other characteristics require rapid introduction of innovative changes in the traffic.

Transport infrastructure is designed to ensure the availability of areas of the city, region, country reliability and safety, suburban and external transport links in terms of population growth and mobility in passenger and freight transport, modern environmental requirements. To address these challenges must play and the development of an integrated transport system that will ensure complementarity of individual and public transport, urban, suburban and external transport systems.

The main directions of development of transport infrastructure of tourism are: first, the creation of modern information systems management and traffic control; secondly, the organization of zones with disabilities by type of vehicle and time of day modes days movement, entry, exit and parking; on the third, creation of public and residential areas extensive network of pedestrian areas, streets, squares, routes, providing convenient insulated from pedestrian traffic connections; fourth, the development of storage and parking systems and service centers, including increasing capacity garages - parking and temporary parking at the nodes of public transportation.

Transport is a means of developing tourism in the region and the country as a whole. Improving transportation services for tourism purposes has a strong socio-economic focus, since it facilitates access to social benefits for the population solves economic problems of the region, increases the attractiveness of the region. Among the priorities of improving transport services for tourist purposes are:

• reducing the cost of fuels by reducing excise taxes on fuel, development of new fuels and expanding the production of fuel in the country;

• improve the quality of pavement and other transportation routes;

• modernization of rolling stock of all transport modes;

• improving service standards in transport;

• organization promoted by all road users;

• the introduction of strict control and the system of fines for traffic violations for all road users;

• organization of monitoring demand and supply for transport services;

• Conducting regular market research.

After analyzing marketing surveillance transport market can conclude the poor quality of satisfaction of tourists because of the physical and moral wear and tear of vehicles as well as insufficient equipping them for the transport of tourists with disabilities, parents traveling with babies, the elderly and others. Behind the needs of consumers and the development of infrastructure facilities such as road no stops manned placards on vehicles coming, buttons, emergency electronic ticket sales offices is a significant barrier to the development of unorganized tourism.

Thus, tourism as a social category, significant for society contributes to the quality of life of the population. In Ukraine, travel abroad still remain the privilege of the minority, while domestic tourism is developing slowly. This is due to several constraints common to most parts of the country, including the most significant is the lack of support from the state or default its obligations and problems of transport infrastructure.

The institutional environment state should concentrate on: the formation of state policy in the sphere of air, road, rail, sea and river transport and in the use of airspace; identifying priority areas of the industry and road management according to the country's competitive advantage in the provision of international tourism in services; development and implementation of measures aimed at the development of trans-European transport networks, transnational axes of the transport system integration of Ukraine into the European and global transport networks; Development of tourism infrastructure, particularly in the directions of the national network of international transport corridors and main thoroughfares.

The main directions of international integration of transport system of Ukraine should include the following: the development of transit potential of the country through the introduction unanimous rules of transportation; improving the quality of transport services provided; creation of equal conditions of access to the market of transport services; improvement of legislation in the transport sector to international standards and active participation in the existing system of international transport corridors.

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THE METHOD OF MULTIPLEX MAGNETOMETRY ELEMENTS FOR ASSESSMENT OF ROLLING STOCK

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Elements of rolling stock and road transport during the operation exposed the combined impact of various external factors that lead to their failure. Detecting damage with external signs occurs during planned inspections using mainly external review Custom calibration of non-destructive testing (NDT). It is known that many metal destruction is due to exhaustion fatigue strength, and external signs of this process is usually not [1]. Existing techniques do not allow the NDT to fully assess suitability for further use hardware that are part of the rolling stock, so there is an urgent need to develop new methods of NDT and monitoring to assess their condition.

One of the most promising directions for that use magnetic control, so that this type of NDT does not require sophisticated equipment, not accompanied by the presence of harmful factors and is very informative [2].

A common problem, for all types of diagnostics, irrespective of physical sense of the process, is the low level of a useful signal from the sensor which can be compared with noise level. And if, considerable improvement of measuring devices in the sensitivity and selectivity field of sensors is extremely difficult [3, 4], so modern methods of processing of the received signal allow to increase considerably the quality of diagnostics.

For the signal processing with the MR-sensor it is proposed to use algorithms based on chaos theory and the principles of non-linear mechanics

The task of the researches is development of the approach which is based on the analysis of collective effects in the synergetic scheme which would allow to add the concrete mechanism of structurization on the basis of the formalism of the fractal Brownian motion to the analysis and to consider the multilevel plan of structurization as gradual development of cluster fractal structure.

Projecting the given analysis technique on identification of useful information in a signal with the high level and noise density it is possible to increase considerably the quality of technical objects diagnostics. It opens prospects for identification of dangerous object conditions at the stage preceding its destruction.

As dynamics of the difficult system evolving in time is observed usually as a dynamic series of some characteristic which creates a database for the analysis and identification of dynamic behavior of the system by means of the methods of nonlinear dynamics, so such analysis will allow to find useful information in the signals from the sensor with the high level and noise density during technical objects diagnostics.

To trace the state function of the studied system according to the change of the concentration of reagents which are directly connected with this function. Identification of the area of initial data at which choice it is possible to expect self-organization with formation of the periodic space-time modes, represents rather a complex problem as its decision demands carrying out extensive studies. At this stage of the researches we were limited to study of the self-oscillating modes especially as these modes define, apparently, the characteristics of the structural organization of initially disordered polymeric medium.

We got the evidence of essential possibility of mode realization of the deterministic chaos in the studied process when fluctuations of the parameter connected with concentrations of reagents in the studied medium form fractal structures.

In a scientific research institute "Iskra" East Ukrainian Volodymyr Dahl National University created breadboardversion of the magnetometric device with which to implement the described approach for signal processingThe main requirements to the magnetometric device for determination of the operability of metal structures are established. The configuration and blocks which are its part are chosen. It is defined that the chosen structure and device components fit the research requirements, blocks are compatible and the system has no “weak links”. According to the test results of a device model sample, the display way, optimum in informational content, of the research results of metal structures, on the measuring block is established. The problem of parameters of a radio channel, power supplies and service functions demand additional research.

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THE EVOLUTION OF COMPUTER RESERVATION SYSTEMS IN TOURISM

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The basis of modern computer reservation systems - CRS (Computer Reservation System - CRS) founded in the late 50's - early 60-ies of XX century. It was then growing popularity of air travel led to the creation of huge airline reservation centers. They used to manually processed requests for reservations that come from travel agents and the customers by post, telephone and telegraph. There was a time when they could not cope with the huge volume of information. This was the impetus for the early development of CRS.

Generation and distribution of information with a view to ensuring its reliability in a transfer and printing (including guides for travelers, price lists, tickets, information on reservation) are expensive. As the price of errors in these processes is very high, some companies in the US since the 60s of XX century. began to develop their own computer systems. After failed attempts of some firms to create a unified system (1961 p. - "DELTAMATIC" company "Delta", 1961. - "PANA-MAC" firm "Pan Am") two American companies "American Airlines" and "United Airlines" independently of created a highly competitive one reservation systems [1].

In the second half of the 80s of XX century. began racing computer reservation systems for the world championships: American system "Sabre" and "Apollo" took the British market, and the new European system "Galileo" and "Amadeus" tried to resist them.

With the advent of these agents were able to make and confirm reservations in seconds. In terms of cost and reliability methods underlying the airline reservation systems and the formation of the necessary documents

were revolutionary, and the effect of the use of these systems was enormous.

Besides rationalization effect obtained by reducing the number of employees, increase service offerings, reduce costs and service time, these systems provide the ability to implement marketing strategies of airlines including pricing, increasing revenue, loading aircraft, informing the customer [2].

With an increasing number of airlines, aircraft, air traffic growth in the second half of the 70s of XX century. CRS naturally become the main instrument transactions reserving tickets. Only domestic routes 95% of orders are five major systems, of which the "Sabre" and "Apollo" accounted for almost 75%. Themselves company "American Airlines " and" United Airlines "provided only 30% of air travel.

The first step in the development of computer reservation systems was to establish a terminal at the offices of most airlines, allowing us to dramatically improve the quality and enhance the performance of airline personnel, while not reducing the number of accepted phone calls and telegrams from the reservation request from travel agents and individuals. The next step was to establish a few years later airline reservation terminals in major travel agencies. Quickly assessing the effectiveness of new technology booking, travel agents began strongly demand from the airlines a significant expansion of the spectrum as provided in the reservation systems of information and functionality of these systems. As a result, initially focused on a specific airline software systems were combined in a system that served the group of airlines providing information not only on the availability of seats on a given flight, but also general information about flight details of tariffs, and information about related industries tourism business - car rental, accommodation, sale of railway tickets and others.

Gradually computer reservation systems for airlines have become the global distribution system of tourist services - GDS (Global Distribution Systems - ODS). In parallel with the expansion of the functions of computer reservation systems were working actively aimed at shortening the travel agent to get confirmation from the service provider. In the absence of fully computerized chain "travel agent - Booking Center - provider" to this spent 2 hours to 2 days, so confirmation that the supplier had to enter into the system manually. New technical achievement in this regard is "seamless" connection, which is based on a fairly simple ideology: Current information on availability, tariffs etc. The most detailed description has only a finite service provider - airline, hotel, car rental company. According to this ideology, the travel agent at the terminal of the global system of computer sees the

booking information "extracted" directly to the service provider's computer system [3].

The largest computer reservation systems on the international tourism market is a system Amadeus, Galileo.

Networking CRS and GDS with national and regional tourist brokers is the latest stage of the evolution of booking and reservation at the tourist market. The widespread introduction of computer networks and related competition between them help to reduce the cost of user access to systems.

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INFORMATIZATION OF TRANSPORT SYSTEMS-DRIVING FORCE OF TOURISM DEVELOPMENT

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In the age of global informatization of all spheres of the tourism industry is left on the sidelines, but must keep pace with the future in order to remain the one of leading sectors of the global economy.

Regional and global transport system plays not the least role in tourism development, its functioning ensures the tourist flows. Fastidiousness of passengers - tourism product consumers and the need for storage and processing an increasing amount of information led to full informatization of transport systems.

Already there are nothing new on sites with an online schedule and fare information on a particular form of transport. Gradually interaction between transport campaigns and the banking sector has led to an online service that allows you to purchase a ticket in one "click" by transferring funds from your own to the appropriate account of transportation campaign.

At the request of demanding tourist who wants to plan your trip "here and now", took computer topics booking system (CRS), which originally were developed by combining of airlines services in on-line space/ Over time these systems by transferring equity joined the railway transport, road transport, shipping companies. As a result - the emergence of global distribution systems (GDS) which during the last decade have become an indispensable tool in the daily activities of tourism enterprises.

In the process of merger and transformation of certain capital market can be divided into four major GDS - Galileo, Amadeus, Sabre, Worldspan. Also good position have such GDS as Fidelio, Gabrielle [1, c. 170].

There are currently actively implemented and used innovative self-service (for example Travel Point) that allow potential consumers to independently develop, change their route, and if it is necessary just to cancel it.

So, transportation system is now an integral part of the global tourism industry. This innovative technology and information transport services is due to the rapid development of tourism industry and entering it to the top ten most promising sectors of the global economy.

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MODERN BOGIE FOR RAILWAY FREIGHT WAGON

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Three element bogies are the main type of bogies for railway freight wagons in Ukraine and in the world (In Ukraine the main model of freight bogies is 18-100). According to the research of many scientists, this type of bogies is morally obsolete, does not meet the requirements of speed and force impact on the railway. The situation is aggravated by the fact that there are more than 20 failure a year of bogie side frame on the railways of Ukraine and Russia. Therefore, insufficient strength is also a disadvantage of bogie [1].

Modernizations of bogies in our country is mainly due to the increase overhaul life. The issue of increasing the strength and speed, reducing of force impact on the railway is not considered.

Also, in many countries are developing a radically new freight wagon bogie [2].

Objectives and problems. The aim of the article is to develop recommendations and constructive solutions to create the concepts of modern freight car bogies, namely to increase the strength of bogie side frames, to reduce force impact on the railway, to increase the permissible speed by closing the axle-box slots on the bogie side frame, using the pre-stressed state of the frame, introduction the first stage of suspension [3].

Methods and technical solutions for concepts of modern bogies. According to the analysis of breakdowns bogie side frames 18-100, the most dangerous zone is transition Radius R55. It should be noted, that 60% of broken frames contained casting defects. Therefore improving the quality control will partially solve the problem of breakages. And this diagnosis is a very expensive process. Reduced quality of railways (especially the hump yards) exacerbates the problem [2, 4].

Typical breakdown of bogie side frames 18-100 in transition Radius R55 on the railways of Ukraine and Russia is shown in Fig. 1.

According to the authors, the reason for the accelerated destruction of the side frames is pouring defects and high values of forces on the hump yards. Max. longitudinal force acting on the outer jaw of side frame is 100 kN [4].

Axle-box lines have been using on the locomotives (for axample TEM3). The scheme with axle-box lines on the side frames of freight bogie 18-100 (fig. 2)

The authors calculated (fig. 3) static and dynamic stress-strain state of the side frames 18-100. The max. equivalent stress in the side frame with axle-box line 35% below the classic 18-100. Cross-sectional area of axle-box line is 20 cm^2.

The next step is to create a pre-stress in bogie side frame. If axle-box line pulls together jaws with the force, general stress in the stress-strain frame reduces.

The authors have developed and patented more than 11 designs of bogies type 18-100 with the first stage spring suspension. Positive results of this solutions [5]:

- reducing force impact on the railway
- increasing the permissible speed
- lowering dynamic loads
- lowering resistance to motion [6].

Fig. 1. Typical breakdown of bogie side frames

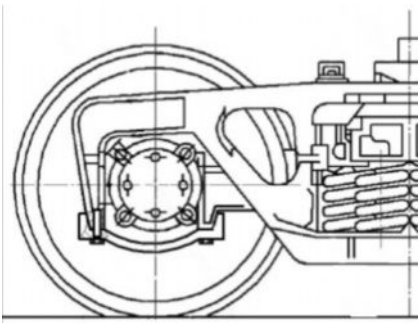

Fig. 2. Axle-box lines on the side frames of 18-100

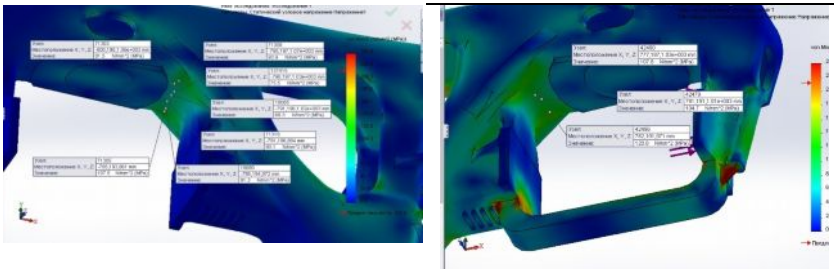

Fig. 3. Calculation of stress-strain state

Rolled steel is the best material for load-bearing structures. Many companies are developing bogies with rolled steel in construction. For example «Tatravagonka» has developed 18-100 bogie side frame. It is harder than casting, the difference is 50 kg.

We used the method of applying circuit and picked up a profile based on the rails. Preliminary calculations show a reduction in weight.

Now there is a preparation for bench tests with axle-box line at State Economic and Technological University of Transport, Kyiv, Ukraine. And there is a preparation for computer tests of bogies with the first stage of suspension in software complex «UM».

We are glad to cooperate in this sphere (e-mail: Kara_SV@i.ua).

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RAILWAY SAFETY AND EFFECTIVENESS IMPROVEMENT

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Railways with mainly passenger service (including high-speed) main problems are: wear of rails and wheels, surface contact fatigue on rails head checks, elevated vibrations and road and rolling stock influence by the out of roundness wheels, increased noise.

Conditions of interaction in «wheel-rail» system provides essential influence on service life, operating costs and organization of railway handling and rolling stock.

Incipient problems decides on the basis of the system approach by which economic efficiency of exploitation and necessity of providing of safety traffic is taken into account. Existing action programm for the reducing wheels wear and rails head checks provides application of the followings methods: tribological materials, building-up of wheel flange, increase of wheel tread thickness, rubber-metal elements, increase of hardness [1,2].

Creation of new types of rolling stocks and trackages saturation requires a lot of time. Thereby the first suggested stage is to concentrate efforts on arrangements, which gives a maximal effect in short terms. As a result of reasons wear influence analysis, concludes that as a primary ar-

rangement which quickly will be realized the methods of wheel flange wear reducing is lubrication in the contact point with the outside surface of rails. Due to forces decrease of carriage motion resistance on rails, lubrication reduces the consumption of fuel-power resources for traction, promotes the service life of wheels and rails, reduces probability of wheels rolling on a railhead, reduces the level of the generated noise.

Sharp high-frequency noise (squeal), radiated from wheels rolling stock interaction with rails, is one of the nonpleasant phenomena, which accompany everyday operating activity of trunk and city railways. A sound, felt as a squeal, lies in a range 500…10000 Hz. A high-frequency squeal in the curves of small radius (R < 650 m) obtains 116 dB. Due to friction modifier application it is succeeded to reduce the indicated level to 92 dB.

A basic problem during development of the automatic wheel flange lubrication system is moments determination of turning on and off the material feed of abrasive material on the flange of wheel. Effective application of lubrication foresees the feed of abrasive material, in that moment when there is a contact of wheel flange with a railhead, fig. 1 [3]. As an information source for wheel flange contact with a railhead moment authentication method of acoustic emission is offered [4]. By the experimental data a flange contact can be simply identified in the range of frequencies from 800…4000 Hz on maximal deviation of sound level pressure from equivalent one.

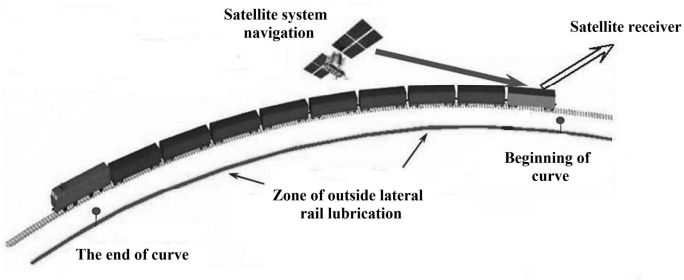

Fig. 1. Technology of lubrication

It is necessary also to mark that efficiency of application of lubrication on the railways essentially also depends on the applied abrasive material. Properties and quality of abrasive material provides conclusive effect on lubricator.

The indicated arrangements conduce to the cutback of spending for railway support and improve efficiency and safety of railway transport.

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DETERMINING THE PARAMETERS OF AN IMPROVED RAILWAY BRAKE EQUIPMENT

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High speed train discs must be capable of absorbing large amounts of heat in emergency brake applications from maximum speed. Heat dissipation during braking is low and therefore it is crucial to ensure low initial brake temperatures.

This can only be achieved with good cooling characteristics, since brake mass must be kept to a minimum to ensure low unsprung mass. It must also be taken into consideration that emergency braking from maximum speed is relatively rare, however the brake system must be capable of performing this duty without excessive thermal loading.

Ventilated brake discs are commonly employed for their good cooling qualities, however this type of brake disc can generate substantial pumping losses when rotating at high speed. The effects are very serious because a high number of discs (usually 4 discs per axle) rotating at high speed (up to 2000 min-I) require very high levels of power, just for disc rotation.

This has resulted in the development of numerous 'low loss' ventilated disc designs and the use of solid discs. Obviously, a very fine balance of low pumping losses and good cooling characteristics are necessary to satisfy braking and power consumption requirements for all vehicle routes.

The basis of the proposed technical solution the task of increasing the efficiency of the method of braking of the locomotive and equipment for its implementation through effective use of compressed air, which is discharged from the brake cylinder, and the cooling of the brake pad and the working surface of the disk, the categorization of products galling to contact "brake pad and brake disc".

The basis of the model the task of increasing the efficiency of the method of braking of the locomotive and equipment for its implementation through effective use of compressed air, which is discharged from the brake cylinder, and the cooling of the brake lining and the working surface of the disk, the categorization of products galling to contact "brake lining and brake disc".

Suggested ventilated disc brake for which reasonably desegment the task of increasing the efficiency of the method of braking of the locomotive and equipment for its implementation through effective use of compressed air, which is discharged from the brake cylinder, and the cooling of the brake pad and the working surface of the disk, the categorization of products galling to contact "brake pad and brake disc".

Justified quantification of factors affecting the process of supplying compressed air between the brake disc and the brake pads during braking and the dynamics of their actions.

Consequently, the use of the proposed design will allow:

- effective use of compressed air which is discharged from the brake cylinders,
- cooling the area of frictional contact of the brake pad and brake disc", using the compressed, cooled air into the holes of the brake pads,
- improving braking performance and reduce the intensity of wear of the brake pads due to the timely disposal, the frictional wear of the zone,
- increasing the level of traffic safety of trains by increasing the reliability of the braking.

The coefficient of heat transfer by radiation is given depends on the degree of tone color scheme (dark, light) radiating surface of pad, of the absolute temperature of the pad and the ambient temperature. In a modified construction of the pad coefficient of heat transfer by radiation is not considered, because it does not significantly affect the wear pads because organized weak heat removal from the zone of friction of the wheel roll surface and overlay in the environment.

The heat transfer coefficient by convection is calculated according to the criteria of Reynolds and Prandle.

The presence of grooves in the proposed design of pads reduces the intensity of wear, especially at high speeds, through the stabilization of the temperature regime at the expense of increasing the efficiency of heat removal from the zone of friction in the environment. During braking, the cold air that is blown under the cover, heats up and goes effectively in the environment. As a consequence, there is an increase, which reduces the average temperature of the friction of the working surface of the pad, thereby increasing the time to reach the maximum temperature at which there is destruction of the projections of the actual contact. In the overlay model when increasing the initial speed of braking of the intensity of the heat increases.

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OPTIMIZATION OF THE PROCESS OF METHANOL AIR REFRIGERATION AND CONDENSATION AT THE SYNTHESIS STAGE IN THE METGANOL PRODUCTION

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Modern chemical-engineering industries should be characterized by high efficiency and productivity. This can be achieved by the production processes optimization, for example, by optimal control of the process.

The methanol production refers to the main productions of the chemical industry. It is a heavy tonnage, nonstop production with the complicated technological scheme. The technology is characterized by the high tem-

peratures, pressure and multi relations of the processes parameters. Searching effective parameters of the influence on the methanol synthesis process and ensuring its stable operation in the optimal mode is a very important task.

The aim of this work is the optimization of the process of methanol air refrigeration and condensation at the synthesis stage in the methanol production.

To achieve this goal it is necessary to solve the following technical problems:

- analysis of refrigeration and condensation unit of methanol as a control object;
- mathematical simulation of the air refrigeration process of the methanol synthesis stage;
- construction of the refrigeration unit control system.

The object of the investigation is the refrigeration and condensation stage of the methanol production synthesis. The subject of the investigation is the refrigeration unit control system.

The investigation methods.

A mathematical model has been developed by using computer simulation method based on the heat balances of the air refrigerators. The investigation of the control system operation has been carried out by a method of the simulation modelling on the computer with the use of SCADA – Trace Mode VI system.

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COMPLEX OBJECTS OPTIMIZATION WITH COMBINED MODELING USE

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Chemical productions are characterized by high complexity of technological processes making up technological systems and a high level of automation based on software and hardware complexes (SHC) with the improved and highly reliable microprocessor systems having appropriate software. Microprocessor control systems along with the control object make technological processes computer-integrated control system (TP CICS). The goal of every TP CICS TS is to optimize the object operation by an appropriate selection of controlling actions.

In connection with wide introduction of the modern TP CICS in chemical production the new requirements for training of highly qualified specialists in the field of chemical and petrochemical industries automation are proposed. Among these industries the nitric industry, oil refining, synthetic rubber, soda products processing productions and many others play a major role.

An optimization problem is one of the main problems of both science and everyday human activity because a human being has a desire to achieve the best (optimal) result. From the formal mathematical standpoint the optimization problem can be divided into two groups: optimization in finite dimensional space, and parametric optimization, i.e., infinite dimensional optimization.

Properties providing an effective functioning of both control object and controlling device, i.e., the whole controlling system in general are referred to as criteria (indicators) of quality (optimality) of the control system. They have quantitative indicators, helping to assess the system quality in the optimization tasks.

All quality indicators are associated with the parameters of the controller by complex dependencies that are controversial: the parameter change leads to an improvement of some quality indicators and degradation of the others. This greatly complicates the choice of the controller parameters.

The implementation of some modern technological processes is possible only under the condition of their full automation.

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THE STUDY OF FACTORS INFLUENCING THE SUPPLY OF COMPRESSED AIR IN FRICTION CONTACT ON OPERATION OF THE BRAKING EQUIPMENT

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The problem of cooling brake friction pairs, increasing the efficiency of the method of braking of locomotive and equipment for its implementation can be solved by efficient use of compressed air, which is discharged from the brake cylinder, and the cooling of the brake pads and the working surface of the wheel, the assignment of products of friction wear of contact "brake disc - pad".

For this purpose compressed air from the brake cylinder through the diffuser and check valve is discharged to the bellows, the next braking is triggered adjustable valve that connects the brake pad with a bellows through which the accumulated air through the rubber tubing is made in the brake pad openings channels is fed into the zone of friction contact, cools it and carries away the products of wear in the environment.

When supplying compressed air between the brake linings and brake disc in the braking process it is possible to identify factors that will influence this process, these are:

• air supply pressure between the brake disc and brake lining;

• the diameter of the inlet fittings in the brake lining;

• optimum clearance between the brake disc and the brake linings (braking preprocessor to the air managed to blow out the pads).

The parameters that influence the operation of the braking mechanism when compressed air between the brake linings and the brake disk are as follows:

• air consumption from the receiver;

• the coefficient of friction, coefficient of efficiency and coefficient of stability of the brake mechanism;

• uniformity of air distribution over the surface of the friction lining during braking;

• specific braking force.

Considering this, the further research might be focused on the determining and recommending such a value of pressure of compressed air, and the diameter of the inlet to the reaction force from the compressed air did not lead to the deterioration of the above parameters.

That is, the numerical determination of the factors that affect the process of supplying compressed air between the brake disc and the brake linings during braking and the dynamics of their actions.

In the case of forced cooling with compressed air the surface of the brake lining should be viewed as a static resistance to sliding. Its basis will serve as a friction plate with symmetrically arranged relative to the longitudinal axis of the holes for supply of compressed air. Calculation of aerostatic bearings is based on the approximation of the pressure field in the gap of differential algebraic equations. The method takes into account the two-dimensionality of the distribution of gas flow in the bearings of different configurations and gives results close to real. In each of the points to consider the integrated equation, using the known formulas for the approximate calculation of derivatives.

There are several methods of supply and distribution of gas in the gap. Very effective is a sectional system for supplying gas with a distribution in the working gap.

Depending on the pressing force of the brake pads on the axis and other parameters of the brake system, are determined by the design parameters of a brake lining.

The proposed method allows determining and recommending such a value of pressure of compressed air, and the diameter of the inlet of the brake lining, so that the reaction force from the compressed air did not lead to deterioration of key indicators of work of the braking system.

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DESIGN FEATURES OF ENHANCEMENT OF UV SOURCES

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Specifics of optical and photo-electric measurements superimpose certain requirements to light sources. First, they shall have identical brightness on all surface area of radiation of a luminous flux. Secondly, the flow of radiative energy shall be stable in time, that is would possess so small fluctuations that within errors of experiment I had no impact on results of the experiment. Thirdly, intensity of the luminous flux proceeding through the surface area of an input slot of the monochromator shall be a constant. In this operation the description and construction of a high-voltage hydrogen lamp, as UV source are provided in the energy range to 11 eV. It is constructive a hydrogen lamp consists of two flanges connected among themselves by a ceramic-metal tube with a bellows decoupling. The first flange connects to the vacuum monochromator, and the second flange by means of the union connects to the hydrogen generator. The tube with an inside diameter of 4 mm is inserted into a ceramic-metal tube quartz (optical quartz). Such constructive decision allows to replace through certain time the polluted quartz tube on new that qualitatively affects stability of operation of UV source. Advantage of the offered UV source in its longevity and stability of operation with rather intensive emitted luminous flux.

SOCIAL NORMS IN MORAL CONSCIOUSNESS OF STUDENTS' YOUTH

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In order to consider social norms and their role in the formation of moral consciousness it is necessary to give a definition of this phenomenon. This necessity is conditioned by a variety of definitions of social norms formulated by different scientists and supporters of different schools and scientific directions which differ and sometimes even contradict in their essence. It results in the polyphony of different views on defining the term "norm" in general and the term "social norm" in particular. Despite the difference of the redefinitions they all have fixed the ability of norms to act as human activity regulators. However social norms include a very wide range of concepts – from moral norms on the verge of breaking the law (for example, "don't cheat") to the norms of etiquette and politeness (such as "greet while meet"). Social norms also include forms of behavior related to customs and traditions and norms of specifically professional behavior.

Modern youth consciousness exposes tendencies of individual–pragmatic character, striving for attaining material wealth, individualistic manifestations of an identity, low social activity. These tendencies are greatly influenced by mass media, which thrust the cult of consumption and the asocial model of self - realization upon a young man's consciousness. It is not by chance that modern humanitarian sciences pay great attention to the problems of moral development of contemporary society, spiritual and moral upbringing of young generations including students' youth.

Moral consciousness is one of the forms of social consciousness that is (as well as its other forms) a reflection of people's social life. Moral consciousness includes values, norms, and ideals. Morality exposes itself as a pursuit of excellence. Moral consciousness is a spiritual side of morality: norms and principles of behavior, emotions, feelings, beliefs and other ideal factors. It is a reflection of life, practical and historical human experience in the form of individual and collective representations, it functions as a mechanism of social inheritance, regulation and organization of the life activity, provides an estimation of the results of personal behavior.

Moral consciousness is a human realization of his place in the society and his being an identity. Self-consciousness is the most important component of the morality structure. Self - consciousness is based on a moral principle because it is penetrated by the presence of others. In the same way from the very beginning an identity exposes a pursuit of excellence.

Moral behavior based on the moral consciousness of an identity and realizing his/her moral relations is a result of an identity formation and his/her free choice. In this case if moral consciousness presents a subjective form of relations, a moral behavior becomes a form of their objectification, or their materialization. In this sense a human behavior is an indicator of his moral culture. A moral practice comprises real manners, actions, moral relations. Deeds and actions reflect a moral aspect of human activity, present some positive or negative character and assume a moral responsibility.

A deed act is a key moment of moral behavior, characterizing an ability of human to set goals deliberately, to choose appropriate means and to realize a free, moral and responsible action. Motivation and estimation (self-esteem) take an important place in moral behavior of an identity as well as action does. Motivation induces to action: a motive is followed by an action and keeps on causing action during its realization. It is a very strong regulator of human behavior, not less important than an action itself, because non - motivated actions do not exist.

Moral relationship is a key element of morality structure fixing the characteristics of any human activity from the aspect of its moral estimation. The most significant in the moral sense are such types of relations as an attitude of a human to himself, his attitude to other people and to the society in general.

The state also plays a great role in formation and functioning of the students' youth morality. From the one hand it is a moral consciousness that sets orientations. But from the other hand the formation and development of morality take place in the students collective and in the society in general, and the state in one way or another influences this process.

By setting the society in certain order, by developing its material industry and economy, the state has created external though necessary conditions for improving its moral life which needs in its turn, certain culture. It is the state that has created conditions for the development of arts, science and religion.

This research does not embrace all aspects of the problem of forming moral consciousness of students' youth. Great attention should be paid to the context of values. The issues of forming personal moral value of students of school and college age must be carefully considered. The problem of harmonic combination of moral consciousness and future professional activity related to the problem of students' age is really urgent and actual.

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PROBLEMS OF FREIGHT FORWARDING ACTIVITY IN UKRAINE

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The geographical and geo-economic position of Ukraine on the Eurasian continent is one of the main prerequisites for the effective use of equity-foot transit potential. Infrastructure of international road corridors in Ukraine can provide a pass significantly more cargo traffic than those which exist today. The main reason for reducing the volumes of transit freight traffic is the economic crisis and the difficult political situation that has developed in our country.

Necessity of overcome the economic crisis encourages cargo owners to find the shortest and cheapest route themselves supplies of goods between the two countries, which in turn forced us to look for ways, to attract additional volumes of transit through its territory.

This fact greatly increased the role of freight forwarders as logistics intermediaries, the contributing implementation of foreign trade operations by coordinating the activities of the different actors of the process of delivery. The quality of their work is directly dependent on the efficiency of foreign trade and the competitiveness of related parties external-trade activi-

ties. To create a competitive market of freight forwarding services, especially not necessary to identify the problems, we are there.

To date, there are the main problems forwarding activities in Ukraine: poor quality of service; lack of information support operations; lack of transportation process optimization; depreciation of rolling stock; difficulties in cargo insurance and transport; the country's infrastructure problems. Let us dwell briefly on each of them.

1. Poor quality of service. No matter how trite it sounds, but the main problem of the companies providing transport and logistics services, is the quality of these services. In addition to technical issues, which we will discuss further, companies do not often pay attention to customer oriented issues. Existing freight forwarding companies mostly narrowly focused forwarders who do not have their own rolling stock to perform transportation or logistics, with a limited set of services. They don't only solve the customers' problems, but also provide them with the new and increases risk and fear for the cargo.

2. Lack of information support of transportation. Modern technology rule the world, and the one who does not adapt to them, is not competitive. Building a competent technical support to the process of transportation, freight forwarding company currently provides a significant competitive advantage in the market. Automation of processes at the enterprise allows you to achieve maximum efficiency, find weaknesses and eliminate the imperfections of business processes. The customer is always worried about the safety of the cargo during transportation, so the company providing permanent access to information about the process of delivery of goods, the customer always prefers.

3. Lack of transportation process optimization. The above problem of low traffic automation leads to a number of other shortcomings of domestic logistics system. Thus, it often happens that when sending individual consignments car does not always fully loaded, etc. It not always used effectively rolling. With that consolidated cargo equipment not only increases the efficiency and profitability for the company's carrier, but also reduces the cost for the customer. Another problem is often not enough thought out route planning and almost always - the lack of spare option . The customer is faced with increased delivery times and, as a consequence - overpriced services that in combination significantly reduces the competitiveness of companies.

4. Deterioration of rolling stock. One of the problems typical for companies from the CIS countries is high depreciation of rolling stock. At firstly, because of imperfections in the system of depreciation and write-off-the nicks. While there is no uniform system of accounting write-off depre-

ciation of technical equipment, which means that each company-one to calculate it differently. Second, some companies used so old and worn-out equipment, its repair and maintenance in good technical condition cost the company more than conditional benefit from a non-purchase of new equipment. It is this illusion of savings leads to higher costs for the maintenance of rolling stock, the stern of the compromise the cargo, as well as can disrupt delivery times due to unforeseen breakdowns and necessary repair techniques.

5. Difficulties in cargo insurance and transport. Another pressing issue in the freight is cargo insurance and transport-carrier. On the one hand, in the international traffic there is liability on the INCOTERMS standardization system, according to which the contract was originally set boundaries-is responsible for the safety of the cargo carrier. But at the same time in internal traffic, not all companies pay attention to the protection of such risks and do not provide cargo insurance services. As a result, customers or redirect this issue with third parties, and the carrier loses responsibility income or, in the case of an unforeseen situations begin lengthy trial on liability and compensation, which negatively affect the reputation of companies, research institutes.

6. Problems of the country's infrastructure. In addition to private companies of certain factors on the activities of freight forwarding companies affect the overall situation in the country. Poor quality of roads creates a low-permeability and a negative impact on the speed of delivery. Often companies can't make the shortest possible route due to insecurity, horn, bad cover major highways. You can't forget about the imperfection of the Ukrainian legislation in the sphere of transport and traffic. Constant changes and Proto contradiction with international standards complicate the job of transport and logistics companies operating in the domestic and abroad, markets.

Knowing the problem, you can always find ways to solve them. Logistics in Ukraine developing, so it is especially important to consider international experience and work to address the existing problems and errors. First of all it concerns the automation and optimization of business processes, as well as improvements portfolio services of freight forwarding companies in Ukraine.

MATHEMATICAL MODELING OF NEW ROTARY-TYPE COMPRESSORS KINEMATIC CHARACTERISTICS FOR RAILWAY ROLLING STOCK AIR SUPPLY SYSTEMS OF NEW GENERATION

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Railway transport of Ukraine takes an important place in the national economy, whose effective functioning is necessary condition for securing of defence capability, national security and state integrity, protection of its economic interests, improving living standards. Currently railways basically meet the needs of national economy and population in transportation, however in recent years a major deterrent to development of railway transport was further aging of its rolling stock. At the same time the state of industrial and technological base and technological level of railway transport in many parameters does not meet growing needs of society and European quality standards of provided transport services, that in the near future may become an obstacle to further social and economic development. Therefore, it's necessary to make drastic steps to modernize its rolling stock for expansion and future development of rail transport.

In accordance the main provisions of the Ukraine Transport Strategy for period till 2020, one of priority directions of railways development is to achieve high technical and economic indicators of transportation process by railway transport. This is due to the challenge of ensuring the required performance and reliability of modern systems of traction and multiple units, which determine the safety of trains. Among such systems, the air supply system, which is operatively associated with brake, electropneumatic, sand systems as well as related support equipment and machinery, should be highlight first. Thus a major role in providing of said systems with compressed air (with the necessary performance and pressure indicators) play compressors.

At the present time in the modern traction rolling stock of railways and subways of Ukraine there are used piston compressors of Poltava Turbomechanical Plant (KT-6, KT-6El, KT-7, PK-5,25, PK-3,5, PK-1,75), of Pervomaysk brake plant (VP-3/9, VV-1,5/9, PK-35, PK-17) and JSC "Transpnevmatika" (EK-4V, EK-4B, EK-4). At the same time with sufficient performance, discharge pressure and satisfactory operational reliability, they are characterized by relatively large mass-dimensional parameters, costs of power to the drive, and have a relatively short period of continuous operation at rated conditions due to the rapid achievement of limiting tem-

perature of compressor oil ignition parts. In addition, negative effects of such compressors operation include high level of vibrations that negatively affect the health of passengers and locomotive crews, as well as reliability and durability of both the compressor and bearing components of rolling stock. Given the rapid deployment works on creation of traction rolling stock of new generation, development and use of new compressors with high technical and economic indicators which include promising, new in design, bi-rotor vane compressors becomes important [1].

The report substantiates relevance of scientific research to improve the functioning parameters, increase operational reliability and durability of compressors of modern traction and multiple units. There are noted the expediency of development and use of rotary type compressors with new improved design in the air supply systems of modern rolling. There are given kinematic diagram of perspective multi-chamber rotary compressor, as well as an algorithm and mathematical description, allowing carrying out mathematical modelling of the kinematic characteristics of its mechanical system [2]. There are noted the expediency of using presented analytical descriptions in comprehensive research [3-5] aimed at developing the new compressors for rail and subway rolling stock of new generation.

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DEVELOPMENT OF MARKET OF TRANSPORT FORWARDING, WAREHOUSING AND CUSTOM SERVICES

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In terms of Ukraine's transition to a market problem to improve the structure and methods of management of transport and logistics business is one of the most important because of the quality of management, streamlining its structure depends on the survival of the entity in the competition, which escalates.

Transportation and logistics company, as part of the infrastructure work at the intersection of different kinds of transport, interact with foreign forwarders and carriers, and largely shape the requirements for reliable and high quality transport services. In order to more fully qualified control and regulation of the transport processes of modern transport and logistics companies perform customs brokerage, warehousing, consulting services, affect the process of tariff as the contracting act as guarantor and lender. Thus, the interaction of all participants of the transport process they take on the risks of customers and direct perpetrators transport. The possibility of increasing the efficiency of their operation, minimizing the risk of decision-making, primarily ensured completeness and quality of information is a key resource in business.

To achieve high competitiveness, provide guaranteed performance of transport and logistics services, high reliability traffic Ukrainian enterprises can only through the use of modern methods of formation and information processing technology operational decision-making processes of planning and management, based on the account of state property management and possible the consequences of decisions.

The basis of logistics companies is a continuous process of operational planning, which involves the continuous consolidation of carriers for the transportation services customers, the choice of rational schemes and technologies perform traffic. The effectiveness of modern organizations is determined not only to provide a certain level of profitability or profitability of their work in the current period and increased competitiveness due to high quality of services, reduce business risks and financial stakeholders traffic.

The company has two main goals while working with customers. The first one is attract new customers service and the second goal is maintenance of existing ones. In the initial stages of the company forced the bulk of the resources to spend to attract new customers. With the stabiliza-

tion of enterprise and establishment in the market of transport and logistics activities, its main focus is on customer retention and increase service quality.

The process of customer relationship management consists of three phases in the company: identify the most profitable or potentially profitable customers for further cooperation; understanding their needs and interests; interaction with customers to meet a wide range of services.

Study of users helps identify not only their needs but also identify key customers, who requires an individual approach, special strategies and measures that allow to integrate this approach in the activities of the company and a customer database which involves: developing special programs for each consumer; assigned to work an experienced manager, responsible for working with the client, which is the source of information about the customer and the organizer aimed at his work.

Creation and maintenance of permanent information flows between the staff and the consumer provides for the exchange of information, useful both for businesses and for consumers. To form the consumer desire to reapply to the same company, is expected to strengthen personal relationships of employees with consumers via individualization and personalization relationship because the client is important not only to provide timely and quality services, but polite and considerate attitude of employees, processing speed and performance of its applications, receiving advice and explanations.

Overall, transport and logistics activities taken regarded as complex infrastructure relationships, emphasizing its interdisciplinary nature. Note that parts of this complex combines not only under the influence of external factors, but in the course of their operation. The absence or underdevelopment of any element of infrastructure provision could significantly limit their functionality. For effective development of transport and logistics companies Ukraine priority is to create favorable conditions for complex service of foreign economic activity.

The principle of comprehensiveness set proportional development of the logistics and transport infrastructure, as well as all their subsystems. Building a comprehensive strategy for the development of transport and logistics infrastructure defines the mechanism of its formation: the formation of legislation; creation of administrative structures at regional and international level; providing investment and financial base; creating economic and organizational conditions for effective functioning.

The accumulated global experience shows that international trade is the diversity of schemes and implementation, but in the end, the movement of goods is a single unit. Therefore, in developed countries the process of

integration of all members of turnover in two directions. The first direction is to create a common logistics interaction between participants of commodity production company to end consumers and fairly clear delineation of functions as each participant and one general organizer of the process of delivery of goods. The second direction is to unite and unify information processes through the establishment of information networks and the use of electronic documents. This important place is given to cargo logistics facilities for the purpose of interoperability information processing tools and universal concepts, terminology and communication, enabling process without a paper document exchange and control the movement of goods.

Reform of the transport and logistics infrastructure of Ukraine should include improving competitiveness and reducing the cost of services, ensuring the safety of goods during transportation and mutual responsibility of participants of foreign relations.

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THE IMPACT OF THE WEATHER PATTERNS ON OPERATION OF THE TRANSPORT AND LOGISTICS SYSTEMS IN AGRICULTURE

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Agriculture has its features that should be considered in the construction and operation of transport and logistics systems. Here the manufacturing process of reproduction is closely linked with the natural. The economic outcomes are influenced by the weather conditions that are legitimately recognized as poorly controlled factors. The management body does not directly impact the environmental factors, but predicts their conditions and adapts to the adverse operating conditions.

In agriculture the weather patterns at large extent determine the rhythm and intervals of the production. Due to the seasonality the agricultural production is characterized by irregularity in the use of labour and means of production. Therefore, to operate during the tensed ("peak") periods in agriculture it is necessary to have significant spare capacities, including transport.

There is no doubt that the operation of transport depends on weather patterns. They can as facilitate the harvesting and transport operations as inhibit them for a while, that consequently can lead to loss of crops. So the delay with harvesting timing, and increase of it over the normative period leads to crop loss in the amount of 1% per day of the above permitted normative period.

Consequently it can be concluded that the component of the weather has a significant impact as on the composition of the harvesting-transport complex, so on the progress of the work, that is the speed of the processes, variability of its components. For example, whether it is enough of the available vehicles of the enterprise to carry out harvesting campaign, and how many should be engaged.

Thus, in the planning of the transport operation it should be taken into account that the crop yield depends as on agronomic and organizational measures, as on the weather conditions of the current year.

Taking into account the weather conditions it eliminates the uncertainty associated with risks in decision-making, and as a result, enables to identify additional reserves of the harvesting-transport complex to increase its efficiency.

IMPROVING TECHNOLOGY OF RAILWAY TRANSPORTATION OF BULK CARGO

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When loading bulk cargoes in rail wagons from the shipper requires the following conditions:

- placement on the floor and on full height walls and doors of the car cardboard or the use of various sealants or plastic film that prevents spillage of cargo through constructive gaps and door space wagons, and precluding contact of the product with metal elements of car body's;

- do cover the entire surface of the cargo in the wagon with plastic wrap to exclude moisture.

However, these requirements may not ensure full safety of the goods transported and, as a rule, for transportation of bulk cargo in open rolling-stock there is a shortage of product due to spillage through constructive gaps cars, blowing counter-flow of air and the shedding of pile caps.

Another important factor is the increased corrosion of metal parts of car bodies at the points of contact with the product. Studies have found that when transported in bulk, such as mineral fertilizers in cars, the corrosion of the walls can reach 0,1 mm in the year. Resource exploitation such cars in adverse conditions is able to decrease two to three times the regulatory period in 22-24 years.

In addition, the problem of excess or deficiency of rolling stock for transportation of bulk cargoes has not only quantitative but also qualitative aspect. With the beginning of the so-called off-season, to cover the costs from downtime of the rolling stock, the railroad sometimes make loading wagons of non-core goods, for example, widespread use of grain-hoppers wagons for transportation of cement. However, even after washing these wagons with the sender of the grain are not in high demand and are often treated as a forced option for sending.

Therefore the actual creation of these technologies cover the goods in the wagon, which would isolate it from the external environment, preventing any chemical reaction of the product with the environment and parts of the train, its “natural” wastage due to spillage or blowing. In addition, the bulk transport it is necessary to prevent or hamper unauthorized access to cargo from the open gondola body, and also to exclude the moisture of the load under the action of rainfall.

One of the promising technologies for securing transportation of bulk cargo are transported to universal gondola cars and rail cars with wagon liners (car bag, wagon liner protective, liner wagon soft single) [1, 2].

Wagon liner is a self-contained package and fully prevents the loss of bulk cargoes during railway transportation. This liner protects the cargo from spillage in the event of leakage through the body of the car, from crumbling, from unauthorized access to cargo from the open gondola body, blowing counter-flow of air from contact with the surface of the gondola.

Today tested and widely applied a few basic designs of gondola wagon liners in the protective cover depending on the type of transported goods and the requirements for its protection from external factors.

Wagon liner into railroad gondola also protects the cargo from environmental influences: from wet, freezing, heating and so on. Thanks to the liner in a gondola car is greatly simplified and the process of unloading.

The construction of the liner may be selected according to customer requirements, the characteristics of the used rolling stock, and depending on the character of the cargo.

As the cost of liner is currently slightly higher than the cost of funds, which are traditionally used to protect goods from loss, their use is justified primarily when transporting valuable bulk cargo. Although the cost of polypropylene liners with the development of technologies of their manufacture and competition of producers is constantly decreasing.

Technology the use of wagon liners in the gondola is quite simple: at the bottom of the gondola is placed the liner and unfold it. Side and end elements of rectangular form spread up the wall of the gondola to the level of the screen capacity with the formation of a box with hinged side and end caps that spill over the walls of the gondola and ribbons are fixed to the outer elements at the time of loading of product.

The product is loaded into the gondola at the specified liner and level the surface. Then the end elements are placed on the cargo and make the connection between the ribbons sewn to the edges. The side parts are placed on the surface of the load overlapping and connecting the edges by connecting the free ends of the ribbons sewn along the edge, to loops sewn to the outer side of the opposite side of the element. Linking to produce in such a way as to exclude the possibility of sail area (Fig.1).

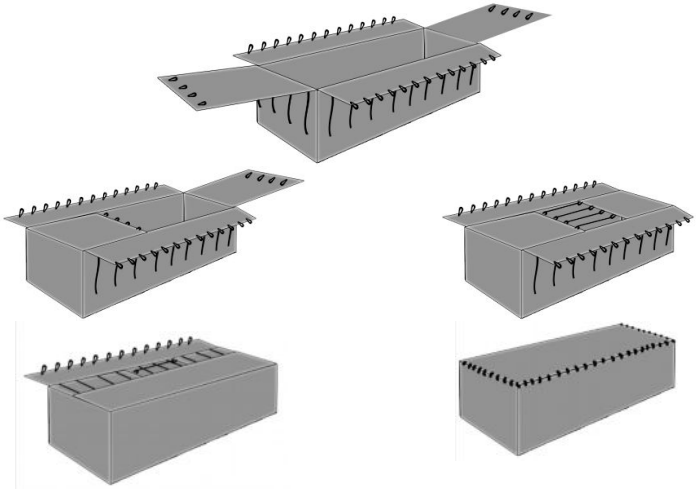

Fig. 1. Sequence linking lids of wagon liner

Unloading of bulk cargo is done through the lower open valves liner or by cutting cloth of the liner in the absence of the latter.

The use of railcar liners for the carriage of bulk cargoes in open-top allows to obtain the following advantages over traditional technologies [1, 2]:

• the possibility of to use for transportation of the most common and readily available kinds of rolling stock (universal gondola cars) instead of special cars (grain-hoppers and hoppers);

• cheaper to transport goods through lower tariff compared to the specialized railcars;

• reducing the time of preparation of the wagon for loading;

• a minimum additional costs for loading - is just the cost of one wagon liner;

• no costs for cleaning of wagons after unloading;

• ensuring the protection of cargo during transport from pollution, environmental action, from caking and freezing

• except blow the cargo from gondola counter flow of air when driving and a loss of goods through constructive cracks gondola;

• protect cargo from contact with the walls of the car, simplifying the process of discharge - no sticking of the product to the walls of the gondola

• no pollution as the cargo and rolling stock.

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DECLINE OF RESISTANCE TO MOTION ON RAILWAY ROLLING STOCK DUE TO THE USE OF WHEELS OF PERSPECTIVE STRUCTURAL CHART

[1]Mikhailov E., Semenov S., [2]Reidemeister O.

1. VolodymyrDahl EastUkrainian National University,

2. Dnipropetrovsk National University of Railway Transport named after Academician V. Lazaryan.

To increase the energy efficiency of railway transport, it is expedient to implement activities aimed at reducing resistance to the movement of

trains. One of the ways to solve the mentioned problems can be improving the construction of running gears of rail vehicles.

Therefore, it is advisable to consider the possible advantages, a fundamental change of the constructive chart of the wheels, for example, the chart, which allows the comb to rotate relative the wheel around their common axis. The authors propose several variants of construction these wheels for railway rolling stocks [1, 2]. Benefits of using wheels promising construction charts were analyzed in [3,4].

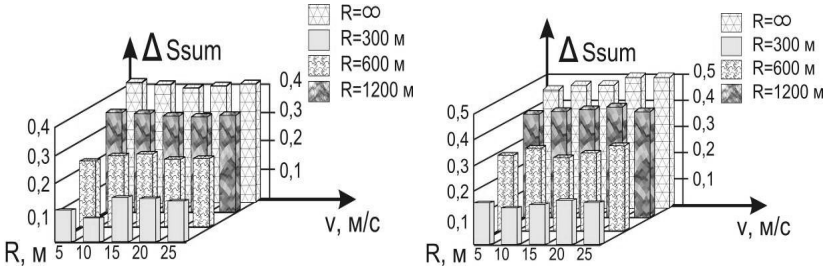
The efficiency of wheels promising a constructive chart, which is a part the undercarriage of wagon, was estimated as a percentage using the factor

$$\Delta S_{sum} = \frac{W_{B\_TK} - W_{B\_ITK}}{W_{B\_TK}} \cdot 100\% , \quad (1)$$

W_{B_ITK} – the total resistance to movement of wagon with wheels is a promising construction charts;

W_{B_TK} – the total resistance to movement of wagon with wheels traditional construction.

In Fig.1 shows some results. They contain assess the impact of the wheels perspectives of the constructive chart at the resistance to movement wagon. The charts show the proportion of reduction the total resistance under given modes of motion the loaded and empty wagon, which is composed of the wheel a promising constructive charts, relative to the total resistance to movement wagon with wheels of traditional construction.



a) empty wagon b) loaded wagon

Fig. 1. Share reducing the total resistance to movement of a freight car with wheels promising construction charts

The analysis of diagrams shows that when used in the undercarriage of a freight wagon wheels promising structural chart of the values of the resistance to its movement is significantly lower than with wheels of traditional construction. This gives grounds to expect and also smaller amounts of wear the surfaces that interact (flanges and side surfaces of the rail).

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NEW FRICTION MATERIALS BASED ON CARBON-CARBON

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Production technology for graphite materials was developed over 100 years ago by A. Byuksmeyster (1878-1880) in Russia, E. Acheson and G. Kastner in the USA (1887-1893).

The main consumers of graphite materials have been metallurgy, chemical industry and nuclear engineering up to the present. Currently, international prices of graphite materials range from $ 3/kg (electrode products) to $ 40-200/kg of special construction and high-purity materials.

Studies on production of friction materials, brake disks or pads to them are based on a theoretical model of gas-phase densification of porous mediums with pyrocarbon by methods of radially positioned pyrolysis zone.

The core essence of thermal-gradient gas-phase methods for binding with pyrocarbon is that during densification there is the temperature gradient, reverse to the gradient of hydrocarbon gas concentration, in the preform. The most common regularities of thermogradient methods follow from the developed by prof. V.A. Gurin theoretical model of densification of porous preforms with pyrocarbon by the method of radially positioned pyrolysis zone.

Plant installations of AGAT – 1.6 type are used for production of new friction materials.

The plant has the following specifications: type of voltage – AC, maximum power – 250 kW, voltage on the heater – up to 40V, current on the heater (maximum) – 6000 A. Dimensions of the working space volume: diameter - 600 mm, height - 1400 mm, door frame – 320x1070 mm.

The essence of the method is in the fact that the given T_k is realized on the surface of the molybdenum rod in a narrow zone (the pyrolysis zone) around the rod. Reactions of pyrocarbon subsidence on the surface of the powder particles take place only in the pyrolysis zone. In the rest volume, temperature along the radius of the preform is below the threshold temperature of pyrocarbon subsidence. Maintaining the desired temperature T_k on the thermocouple, it is positioned along the radius of the preform at the desired speed towards the external surface and all the powder-filler is bound with pyrocarbon to the desired density.

Unlike isothermal methods, throughout the whole process of densification transport pores of preforms remain open. The porous preform shell and external layers of the filler are the last to be bound with pyrocarbon. Hydrocarbon gas freely diffuses into the pyrolysis zone, and hydrogen produced – in the opposite direction. Along the radius of the densified porous medium there always exists the temperature gradient in the direction reverse to the gradient of hydrocarbon gas concentration.

The method is exceptionally energy-efficient. Merely the external surface of the preform radiates heat, and it is quite cold throughout the whole process. Only at the end of the process temperature on the surface reaches $T_к$ = 900 -1000 °C.

The theoretical model of this method should, firstly, answer the question, at which speed it is necessary to position the pyrolysis zone in order to get the desired (in most cases – the highest possible) density of the material.

The problem is solved by considering the systems of equations of molecular mutual diffusion “hydrocarbon gas – hydrogen” in cylindrical coordinates under conditions of presence of the temperature gradient in the diffusion direction and under boundary conditions. Boundary conditions are

the following ones: on the external surface of the preform hydrocarbon gas concentration is 100%, and hydrogen – 0%. There has been also taken into account the fact that during the process temperature on the preform surface is constantly growing, that is, hydrocarbon gas concentration is a function of the surface temperature. Omitting solution of the systems of equations of mutual diffusion of the given gases, we give the final formula for the positioning speed of the pyrolysis zone:

$$V=\frac{\eta\xi\delta D_0 n_0}{\Delta\rho T_0}\cdot\frac{\left(T_k+Kr1\right)}{r1\left(T_k-KR+Kr1\right)\cdot\left(\frac{T_k+Kr1}{T_k-KR+r1}+\ln\frac{RT_k}{\left(T_k-KR+Kr1\right)\cdot r1}-\frac{T_k+Kr1}{T_k}\right)} \quad (1)$$

As you can see, all the arguments in this equation, except for the temperature gradient, are tabular data or can be determined by generally available experimental methods.

When using the method, there also arises an important question of forecasting the maximum possible density of materials or products made of them.

This issue is defined by the equation, which allows calculating the maximum possible final density of materials ρ_k^M depending on the specific content and pycnometric density of the filler:

$$\rho_k^M=\left(1-\frac{C_н}{\rho_н}\right)\cdot\rho_{рус}\cdot\eta+C_н \quad (2)$$

All the parameters that are included into the equation (2) are easily calculated or determined experimentally.

The highest possible degree of filling voids with pyrocarbon η was determined in accordance with the cluster theory of penetration threshold.

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THE PROBLEM OF OPTIMAL CONTROL OF PROCESSES OF ORE SIZE REDUCTION

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Minerals at concentrating factories undergo a series of sequential processing, which can be divided into three groups according to their purposes in the technological cycle of the factory: preparatory, properly concentrating and supporting. Preparatory processes include crushing, grinding, screening and classification, during which separation of minerals and division of the processed mineral into categories by size take place, which is necessary for successful implementation of concentration. The processes of crushing and particularly grinding are very energy-consuming. At concentration factories these processes consume more than half of the energy consumed. Therefore, an urgent problem is to find the optimal mode of getting the final product with minimal energy costs.

The issue of optimization and control is based on the study of the models of major technological processes. Despite a multitude of all the processes at concentrating factories, there are generally considered the standard ones: material transportation, concentration change, and change in material size. These processes can be described by the first and the second order differential equations with good approximation. For example, the following equation can be used for the transport system:

$$F\frac{\partial x}{\partial t} = -Q\frac{\partial x}{\partial l};$$

This one can be used to describe concentration changes of a certain size category in an ideal mix:

$$V\frac{dx}{dt} = Q(x - x_0).$$

If one considers material size as content of a certain size category, then the process of size change can be regarded as analogous to the process of concentration change. The mechanism of ore grinding in a mill is characterized by the second order equation:

$$T_0^2\frac{\partial^2 x}{\partial t^2} + T_1\frac{\partial x}{\partial t} + x = x_0,$$

wherein $x -$ is content of the i[th] size category;

$\frac{dx}{dt}$ – is grinding speed; $\frac{d^2x}{dt^2}$ – is grinding slowdown.

The grinding process is generally described with the help of equations, which tie content of the ready category in the derived product with duration of grinding, and physical and mechanical characteristics of ore.

To formulate the problem of optimal control, let us move to Cauchy equations in the normal form:

$$\dot{\bar{x}} = f(\bar{x}, \bar{u}, t).$$

As the original equation is normally of the second order, then the state vector $\bar{x}$ will also be of the second order. If we consider that $x-$ is content of the i[th] size category, then $x_1 = x$, $x_2 = \dot{x}_1$.

Thus, the model in the state space will look like:

$$\dot{x}_1 = x_2,$$

$$\dot{x}_2 = \frac{x_0}{T_0} - \frac{x_1}{T_0} - \frac{T_1}{T_0} x_2.$$

Boundary conditions are: $t = 0$, $x = x_0$, $x(t_f) \in x_f$, $x_f = x_{-0.074}$, where t_f – time, during which size reduction takes place; x_f – limit of the size category. Quality requirements can be formulated in the form of restrictions on the state vector components.

Analysis of physical and mathematical models makes it possible to obtain the following dependences

$$\dot{x}_1 = f_1(x_1, x_2, E, Q, t),$$

$$\dot{x}_2 = f_2(x_1, x_2, E, Q, t),$$

where E – is energy expended during grinding; Q – is ore consumption.

The problem of selecting the optimal control criterion has been considered by many authors, but an unambiguous solution has not been obtained. On the one hand, in terms of energy saving it is an important criterion to minimize energy consumption. On the other hand, studies have shown that economic indicators are determined by maximization of the output of the finished product of the specified quality and, consequently, ore consumption. Thus, from the point of view of solution of the set problems, it is advisable to use two optimality criteria:

$$E \to \min\ ,\ Q \to \max\ .$$

The set problem is solved by Bellman's dynamic programming method.

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THE BASES OF CONSTRUCTION OF TWO-STAGE AIR SEPARATOR FOR LOOSE MATERIALS

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The main drawback of the existing machines of air classification is low efficiency and high pollution of fractions as the theoretical bases of the construction of machines do not account the structure of turbulent flow of air mixture with carried and carrier components. Therefore, the theoretical and experimental researches of operating processes of machines of air sorting and creating on the basis of the received new equipment data are relevant. The aim of this work is the study and development of separator increased efficiency through the regulation homogeneity of the fractional composition of the material and the size of turbulent eddies in the separation zone.

The creating of a new design of separator is implemented using of three fundamentally new technical solutions due to the aggregate of definite class: the deposition of a large fraction in the first stage; the destruction of conglomerates of fine particles and separating them from the general flow at the inlet to the second stage; the increasing turbulence in the second division of the exact stage. The development is based on the basic parameters that characterize the turbulent flow: Reynolds' number, the dynamic speed, intensity and degree of turbulence, the turbulence scale, frequency turbulent fluctuations and their distribution.

At stationary turbulent flow the component of an elementary volume of air speed is a fixed function of time. Speed ω (t) is described by the differential equation:

$$\lambda \frac{\mathrm{d}\omega}{\mathrm{dt}} + \omega(t) = v(t),$$

where λ - the constant of time characterizing the particle inertia; v (t) - the air speed in the trajectory of the particle.

The mean square of speed of the particle is determined

$$\overline{w^2} = \int_0^\infty E_w(\omega)d\omega = \int_0^\infty \frac{E_v(\omega)d\omega}{1+\omega^2\Lambda^2}.$$

The mean square of the transverse component of the particle velocity in the stream

$$\overline{w^2} = \int_0^\infty \frac{E_v(\omega)d\omega}{1+\omega^2\Lambda^2} = \frac{2}{\pi}\overline{v^2}\,\frac{\pi}{2\Lambda}\int_0^\infty \exp\left(-\frac{\tau}{T_v}-\frac{\tau}{\Lambda}\right)d\tau = \frac{\overline{v^2}T_v}{\Lambda+T_v}.$$

It is proposed to control the size of the turbulent structures installing bars on their way. A cross section of the mixing (Δ_c) consists of three parts:

$$\Delta_c = 2r_0 + 2L_{V0} + \Delta y,$$

where $2r_0$ - the size of the eddy, $2L_{V0}$ - double way of eddy moving Δy - flow thickness.

The equation of the energy spectrum in spectral form

$$\frac{\partial E}{\partial t} = W - 2\nu k^2 E;\ \frac{\partial(Edk)}{\partial t} = Wdk - 2\nu k^2 Edk;\ \int_0^\infty Ed\lambda = \frac{1}{2}(\overline{u_1^2}+\overline{u_2^2}+\overline{u_3^2}),$$

where E - energy spectrum; ν - kinematic viscosity; k - wave number; W - member characterizing the energy transfer.

The deterministic model at describing the separation process in a uniform upstream of the form (x-axis pointing up) is:

$$\dot{w} = -g - \xi \cdot \frac{\pi\delta_u^2}{4m} \cdot \frac{\rho_e |\vec{v}(x) - \vec{w}|}{2}(\vec{w} - \vec{v}(x)),$$

$$\dot{x} = \vec{w}; \quad v(x) = \frac{Q}{F(x)}; \quad \mathrm{Re}_{\delta} = \frac{\delta \left| w - v(x) \right| \cdot \rho_{г}}{\mu}$$

where $\vec{v}$ - the speed of the carrier gas; $\vec{w}$ - velocity of the particle; $\delta_{ч}$ - the diameter of the particles; $\rho_{г}$ - gas density; ξ – the aerodynamic drag coefficient of the particle; Q - gas flow through the vertical gas passage; g – the acceleration due to gravity; $F(x)$ - the variation of the cross sectional area of the gas flue.

The size of the equilibrium particle:

$$\delta_{p} = \left[\frac{3}{4} a \frac{\mu^{n} \rho^{1-n}_{г}}{g \rho_{ч}} \left| v(x) \right|^{2-n} \right]^{1/(1+n)}.$$

The results of experimental studies of air separation of bulk materials in a new two-stage separable-moratorium on laboratory bench and advanced industrial designs are presented. The distribution of the field of air flow rates in the flow around a flat-screen reflector is analyzed. The effect of the two-phase flow rate, the size of the lattice design of large-scale extinction eddy structures and division borders on separation efficiency are determined. The basic aerodynamic design parameters of separator construction are considered, its efficiency is analyzed.

HOT EXTRUSION OF BALLS WITH THE WEAR-RESISTANT LAYER

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Constant improvement and development of new units and mechanisms in the field of automotive industry is associated with increase of bearing loadings in units of the cross-country vehicles, exposed to friction, deterioration and abrasive wear. The requirements claimed to wear-resisting parts are defined by modes of operations as well as character and conditions of their work. In mechanical engineering are widely used and applied parts with a plated layer which is made of rather viscous material. The working part of the abovementioned parts is plated by a material having higher wear-

resisting parameters. Parts of a similar type have higher bearing ability and are capable of withstanding the repeatedly variable impact loadings that increases operating time of units and mechanisms. Thickness of a wear-resisting layer is defined by the sizes of an admissible deterioration and abrasive level.

Parts of complex mould are widely applied in automotive industry. The abovementioned ones have spherical bearing surfaces. The most effective method for manufacturing of spherical bearing surfaces is application of hot dynamic extrusion of the powder porous blank that provides high operating ratio of the metal.

The balls are made of steel by machining of bar on metal-cutting machine tools with the subsequent thermal processing. Manufacturing of parts on traditional technology is rather labour-intensive process, thus in a shaving is lost up to 40 % of metal that affects the cost price of production.

The purpose of syrvey is development of resource-saving technological process of manufacturing balls with the wear-resistant layer located on a spherical bearing surface by reverse hot extrusion of pressings with simple configuration approached to the finished product.

Researches of working surfaces of the balls which have failed as a result of deterioration and abrasive wear have shown that the equatorial part of the working spherical surface is exposed to the most intensive deterioration.

Experimental and theoretical researches as for extrusion of parts with spherical groove (cavity) have been caried out in works. It has been determined that for reduction of non-uniformity of the intense-deformed state and elimination the conditions of formation defects at hot extrusion it is necessary to use porous bimetallic pressing with a facilitating cavity.

Forging of a part have been received from porous pressing with a facilitating cavity. On the basis of calculations as for definition the sizes of a facilitating cavity with the use of program-solver LS-DYNA 971 the optimum angle of inclination of a forming conic facilitating cavity is accepted 36º, and depth is 6 mm. A plated layer of pressing have been made of charge containing 99,4 % of an iron powder of sort PG4M2 GOST 9849-74 (ПЖ4М2 ГОСТ 9849-74) and 0,6 % of pencil lead GK-1 GOST 4404-78 (ГК-1 ГОСТ 4404-78). Porosity of a plated layer made 12%, weight made 163 grams. Plating layer have been made of powder P80X9C2M (П80Х9С2М) obtained from metal and abrasive waste of steel 40X10C2M with porosity of 17 % and weight of 3,54 grams.

Porosity research of obtained forgings on cross-section of a plated layer has shown that different porosity does not exceed 0,5-1 % that meets the operating conditions of the given part as the basic bearing loading is

perceived with a spherical surface, and the walls of the ball serve only directing function.

Directly after extrusion forgnigs have been subjected to heat treatment that is tempering in the chamber of electric furnace in the container with filling by carburizer for prevention of oxidation. Forgings' tempering has been carried out under 400ºC with duration of 1,5 hours and it has been made an air cooling. Heat treatment has not rendered appreciable influence on change of the sizes and quality of surface, wear resistance of a plating layer makes 1,65 nanometers/m.

Forging after heat treatment has been subjected to machining: threading, making chamfers and operational development of the sizes up to a ready detail according to requirements of the drawing.

Conclusion. The technology of balls' manufacturing with wear-resistant layer including the following operations have been developed: manufacturing of pressing with porosity of a plated layer of 12% and a plating one of 17% on hydraulic press with force of 1600 кН model PD-476 (ПД-476), heating in the protectively-regenerative environment up to the temperature of 1100±5ºC, hot reverse extrusion on screw press model F-1730 (Ф-1730) with force of 1000 кН and tempering at temperature of 400°C. Application of the developed technology has allowed to raise wear resistance of a product that leads to increasing operation time up to 34%. The operating ratio of the metal makes 98%.

CALCULATION OF RELIABILITY ELECTRONICS

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The work is dedicated to simplify reliaility calculations of developed electronics. Actuality of this topic is simplification and minimization of reliability electronic equipment, which is described and implemented in the program. The benefits of this program is a simple user interface, the ability to easily expand the database failure rate elektroradioelementiv etc.

Lack of uniform methods of primary analysis equipment reliability during operation leads to serious difficulties in the calculation of the required data to ensure reliability during development. This is related to the complexity and failure analysis of linguistic situations or mechanical impact on equipment or climatic factors.

To ensure the reliability necessary to take into account relationship with numerous organizational and technical measures, and sometimes fundamental researches. Evaluation often complicated by the fact that a large number of potential sources of failures and varied in all stages of creation and application systems and in addition have different nature and different statistical value.

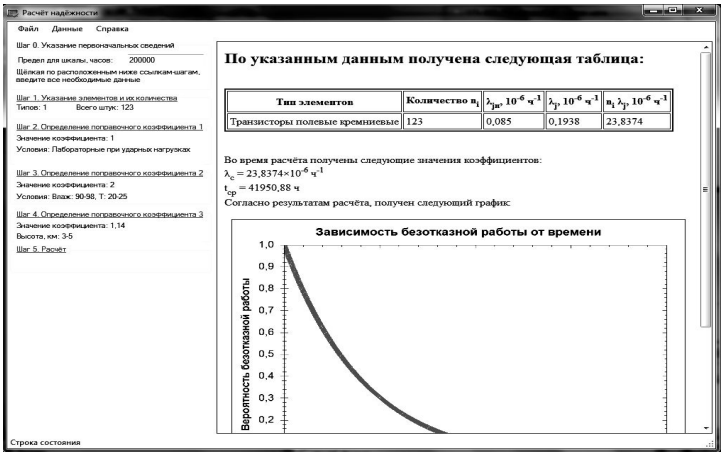

Fig. 1. Main menu

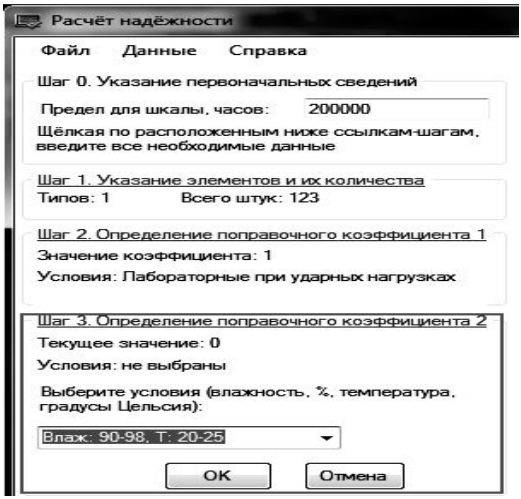

Fig. 2. Correction factors

One of the main features is an ability to create and edit components and selection of species and types.

The program provides an opportunity to calculate the reliability of electronic equipment, taking into account the elements, time and operating conditions, as well as humidity and ambient temperature. The interface made as easy as possible and simple for the user.

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DEVELOPMENT OF SCIENTIFIC BASES OF CREATION AND INTRODUCTION OF FREIGHT CARS IN ORDER TO INCREASE THE EFFICIENCY OF THEIR USE

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The paper is dedicated to the solution of an actual and important complex scientific and applied problem - development of theoretical positions, methodological foundations and practical means of creation and implementation of freight cars with the aim of increasing the economic efficiency of their use, namely improving of the competitiveness of domestic car builders and rail transport companies in the transport market, and reducing of the total economic costs for renewal of freight car fleet and railroading.

The process of damages in gondolas [1,2] design during their life cycle has been systematized and the Ishikawa diagram of analysis of the root causes of field failures of freight cars has been developed.

The idealistically aimed concept of the freight cars design [3,4] creation has been developed which contains: the formulated concept of the ideal freight cars and the estimation procedure of the extent of their ideality, the

scientific rationale of the necessity of the transition to freight cars of a new generation, the prognosis and the promising development paths of their designs.

The method of creation of various structural descriptions of the freight cars implementation and their characteristics, in the form of structural "AND-OR" –trees had been developed.

The structural and functional models of freight cars designs have been proposed that allow to represent the car as a series of interrelated and interacting subsystems, and to take into account the key factors of their operation in research and design with the highest fullness.

The methodological foundations of the technoeconomic study of freight cars designs have been created on the basis of a proposed procedure for conducting of a value analysis [5] for their carrying systems, which in the financial form (cash equivalent) allows to display the functions of the individual components of their structures and the level of resource utilization by the functions, and to explore the reasons why these resources are used.

The methodological bases of designing of freight cars structural components have been improved, by means of development of a method of their rational parameters basis for three (and optionally more) criteria of the efficiency promotion, and the creation of software products of included procedures automacity [6].

The complex of multifactor mathematical relationships of key indicators and parameters of the basic elements of carrying systems of freight cars and their promising performances has been produced.

The scientific justification for potential directions and models of the efficiency improving of freight cars has been developed, which takes into account the characteristics of their design and lifecycle.

Scientific and practical results of the paper are the basis for solving the problem of creation of high-efficiency railroad freight cars [7].

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PERSPECTIVES OF USING OF COMPOSITE MATERIALS IN CAR BUILDING

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Railway transport is the mass means of transport, it plays an important role in the national and international cargo traffic. However a number of disadvantages of railway cars [1,2], such as an increased materials consumption, insufficient capacity of body and cubic capacity, cause the cost supplement of the cargo traffic and the decrease in profitability of work and competitiveness of rail transport in their operation on the networks of railways.

Therefore an urgent task for today is to create a new generation of rolling stock that answers the general technical requirements, has the reduced tare weight and increases the axle load. The solution may be a body construction of composition materials.

The composition materials are such materials consisting of two or more materials or two or more phases and have better characteristics than the simple uniform materials [3,4].

Carbon fibers are widely used in the construction, which should have a limited weight. Among all the reinforced plastics carbon fiber-reinforced plastics have the highest resistance to fatigue tests and life duration. Carbon fiber-reinforced plastics conduct electricity well. Carbon fiber-reinforced plastics pass X-rays badly. They have a very low coefficient of the linear expansion. At the same time, they are fragile and have a low impact toughness. Therefore, in many cases it is better to use them in hybrid composite materials together with glass, aramid and other fibers.

Through the application of composite materials the rolling stock can be lightened almost by 50%. This involves the reduction of a power consumption in operation - a factor that in light of the green policy is critical. Moreover, the lack of corrosion increases the working time of composite structures.

The gondola body construction of composition materials will enable them carry the wide range of goods, because carbon fibers have a high chemical resistance to acids and alkalis. In addition, they have very a high heat resistance.

The strength and stiffness of carbon fiber-reinforced plastics is about six times higher than in the basic steel grades used in cars designs.

Carried out researches will contribute to the further development of issues for the design of cars body supporting structures of the new generation.

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CONTROL OBJECTS IDENTIFICATION AND REGULATORS SETTINGS OPTIMIZATION

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Modern technological processes are complex objects characterized by the tonnage, the processes high speed, the explosion and flammability risk, the possibility of harmful and poisonous substances emission in the environment, and so on. One of the major tasks of automation systems design is the control object identification. Object mathematical modeling is a very difficult and time-consuming work including the following steps: determining the process parameters affecting the object; determining relations between the parameters; object balances forming; these balances linearization; differential equation derivation.

The result is a complex high-order differential equation used later on for the calculation of the automatic regulation system ARS.

The problem is solved much easier if the acceleration curve of the equivalent control object exists.

The purpose of this work is the development and software implementation of the technological control object identification algorithm on the acceleration curve of the second order segment and the choice of the regulator optimum settings with the quadratic optimization function use.

The object of this investigation is the single-circuit ARS of the temperature in the catalytic reactor and the turbine speed GTT (gas turbine technological) of the nitric acid production.

The subject of this investigation is the transients and ARS quality indicators.

The method of this investigation research can be defined as the theoretical one with a computer using. The transfer function calculation algorithm according to the acceleration curve has been implemented with the «Maple» software package.

To identify the equivalent control object by the second-order segment at the ARS parametric synthesis has been proposed in this work. The algorithm of the equivalent object transfer function search according to the

acceleration curve has been devised and this algorithm software implementation in «Maple» mathematical package has been developed.

The identification of the catalytic reactor and the GTT turbine of nitric acid production have been made. It is specially noted that replacement in the calculation of the catalytic reactor acceleration curve and GTT turbine with the second-order segment can cause an error that will not exceed 3.5% and it is quite acceptable for the calculations of this type.

According to the obtained equivalent objects transfer functions the settings of P -, PI - and PID - regulators for ARS of catalytic reactor temperature and ARS of GTT turbine speed by the method of triangles, method of undamped vibrations (The Ziegler–Nichols method) and with the quadratic optimization function have been found. Comparative analysis of the transition processes quality indicators investigated by the ARS at the settings obtained by different methods has been made.

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THE OPTIMAL CONTROLLER SETTINGS SEARCH ON THE BASIS OF QUADRATIC OPTIMIZATION FUNCTION

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Modern technological processes are complex control objects. Thanks to the optimal controller settings, automation systems will ensure the maximum possible, in a given technology condition, product quality and minimum production costs at a given production volume. Determination of the optimal process control settings by conducting the experiment at the site may lead to the loss of finished products quality, raw materials and catalysts

deterioration, and even to the disaster situations, including fires, explosions and harmful substances environmental emissions. Therefore, the development of theoretical methods for the optimal controller settings calculations is a very important and urgent task.

The aim of this work is the development of an algorithm for optimal controller settings search on the basis of integral quadratic optimization function and comparing it with the other methods.

The task of this work is the selection of an optimization function; the choice of the hill-climbing method; the development and software implementation of the controller settings search algorithm; the definition of quality indicators of the studied systems transients; the comparative analysis of the controller settings methods search.

The subject of this research is the single-loop automatic control system (ACS), and the object of the research is the optimal controller setting parameters and transients quality indicators.

The research method is the theoretical one with the computer use. The algorithm of the optimal controller setting parameters calculation has been implemented with the aid of the "Maple" software package.

Для пошуку екстремуму оптимізаційної функції використано метод градієнту, що дало змогу достатньо просто реалізувати пошук екстремуму оптимізаційної функції програмним шляхом. З'ясовано, що достатня кількість ітерацій, при якої зміна оптимізаційної функції не перебільшує 5%, дорівнює п'яти.

The gradient method has been used for an optimization function extremum seeking, which has given an opportunity to implement an optimization function extremum seeking by the software. A sufficient number of iterations at which the optimization function variation is less than 5% has been found to be equal to five.

The research results demonstrate the improvement of the system dynamic properties when using the controller parameters calculated by the proposed method: an overshoot reduction to 10 times; a regulation time reduction to 10 times. While investigating the systems with P - controller it ought to be remarked an overshoot expansion, the system static error being reduced to 20 times.

IMPROVING THE TECHNOLOGICAL PROCESS OF HYDROTRANSPORTATION OF COAL-WATER FUEL

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Analysis of the state and functioning of the linear section showed that during exploitation of the coal pipeline the transportation process was carried out rather irregularly, load was incomplete, the pipeline capacity was often less than 50m^3/h. In addition, the values of structural and rheological properties of coal-water fuel (CWF) were unstable. As the result, there have been conditions for accumulation of precipitations and formation of obstructions in the pipeline for a long time. Therefore, we can say that the main causes of breakdown in the technological process of CWF transportation are:

- unstable values of structural and rheological properties of CWF:
- manufacturing defect;
- frequent and long transportation stoppages due to lack of coal, reagent-plasticizer; heat generating set stoppages, etc.;
- neglect of emergencies during calculations and design of the pipeline.

In 2015, we carried out research on restoration of the working capacity of the linear section of the coal pipeline. We proposed a technology for cleaning the pipeline off the old suspension and transportation of CWF using gauge balls [1] made of ice and other materials. Basing on the proposed technology, there was developed a procedure of cleaning the linear section and transportation of fuel, the main elements of which are:

• determination of the pipeline state according to preliminary pumping by flushing liquid (water or moderately concentrated suspension) of the linear section of the coal pipeline;

• identification of the most intense sections where precipitations thickness is from 50 to 100 mm (depending on changes in the flow rate and pressure);

• calibration of critical sections by ice gauge balls with initial diameter d = 100mm, followed by increase in diameter of the balls;

• calibration of more extensive sections with precipitations thickness of less than 40 mm by combined polyurethane balls with d = 300 mm.

Use of this technology allowed pumping the pipeline and increasing the pumping capacity up to 80 m^3/h after a long stoppage.

The results of this research confirm the working capacity of the proposed cleaning technology and transportation of CWF using gauge balls made of ice and other materials [2,3,4].

However, to fully restore the capacity and improve the reliability of exploitation of the linear section of the pipeline, one should fulfil the following additional actions:

- to equip emergency earth storages along the route of the coal pipeline to receive flushing water and unconditional coal-water suspension during their emergency extension;
- to reconstruct cameras of release of gauge balls at the head and intermediate pumping stations in order to shorten the load time of the balls;
- to equip the linear section of the coal pipeline with a radio relay system of collection and transmission of telemetric information from block-boxes to the supervisory console of the coal pipeline, followed by computer data processing [5,6].

During the process of long stay of an idle hydrotransport system in the pipeline there was observed slight layering of the suspension, followed by homogenization at renewal of the flow [7,8,9].

Start of the system after long stoppages caused no difficulties. In the process of long-term storage there was observed slight layering of the suspension, followed by homogenization during the flow. After long storage there was some increase in specific losses of pressure that apparently could be explained by increase in tiny particles of solid material in content of the suspension and decrease in effectiveness of the plasticizer with formation of blobs.

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PROBLEMS OF TRANSPORT-FORWARDING ACTIVITY IN UKRAINE AT THE PRESENT STAGE OF ECONOMIC DEVELOPMENT

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Today transport-forwarding activity and transport-forwarding services are an integral part of business, transport, logistics and foreign trade. Transport-forwarding industry is very relevant and important for both individuals and legal entities, as well as for scientists. Forwarding services are used to facilitate the implementation of transport and mediate. Although this topic is a very common, yet it still requires further research and study, especially in the theoretical aspect.

Definitions of transport-forwarding activities and transport-forwarding services can be viewed in different ways, but the essence of these terms remains the same. Firstly, the transport-forwarding activity is a set of services, which include the whole range of works connected with the shipping, loading, providing protection, insurance and delivery to the destination. Forwarders, in turn, act as intermediaries in the provision of services.

It should be noted that in a market economy confirmed the important role of transport-forwarding activities in the process of logistics technology,

both in the implementation of foreign trade relations, and the organization of transit flows of goods and vehicles across the territory of Ukraine.

The current study aspects of transport-forwarding activities, our scientists are paying a lot of attention. So the question of formation and development of forwarding in Ukraine are engaged are Professor Nagorny and Associate Professor Naumov from KhNAHU. In its publications, the authors identify a number of problems related to the development of the expedition in Ukraine: non-competitive technologies of customer service, lack of System Works information support operators forwarding companies, market mix forwarding to the service of international cargo transportation, as well as the lack of a scientific base in terms of optimal decision-making when the behavior of the market of transport services.

However, these issues must also be added, and the imperfection of the legal framework of relations between the carriers and freight forwarders. The problem is that the carriers consider unjustified intermediaries forwarders, freight forwarders and insist that they are full participants in the transportation process and direct organizers of transport and forwarding services. The problem is that the activity of both parties is governed by different legal acts, namely the activities of carriers is regulated by law, depending on the type of transport ("Law on Railway Transport", "Law on Road Transport"), and the activities of forwarders - "Law on forwarding activity", which was adopted in 2004 and amended in 2009. This law is only one reference to a contract of carriage concluded between the parties.

This legal imprecision should be corrected by the adoption of the Resolution "On approval of the rules of forwarding activities" in accordance with Article 6 of the Law of Ukraine "On the forwarding activities", but it remains only at the project level, and thus slowed the following issues:

• integration of Ukrainian service providers in the international legal space of the forwarding activities;

• design and introduction of modern technologies of general logistics services clientele together forwarders and carriers;

• development and maintenance of fair competition between producers of forwarding services and transport services;

• definition of conduct rules on the market.

The situation that has developed today in the relationship between carriers and forwarders, logistics is an essential aspect. It lies in the fact that the client believes that the forwarder, he ordered comprehensive services. And manufacturers of certain types of forwarding services must decide who performs such functions in the service of production technology and who is who should carry out the calculations.

Unfortunately, this problem is given insufficient attention, and only a few authors, the practice of forwarding and transport activities periodically raise these issues in professional journals, in their appeals to the associations of carriers and forwarders and the Ukrainian Ministry of Infrastructure.

Thus, the decision to allow the above problems:

• increase the economic viability and security of transportation activity;

• reduce market competition between carriers and freight forwarders;

• eliminate the possibility for some forwarders to limit their job speculation market information by the conclusion of forwarding contracts with other forwarders.

• simplify the contractual-legal and operational relationship with the customers actual manufacturers of services certain types.

As to the issues of logistics, to issues of normative legal provision of the Ukrainian forwarding activities is necessary to apply a systematic approach and define forwarding activity as market activity aimed, primarily, to customer satisfaction and promote their material and accessories it flows.

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LOGISTICS METHODS RESOURCE MANAGEMENT REPAIR COMPANIES

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For now, railway transport is one of the main modes of transport industry. Its share in the cost of commodity products ranges from 6-10% for steel mills to 30-70% for open mining operations.

In costing domestic railway transport one of the largest expenditure items are "repair and maintenance of rolling stock". This article is counted: the locomotive fleet - up to 25%, electric locomotive - up to 26%, by rail car - up to 45% of total operating costs [1].

Saving energy, material and human resources is a priority of the current stage of railway transport development. Special attention is paid to this issue in enterprises locomotive and rolling stock department, providing repair of rolling stock for which the resource and energy component played a key role in shaping the cost of services.

The total volume of financial resources involved in the process, depends not only on the production program of the company, but also to a considerable extent on the system of production, production logistics efficiency and logistics. An effective way to reduce inventories in the repair of rolling stock is the introduction of technology "lean" manufacturing [2-3].

Integrated reduce repair capacity resources production ensured a balanced mix of measures to mechanization and automation of technological processes, optimization of the production logistics and logistics.

The solution of complex tasks to improve efficiency and reduce repair capacity resources of the system can be achieved by forming a "stream" of organizational structures based on logistics principles. In logistics hallmark of every subsystem is not so much its technological feature or product orientation as the degree of participation in the generation, processing, promotion and redemption flows of materials, services, finance and information. In this approach, all subsystems are evaluated based on their ability to implement the functions are focused on efficient processing flows. Strengthening these structures information and material relations can expand production capacity subsystems, applied technologies based on agreed performance operations with minimum resources used.

In this regard, the formation and development of railway rolling stock repair industry through implementation of complex logistics principles is of particular relevance.

The effect of logistic models use in describing and managing production systems achieved the continuity of a process and management process. In continuity refers to minimizing delays, downtime costs, disruptions and failures of the production system.

Description units for repair of railway rolling stock is based on the basic principles of logistics. Logistic approach to the operation of repair facilities is to integrate basic units into a single logistics system for processing and managing the flow of materials, information, finance, arising in the performance of its functions now.

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NEGATIVE CONSEQUENCES OF POLLUTION OF ATMOSPHERIC AIR FROM THE MOTOR TRANSPORT

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The problem of airprotection against pollution by its toxic components of exhaust gases is difficult, and its successful decision is caused by close cooperation of manufacturing plants of cars and the motor transportation organizations, and also depends on knowledge and experience of employees of service stations and drivers of cars. In large industrial centers of Ukraine the volume of harmful atmospheric blowouts which fall on motor transport which make in some cities to the two third from total blowouts in the atmosphere sharply increases.

The automobile engine is a source of blowouts in the atmosphere of scale of substances directly or indirectly worsening its ecological state as a

result of combustion of fuel and the greases getting into combustion chambers, blowout of components of various types of additive compounds and products of wear of the engine. The fulfilled gases contain two main groups of harmful blowouts [1]:

• having direct negative effect on a human body and environment (carbon oxide, nitrogen oxides, hydrocarbons, including an aromatic series, various type of acid, joint of lead, sulfur);

• making negative indirect impact, being the prerequisite of global environmental disasters, such as formation of photochemical "smog", "greenhouse effect", "ozone gaps", etc. (dioxide carbon, methane, solid particles, etc.).

The toxic substances, which containi in the fulfilled gases of automobile engines can be stored in the atmosphere for a long time and be transferred to long distances. They can unite with natural components of atmospheric air (CO_2, H_2O, O_2) or create other gases or particles [2]. Atmospheric air in this case should be considered as a secondary factor (before emergence) harmful substances which toxicity in some cases exceeds toxicity of primary pollutants. So, for example, in the atmosphere of NO passes into NO_2 which relative toxicity twice higher, than into NO. Physical action is shown by existence of concentration of vapors of acids in damp air with formation of aerosols, reduction of the sizes of drops of liquid as a result of evaporation in dry warm air. Therefore the analysis of blowouts from motor transport on highways of the cities is an actual task.

For definition of blowouts from motor transport on highways of the city Severodonetsk and a gas contamination of the atmosphere we investigated features of distribution of motor transportation streams, their structure and intensity.

Research objective is obtaining primary data on structure of motor transportation streams and intensity of the movement in this city.

Territorial distinctions of structure and intensity of transport streams depended on the area and the cross sizes of the city, population in various areas, schemes of planning of a street road network, features of an arrangement of the industrial enterprises, motor transport services, gas stations and car repair shops.

Temporary distinctions are substantially connected with a mode of behavior of the industrial enterprises and city institutions and with climatic features of the area in which the city is located.

On the base above told by us the most loaded highways which were applied on a city schematic map are chosen. For calculation of blowouts of the soiling substances with the fulfilled gases of motor transport intensity of traffic was used [3]. On the basis of calculation of emissions and a gas con-

tamination of the atmosphere the settlement card of pollution of air space of the city is constructed, and also the assessment of a condition of the air environment of the city on the basis of the existing is made:

a) transport and planning decisions;

b) quantitative and qualitative characteristics of motor transportation streams;

c) the organizations of traffic in the city.

Zones and sites where levels of a gas contamination are higher than maximum permissible norms are defined, the analysis of the reasons which caused these excess and the list of possible technical actions for elimination of excess influence of motor transport is made.

The assessment of level of pollution of the air environment of the city exhaust gases is executed on the basis of the settlement forecast [3].

Results of calculation showed that excess of the maximum permissible concentration (MPC) on the edge of a highway on the most loaded roads is observed: carbon oxide by 2,5 times; nitrogen oxides more than 10 times. The zone from the roadside to the line of a standard condition of atmospheric air is characterized as a zone with the increased pollution level on carbon oxide.

For other substances results of calculation showed the following: at edge of a highway on the most loaded roads concentration of hydrocarbons which reaches 0,7 maximum concentration limits is observed; soot - to 0,47 maximum concentration limits; sulfur dioxide - to 0,15 maximum concentration limits. It should be noted that concentration of hydrocarbons (not burned down fuel) and soot correspond to standards, however the population are hazardous to health.

The analysis of results of calculations of blowouts made on the basis of the data on gross blowouts of the soiling substances obtained by us in the atmosphere from motor transport testifies that zones of levels of pollution of atmospheric air can be, are shown for two substances: dioxide of nitrogen and бенз (and) pyrene. Pollution is essential to substances which remained, only at the roadside, however it should be noted that at background pollution from the industrial enterprises and on sites of roads with the closed building along them and bad airing, pollution by these substances can be essential and on a distance from the roadside.

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