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303室  
邮编:100022  
电话:(010)67006041;67006042  
传真:(010)67006043  
E-mail:sykjyz@vip.sina.com  
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## Contents and Abstracts

### OIL AND GAS PIPELINE

1 Application of Big Data Clustering Algorithm in Leakage Detection of Oil Product Pipeline. Li Xinwei, Liu Ruizhe.

**Abstract:** In order to solve the problems of continuous repeated alarm and a large number of false alarms in leakage detection of oil product pipeline, a clustering algorithm model of oil product pipeline based on big data clustering algorithm is proposed. Taking Hunan oil product pipeline as an example, through simulating the changing law of outlier coefficient under different working conditions using big data, the outlier coefficient threshold is summarized, and the threshold under different working conditions is set up to improve the accuracy of oil product pipeline leakage detection.

**Key words:** petroleum, oil product, pipeline, leakage, detection, big data, clustering algorithm, application.

### INFORMATION TECHNOLOGY

6 Application of Intelligent Identification Technology in a Waterfront Gas Station. Zhou Yue.

**Abstract:** In view of the problems existing in the traditional video monitoring system, such as the need for fixed personnel on duty and unavoidable monitoring loopholes, the construction of an intelligent identification management system for waterfront gas station is proposed. The overall design principle, management system architecture, main functions and practical application of the intelligent identification management system of the waterfront gas station are introduced. Through the application of the system, the intelligent safety supervision of the station is realized, the work efficiency and safety management level are improved, the labor cost is reduced, and the safe production and operation is guaranteed.

**Key words:** waterfront gas station, safety, management, intelligent identification technology, construction, application.

9 Design Scheme of Gas Station Internet of Things (SIOT) Zhao Miao, Fang Wei, Ning Ke, Fan Hongbo.

**Abstract:** In view of the problems of relevant equipment gradually added in gas stations to meet the needs of operation, safety and environmental protection that the functions and roles are overlapping, relevant data cannot be networked, communication interface standards are not unified, data can only be uploaded, and equipment early warning depends on manual solution, the design scheme of gas station internet of things (SIOT) is proposed, and the system structure of SIOT is introduced. Through internet of things (IOT) technology, using edge computing, combined with big data and artificial intelligence (AI) technology, some manual judgment and operation work are transferred to the interworking and interaction between equipment, so as to realize the high integration, comprehensive display, interconnection, linkage between equipment, comprehensive monitoring of equipment at the management end, remote management and distribution of equipment parameters and the unification of equipment data interface.

**Key words:** gas station, equipment, internet of things, information, system, program, design.

### SAFETY TECHNOLOGY

13 Integration and Maintenance of Automatic Fire-fighting System for Large Oil Product Depot. Chen Xiang.

**Abstract:** In view of the low automation level of the firefighting system of a large oil product depot, in which the relevant valves need to be opened manually, affecting the initial fire extinguishing, the integrate transformation of the automatic firefighting system is implemented. By means of automatic control and communication technology and database technology, the fire water and foam system, combustible gas alarm and manual alarm system are integrated through the Internet, and using the advantage of the support of industrial field configuration software for relevant equipment and protocols, the functions including support of multiple protocols, field equipment communication, real-time data acquisition and control are realized, which can meet the requirements of rapid and accurate disposal in daily firefighting and emergency state of oil depot. At the same time, the causes of false alarm and failure of pneumatic valve in

the early stage of system operation are analyzed, and the corresponding disposal measures are put forward to ensure the normal operation of the system.

**Key words:** oil depot, firefighting, automation, system, integration, maintenance.

### GREEN ENERGY

17 Quality Control of Hydrogen for Proton - Exchange Membrane Fuel Cell (PEMFC). Liu Haili.

**Abstract:** The hydrogen production methods are briefly introduced, including hydrogen production from fossil fuel, industrial by-product, water electrolysis, and new methods such as water photolysis and biomass, and five hydrogen purification methods including condensation - low temperature adsorption, low temperature absorption - adsorption, pressure swing adsorption, palladium membrane diffusion and metal hydride separation are described. The relative standards of hydrogen used in proton - exchange membrane fuel cell (PEMFC) are compared and analyzed. The influence of total sulfur, carbon monoxide, formaldehyde and formic acid, total halide, ammonia, carbon dioxide, water, total hydrocarbon, oxygen, particulate matter, nitrogen, argon, helium and other impurities in hydrogen on the quality of hydrogen used in PEMFC as well as the effects of nitrogen oxides, sulfur oxides, ammonia, carbon monoxide and other pollutants in the air on PEMFC are presented, which can provide the basis for the quality control of hydrogen used in PEMFC.

**Key words:** proton - exchange membrane, fuel cell, hydrogen, quality, control.

### SAFETY MANAGEMENT

23 Problems of Construction Safety Management in Gas Station and Countermeasures. Li Tongshuan.

**Abstract:** From the aspects of construction, engineering and supervision personnel, safety protection appliance and construction machines and tools, safety education and training and safety examination, high-risk operation management, new energy business development, and contractor assessment, etc., the problems existing in the safety management of gas stations construction are pointed out, and the corresponding solutions are put forward, such as strengthening the personnel management of construction, engineering and supervision units to improve admission control, ensuring that safety protection appliance and construction machines and tools can meet the field safety requirements, carrying out targeted safety

education and training, strengthening the management and control of high - risk operations, attaching great importance to the construction of new energy business, and strict assessment of contractors to ensure the construction safety of gas stations.

**Key words:** gas station, construction, safety, management, problems, countermeasures.

28 Suggestions on Strengthening On - Site Safety Management of Electric Vehicle Charging Pile. Song Weijun.

**Abstract:** In view of the rapid development of new energy electric vehicles at present, there are some potential safety hazards in the use of charging piles. Based on a brief introduction to the definition and classification of charging piles, the problems of on - site safety management of charging piles are pointed out and analyzed, some suggestions to strengthen the on - site safety management of charging piles of electric vehicles are put forward, viz. deepening the investigation of potential safety hazards, implementing practical safety protection measures, improving safety publicity and education, and perfecting emergency management.

**Key words:** electric vehicle, charging pile, site, safety, management, suggestion.

#### OPERATION MANAGEMENT

31 Application of "Three Steps" Requirements of Construction Scheme in Gas Station Construction Project. Qi Fengli.

**Abstract:** In view of the problems existing in the preparation of the construction scheme of the gas station construction project of SINOPEC Jiangsu Petroleum Product Company, such as insufficient attention, failure to form the preparation force, lack of pertinence, nonstandard preparation and untimely review, the "three - step" measures for the preparation of construction scheme for gas station have been formulated and implemented, viz. scheme preparation with on - site investigation, scheme review with on - site record, and scheme release with on - site confirmation. The concept, basic provisions, work flow and application effect of "three steps" in the preparation of construction scheme are introduced, which can realize the process normalization of preparation and review of construction project, the standardization of text preparation and the informatization of preparation

process, and provide a reference for the preparation and review of construction scheme of gas station.

**Key words:** gas station, project, construction, scheme, preparation, review, standardization, practice.

34 Integration and Optimization of Unconventional Operations in Gas Stations. He Caining.

**Abstract:** In view of the problems of decentralized equipment and facilities, marginalization of daily supervision, inefficient management efficiency and potential safety hazards existing in unconventional operations such as fuel dispenser calibration, oil tank cleaning, emergency recovery of refueling oil products, pipeline emptying, urea filling and oil vapor recovery detection in some gas stations, the unconventional operations have been integrated and optimized. An integrated unconventional operation device with the functions of refueling gun accuracy verification, oil tank cleaning, emergency recovery of wrong oil product refueled, pipeline emptying, urea filling and oil vapor recovery detection has been developed, which can be used to improve the work efficiency, save the operation cost, reduce the potential safety hazards and reduce the oil and gas emission pollution.

**Key words:** gas station, unconventional operation, integration, optimization.

39 Application of Big Data Statistical Analysis in Oil Product Retail Business. Wang Peinan.

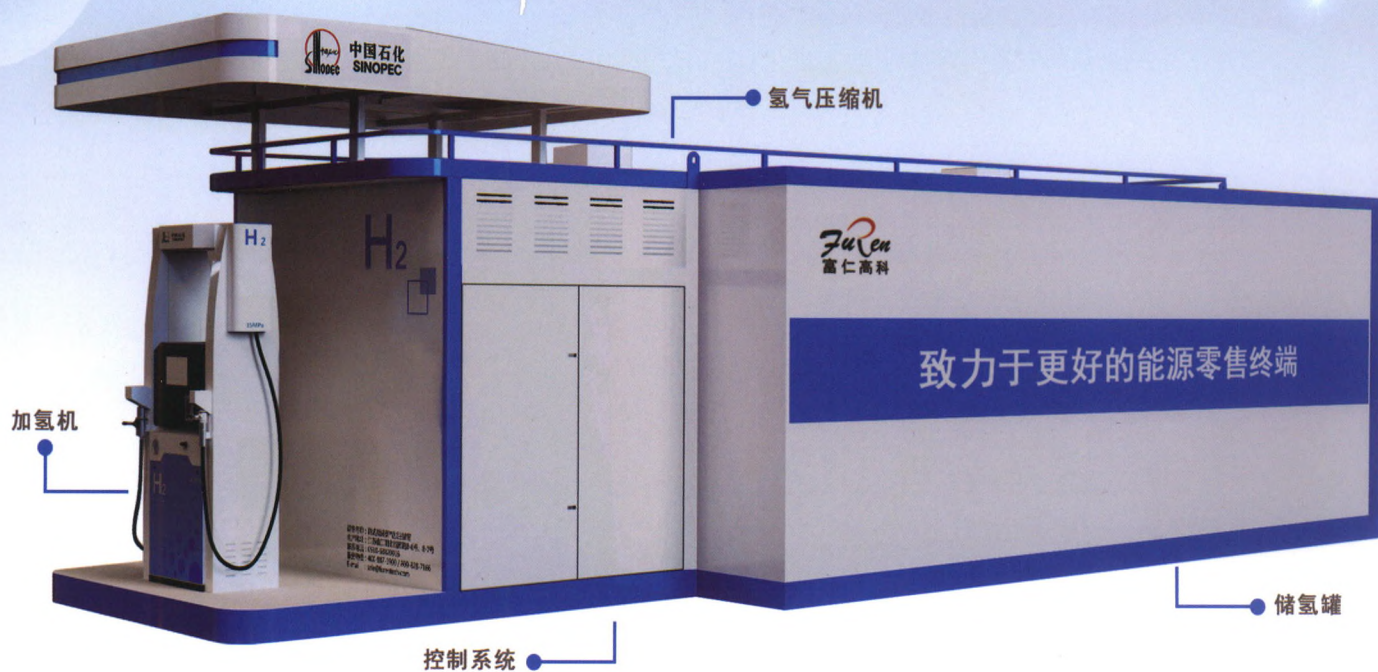
**Abstract:** The meaning and significance of big data statistical analysis and the characteristics and current situation of oil product retail data are introduced. Taking the statistical analysis of retail business of an oil company as an example, using big data for modeling, a statistical analysis index system is constructed. By using big data statistical analysis, the traditional single digital statistical method of oil product retail business is transformed into a statistical analysis system with comprehensive and forward - looking indicators and a combination of qualitative research and quantitative analysis, which can provide an important decision - making basis for enterprises to realize digital transformation, high - quality development and market competition.

**Key words:** oil product, retail, business, big data, statistics, analysis, application.

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