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### Optimization design of the low-temperature multi-effect distillation desalination system with horizontal pipe falling film evaporation

GONG Lu-yuan, YANG Yong, SHEN Sheng-qiang  
(School of Energy and Power Engineering, Dalian  
University of Technology, Dalian 116024, China)

**Abstract:** With the widely development and utilization of the technology of falling film evaporation outside horizontal tubes, the low-temperature multi-effect distillation is the promising alternative in the future for the seawater desalination technology because it has high heat transfer coefficient, small heat consumption, and low scaling potential. In the paper, the optimization design of low-temperature multi-effect distillation desalination system with horizontal pipe falling film evaporation was carried out, and the thermal properties of the multi-effect distillation system were compared under different process for feed seawater. Based on the analysis and the comparison, the forward and parallel feed water configuration was the best choice with the advantages of highest gained output ratio (GOR), less heat transfer areas and low cost and so on. Based on the analysis, the optimization design for a low-temperature multi-effect distillation system with 6 effects evaporator was carried out for three combining model for 4 + 2, 3 + 3 and 2 + 2 + 2 system. And the conclusion is that the 4 + 2 model mode proves optimal design results.

**Key words:** desalination; horizontal tube falling film evaporation; low-temperature multi-effect distillation; optimization design

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### The station of coal handing system in coal mine-power plant

WANG Meng, SUN Liang-huan  
(SNPDRI, Beijing 100094, China)

**Abstract:** With the development of society, the station of resource is becoming more and more important. In energy sources field, the integrate of coal mine and power plant has showed its advantage. By researching and studying the coal handing system in coal mine-power plant which had been worked and which has been designed, the coal handing optimization project in coal mine-power plant was provided. It is better to use double route belt conveyor to transport coal from coal mine to power plant in coal mine-power plant; it is better to set silo on the interface between coal mine and power plant because of work system difference and the silo's reservoirs would be the one-day-output of the coal mine or the one-day-input of the power plant; The reserves of the stockyard in power plant would provide the power plant using coal for five to seven days and coal stockyard can be cancel through the special argumentation; In the coal stockyard, it is better to set two handing machine. Commonly, wheel stacker-reclaimed and under ground hopper will be used together; In CFB (circle flow boiler) power plant, twice coal crush system should be sited to get the appropriate granularity coal.

**Key words:** coal mine-power plant; image analysis; coal handing system

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### The discussion of the optimization of substation transformer with the method of total owning cost

KE Chao-jun, XU Zhe-xiong  
(School of Electronics and Information Tongji  
University, Shanghai 200092, China)

**Abstract:** Theory of total owning cost (TOC) is introduced. It calculated substation transformers' comprehensive cost, which considers not only the initial purchase cost of the transformer, but also takes into account the time value of money. The loss expense of the lifetime is translated into the present value price. The smaller value calculated by TOC, the better transformer's energy efficiency. A project example is illustrated, choosing the S9-type, S11-type, SH15-type substation transformers. The result is that the new-type SH15 transformer is the supreme energy efficiency.

**Key words:** transformer; energy-saving; TOC; present value price

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### Simulation of a process with cold energy recovery from liquefied natural gas

LU Tao, ZHONG Hua  
(School of Mechanical and Electrical Engineering, Beijing  
University of Chemical Technology, Beijing 100029, China)

**Abstract:** According to the principle of Braxton cycle of combustion gas and Rankine cycle, a process with cold energy recovery from liquefied natural gas, was presented and simulated using the software ASP-EN PLUS. State parameters as pressure, temperature, flux, etc., process parameters as work, heat, etc., performance parameters as thermal efficiency of each cycle and total thermal efficiency was obtained. It has provided theoretical support for the establishment of an efficient power generation system using cold energy recovered from LNG.

**Key words:** natural gas; cold energy; power; simulation

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### The design of exhaust gas heating adsorption system for bus air-conditioning

ZHANG Ning  
(Liaoning Technical College of Construction,  
Liaoyang 111000, China)

**Abstract:** Studies the conventional bus air-conditioning system and designs a method which uses activated carbon-methanol. The working principle is the refrigeration power which comes from the exhaust gas heat, and uses some solid (adsorbent) that adsorbs gas in low temperature, then desorbs them in high temperature to refrigerate, thereby reduces the internal temperature of the bus lower. The influencing factors on the activated carbon-methanol not only may reduce damage to the atmospheric, but also operate normally, so as to realize the energy conservation and environmental protection.

**Key words:** adsorption refrigeration; exhaust gas heat; bus

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### Measurement model of unburned carbon for fly ash in utility boiler

LI Zhi, HU Jun-yu, ZHAO Dian-rui, et al  
(Shenyang College of Engineering, Shenyang 110036, China)

**Abstract:** Microwave technology is widely used nowadays for online measurement unburned carbon content in fly ash, however, fly ash type has great influence on its accuracy. RBF neural network is utilized to fuse the multi-parameter data of influence fly ash type and microwave power, measurement model of unburned carbon for fly ash in Utility Boiler is established. The measurement model can effectively prevent the fly ash type effect on the unburned carbon measurement, bring about enhancing measurement accuracy.

**Key words:** boiler; RBF neural network; unburned carbon; measurement model

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**Investigation into the measure for reducing carbon content for reducing carbon content in ash and slag burning inferior anthracite**

TANG Jun-hua, ZHOU Jie-min  
(School of Energy Science and Engineering Central South University, Changsha 410012, China)

**Abstract:** The carbon content in ash and slag in the 240t/h CFB boiler Number 1, which burns inferior anthracite, is rather high. The reason for that is analyzed and the measures for reducing carbon content for the 240t/h CFB boiler Number 2 is obtained. By optimizing the design and operation according to the measures, the carbon content in ash and slag in the 240t/h CFB boiler 2 is decreased remarkably.

**Key words:** circulating fluidized bed boiler; ash; carbon content; design; operation; measures

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**Experimental study on wet flue gas desulfurization with additives for 600MW units**

NIE Peng-fei, WU Xue-ming, DOU Zhong-qiu  
(Datang International Power Generation Co. Ltd., Tangshan 063611, China)

**Abstract:** In allusion to the problems of limestone-gypsum wet desulfurization system for some thermal power plants such as big changes of sulfur coal, high power consumption, design capacity is small and so on, the method of adding additives to the desulfurization system were presented. Describes the mechanism of TJY-CH-C-type additives, Experimental study were carried on by using TJY-CH-C-type additives on the wet desulfurization system in Wangtan 600MW power plant. It was showed from the experiment results that the efficiency increased significantly after additives was added to the wet FGD system, the purpose of economic operation was achieved.

**Key words:** wet desulfurization; additives; 600MW units; experiment; economic operation

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**Energy-saving analysis of the 150MW CFB boiler**

Li Zhi-bo, ZHAO Bin, LI Jun-hao, et al  
(Tangshan Kailuan Dongfang Power Generation Co. Ltd., Tangshan 063000, China)

**Abstract:** CFB boiler is clean combustion equipment. Compared with pulverized coal fired boiler, it is of great latent capacity in energy-saving and emission-reducing. In this paper, the 150MW CFB boiler in Tangshan Kailuan Dongfang Power Generation Co. Ltd is taken an example. Three improvement measures about anti-wear of heat surface were taken during medium maintenance of the CFB boiler by analyzing the main reasons that affected operation of the CFB boiler, as a result, the non-plan outage of boiler is effectively reduced. The program about the energy-saving transformation of ash cooler system and waste heat recovery of boiler flue gas is analyzed. And the result can provide reference for the operation and design of CFB boiler.

**Key words:** CFB boiler; operation analysis; anti-wear of heat surface; ash cooler; flue gas temperature

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**Numerical analysis of the energy saving characteristic of phase change power storage wall through Ansys**

CHAI Guo-rong  
(Material Dept. of State Intellectual Property Office of the P. R. C., Beijing 100088, China)

**Abstract:** Mathematical model has been set up based on Ansys soft-

ware. Energy saving performance and heat transfer characteristic of different phase change power storage compose of different length of concrete and different length of phase change material is researched by numerical simulation. Results show that adding phase change material for different length wall will get obvious energy saving performance. And the optimized phase change material length should be considered according to related accepts. Forth more, the temperature fluctuation line-ly decreases with the increase of phase change material length.

**Key words:** change materials; energy saving; numerical simulation

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**Optimization for heat exchanger networks of distillation unit by using pinch technology**

ZHANG Hong-li, ZHU Yan-ling, ZHENG Jun  
(Petro China Northeast Refining & Chemical Engineering Co. Ltd., Huludao 125001, China)

**Abstract:** The basic theories and principles for design of pinch technology are introduced. The optimal heat transfer temperature difference  $\Delta T_{min}$ , minimum utility usage and location of pinch points are determined by adopting optimization analysis for the heat exchanger network of atmospheric distillation unit through using Aspen Hx-net software and the pinch technology, Heat exchanger network is optimized. On the view of running conditions of the unit, the optimized heat exchanger network has obvious saving effect, Payback period of unit is only 8 months.

**Key words:** pinch technology; heat exchanger network; composite curve; optimization

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**Altering and Energy saving for high-medium pressure Cylinder in the Ultra Critical Pressure Unit**

XU Chuan-tang  
(China Resources Power(Changsu) Co. Ltd., Suzhou 215536, China)

**Abstract:** The text introduces the ultra critical pressure unit manufactured by Hitachi in Japan. Aiming at a big loss of steam and low efficiency in high-medium cylinder. Using Bladen seal in place of traditional one. Looking for the way to improve efficiency in high-medium cylinder.

**Key words:** low-pressure cylinder; loss of steam consumption; brush seal altering; improving efficiency

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**Hot water boiler furnace burning and cracking analysis and the improvement of water controlled technology**

JIANG Dong-hua  
(China petroleum & chemical Co. Ltd., in liaocheng oil pipeline transportation branch, Liaocheng 252000, China)

**Abstract:** To preventing the serious shorten service life of the boiler, reducing production costs and the labor intensity of the position, analyzed the reason of the boiler furnace burning and cracking. It discussed the shortcomings of controlling detection device when the boiler was in dry. In addition, proposed the preventive measures of cracking furnace burning. Discussed the prevention of boiler furnace burning crack automatic control system, and the boiler dry burning problem has been completely solved. So the security and reliability of the boiler running was better.

**Key words:** hot water boilers; cracking furnace burning; level controlling; dry burning; energy saving

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企业名录

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