

METALLURGY AND RELATED TOPICS - SECTION "D"

Marketing and management in metallurgical and mining enterprises

1. E. Weiss, S. Majkuthová; *BERG Faculty Technical University of Košice, Košice, Slovakia*

Discounted Cash Flow (DCF) Assessment Method and its Use in Assessment of a Producer Company. The present day theory and practice of assessment of enterprises is characterized by the existence of many different methods of assessment. One of its reasons is that the requirements for assessing of enterprises have considerably changed during the recent years. At the same time, the advancement in the science on enterprises has led to development of new assessing concepts and methods.

2. J. Dvoracek, R. Sousedikova, L. Domaracka*; *HGF VSB Technical University of Ostrava, Ostrava, Slovakia, *BERG Faculty Technical University of Košice, Košice, Slovakia*

Industrial Enterprises Bankruptcy Forecasting. Contribution deals with problems of bankruptcy forecasting of industrial enterprises based on the analyses of capital circulation. The analyses are based on data of some tens of Czech republic enterprises fault in the bankruptcy.

3. Taušová, B. Stehlíková, Kršák; *Faculty BERG, Technical University of Košice, Košice, Slovakia*

The Financial Stability Evaluation from the View of the Liquidity Indicators in the Area of Heavy Industry. From the main view we aimed to the one area of financial analysis - analysis of the financial stability, that presents summ of individual indexes (indexes of profitability and liquidity), that evaluate firm from the view of the property and capital structure. We obtained datas for this analysis from the balance sheet and loss and profit statement from chosen mining firms. According indexes of liquidity we can state, that specifics of production process - level of finalization, using of technology, policy of supply and customer relationships and stock's managing are influencing paying ability of the mining firm. Holding the optimal level of cash means is pushing high demands to the operative financial management of the mining firm. By the way of chosen indexes using in area of financial analysis we evaluated chosen mining firms with similar technology of production.

4. D. Al-Zabidi, A. Al-Zabidi; *BERG Faculty Technical University of Košice, Košice, Slovak Republic*

Significance of the Financial and Marketing Controlling. In presented article we will deal with possibility to improve financial and economical management in chosen firm, mainly through controlling, during which we will lay emphasis to the financial and marketing controlling of the firm. The objective of the financial and marketing controlling is support successful business management, accept superior decisions, which lead to the efficiency and profitability of actual activity.

5. P. Fila, M. Balcar, L. Martínek ; *ŽDAS, a.s., Žďár nad Sázavou, Czech Republic*

Opinion of the Field of Incomplete Working Costs in Connection with some Technological Electric Steel Making Processes. Aim of the paper is to make the public familiar with results of the evaluation of the incomplete working costs at the ŽDAS, a. s. electric steel making plant. In the first part of the paper, the subject of the evaluation is the comparison of the costs when making stainless steels by EOP technology and EOP/LF/VOD technology. The second part of the paper deals with the comparison of the incomplete working costs when making special super clean steels for power engineering, as the production technology of this special steel has developed in the course of the last several years. Emphasized will also be the sphere of the incomplete working costs in connection with possibilities of very precision calculation points for single alloying elements. The paper was prepared within the EUREKA program of the E13192 ENSTEEL project, 1P04OE169 identification code in financial support of MŠMT of the Czech Republic.

6. P. Rybar, L. Domaracka; *Faculty BERG, Technical University of Košice, Košice, Slovakia*

Economical Conditions of Seabed Mining. Economical studies assumes annual exploitation of one prospector from 700 thousands ton to 3 millions ton from seabed deposit of polymetallic concretions, it means from 210 000 t to 900 000 t of manganese, or 8 400 t to 36 000 t of nickel. This parameters presents for manganese from 2 to 10 % of the present annual worldwide consumption and for nickel from 0,7 to 3 % of the consumption. Experts predicts that capital investments for polymetallic concretions exploitation would be between 542 to 700 USD.t⁻¹ and operational costs would be from 75 to 160 USD.t⁻¹. From these entries results that capital investments are moving in the interval 400 millions to several billions USD and annual operational costs from 50 to 500 millions USD in dependence of exploited quantity. In Interoceanmetal (IOM) were in the beginning of the ninties made technical and economical studies, but it is questionable if they satisfy requirements of expert study. We are sure, that Slovakia has to take in consider that the only alternative, how to gain ore raw materials is to exploited them from the seabed and the only alternative is IOM, so Slovakia has to have its own expert study.

7. L. Domaracka; *Faculty BERG, Technical University of Košice, Košice, Slovakia*

Interoceanmetal Organization and Seabed Mining. In the sixties of XX. Century, reputable observation organizations acknowledge occurrence of available mineral raw materials in the seabed. Information about quantity and chemical structure of polymetallic concretions leads to creation of American and west European air, armament and mineral oils corporations. E.g. Ocean Mining Associates - OMA, Ocean Management Inc. - OMI, Ocean Minerals Co. - OMCO and others. In the eastern Europe with given problematic was dealing program Intermorgeo, which activities in the year 1987 leads to the creation of the common organization Interoceanmetal (IOM) with the settlement in Polish Szczecin. Activities IOM is considered on future utilization of polymetallic concretions in the Pacific Ocean - Clarion-Clipperton area. In this area are concentrated activities of other pioneers investors, e.g. MMAJ-Japan, KORDI- South Korea, IFREMER-France, COMRA-China and Южморгеология- Russia. In the year 1994 was established International organ for seabed with its settlement on Jamaica and Slovak republic is its regular member.

8. E. Staniewska; *Faculty of Materials Processing Technology and Applied Physics Czestochowa University of Technology, Czestochowa, Poland*

The Logistics of the Strategic Materials Supply in the Metallurgical Enterprise. In conditions of market economy the supply has to achieve the new challenges because the quality and efficiency functioning in this area influences in a large degree on the all fields of enterprise activity

and its results. The supply issue and the cost reduction should be one of the basic elements of the enterprise strategy. In the article the purchase policy and supply aspects of logistics in strategic materials in the metallurgical enterprise were introduced.

9. J. Holisz-Burzyńska, E. Staniewska, R. Budzik; *Faculty of Materials Processing Technology and Applied Physics Czestochowa University of Technology, Czestochowa, Poland*

The Physical Flow of Materials and the Associated Costs in the Production Process of a Rolling Mill. An efficiency of resources use is, in a large extend, determined by the organization of production flow and the way of control them. The optimization of materials flow in the production process requires the identification of physical flows of goods and its costs. In the article the physical flow process of materials stream in the production process in one of Polish rolling mill and also its logistics analysis and cost analysis were presented.

10. C. Kolmasiak, Z. Skuza, Z. Wencel; *Faculty of Materials Processing Technology and Applied Physics Czestochowa University of Technology, Czestochowa, Poland*

The Quality of Exit Elements in the Production Process of a Selected Enterprise in the Metallurgical Branch. The transformations in the metallurgical branch cause continuous changes in a quality of a management system. The diversification of the basic requirements of ISO standard is one of the change directions. The objects of analysis are chosen exit elements of the production process in Polish and foreign iron foundries as well as the influence of rise of productive incompatibilities in studied foundries on management quality process.

11. S. Rešković; *Faculty of Metallurgy University of Zagreb, Sisak, Croatia*

The Development on Production Managemen - ISO 9000 2000 and Futher Steps. A quality system according to the requirements / guidelines in ISO series and total quality management are required to do business in the global world marketplace. For every nowadays company the ISO certificate presents an entrance ticket to the business world and opened market. By developing the quality system audit requirements, activities are extended to quality audit for all company business processes. In the paper deals with the main points of such a procedure which is to meet ISO Norm 900 requirements quality policy, organization and preventive maintenance process, documents, instructions, activities, plan, communications, data processing and stuff education. Here are shown some basic facts about two concepts on developing of planning and production management.

12. Z. Skuza, R. Prusak, R. Budzik; *Faculty of Materials Processing Technology and Applied Physics Czestochowa University of Technology, Czestochowa, Poland*

Restructuring of Metallurgical Industry in Aspect of Economics – System Changes and Integration with European Union. In this paper main elements of adjustment processes for metallurgical industry in system, social and economic aspects were presented. Besides issues bound with changes in national economic in aspects of integration with European Union were discussed. Results in this paper were based on analysis of polish metallurgical industry in 1991 - 2005.

13. P. Virdzek, K. Teplická; *BERG Faculty Technical University of Košice, Košice, Slovakia*

Progressive Methods in Design and their Application in Engineering Industry. The problem of a product's life cycle against R&D time has occurred due to changes in the behavior of customers. One possibility how to solve this problem is to use Information technologies and the concept of CIM (Computer Integrated Manufacturing) that considerably reduces R&D time, production time and the time to market. The CIM conception is based on the utilization of single modules (CAx systems) in the Design and Production planning area, manufacturing area (CAD/CAPP/CAM) and others, integrated together into one functional unit.

14. J. Král, J. Král jr.; *Technical University of Košice, Košice, Slovakia*

A Contribution to Selected Methods of Rapid Prototyping. The rapid prototyping method is very strong method to increase competitiveness on the market. The pressures of the competitive environment force the producers to bring new, more perfectly, nicer and cheaper products without delay on the market. The new modern techniques and technologies are expressively helpful to this products innovation process. Construction of 3D models in high-level CAD systems, exploitation of normed databases, activities automatization, CNC machining etc. are frequently used tools to swifter development of the new product. It is possible to produce a model in arbitrary development phase without using an expensive forms and tools through the use of rapid prototyping. The correct integration of all product development process and convenient incorporation of the RP technology to the cycle of evolution is important for utilizing of all advantages of rapid prototyping.

15. I. E. Uskova, T. A. Kasatkina; *Moscow State Steel and Alloys Institute (Technological University), Moscow, Russia*

Tactics of the Advance of Innovation-Oriented Scientific Developments to Market The "hyper-project" is a method to advance the innovation-oriented scientific developments to market. The realization of "hyper-project" requires the development of a large number of mutually complementing projects, including alternative ones, intended for the organizational and economical optimization of the "Science - Production" process. To increase the effectiveness of the scientific and technical activity within the framework of "hyper-projects", it is necessary first of all to determine the planned technical and economic parameters of the innovation product: the economic effect, the production volumes, and the profit margin by the progressive total over years.

16. R. Prusak, W. Waszkielewicz, A. Kulawik; *Faculty of Materials Processing Technology and Applied Physics Czestochowa University of Technology, Czestochowa, Poland*

Modifying and Improvement of Human Resource Management System in Metallurgical Enterprise. In this paper the example of methodic of proceeding in analysis and modification of human resource management system were presented. Besides results of research carried on analyzed question on the example of chosen unit of metallurgical enterprise were discussed.

17. A. Kulawik, R. Prusak, W. Wludyka; *Faculty of Materials Processing Technology and Applied Physics Czestochowa University of Technology, Czestochowa, Poland*

Interdependence of Live and Objectify Work Effectiveness and Their Influence on Results of Metallurgical Enterprise. In this paper the

example of procedure of life and objectify work effectiveness analysis in metallurgical enterprise were presented. Besides, on the example of chosen units of metallurgical enterprise, results of analysis - based on methodic proposed in the article - were discussed.

18. J. Spišák, I. Košťál, D. Dorčák; *Faculty of BERG, Institute of Production Process Control, Laboratory for Development and Implementation of Raw Materials Extraction and Processing, Technical University of Košice, Košice, Slovakia*

Facilities of Increase Productivity of the Process of Firing Magnesite Clinker in a Rotary Kiln. The main point of this contribution, it was to describe defects an actual condition of the process, facilities of increase productivity of the process in a rotary kiln for the firing magnesite clinker, in conditions the company SLOVMAG, a.s. Lubenik and to define their falls for the efficiency all productional process. The contribution originated as the outcome of the concrete teamwork from the company SLOVMAG, a.s., Lubenik and The Faculty BERG TU Košice, like the solution of the project which is scientific-technical no. 3002.

19. E. Floreková, M. Šima, M. Benková; *Faculty of BERG, Institute of Production Process Control, Technical University of Košice, Košice, Slovakia*

The Application of Statistical Quality Control in the Metallurgical Process. The speed of transition of material through the technological mechanism is critical for the technological process. Required value of speed is at stated interval, $T = \langle LTL; UTL \rangle$, T - Target value, LTL - Lower tolerance limit, UTL - Upper tolerance limit. Using a measurement there are obtained values of speed - x_i , which have been analysed from point of view of fluctuation (variation) in time (regulation diagrams of value and range) and normality (frequency and distribution of presence of recorded values). For comparing of real and required values the box and whisker plot has been prepared, capability indexes have been counted and the "overlaps" of confidence interval and tolerance interval for required value of speed have been compared.

Mineral engineering

20. T. Sasvári, J. Kondela; *BERG Faculty Technical University of Košice, Košice, Slovakia*

Demonstration of Alpine Structural Phenomena at Structure of Magnesite Deposit Jelšava - Dúbrava Massif. Magnesite deposits in the Central Western Carpathians belongs among biggest deposits in the Europe. Their today's structure is mainly result of the Alpine orogenesis. During this period several deformation stages were active, which deformed the deposit body. This resulted in today's complicated structure of the deposit. The genesis of deposit is still ambiguous; however, the importance of the Alpine orogen is clear at least form structural point of view. The presented individual deformation stages show multiple compressional and extensional phases. Identification of properties of individual structures directly helps by exploitation of individual parts of the deposit.

21. M. Krempaský; *BERG Faculty Technical University of Košice, Košice, Slovakia*

Application of Geostatistics at Modelling Mineral Raw Materials' Deposits. The utilizations of geostatistical methods for simulation of mineral raw material deposits have their substantiation especially by quantitative analysis. Some parameters are considerably exercise an influence at computed estimate values for blocks of resources. First of all, it is point density with known value of chemical composition. Insufficient sampling of area leads up to calculation of contemplated unreal values, which can be identified immediately by additional analyses of model. The geostatistics provides for depiction of resources distribution in deposit impartial estimate of average contents in blocks by fulfilled two conditions at the same time namely the average error of estimation is nought and the dispersion of estimation is minimal.

22. I. Leško, P. Flegner, B. Pandula; *Faculty of Mining, Ecology, Management and Geotechnology Technical University of Košice, Košice, Slovakia*

Application of Methods for Noise Analysis in Geotechnics. The contribution describes the technical and algorithmic solution of the identification of rotary drilling process. The article presents the first results of research on the utilization of acoustic methods in identification process by optimal control of rotary drilling.

23. I. Leško, P. Flegner; *Faculty of BERG, Institute of Production Process Control, Technical University of Košice, Košice, Slovakia*

Frequency Analysis with High Resolution by the Control of Rotary Drilling. The contribution describes the technical and algorithmic solution of the identification of rotary drilling process. The article presents the results of research on the utilization of acoustic methods in identification process by optimal control of rotary drilling. Is used special algorithm DFT ZOOM for frequency analysis of signal with high resolution. Fourier analysis is used in signal processing in much the same way as with one-dimensional signals. The present research is oriented toward deepening the knowledge about the properties of concurrent acoustic signal and toward the area of classification of drilled rock massif form the viewpoint of its geomechanical properties and corresponding rational mode of separation. The final goal of the research is to find the method of indirect measurement of the objective.

24. J. Futó; *Faculty of BERG, Institute of Production Process Control Technical University of Košice, Košice, Slovakia*

Monitoring and Optimisation of the Rock Disintegration on the Experimental Drilling Stand. The paper describes the results of research by aim to find relationships between optimal drilling and sound signal of drilling machine. The optimization criterion has been formulated as the minimization of specific energy with maximal effective speed of drilling in process of the rock disintegration. For measurement of acoustic signals have been used very sensitively sound meter Mediator 2238. From this measurement have been processed acoustic spectrums. New method based on these relationship enables the optimal control of drilling machine by using measured acoustic signals only. The optimizing the disintegration process, the thrust of the drilling tool, revolutions, drilling speed and disintegration power have been monitored. This paper analyses experiment results for disintegration process optimization with use of acoustic signal.

25. V. Sedlák, S. Mlčíková, V. Hurčíková, S. Bubnár; *Faculty BERG, Technical University of Košice, Košice, Slovakia*

Detection and Analyse of Vertical Movements on the Fill Slope Territory. From the science point of view the deformation measurements serve to an objective determination of movements and from the technical point of view the deformation measurements serve to a determination of the building technologies and the construction procedures. Determined movements by means of using the geodetic terrestrial or satellite

navigation technologies give information about displacements in concrete time information on the base of repeated geodetic measurements in the same concrete intervals. Level deformation investigation of the point of the monitoring station stabled in the fill slope territory Košická Nová Ves, i.e. part of city Košice (East Slovakia), is the main task of the presented paper. Level measurements are realized periodically since 2000 till 2005. The obtained results are consequently compared with the first deformation geodetic measurement realized in same territory in 1990.

26. M. Šimčák; *Faculty of Mining, Ecology, Process Control and Geotechnologies Technical University of Košice, Košice, Slovakia*
Using of GPS for GIS Application. Geodetic surveying today is a most precision and most perfect obtaining method of object's geometric properties. In geographic information systems is a GPS technology primary data collection using usual. Data from GPS apparatus are executed through appropriate software for GIS applications. Some GPS apparatus (e. g. Z-Max by Thales Navigation) are abilities of choosing of coordinate system (geographic, Cartesian system, as well as National Coordinate Systems) when GIS for special location creating.

27. M. Šimčák; *Faculty of Mining, Ecology, Process Control and Geotechnologies Technical University of Košice, Košice, Slovakia*
Remote Sensing for Creation of GIS. Remote sensing is a complete of applications to collecting of data about land surface, without direct physical contact with it. Remote sensing provides data collection of wide areas (lands, deserts, oceans, seas) in short time. In this approach of measuring, electromagnetic spectrum with different wave lengths is used. With these correction of electromagnetic spectrum is possible to data obtaining, (river, glaciers, forests), to data bases and applications execute. Data obtained through remote sensing is executed with special software to GIS applications, for consecutive building and analysis.

28. Ž. Kuzevičová, E. Šaršaňová, I. Kaduková; *Faculty of Mining, Ecology, Process Control and Geotechnologies Technical University of Košice, Košice, Slovakia*

Using Methods of Geostatistics in Geographic Information Systems. The field of geostatistics was created in the early sixties of the 20th century by Matheron. Geostatistics was first applied to research on mines, then in the fields such as Hydrogeology, Environmental Science and it is one of the methods applying interpolation in GIS. It is an application of the theory of random functions to the estimation of natural phenomena. The estimation of properties at unobservable location is called interpolation. Interpolation is one of the familiar functions of GIS.

29. L. Kočíková; *Faculty of Mining, Ecology, Process Control and Geotechnologies Technical University of Košice, Košice, Slovakia*
Possibilities of Using GIS Tools in the Evaluation of Ground Water Sources in Hornád Basin. Hornád Basin is the significant unit in basic geology of Slovakia. The first step in evaluation is creating complex database of exploration drills of this location. After database was build, GIS give us many different methods for analyses and modeling ground water. The GIS has tools for creating thematic maps as e results of analyses. These thematic maps can be used for making decisions and resolution.

Energy sources

30. A. J. Dreus, A. Povrzanović*, O. O. Kochubey; *Dnepropetrovsk National University, Dnepropetrovsk, Ukraine, *Faculty of Mechanical Engineering and Naval Architecture University of Zagreb, Zagreb, Croatia*

Review of Perspective Technologies in Power Engineering. Work is devoted to the analysis developments of global power industry. Experience of use of alternative ways development of energy, and also nuclear and hydrogen power was analyzed. The special attention is given to technical equipment and technologies Helios, Geo, wind power, and other alternative ways. Mathematical models physics process in such technologies are developed. The carried out calculations can be used for an estimation of efficiency this methods for energy.

31. Y. O. Gitcho, D. S. Adamenko; *National Metallurgical Academy of Ukraine, Dnepropetrovsk, Ukraine* **Development of Arrangements and Exploration, Connected with Increasing of Heat Supply System Effectiveness of the Industrial Enterprises.**

On an example of tyre manufacturing the technical solutions and results of exploration on increasing of heat supply system effectiveness are given. In particular, using of steam overpressure at industrial boiler for galling the electric power is offered. The utilization of heat of steam condensate completing in technology of a vulcanization of tyres for technological and communal-general needs is offered also. The efficiency of arrangements proves to be true by design-theoretical explorations, which are fixed in a base of design solutions.

32. A. J. Dreus, I. Mamuzić*, O. O. Kochubey, O. A. Ryadno, V. O. Syasev; *Dnepropetrovsk National University, Dnepropetrovsk, Ukraine, *Faculty of Metallurgy University of Zagreb, Sisak, Croatia*

The Technical and Economic Analysis of Efficiency of Alternative Fuels in the Industry. Now the problem of use of alternative sorts of fuel in the industry is very important. We have offered procedures of calculation the technological, economic and ecological parameters of process combustion such fuels. The comparative analysis of efficiency application of alternative and traditional energy sources in the world industry and Ukraine is executed. Results of research of use bio gas, blast furnace gas, straw and other alternative fuel are present.

33. Š. Kuzevič; *Faculty of Mining, Ecology, Process Control and Geotechnologies Technical University of Košice, Košice, Slovakia*

Life Cycle Assessment of Geothermal Well for Hot Water Production. Since the study is concerned with a geothermal energy system, attention has been focused on the energy index and the energy consumption. The reliability of life cycle assessment is depends on complete data, that are not always available. The ISO 14 040 norm recommends the investigating of those parameters, that could influence the final environmental profile. Regarding of data quality, life cycle assessment studies should include time related coverage, geographical coverage, technology coverage; precision, completeness and representativeness of data consistency and reproducibility of methods used throughout the life cycle assessment, sources of the data and their representativeness to eliminate the uncertainty of the information.

34. Š. Kuzevič; *Faculty of Mining, Ecology, Process Control and Geotechnologies Technical University of Košice, Košice, Slovakia*
An Integrated Data-Acquisition System for Monitoring of Geothermal Energy Systems. The proposed system consists of a set of a twenty sensors for measuring of thermal and electrical parameters. The collected data are first conditioned using electronic circuits and then interfaced to a PC using a RS-232 serial interface. The acquisition program is used to further process, display and store the collected data in the PC disk or

system flash disk. The proposed architecture enables the rapid system development and has the advantage of flexibility in the case of changes, while it can be easily extended for controlling the renewable energy source system operation. A data-acquisition system is used for monitoring the performance of geothermal water pressure, water flow capacity, water-pumping input-output systems, output temperature and injection system temperature. The A/D converter interfaced to a microcontroller-based unit records a set of sensor signals, while the collected data are stored in a local EPROM. The data collected by the microcontroller are transmitted to a PC, through a RS-232 serial connection, where they are stored for further processing. The acquisition software was developed specifically for this application, in order to process and display the collected data on the PC.

35. Š. Kuzevič, Ž. Kuzevičová; *Faculty of Mining, Ecology, Process Control and Geotechnologies, Technical University of Košice, Košice, Slovakia*

Potential of Geothermal Energy Improvement in Slovakia. Geothermal energy is a significant as local energy source and its potential in Slovakia is estimated at 5538 MW. Slovakia has very good conditions for exploitation this kind of renewable energy, 25 regional parts of Slovakia with geothermal sources is identified now. Only 5,4 % of identified technically usable potential is using as a thermal energy, especially for buildings heating. In this contribution, the development of a geographically based system for a geothermal energy improvement in Slovak republic is described.

36. R. Rybar, D. Kudelas, L. Grega; *BERG Faculty Technical University of Košice, Košice, Slovakia*

Solar System Energy Gain Analysis and its Influence on Absorber's Surface Area Dimensioning. Important condition for energy gain leveled of solar system is orientation of absorber surface. An absorber does not necessarily have to be oriented exactly to the south in order to serve as a mounting surface for solar collectors. Variations from southern orientation of up to 30° lead to only low losses. A collector's slope can even be between 30° and 75°, whereby a solar heating system with less slope has a higher energy yield in summer, and one with more slope has a higher energy yield in winter. In the solar systems dimensioning processes necessary to know the system thermal balance for real running condition. The results of system thermal made in more alternatives signify basic condition for optimal dimension decision.

37. R. Rybar, E. Vegsoöva; *BERG Faculty, TU Košice, Košice, Slovakia*

Possibility Analysis of the Solar Collectors Installation for the Hot Service Water Preparation System on the Balcony Railings of Block Flats, type K-L.04.18-D2. The energy of the sun can serve for many purposes. One of them is to generate heat. Using solar collectors the sunlight is directly converted into heat. The use of solar heat has many advantages. In this paper we give the situations in which the collectors are assembled on the balcony railings of urban built-up area of bloc's flats as an advantageous choice for renewable energy on large-scale implementations.

38. D. Kudelas, R. Rybar, G. Fisher; *BERG Faculty Technical University of Košice, Košice, Slovakia*

Concept of Accumulation System Configuration Enabling the Usage of Low-Potential Wind Energy for Supply of Peak Electric Energy. The construction concept will allow gaining the maximum value of aerodynamic effectiveness in a wide range of service conditions. In this way conceived wind aggregate will enable capturing the low-potential wind energy and its transformation and accumulation into electric energy usable as peak energy by the means of energetic converters with capacitance accumulation. Part of the solution is also a configuration concept of objective wind energetic unit with non-electric accumulation with trend to the possibility of a wide usage in the energetic network structures.

39. D. Kudelas, R. Rybár; *Faculty BERG, Technical University of Košice, Košice, Slovakia*

Wind Pneumatic Accumulation Storage System. Renewable energy sources cover 3,27 % Slovakia energy consumption recently. Slovakia as inland country dispose essentially with lower wind energy potential in compare with western European countries, determined by natural conditions. For all that was developed wind pneumatic accumulation storage system. As the aim we have chosen to design a stable standpoint with sufficient storage tank of wind energy, possibly with storage tank of compressed air. Wind energy serves as the primary resource, when it powers the compressor, which fills the pneumatic accumulator (storage tank of compressed air). The compressed air is in the time of peak endurance consumed from the pneumatic accumulators for the work of pneumatic engine, which powers the generator and the produced electric energy is being supplied to the public network.

40. D. Kudelas, R. Rybár, G. Fischer*; *Faculty BERG, Technical University of Košice, Košice, Slovakia*

Concept of Wind Energy Pneumatic Accumulation System. The construction concept will allow to gain the maximum value of aerodynamic effectiveness in a wide range of service conditions. In this way conceived wind aggregate will enable capturing the low-potential wind energy and its transformation and accumulation into electric energy usable as peak energy by the means of energetic converters with capacitance accumulation. Part of the solution is also a configuration concept of objective wind energetic unit with non-electric accumulation with trend to the possibility of a wide usage in the energetic network structures.

41. D. Kudelas, R. Rybár; *Faculty BERG, Technical University of Košice, Košice, Slovakia*

Wind Potential Evaluation for Pneumatic Accumulation Storage System. In process of location wind analysis was used data gained from precise measurement using metrological anemometers in Košice – airport (205 altitude) in height of 13,7 meters during five years. Following analysis of obtained data it is suitable, for dimensioning of proposed device, wind speed interval 4 - 5 m·s⁻¹. Hourly wind speed appearance frequency 4 m·s⁻¹ and higher presents approximately 32 %. By utilizing of suitable wind motor type (savonius, resp. more blades rotor), it will be possible catch relevant flow fraction, which is with standard wind devices unavailable.

42. D. Kudelas, R. Rybár; *Faculty BERG, Technical University of Košice, Košice, Slovakia*

Losses in Wind Pneumatic Accumulation Storage System Utilization. The construction concept will allow gaining the maximum value of aerodynamic effectiveness in a wide range of service conditions. In this way conceived wind aggregate will enable capturing the low-potential wind energy and its transformation and accumulation into electric energy usable as peak energy by the means of energetic converters with capacitance accumulation. Part of the solution is also a configuration concept of objective wind energetic unit with non-electric accumulation with trend to the possibility of a wide usage in the energetic network structures. In process of all energetic transformations appear losses. It is

extra visible in pneumatic accumulation. After losses analysis, ambitions for increase efficiency of whole unit result in choice of other working medium in energetic process conversion.

43. D. Kudelas, R. Rybár; *Faculty BERG, Technical University of Košice, Košice, Slovakia*

Wind Pneumatic Accumulation Storage System Innovation. By building up of laboratorial model was gained conditions for realization operation experiments, with aim gaining data for appointing operation – technical characteristic and relevant parameter definition, needed for evaluation and dimension of proposed devices. In increasing of conversion process it can be perspective compensate air as a working medium for liquid (water), which is able use energy momentum effectively to suitable dimensioned turbine blades. Other suitable solution could be jump electro generation part and operate it in parallel mode with heat electro unit, as supplying pressed air for gaseous, solid, liquid fuel burning.

44. R. Rybár, D. Kudelas; *BERG Faculty Technical University of Košice, Košice, Slovakia*

Impact of Wind Speed Measurement Methodology to the Wind Devices Utilization Affectivity. Precision measurement of wind speeds, and thus wind energy is not nearly as important for weather forecasting as it is for wind energy planning. Meteorological anemometers are not usable for wind speed measurement in the wind energy industry, since they may be very inaccurate and calibrated poorly, with measurement errors of maybe 5 % or even 10 %. The best way of measuring wind speeds at a prospective wind turbine site is to fit an anemometer to the top of a mast which has the same height as the expected hub height of the wind turbine to be used. This way one avoids the uncertainly involved in recalculating the wind speeds to a different height.

45. R. Rybár, D. Kudelas; *BERG Faculty Technical University of Košice, Košice, Slovakia*

Biomass Utilization Possibilities for Public Edifice Heating. Biomass heating systems consist of a number of elements, including a heating plant, which typically includes an automated biomass combustion system and a peak load and back-up oil-fired heating system, heat distribution system, and a wood fuel supply operation. The appropriate choice usually depends on the heating load, the money available to invest in a biomass plant, and the financial viability of the specific option. Result of heating system conversion is to economize of power costs and to contribute in energy sources conversion in renewable energies trend.

46. K. Munnich, Ž. Kuzevičová; *Faculty of Mining, Ecology, Process Control and Geotechnologies, Technical University of Košice, Košice, Slovakia*

Potential of Biomass Improvement in Slovakia. Biomass is a renewable energy resource derived from the carbonaceous waste of various human and natural activities. It is derived from numerous sources, including the by-products from the timber industry, agricultural crops, raw material from the forest, major parts of household waste and wood. Exploitation of renewable energy is only 2,6 % from whole usage of primary sources of energy now. A lot of sources of renewable energy remain idle. Biomass is the source with the most potential from all renewable sources.

47. E. Vegšöova; *BERG Faculty, TU Košice, Košice, Slovakia*

Delius Pavilion Heating System. In this paper we give the results of Delius pavilion heating system conversion. The conversion should economize power costs and contributes to energy resources. The conversion is renewable energy trend.

48. R. Rybar, E. Vegšöova; *BERG Faculty, TU Košice, Košice, Slovakia*

Suggestion on the Heating System Restructuring for Pavilion Delius. Biomass heating systems consist of a number of elements including a heating plant with a typical automated biomass combustion system which is at peak load backed-up by oil-fired heating system, heat distribution system, and a wood fuel supply operation.

49. E. Štroffek, P. Peterka, J. Krešák, S. Kropuch; *BERG Faculty Technical University of Košice, Košice, Slovakia*

Diagnostics of Pipelines System. Underground gas storage in Slovakia has a 25 years history. The first phase of building, the object for underground reservoir Láb began in 1977. The underground reservoir is separated into five independent parts, phases of building. All parts are concentrated in central control area. The oldest part of equipment for underground reservoir needs overhaul and maintenance today. The maintenance process uncovers a lot of problems that were created through building process. The great problems are uncovered in the area of pipeline system diagnostics. In the past, maintenance operators faced difficult decisions, to choose the best method or combination of methods to evaluate pipeline condition.

50. N. V. Selezneva, V. B. Veselovskiy, I. Mamuzić*, V. O. Syasev; *Dnepropetrovsk National University, Dnepropetrovsk, Ukraine, *Faculty of Metallurgy University of Zagreb, Sisak, Croatia*

Mathematical Model Operation of Formation and Fracture of Sedimentation on Devices of Constructions. Sedimentation on devices of constructions and electric mains of glazed frost, sleet with subsequent it freeze-in is one of the heaviest and the natural factors, reducing to breaks in electro supply, to losses of the material and financial assets. The analysis and classification of requirements of icing are carried out depending on climatic actions (pressure, temperature, a velocity of a wind, etc.). It was designed procedure of icing and melting on a joint solution of systems of the ordinary differential equations which feature a temperature field in constructions and physical requirements of interaction with a surrounding medium. The obtained approximate analytical solutions for concrete examples are compared with known theoretical and experimental datas.

Environment pollution

51. V. G. Zajtsev, V. L. Koporulin*; *Dnepropetrovsk National University, Dnepropetrovsk, Ukraine, *National Metallurgical Academy of Ukraine, Dnepropetrovsk, Ukraine*

Optimal Control in Problems Environmental Contaminations. The work is devoted to the accounting of many effects and the phenomena necessity of the formulation of an initial problem as a variation inequality that allows taking into account them already at a stage of statement of a problem is represented important. In work the problem of optimal control by some ecological process with free boundary when it is required

to operate the concentration of environmental contamination caused by a dot source of pollution of intensity $q(t)$ is considered. As managing influence it is possible to consider neutralizer of concentration of pollution. The algorithm of the numerical decision of a problem of optimum control for process of the environmental contamination described nonlinear by the parabolic equation with free boundary is offered. The numerical example of the decision of a problem is resulted.

52. V. G. Zajtsev; *Dnepropetrovsk National University, Dnepropetrovsk, Ukraine*

Optimal Control by Process with Free Boundary. In article the problem of optimal control by some ecological process with free boundary when it is required to operate the concentration of environmental contamination caused by a dot source of pollution is considered. As managing influence it is possible to consider neutralizer of concentration of pollution. Thus, the limited absorbing ability of environment is taken into account, and the opportunity of change of it can be caused only by internal influence. In work the constructive approach to the numerical decision of problems of optimal control for nonlinear the parabolic equations with the free boundary. It may be reduced to sequence of the decision of point-to-point nonlinear regional problems for direct process and sequence of linear regional problems for the connected system is offered. The numerical analysis of a modeling example shows serviceability of the specified approach.

53. T. K. Chakravarty; *Steel Authority of India Limited, India*

Corporate Responsibility for Environmental Protection (Crep) - Sail's Initiative. My Company, namely Steel Authority of India Limited, has a slogan "there is a bit of steel in everybody's life". Accordingly, the Ministry of Environment and Forest (MOEF), Government of India has taken the initiative to make the more polluting industries adopt voluntary measures to go "beyond environmental standards". SAIL, the state owned enterprise and representing 30 % of India's steel output, has reciprocated the Government's initiative under the Charter of "Corporate Responsibility for Environment Protection (CREP)". Within the framework of CREP Charter, SAIL has prepared a road map for progressive improvement of its environmental performance which is in tune with the SAIL Corporate Plan for business development till 2012. The road map envisages introduction of Clean Technologies in Mining, Coking Coal, Sintering Blast Furnace Operation, Steel Making and Shaping besides energy conservation. Water and Waste Recycling and reduction in the generation of Green House Gases. The hall mark of CREP Charter is an effective Environment Management System (EMS) linked to ISO - 14001.

54. M. Leško, M. Búgel, A. Pietriková*, T. Bakalár; *Faculty of Mining, Ecology and Geotechnology Technical University of Košice, Košice, Slovakia, *Faculty of Electrical Engineering and Informatics Technical University of Košice, Košice, Slovakia*

Serpentine Waste Milling. Serpentine heaps in the surroundings of Dobšina are a long-life ecological problem of the city and at the same time a suitable raw material for production of $MgCl_2$ and SiO_2 . In the technological scheme of chemical processing the milling operation it has an important role. In this context the milling rate is an important parameter for creation of the technological scheme and suggestion of industrial equipment.

55. J. Dvořáček, V. Vodzinsky*, L. Domaracká*; *Faculty of Mining and Geology VSB-Technical University of Ostrava, Ostrava, Czech Republic, *BERG Faculty Technical University of Košice, Košice, Slovakia*

Industrial Wastes and Economics of their Utilization. The contribution deals with the utilization of industrial wastes, especially from mining and metallurgical enterprises. The wastes are being processed into the form of hydraulic non-washable stowing which can be deposited in the closed underground mines. The economic aspects of this activity which compete with depositing of non-processed industrial wastes on surface stockyards are considered here.

56. M. Benková, L. Floreková, D. Bednárová, G. Bogdanovská, A. Mojžišová, B. Stehlíková; *Faculty of BERG, Institute of Production Process Control Technical University of Košice, Slovakia Košice*

DBS Technogenous Wastes for Utilization Purposes. In case of the non-ability of treating antropogenetic waste as secondary raw material, which passed the technological processes there is ability of saving the environment with other approaches e.g.: grass-covering, forestation, sprawling out, etc. For these complementary reasons is necessary uniform approach, for which starting point is the consistent database system, which integrates all necessary (known) parameters from monitoring area. Entity relation model on zero level presents conceptual project (KEGA 3/3125/05). The basic entities are: place, cadastral area, extent, geological background, previous and actual owner, type of dumping ground, the date of begin and the end of the life cycle, capacity, method of measurement/monitoring, physically-chemical compound, content of useful components, possible treatment technology, expect utilization after treatment.

57. D. Constantinescu; *University Politehnica of Bucharest, Bucharest, Romania*

Analyze of the Eco-Metallurgical Systems using the Neural Networks. In order to analyze some aspects related to complex relations between a *metallurgical system* and the environment, the paper starts from an idea regarding the possibilities of practical applications of the *neural networks*. These results are added, resulting in a value that is delivered to the given next "neuron" belonging to the environmental system. By its turn, the state or activation value of this neuron is calculated by the application of a threshold function to its input value, resulting in the final value. This threshold function is frequently nonlinear and must be chosen critically, as the performance of the neural network heavily depends on it. As to all the neural system, also in the considered example it is necessary a "training step". During the training step, input and output data are continuously presented to the network. The difference between real and calculated results must be processed through a mathematical procedure, which adjusts the values in order to minimize the error. The proposed model has in view a possible application in the case of some metallurgical technological lines.

58. A. Csikósová, M. Antošová; *BERG Faculty Technical University of Košice, Košice, Slovak Republic*

Economical Evaluation of the Living Environment Pollution in Magnesite Firm. In presented paper there is analysed magnesite firm with its influence on the living environment due to the air pollution, water pollution and soil pollution. Analysed by Slovak Republic firm is producer of clinker and magnesite products with export to some big countries of the world. It is profitable firm with profit achievement during following period. But it must pay considerable fees for pollution of the living environment and therefore it must accept several measurements for improving of ecological behaviour of the firm.

59. L. Kočíková; *Faculty of Mining, Ecology, Process Control and Geotechnologies Technical University of Košice, Košice, Slovakia*

Protection of Ground Water Sources as a Part of Environmental Protection. Development of human activities (industry, traffic) and their impact to environment had big power for creating scientific disciplines, which task is environmental protection of all parts of life environment. In consequence of many collisions the methods of protection and reconstruction ground water are incessant make perfect. It is important to pay attention for protect ground water, mineral and thermal water and to suggest objectively redevelopment steps. The GIS tool can be big contribution for all that.

60. M. Rybárová, J. Koščo*, M. Gálisová;** *Faculty of Electro and Informatics, Technical university of Košice, Slovakia, *Faculty BERG, Technical University of Košice, Košice, Slovakia, **Ingeo Banská Bystrica, Slovakia*

Application of Zeolite - Ultimate Stage at Decontamination of Water. In Rimavska Sobota casern (East Slovakia) is decontamited ground water polluted during residence of soviet army on territory of Czechoslovakia in the second half of XX century. Decontamination is executed at installation which consists of gravitational - sorptive element, aeration tower and flow filter char-coal filtre media. In the second leg of installation, there was applied crushed zeolite, instead of char-coal filter media. Analyses showed that sorptive ability of zeolite refill of the filter is very high, but the zeolite becomes saturated after three days. For this reason zeolite has to be refill each second, third day respectively. But the same period of altering the filtration refill is realized in a case of char-coal too.

61. M. Rybárová, L. Hvizdák*; *Faculty of Electro and Informatics, Technical University Košice, Košice, Slovakia, *Faculty BERG, Technical University Košice, Košice, Slovakia*

Improvement of the Quality of Air in a Dressing-Room of Slovmag Lubenik Mine (East Slovakia). There were carried out several observations of efficiency of the product Hydrosafe on improvement of the environment in cloak-room of miners. The product Hydrosafe is made on a base of crushing zeolite. Efficiency was detected by special instrument which measure volatile organic substances (VOC - Volatile Organic Compounds) been present at air. Conditions measurement were as follows: measurement length 7 days (March 2005), number of measured data: 10 019, place of measurement: hall (10 × 25 m), dry dusty environs, strong smell from boiler suits, temperature of the air: 22,3 - 24,9 °C, specific humidity: 22 - 30 %, dew-point: - 1,5 - 6 °C. Measurements showed efficiency of the zeolite product in time of the testing in an improvement of quality of air in a dressing-room of miners. Measurements were repeated few times with similar results.

62. L. Kozáková, Š. Kuzevič, Ž. Kuzevičová; *Faculty of Mining, Ecology, Process Control and Geotechnologies, Technical University of Košice, Košice, Slovakia*

Using Geographic Information Systems for Environmental Analyses. The air pollution belongs today between most important problems in the wide cities. Increase population, industry and traffic at the small place are cause for growing occurrence air pollution. One reason of the worse health of the population in the cities is an air pollution analysis. For all that reason we must know to describing and modeling behavior of pollution in the air. GIS provides many different tools for modeling and analyses and contains tools for programming special applications. In this contribution we describe the method of air pollution mapping and quantitative analysis of second greatest city of Slovakia – Košice. Geographic information system based on air pollution analysis is of urban built-up area is a effective tool for many similar application in local, regional and wide area analysis with specific parameters.

63. J. Hvizdakova; *Faculty BERG, Technical University of Košice, Košice, Slovakia*

Silicosis in Humel Gallery. Locality Humel is situated NW direction from Nizny Medzev burg close to Kosice, East Slovakia. Geological survey was executed by East Slovak ore survey, Slovak state company, Spisska Nova Ves since 1951. The commission of experts met in Bratislava in the year 1956 and found troublesome state of health of miners working in exploratory gallery Humel. There was detected rapid form of silicosis after four years of work in gallery, which normally occurs ten - fifteen years after underground works in dusty environment. Detection of potential causality of aggressive type of silicosis pointed on special quality of quartz present in a deposit, presence of radon, unsuitable work conditions of miners in Humel gallery and very bed social style of miners.

Heat transfer

64. K. Kostúr, J. Kačur; *Faculty of BERG Institute of Production Process Control Technical University of Košice, Košice, Slovakia*

Intelligent System of Indirect Temperature Measurement. Paper presents system of the indirect measurement based on the first way. The problem was solved by design of the mathematical models for solution of the temperature field basically of the measured surface teapeatures and model that rise from direct and indirect measured heat flows. The intelligent system consists from following modules: module for direct measurement of the surface temperatures by pyrometer, module for calculating of the heat flows, module for correction of thermophysical parameters (function of the temperature), module for estimate of emissivity. Designed system was verified in laboratory conditions on model of the steel roll. Paper presents some results from solution of the project "Intelligent System of Indirect Temperature Measurement".

65. K. Kostúr, M. Durdán; *Faculty of BERG, Institute of Production Process Control, Technical University of Košice, Košice, Slovakia*

Indirect Measurement of Temperatures in Steel Rooll. The temperature of the heat-treated products is main value which determinate their quality and energy consumption. Interest in quality of annealing of steel rolls is needed to know the temperature inside of object, where the temperatures are lowest during annealing. Recently in the world this temperature can not be measured in the real conditions and time of annealing is set up empirically. In the paper we describe a practice for indirect estimating of inner temperature array of steel roll that rise from indirect measuremnt of thermal flows. For this reason it was designed and experimental verified method of indirect measurement of thermal flows, that rise from direct measured temperatures of the roll and hood. By using of this method the level of precision of indirect measurement is adequate in precision of engineering measurement.

66. M. Laciak, K. Kostúr; *Faculty of BERG Institute of Production Process Control Technical University of Košice, Košice, Slovakia*

The Estimate of the Temperature Conductivity in the System of Indirect Measurement. The temperature conductivity is one of the inputs

in the system of indirect temperature measurement. This parameter depends on the temperature and type of the charge. The accuracy of complete system depends on exactly estimate of this parameter. Procedure for estimate of the temperature conductivity is based on optimization method - iterative dynamic programming (IDP). The material was heat in laboratory electric furnace. The temperature was measured directly by thermocouples. The system of indirect temperature measurement calculates temperatures indirect. The setting of thermo-physical properties was realized by means of minimization of deviation between direct and indirect measured temperature in the iteration loop of the method continual in time. From the view of the optimization the optimization vector is compose by values of the temperature conductivity at the different temperatures.

67. M. Pástor, K. Kostúr, M. Truchlý; *Faculty of BERG, Institute of Production Process Control, Technical University of Košice, Košice, Slovakia*

The Indirect Measurement of Heat Flows. Design of specific control systems is important for reduction of an energetic consumption of very energy demanding technologies and for quality increasing of produced articles. More on this base working control systems (by thermal working aggregates – furnaces and heat exchangers, a.o.) outgoing only from direct and indirect temperature measurement. The effective control systems required (e.g. for effectiveness thermal determination) specific heating flows meter. On the market is absence of respectable sensors for this control area, therefore this contribution proceeded with problematic of the heating flows meter proposal and the verification of two principles (conducting and calorimetric) for various heat systems and materials.

68. M. Truchlý, K. Kostúr; *Faculty of BERG, Institute of Production Process Control, Technical University of Košice, Košice, Slovakia,*

The Method for Estimation of the Specific Heat Capacity of Materials. The estimation of the thermo – physical properties of various materials is necessary for the correct modelling of the processes like heating, cooling, etc. The specific heat capacity of the materials belongs to this group. Previous research in the area of the thermal processes modeling shows, that it's very important to know the dependency of this parameter on temperature with required accuracy. This paper describes the method for measurement of the specific heat capacity of materials based on direct measurement of the temperatures of the material and surrounding zones in the furnace. The estimation of the specific heat capacity goes out from energy balance equation. For the calculation of the heat flow was used the elementary balance method (MEB).

69. E. K. Bevza, O. O. Kochubey, I. Mamuzić*, D. V. Yevdokymov; *Dnepropetrovsk National University, Dnepropetrovsk, Ukraine, *Faculty of Metallurgy University of Zagreb, Sisak, Croatia*

Numerical Calculation of Radiation Heating in Vacuum. The material properties are assumed constant and the problem is formulated as linear heat condition problem inside the body with radiation boundary condition on the outer boundary. The boundary element method is used as a tool of numerical calculations. The initial boundary-value problem was transformed into a nonlinear boundary integral equation. To overcome a non-linearity effect an iteration procedure is applied an every time step. Starting of the body melting requires an introduction a new internal moving boundary for describing of phase transition. The proposed approach is illustrated by several examples of numerical calculations.

70. D. M. Ivasishyna, O. O. Kochubey, I. Mamuzić*, D. V. Yevdokymov; *Dnepropetrovsk National University, Dnepropetrovsk, Ukraine, *Faculty of Metallurgy University of Zagreb, Sisak, Croatia*

Asymptotic Analysis of Heat Conduction in Thin Layers. Thin layers are widespread in different equipment and technologies as protective coatings, separating layers, adhesive joints, and gaskets and so on. It is extremely difficult to apply conventional numerical methods (finite difference and finite element) for calculation of thermal fluxes in thin layer, due to its small thickness. As a result, it is managed to show that the temperature distribution across the layer is described by second order ordinary differential equation (zero approximation), which is easy for analytical solution. The terms, corresponding to time derivatives and longitudinal heat conduction, have next smallness order. The proposed asymptotic model is illustrated by several examples of calculations.

71. V. V. Veselovskiy, I. Mamuzić*, V. O. Syasev, V. B. Veselovskiy; *Dnepropetrovsk National University, Dnepropetrovsk, Ukraine, *Faculty of Metallurgy University of Zagreb, Sisak, Croatia*

Contact Thermal Resistance in Management of Thermal Modes. Three models of contact thermal resistance for managerial processes by thermal conditions of metallurgical manufacture are submitted. The first model is submitted by a system of the parabolic equations. The second model is featured by the system of the hyperbolic equations including a relaxation time, and is characteristic for high-intensity, impulse thermal actions. The third model includes association a state of a material from change of thermo mechanical magnitudes: a thermal stream and an internal energy. The model is featured the integro-differential equations. The relaxation time of an internal energy and function of a relaxation, except for a relaxation time of a thermal stream are included. Methods and modes of control of thermal conditions with used of contact thermal resistance was shown.

72. T. M. Bosenko, J. A. Brusjanina, K. V. Gorelova, V. B. Veselovskiy, O. O. Kochubey, I. Mamuzić*; *Dnepropetrovsk National University, Dnepropetrovsk, Ukraine, *Faculty of Metallurgy University of Zagreb, Sisak, Croatia*

Mathematical Model Operation of Heat Exchange in View of Thermal Storage. Recently it is intensively explored and in some cases the effect of storage of the shape in metals is successfully implanted in technique. These problems are actual for high-temperature technological processes, the reference for power engineering. The solution of a problem is obtained by an operating method with use of an integrated Laplace transformation on a temporal variable. Parametric examinations of a problem of calculation of temperature fields for a unlimited plate with thermal storage are carried out at various aspects of thermal action. Reliability of outcomes proves to be true comparison of operating and numerical methods.

73. T. M. Bosenko, E. I. Voronetskaja, M. N. Groz, E. I. Nesterenko, V. B. Veselovsky, I. Mamuzić*, V.O. Syasev; *Dnepropetrovsk National University, Dnepropetrovsk, Ukraine, *Faculty of Metallurgy University of Zagreb, Sisak, Croatia*

Mathematical Modeling and Research of Heat Exchange at the Heatstroke. Problem of study of regularities of development of spatial non-stationary temperature fields in skew fields of the various geometrical form in view of a final velocity of distribution of heat, research of high-intensity thermal processes as thermal explosion, laser handling of materials, etc., are connected to a solution of a hyperbolic differential heat conduction equation with various boundary conditions. Mathematical models of processes of high-intensity heat exchange are constructed

on the basis of an unlimited plate at various combinations of boundary conditions and two entry conditions. Solutions of a task are obtained by a method of Fourier, operational and numerical methods which comparison confirms reliability of outcomes. Regularities of distribution of temperatures from an aspect and duration of thermal actions, time of a relaxation of a thermal stream are established

74. V. V. Belyaeva, V. B. Veselovskiy, N. Devčić*; *Dnepropetrovsk National University, Dnepropetrovsk, Ukraine, *Sisak, Croatia*

The Calculation of Metallurgical Equipment Heatproof Elements. Heat transfer calculations of metallurgical equipment heatproof coverings needs heat resistance accounting of contact surfaces in the case of discrete contact. This report represents the solutions of unsteady heat conduction problem with unified external boundary conditions and non-ideal heat contact conditions for metallurgical equipment heatproof coverings. Calculating inverse heat conduction problems which are necessary to find the boundary conditions of heat transfer using the experimental data of temperature measuring the regularization method and orthogonal Chebishev polynomials were used. The results of numerical experiments which were carried out to find boundary conditions in the different regions of heat oven are presented.

75. A. V. Berlov, V. B. Veselovskiy, A. Povrzanović*; *Dnepropetrovsk National University, Dnepropetrovsk, Ukraine, *Faculty of Mechanical Engineering and Naval Architecture University of Zagreb, Zagreb, Croatia*

The Mathematical Simulation of Heat Regimes of Combine Heatproof Constructions. This report represents the systematical analyses of different physical fields influence on the construction elements. The unified dependences representing the heat impact effects were obtained. It is proposed to account the heat impact effect as a heat source in the heat conduction equation. The models for temperature field calculation in the case of the multilayer flat bodies system with unified external and internal boundary conditions under the different physical fields influence are presented. The structural solution of the problems considered was obtained using the operational method. This solution is the sum of simple structure solutions the number of which depends on the influence components. The parameter investigations of the combine metallurgical equipment heat isolation were carried out.

Science on materials

76. Z. Wencel, R. Budzik, C. Kolmasiak; *Faculty of Materials Processing Technology and Applied Physics Czestochowa University of Technology, Czestochowa, Poland*

Synergy of Surface Layer Phases as a Quality Operating Parameter. In the paper the results of the investigation on surface layer of carbonized X150CrMoV12-1 tool steel have been presented. Abrasive wearing of the surface was determined by the ASTM G77-98 method. The microstructure of the matrix and distribution of carbides have been observed using a Scanning Electron Microscope. A correlation between the investigated parameters (structure/carbides distribution) was found.

77. O. O. Kochubey, I. Mamuzić*, D. V. Yevdokymov; *Dnepropetrovsk National University, Dnepropetrovsk, Ukraine, *Faculty of Metallurgy University of Zagreb, Sisak, Croatia*

Aims and Problems of Space Metallurgy. The first specific feature of space metallurgical processes is microgravity conditions that are an absence of natural convection and, as a rule, any convection in general. Therefore diffusion and radiation are main forms of heat exchange. Another its specific feature is difficulty with energy sources. In fact, only the solar energy can be used in real metallurgical processes in space. Since an experimental development of technology and equipment for space metallurgy is practically impossible, the main tool of technology creation is theoretical analysis and mathematical modelling, in particular. Thus development of correspondent mathematical models and numerical methods for creation of numerical simulation tools is the most important aim of space metallurgical science on the present stage.

78. O. O. Kochubey, A. Povrzanović*, M. V. Polyakov, T. I. Tarasova, D. V. Yevdokymov; *Dnepropetrovsk National University, Dnepropetrovsk, Ukraine, *Faculty of Mechanical Engineering and Naval Architecture University of Zagreb, Zagreb, Croatia*

Segregation Phenomena in Phase Transition in Multicomponent Media in Microgravity. Segregation phenomena are widely used in many material production field of industry. From the mathematical point of view segregation can be described by additional nonlinear substance source on the phase transition boundary. In dependence on specific feature of phase transformation process there can be two kinds of segregation boundary conditions, but in any case the source is proportional to segregating substance concentration. The slow phase transition case in multicomponent media is considered in the present work. Combined small parameter and boundary element method proposed in previous work by the authors is applied to the phase transition calculation. This approach is generalized on the case of multicomponent media. The proposed algorithm is illustrated by several examples of numerical calculations.

79. M. Havlík, K. Kyseľová; *Faculty of Metallurgy Technical University of Košice, Košice, Slovakia*

Fusibility of Natural Materials as a Function of their Chemical and Mineralogical Composition. Crucial effect on fusibility of natural materials have the content of SiO_2 , Al_2O_3 , CaO , MgO , K_2O , Na_2O a Fe_2O_3 . Fusibility also depends on presence and size of the crystals of individual minerals. Homogeneous rock with fine structure is likely to provide melt without crystalline phase residua. Most refractory towards the solving action of surrounding melt are minerals olivene and magnetite. Higher contents of easily fusible minerals of plagioclase and pyroxene type in fine grain compact matter decrease the melting temperature.

80. V. Manoliu, G. Ionescu, A. Stefan; *National Institute for Aerospace Research "Elie Carafoli", Bucharest, Romania*

Principles Regarding the Thermal Test of the Materials in Extreme Conditions. The development of some advanced materials for applications in aerospace, power, and metallurgical industries imposes new methods and installations to test them. The orientations of aeronautical industries performances increasing impose the continuous rising of the speeds, flight level, loads, turbo engines power, etc. From the assembly of wear factors, which acts simultaneously on the „hot parts“ of the turbo engines the thermal factor acts the most disturbing. The present thermal test shock of the materials in Europe utilizes moderated conditions with lent thermal cycles, during 5 - 8 minutes between heating and cooling. Within the paper will be presented the constructive principles of an original new installation, for testing at quick (seconds order) thermal shock.

81. O. I. Gubin, V. B. Veselovsky, I. Mamuzić*, O. O. Kochubey; *Dnepropetrovsk National University, Dnepropetrovsk, Ukraine, *Faculty of Metallurgy University of Zagreb, Sisak, Croatia*

Mathematical Model Operation and Calculation of Thermal Processes at Laser Handling Coats. Mathematical model operation of the thermal processes which are flowing past at laser handling of a coat, marked on some basis, is carried out in view of association thermal and physical characteristics of a system from temperature. Calculation of process of a profusion of a coat without taking into account the surface transpiration as the most power-intensive process has rather narrow area of applicability on magnitude of a denseness of the absorbed stream of an energy and time of action. Numerical model operation allows spotting character of a modification of velocities of fronts of transpiration and a fusion, thickness of a stratum of a melt and a temperature field of a system that is important for a select of optimum technological conditions of laser handling coats.

82. L. Fröhlich, M. Fröhlichová; *Faculty of Metallurgy Technical University of Košice, Košice, Slovakia*

The Structure and the Phase Transformations of Deterioration of Mullite Building Materials. The work brings up theoretical and practical results of the study of how water effects on mullite building materials installed in the body of the chimney. Through the material research some phase changes showed up in the building material which resulted in $\text{Al}_2(\text{SO}_4)_3 \cdot 16\text{H}_2\text{O}$ creation. Hydrated sulphate creation and its rate leads to a total deterioration of mullite building materials.

Computer science

83. O. Volkovskiy; *National Metallurgical Academy of Ukraine, Dnepropetrovsk, Ukraine*

Kernel Researching OS Linux for Filtration of Network Packages. For protection information from unauthorized access on computer network is considered firewall on base of operating system Linux. Firewall is founded on filtrations of packages, getting through join, and react in accordance with set of rules. It is organized all-round testing firewall, it is seen execute it practically all allot a task on network and transport levels. Firewall works in "transparent" for user mode. Under some combinations installed on hosts OS possible certain reduction of velocity of work.

84. O. Volkovskiy; *National Metallurgical Academy of Ukraine, Dnepropetrovsk, Ukraine*

Modeling of Working the Floodgate of Applied Level. For realization of protection of network at a application level is considered the floodgate of applied level on base of Layer 7 Classifier with use the kernel of operating system Linux. L7-filter is used for performing the regular expressions at coincidence of assigned installation with applied level data (the protocol, contents) of checked package. The results of organized testing of L7-filter are indicative of execution practically all functions entrusted on it. When installing L7-filter host and firewall do not feel the essential additional loads in use of the operative memory and loading of the central processor. Detecting presence of filtration possible only on increase time of copying the volume of information.

85. R. Bombala, Ž. Kuzevičová; *Faculty of Mining, Ecology, Process Control and Geotechnologies, Technical University of Košice, Košice, Slovakia*

Using Spatial Data in Network Oriented Computer Systems. A distributed database system contains a distributed database (DDB) and the software to manage the DDB. In a distributed database system, multiple logically related databases can be distributed over a computer network. Many machines can be used to solve one problem and data may be replicated at different sites, and hence improve performance, reliability, availability and extendibility. Applications of distributed database systems include multi-plant manufacturing, a chain of department stores, a bank with many branches, airlines, and military command and control.

86. J. Kráľ, J. Kráľ jr.; *Technical University of Košice, Košice, Slovakia*

A Contribution to Programming Numeric Control Led Machines Through the Use of Macros. The contribution is solving a problem of creation own parameterized macro for the CAM 2000S software. The program allows creating its own parameterized macros for specific parts and implementing them into it. There is a realized generation of such macro with regard to real technological process for CNC 600 control system in this contribution. The result of the whole solution is an independent macro, which does not require any knowledge of CAD system, and all parameters for the part production can be assigned directly in the macro.

Other applications

87. V. P. Kozlov, V. B. Zvorykin; *National Metallurgical Academy of Ukraine, Dnepropetrovsk, Ukraine*

Determination of the Vibration Frequencies and Forms of the Submarine Hydrotransport Pipeline with the Concentrated Masses. The numeric solution method of eigenvalue problem of the absolutely flexible pipeline located in the water stream and which contains the concentrated masses as floats is offered.

88. V. P. Kozlov, V. B. Zvorykin; *National Metallurgical Academy of Ukraine, Dnepropetrovsk, Ukraine*

The Eigen Oscillations of the Hydrotransport Pipeline, which is contained in Deep-Sea Mining Installation. Results of computations of frequencies and forms of eigen oscillations of the hydrotransport pipeline, which is contained in deep-sea mining installation, are offered. These results have been obtained by suggested method.

89. D. Domaracky; *Faculty BERG Technical University of Košice, Košice, Slovakia*

Enriched Natural Zeolites Medium of Agrochemicals and Fertilizers. Nature zeolites are enhancement by chemical solution with micro and macro elements, appropriate of nutritional request growing plants. Results in experiment is, substratum of zeolites are appropriate for ecological agricultural products and provide for higher production of plants. Application of enriched natural zeolites is mainly available in application field of cultivating ecological food-stuffs demand of nutritions, where we won't use hazardous fertilizers for soil and environment.

90. V. E. Hrichikov, V. Yu. Seliverstov, Yu. V. Dotsenko, V. F. Mazorchuk, R. V. Usenko; *National Metallurgical Academy of Ukraine, Dnepropetrovsk, Ukraine*

Application of Rental Dross in Phosphatic Coldly Hardening Mixtures for Making of Forms Lost Wax Process. Basic technological

properties of experimental phosphatic are investigational mixtures on the basis of quartz sand and rental dross for making of forms lost wax process. Influencing of maintenance of dross and phosphoric is certain acids on technological properties of mixtures. Technology of cold of coverage is developed quartz sand by powder of oxides of iron, and also experimental composition increasing is got adhesion of molding material to the waxen model. It is set that experimental composition abbreviates production inputs and duration of technological process of making of forms casting. The offered technological process provides the increase of stability to appearance of cracks at thecal forms, diminishing of time of drying and cycle of treatments by a high temperature of shells.

91. T. Šarić, R. Lujčić, G. Šimunović; *Mechanical Engineering Faculty University of Osijek, Slavonski Brod, Croatia*

Applying of Artificial Neural Network in Maintenance Planning of Metallurgical Equipment. Maintenance of metallurgical equipment is very complex and demanding job. Condition Based Maintenance (CBM) is used for complex and significant equipment. The paper shows element selection that will be used in CBM planning as a location on which will be applied neural network. The paper presents few different neural network algorithms that have been used for different prediction problems and review of achieved results. Data structure that has been used in researching problem is part of Information System and its Equipment Maintenance subsystem that was developed for enterprise Aluminij d. d. Mostar.

92. P. A. Steblyanko, T. Krylova; *National Metallurgical Academy of Ukraine, Dnepropetrovsk, Ukraine*

The Definition Non-Stationary Thermal-Plastically Station of Non-Homogeneous Shells by Means of Method of Component Splitting. The new version of a method of component-wise splitting of heightened accuracy for calculation nonstationary thermoelasticplastic of station of thin-wall units of shell is offered. As unknowns the shifts of a median surface, velocities of shifts of a median surface of a shell, specific efforts, torque-weight ratios, and velocities of change of torque-weight rations, deformation of a median surface, curvatures and turns are selected. The feature of a set of equations in partial derivatives, to which one reduces the solution of a problem, consists in absence derivative of the second order on coordinates, which results in increase of accuracy of calculations

93. V. Dragojevič, T. Smolar, I. Kverh, P. Cvahte, M. Jelen, A. Smolej; *Impol d.o.o, Slovenska Bistrica, Slovenia*

Environment Friendly Aluminium Alloys Developed in Impol, Conforming to Standards AA, EN, ELV (2000/53/EC) and RoHS (2002/95/EC). Impol is a world-class supplier of free machining alloys of exceptional quality and excellent machinability characteristics. In line with EU Directives RoHS (2002/95/EC) and ELV (2000/53/EC) Impol has developed a series of aluminium lead free alloys for use on automatic single-point, multi-spindle screw machines and CNC equipment. All Impol products are of a very high and constant quality, complying with ISO 9001:2000, ISO 14001, ISO/TS 16949 and OHSAS 18001.