SYSTEMS AND CONTROL PROCESSES

RESEARCHING THE MATERIALS EMISSIVITY INFLUENCE ONTO THE THERMAL CONTROL METHOD'S ACCURACY

page 4–7

The thermal imaging inspection is one of the main technical diagnostics development directions, allowing to control the thermal condition of equipment and structures without removing from the exploitation at an early stage of defects' development, while reducing the technical inspection and defect detection costs. During thermal inspection essential is to pay a special attention to the analysis of the measurement errors occurred causes. One of the main issues we face with while calculating the temperature in compliance to the results of thermal imaging measurements, relates to the uncertainty in the assessment of the object's surface emissivity. The effected study has been aimed onto researching the materials' emissivity influence onto the thermal control method accuracy. The studies' results demonstrate a significant impact of materials' emissivity onto accuracy of temperature non-contact measuring method. Elaborated is the methodology of calculating the measurement uncertainty, due to the error in setting the coefficient emissivity.

Results obtained can be used in various industries for more accurate actual temperature estimation for a real object.

Keywords: non-metallic heterogeneous material, dissipative properties, damping decrement, acoustic measurement method, measurement uncertainty.

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CREATION OF TIME MANAGEMENT METHODS IN THE PLANNING OF EXECUTION FOR COMPANY DEVELOPMENT PROGRAMS

page 7–12

In this article the problem of time management in the planning of execution for development programs is considered. The aim of research was to develop a time management methods of the program projects in the planning of execution. As a result, it is developed an approach to the time management based on the network modeling for program with technologically dependence of the projects. Scope and specificity of the program defines a project or a job as a structural unit of the network model. For models with detailing at the level of the work it is suggested an approach to the formation and evaluation of synergies. For programs without depending on technology of the projects it is developed economic and mathematical model that allows creating a schedule of projects to meet the requirements for financial performance, taking into account the balance of the program costs by period. The results of this research complete the theoretical basis and methodological support to the integration control for program management.

Keywords: program, planning of execution, model, network schedule, synergism effect.

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AUDIT OF RISKS SECURITY OF THE WORKPLACE

page 12–17

The article describes the approaches to the problems of improvement of working conditions on the basis of existing risk calculation methods and a new integrated approach.

Modern production is a complex in which an important place occupied by the person. Production increases its power and also increases the load on the person. Production capacity has various forms and types but the result is always the same — namely, the deterioration of the health of workers, the increase in the number of injuries and more. The entrepreneur must plan and optimize production capacity taking into account the resources of the human body.

The article shows the levels of responsibility of officials and also shows that there are critical «nodes» that affect the general state of security in the enterprise and in some workplaces. OSH management system in the enterprise should be based on scientific principles and system analysis. On this basis, it is proposed to include the basics of system analysis is required to audit methods hazard risks in the workplace.

This will allow more effectively and quickly identify risks and plan the work to reduce their level. A method for determining an integrated risk assessment in the workplace, taking into account the components of the audit process, can improve the reliability of the results and a more effective use.

Qualified audit and analysis of the production loss is not possible without taking into account injuries and occupational diseases. The auditor should have objective information about all of the risks in the workplace, their proper accounting and distribution in company.

Keywords: risks, system, management, security, standards, audit, control.

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ANALYSIS OF ALGORITHM FOR ESTIMATING DISTRIBUTION FUNCTIONS OF RANDOM VARIABLES FOR THE PREDICTION OF TECHNOGENIC RISK

page 17–23

An algorithm for estimating distribution functions of random variables for the prediction of technogenic risk is described. This algorithm is based on the use of three methods: Monte Carlo method, index method and the method based on the elements of reliability theory, and for obtaining and normalization of source data and at genetic algorithms and methods for determining the distribution function of the random variable. The use of these methods in the present combination allows avoiding the problems associated with the uncertainty of the source data and solves the problem of predicting the reliability of complex technical systems in their operation.

It is also considered an example of the failure probability function of the technical system in time. The nominal value of the failure probability of individual elements of the system is calculated by the index method (calculation by the index method includes all components of technogenic risk associated with the conditions of operation). It avoids the problem of uncertainty of source data for technogenic risk calculation of all systems. The calculated probability is the input for the Monte Carlo method and the probabilistic method. The calculations in the time interval allow determining the function which characterizes the failure probability density of the technical system in time.

The results of researches are the failure probability functions in time for the turbofan engine. Verification of the results by comparing the available reliable data on the reliability of the turbofan engine was carried out to test the adequacy of the developed algorithm. Verification show that the results are valid, and the algorithm can be used to calculation and prediction of technogenic risk of industrial facilities during the operational phase.

Keywords: technogenic risk, prediction, genetic algorithms, simulation modeling, quantitative risk assessment.

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IMPLEMENTATION OF DYNAMIC COMPENSATORS IN THE MULTI-LOOP CONTROL SYSTEM

page 23–28

This article discussed how to implement dynamic compensators for multi-loop control systems that make up the process control system or computer-integrated systems. The main aim of the study is to validate the choice of a method of technical implementation of dynamic compensators. The characteristics of the considered methods for implementation of dynamic compensators are given. Suitability indicators of these methods are proposed for inclusion in the composition of automated process control systems and/or computer-integrated systems of multi-loop control systems that contain dynamic compensators in their structure. Comparison of the suitability of the methods for the technical implementation of dynamic compensators is considered using the proposed indicators. Specific method of technical implementation of dynamic compensators is chosen as a result of comparison of indicators. The proposed method makes it possible to unify the software elements of dynamic objects control systems. The research results can be applied by experts in the synthesis of elements of software and automated computer-integrated process control systems.

Keywords: dynamic compensators, multi-loop systems, automated system.

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INFORMATION AND CONTROL SYSTEMS

MATHEMATICAL SIMULATION OF INTEGRATION PROCESSES OF PRODUCTION DATA

page 29–33

This article presents the results of research in the development of ways and means to integrate the production data on the stages of technical preparation of production and production of products to order. The main aim of research is to develop a mathematical model of integration of production data and processes for their preparation. It is also one of the objectives in this paper is to present the mechanism of integration of technical preparation of production processes based on models of semantic networks of production developed by the authors. The article presents the results of mathematical simulation of processes of integration of production data using semantic networks constructed on the basis of logical-semantic principles. The authors have proposed a modern approach towards ensuring that the establishment of a unified information environment of the enterprise, which operate integrated automation systems from different manufacturers. This approach is based on the use of models of semantic data networks, which provide the necessary information about the products, resources, and processes for the manufacture of a variety of automation systems. Research results can be used for the developers of modern integrated automation systems as the basis for the creation of an integrated information environment of industrial enterprise.

Keywords: production data, data integration, integrated automation systems, semantic simulation.

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TECHNOLOGY TRANSFER IN THE TRANSPORT INDUSTRY

THE IMPACT OF FLUCTUATIONS IN VOLUME OF TRANSPORTED PASSENGERS IN URBAN TRAFFIC ON THE PERFORMANCE INDICATORS OF ROUTES

page 34–37

This article discusses the possibility of applying statistical analysis to the operating costs of the enterprise to make the transportation of passengers on city routes, as well as the impact of fluctuations in volume of transported passengers on such costs. The use of modern means of data analysis allows make a quantitative statistical analysis of the main performance indicators of the enterprise on the city routes. The presented method allows analyzing the activity of the enterprise to evaluate enterprise risks when planning their activities. Scenarios forecasting mechanism for changes of the basic operational resources of the enterprise is shown. The authors propose to use established relationships between the volumes of transportation of passengers and the cost of transportation to ensure the quality of strategic planning. The research results can be applied to the transport companies that provide services for passengers on bus routes of the public service in the cities.

Keywords: passenger, probability, costs, traffic volumes, route.

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DEPENDENCE OF AIR PASSENGER TRANSPORTATION FROM SOCIO-ECONOMIC INDICATORS OF UKRAINE

page 38–43

The paper studies the relationships between the impact a number of socio-economic factors: the total GDP of Ukraine, GDP per capita and inflation rate, on air passenger transportation.

Knowledge of the relationship between the studied factors makes it possible to forecast the air passenger traffic depending on the socio-economic factors with a reasonable accuracy.

It was found that the greatest impact has the GDP per capita factor. Strengths and weaknesses of correlation relationships of pairs of factors were identified. The pairs of factors that are the most and least suitable for forecasting air passenger traffic were determined.

For each pair of factors the correlation coefficient and coefficient of determination were calculated, an equation to quantify the magnitude of air travelers was obtained.

Forecasting of air passenger traffic based on the socio-economic factors enables airlines of Ukraine to search for and select of the optimal airline development strategy.

Keywords: air transport, socio-economic indicators, statistics, correlation and regression analysis.

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DEVELOPMENT OF METHODOLOGY OF WORK-REST SCHEDULE FOR DRIVERS ON ROUTES OF PUBLIC PASSENGER TRANSPORT

page 44–48

This paper discusses the development of methods for work-rest schedules on the routes of public passenger transport. Some of the results obtained during the study are given. The main aim of the study is to improve methods for the rational organization of transport process of urban passenger transport by identifying patterns of influence tension of the drivers on the routes.

This method allows determining the specifics of work-rest schedule for drivers of urban passenger transport. Conditions for determining regulated breaks are proved on the basis of indicators of physical work and energy consumption of the drivers on a specific urban bus routes.

Results of the study can be used in motor enterprises for the distribution routes in their complexity between drivers based on their qualifications for the formation of variably-day route regimes of work-rest schedule with restriction on complexity of work.

Keywords: urban bus routes, traffic schedule, work and rest schedule, work of the drivers.

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IDENTIFICATION OF THE PRODUCT AND RESOURCES FOR «LOGISTICS SYSTEM» PROJECT

page 49–53

The possibility of using project management methodology to the management of the logistics system is studied. The aim of this article is the presentation of the logistics system as a project.

To achieve this aim it was used the axiomatic method of knowledge, based on the conceptual apparatus and the theoretical basis of knowledge of such areas as: general economic theory, system analysis, logistics and project management.

Definition of the concept of the logistics system of the product is given, features and characteristics are selected. It is proved that the logistics system is a project, because it has all the features of the project, therefore, it is possible and advisable to apply project management methodology in creating logistics systems of various configuration and management.

The results can be applied by logisticians, optimizing logistics management systems, as well as scientists, developing formal models and methods of management of logistics systems.

The effectiveness of the logistics approach to management of material flows and the methodology of project management in different systems do not require proof. Their combination will provide synergistic «management» effect, rationalize the allocation of scarce resources and optimize the finishing material flow from the source to the stock.

Keywords: «product» of logistics system, project, resources, features and characteristics of the «product» of logistics system.

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