Summaries

JERZY ALENOWICZ

Research Procedures of Surface Mining Equipment Located on the European Union Market • Kwartalnik Górnictwo i Geoinżynieria • z. 2, 2007

Questions connected with location of surface mining equipment on the European Union market as well as definitions of elementary concepts and terms have been presented in the article. A complex assemblage of regulations referring to the principles of surface mining equipment location and usage on European Union market has been discussed. Primary obligations rested with a producer who locates surface mining equipment on EU market have been described. A short description of research in a range of estimation of conformity with New Approach Directives in the mechanical and electrical section has been presented. Risk assessment, as factor aiming at achievement of the highest possible safety level of the equipment, adequate for technology state and resulting restrictions, have been discussed. Rules of readjustment of machines operated currently to European Union regulations have been presented. Examples of research conducted by Poltegor Institute after European Union integration have been described.

Keywords: *European Union Market, New Approach Directives, research, risk assessment*

JÓZEF AUGUSTYNOWICZ, DIONIZY DUDEK, KRZYSZTOF DUDEK, ANDRZEJ FIGIEL

Forecast of the Work Safety Period of the Mining Machine. The Last Developments of an Object Degradation Problems • Kwartalnik Górnictwo i Geoinżynieria • z. 2, 2007

Selected aspects of the natural degradation process of the technical object were presented. Statistical estimation model of the degradation parameters was proposed. This model should use diagnostic symptoms taken from the tensometry, the thermovision and the vibroacoustic testing.

Keywords: *technical diagnosis, machine examinations, statistical models*

KATARZYNA BAJOREK-ZYDROŃ, WOJCIECH KRZAKLEWSKI, MARCIN PIETRZYKOWSKI

The Assessment of Scots Pine Nutrient Supply in the External Dump of 'Bełchatów' Lignite Mine • Kwartalnik Górnictwo i Geoinżynieria • z. 2, 2007

The aim of the work was to assess the Scots pine (Pinus sylvestris L.) nutrient supply in the first age group (of up to 20 years) growing on the top of the external slope in the Bełchatów lignite mine and in managed forests in the vicinity of the dump. The research was conducted on 60 experimental plots (10×10 m) in a chronosequence of 5–7, 9–11 and 12–14 years, with 10 repetitions for each age group on the slope and in managed tree stands. It was found that nitrogen was the most deficient element in the Bełchatów dump. Its average content ranged from 0.8 to 0.9%. Based on the results of pine high and needle length measurements it was established that satisfactory growth of the trees from this species took place when nitrogen content in its assimilation apparatus was at least 1.0% N. The content of other biogenes important for trees (Ca, Mg, K, P, S) was considered satisfactory in pine needles, however the phosphate content in the slope was visibly lower than in the assimilated material of pines from forests in the vicinity of the dump. The proportions of individual macroelements in pine needles were satisfactory and the mean content appeared in quantitative series characteristic for the species: N > K > Ca > P > Mg. The obtained results show that with the exception of nitrogen, the initial soils of the dump provide the majority of nutrients for the Scots pine introduced as part of the reclaim process.

Keywords: *external dump, forest reclamation, Scots pine, nutrients*

WALTER BARTELMUS, RADOSŁAW ZIMROZ, WOJCIECH SAWICKI, MAREK MANIAK, ZBIGNIEW WOŹNIAK, KAROL FURMANIAK

Some Aspects of Diagnostics of Multistage Gearbox with Planetary Stage in Driving Unit Used in Bucket Wheel Excavator · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

The papers deals with selected issues of diagnostics of multistage gearbox with planetary stage used in driving system for bucket wheel excavator SRs1200. This paper is one of results of cooperation between Wroclaw University of Technology and Open Cast Mine "Konin" that is focused on diagnostic procedures for supporting maintenance of this strategic object. One of the most important issue is time varying external load that is observed during normal operation. It affects all stages of diagnostics process (measurements, signal preprocessing, feature extraction and reasoning). Diagnostics without load monitoring very often gives incorrect results (no detection of failures or false alarms). In the frame of mentioned cooperation a few experiments has been carried out, the idea of a diagnostic system with load as the criterion of adaptation of diagnostics has been proposed. In this paper the basic ideas of this system and initial results have been presented.

Keywords: *diagnostics, planetary gearbox, time varying load, adaptation*

JERZY BEDNARCZYK

Development of Underground Coal Gasification Technology end Prospects of Industrial Implementation · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

Underground coal gasification is a subject of intense experimental research in many countries. Published results, especially relating to pilotage plants, indicate that in the foreseeable future this technology may be employed for deposits exploitation in the area where opencast mining or underground mining is unprofitable. Low-incarbonizated brown coal occurring in Poland enables underground gasification because of high reactivity and high moisture content and because of shallow deposition of strata. Underground gasification may become competitive in relation to ground-based coal gasification installations. Elaboration of safe and effective technologies adapted for occurring geological and hydrogeological conditions as well as complicated instrumentation for installation building are conditions of its realization. Technological complexity resulting from a large dynamics of thermochemical gasification processes proceeding in unrecognized reactors of natural deposits requires precise identification measurements and optimal control of process systems with adaptation of activities to changing conditions. Underground coal gasification conducted for dozens of years in Russia and Uzbekistan, valuable and large-scale tests conducted in USA, results from experimental tests from Australia and Spain as well as planned projects in Great Britain, Republic of South Africa, India and China indicates a serious interest in this technology. This technology implementation may contribute to production of energy for local needs in areas of deposition of strata.

Kaywords: *underground technology, underground gasification*

ARTUR BĘBEN, MICHAŁ MAZIARZ, JAN KROKOSZ, WACŁAW URBAN

New Generation Drills with Rotary Tangent Bits as the Novelsolution for Drilling and Reaming in Tertiary and Quateriary Formations · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

In the paper are presented drills (heads) of new generation with replacable rotary tangential bits for drilling and reaming holes in formations of medium cohesiveness usable also for horizontal and return drilling. There are presented illustrative and design solutions of drills for blasting and relaxing holes drilled in open-cast and underground mining of diametres range ∅105÷216 mm and for drilling and reaming hydrogeological as well as geological- exploratory holes of diametres between ∅250 mm and ∅670 mm.

Keywords: *mining equipment, drilling tools*

JANUSZ BOJCZUK, ADAM BAJCAR

Opencast Lignite Mine Barsingsar in India. Topic Issues of Mining Technology, Lignite Processing and Transporting and Mine Dewatering · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

The article presents based on a truck and shovel mining technology. Building methodology of the technological model considering all exploitation phases of open pit and including lignite quality variables is given. Moreover,

the lignite processing with lignite transportation to power plant by belt conveyors system is presented. Dewatering problems relative to specific Barsingsar region climatic conditions together with land reclamation program and mine closure plan are presented in the paper.

Keywords: *lignite, opencast mine, belt conveyor, sizer*

VOLODYMYR I. BONDARENKO, VOLODYMYR S. FALSHTYNSKIJ, ROMAN O. DYCHKOVSKIJ, VOLODYMYR JU. MEDIANYK

Stowing as the Method of Mining Pressure Control During Underground Coal Gasification · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

Process of underground gasification of coal is connected with some negative factors. First of all it is subsidence of the soil and break of harmful gases to the surface. Authors suggest applying the stowing for prevention of these negative phenomena and control of mining pressure. The injection fulfilling of goaf for effective work of underground gazogenerator is offered. The experience of work of experimental underground gazogenerator "Pidzemgaz" is considered. The substantiation of parameters of injection stowing of the goaf is resulted.

Keywords: *coal gasification, injection, stowing*

VOLODYMYR I. BONDARENKO, PETRO I. PILOV

New Technology and the Equipment for Brown Coals, Peat and Slimes Briquetting · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

The new briquetting technology of secondary fuel and brown coal is developed at National Mining University, Dnipropetrowsk, Ukraine. It is based on the adhesion and chemical processes, proceeding in viscously plastic systems, formed by thin disperse particles of coal and occurrence their knitting properties. It is possible to make composite fuel which components is the mix of coal and anthracite slimes, brown coals, and various waste products containing organic substances.

Keywords: *briquetting, waste products, lignite, secondary fuels*

ANDRZEJ BOROWICZ, RYSZARD FRANKOWSKI, ANDRZEJ GĄDEK, WALDEMAR JOŃCZYK, JOANNA SPECYLAK-SKRZYPECKA, GRAŻYNA ŚLUSARCZYK

"Złoczew" Brown Coal Deposit — Geological Structure, Reserves and Exploitation Perspectives · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

"Złoczew" brown coal deposit discovered in the 1950s may become a satellite-bed for BOT in the near future, for the sake of comparable quality and quantity parameters in relation to Bełchatów brown coal deposit (Szczerców field) and because of localization (50 km to the north-west from Bełchatów power plant). This requires certain actions resulting from geological and mining regulations and from formal and legal activities. Presently "Złoczew" brown coal bed deposited in a rift valley is documented in C2 category by means of 64 boreholes made in 1961–1979. Paleogen and neogen sediments, over 300 m thick, fill the rift valley. The coal formation complex formed of coal beds separated by barren measures of clay, slime, sand, gyttja, lake-marl is maximally almost 130 m thick (in the central part of the bed).

Keywords: *brown coal deposits, geological database, deposits digital models*

TOMASZ CHMIELNIAK, MAREK ŚCIĄŻKO

Study of Lignite Gasification for Hydrogen Production · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

The performance of hydrogen production plant based on Legnica lignite (Poland) gasification using commercially available technology was simulated. For lignite gasification the entrained flow, dry feeding gasifier was selected. Pre-feasibility study of the plant processing 7 million ton of row coal (50% water content) was presented and discussed. Three options of plant configuration were considered: hydrogen production with CO_2 venting with and

without emissions penalty and hydrogen production with CO_2 transport and storage. In all cases CO_2 was separated from the gas stream before hydrogen separation unit. For all considered plant configurations results of analysis confirm economical feasibility of the technology.

Keywords: *lignite, gasification, hydrogen*

TOMASZ CICHOŃ

Possibilities of Using Post-Exploitation Objects for Recreational Purposes in Example of External Dump of Szczerców Field · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

Open cast exploitation of deposits of lignite leaves post-exploitation pits and external dumps. Building of external dumps is connected with occupying of large areas and increasing of areas designed for final restoration. External dumps bring in diversity in landscape which is very often touristic unattractive. Dumps make possible making view points, bike and foot paths and object demanding large height differences, e.g. ski lifts. This type of reclamation may be used in northern slope of Field Szczerców external dump. Part of mentioned above recreational objects may be realized in years 2007–2013 as a part of Winter Sport Center BOT KWB Bełchatów

Keywords: *external dump, final restoration, ski track*

KRYSTYNA CZAPLICKA-KOLARZ, IRENEUSZ PYKA

UE Energy Mix by 2030 — the Role of the Native Fuels · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

The European Union is strongly dependent on the primary energy carriers import. Prognosis show increasing of this dependence in the next decades. The only own primary energy carrier, of which reasonable deposits are in EU countries are hard coal and lignite. Coal utilisation causes many negative impacts on environment, including CO_2 emissions. Coals, as primary energy carriers, are characterised by the greatest emissivity, comparing with other carriers, including the natural gas. In the paper UE energy mix and prognosis for the future UE energy mix are discussed, emphasising the role of lignite. The most important challenges are emphasized and the most present actions and energy policy of UE are presented and discussed.

Keywords: *lignite, European Union, primary energy carriers, energy mix, prognosis (scenario)*

LEOPOLD CZARNECKI, MARIA DYNOWSKA, JERZY KRYWULT

Stress Measurements for Rock Mass Stability Estimation · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

The report presents experiences acquired in the Bełchatów brown coal mine in the field of measurements of stress in the rock mass. It describes the way of handling measurements. Certain exemplary results were presented together with possibilities of their practical usage.

Keywords: *measurements of stress, rock mass stability*

LEOPOLD CZARNECKI, WALDEMAR JOŃCZYK, BARBARA ORGANIŚCIAK

Rock-Slide Hazards in KWB "Bełchatów". Prognostication, Monitoring and Limitation of Hazardous for Example Hazard Area No. XIII/N on the Transportation Sidewall · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

The paper elaborates on KWB "Bełchatów" pit northern sidewall stability issues, related with complex geological structure of the subject area. It describes rock-mass structure of the hazardous area and adjacent areas. Presented are three variants of securing the pit's transportation sidewall, being currently under threat of the large scale rock-slide. Characterized is approved for realization, the way of securing the sidewall by creating the spreader-made ground-buttress. Described are also the results of survey measurements of surface and a deep ground deformations, carried out as part of the first stage of slope stabilising works.

Keywords: *rock-slide, sidewall, border faults of tectonic trench, consequent dips, olistolith, interbedding shale, flat slide, overturned fold, relic waters, fault, ground-creep, ground-buttress, spreader*

JERZY CZMOCHOWSKI

Numerical-Experimental Vibration Analysis of the Fixed Jib of the Multibucket Wheel Excavator · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

The adverse vibrations of elements of excavator supporting structure are the significant problem observed during the exploitation of multibucket wheel excavators. The source of these vibrations is the changeable loading from the mining process and from the moving output on the conveyors, as well as the strokes in the transhipment points. Because of the large dimensions of these machines significant deflections of masts, fixed jibs, bucket wheel booms and counterweight boom are observed during the machine moving. The aim of the study is the numerical-experimental vibration analysis of the fixed jib of one of the excavators, which the lateral deflections during the mining and moving are observed in. For this reason the equivalent measurement system that bases on the accelerometer sensors for vibration recording and frequency analysis is used. For the numerical simulation, the shell model for calculation with use of Finite Element Method (FEM) that enables to conduct the analyses of local and global vibrations was elaborated. The FEM model was tuned to parameters determined during the measurements done on the object. Correctly prepared computer model has enabled the collaboration of various variants of structural changes, that purpose is to decrease the disadvantageous vibrations of the measured assembly.

Keywords: *multibucket wheel excavators, Finite Element Method, modal analysis*

KAZIMIERZ CZOPEK

Cost Assessment of Profitability of Exploitation of Brown Coal from the Legnica Zachód Bed · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

Profitability of exploitation of brown coal from the Legnica-Zachód bed as well as the profit ratio on the level of sale have been presented. For that purpose operation type costs have been used thus comparing their structure and value in the open mines. Their analysis helped to predict the exploitation costs in the Legnica Zachód mine taking into account, at the same time, the results of the brown coal mines in Germany. The cost-price analysis of profitability of cooperation of the mine and electric power plant and electric power plants on the energy free market has been made.

Keywords: *brown coal, energetic, effectiveness, costs, prices*

THORSTEN DIERCKS

Coal in Current European Union Policies — the Energy Package of January 2007 · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

In January 2007, in its Energy Package, the European Commission called for a "new industrial revolution". The EU Summit has agreed to the major objectives, particularly a binding target for renewables of 20% in 2020. As a part of the Package, the Commission has also released a Communication on Sustainable Power Generation from Fossil Fuels, mainly coal. The Paper describes the actions needed for the continued contribution of hard coal and lignite in Europe and worldwide in the decades to come. The presentation shows the major aspects of the current EU coal policies as well as the European coal industry's view, including EURACOAL's Clean Coal Concept.

Keywords: *the Energy Package, Clean Coal Koncept, EUROCOAL*

RYSZARD FRANKOWSKI, ANDRZEJ GĄDEK, EDWARD SOŚNIAK

Short-Term Mine Planning Using MineScape Software in BOT KWB Bełchatów SA · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

Short-term mining activity planning has being carried on in BOT KWB Bełchatów SA since late seventies of last century. Work-plans for primary machines are being prepared for all stripping & mining levels of Bełchatów and Szczercow pits as well as spoil-banks of each pit individually. In it's mining part, a work-plan includes following types of information: current pit geometry, location of drill holes, current and planned location of relevant conveyor belt together with conveyor segments numbering (every 10th segment numbered), descriptions of planned mining technology activities. In it's geological part a work-plan include information on total volume, quantity &

quality of coal and accompanying minerals, planned for excavation in a given mining-pass, natural hazards, equipment left in drill holes, cartographic picture of current mining bench. Considering the amount of data gathered and documented on a work-plan map, and amount of work involved in creation of such maps/documents, ever since early nineties of last century a computer-based systems have been used to support the process of creating them. In the mining part of a work-plan creation it was UK based software system called MOSS™ (and it's newer version called MX™). For geological part it was UK based system DATAMINE™ and computer programs created by Poltegor-Instytut (database + related programs). In 2004 BOT KWB Bełchatów SA purchased software system called MINESCAPE™ produced by an Australian software company MINCOM™. Based on digital models of deposit geology, considering areas of expected natural hazards, technical parameters of machines and also based on long-term mining plans (so called directive mine designs), the excavator work-plan is being created using MINESCAPE™ system.

Keywords: *short-term mine plannin, primary machines work-pla, pit geometr, information system MOSS™ and DATAMINE, software and database Poltegor-Instytut Wrocla, digital model of deposit geolog, Australian company MINCOM™, MINESCAPE™ software*

LIDIA GAWLIK, ZBIGNIEW GRUDZIŃSKI, URSZULA LORENZ

Selected Problems of Production and Use of Brown Coal • Kwartalnik Górnictwo i Geoinżynieria • z. 2, 2007

Brown coal and hard coal are two main fuels used from electricity production in Poland. Brown coal is produced in four regions: Adamów, Bełchatów, Konin and Turów. In last few years the coal production stabilized at the level of about 61 M tons. To keep the present production level after 2020 it is necessary to build coal mine for exploitation of the most attractive undeveloped deposit "Legnica". In Poland brown coal is mainly used for electricity production. The prices of the electricity is presented in the paper. Also some data on emissions connected with electricity production from brown coal are given.

Keywords: *brown coal, reserves, coal production, electricity production, emissions*

EUGENIUSZ IDZIAK, ROMAN SZYSZKA, ANDRZEJ SIENNICKI, BOGDAN TUREK

Robotized Excavator Buckets Welding • Kwartalnik Górnictwo i Geoinżynieria • z. 2, 2007

Excavator buckets are fast moving elements. Each bucket is subject for rebuilding before renewed assembly on the excavator. On the robotized welding stand, during rebuilding process, operations of bucket wear parts cutting out, facing by welding, and welding are automatically executed. This is possible since this stand is composed of ROMAT 320 series robot, tilting-rotary positioner witch load capacity 75000 N and welding installation carrying following processes:
— high-duty MAG-MIG TANDEM method welding,
— oxy cutting,
— plasma cutting,
— facing by core self-guard wires.
Reproducible operations execution during bucket rebuilding process with robotized stand caused more efficiency increasing, quality improvement and most noxious and harmful operations elimination for workers health, which were manually by them executed as yet

Keywords: *plasma cutting, oxy cutting, bucket, excavator, facing, rebuilding, robot, robotized, welding, TANDEM*

TADEUSZ KACZAREWSKI, TOMASZ ŻWIRSKI, MACIEJ KMIOŁEK

Mining Computer System in the BOT KWB Turów SA • Kwartalnik Górnictwo i Geoinżynieria • z. 2, 2007

The new requirements to make safe and optimal excavation force BOT KWB Turów SA to find new solutions to new needs. The modern Information System for Miners is the solution in which miners apply digital tools to collect, processing, store and combine geological, survey and geotechnical information. Formation of Information System for Miners, start from building digital map. At present the digital maps are joined with the Geological Database and there are the base component of GSI. Departments of BOT KWB Turów SA use this Information

System: Survey Dept, Geological Dept, Mining Dept, Geotechnical Dept. Measurable advantages: safe time, lowering employee, give up external services. Immeasurable advantages: increase data credibility, elimination wrong economic decisions and catastrophic events like landslides.

Keywords: *lignite mining, informatics systems, data bases, optimization of mining, digital 3D maps*

ZBIGNIEW KASZTELEWICZ, KAZIMIERZ KOZIOŁ

Productivity and Working Time of Bucket Wheel Excavators in Polish Lignite Mines · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

There are two basic parameters which describe excavators work in Polish lignite mines, i.e. efficiency and working time. Presented indices describe individual types of excavators and an average value for all machines operating in the mine. Former exploitation results prove the proper use of their technical parameters, not only on the field of productivity but also time of work. Received values of those parameters are estimated as an European level. This parameters would be even higher when it had been possible to eliminate limitations which appeared periodically at the mine sites. Those limitations appeared in lignite mining industry on two fields: technical and organizational (shortage of parts, shortage of additional machinery, financial limits, standstills in peak energy demand hours, etc.).

Keywords: *lignite mining, productivity of bucket wheel excavators*

ZBIGNIEW KASZTELEWICZ, KAZIMIERZ KOZIOŁ, JERZY KLICH

Post Extraction Land Reclamation in Lignite Mines in Poland in XXI Century· Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

The lignite mining profile in the range of land obtaining and return under mining activities has been presented in the article. Hitherto existing achievements of the mines in reclamation and utilization of pits have been also described.

Keywords: *lignite mining industry, reclamation, aftercare of post extraction open pits*

ZBIGNIEW KASZTELEWICZ, KAZIMIERZ KOZIOŁ, JERZY KLICH

Lignite — Optimal Energy Offer for Poland

The article presents the sector of brown coal in Poland on the basis of active mines. The capabilities to satisfy country energy demands, with use of own natural resources, take into consideration also economic factors and safety of energy supplies. Sector development secures alternative employment for thousands professionally active people as well. Lignite as the cheapest fuel, giving guarantee of energy safety for long years, is a leading motto of this paper. In connection with research and development, as well as production possibilities, it makes the optimum offer for Polish power industry.

Keywords: *mining industry, power industry, energy raw materials, power supply safety*

ZBIGNIEW KASZTELEWICZ, KAZIMIERZ KOZIOŁ, WIESŁAW KOZIOŁ, JERZY KLICH

Lignite — Prospects of Development · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

The paper characterizes the most promising Polish lignite deposits. It also presents the possibilities of using it for energy needs in the perspective of a 100–120 years. The study concerns such strategic deposits like “Legnica”, “Gubin – Mosty” and “Złoczew”. The last is the satellite deposit of “Bełchatów” Mine, making the prospect for Bełchatów Power Plant to be active until 2070.

Keywords: *lignite mining, deposits of lignite, electric energy production costs, power supply safety*

ZBIGNIEW KASZTELEWICZ, ARKADIUSZ MICHALSKI, ZBIGNIEW JAGODZIŃSKI, PAWEŁ CZAPLICKI

Reclamation of the Post Mining Areas in Konin Lignite Mine · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

Hitherto existing achievements of the Lignite Mine in Konin in the land reclamation of the post mining activities have been presented in the article. The reclamation and utilization of the already closed pits and those planned to liquidation in the nearest period have been described.

Keywords: *lignite mining, postmining pits, reclamation, aftercare of postmining areas*

ZBIGNIEW KASZTELEWICZ, RYSZARD REIZER, JERZY SZYMAŃSKI, JERZY ŚWIDERSKI

Modern Low Voltage Frequency Converters for Drives of Caterpillar Surface Mine Machines and for Drives of Conveyor Belts with Regulated Speed · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

In the paper modern drive solutions of mobile conveyor belts, caterpillar excavators and spills for surface brown coal mine as well as control methods of systems are presented. In classic drive solutions DC motors were used. Nowadays DC motors are replaced by AC motors. AC motor drives are controlled by advanced frequency converters in which scalar and vector control strategies are implemented. Power electronic recuperation units are used for power saving. Recuperation units return electrical energy to the power grid when the induction motors work as generators. The solution of the multi-motor drive system is discussed on the basis of the biggest brown coal excavator in Poland.

Keywords: *caterpillar machine, conveyor belts, electric drive, excavator, multi-motor drive, spills, voltage frequency converter, VFC*

KONSTANTINOS KAVOURIDIS, CHRISTOS ROUMPOS, MIHAIL GALETAKIS

The Effect of Power Plant Efficiency, Lignite Quality and Inorganic Matter on CO_2 Emissions and Competitiveness of Greek Lignite · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

Greece, mining approximately 70 Mt annually, is the second lignite producer in the EU and fifth largest in the world. Lignite is a key strategic fuel for Greece because it's a very cheap and stable source of energy that is readily available in large quantities. The future exploitation of lignite and hard coal deposits in Greece and Europe depends on the possibility of the coal industry to adapt the environmental requirements of Kyoto Protocol, regarding the control of greenhouse gas emissions. The CO_2 charges through the Emission Trading Scheme (ETS) will increase the operating cost of existing coal fired power plants and currently is the main reason for a lack of investment in coal fired units in many EU member states. CO_2 reductions through fuel switching (from coal to gas) have become increasingly expensive and risks jeopardising European competitiveness. Furthermore technologies for CO_2 capture in fossil-fuel power plants and CO_2 sequestration could be exploited only in the longer term (after 2020). To remain lignite as a major component of the Greek energy mix, technological solutions and policies are needed which will enable lignite to contribute to the solutions for climate change. In the short and medium term the increased power plant efficiency and the continuous application of qualitative criteria in lignite deposit exploitations (improved calorific value and reduced $CaCO_3$ content) will be proved as the only capable of delivering competitive lignite/coal — fired generation and contributing to preserve resources and reduce CO_2 emissions.

Keywords: *CO_2 emissions, lignite power plant, lignite mining*

WOLFGANG KETZMER

Lusatian Lignite — Modern, Competitive and Sustainable Lignite Mining · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

Since the beginning of the 1990s, comprehensive refurbishment and modernisation measures of the opencast mine equipment have been carried out to increase and ensure competitiveness of the opencast mines of the Lusatian lignite mining area. The development of modern and competitive lignite mining required a comprehensive rehabilitation of plants and equipment of the raw coal transportation — the so-called "Coal connecting railway system

Lusatia“. Immission protection for the neighbourhood of opencast mines, recultivation and ambitious shaping and use of the post-mining landscape as well as socially-acceptable resettlements are challenges Vattenfall Europe Mining AG faces with regard to a sustainable lignite mining. In 2011 the importance of the energy region Lusatia will be further enhanced by the starting of the commercial operation of the Boxberg unit R with an installed capacity of 675 MW. The long-term development of the Lusatian lignite mining area has to be considered for a period of at least 40 years. Lusatia has an enormous potential with more than 12 billion tones of lignite. Vattenfall will concentrate on the application of the CO2-free power plant technology for the future use of run-of-mine lignite in modern, environmentally friendly and most of all competitive power plants.

Keywords: *lignite mining, opencast mining*

MARCIN KOŁODZIEJCZAK

Safe and Reliable Methods of Acquiring and Archiving Telemetring Data on Example Mining System in BOT KWB Bełchatów SA • Kwartalnik Górnictwo i Geoinżynieria • z. 2, 2007

The paper contains a description of acquiring and archiving data in telemetry system on example Mining System in BOT KWB “Bełchatów” SA. This article describes solutions which are used in communications layers of system, using redundant communication channel, which guarantee reliability transmitting signals from machines and conveyors in strip mine to field and central databases. There is also a description of data processing, visualization and making this data available to dispatchers, engineers and maintenance services. This paper presents also mechanisms and technical solutions, which guarantee safe storing data in Mining System, in case of any element failure in the system or losing communications inside system.

Keywords: *automation system, acquiring data, storing data, safe archiving data, visualization*

ZDENĚK KOSŇOVSKÝ, SŁAWOMIR SZTEJNBIS

Application of the Most Recent Achievements in Manufacturing Technology of Spare Part for Surface Mining Machinery • Kwartalnik Górnictwo i Geoinżynieria • z. 2, 2007

The paper presents brief characteristics of grades of materials used for the manufacture of a ball bearing ring, a toothed ring and a track plate, and describes heat treatment methods. Machines working in surface mining, because of the specificity of working conditions and huge loads, require their design to account for the parts that meet the highest standards as regards loads and time-to-failure values. A crucial impact on operation of such items as ball bearing rings, toothed rings and track plates has the selection of a suitable grade of material, taking a maximum advantage of its mechanical properties and having it undergo appropriately selected heat treatment processes. An appropriate selection of the above parameters and a proper computer simulation of a manufacturing process allows for the manufacture of high quality spare parts.

Keywords: *toothed ring, ball bearing ring, ball race, track plate, volume hardening, induction hardening, brands of materials, spare parts, excavators*

WIESŁAW KOZIOŁ, EDWARD SOŚNIAK, WALDEMAR JOŃCZYK, ŁUKASZ MACHNIAK

Exploitation of Hard Rock-Mass Accompanying of the Lignite Deposit “Bełchatów” and Possibility their Industrial Utilization • Kwartalnik Górnictwo i Geoinżynieria • z. 2, 2007

In BOT KWB “Bełchatów” SA exist the necessity to mine of hard rock-mass in relation to locations of the lignite deposit in rift valley as well as large depth of overburden covering this deposit. The paper describes general geological profile as well as quantity of the rock-mass. Gettability was marked on basis of characteristic qualitative features. The applied technologies as well as technological operations aim at maximum utilization of these rock-mass for own demands as well as the external recipient demands. The analysis of rock-mass qualitative parameters results that produced aggregates was classified to road aggregates the lowest class, and part with them will be off class aggregates. Large demand for road and construction aggregates in Poland, also for lower classes (quality), causes that those aggregates are valuable market product.

Keywords: *hard rock-mass*

KRZYSZTOF KRAUZE, KRZYSZTOF KOTWICA

Simplified Method of Diagnosis of Technical Condition of Heavy Hydraulic Impact Hammers Used to Supplementary Works in Open Pits · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

The paper presents new simplified method of diagnosis of technical condition of heavy hydraulic impact hummers that are used in open pits. This method, on the contrary to the most commonly applied methods of calculating impact energy, does not require special research bays (positions), is cheap and possible to apply directly in the place of work of hammer.

Keywords: *heavy hydraulic hammer, impact energy, measurements, open pit*

ZDZISŁAW KULCZYCKI, ARTUR SOWA, JERZY PICUR

The Use of Computer Systems for Preparing the Surveor Geological Documentation of Mines · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

One of the kind of documentation's which mine entrepreneur has, is a surveyor-geological documentation. The documentation can be made up or completed only by certificated mine surveyors and geologist in accordance with their qualifications. The surveyor and the geologist do for a mining establishment many kinds of measurements, quantity surveys and calculations. Results of these works can be used, among other for creating maps of mining excavations. To realise this tasks, which are connected with surveyor-geological documentation the computer methods and tools also can be used. The large accessibility of the software connected with visualisation of results of survey or geological measurements allows to change the form of preparing the cartographic and textual documents which compose of the surveyor-geological documentation. For meeting the obligations, which are needed in the surveyor-geological documentation it is necessary, that the documents have special features. The passage from traditional way to electronic system of documents preparing and updating needs special methods and demands time-consuming works. The digital surveyor-geological documentation needs to transfer traditional maps in to digital environment, standardise thematic layers as well as to prepare special procedures for actualisation of excavations progress as well as other elements on the mining maps. The paper presents and characterises also individual elements influencing essentially management of digital records referring to survey and geological data.

Keywords: *surveyor-geological documentation, numerical maps, management of digital maps, recording, protection, updating, digital surveyor-geological documentation*

BERND LOOSE, THOMAS PAETZOLD, STEFFEN KROSCHK

Cutting Investment Costs by Using a New Solution of Speed Controlled Belt Conveyer with Available Medium Voltage 6kv-Slipring-Motors · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

Traditional belt conveyors with power over 400 kW in open pit coal mines are usually equipped with 6 kV slipring motors with resistors or liquid starters. The following benefits of speed-controlled belt conveyors:
— saving of energy costs thanks to adjustable belt speed control, depending on the belt loading level,
— reduction of mechanical wear of cable drums, gears and conveyor belts,
— saving of investment costs thanks to decreasing of installed power in connection with extended loading power,
— decreasing the amount of stoppages and reduction of repair costs, do not exist in case of traditional belt conveyors.

The 6 kV drives, installed by BEA Technische Dienste Lausitz GmbH and Rockwell Automation in Vattenfall Europe Mining AG with existing 6 kV slipring motors, have enabled to cut investment costs significantly. After additional sensors and measure instruments were mounted and tested with 20-year-old DSRCJ 5621-6 slipring motors (produced by VEM Sachsenwerk), these motors have been feeding by PF7000 6 kV Rockwell Automation frequency converter and working (permanent operation) on the 2,5 m belt conveyor station in open pit coal mine Welzow Süd.

Keywords: *belt conveyor, 6 kV slipring motor, frequency converter PowerFlex® 7000, twin drive technology*

JAN MACUDA, LUDWIK ZAWISZA

Methane in Lignite Beds · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

The results of studies of methane adsorbed in the lignite beds in the large areas of documented lignite beds in Poland are presented in the paper. Methane adsorbed in the lignite beds of the analyzed opencasts is highly variable.

The biggest methane concentrations are observed in the Lignite Opencast Bełchatów and are about 294.82 mln m^3. The present methane resources in the Lignite Opencast Adamów are only 0.10 mln m^3, in Lignite Opencast Turów 3.63 mln m^3, and in the Lignite Opencast KWB Konin 0.53 mln m^3. The highest methane content in the lignite beds of Bełchatów are also proved by the high methane content in the air produced by the hydrogeologic, observation and technical wells localized within the field Bełchatów and Szczerców.

Keywords: *methane, lignite, methane resources*

WIESŁAW MIGDAŁ

The Role of Industrial Informatics in the Process of Integrated Enterprise Informatization Shown in the Example of Opencast Mining · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

The article focuses on the use information resources of industrial informatics in managerial decision-making processes. The Author emphasizes particularly the multiple aspects of the quality of information generated in industrial informatics systems as well as information deposited in the systems. Technical values of such information are indicated, and its economic and managerial nature is displayed, which is demonstrated by specific examples. The subject matter is dedicated to practitioners of economics who fail to appreciate the economic aspect of technical information, particularly in the process of integrating the enterprise information systems achieved through integrated informatics technology, including the implementation of technologically advanced systems. The Author considers the stage of preparing an enterprise for the implementation of integrated informatics technology, equipped with the capacity to support managerial decision-making processes with industrial informatics resources, as critical to the possible uses of information characteristic for technical aspects of the enterprise production process. The logic of interrelations of the enterprise information resources is shown and a sample tool for practical sanctioning of the lasting nature of such relations is demonstrated. The subject matter of the article is presented in the example of a lignite mine. The entity selected illustrates the case of good practice in preparing an enterprise to the implementation of advanced informatics technology used to support highly specific enterprise management in turbulent environment and competitive global market.

Keywords: *industrial informatics, management informatics, integrating of information systems, support in enterprise management*

ANDRZEJ MISZCZYK, KRZYSZTOF BRUSKI, KAZIMIERZ DAROWICKI

Modern System Solutions for Anticorrosion Protection Optimization in Brown Coal Mining · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

A new concept of cooperation between units interested in optimization of anticorrosion protection in brown coal mines is presented. It includes contribution of paint producer and scientific units testing new anticorrosive solutions. Individualized approach to design of anticorrosion measures enables fast testing and introduction of new solutions. Moreover, it makes possible to control application conditions by paint producer to ensure high quality coatings. The methods of selection and testing of new paint systems using impedance spectroscopy is presented. Examples of degradation impacts from vibration, wearing and aggressive chloride-containing waters are discussed.

Keywords: *corrosion, protective coatings, brown coal mine*

SZYMON MODRZEJEWSKI

Electricity from Lignite in the Light of Clean Coal Power Technologies Programs, Prices and Production Costs in 1995–2006 · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

Directions of activities indicated by International Energy Agency and European Union in a range of perspective development scenarios of clean coal power technologies have been presented. Undertaken actions within this issue developed in Foresight program, including brown coal mining and processing technologies, have been outlined. Conceptions of hydrogen production from brown coal are especially important. Diverse growth of electricity price in particular countries of European Union in 2005–2006 has been outlined. Development of electricity production from brown coal, as well as its prices and costs in comparison with domestic prices for final consumers have been analysed. An unfavourable trend of enlargement of differences between domestic electricity price and recently

stable price of electricity produced in brown coal fed power plants has been displayed. Annual growth of energy production since 2002 mainly in coal power plants has been displayed. Electricity consumption 3% growth caused by Gross Domestic Product 5,8% growth has been outlined. Presented conditions afford possibilities for a definition of development trends of brown coal industry.

Keywords: *clean energy technologies, electrical power engineering*

JACEK MOTYKA, MARIUSZ CZOP, WALDEMAR JOŃCZYK,
ZBIGNIEW STACHOWICZ, ILONA JOŃCZYK, RENATA MARTYNIAK

Water Environment Impacts of the Deep Brown Coal Exploration in Belchatów Open-Pit (Poland) · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

Brown coal exploration in the Belchtow open-pit is connected with intensive and deep drainage of the groundwater from Quaternary, Tertiary and also Cretaceous-Jurassic aquifers. Drainage of the high permeable aquifers has led to the formation of the extensive zone of the hydrodynamical changes of water environment. Bełchatów open-pit cone of depression has an a area of about 450 km^2. Within central part of this cone in the vicinity of the Bełchatów open-pit, groundwater table was highly lowered, on the order of tens metres. The next influence of the mining activity in Bełchatów open-pit is connected with changes in surface water budget, mainly in decreasing in groundwater recharge of the cachtments. Drainage of the groundwater is a reason for formation of the anthropogenic, modern vadose zone with availability of the oxygen. Groundwater quality deterioration within cone of depression is connected with geochemical processes of the sulphide minerals oxidation, buffering of the acid mine drainage and formation of the highly soluble secondary sulphate minerals and also occurrence of the Na–Cl groundwater in the "Dębina" salt dome area. Monitoring system of the water environment in the vicinity of Bełchatów open-pit gave the possibility for observation of the water environment and also for planning of the remediation scenarios.

Keywords: *brown coal mining, impacts of mining activity, Bełchatów open-pit, water environment, cone of depression, hydrochemical changes*

JANUSZ NOWAK

Strategic Trends in Development of Lignite Mining Technologies · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

The paper presents current condition of Polish power industry with regard of European environmental requirements and reserves availability. Possibilities offered by global technological development for lignite as an fuel for power industry, are shown. Taking into consideration the hard coal properties, it was shown that development strategy for lignite should not include all future methods of transferring it into other energy carriers due to the high cost of such operations. Correlation of mining development of both types of coal and their planned utilization for the power production purpose was underlined. Possibilities of using lignite for underground gasification and producing the power energy using the syngas are presented as an example of development of new technologies for lignite utilization.

Keywords: *lignit, coal gasification, power industry*

ANDRZEJ PATRYCY

Conditions of Lignite Fired Power Plants Development · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

This lecture discusses conditions of providing construction of lignite fired power plants in Poland with respect to: prognosis of increase of electrical energy demands and complexions related to necessity to maintain natural environment protection standards which are mandatory in European Community. An overview of ecologically "clean" coal fuel based technologies of electrical energy production and presentation of some realization examples have been provided therein.

Keywords: *power sector, coal power plants, clean energy*

MACIEJ PAWLIK, ANDRZEJ OZIEMSKI

Efficiency Improvement in 370 MW Brown Coal-Fired Power Units · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

The paper presents the case study of possible ways to improve the power generation efficiency for 360 MW power units installed in the Bełchatów Power Station. Due to the modernization programme of low pressure stage of 18K360 steam turbine, the capacity of single power unit has increased to 370 MW. The review of possible ways to improve the power generation efficiency includes changes of thermodynamic cycle operating conditions and modification of power plant systems in accordance with solutions applied in modern steam power stations. Current operating conditions of the power station are taken into consideration in the study. An expected increase of power unit efficiency is estimated as well as technical and economical effects for each suggested solution.

Keywords: *power unit, improvement of power generation efficiency*

TADEUSZ RATAJCZAK, ELŻBIETA HYCNAR, WALDEMAR JOŃCZYK, ANNA SKÓRZAK

Complex Utilization of Associated Mineral Raw Materials and The Problem of Revitalizing Post-Mining Areas — a Case Story of the Lignite "Bełchatów" Deposit · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

In the wide-understood problem of lignite mining management, the role of overburden rocks is of special importance, considering opencast extraction of the commodity. These rocks have sometimes properties of associated mineral raw materials and in such situations their presence gives rise to various exploitation and environmental issues. To avoid any irreparable loss of the overburden rocks, they are stored after stripping in the form of artificial, anthropogenic deposits with specific properties. The presence of such secondary deposits and their proper management will decide about revitalizing post-mining areas when lignite mining comes to the end. The revitalization will include diverse activities, aimed at restoring an original status of the area or — if it is not possible — giving both the site after the mined-out deposit and the mine infrastructure new, different economic values. Revitalization of post-mining areas deals just with such challenges.

Keywords: *associated mineral raw materials; anthropogenic deposits; revitalizing post-mining areas*

EUGENIUSZ RUSIŃSKI, MARCIN KOWALCZYK, JERZY CZMOCHOWSKI

Chosen Issues of Modernization of Joint Between Bucket Wheel and Planetary Gear · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

Clamp joints used in the mining mechanisms of multibucket wheel excavators are the cause of serious repairing problems as well as financial looses. As far as the mining machines of quite difficult to mine formations in KWB Turów are concerned, the most important deficiency of used in these machines clamp joint is a tendency to form the adhesion connection on the surface of clamp of the movable part of yoke to the pin of the buckle wheel shaft. Every time pulling down the gear from the shaft causes the shaft surface defect or is not possible to do without damage. Generally after disassembling, shaft and yoke need to be regenerated or exchanged. This is the one of the main reasons, that the project concerning the elaboration of new solution was started from. In the article, the chosen issues of designing the new connection between planetary gear yoke and bucket wheel were presented. In the chosen concept of shaped joint the existing elements of mining mechanism are maximally used. All of the elaborated structural solutions underwent the penetrating strength FEM analysis with taking the way of performing into consideration.

Keywords: *bucket wheel drive systems, clamp joint, forming joint*

ROMUALD SALATA, HANNA MRÓWCZYŃSKA

Potential Directions of Pro-Ecological Use of Brown Coal from the Mine BOT Turów SA · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

Basing on petrographical characteristic of "Turów" deposit it discussed potential direction of off-energy, pro-ecological aplication of waste product, that is dust generated during coal sorting for individual consumers needs. It

also presented a realization idea of planned projects, that besides organizational problem, contains also technological and economic issues. Above problems will be realized within the activity of Industrial — Technological Park, operating in Zgorzelec area, including BOT Power Plant SA and BOT Lignite Mine SA.

Keywords: *petrofography of brown coal from "Turów" deposit, coal dust, sorbents and carriers, humic substances, Bogatynia — Zgorzelec Industrial — Technological Park*

TADEUSZ SMOLNICKI, GRZEGORZ PRZYBYŁEK, MARIUSZ STAŃCO

The Increase of Carrying Capacity of Large-Size Bearings with the Use of Raceway Correction Method · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

Large-size bearings of machine's revolution structure of basic surface mining machines pertain to the most effort subassemblies of the load carrying structure, which is a reason of a high and eccentric loading, insufficient rigidity of the supporting subassemblies as well as disadvantageous working conditions. Usually the technical possibility of providing the suitable rigidity of supporting subassemblies does not exist. The raceway correction method bases on the suitable forming the raceway bottom groove and the lifting it in the more flexible areas and lowering in the more rigid areas. As a result of above treatment the loading compensation of particular rolling elements as well as significant decrease of maximal loadings that decide about failure was obtained. The use of such a treatment enables the significant increase of bearing life. The correction treatment of bearing raceway is described on the ZGOT 11500.100 dumping conveyor example, that is being built for BOT KWB Turów SA mine at present.

Keywords: *surface mining machines, sleewing bearing, raceway correction, finite element methode*

MAREK SOKOLSKI

The Modernization of The Power Drive Systems as a Way of Reducing of the Noise Hazards Level — Case Study · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

The results of noise measuring of the bucket-chain excavators Rs 400 ("Adamów") tested before and after modernization were presented. The high noise annoyance in the not modernized excavators — especially in the power drive systems of the digging and slewing mechanisms — was perceived. The significant influence of the modernization of the bucket-chain excavators on the noise level reduction was proved.

Keywords: *lignite mine machinery, degradation, modernization, noise hazard*

ZBIGNIEW STACHOWICZ, JACEK SZCZEPIŃSKI

Impact Assasment of the Future "Piaski" Open Pit Dewatering on the Water Environment · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

Overburden stripping in the "Piaski" open-pit is planned in 2010 and the lignite production will start one year later. Production capacity will be 3.5 Mg/year. According to the present conception lignite production will finish in 2036. Identified and documented geology structure, hydrogeological conditions and technology of operation, enable to apply as a fundamental water wells dewatering system. Taking into account hydrogeological conditions, three hydrostratigraphic units were distinguished in the area of potential impact of dewatering: overburden aquifer, lignite underlying aquifer and cretaceous aquifer. To simulate dewatering impact on water environment the USGS program MODFLOW has been used. Based on the two-layered numerical model with area of 1550 km^2, groundwater circulation was simulated in the natural conditions as well as in the conditions changed due to mine dewatering operations. The results indicate that because of mine dewatering the range of the cone of depression will amount to 3–5 km. Groundwater recharge originate mainly from the infiltration of precipitation and additionally from Czarna Struga river. Open pit dewatering may results in decrease of baseflow to Warta river by about 1.9 m^3/min.

Keywords: *dewatering, environment, flow modelling*

KRZYSZTOF STAŃCZYK, MAREK BIENIECKI

Possibilities of CO_2 Emission Reduction and Their Influence on Efficiency and Cost of Coal Energy Production • Kwartalnik Górnictwo i Geoinżynieria • z. 2, 2007

In the paper the analysis of the projects dealing with the main technological solutions of CO_2 capture and storage were done. The following systems were discussed:
— system of capture and storage of CO_2 in post-combustion,
— system of capture and storage of CO_2 in pre-combustion,
— system of oxy-combustion,
— and co-combustion of coal and biomass.
In the analysis were discussed:
— influence of the chosen technology of CO_2 abatement on costs and energy effectiveness of electricity production,
— influence of emission trading on economy of the different options.

Keywords: *energy, emission, technology, carbon dioxide, effectiveness, costs*

IVAN SVOBODA, MARIE VRBOVA, VRATISLAV ONDRÁČEK

Surface Coal Mining and Land Reclamation in the Czech Republic • Kwartalnik Górnictwo i Geoinżynieria • z. 2, 2007

Reclamation activities in the area of Czech brown coal basins have been carried out for more than 50 years. During that time the reclamation policy has undergone dynamic development. The actual concepts aims at renewal of the functions of not only the territory directly affected by mining but also the entire neighbouring landscape. The reestablishment of the water managmenet regime in whole post-mining area is very important and the future lakes in mine residual pits are planned for the purpose of the enhancement of the environmental stability. This involves a great numer of measures, which are very challenging in terms of technology and economy. Optimised conditions for implementation these measures should be created through the mining activities themselves, particularly during the final phase of mining. This way, considerable financial amounts will be saved in the post-mining phase. Such approach will significantly contribute to the renewal of ecological, aesthetical and socio-economic functions of the area devasted by brown coal mining activities.

Keywords: *reclamation, renewal of the landscape functions, dumps, lakes in residual pits, geomechanical stability, mine site drainage, morphology of territory, planning of post-mining landscape, scheme of rational landscape creation*

JERZY ŚWIĄDROWSKI, ALINA REJMAN-BURZYŃSKA, EUGENIUSZ JĘDRYSIK

Lignite as Raw Material for Liquid Fuels Production • Kwartalnik Górnictwo i Geoinżynieria • z. 2, 2007

The present-day methods of lignite utilization consist mainly in its combustion in power industry. Nevertheless, in lignite resource-abundant countries research works on more sustainable, less environmentally harmful and more efficient way of lignite utilization have been carried out for a number of years. The incentive lies in generally low lignite production cost when compared with hard coal. One of the possible trends in lignite processing is generation of liquid products — substitute for crude oil, applying the direct hydrogenation method. Lignite suitability for this kind of processing has been already proved in lab-scale, PDU-scale and pilot plant scale. In the paper the present-day research works on lignite (among the others Australian ones) direct hydrogenation are presented as well as the advantages and drawbacks of lignite as a raw material for liquid fuels production. It is concluded that in the national circumstances lignite should be considered a potential raw material for hydrogenation process.

Keywords: *lignite, hydrogenation, liquid fuels*

ANTONI TAJDUŚ, JÓZEF DUBIŃSKI, JAN ROGUT

Coal Mining Industry as A Driving Force for Advanced Technologies Development of XXI Century • Kwartalnik Górnictwo i Geoinżynieria • z. 2, 2007

Bituminous coal and lignite are the main energy carriers in Poland and according to primary energy consumption forecasts they will remain the basic energy carriers at least until 2030. It goes beyond any question that bituminous coal and lignite form the foundation of energy security in Poland. Currently, the issue of key importance is whether

Polish coal mines will be able to meet the required demand or whether coal imports will become necessary. Consequently, the greatest challenge of the Polish mining industry is the cooperation in the field of development of clean coal technologies indispensable in light of the increasingly stricter environmental regulations, especially regarding CO_2 emissions. This challenge concerns equally the mining as well as the energy sectors. The role of the mining industry as an integrating medium of science and technology, constituting a driving force for the development of advanced twenty first century technologies has been presented. The paper also focuses on the European dimension of new mining and energy technologies which should be developed in Poland to facilitate the country's active participation in international activities in the field of clean coal technologies. Some of which may become Polish specialization. The following exemplary technological solutions which represent different stages of development are discussed in detail:

— Adsorption enhanced anaerobic coal gasification to hydrogen and/or SNG- Substitute Natural Gas (projects ISCC and C_2H).
— Hydrogen generation by direct underground coal gasification (project HUGE).
— CO_2 recycling in integrated coal and nuclear based energy generation (project proposal).
— Underground CO_2 sequestration in unmineable coal seams (project RECOPOL).

The proposals of research and development activities which are of key importance to maintain and develop the position of both the mining industry and the coal related energy sector in the 21st century have been delineated.

Keywords: *clean coal technologies, georeactor, underground coal gasification, CO_2 sequestration*

LUDWIK ZAWISZA, JAN MACUDA, WIKTOR GĄDEK, JÓZEF NOWAK

Production Logging Test for Determining Zones of Water Flux to Large Diameter Wells · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

Measurement methodics, data presentation modes and results of interpretation of profilings made with the use of a Production Log (PL) within a production test in hydrogeologic wells are presented in the paper. The described measuring methodics and interpretation are presented on the example of data from the geothermal well M-1, well K-3 for discharging mine's waste brine, and geothermal well SS-1.

Keywords: *Production Log, large diameter wells, water flux*

ERIK ZIMMERMANN, CHRISTIAN NIEMANN-DELIUS

Microwave Beneficiation of Brown Coal · Kwartalnik Górnictwo i Geoinżynieria · z. 2, 2007

Coals of the Rhenish lignite mines, designated for power plant utilization, were exposed to microwave radiation energy for different time periods and energy levels, varying from 2,5 kW up to 10 kW, in order to dry the coal. The samples were treated with microwave radiation with a frequency of 2,45 GHz. A batch- as well as a continuous drying simulation and a verification with pre- dried samples (70°C for 24 h), were conducted on a pilot scale level industrial microwave oven. To prove the general viability of microwave radiation as a beneficial process for brown coal, basic coal properties such as moisture content, volatile matter and gross calorific value were analyzed. Results show, that nearly no decomposition of the coal takes place, the moisture content can be reduced to a suitable level for pulverized coal firing power plants, the gross calorific value increases and double energy input leads to halved drying times. Furthermore the temperature of the brown coal did not exceed 90°C during exposure to microwaves at ambient temperature and normal atmospheric pressure. The drying of the coal with microwave radiation showed in a first approach no negative side effects of the coal properties.

Keywords: *lignite, brown coal, beneficiation, drying, microwave*