

TOSHIBA REVIEW

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System Technologies for Water and Sewerage Works

Special Reports II

Information and Control Systems for Thermal Power Plants in the New Era

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Special Reports I

System Technologies for Water and Sewerage Works

*Demand for Environmental Monitoring Based on Biological Responses

KUNIMOTO Manabu

*Technical Trends in Water and Sewage Treatment Systems

KATO Takatoshi KATO Takao

Water and sewage treatment systems have been intensively developed in Japan so as to realize an affluent society and protect the environment. However, various problems have been encountered such as the contamination of water resources by nitrogenous substances, dioxin, O-157, Cryptosporidium, by-product materials, and so on. Toshiba is continuing active research to provide complete solutions to these problems.

This paper describes some of Toshiba's new technologies, including a water quality monitoring support system, ozone purification system, supervisory and management systems, fuel cell system, and plant operation and maintenance services.

*Monitoring and Control Computer System for Water Purification Plants and Sewerage Plants

TAKATSU Mitsuru TONOZUKA Yoshikazu HASHITA Hiroyuki

A quarter of a century has passed since monitoring and control systems using computers were first installed in water purification plants and sewerage plants. From now on, the level of requirements demanded of monitoring and control systems will rise in line with their role as a core technology for wide area management of public systems, including unmanned systems. Moreover, many public plants are more than 15 years old and their reconstruction is necessary. Since the plants being monitored and controlled are lifeline systems, however, it is impossible to stop their operation.

Toshiba has developed a new monitoring and control computer system for water purification plants and sewerage plants to satisfy these requirements.

*Application of Biosensor to Water Quality Monitoring

MATSUNAGA Tadashi FUJISAWA Minoru KANEKO Masao HARAGUCHI Satoshi

We have developed a toxicity monitoring support unit equipped with a biosensor to continuously and sensitively monitor the mixing of toxicants at drinking water sources. The index of water toxicity is respiratory inhibition of iron-oxidizing bacteria. Due to the adoption of the biosensor it is possible to detect respiratory inhibiting toxicants (e.g., cyanide), agricultural chemicals, heavy metals, and chlorinated organic chemicals.

With a conventional biosensor it is difficult to maintain stable operation due to the influence of other microorganisms and organic compounds. The adoption of iron-oxidizing bacteria, which are autotrophic and can remain active even in a strongly acidic environment, improves the stability of operation. Furthermore, by equipping the unit with an automatic cleaning and calibration system and two biosensor systems, it is possible to realize continuous, maintenance-free water quality monitoring.

*Fuel Cell Power Plant Running on Anaerobic Digester Gas

SHINOZAKI Tsutomu KUSAMA Nobuyuki OGAWA Masahiro

A fuel cell power plant running on anaerobic digester gas (ADG) produced at a wastewater treatment plant has been constructed as a new renewable energy system. This system consists of a 200 kW fuel cell power plant (Toshiba's PC25TMC system), and a gas pretreatment unit which removes the very small quantity of contamination from ADG. In order to realize the system, we developed the gas pretreatment unit and remodeled the PC25TMC fuel cell power plant. Toshiba and the Yokohama Municipal Sewage Works Bureau jointly conducted the technology development, and the fuel cell power plant at the Hokubu Sludge Treatment Center was Japan's first to run on ADG.

This type of system is also installed at municipal wastewater treatment plants in the United States in order to conform with the strict environmental regulations, and is usually owned and operated by an energy enterprise under a specific power supply contract with a municipality or local government.

*Ozone Processing Technologies for Water Purification and Sewage Treatment

NOGUCHI Motoi MAKISE Ryutaro TAKASE Itaru

With the progressive contamination of raw water sources, the supply of safe and good-quality water and the reuse of treated sewage water because of the depletion of water resources are being greatly highlighted.

In response to this situation, Toshiba has been supplying ozone processing facilities employing the characteristics of ozone, which has powerful oxidation capability. These characteristics of ozone are being used in the field of water purification for tasks such as odor elimination in service water so as to supply safe and good-quality water, and in the field of sewage treatment to decolorize and remove the odor of treated water so as to ensure stable and good-quality treated water supplies.

This paper introduces examples of these ozone processing technologies for water purification and sewage treatment.

*O&M Business and Corresponding Service Techniques

TAKASHIMA Hidekazu NAKAMARU Tadashi

Many local governments are following a trend toward privatizing their works such as operation and maintenance (O&M) of water supply plants and sewerage plants, as a countermeasure to the difficulty in retaining workers as older workers retire or due to less hiring of new workers as a result of financial constraints.

Toshiba provides after-care services such as periodical maintenance services and on-call services in emergencies for electrical equipment and measurements. We have recently inaugurated O&M services for water supply plants and sewerage plants as a new business field. In order to widely expand this business, we aim to perform it systematically taking full advantage of our technological capabilities rather than simply dispatching workers.

Special Reports II

Information and Control Systems for Thermal Power Plants in the New Era

*Information and Control Systems for Thermal Power Plants under Liberalization of the Power Utility Industry

MATSUDA Takeshi

*Economic Circumstances of Thermal Power Generation and Solutions Offered by Control and Information Systems

FUKUDA Hiroshi

Control and information systems for thermal power plants, which still account for the majority of power generation systems in Japan, have become highly sophisticated with the growth of the economy and the innovations that have taken place in technology. The circumstances of the power generation industry in Japan are undergoing a radical change due to the introduction of the free market principle for major consumers in March 2000. The main theme of control and information systems is changing from the realization of high reliability and high-level functions to the realization of low-cost, high-performance operation.

Toshiba is devoting its efforts to providing systems suited to the needs of this new era, utilizing the latest computer, information, and control technologies.

*Cost-Saving Solutions for Thermal Power Plant Operation

TANAKA Toshihiko NAKAMOTO Masashi MURATA Jin

Deregulation of the electric power industry has made the market competitive, and the Japanese government has introduced a new method for assessing electric power charges. The need has therefore recently arisen for electric power companies operating fossil-fuel power stations to rationalize their plants. On the other hand, thermal power plants in Japan are operating under various conditions, from aged power plants to the latest combined-cycle power plants.

Toshiba offers several solutions for thermal power plants to reduce their total cost of operation.

*GSXP™ Series Control Systems for Utility Thermal Power Plants

NARITA Hiroyuki HIROMOTO Hiroshi TOBO Masayuki

The GSXP™ series of control systems for utility thermal power plants was developed in 1997 to meet power companies' requirements for more cost / performance-oriented systems accompanying the deregulation of the power industry over the past few years. Since then, Toshiba has supplied a number of these systems and conducted extended development to further satisfy users' needs. In recent applications, comprehensive CRT operations with advanced monitoring functions have drastically reduced the need for control panels equipped with switches and indicators. The high-speed controller in the GSXP™ series incorporates all continuous and logic controls, which previously required numerous solid-state circuit boards. In the case of control system renewal, Toshiba has also realized an interpreter system to enable software resources to be utilized for the GSXP™ series.

*New TOSMAP-DS™ Distributed Control System Using De Facto Standard Technologies

KAKEHI Atsuyuki TSURUMI Hajime

This paper provides an overview of the cost-effective and state-of-the-art TOSMAP-DS™ distributed control system, which Toshiba is supplying in competitive overseas markets for thermal power plants. De facto standard technologies such as WindowsNT®, Ethernet, and DeviceNet were employed in developing the hardware and software of TOSMAP-DS™. This feature makes the system cost-competitive, flexible, and user-friendly. In particular, the "tag" -linked concept is introduced in TOSMAP-DS™ to reduce the engineering effort.

TOSMAP-DS™ can be used for a wide range of applications in thermal power plants, from large-scale coal-fired plants to small-scale turbine control systems (digital-electrohydraulic control systems).

*Computer Systems for Thermal Power Plant Operation and Management

OOTANI Keiko KAWAMOTO Shinji GOTO Masanori

High-performance PCs and LANs have recently become more widely adopted in the information technology field. Data exchange technologies such as the Internet, intranets, and CALS (Continuous Acquisition and Life-cycle Support/Commerce At Light Speed) are also significantly advancing, as well as wireless data transmission technology.

Using these technologies, Toshiba is promoting integrated information systems that support operation and maintenance work in thermal power plants. These systems increase the effectiveness of routine tasks and enable maintenance costs to be reduced with optimum data resources, by using accurate data associated with the plant condition.

*Operation and Maintenance Services for Thermal Power Plants

TAKEOKA Yoshio HINO Shiro FUKUI Hiroji

The management of thermal power plant operation and maintenance is becoming increasingly important as these plants age. Toshiba has promoted many after-care businesses in the field of power plants. Today, we are providing various operation and maintenance (O&M) services associated with products, remote support systems, and many types of supporting tools incorporating our advanced technologies.

Toward the 21st century, total solutions from the management side of the power station are required in order to minimize overall costs through the power plant life cycle, or the total cost of the power station. Toshiba is also developing total solutions for thermal power plants to meet the above requirements.

Feature Articles

*cdmaOne Cellular Phone for Domestic Use

IGARASHI Junichi ENOKI Masayuki TATSUMI Kaoru

The new cdmaOne mobile communication system has rapidly developed in the Japanese market. In February 2000, the number of subscribers was over 4 million. Toshiba has realized the lightest terminal equipment of this class by 73 g. Our new model cdmaOne cellular phone is equipped with highly advanced functions such as direct access to Internet contents and a 64 kbps-packet data service conjugated with a notebook type PC.

This model can use a new service called EZweb/EZaccess, which allows subscribers to use e-mail and browse information on the Internet effectively by packet data service. Moreover, antenna switched diversity improves the basic performance of voice communication, offering the high voice quality and continuity of connection which are features of cdmaOne.

*Integrated Control, Telecontrol, and Protection System for Hydroelectric Power Plants

KONNAI Tadashi NOGUCHI Tetsuya

Most hydroelectric power plants in Japan are operated over the telecommunications system as unmanned power plants. To achieve this operation, a fast and reliable process must be realized with the aid of microprocessors. On the other hand, the need for economy and space saving is pushing the industry toward integration of various components of the distributed control system.

A control system for hydroelectric power plants with integration of the sequence controller, automatic voltage regulator (AVR), and governor (GOV) has already been realized. Recently, however, we have developed a new integrated control system in which further integration of the telecommunication function and protective relay function has been achieved.

This paper introduces the newly developed integrated control system.

*Model TW-F70 Automatic Washer Dryer

YAMAZAKI Fumitaka NISHIWAKI Satoru KAWABATA Shinichiro

The washing and drying of laundry is daily household work. In recent years, the aging of households as well as an increase in single households and in wives with outside jobs have appeared as trends. Moreover, many housewives desire a more comfortable life and wish to participate more fully in society. As a result, there has been greater demand for automatic washer dryers that can overcome limitations such as the necessary labor, the time required from washing to dry clothes, and the space needed for dryer installation.

In response to these requirements, we have developed the model TW-F70 automatic washer dryer. The TW-F70 is equipped with a direct-drive (DD) motor that directly drives the drum, thus solving the problem of present automatic washer dryers by realizing low vibration and low noise. This model has been named the "Toshiba Home Laundry Ginga 21" (ginga : "galaxy").

Epoch-Making Toshiba Technologies

*5. Digital Broadcasting System