

MECHANICAL AND THEORETICAL ENGINEERING

**L. G. Varepo, A. Yu. Brazhnikov**

Study of isopropyl alcohol concentration in dampener solution dependent on ink emulsifying ability

In the article the research results demonstrate the effect of isopropyl alcohol concentration in dampener solution on emulsifying ability of offset inks. The emulsifying kinetics of offset inks from FlintGroup and SunChemical manufactures are examined.

**Keywords:** offset printing, dampener solution, ink emulsifying.

**L. G. Varepo, A. Yu. Brazhnikov**

The estimation of dampener solution temperature excursion in dampener system of an offset print machine

The experimental results of temperature shifting in dampener solution and ink emulsion in inking apparatus are shown in the article.

**Keywords:** dampener solution temperature, offset printing, alcohol dampening.

**S. N. Litunov, V. S. Slobodenyuk, D. V. Melnikov**

Review and analysis of additive technologies. Part 1

Various methods and apparatuses of 3D printing are considered. The design of the print head a 3-D printer, which uses the principle of inkjet printing is developed. The head can be used to print high-viscosity materials. A comparative analysis of 3-D technology is done. The direction of development of additive technology is analyzed.

**Keywords:** additive technology, 3D- printing, 3D- technology.

**B. E. Lopaev, I. I. Kagarmanov**

Calculation of viscosity flux for electroslag remelting based on method of equal sum

By equal sum method there is presented analytical method for calculating the viscosity  $\eta$  depending on the temperature  $T$  of the molten flux for electroslag remelting metals. It is found that the difference in the values of  $\eta$  on  $T$  defined by the proposed method and obtained experimentally does not exceed  $\pm 1,5\%$ . The proposed method of calculation predicts  $\eta$  molten flux at any temperature without the need to experiment.

**Keywords:** fluxes, viscosity, experiment, metal, temperature, electroslag remelting.

**N. N. Chigrik**

Definition of limiting sizes of altitude of piston compression rings in internal combustion engine in view of influencing inaccuracies of spoilage. Part 2

In the article the justification is given, that the deflection of the shape of end surfaces of piston compression rings is necessary for valuing by general deflection from a parallelism and flatness (*ECAE*) at share definition of deflections from nominal size of altitude of a ring present bellying and

positional relationship of his end surfaces concerning kit of the main designer bases, that is feasible with applying of the proposed device for check of a positional relationship of surfaces. The rule of determination of maximum sizes of size element is shown out, on which one the reception of effective articles should be conducted in view of influencing enabled inaccuracy of measurements ( $\delta_{u3M}$ ) on result unsuitable, allowing, that the deflections of the shape are read out from a base surface of the shape and depending on an aspect of a surface are valued in all-up and element arguments of geometrical fidelity of the shape.

**Keywords:** piston compression ring, internal combustion engine, single-stage random inspection, deflection of the shape and location of surfaces, probability errors I and II

**I. A. Bugay, E. V. Vasilev, M. V. Vasileva, A. V. Eliseeva, M. A. Peskov**

Analysis of problems of pulling grooves of complex shape in Russia and abroad

This article analyses the status and problems of broaching blades of compressors in Russia and abroad. There is considered load experienced by the cutting insert during operation. Random selection of inserts of carbide products from the catalog of Kirovgrad Hard Alloy Plant for titanium and heat-resistant steels based on the forces acting on the cutting insert.

**Keywords:** routing, load, shovel, cutting plate, titanium, heat-resistant alloy.

**P. V. Nazarov, E. V. Vasylev, I. K. Chernykh, M. V. Vasyleva, A. S. Adanitsaya**

Development of construction of device for external grinding

The article analyzes the devices that already exist designed for grinding products of different forms, analyzes their construction, their pluses and defects and develops the device for grinding of certain type of details.

**Keywords:** external grinding, part of rotation, time reduction of technological process.

**D. A. Skripnichenko**

Maximum speed of motion of multipurpose tracked platform depending on the characteristics of roadway

There is formulated and solved some applied problems finding limit modes of motion of multipurpose tracked platforms in the field roads and off-road, the results should be considered when developing guidance and instructions for the safe and reliable operation of these machines.

**Keywords:** multi-purpose tracked platform, limit modes of movement, the breakdown of the suspension.

#### **ELECTRICAL ENGINEERING. POWER ENGINEERING**

**V. R. Vedruchenko, V. V. Krainov, M. V. Koksharov, N. V. Zhdanov, E. S. Lazarev**

Selection of technological and technical decisions for using fuel mixtures in diesel engines

The construction details of mixing devices are examined, the selection methods of compatible fuels are proposed for effective mixes creation.

The approved experimental technical and technological decisions for fuel preparation problem are analyzed, which can solve a task for irritants reducing while diesel working.

**Keywords:** fuel, chemiotoxicology, fuel mixture, mixer, diesel engine, alternative fuel.

**V. R. Vedruchenko, V. V. Krainov, M. V. Koksharov, N. V. Zhdanov, E. S. Lazarev**  
Chemiotoxicological analysis and technological decisions for using fuel mixtures in diesel engines

A full chemiotoxicological analysis of oil fuels for a wide class of diesels is implemented. The impact of fuel properties for diesel operating parameters is shown. Using fuel mixtures from light and heavy diesel fuels is proved.

The approved experimental technical and technological decisions for fuel preparation problem are demonstrated, which can solve a task for irritants reducing while diesel working.

**Keywords:** fuel, chemiotoxicology, fuel mixture, mixer, diesel engine, alternative fuel.

**E. V. Ptitsyna, D. V. Ptitsyn, A. B. Kuvaldin**  
Improving efficiency of light and dark infrared emitters with power current of complex form

There are investigated factors that determine the choice of efficient modes of operation of electrical installations infrared heating with light and dark emitters and the efficiency of using the current complex shapes for its power supplied.

**Keywords:** infrared radiator, electric operation, power consumption, current complex form.

**V. P. Beloglazov, L. V. Beloglazova**  
Effect of changes in height of rings on effectiveness of inertial-vacuum dust collector

This article describes a fundamentally new inertial vacuum ash collector. By changing its parameters it leads to significant deterioration in the efficiency of gas-cleaning equipment. The authors investigate the effect of the rings height on the inertial-vacuum dust collector effectiveness. The findings and conclusions of numerical experiment are contained in the article. The work is conducted with the support of "Energy without limits" fund.

**Keywords:** ash collecting, ash collector, ash, efficiency, energy, power accessories.

**T. I. Belskaya**  
About choosing burner units for low-powered boilerplant under reconstructions of municipal heat boiler station and other fuel-burning arrangements

The base source of environment waste in energy sector is analyzed. It is showed, that typestyle and model of gas burner units for various kinds of boilerplant produce a large effect on column waste of noxious agent and combustion efficiency of fuel.

The method and algorithm of selection typestyle of gas-fired burner based on the analyses of cause-and-effect relations under working the fuel-burning arrangement is offered. The gas-fired burner are chosen for a specifically machine according to its application and construction under repair or work under the reconstruction of the boilerplant.

**Keywords:** environmental problem, gas fuel, gas burner, boiler furnace, heat capacity supply, combustion efficiency of gas.

**D. G. Safonov, V. A. Ochshepkov, S. S. Girshin**

Calculation of the zero sequence voltage based on the natural asymmetry parameters of the power line

The article is devoted to assessing the impact of natural asymmetry parameters of the power line by the value of zero sequence voltage in networks with compensated neutral.

The article presents the parameters calculation of the power line 35 kV and the dependence of the neutral bias voltage from the resistance of the arc suppression reactor.

**Keywords:** power line capacity, zero sequence voltage, arc suppression reactor, resonance.

**E. N. Slobodina, A. G. Mikhailov**

Intensification of heat exchange process at boiling of liquid in the rarefied environment

The article describes the features of boiling heat transfer in rarefied environment, affecting the efficiency of heat exchange equipment. The method of intensification of heat exchange process at pressures below atmospheric is proposed.

**Keywords:** vacuum boiler, boiling, heat transfer, pressure, fins, capillary constant.

**INSTRUMENT ENGINEERING, METROLOGY  
AND INFORMATION MEASURING EQUIPMENT AND SYSTEMS**

**V. I. Gorbunkov, G. S. Garibyan, K. R. Sayfutdinov, V. V. Sedelnikov**

The plasma's gas discharge parameters of low pressure in photo reactor

There are discussed the results of investigation of the radiator in the form of germicidal low pressure mercury lamp in a closed opaque cavity. The lamp included in the photo-flow reactor operating on the falling film principle. It is shown that in each case using emitter included in photoreactor necessary to conduct further studies both discharge and radiative characteristics of the extinction coefficient based reagent.

**Keywords:** photochemical reactor, excimer and germicidal mercury lamps.

**I. A. Kirovskaya, E. V. Mironova, A. A. Grigan, M. A. Zverev, A. I. Blesman,  
D. A. Polonyankin**

Synthesis and research of new materials based on the system CdS-ZnS for ecological devices-gas analyzers

According to developed methods new materials –  $(\text{CdS})_x(\text{ZnS})_{1-x}$  solid solutions with different composition have been obtained. By analyzing volume (crystallochemical, structural) and surface (acid-base) properties, determined interrelate regularities on changing materials properties with composition practical recommendations for using obtained materials as efficient (highly sensitive) semiconductor elements of base gases analyzers (for example  $\text{NH}_3$ ) have been given.

**Keywords:** new materials, bulk and surface properties, semiconductor (highly sensitive) elements, gas analyzers.

**A.V. Maystrenko, A. A. Svetlakov, N. V. Starovoytov**

Digital differentiation signals based on moving quadratic approximation and its application in the synthesis of PID – regulators

We developed a method for differentiating the digital signals based on the use of sliding quadratic approximation and the pseudoinverse. On the basis of synthesized new PID-regulator, has significant advantages, which include sufficiently simple software and hardware implementation, greater accuracy, quality control, and noise immunity.

**Keywords:** matrix, approximation, digital differentiation of signals, the PID-regulator.

**K. S.Grekov, Yu. G. Dolganev, A. V. Kosykh**

Researching the autogenerating method of measuring quality of surface

The paper describes existing methods evaluating the quality of surface; it is suggested a new method autogenerating evaluation method of surface quality in accordance with the current state of scientific research. There is carried out research of applications of the proposed method, and investigated the results of computer simulation, which are conclusions of applicability of the method.

**Keywords:** oscillator, roughness, additional capacity, surface quality, capacitive sensor.

**A. O. Lozhnikov**

Investigations of TD cut resonators with spurious suppression

It has been shown that the modified design of the TD-cut quartz crystal can suppress not only the temperature mode B, but also harmonics of fundamental and temperature modes allowing you to create the oscillator circuit of high reliability without the danger of driving on spurious mode. Experiments are carried out in a wide range of operating temperatures and frequencies.

**Keywords:** TD-cut resonator, B-mode, C-mode, crystal resonators, double rotated cut, mono frequency, spurious suppression.

**D. V. Sapozhnikov, A. V. Gamilovskaya, A. A. Belousov, D. V. Fedorov**

Frequency discriminator designed with monolithic quadrature mixers

This article is about frequency discriminator designed with monolithic quadrature mixers. The article includes output characteristics of designed device.

**Keywords:** frequency discriminator, instantaneous frequency measurement systems, quadrature demodulator, quadrature mixer.

## **INFORMATION TECHNOLOGY**

**V. N. Zadorozhnyi**

Improving accuracy of GPSS-models through the use of a random number generator "Mersenne Twister"

Approaches to application of GPSS World external random number generator are explored. Examples of application MT-generator based on the algorithm "Mersenne Twister" for simulation of queuing systems are proposed. It demonstrates appearing at the same time the possibility of a significant increase in the accuracy of re-modeling results.

**Keywords:** simulation, random number generator, queueing systems, heavy-tailed distributions.

**V. N. Zadorozhnyi, V. A. Badryzlov**

Transition processes in growing networks with nonlinear preferential attachment rule

Transition processes in stochastic growing networks with nonlinear preferential binding rule analyzing. We derive the equations of the dynamics of networks. Numerical methods for calculation of transients in networks and network nodes developed.

**Keywords:** growing networks, random graphs, stationary and transient random processes.

**V. P. Sizikov**

The system analysis of two bodies' interaction on the DIS-technology basis

Withdrawing system of methodology in the rank of DIS-technology the system analysis of two bodies' interaction has been carried out. The features in manifestation of such interaction are revealed on the example of model in the rank of a triad.

**Keywords:** DIS-technology, electromagnetism, gravitation, mode, process-system.

**A. E. Ultan**

Projecting procedures satisfying the u-requirements for algorithms separable from knowledge

The article is devoted to design of intellectual computer components of threefold appointment. It contains a description of the architecture for the procedures separable from knowledge.

**Keywords:** component, education, Internet.

**A. E. Ultan**

Projecting procedures satisfying u-requirements for algorithms not separable from knowledge

The article is devoted to design of intellectual computer components of threefold appointment. It contains a description of the architecture for procedures inseparable from knowledge.

**Keywords:** component, education, Internet.

**A. N. Florensov**

On the mathematical model of mind development

Based on the analysis of the phenomenon feral child it is found that the mind is not a qualitative characteristic as a natural-scientific concept. It is described a quantitative value and the formation of a systematic increase of this value takes place entirely a result of a sequence of interactions with other individual mind. The mathematical model of the formation and development of the mind is presented which based on the information interaction. Components analysis revealed the increment value of the mind in solitary interactions, the role of individual and social factors in them to produce dependence which can be used in education for the effective further development of the mind.

**Keywords:** mind, intellect, value of intelligence, interaction, information, mathematical model.

**E. A. Bakhtenko, A. A. Sukonshchikov**

The concept of adaptive approach in informational support in industrial company

This article covers the features for organization of information support staff of an industrial company. The article describes the analysis of the structure of an integrated data space based on the modern local production experience. Also the article presents formalized description as the theoretical base of the mechanism, which is designed to adapt the information issue. The review of the experience of its implementation is also included.

**Keywords:** data, relevance, accessibility, production process, integrated data space, informational support, aggregation, adaptivity, data nodes.

**A. A. Zlatkina, E. T. Gegechkory**

Business process reengineering methodology and typical techniques of its usage

The unstable economic situation in Russia and in the world requires the organizations to react the environment changes fast, to have high competitive advantages and to save business stability. Moreover, despite the quantity of publications and books, about the half of reengineering projects are failed. Usually the cause of it is the wrong idea about reengineering. The particular qualities of business process reengineering were reviewed and analyzed. There is process approach of organization management and business process notion in the base reengineering methodology. The methodology is also reviewed from the project management point of view. The basic methods and techniques are distinguished, for example horizontal process compression. To achieve the reengineering objectives the information technology, which allows to create business process models, such as BPWin, are used.

**Keywords:** reengineering, process approach, business process, project.