PRODUCTION RESERVES

INCREASING GAS-TURBINE DISKS QUALITY BY IMPROVING THEIR PROCESSING TECHNOLOGY

page 4–8

Constant tightening of the main characteristics of gas turbines has led to the need to develop and introduce new high-temperature materials with improved physical-mechanical properties, such as heat-resistant steel 15H12N2MFVAB-Sh (EP517-Sh). However, the lack of studies of key workability parameters of this material hinders its wide use in gas-turbine construction.

The basic idea of the presented work is to create scientifically based technological processing conditions of tab grooves in the disks, made of steel EP517-Sh at maximum productivity increase of their processing method. Such conditions will lead to the roughness formation of the processed surfaces at the level of design requirements, useful compressive residual stresses and weakened surface layer that will significantly increase the tool joint reliability in the absence of any defects on the working surfaces of various tab grooves. For that, the regression equation of the processed surface roughness dependence on technological factors of the drawing process $Ra = f(V, S, \gamma, HRC)$ was derived. The graphs of the considered dependencies were constructed for convenient analysis of the obtained results.

Reliability of the conclusions on the work and recommendations on their introduction were confirmed by production researches.

Keywords: technological factors, quality parameters, tab grooves, physical model, highly productive technology.

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FORMATION OF THE SURFACE LAYER A TRIBOTECHNICAL PURPOSE FOR IRON-CARBON ALLOYS

page 8–13

One of the surface hardening methods of iron-carbon alloys, namely chemical-heat treatment using a vapor-gas saturation medium was studied in the paper.

The conducted researches suggest that ascending diffusion of carbon takes place during the surface layer formation in the vapor-gas medium due to the disintegration of the lamellar structure of pearlite cementite and crushing of plates of graphite inclusions of cast iron with its accumulation on the layer surface. These processes are inevitable for iron-carbon alloys in isothermal conditions with the presence of vapor-gas redox medium.

It is proved that the main graphite shape change stimulators in cast irons are calcium, magnesium and oxygen, present in the saturation medium, and the free carbon content in the modified surface layer will give it new properties.

Considering the obtained results, operational characteristics of the obtained layer, namely wear resistance and antifriction properties were also investigated.

The samples, processed in the atmosphere of the superheated steam of aqueous solution of salts, containing such chemical elements as sulfur, oxygen, molybdenum, nitrogen or nitrogen, phosphorus, oxygen were tested in the laboratory.

It was revealed that using the superheated steam of aqueous solution of salts, containing such elements as sulfur, molybdenum, oxygen, phosphorus as saturation medium allows to reduce the friction coefficient value of the iron oxide layer at increasing its score-resistance and, as a result, increase operational properties of parts and units of machines and mechanisms, operating in friction conditions.

Keywords: iron-carbon alloys, hardening, chemical-heat treatment, vapor-gas saturation medium.

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CUTTING PROPERTIES OF LEATHER MATERIAL, FILLED WITH NATURALLY OCCURRING MINERALS

page 13–17

Efficient use of animal skins in the design of footwear is largely determined by its cutting properties. Uneven density, thickness and elongated topographic areas complicate the efficient use of leather in cutting.

Skins filled with modified dispersions of natural mineral montmorillonite (MDM) and zeolite (MDZ), cause further formation of the structure of the dermis, which helps to increase its operational and hygienic properties. However, in terms of footwear manufacturing processes such skins are insufficiently studied.

This article is devoted to the nature of the distribution of mineral filler in topographic areas of the skin, change of its thickness, distribution of elongation in the area and determination of the effectiveness of using such skins at cutting of upper parts.

Mineral particles during the filling of semi-finished leather fill the gaps between the structural elements of the dermis, which effectively fills the peripheral areas and increases the thickness of the finished leather. Average value growth of skin thickness increased by 14,4 % and the yield on the skin area by 3,1 % — 5,1 %.

Magnitude of the variations of linear dimensions of theupper parts related to the magnitude of uneven skin extension, dispersion of linear dimensions of parts in the formation (different length of parts, misalignment, distortion of model).

Leveling of properties throughout the area, uniformity and evenness of elongation in the peripheral areas, increasing of the uniformity coefficient, higher values of tensile strength at 1,8—10,7 % are observed in experimental animal skins. This will enable more effective and efficient use of animal skins in their cutting and, therefore, reduce the amount of waste leather, reduce the cost and price of the finished product.

Keywords: leather, topographic areas, natural minerals, montmorillonite, zeolite, elongation, cutting properties.

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OPTIMIZATION TECHNIQUE OF ORGANIZATIONAL AND TECHNOLOGICAL STRUCTURES OF SYSTEMS OF SMALL BATCH ASSEMBLY OF COMPLEX MECHANICAL ENGINEERING PRODUCTS

page 18–21

The optimization technique of organizational-technological and technical preparation of assembly production of complex mechanical engineering products is considered in the paper.

Development trends of modern assembly production consist in continuous increase in production output in terms of both nomenclature and volume and lead to the steady growth of unit man-hours of assembly operations, and, consequently, to the growth of demands for production facilities and increase in the number of workers, employed in the assembly production (especially at its final stages).

As is known, the common problem of machine manufacturing consists of technological tasks, including the parts manufacturing accuracy and assembly process quality. If the first problem is solved at the optimization stage of parts machining, the second finds the solution at the final stage of machine manufacturing in conditions of assembly production technology. Labor productivity in small-batch assembly production of complex mechanical engineering products also appears to depend on subjective factors, and its level tends to periodic change.

The introduction of automated design systems of assembly processes, based on simulation techniques is the effective solution to these problems.

The paper gives the operation principle of the simulation system, which allows to develop the structure of technological operations, and provides a minimum assembly time of complex mechanical engineering products in small-batch production conditions.

Keywords: manufacturability, hydraulic unit, assembly coefficient, 3-D model, basing, simulation.

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AN APPROACH OF DEVELOPING A SYSTEM OF SOLID WASTE TREATMENT

page 22–26

Nowadays, in Kharkov region, there are problems in the system of treating solid municipal waste. In the paper, it is suggested following the example of foreign countries and implementing a two-stage waste disposal from residential areas by situating a waste transfer station. In this regard, there is a necessity of solving several problems: the problem of locating a station using a graph theory (finding internal or external median); searching an optimal route of waste disposal in a given area (searching Euler's or Hamiltonian cycle in the graph); selecting the most suitable mark of a waste collection truck out of the available fleet of interchangeable vehicles. Solving these problems would allow reducing fuel consumption, using large-tonnage transport, facilitating a daily work of housing and utilities infrastructure or companies, disposing solid municipal wastes. Furthermore, solving these problems can be united into one software product, which would automate and make calculations for a graph with a large number of state points.

Keywords: solid municipal wastes, algorithm, graph, situation problem, optimal route.

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DETERMINATION OF WEARPROOFNESS OF CONTACT WIRE BY THE METHOD OF COMPLETE FACTOR EXPERIMENT

page 26–30

Using complete factor experiment, the analysis of the possibility of using steel-aluminum contact wire of the new

sample during operation in the city contact network was conducted in the paper. The main objective of the study is to conduct this analysis, taking into account the following factors: the pressing force of the current collector to the contact wire, the road grade, the load current on the contact wire.

During the performance tests, it is sometimes impossible to directly assess the impact of this or that method, implemented in the contact «contact wire — current collector» (the change in specifications, etc.) on the wire wear, and efficiency has to be judged only by the change in overhaul life of runners, suggesting that the inserts wear-rate reduction is accompanied by the wire wear-rate reduction. This assumption is correct in some cases, but this approach is not entirely correct but in others.

The presented mathematical model allows to state that the load current has the most destructive influence on the contact wire since it has the largest ratio of the absolute value.

The proposed steel-aluminum contact wire is more appropriate to use at low-traffic sites, slopes, depot sites and zero-run sites since the contact wire wear is minimal at these sites.

The research results can be applied by design engineers in designing transport contact network.

Keywords: complete factor experiment, steel-aluminum contact wire, load current, planning matrix.

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IMPROVING METHODS OF POWER CONSUMPTION MANAGEMENT OF URBAN ELECTRIC TRANSPORT

page 30–33

The problem of improving existing methods of controlling power consumption by urban electric transport is considered in the paper. The main objective of the research lies in improving the power-saving by enhancing methods of managing power consumption of urban electric transport using a statistical observation of power consumption in various aspects of converting power into transport work. Using the method of statistical power consumption management allows maintaining the processes at the level, ensuring optimum power consumption for carrying out transport operations based on control cards. The developed technique allows optimizing management processes and reducing operating costs of the electric transport company. The research results can be applied by scientific and pedagogical workers, post-graduate students, students of educational institutions and specialists of transport companies for managing power consumption processes. The proposed principle can effectively solve the problem of power saving.

Keywords: urban electric transport, power consumption, power saving, control card, resource saving technologies.

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ECONOMY OF ENTERPRISE

RELATIONSHIP BETWEEN DIFFERENTIAL PRICING AND CONSUMERS' PERCEPTION OF PRODUCT QUALITY: UKRAINIAN PRACTICE

page 34–37

The economic relations of consumer electronics sale through retail trade were investigated in the paper. In this case, the emphasis is placed on studying the relationship between the product quality in a particular product category and using the appropriate differential pricing strategy. The main objective of the study is to develop recommendations on using various differential pricing practices to improve enterprise profitability.

Using modern information collection methods allows retailers the most promptly and accurately investigate the

efficiency of using a particular pricing method for various product groups and promptly respond to changes in market conditions. The proposed analysis method allows to separate the concept of product quality for various product groups, and also to obtain information using conventional statistical tools.

The improved approach to understanding the product quality for various groups of consumer electronics was developed in the paper. The basic differential pricing practices were systematized based on the customers' perception of product quality. A correlation analysis to identify relationships between sales volumes (using various differential pricing practices) and customers' perception of product quality was conducted, and recommendations on using certain differential pricing practices for various product groups were made.

The research results can be used by consumer electronics retailers in everyday activities for decision-making on the implementation of certain pricing policy for various product groups.

Keywords: differential pricing, product quality, correlation.

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THE CORRELATION SUSTAINABLE DEVELOPMENT AND POPULATION LIFE QUALITY FOR EXAMPLE CARPATHIANS REGION

page 37–41

Today it is clear that any technical and technological innovation requires additional energy, raw material, it causes the emergence of additional quantities of waste and pollutants, so it causes stronger pressure on nature. It is necessary to take gradually a new world outlook — the ecological and economic paradigm — the idea of sustainable development — as a principle of the consumption of nature by the humanity.

In the Carpathian region the rate of degradation of the «life sphere» is much faster than the rate of the awareness of this extremely dangerous process by the population and authority. The population of the Carpathian region is now living in the conditions of socio-economic discomfort, there have accumulated a lot of environmental, economic and social problems, solution of which requires the efforts of both, the state and public.

The Sustainable Development Strategy provides that the productive forces, economic structure, specialization and location of output industries in the current conditions have to conform very close with the available natural resources, productive, reproductive and assimilative capacity of the environment. Moreover, the level and character of the usage of natural resources, especially land, water and mineral resources, the scale and direction of financial investment, the organization of technical, technological and organizational progress should be consistent not only with the current, but also with the perspective needs of the society.

Keywords: Carpathian region, sustainable development, environmental problems.

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ORGANIZATIONAL CLUSTER-BASED ASPECT OF REVIVING AND DEVELOPING RAILWAY TOURISM

page 41–44

The organizational aspect of a railway tourism revival in Ukraine was considered. For its development, a cluster approach was proposed. It was found that the development of railway tourism in modern conditions is impossible without diversifying railway transport activities into the adjacent segment of economy management, i. e. tourism. It was suggested carrying out the diversification by developing transport and tourism clusters. The purpose of creating the transport and tourism cluster lies in increasing the competitiveness of railway transport and tourism market by means of a synergetic effect, the efficiency improvement of enterprises

and organizations, belonging to the cluster, innovation promotions and development of new activities. Carrying out tourist activities by Ukrainian railways as a tour operator requires a long-term railway tourism program, which will involve asystem of management and organizational solutions, include meeting population's needs in tourist services, create a positive image of the railways in a tourism market by providing competitive advantages of railway transport in the passenger transportation market and taking into account an environmental influence and inner potential of railways.

Keywords: railway transport, diversification, transport and tourism cluster (TTC).

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CHANGES IN THE LEGAL CONDITIONS OF TRANSPORT BIOFUELS IN POLAND ON THE BACKGROUND OF THE EUROPEAN UNION

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The legal environment and development conditions of transport biofuels were analyzed in this paper. Law conditions can be stimulating or inhibiting tool to develop new technologies, demand and supply. Authors also conducted the study about biofuels of 1st and 2nd generation. Great hopes are connected with the 2nd generation transport biofuels, which are produced from plants: non-energy or waste (e. g. FT-diesel, bio-DME spirit lignocellulosic bio-SNG). The 2 generation has better features for the reduction of greenhouse gas emissions than biofuels of the 1st generation (i. e.: bioethanol formed by alcohol fermentation of esterification and biodiesel from rapeseed oil). Furthermore, National Indicative Target (NIT) linked with the reduction of CO_2 were mentioned at this work. Only certified biofuels will be able to be taken into account for the calculation of national biofuel consumption NIT in transport in particular Union countries.

Keywords: transport biofuels, CO_2 reduction, National Indicative Target, law and legal environment, EU directives.

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