TECHNOLOGY OF FUEL CREATION ON THE BASIS OF WASTE FUEL ENERGY SOURCES

page 4–5

The direction for reducing anthropogenic impact of the fuel industry enterprises on the environment by creating combination fuel, based on their solid and liquid waste was investigated in the paper.

Using modern physico-chemical research methods — gravimetric, rheological, optical, sedimentation, calorimetric and electrophoretic and statistical analysis of the results revealed an optimal carbon slurry fuel composition, which provides saving the necessary physical and chemical properties under almost complete fuel component burn-up, and minimal pollutants emission in the environment.

The possibility of using liquid pyrolysis products of polymer waste as a dispersion medium for obtaining highly concentrated coal slurries is shown. The technological mode for obtaining coal slurry fuel, based on waste «T» coal and brown coal is proposed. The economic and environmental feasibility of such systems as an energy source is shown. Creating highly concentrated coal slurries, based on liquid pyrolysis products of rubber allows an effective use of low-calorie energy sources.

Fuel with the developed composition can be recommended for introducing at power generation enterprises. Their use will allow to reduce the imported fuels consumption, improve the ecological situation in many regions of Ukraine.

Keywords: oil sludge, waste coal, liquid pyrolysis products of polymers, sedimentation stability, viscosity.

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EXTRUSION OF DOUGH IN RING LUBRICATING LAYER

page 6–8

Abroad there are developments in which the highly viscous mass conveyed in the pipe surround the circular casing of a low viscosity fluid, thereby reducing friction. In this regard, it seems urgent to develop design of macaroni presses, in which the resistance movement test in the press matrices was minimized, which improves the efficiency of their work, as well as performance. The purpose of research is to solve the problem of non-contact forming pasta — based research and development of a fundamentally new method and apparatus according to contemporary pasta production. Basic analytical problems were solved using the theory of hydrodynamic flow in thin layers, namely the theory of gas lubrication. The contactless molding pasta method reduces friction to nearly zero in the matrices of the pasta press. The research results can be applied in the design of pasta presses using matrices with porous inserts.

Keywords: viscous mass, friction, macaroni press, hydrodynamic, thin layers, matrices.

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PROTECTION OF WATER BASIN FROM CONTAMINATED WATER OF SULPHIDE

page 8–10

The processes of removal of sulfides are investigation. A technological setting is developed for the cleaning of natural and waste waters from sulfides.The aim of our research was to investigate the kinetics of removal of sulphides and development of technological systems for natural and waste waters from sulfides. Sulfides have a toxic effect on human and cause skin irritation. Hydrogen sulphide is toxic to living organisms. The toxicity of sulfide-ions is not so great as to cause acute poisoning, but prolonged use of water containing the substances in concentrations above the standard can develop chronic intoxication, leading ultimately to a particular disease. Note also that the toxic effects of substances can be shown not only by oral (by mouth) to receive them with water, but when absorbed through the skin in the process hygiene (shower, bath) or health (swimming pools) procedures. Also, the presence of sulfides in water (hydrogen sulfide) gives the water an unpleasant odor. At high concentrations of hydrogen sulfide a headache, dizziness, insomnia, weakness, cough. There is also a common neurotoxin effects. In scientific

work carried out researches in area natural and waste waters from sulfide ions. Developed a working technological installation for natural and waste water from the sulphides. Optimized conditions for the removal of sulfide from wastewater.

Keywords: sulfides, waste water, sorbents, synthetic anionic clay, metallurgical slag, sorption.

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QUALIMETRICAL ANALYSIS OF THE TECHNICAL LEVEL OF SAFETY COUPLINGS

page 11–13

Establishment of system of indicators of quality and optimum design of the ball safety couplings (BSC) on the basis of scientifically reasonable criteria is an actual scientific and practical problem and a necessary condition for advance of the corresponding production of mechanical engineering of national producers to the world markets. The purpose of the conducted researches is increase of a technical level of designs of BSC by a way of application of the qualimetrical models providing objective, multilevel and system display of their working properties. On the basis of the theory of system qualimetrical modeling fulfilled by authors on standard samples of a batch production of machine- and machine-tool building (gear and worm reducers, friction gears and dynamic vibroquenchers, industrial robots and platforms, etc.), research of a set of working properties of BSC is executed.

According to the allocated structurally functional modules of a standard design of BSC, each of which is coordinated with a certain level of hierarchy of the BSC qualimetrical model, indicators of quality are ordered and the corresponding settlement dependences are established. As a result of structurally functional modeling of a standard design of the BSC it is created a matrix of indicators of its reliability, accuracy, load ability and functionality. Normalization of single indicators of quality is executed, created a matrix of quality of qualimetrical model by which the system indicator of a technical level and reserves for optimization of the studied designs are defined.

Keywords: ball safety coupling (BSC), structurally functional modules, quality indicators.

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ANALYZING TEST RESULTS OF INFUSION PUMPS

page 13–15

The analysis of results of testing infusion pumps, which can be used in resuscitation and delivery rooms of intensive care, in other hospital rooms and when transporting patients, including ambulance cars has been proposed. The differences between actual and given volumes of an injecting solution and speed of its delivery were found. The principles of estimating data accuracy of infusion pumps complying with the international standards were considered. The experimental studies of an infusion pump for checking its operational data reliability were carried out. The calculations by the formulas complying with international standards were made. The prerequisites for developing a risk prediction model when operating infusion pumps were developed. The analysis of the International Electrotechnical Commission standard IEC 60601-1-8 was carried out. Medical electrical equipment Part 1–8: General requirements for basic safety and essential performance — Collateral standard: General requirements, tests and guidance for alarm systems in medical electrical equipment and medical electrical systems.

Keywords: infusion pump, speed of solution delivery, measuring error, solution volume.

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NANOTECHNOLOGY IN COSMETIC FIELD

page 15–17

It was shown the general characteristic of nanomaterials which are used in cosmetic industry, it was studied their diversity and the principle of operation. There were raised issues about the accuracy of assessment methods of their safety for consumers' health and the environment. It was studied the international market of the producers of nanocosmetics and it was analyzed the major trends in domestic production. It was emphasized the importance of creating of a strong relevant regulatory and technical support in terms of social responsibility for the development of nanotechnology in the cosmetics industry. As a nanorevolution in the cosmetics industry cannot be ignored, moreover stopped, any inaccuracies in scientific risk assessment will cause a negative public attitude to nanotechnology, which can lead to slower development of new technologies.

Keywords: nanotechnology, cosmetics, nanomaterials, assessment of safety, security, normative and technical support.

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HISTORICAL ASPECTS OF THE IRON-CEMENTITE DIAGRAM

page 17–19

The purpose of the research lies in generalizing, improving and supplementing an iron-cementite diagram. The aim was to study historical aspects of the diagram. The method of solving the problem was to find the lost and forgotten historical facts. An improved phase diagram of iron-cementite conditions is given in the paper. The novelty of this diagram lies in combining phase transformations, structural components and glow colors at different temperatures and concentrations of the components that allows obtaining the maximum amount of information by using the diagram. A historical aspect of the diagram was also studied, the origin of names of phases and structural components was considered as well. The diagram of iron-carbon has a great practical value and gives the basis for studying the processes of treating iron and steel with heat. It is used for determining the types of heat treatment, temperature ranges of transformations, etc. In addition, the diagram can be used for predicting the microstructure at any preset temperature.

Keywords: diagram, iron-cementite, structure, phase, metal.

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THE INNOVATIVE METHOD OF INCREASING DURABILITY OF MACHINE PARTS BY CHEMICAL-THERMAL TREATMENT

page 20–21

The purpose of the paper was to study the influence of technological parameters of boriding in nanopowder on the properties of different classes of steels. Finding the optimum treatment temperature and time was the method to solve this problem, and studying the boriding time influence on the hardened layer depth and hardness was used to estimate the parameters, characteristic of diffusion layers. Different classes of steels were research materials. A mixture with the content of nanodispersed boron-containing substances was used in boriding of pastes. Based on the studies, to simplify the technological process it is proposed to combine boriding with hardening for all except high-speed steels. For them, it is advisable to conduct boriding at 1000 °C. Boriding duration is selected according to the requirements for parts. New boriding method, allowing to carry out treatment with obtaining sufficient diffusion layers was proposed. The practical significance of this paper lies in the fact that the application of the developed easy-to-use and effective nanotechnology of

parts boriding from steels reduces chemical-thermal treatment duration by 2—3 times with obtaining high-quality boride layers, which significantly increase wear resistance of machine parts.

Keywords: boriding, steel, diffusion layers, microhardness, layer depth.

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QUALITY ASSURANCE OF BIOMEDICAL EQUIPMENT REPAIR PROCESS ON TECHNICAL CONDITION

page 22–24

Construction of a system of biomedical equipment repair on the actual technical condition is considered, and results of research in this area are given in the paper. The purpose of the research is to analyze the ways of quality assurance of biomedical equipment repair process in transition to the operation on the actual technical condition. Using the methods and means for the repair process stages automation allows to estimate actual technical condition of biomedical equipment. The analysis of the existing repair system for determining the factors, affecting the repair process quality and operating efficiency in general was conducted in the paper. The developed biomedical equipment repair system structure, which is based on the introduction of production and information technologies, allows to repair on the actual technical condition that is determining in ensuring the process quality. The research results can be applied by maintenance engineering staff, who work in biomedical institutions, as well as specialists of production and service centers of the biomedical-technical industry.

Keywords: quality level, technical condition, repair process, operation, biomedical equipment.

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CALCULATION OF QUALITY OF PARTS BY LINER DIMENSION

page 24–26

In this paper we consider the problem of obtaining a general model of the random variable of the linear size of machine parts. Construction of the general model will solve a number of problems related to the quality of manufactured products. The purpose of research is to find estimations of the parameters of the model, with using of order statistics on a small sample, and on a large sample to establish that the model is close to the true. The results obtained allow us to solve many practical problems of engineering technology. That is, prognosing of percentage of defective products. When manufacturing the product to find the lower and upper bounds for the size of machine settings and get the maximum quality. Also find the value of the linear dimension, on which is configured the machine to get the highest quality products. These results allow us to estimate the percentage of manufacturing an article by a particular technology with the highest quality possible. The results obtained allow having calculation formulas to evaluate different technology of manufacture of products and quality of manufactured products by the parameter of the linear size.

Keywords: quality, machine parts, accuracy, linear dimension, random variable, the distribution model.

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ANALYSIS OF ANTHROPOMETRIC DATA FOR DESIGNING CORSETRYPRODUCTS OF BRA GROUP

page 27–29

This article provides an analytical overview of typical figures classifications for designing corsetry products used by the leading foreign trade companies and manufacturers, as well as their comparison with the national standards. As a result, it was concluded that the number of proposed size types and bra cup depth of foreign manufacturers is much higher than in the national standards. This is explained by the fact that the manufacturers are interested in attracting a wider range of potential buyers. The size charts of large trading companies in contrast with the size charts grid of smaller enterprises reflect the options of population types and sizes more completely.

The analysis of the current national anthropometric database for designing corsetry product of bra group demonstrates out-of-date nature and incompleteness, as well as the need for conducting a measurement survey to review it.

The anthropometric study aimed at the analysis of designing corsetry products of bra group, in which 350 women took part, shows the necessity of introducing two new extra small sizes and one extra big size into the anthropometric database. It also reveals a number of dependencies which demonstrate the changes in individual parameters of the female body depending on age, profession, body fat and posture.

Keywords: anthropometric data, dimensional signs, corsetry products, bra groups, industry standard, national standard.

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IMPROVEMENT OF THE TECHNOLOGY OF THE GAS TREATMENT BY THE CONDENSATION METHOD

page 29–31

Natural gas treatment for transport using the condensation method is considered in the paper. The main objective of the study is to examine the possibilities of decreasing the amount of low-pressure gases, produced when reducing hydrocarbon condensate, separated from natural gas, to the standard conditions. Decreasing the amount of these gases becomes possible due to introducing a portion of the treated natural gas in a gas-liquid flow before the final stage separator in the gas treatment plant. Thus, the portion of low-boiling components, constituting the treated natural gas in the gas phase increases. This leads to the decrease in the low-boiling components solubility in the hydrocarbon condensate and thereby clearer gas components separation into the low-boiling and high-boiling components, which form the hydrocarbon condensate. The calculation results of the technological scheme of gas treatment plant, the operation of which is based on the proposed method are given in the paper. Calculations show the possibility of reducing the amount of low-pressure gases by 10 %, which in turn reduces the energy consumption for recycling these gases. The proposed method for decreasing the amount of low-pressure gases, formed when reducing the hydrocarbon condensate to the standard conditions can be used in gas treatment plants.

Keywords: condensate, solubility, component, degasification, treatment, gas, rectification, flow.

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GREEN TECHNOLOGY RECYCLING HIGHLY TOXIC INDUSTRIAL WASTE

page 31–33

Recently, due to the increasing environmental problems in the process of industrial chemical production, there is a need to increase the conversion of raw materials into the finished products. This prevents the formation of by-products and especially toxic waste. This dramatically reduces the cost for selection and utilization toxic industrial waste. In this paper we describe a several of new policy decisions more effective ways of processing and recycling of industrial organochlorine waste (OCW) in the production of dichloroethane and vinyl chloride monomer, returning — recycling of raw materials.

The study on chlorination of unsaturated chlorinated wastes showed that the additional treatment with chlorine to reduce the amount of unsaturated OCW and to increase the content of 1,2-dichloroethane in chlororganic waste at 9—15 % reduced the loss of 1,2-dichloroethane when burned. The study optimized the conditions of the process of alkali dehydrochlorination, using a freshly prepared suspension of Ca(OH)2 in NaOH, which allows to process the 1,2-dichloroethane and 1,1,2-trichloroethane with a total conversion of 95—96 % of trade vinyl chloride and

vinylidene chloride to the outputs of the last 25—70 %. This method can reduce the amount of waste incinerated chlororganic 2—5 times.

Keywords: 1,2-dichloroethane, industrial organochlorine waste, dioxine, chlorinating, rectification, alkaline dehydrochlorination.

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ANALYZING TECHNOLOGICAL COMPONENT OF MANUFACTURING INTERNATIONAL SPECIAL PURPOSE PRODUCTS (BY EXAMPLE OF SPACE INDUSTRY)

page 34–36

The peculiarities of producing international special purpose products by the example of space industry are considered in the paper, and some of the research results in this field are given. The main objective of the research lies in developing theoretical bases of prioritizing the industry in terms of its international specificity.

Using modern methods of decision-making when choosing technology priorities based on a foresight and a socio-economic forecasting allows providing both competitive advantages in global industries and development of the national economy thanks to a cross-sectoral technology transfer.

The peculiarities of choosing technology priorities based on a life cycle theory and technology parameters are considered in the paper. The given technique allows obtaining evaluation data using tools for analyzing development alternatives. The algorithm for selecting research papers from a list of projects has been developed. These research papers are offered for executing a scientific and technological program within the scope of a respective section, related to the space industry. The research results can be used by experts for substantiating the innovative development priorities of the industry.

Keywords: technology, space industry, standard, international special purpose products.

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REGULATORY SUPPORT FOR DISMANTLING TECHNOLOGIES OF INTERFERENCE JOINTS

page 36–38

Regulatory support for dismantling technologies of interference joints using thermal influence, namely, induction heating is considered in the paper. Some results of our research in this field are presented. The main purpose of the research is to develop the principles for creating regulatory support for unified disassembly technologies, allowing to obtain high-quality products for machine-building repair industries. Using modern standardization tools and methods allows to create the basis for regulatory support in the form of products classifier; unified operations; catalog of heaters, coppesponding to groups of heated products and interrelated by limiting parameters. The principles of creating regulatory support for dismantling technologies of interference joints based on the developed schemes of classification parameters of parts, joints and manufacturing disassembly operations using induction heating, as well as classifications of induction-heating equipment with determining limiting parameters, which are the link between them are proposed. Using the research results will allow to create uniform organically linked standardization and unification system of the technological production system for repair organizations and machine building enterprises.

Keywords: regulatory support, joints classification, technological disassembly operations, induction heating.

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THE METHOD OF PREDICTING THE PROCESS OF CONDENSATION OF MOISTURE AND HYDRATE FORMATION IN THE GAS PIPELINE

page 38–40

The problem of ensuring the required value of one of the natural gas quality indicators during its transportation to the consumer — moisture content is considered in the paper. The method for predicting possible moisture condensation and hydrate formation processes in gas pipelines considering mixing gas flows with different moisture content was developed.

Predicting the moisture condensation and hydrate formation in gas pipelines is an actual task since a timely prevention of these processes is the key to efficient gas transportation, namely, prevents hydrate blocks formation in gas pipelines, gas equipment failure and emergency situations.

The above method and computer program allow accurately and promptly determine the locations of possible hydrate formation and moisture condensation at specific gas pipeline sections, and also set limits on the gas humidity value at the gas pipeline section entrance that is analyzed, taking into account the presence of mixed gas flows.

Keywords: natural gas quality, moisture condensation, hydrate formation, moisture content.

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COOLING MACHINE ON THE HIGHBOILING SUBSTANCES

page 41–43

The general idea of the proposed machines consists of employing a low-pressure aggregate (p <1 bar) — vacuum pump instead of traditionally used compressor. Owing to the fact that mechanical loads of low-pressure systems proposed are comparatively not very high, such systems possess a number of advantages comparing to the high-pressure ones: safety, longevity, reliability, a less metal capacity, etc. The proposed as a heat pump and refrigerator make possible using of the wide range of high boiling and ecologically clean substances as cooling agent, for example, ethanol, methanol and its water solution, etc. The cooling substance is selected in dependence of the required temperature, considering the safety of exploitation and ecological safety of the substance and its production. These machines do not destroy the ozone layer of the Earth and the heat pump does not cause a heat contamination for the atmosphere and saves the high-quality fuel substances such as gas, oil and coal.

Keywords: heat contamination, ozone layer, Kyoto protocol, heat pump, refrigerator, high boiling substances.

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PREREQUISITES FOR DEVELOPING «GREEN LOGISTICS» AT RAILWAY TRANSPORT

page 43–45

The urgency of improving environmental conditions and increasing the effective use of natural resources is considered in the paper. The main objective of the research lies in determining prerequisites for developing «green» logistics at railway transport. The data analysis concerning this matter is topical for Ukraine, as ecology issue is the most urgent nowadays. However, there are a number of problems, hindering the development of «green» logistics. They include the absence of relevant legislative database, the lack of specialists in the field of «green» logistics and ecotransport, and also negative appeal for investment. The research results can be applied to railway transport, which is in a desperate need of introducing innovative technologies for improving environmental safety, quality and reliability of its running, safe railway operation. We suggest distinguishing one of the main trends of logistics development in Ukraine today, i. e. ecologization, involving implementation of measures for reducing negative impact of rail transport on the environment and setting up of effective environmental measures at other means of transport that will help to improve the ecological situation in Ukraine.

Keywords: ecology, railway transport, «green logistics», environment, «green» technology.

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EFFECT OF ACCELERATED CRYSTALLIZATION OF SILICUM AND GERMANIUM

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The research results of silicium and germanium crystallization from a melt at an increased rate are given. It was found that during crystallization of monatomic substances as limiting factors it is necessary to consider not only physical factors, i. e. kinetics at the crystallization front along with heat and mass transfer, but also crystallochemical ones, i.e. coordinating atoms and type of interatomic bindings. The possibility of increasing the crystallization rate due to the «tunneling» effect of silicium crystallization, namely at high temperature gradients in the first-order phase transition, an intermittent («tunnel») transition of silicium density in the liquid phase occurs ranging from 2,53 g/cm^3 to 2,33 g/cm^3, is set up. The transition is realized by an abtupt change of crystallochemical properties of the groups of atoms from a octahedral coordination to a tetrahedral one. Silicium monocrystals, grown at an increased rate of crystallization have perfect structure and can be used in electronics, biomedicine, power electronics, power electronics technologies and other fields, where crystals with increased structural perfection are applied.

Keywords: silicium, germanium, crystallization rate, kinetics, heat and mass transfer, coordination, interatomic binding.

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