

Toshiba's Water Solutions Contributing to Realization of Sustainable Society

Approaches toward Solutions for Watershed Environments to Support Sustainable Society

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Toshiba's Approaches to Smart Water Solutions Supporting Resilient and Sustainable Social Infrastructures

NAKADA Masajiro / TONOZUKA Yoshikazu

In line with the growing importance of business continuity plans (BCPs) since the Great East Japan Earthquake of March 11, 2011, measures to ensure stable power supplies including the utilization of renewable energy sources, as well as to improve the earthquake resistance of buildings and enhance the robustness of equipment, have been implemented in parallel. In particular, the aging of social infrastructure systems has become a critical issue. Demand is therefore increasing for the realization of a strong and sustainable society that is prepared for various crises in the economic, industrial, energy, medical, educational, food, and communications fields, in accordance with the Basic Act on National Resilience enacted in December 2013.

In order to respond to various issues related to stable supplies of electricity, aging public facilities, transfer of management know-how to overcome a lack of skilled operators, effective utilization of resources, and reduction of the environmental burden in the public and private water supply and sewerage fields, Toshiba is offering a broad range of smart solutions for water-related facilities to support the resilience and sustainability of social infrastructures.

TOSWACS_{TM}-V Water Supply and Sewerage Monitoring and Control System Contributing to Sustainable Business

Operations

TERASHIMA Koichi / ADACHI Yoshifusa / YOKOYAMA Suguru

The water supply and sewerage businesses in Japan, which play a critical role as social infrastructure systems, have recently been facing various issues including reinforcement of their business infrastructure due to the declining customer population, technology succession to deal with the retirement of experienced staff, and growing demand for the replacement of aging facilities. These issues are dramatically changing the circumstances surrounding water supply and sewerage service operations.

In order to solve these issues, Toshiba has been developing the TOSWACS_{TM}-V water supply and sewerage monitoring and control system with various further strengthened functions applying information and communication technologies, thereby contributing to the realization of sustainable operations in these fields.

Self-Sustaining System Utilizing Renewable Energy Sources for Water Supply and Sewerage Facilities and Approach to Power Generation Business

OISHI Masayuki / KAZUSAWA Shinya / MENJU Takashi

In the field of water and sewerage facilities, there is a growing need for environmentally friendly electricity supplies utilizing renewable energy sources to facilitate efficient operations and maintain water treatment functions in the event of a disaster. With this as a background, Toshiba is promoting power generation business utilizing renewable energy sources appropriate for water and sewerage facilities, such as photovoltaic power generation, sewage gas power generation, and small-scale hydroelectric power generation. We have also developed a self-sustaining system utilizing renewable energy sources in conjunction with multiple power units in order to supply power and perform fallback operation by maintaining the minimum functions of the water treatment system at the time of a disaster.

Technologies Achieving Energy Saving and Reduction of Operating Costs for Water Supply Systems

HATTORI Dai / KUBO Kie / NAMBA Ryo

In the field of water supply services, plant operations to achieve effective utilization of energy and reduce the burden on the environment have become a focus of attention in recent years in addition to the ongoing need for the securing of safe and stable supplies of water.

To meet these requirements, Toshiba has been developing and providing various technologies to offer comprehensive water solutions both for inside plants and externally. These include a newly developed ozone generator that achieves a 20% reduction in energy consumption compared with the conventional type, a water management system that enhances the efficiency of plant operations, and a water leakage detection technology that contributes to the effective utilization of limited water resources.

Solutions Contributing to Effective Utilization of Resources and Energy- and Cost-Saving Operation of Sewerage Facilities

ENOKI Tatsuhiko / HIRAOKA Yukio / ABE Hironobu

Following the revision of the Act on the Rational Use of Energy, sewerage facilities operated by large municipalities such as ordinance-designated cities may be categorized as type 1 designated energy management factories, etc., which are required to submit medium- and long-term plans to achieve a reduction of more than 1% per year in energy consumption in terms of basic units of energy. Demand has also been growing for technologies that can further reduce the operating cost of sewerage facilities due to the increase in electricity costs since the Great East Japan Earthquake.

To resolve these issues, Toshiba is actively promoting the development of plants that optimally use unharnessed energy sources in sewerage systems to achieve high-efficiency resource circulation, as well as the development of energy-saving solutions and of technologies for risk reduction to detect abnormal conditions in plant facilities at an early stage, with the aim of realizing optimal plant operation.

Industrial Wastewater Treatment Solutions to Reduce Environmental Burdens at Low Cost

YAMAGATA Hideaki / KIKUCHI Yasutaka / ASHIKAGA Nobuyuki

In the industrial wastewater treatment field in Japan, attention has been increasingly focused in recent years on the reduction of burdens on the environment through such measures as energy conservation, reduction of greenhouse gas emissions, and conservation of natural resources.

Toshiba has been making continuous efforts to realize wastewater treatment systems that reduce environmental burdens by proposing optimal solutions to underlying issues and needs in customers' factories and plants. These include various solutions for energy saving, space saving, reduction of construction costs, resource recovery, and reduction of operational risks. To achieve these objectives, we are not only promoting design optimization of wastewater treatment processes but also developing various wastewater treatment systems making use of our proprietary technologies, particularly a nonchemical filtration system and a wastewater treatment system incorporating a methane fermentation process in an upflow anaerobic sludge blanket (UASB) reactor, which are contributing to the reduction of environmental burdens in the factories and plants at which they have been introduced.

Smart Solutions for Realization of Effective O&M Services for Water Purification Plants

SUGINO Toshiharu / YOKOKAWA Katsuya / ARIMURA Ryoichi

Toshiba has been actively contributing to the provision of safe and secure water supplies by ensuring effective operation of water purification and sewage treatment plants through the development of central monitoring facilities and various support systems, such as optimal water management, rainwater drainage, and chemical dosing systems. As a result of the changes that have taken place in the circumstances surrounding the water supply and sewerage fields in recent years, the need has arisen for public-private partnerships (PPPs) to strengthen these operating foundations, including the delegation of operation and maintenance (O&M) services for water purification plants to third parties.

By encouraging closer cooperation with individual water supply corporations within the framework of such PPPs, we have reconstructed our accumulated control and management technologies for O&M services responding to on-site requirements based on the experience and know-how that we have obtained with a wide variety of systems. These technologies make it possible to provide smart solutions for the optimal operation of water purification plants, including the reduction of utility costs and risks.

Method for Quantitative Analysis of Hexavalent Chromium in Chromate Conversion Coating on Metals Using Advanced Analysis Technology

OKI Mitsuhiro / MORIMOTO Sayaka / YOSHIKI Masahiko

The Restriction of Hazardous Substances (RoHS) Directive of the European Union severely restricts the use of six hazardous substances in electrical and electronic products. The management of chemical substances present in such products has therefore become an issue of vital importance for manufacturers. In the case of chromium (Cr), the RoHS Directive focuses only on its management in the hexavalent oxidation state. However, the analysis of hexavalent Cr is difficult because an analysis technology is required with higher accuracy than the conventional extraction method using boiling water.

To solve this issue, Toshiba has developed a new method for the quantitative analysis of hexavalent Cr in electrical and electronic products utilizing an advanced analysis technology called the X-ray absorption fine structure (XAFS) method. We have also developed a new extraction method using lithium hydroxide (LiOH) solution, which can extract hexavalent Cr with a high extraction rate from chromate conversion coating samples on metals without valence change.

Hydraulic Double-Arm Robot

TAKAHASHI Hiromasa / KAZAMA Takuro / OGA Junichiro

The cell production method, which facilitates high-product-mix and low-volume manufacturing, has been expanding into the mainstream, and demand has been growing for a robot similar in size to workers that can dexterously act as a multiskilled worker and handle heavy materials in a cell production line.

Toshiba has developed a hydraulic double-arm robot that is equipped with hydraulic actuators for the arms, allowing it to handle heavy materials, and the TV800 vertical articulated robot arm consisting of electric actuators produced by Toshiba Machine Co., Ltd. for the wrists, allowing it to also achieve dexterous handling operations through visual feedback and compliance control.

User Interface Design Technology for Railway Transportation Planning Systems Applying Cloud Computing Platform

SUZUKI Tatsunori / KUBO Hideki / DOI Masaharu

Railway transportation planning systems have traditionally been customized based on each railway company's requirements. Recently, however, cloud-based software as a service (SaaS) applications for railway transportation planning have begun to be applied to the development of these systems using information and communication technology (ICT) solutions. In these circumstances, demand is growing for high-quality user interfaces (UIs) in order to provide users with an efficient work environment, user-friendliness, and high motivation, instead of simply adding new UI components.

To satisfy these increasingly sophisticated users requirements, Toshiba has developed a UI design technology adopting user experience (UX) design that offers improved operational performance, and applied it to a railway transportation planning ICT solution SaaS developed by Toshiba Solutions Corporation.

FACITENA_{TM}-i Remote Power-Saving Cloud-Based Service for Small- and Medium-Scale Buildings

HAYASHI Kei / SUGAWARA Susumu

In office and commercial buildings, which consume large amounts of electricity, further energy saving, reduction of power consumption, and efficient energy utilization by promoting interoperability between buildings have become increasingly important as countermeasures against shortages of electricity since the Great East Japan Earthquake. Efficient management to enhance the value of buildings is also required from the viewpoint of building owners.

To meet the demand for energy saving in small- and medium-scale buildings, Toshiba has developed the FACITENA_{TM}-i remote power-saving cloud-based service incorporating a function for the graphical display of measurement data such as power consumption, an energy-saving control function for air conditioners, and an electric power demand control function.

TOSREC_{TM}-V Dam Control System for Dam Operation with Enhanced Design Productivity

SASAKI Makoto

The dam control system is an essential element of the control facilities for operation of a dam, providing calculation functions for water flow management as well as control and support functions for discharge facility operation. This system, mainly consisting of (1) a discharge control device, (2) discharge support and runoff prediction devices, and (3) display and recording terminals, ensures that the dam's discharge facilities are steadily and easily controlled in accordance with the dam operation rules.

Toshiba has now developed TOSREC_{TM}-V, a dam control system offering enhanced design productivity that can be implemented without the development of customized programs, thus reducing worker hours and shortening the lead time. This system makes it possible to change the display layout and report format by means of dedicated tools in a user-friendly manner and to change the calculation and control logic through software engineering tools.

Approaches toward Expansion of Residential Fuel Cell Systems

OGAWA Masahiro / YABUKI Masanori

The development of fuel cell systems is progressing in Japan for energy conservation and the reduction of carbon dioxide emissions. The Japanese government is promoting the dissemination of residential fuel cell systems, with cumulative targets of 1.4 million units installed by 2020 and 5.3 million units by 2030.

Based on more than three decades of research and development of fuel cells, Toshiba released a residential fuel cell system called ENE-FARM in 2009. In the five years since then, approximately 40,000 units have been shipped. We shifted the manufacturing base to a new factory to increase production in 2013, and introduced a new model of the ENE-FARM system with high-value-added functions on the market in 2014. Moreover, to further promote the dissemination of ENE-FARM, we are making efforts to strengthen the system lineup including a model with a configuration suitable for condominium buildings and models with enhanced usability, such as a grid-independent system equipped with a self-sustaining startup function and a hydrogen fuel type system. These systems are expected to be supplied not only to the Japanese market but overseas markets as well.

Alkaline Solution Produced by Electrolysis of Hydrochloride for Cleaning Semiconductor Wafers Achieving Low Environmental Burden and High Cleaning Performance