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ABSTRACT**ASPECTS CONCERNING CAVITATION EROSION OF SOME AUSTENITIC STAINLESS STEELS USED FOR IMPELLER BLADES AND DISPLACEMENT MOTORS.....5**

Ilare BORDEAȘU, Mircea O. POPOVICIU, Brândușa GHIBAN, Nicolae GHIBAN, Florin MICULESCU

Key words: austenitic stainless steels, erosion, maximum depth penetration, (micro) constituents.

Abstract: The paper makes the analysis of damages produced by vibratory cavitation at four types of austenitic stainless steels (with 100% austenite, 98% austenite + 2% ferrite, 90% austenite + 10% ferrite and 65% austenite and 35% ferrite). The quantity of structural constituents was established in accordance with Schaeffler diagram [1]. These steels were created for impeller blades and components for displacement motors. The maximum depth penetration (MDP_{max}) at erosion was considered as comparison parameter, measured after 165 minutes of cavitation attack. Remarks and conclusions were based both on chemical effects (especially of manganese and silicon contents) and on simultaneously influence of microstructure and chemical composition on cavitation attack behavior of the steel. So, steels with ferritic structures may be created in order to resist to cavitation attack better than completely austenitic structure steels. The tests were realized in accordance with ASTM G 32-85, in a magnetostrictive vibrator device with nickel tube in the Laboratory of Hydraulic Machines from Timisoara.

IMPLEMENTATION OF THE LIME SEMIDRY DESULPHURISATION PROCESS IN THE ROMANIAN ENERGY INDUSTRY-CASE STUDY.....9

Dorel BĂDESCU, Claudia TOMESCU, Ioana IONEL, Ioan PĂDUREAN, Viorica CEBRUCEAN

Key words: Sulphur dioxide, semi-dry desulphurisation, lime, flue gases, stack, end-product.

Abstract: The integration of Romania in the European Union implies the reduction of the pollutant substance emissions, exhausted into atmosphere through the existent Power Plant stacks. The Governmental Decision no.541/2003 and Directive 2000/80/EC establish the measures needed to limit the emissions of certain pollutants (sulphur dioxide, nitrogen oxides and dust) from burning of fossil fuels in large combustion plants. To reduce the SO_2 emission it is required to install a desulphurisation system in existing power plants. For the units with medium power or reduced hours of operation the technical and economic results recommended to use the semidry methods of desulphurisation, with lime.

The semidry FGD installation was adapted to the real condition of the existing units in Romania, where, because the space behind the boilers and stack is limited, it will be mounted on the first coal pile. Also, the clean flue gases will be exhausted through a new stack. Because the selling of the end-product is reduce in Romania, it will be mixed with ash and transported to be deposited to the existing ash pond. The investment and operational costs of the FGD system will increase the energy price, but the emission values of SO_2 will be under the limits of the environmental legislation.

This semidry FGD will be constructed at SC Electrocentrale SA Deva, and several coal-fired cogeneration power plants.

IMPLEMENTATION IN THE ROMANIAN ENERGY INDUSTRY THE FLUE GAS WET DESULPHURISATION METHODS, DREAM AND REALITY.....14

Carmencita CONSTANTIN, Marian DOBRIN, Ioana IONEL, Ioan PĂDUREAN, Francisc POPESCU

Key words: Sulphur dioxide, wet desulphurization, limestone, flue gases, stack, dehydration, gypsum

Abstract: The integration of Romania in the European Union implies the reduction of the pollutant substance emissions, exhausted into atmosphere through the existent Power Plant stacks. The Governmental Decision no. 541/2003 and Directive 2000/80/EC establish the measures needed to limit the emissions of certain pollutants (sulphur dioxide, nitrogen oxides and dust) from burning of fossil fuels in large combustion plants. To reduce the SO_2 emission, it is required to install a desulphurization system in existing power plants. For the units with more than 300 MWe and operation on base load, the technical and economic results recommended to use the wet methods of desulphurization, with limestone. The wet FGD installation was adapted to the real condition of the existing units in Romania, where because the space behind the boilers and stack is limited, it will be mounted on the first coal pile. Also, the clean flue gases will be exhausted through a new stack placed up to the absorber.

Because, now there is no desulphurization gypsum market in Romania, it will be mixed with ash and transported to be deposited to the existing ash pond. Some of the power plants have decided to have a dehydration system from the beginning, others will construct it after having found buyers for gypsum. The investment and operational costs of the FGD system will increase the energy price, but the emission values of SO_2 will be under the limits of the environmental legislation. This wet FGD will be constructed at SC CE Turceni SA, SC CE Rovinari SA, SC CE Craiova SA, SC Termoelectrica SA and RAAN

UP-TO-DATE METHODS FOR THE ECONOMIC MANAGEMENT OF GREENHOUSE GAS EMISSIONS (GHG) FOR THE STEEL INDUSTRY OPERATORS.....21

Carmencita CONSTANTIN, Claudia TOMESCU, Ioana IONEL, Ioan PĂDUREAN, Dumitru CEBRUCEAN

Key words: Emissions trading scheme, monitoring and reporting CO_2 emissions, annual report, ECO_2 Premium – CIA

Abstract: As target of the EU regarding the emission trading scheme, one mentions the promotion of devices properly designed, for reducing efficiently from technical and economic point of view, the GHG generated by installations with activity that generates this kind of emission, in order to fulfill the commitment assumed by EU, under Kyoto Protocol. Starting 1st of January 2007, all installations developing activities as provided by Annex 1 of GD 780/2006, which transposes into national legislation Directive 2003/87/EC will have to monitor and report the GHG emissions

according to Order 1175/2006. This means that the operators from steel and iron industry will have to monitor all activity data and quality parameters, to document and archive monitoring data generated by all sources, to draw up the annual report and also to retain all the data used for emissions calculation, for at least 10 years.

One will demonstrate that, for all these problems, the ECO₂Premium-CIA system is a solution, being software designed for fulfilling the obligation set by national legislation for emission trading scheme.

CONTRIBUTIONS REGARDING THE NATIONAL MANAGEMENT SYSTEM FOR REPORTING AT EUROPEAN LEVEL OF GREENHOUSE GAS EMISSIONS DATA RESULTED FROM THE INDUSTRIAL SECTORS COVERED BY EU-ETS DIRECTIVE.....27

Dorel BĂDESCU, Marian DOBRIN, Ioana IONEL, Ioan PĂDUREAN, Gelu PĂDURE

Key words: The E. U. Emission Trading Scheme, monitoring and reporting of the CO₂ emissions, central level database, ECO₂Nat system.

Abstract: In accordance with Decision 2005/381/EC - art. 21, Member States are required to submit to the European Commission an annual report regarding the implementation of the requirements of Directive 2003/87/EC establishing in European Union the Emission Trading Scheme of GHG allowance (EU-ETS) - until June 30 current year (for information related to the previous year) .

In order to fulfill reporting requirements of ETS on the application of Directive 2003/87/EC it is necessary to elaborate at central level a system for collecting, processing and management of data provided by EU ETS operators.

One will demonstrate that, for all these problems, the ECO₂Nat system for management of the information regarding the implementation of Emission Trading Scheme of GHG allowance is a solution; the software being designed to fulfill the obligation under condition of respecting the national monitoring guidelines.

SELECTION OF STEELS FOR THE MANUFACTURING OF TUBULAR SHAFTS FROM THE MOVEMENT MECHANISM OF DUMPERS.....33

Marin TRUȘCULESCU, Ioan PĂDUREAN

Key words: tubular shafts, the movement mechanism, dumpers, functional necessity, dependent functional necessity

Abstract: The selection of the steels used for the manufacturing of the tubular shafts from the movement mechanism of the dumpers is analyzed in this paper using the following criteria have: the functional necessity and the dependent functional necessity.

The used method can be successfully applied to different qualities of materials and to different manufactured products for which it is necessary to respect the functional characteristics.

ECONOMICAL AND ECOLOGICAL ANALYSIS OF A SOLAR THERMAL SYSTEM WORKING IN WEST ROMANIA.....36

Ioana IONEL, Ioan PĂDUREAN, Diana SILAGHI, Dan STEPAN, Florin SILAGHI

Key words: solar energy, emission factor CO₂, energy cost, reduction

Abstract: The present paper presents the results of the experimental research achieved in reference to a solar thermal system for domestic water heating, installed in the

city of Arad (lat. 46.19 °N; long. 21.31 °E), [17]. The experimental results show the time variation of the measured parameters, during a very long monitoring periode extending from December 2006 to July 2008: illumination $E[lx]$, the temperature of warm water achieved experimenatly in the solar tank $T_1[°C]$, the temperature of the thermal agent used $T_2[°C]$ in the condenser-collector of the solar panels and the relevant simultaneous meteorological factors. On the basis of the experimental results one accomplished the economical and ecological analysis of the thermal solar system in connection with the experimental rig. Under the sudied real working conditions for the West of Romania, it was demonstrated that the price of one unit of energy generated by a solar thermal system (32.6 - 43.5 €/Gcal) is several times smaller than the price of one unit of electric energy (127.9 €/Gcal) and the price of one unit of central heating system (45-55 €/Gcal), if the Romanian state will subsidize the price of the initial investment. Also by using the solar energy, as a substitute of the fossil fuels, important reductions of CO₂ exhaust amount to the atnmosphere can be obtained.

THE MICROHARDNESS'S VARIATION OF A NI-CU LOW ALLOY S.G.CAST IRON.....41

Ioan MILOȘAN

Key words: bainitic s.g. cast iron, heat treatment, wear, microhardness

Abstract: The paper contains a study about the bainitic nodular cast iron's microhardness under different isothermal time and abrasive wear, were study in the present paper. It was made some determination of the microhardness ($HV_{0.01}$) in the 120 μm of the section of the wear specimens. There was observed that a part of the residual austenite was transformation in "ε" martensite and this explained the increasing of microhardness's values.

THE COMPLEX CONTROL OF THE METAL COATING PROCESS BY ELECTRODEPOSITION...44

Alexandru STĂNESCU, Bogdan FLOREA, Cezar BALESCU, Augustin SEMENESCU

Key words: electrodeposition, metal covering deposition, automatization.

Abstract: The analysis of the clascal system of the metal coating and the existence of the production equipments which are working by mechanical model made us to propose in this paper a solution for automatization of this kind of processes to increase the quality and the quantity of the pieces.

THE CORROSION OF PLATED TABLETS THROUGH EXPLOSION.....47

Ana VEȚELEANU

Key words: plating, explosion, intercrystalline explosion, stainless steel.

Abstract: This work presents a study concerning the behavior to intercrystalline corrosion of the stainless steel plates used for the plating by explosion of plates from steel carbon. The ensemble achieved which combines the features of the two materials are used for the achievements of the containers from chemical industry which works at high pressure.

DECARBURIYATION STUDY FOR BEARING STEEL USING BARKHAUSEN NOISE.....50

Petru A. COTFAS, Cornel SAMOILA, Doru URSUTIU, Daniel T. COTFAS

Key words: Barkhausen noise, decarburization, magnetization, bearing steel.

Abstract: The microstructure of the magnetic metallic materials can be studied by using the Barkhausen noises. This paper presents a study over the decarburized layers appeared in the bearing rings by using the Barkhausen noises method as a non-destructive measurement and control method.

The study was made on bearing rings that had been taken in different stages of manufacture: forged state and final state of manufacture. In order to obtain the decarburized layers, the bearing rings were subjected to specific decarburization heat treatments, obtaining different depths for the decarburized layers.

From the Barkhausen noises measurements obtained from the two types of bearing rings, a dependence of the Barkhausen noise to the decarburized layer depth was found.

STUDY ON COSTS RELATED TO THE IMPLEMENTATION OF THE WEEE DIRECTIVE IN ROMANIA.....55

Cristian IVĂNUȘ, Ilie BĂBĂIȚĂ

Key words: WEEE, cost, waste management, environmental management, visible fee.

Abstract: At present, international experience is the most reliable available source for the estimation of costs. This paper analyzes diverse aspects of the costs of waste management of electronic and electric equipment. The scope of the study focuses on the costs of WEEE management in €/kg and in €/pcs in the European average as well as in comparison to the Romania visible fees are in the following ranges. The results show that there are significant cost variations between the minimum and maximum values. In comparison with the European countries included into the survey the Romanian visible fees generally seem to be rather higher than the average of the survey. However, currently the quantities in Romania are low and the start up costs in the surveyed schemes in other European countries have mostly already been paid off. Hence, even though some cost components (such as labour costs) might be relatively low in Romania, there are valid reasons for the costs being at the higher end of the ranges. In consequence, the Consultant considers the visible fees being in a reasonable range.

STABILITY OF THE INOCULATING EFFECT.....63

Vasile COJOCARU-FILIPCIUC

Key words: Thermodynamic equilibrium; iron microstructure; graphite structure; carbon diffusion.

Abstract: The paper presents mechanisms which explain disinoculation phenomenon. Graphite nodules become outside of thermodynamic equilibrium when they have been constituted. That is why graphite nodules become thermodynamic unstable. As a result, dissolving phenomenon of the graphite nodules in metallic matrix is released.

Graphite nodules dissolving involves very fine graphite – as flakes –, and a ferritic metallic matrix, in case of extreme. Fine graphite has a interdendritic distribution.

Graphite nodules dissolving can annul the effect of the graphitizant inoculating agents, even. As a result, free cementite is obtained in microstructure.

SEM, WAXD AND ED(P)XRFS INVESTIGATIONS ON NEW SORTS OF COKE.....67

I. Pencea, F. Barca, C. E. Sfat, Brândușa Ghiban

Key words: coke, precursor, SEM, WAXD, ED(X)XRFS, composition, morphology, structur.

Abstract: One of the main components of a carbonic material for rocket propulsors is coke [1, 2]. The coke characteristic should fulfill the requirements of application. Thus, the coke used as filler for rocket nozzle should meet some specific characteristic as powdering, soft packing for SiC and other ranforsants and a certain degree of graphitization at elevate temperature. Under these and other considerations there were performed researches on laboratory scale to obtain cokes using available cheap precursors. There were obtained six coke sorts using two coke precursor charge compositions and three different heat treatments. The classical coke characteristics of the six new cokes were mesured. For a better understanding of the coke characteristics there were performed advanced investigations by SEM, WAXD and ED(P)XRFS.

The morphologie of coke lump or/and coke fines were revelead by SEM while the atomic coke structures were investigated by WAXD. The coke particle morphology and structure data are directly regarded to the coke packing efficiency and its mechanical strengts. The ED(P)XRF is used to check the residual impurities in coke that may have a significant environmental risk as Pb, Cd, Zn, As etc. The same, the impurities could react with matrix at elevate temperatures causing unpredicted effects. The paper emphasises the existence of a specific correlation between coke morphology and coke atomic structure which should be established for each sort if one wants to achieve optimum coke perforances for a specifific application.

By the authors knowledge, the paper is among the few in this field that use clasical means toghether with modern WAXD and ED(P)XRFS techniques for advaced characterisation of coke.

A NEW CONFIGURATION FOR CASTED BEARING SUPPORT FROM THE WORK ROLL LIKE PART OF THICK SHEET ROLLING MILL.....74

B.FLOREA, S. DRAGOMIR, G. FLOREA

Key words: backup roll, bearing support, thick sheet, shape, hydraulic installation.

Abstract: The new vision “models in engineering” is used for configuration parts or subassemblies realized by iron cast. Is show a study of bearing support from thick sheet mill, their deformation and displacement using “Finish Elements Method”.