

Summaries

MARIAN BROŹEK, AGNIESZKA SUROWIAK

Separation Efficiency of Jigging Process • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2006

Terminal settling velocity of particle is an argument of separation in jigging process. Terminal velocity is dependent on physical and geometrical properties of particle. Therefore precision of separation will be dependent on distribution of physical and geometrical properties of particles in the feed. This article presents the results of testing of the industrial jig. After division of separation products on narrow size fractions-density fractions, the terminal velocity of particles were calculated. Knowing the yields of narrow size-density fractions the partition curves for two cases were drawn: in first when the terminal settling velocity of particle is an argument of separation and second when as an argument is density of particle. Accuracy of separation determined by probable error is greater for the first case.

Keywords: *jigging, terminal settling velocity of particle, partition curve, probably error*

TOMASZ DONIECKI, EWA SIEDLECKA

Coaly Sludge as the Element of Mineral Insulation of Disposal Storages • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2006

Waste disposal is connected with hydro-ground environment contamination because of a toxic, chemical compounds migration. Agreement with existing regulations it is demanded of the storage yard protection by mineral insulation and synthetic insulation of the ground. Mineral fine-grained wastes are quite often offered to the mineral insulation building (for example: fly ash from commercial power engineering and clay rocks). It is possible using coaly sludge from coal enrichment process. The paper presents the possibilities of application of coaly sludge from KWK "Janina" (Libiąż) as an insulation material to the protection of hydro-ground environment in the storage yard region. Elementary parameters were defined: mineral composition, chemical composition and grain-size distribution. Additionally, physical properties were defined: density and volumetric density, optimum water content and maximum dry density. Variation of the hydraulic permeability with optimum porosity was correlated. It is possibility to use coaly sludge as the clay rocks substitute to the storage yard insulation.

Keywords: *waste slimes, hydro permeability, effective porosity*

PETER FECKO, IVA PECTOVA, VLADIMIR CABLIK, SILVIE RIEDLOVA, PAVLA OVCARI, BARBARA TORA

Bacterial Desulphurization of Coal • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2006

The aim of this paper is to evaluate the suitability of a coal samples from different mines from Poland and Czech Republic for bacterial leaching. Laboratory research used a pure bacterial culture of *Thiobacillus ferrooxidans*. Were tested the samples from this localities: Mine Marcel, Mine Jankowice, Mine Staszicz (Poland) and Mine Darkov and Mine Dukla (Czech Republic). The results showed that bacterial leaching was effective, with one month leaching time, when total desulphurization is from 38% to 72% and desulphurization of pyritic sulphur is from 60% to 82%. The paper describes changes of coal macerates after bacterial leaching.

Keywords: *bacterial leaching, thiobacillus ferrooxidans, desulphurization, coal macerates*

DARIUSZ FOSZCZ

Estimation of Regression Function Parameters by Classical and Bootstrap Methods • *kwartalnik Górnictwo i Geoinżynieria* • z. 3/1, 2006

The paper presents description of methodology and analysis of non-classical bootstrap statistical methods application possibilities in regression function parameters estimation of mineral engineering processes. The review of applied methods of regression model parameters estimation was done. In purpose of initial checking of analysed methods, the evaluation of copper contents in feed influence on yield was made for technological results from O/ZWR Polkowice Region and Lubin. The estimation of regression function parameters estimation was done by classical method (Least Square Method) and by bootstrap methods. The comparative analysis of obtained estimation results of functional dependencies between analysed parameters for these methods.

Keywords: *bootstrap methods, regression function*

DARIUSZ FOSZCZ, TOMASZ GAWENDA, DAMIAN KRAWCZYKOWSKI

Comparison of Real and Theoretically Estimated Energy Consumption for Ball Grinder • *kwartalnik Górnictwo i Geoinżynieria* • z. 3/1, 2006

The energetic theories of comminution, methodology of grinding process energy consumption calculation and determination of Bond work index were discussed in the paper. The examples of certain energy consumption indexes adaptation from presented comminution theories for real work conditions of comminution devices were presented. The Bond work indexes results for dolomite ore, being processed in O/ZWR Polkowice Region KGHM Polska Miedź S.A. were shown in the paper. The real energy consumption for ball grinder comparison to determined Bond work indexes was done. The comparison was conducted for industrial experiment data, which purpose was to measure energy consumption by various grinder processing modes.

Keywords: *comminution energy consumption, Bond work index*

SAAD M. FOUZI, M.G. KAHLIFA, Y.M.Z. AHMED, F.M. MOHAMED, M.E.H. SHALABI

Sintering of Egyptian Iron Ore • *kwartalnik Górnictwo i Geoinżynieria* • z. 3/1, 2006

There are many parameters affecting of the sintering process such as: amount of water added, basicity of sinter, amount of sinter return, amount of coke breeze, any addition of iron bearing material (mill scale) and time of ignition. Thus the aim of this work is devoted to study the optimum condition for sintering process of the Egyptian iron ore.

Keywords: *Egyptian iron ores, sintering*

TOMASZ GAWENDA, ZDZISŁAW NAZIEMIEC, TADEUSZ TUMIDAJSKI, DANIEL SARAMAK

Ways of Optimisation of Grain Composition and Shape of Grains in Aggregates in Products of Jaw Crushers • *kwartalnik Górnictwo i Geoinżynieria* • z. 3/1, 2006

The aim of the article is presentation of ways of optimisation for physical properties of aggregates (grain composition, shape of surface) from the viewpoint of constructional and road industry needs. On the basis of laboratory research there were worked out principles of forecasting of grain composition of comminution products in crushers as regards yields of classes and participation of irregular grains. Forecasts are based on making parameters of grain curves approximation formulas dependent conditional on both properties of mineral raw materials and technological characteristics of crushers (level of fill of the chamber, width of outlet crack, frequency of jaw's vibration and it's jump, shape of jaws). Yield of irregular grains is mainly adjusted by a selection of the shape of jaw and by parameters mentioned above. It was carried out industrial verification of obtained laboratory results. Essential stage of research was an establishment of hierarchy of influence of investigated factors on comminution effects. Worked out mathematical models were the base for selection of crushers in order to gain best results in production of aggregates.

Keywords: *mineral aggregates, grain composition curves, crushers characteristics, regular grains*

RYSZARD KOBIAŁKA, ZDZISŁAW NAZIEMIEC

Researches over Crushing Process Conducting by Various Transverse Profile Jaws • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2006

The paper presents the results of jaw crusher jaws layers of miscellaneous work surface shaping. The combinations of crushing plates were presented in the paper: stable jaw of smooth surface, moving jaw of groove surface. The jaws with grooves of circular, triangular and trapezoidal cross-section were investigated. Evaluating the efficiency of comminution, the grain composition and irregular grains contents determination for given products was conducted, as well capacity and crushing force were measured. For combination of smooth and groove layer, good results, in aspect of grain composition and irregular grains contents, were obtained. Crushing forces were higher for combined plates than for both groove ones. The crushing capacity was significantly higher for combined plates.

Keywords: *crushing, jaw crusher, crusher layers, crushing capacity*

ELŻBIETA KONOPKA, ALEKSANDRA LEWKIEWICZ-MAŁYSA

Investigations on the Treatment Waste Mine's Water Accompanying of the Hydrocarbon Raw Materials • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2006

Waste mine's water produced during oil and natural gas exploitation are to varying degree (highly) mineralized with chlorine and sodium brines. Considerable quantities of specific organic substances and a charge of hardly settling suspension are present in the mine's water. This waste needs treating to such a degree that it can be disposed to water courses or injected into the rock mass. Laboratory analyses of two exemplary waste samples were targeted at the efficiency of the coagulation-flocculation method in view of degree of contamination. The analyses were aimed at determining possibilities and limitations of methods of removing components of waste which have a negative environmental influence on surface waters and rock mass.

Keywords: *oil and gas mining, waste mine's water, coagulation, flocculation*

JACEK KORDEK, TOMASZ GAWENDA, WALDEMAR KĘPYS

Specific Surface of Powders, Comparison of Calculated and Measured by Flowing and Adsorptive Methods Results • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2006

For some powders of mineral origin, the precise grain composition and specific surface determination was done. The compositions were determined by two laser methods and specific surface by Blaine's flowing method of and adsorptive method BET. The juxtaposition of results given in such way allow to formulate an opinion about the term "specific surface" because of totally different approach to results and their significantly different values. The conducting of parallel measurements confirms that physical and chemical, as well calculating determinations spare to various purposes may be comparable when the right proposed rules are applied.

Keywords: *specific surface, grain composition*

JACEK KORDEK, TOMASZ NIEDOBA

Determination of Powders Grain Composition — Comparison of Results Given by Various Measurement Methods • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2006

The measurements, which purpose was to compare the grain composition results of mineral powders given by various measurement methods, were carried out. The parts of experiment were: preparation of various grain compositions on basis of basic rocks and minerals being used in mineral processing, realization of precise grain composition analyses by using laser diffract meter and Infrared Particle Sizer, as well large results analysis as the attempt of determination of their reciprocal calculation. The results discussion allow to formulate the generalization of diversified acuteness dependent on sort of analyzed material and measurement range. The proposed formulation may be useful in practical comparison and evaluation of results acuteness in measurement methods being applied.

Keywords: *grain composition, laser diffraction, IPS method, conversion of distribution function*

MAREK LENARTOWICZ, JERZY SABLIK

The Hydrophilic Particles in Industrial Flotation Process of Coal of Different Rank • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2006

Presence of hydrophilic particles, which surfaces have surface tension of wetting γ_c equal or higher than surface tension of the zero contact angle $\gamma_{c(\theta=0)}$ (57.87 mJ/m^2) in a group of particles obtained from a lump of coal, feeds and products obtained from sampling IZ-12 type flotation machine washing coals of different rank has been investigated. The distribution curves of surface tension of wetting of an investigated group of particles obtained by film flotation method and the value of the surface tension of the zero contact angle has been used in order to appoint a percentage content of hydrophilic particles. It has been found that the number of hydrophilic particles in a lump of coal, feed and washing products decrease with the growth rank of coal. What is more, the investigation shows that the hydrophilic particles pass into the concentrate products probably on the basis of a mechanical curvy of mineral particles, curvy of intergrowth, and formation of slime coating on tailings particles and scraping by scrappers with flotation pulp.

To sum up, the analysis of the distribution of hydrophilic particles and surface tension of wetting in flotation products obtained in industrial IZ type flotation machine can be used for the evaluation of the technology of flotation and the work performance of this machine.

Keywords: *black coals coal contents, fraction flotation, surface tension, surface energy distributions*

ALEKSANDER LUTYŃSKI

Noise Measurements at Production Stands of the Coal Preparation Plants • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2006

The paper deals with the results of the noise measurements carried out at ten points of production stands of two coal preparation plants. The production stands were: vibrating screens PZ, WP-2, WK-1, belt conveyor, bucket conveyor, plate filter FTPO 180, Disa dense media separator, dense media separator KR 3/2, fines water jig and crusher KB 3200×6000 . In the article apparatus, used methodology and a method for carrying out analyses are described. In eight of production stands noise level was exceeded above the limit of 85 dB according to polish standard PN-N-01307.

Keywords: *noise, devices measuring noise level*

ANDRZEJ ŁUSZCZKIEWICZ, ANDRZEJ WIENIEWSKI

Directions in Development of Ore Processing Technology in Polish Copper Industry • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2006

Ways of implementation and suitability of world's recent developments in mineral processing of nonferrous metallic ores for Polish LGOM deposits have been analyzed in the paper. A great number of problems, which occur during processing of the Polish ore are similar to those appearing in other worldwide nonferrous ores. It includes depletion of available deposits and decreasing quality of the ores making them difficult-to-treat materials. As a result a continuous improvement of mineral processing plant equipment to the changing parameters of ore becomes crucial. There also is a need for introduction of new technological flow sheets that include a combination of flotation and chemical methods to effectively recover valuable minerals. A review of concepts of currently used types and amounts of reagents, and if necessary, their adjustment becomes a key factor of the efficiency of the process. An application of economically feasible new methods of tailing utilization and implementation of a simple supplementary processing step for flotation of tailing just before sending it to the tailing pond probably are also worth to be considered.

Keywords: *copper ore processing, technology, development trends*

EWA MAŁYSA, AGNIESZKA SUROWIAK

Effect of Coal Pulp Density on Water Contents in Froth Flotation Products • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2006

Results of coal flotation depend not only on surface properties of coal grains but can also be significantly affected by a degree of the gas phase dispersion, size of the air bubbles and properties of the froth layer formed.

The paper aimed at determination of influence of the coal pulp density (solid parts concentration) and the pulp volume on water contents in the froth concentrates. It was found that amounts of water contained in the froth products depended on the coal pulp density. Highest water contents were obtained for the pulp density of 80 g/dm³. This is an interesting result as it correlates well with the highest yield of the coal, which was obtained also at this pulp density. Water contents in the froth products were also analyzed as a function of the flotation time. It was observed that for all flotation times the highest water contents were at the pulp density of 80 g/dm³. These data seem to indicate that there can exist a correlation between high coal yield and water contents in froth, but this question requires further studies.

Keywords: *hydrofobicity, coal flotation, foam, foaming reagents, pulp density, hexanol, water contents in flotation froth*

JOLANTA MARCINIAK-KOWALSKA, EDYTA WÓJCIK-OSIP

Preliminary Investigation over Possibility of Application of Lamella Packs for Intensification of Flotation Process • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2006

Pioneer and initial research on application of lamella packs at the angle of 60° to coal slurry flotation process has been described in the article. Area of flotation cell has been 5 times enlarged. Research has been conducted comparatively: with or without lamella packs. Influence of the amount of applied flotation reagent (FLOTMIX), and extra added pulp aeration on ash content in concentrate and concentrate yield were analyzed.

Keywords: *coal suspensions flotation, sedimentation with multistream blocks application*

WIESŁAW MAĆZKA, ZOFIA OCIEPA, JADWIGA PIECZONKA, ADAM PIESTRZYŃSKI

Accomplishments of Beneficiation Mo-W-Cu ores from the Myszków Area • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2006

Formation and structure of molybdenum-wolfram-copper deposit in the Myszków area are presented. The beneficiation technology of such ores is discussed. The results of laboratory beneficiation test are shown. Taking into consideration results of mineralogical analysis of selected flotation products and effects of beneficiation, the factors effluent on quality of concentrates and recovery of metals are discussed.

Keywords: *mineralogy, flotation, molybdenum-wolfram-copper ores*

IGOR KONSTANTINOVICH MLADETSKIJ, PETR IVANOVICH PILOV, EKATERINA NIKOLAEVNA KOBETS, TAI SIYA IGOREVNA MARKOVA

Characteristics of Complex Separation Schemes and an Error of Separation Products Output Determination • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2006

Imperfection of dividing devices assumes their connection in technological chains. The more rigid the requirements to the cleanliness of products of division, the more complex(difficult) such chains. As a rule, it is the consecutive connections with feedbacks - recycles. The mathematical description of such circuits is bulky enough and in identical transformations gives a high probability of a mistake. With the purpose of formalization of the mathematical analysis of technologies of division we have offered the method which is turned into an algorithm of qualitative - quantity indicators calculation of division in each point of the dividing circuit which essence consists of drawing up of the equations of balance of narrow fractions of a product on each dividing operation. These equations form the system which gives required values of technological parameters when is solved. By results of the decision, it is possible to make the technological balance of the enterprise for any required interval of time. The reporting of the concentrating enterprise is connected to quantity (amount) of made production which is always expressed through an output(exit) of a product. It is the main characteristic of work of the enterprise. It is calculated on the basis of approbation of quality indicators. The more exact the approbation - the more exact the definition of the output and the more complex the scheme - the more complex the definition of the output's error. Thus, the formal algorithm of definition of an error of calculation of quantity indicators of complex dividing circuits is necessary. Numerical methods are most comprehensible to work on computers and consequently we have tested one of the ways of

estimation of this error, which, in our opinion, is suitable for such analysis. The essence of the method consists in use of the function of disclosing of the valuable component, which acts on an input of the dividing circuit. For change of the condition of the circuit the increment is given with the help of this characteristic which is shifted concerning initial position. All other calculations are carried out on earlier, mentioned algorithm.

Keywords: *algorithm calculation of indicators, equations of fraction balance*

EUGENIUSZ MOKRZYCKI

The Perspectives of Hard Coal Utilization • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2006

Coal is the most important primary energy source. It take the first place before oil and natural gas. Hard coal reserves are immense and are located in all geographical regions of the world (over 70 countries). The forecasts worked out by the agencies and institution working worldwide (WEC, IEA, UE) assume that in the nearest 30 years the use of coal will increase, especially w in processes of burning for electricity generation. The prices of liquid and gaseous hydrocarbons will continue to rise on the international markets. The reason for that is the unstable political and economic position of the countries, being the main producers and exporters of oil and natural gas. Coal should stabilize the situation as its supplies are stable and improve the energy security of the World.

To achieve that goal it is necessary to acquire social acceptance through the wide introducing into service so called clean coal technologies, that significantly improve the energy efficiency and reduce particular matter and greenhouse gases emission. Poland, possessing significant reserves of hard and brown coal, may play the leading role in warranting the energy security not only in the country but also in the European Union.

Nevertheless it is necessary to modernize the existing production potential and its development as well as the increase of competitiveness of the Polish coal mining industry.

Keywords: *polish black coal, polish brown coal, clean coal technologies, enrichments economics*

ALICJA NOWAK, TOMASZ GAWENDA

The Comparative Analysis of Crushers in Basalt Rocks Comminution Multiple Stage Systems • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2006

Basalt rocks are valuable feed to production of broken aggregates for road and building industry. Grain composition and grains shapes, highly influencing on aggregates resistance, determine the aggregates quality. The contents of irregular grains in mineral aggregates depend mainly on material crushing method, i.e. on sort of applied comminuting devices, their construction and movement parameters, comminution level and number of crushing stages. The paper presents conditions and results of multiple stage comminution processes for two selected basalt aggregates production plants. The effects of comminution were investigated for various sorts of crushers. The dependence of grain fractions yields on ratio of grain size d and crusher gap size e was determined. The comminution levels given by following crushing stages were determined too, as well their correlations with maximum value of d/e . The irregular grains contents in individual grain fractions of produced aggregates and the dependence of crushing products shape coefficients on comminution level were shown. Also, changes of cone crushers capacity dependably on crusher gap size and comminution level, were given.

Keywords: *comminution, cone crushers, jaw crushers, impact crushers, comminution levels, crushing stage, irregular grains*

BARBARA PESZKO, TOMASZ NIEDOBA, MARIA SZYMAŃSKA-CZAJA

The Assembling of Grain Size Distribution Functions Given by Various Measurement Methods • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2006

The methods of determination of grain compositions have limited measurement range and in many domains of industry, the necessity of conducting material grain analysis of sizes being outside the working range of certain method. For example, the grain composition analysis of majority of rock materials and also products being manufactured synthetically as abrasive powders needs to be conducted for the grain sizes from millimeter part (sieve

analysis) to a few micrometers (sedimentation analysis) or even below this limit. Thus, there is a need for relevant method of one sort of data conversion to second one. This paper presents the analysis of results recalculation from two various methods of size analysis and how can they be transformed and connected to create one associative size distribution function, by means of relatively simple experimental and calculative techniques.

Keywords: *sieve analysis, sedimentation, grain size distribution function, data conversion*

HRISTINA PETROVA, ANTOANETA BOTEVA

Probable Mechanism of the Operation of the Flotation Pulp Density on the Selective Flotation of the Sulphide Minerals • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2006

In this report it's looked through the problem about the research of the possibilities, by the change of the solid phase content in the pulp for improvement of the flotation process selectivity during the flotation of the multicomponent ores. It's searched for the relation between the lessened aeration in the conditions of the flotation with higher density of the flotation pulp and the competitive struggle between the main sulphide minerals which differ themselves of it's hydrophobic mineral surface and of the processes, running in the three-phased froth as well. The results of the research indicate that the increased density doesn't always lead to the decrease of the process of selectivity. It's found that the rising of the solid phase content in the pulp up to a definite limit improves the selectivity of the process, but it can hardly get worse above this limit. The limit is most likely to be different for the different technological cases, but it's obviously to be always available.

Keywords: *sulphide minerals, selective flotation, pulp density*

DANIEL SARAMAK, TADEUSZ TUMIDAJSKI

A Role and Sense of Approximation of Grain Composition of Raw Materials • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2006

The article describes problems concerning matters of approximation of grain size curves of mineral raw materials and also ways of using these results for description of specific surface of grained materials. In the article there were presented theoretical conditions connected with manners of approximation of grain size curves and approximation formulas for grain size curves described by logarithmic-normal distribution and logistic distribution. It was also made an approximation of these distributions, as well ways of calculation of specific surface of fine grained materials with using Taylor's power sequence based on approximation results were presented.

Keywords: *approximation of grain composition curves, logarithmic-normal distribution, logistic distribution, analytical determination of specific surface*

KAZIMIERZ STANISŁAW SZTABA

Considerations on Prospects of Development of Mineral Engineering and its Conditionings • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2006

It will not be possible to resign from the use of natural sources of raw materials. It concerns especially the non-reproducible mineral raw materials whose resources are limited and which, at the same time, constitute the only source of numerous elements and some of their compounds, necessary for supporting the life of mankind and its development, i.e. civilization in general. Therefore we cannot neglect perfecting the methods of managing these resources. Mineral engineering opens the technological division of this managing. Yet one cannot admit that in the range of its basis and applications all significant problems have already been solved and new challenges and research tasks cannot be formulated. Even perfecting the achieved standards and, particularly, meeting the needs generated by the development of demand for the products of processing of primary raw materials and, in a larger and larger extent, the secondary materials (originating from them) of the increasing degree of difficulty of utilization, especially the postulates concerning their quality features, will require more and more sophisticated technological procedures, based upon the properties of primary materials which were not used before. On the other hand, the increasing deficiency of the latter ones, with the simultaneous forming of larger and larger amounts of secondary materials which cannot be utilized at the very beginning and which threaten with creating a waste barrier, will

force the development of technologies alternative to traditional ones from the point of view of raw materials, applying “classical” pure feed raw materials and obtaining products which have comparable utilitarian properties as compared to the products of “classical” technologies. The processes of perfection must also comprise the “environment” of technological tasks, starting from control-measuring procedures and evaluations of effectiveness of technological activities, through principles of construction and operation of technological machinery and others, supporting the rational management of raw materials, up to technological and organizational optimisation, and, finally, also economic, as well as managing any, not only raw material, natural resources, carried out in agreement with the rational use of resources and natural environment.

Słowa kluczowe: mineral engineering, assessment of technological efficiency in mineral processing

KAZIMIERZ TRYBALSKI, DAMIAN KRAWCZYKOWSKI

Modeling of Industrial Ore Grinding Process Using Energetic Factors of Evaluation • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2006

The costs analysis of grinding and classification center in one of KGHM “Polska Miedź” SA ore enrichment plants was conducted in the paper, what identified the highest energy consumption of grinding process. The energetic-technological factors evaluating grinding and classification processes were then proposed and calculated. On their basis the examples of models were constructed, which were regressive ones and neural networks forms, taking into consideration dependencies between process evaluation factors and energetic-technological data of investigated process. The comparison of given models was carried out.

Keywords: statistical modeling of grinding processes, neural networks, regressive models

PIOTR WODZIŃSKI

Drum Screens in Mineral Mining • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2006

Drum screens were developed in the 19th century and had been used for a long time in various branches of national economy, mainly in flour mills. Next, they were replaced by vibrating and revolving screens and their production ended. Recently, these machines reappeared because of their applicability in municipal waste sorting. The drum screens appeared again in other industries, including mineral mining.

It seems that modern drum screens should be high-speed machines, i.e. such in which high speed factor (the ratio of drum angular velocity to rotation velocity) should range from 0.8 to 0.9, and not from 0.2 to 0.3, as is the case in the currently operating screens. The main disadvantage of a drum screen is poor utilisation of its sieve surface (up to 30%). In vibrating screens sieving surface can be utilised in 100% provided the feed is loaded in a correct way to the screen. The author intended to describe drum screens in the light of new results of researches on these machines carried out recently at the Technical University of Łódź. The latest designing achievements in this area have also been taken into account.

Keywords: drum screens, development tendencies in mechanical classification

JAN ZAWADA, KONSTANTY CHOCHOŁ

On New Elements of Mechanics of Crushing Process — Problem of Loading (Based on Blake Toggle Crusher) • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2006

The available description of mechanics of crushing process in double toggle Blake crushers, presented in literature and applied in practice, in general, is an approximated description which usually needs verification. Wide experimental studies were carried out at a modern test stand including model crusher of Blake type, measuring and control-register system. The results enabled to formulate new approach to mechanics of crushing processes, mainly focused on: load distribution in working space, friction conditions in working space, crushing energy and verification of energy hypotheses, deformation of toggle mechanism components. The results obtained in the studies formulate the base for theoretical analysis of the mechanics of the process.

Keywords: crushing energy, crushing energy hypotheses, experimental verification

The Influence of Rotational Speed of Flow Classifier Rotor on the Performance of Fluidized Bed Opposed Jet Mill • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2006

The necessity of applying materials with high degree of fineness in the contemporary technologies require used to modern technology in mechanical comminution of different substances, which will assure demanded particle size distribution of grinding product. The scientific performances are mostly aimed at the search for new work conditions of industrial grinding devices, which should guarantee parameters and fineness of grinding products and should decrease energy consuming of grinding and improve environmental protection. All the above seems to be met in the researches of granular materials grinding in the high-energetic fluidized bed. The fluidized jet grinding relies on keeping up a turbulent fluidization in the grinding chamber of mill, which is a result of collisions of air counter-fluxes. They make it possible to obtain high-energetic fluidized bed, which in turn ensures an effective comminution of tested granular material. The state of pulsatory fluidization is created in the certain surroundings of an axial zone of the fluidized bed. The state of fountain fluidization is created in the axial zone of the fluidized bed, which is characterised by carryover of grains in the zone of high velocities in the centre core of grinding chamber, then by gravitational falling of coarse fraction near walls and by carrying away of the small fraction by the flowing gas into the separation system. The theoretical basis and experimental results for the fluidized jet grinding of granular materials are presented in the paper. The researches were performed on a laboratory fluidized bed opposed jet mill. The experiment contained grinding tests of selected narrow size fraction of limestone in turbulent fluidized layer conditions. The aim of researches was to explain the influence of the values of rotational speed of flow classifier rotor on the efficiency of mill and the particle size distribution of grinding product. The determined masses and particle size distribution of grinding products make it possible to estimate the quality and the efficiency of the carried out fluidized jet grinding tests.

Keywords: *fluidization, grinding, fluidized bed opposed jet mill, rotational speed, efficiency, particle size distribution, limestone*

Chromatography Investigations over Wasted Tyres Granulate Pyrolysis Products • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2006

Until the 1960s, rubber from scrap tires was routinely recycled, but that started to change as cheap oil imports — the raw material behind synthetic rubber — made reclaimed rubber less valuable, and the spread of steel belted tires made tire recycling more expensive, difficult and time-consuming. Scrap tires not only waste landfill space, they can damage the linings put in place to keep groundwater and surface water from mixing with land filled contaminants. In this paper it presents the results of chromatographic analysis of waste rubber pyrolysis.

Keywords: *rubber pyrolysis, wasted tyres, chromatography*