

Solve Issues Related to Water Resources

Environmental Improvements at CMK Corporation Thailand Co., Ltd. (Initiatives of Kurita-GK Chemical Co., Ltd.)

CMK Corporation Thailand Co., Ltd. primarily manufactures printed circuit boards for automobiles. Producing circuit boards requires the use of large amounts of water for cleaning, and the company uses more water than any manufacturing plant in the CMK Group, so reducing the amount of water it consumes has been an ongoing issue.

Kurita-GK Chemical Co., Ltd. proposed reducing water usage by raising the processing efficiency of the company's RO membrane facilities, which are the main piece of equipment used to manufacture water for cleaning. RO membranes filter out impurities and inorganic salts. After passing through the membranes, the water is used as industrial water, and water containing inorganic salts is processed as wastewater. When biofouling occurs on the surface of the membranes, it reduces permeated water volume, which increases the amount of water used. To address this problem, Kurita-GK Chemical applied water treatment chemicals that control biofouling on the RO membranes to successfully reduce water usage by 310,000 m³ per year. In addition, the frequency at which the RO membranes are cleaned has been reduced from once per week to once every two months, and the frequency at which the cartridge filters, which are installed upstream from the RO membrane facilities, are replaced has been reduced from once per week to once every 1.5 months.



RO membrane facility

Voice of the Customer

KURITA's RO chemical and consulting service provided us a great improvement in RO operation. We could operate RO system smoother and reduce total cost saving. Thank you, KURITA team, for their support.

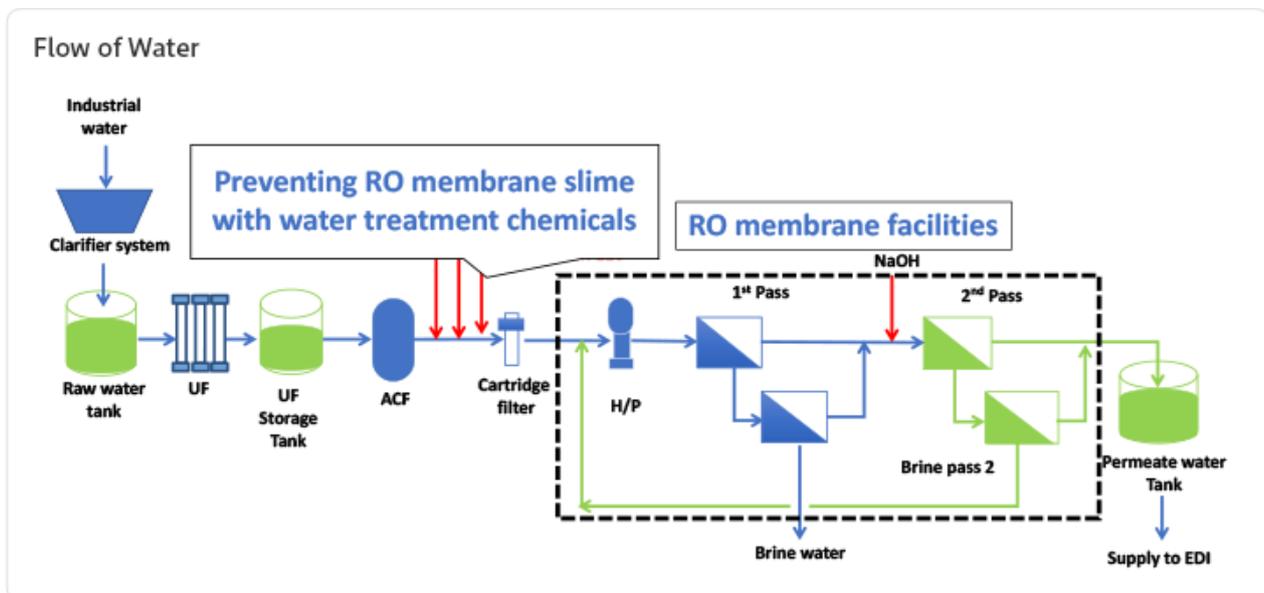


Mr. Wittaya Srisuwan
Factory Engineering

Environmental Improvements at PTT Public Company Limited (Rayong Gas Separation Plants) (Initiatives of Kurita-GK Chemical Co., Ltd.)

PTT Public Company Limited is a petroleum and natural gas provider, the largest energy company in Thailand. The PTT Group promotes CSR activities based on the PTT Group SSHE (Security, Safety, Health and Environment) Management Standards with the goal of being an 'Advanced and Green National Oil Company.' The company's Rayong Gas Separation Plants had a problem with biofouling in its RO membrane facilities, which are used in water, reducing the amount of water passing through the membranes and requiring cleaning to maintain water volumes.

Kurita GK Chemical Co., Ltd. proposed using water treatment chemicals to prevent RO membrane biofouling. The proposal was adopted and resulted in stabilizing the amount of water passing through the membranes and also reduced membrane cleaning frequency from once every two months to once every four months, which served to reduce the amount of water used by 1,260 m³ per year, including cleaning water. In addition, optimizing management of RO membrane facility operations and reducing the load on the water supply pumps caused by biofouling served to reduce electricity consumption by the equivalent of 11.5 tons-CO₂.



Voice of the Customer

In this case, Kurita's proposal can reduce water and energy consumption after CIP by Kurita's treatment program. RO can operate normally and have good condition. So, it can reduce a risk of membrane cracking. RO membrane can extend the operating time because of the performance as same as new membrane. I would like to thank Kurita for recommendation for saving cost. And we look forward to receiving more improvement proposal to cooperate together.



Mr. Thodsaphon Phansadsadee
Process Engineering and Optimization Division,
Production Planning and Technical Management Department

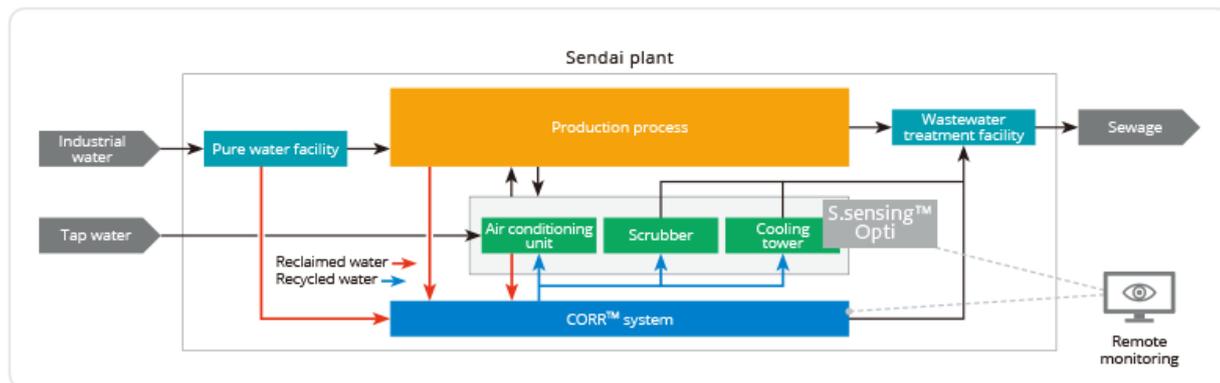
Kurita's Recycled Water Supply Service to Reduces Water Usage at the Sendai Plant of Kanazawa Murata Manufacturing

Reductions of **40%** in Tap Water Usage and **30%** in Sewage

At the electronic components manufacturer Kanazawa Murata Manufacturing Co., Ltd., an environmental initiative based on the Murata Manufacturing group's environmental action plan is under way. The Group has set a target for reducing water usage per production volume, and has set about reducing the volume of water used at its Sendai plant. Kurita Water Industries proposed a recycled water supply service that reclaims and recycles wastewater to help this customer achieve its goals. The service is a contract with the customer to supply recycled water, including operation and management of the CORR™ wastewater reclamation system. In applying this service, we cooperated with the customer to investigate the volume and quality of the reclaimable wastewater at each outlet, and to select areas for use of the recycled water depending on its quality. In this case, since the recycled water is used as make-up water for a cooling water system, we also provided cooling water quality management using the S.sensing™ Opti remote monitoring system.

Using the service has enabled the customer to use water in the plant more efficiently, and the customer expects to achieve reductions of 40% for tap water and 30% for sewage compared to fiscal 2018.

Conceptual Diagram of Recycled Water Supply Service



Voice of the Customer

Since introducing this service, we are delighted to have achieved the reductive effect on water usage as initially planned, as well as reducing labor for facility management. Furthermore, when we were at the stage of considering applications, various departments of Kurita Water Industries helped us to maximize the benefits of water usage reduction, demonstrating Kurita's powerful capabilities. We are now looking forward to receiving proposals for further reducing our environmental impact by expanding the scope of application and looking at management of water facilities throughout our entire plant.



Mr. Etsuhiro Saito
Administration SEC
Sendai Plant

Water saving example at Teijin Polycarbonate China Ltd. (Initiative by Kurita Water Industries (Dalian) Co., Ltd.)

Water usage Reduced by **30%**

Teijin Polycarbonate China Ltd. manufactures polycarbonate in China. China's annual water resource per person is significantly lower than the global average, causing environmental regulations on matters such as water usage restriction and water quality of wastewater to grow tighter every year. Some regional regulations are tougher than the national regulations, and Teijin Polycarbonate China faced an urgent task to reduce its water usage.

Kurita Water Industries (Dalian) Co., Ltd. worked with the customer to check the volumes of water use and wastewater, as well as water quality, for the entire plant. Then, we proposed using an RO membrane facility* to treat and reclaim water from cooling facilities and plant waste water with a low degree of contamination. The customer accepted the proposal, which has enabled a reduction of around 30% in water use across the entire plant.

※A facility for filtering water using a reverse osmosis (RO) membrane that allows water to pass through while preventing the passage of impurities such as ions and bacteria.

RO membrane facility



Voice of the Customer

Reducing the volume of water usage was a major challenge for us. We are very grateful for this proposal for an appropriate countermeasure, which has delivered the expected results.

Now we have asked Kurita to look into ways to further increase the volume of water that we reuse. We look forward to your continued assistance.



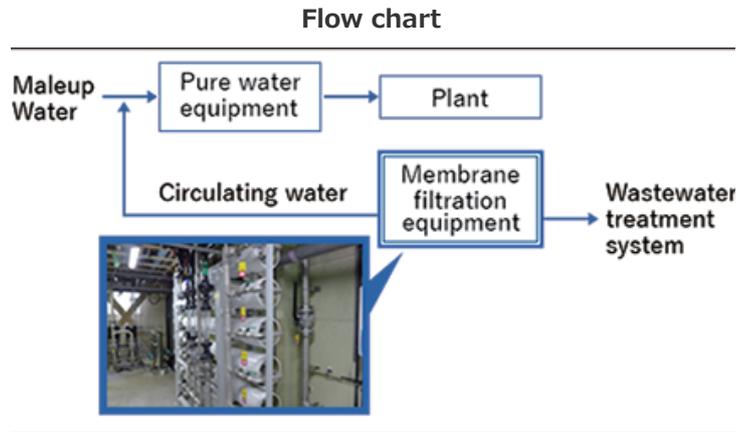
Manufacturing Department Manager
Masahiro Ishida

*Position is as of fiscal 2019.

**Water saving example at SHINKO ELECTRIC INDUSTRIES CO., LTD. Takaoka Plant
(Initiative by Kurita Water Industries Ltd.)**

Annual water consumption Reduced by **25,000m³**

SHINKO ELECTRIC INDUSTRIES CO., LTD. mainly manufactures semiconductor packages that achieve the miniaturization and high functionalization of electronics products. The company positions environmental protection as one of its top management policies. To minimize water consumption at its plants, this customer collects and reuses as much water used for production as possible. However, the properties of the discharged water changed when the company modified the production volume and method in response to changes in its business environment. Consequently, it was becoming difficult to maintain a balance between the quality and quantity of water used at its plants. Kurita Water Industries proposed an improvement measure, with which water quality is improved by removing organic constituents, which were affecting the quality of pure water, by means of membrane treatment. The customer adopted our proposal. As a result, the amount of reusable circulating water increased, and it became possible to reduce the amount of makeup water, enabling water consumption to be reduced by 25,000m³/year.



Voice of the Customer

We evaluate this proposal highly because it has enabled us to stabilize the quality of pure water and reduce the number of parts that are replaced due to the adhesion of dirt from organic constituents.

We expect Kurita to give us further proposals for reducing the environmental impact of our plants and ensuring stable operations.



Mr. Takeshi Matsuki
Manager of Facilities Management Department II,
Environmental Management Division
*Position is as of fiscal 2018.

Realize Sustainable Energy Use

Environmental Improvements at CELUPA INDUSTRIAL CELULOSE E PAPEL GUAÍBA LTDA. (Initiatives of Kurita do Brasil LTDA.)

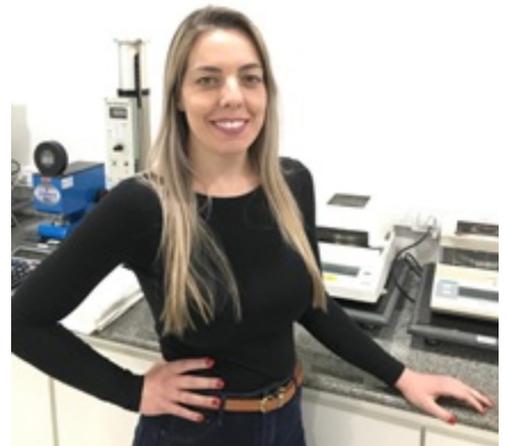
CELUPA INDUSTRIAL CELULOSE E PAPEL GUAÍBA LTDA. manufactures various types of specialty papers for sterilization processes, food packaging and the production of coffee filters. The papermaking process requires the use of steam, so one challenge at the company is reducing the amount of fuel used for steam generation, thus reducing CO₂ emission as well.

Kurita do Brasil LTDA. proposed the use of a new technology "KURITA PJ" for raising thermal conductivity by water-proofing the metal surface of the paper drying drums that are heated by steam. A layer of water is formed inside the drying drums when steam condenses on the metal surface in contact with the steam. Even when extremely thin, this water membrane greatly reduces heat conductivity, which causes more energy to be consumed in the papermaking process. Kurita do Brasil proposed a technology to eliminate this water membrane. Treating the steam with a water-proofing chemical successfully reduced the amount of heat needed, which in turn reduced the fuel consumption per ton of paper produced by 2.8%.

Voice of the Customer

Application of PJ Technology has been advantageous for our process. In addition to the reduction in steam consumption, we achieved environmental gains by reducing the carbon footprint and consumption of fresh water to produce the steam.

With Kurita PJ the process works in stability and brings important gains for CELUPA.



Ms. Natalie Figueiredo da Silva
Quality Control

Energy Creation at Fuji Clean

Reducing annual CO₂ emissions by **10,000 t**

Fuji Clean Co., Ltd.'s businesses range from collection and transportation of waste to intermediate treatment* and final disposal in landfill. It contributes to society through safe treatment of waste. Fuji Clean developed a concept of creating renewable energy by methane fermentation of waste, and contributing to the local community that provides the waste by supplying electric power and heat during disasters. Since the areas surrounding the company's facilities and the area downstream are prospering agricultural areas, the company needed a treatment that did not produce wastewater, and was seeking for a partner with suitable technologies. Kurita Water Industries proposed production of biogas from waste using the dry methane fermentation technology that it has developed over many years. This methane fermentation technology is able to treat waste such as paper waste, which has a high organic matter content and low water content, and does not produce wastewater. Since it met Fuji Clean's requirements, the proposal was accepted. Moreover, through this proposal, Fuji Clean's project was selected as the Demonstration Project for Regional Autonomous Biomass Energy System by the New Energy and Industrial Technology Development Organization (NEDO), and is currently being trialed. Furthermore, the biogas generated by the dry methane fermentation reactor is used as fuel for an onsite boiler and power generator, reducing the use of electricity and fossil fuels, and attendant CO₂ emissions.

* Intermediate treatment: Minimizing the volume of waste for landfill by separating it and then crushing or incinerating it.

Voice of the Customer

We decided to adopt Kurita Water Industries' dry methane fermentation technology because it was suitable not only for our vision, but also for the condition of the waste that we receive. Since the types and volume of waste change day by day, we encountered some difficulty in setting up a dry methane fermentation reactor, but we were glad have Kurita alongside us as we strove to establish a method for operation and management. We hope to receive further input from Kurita on biogas generation, as well as cooperation on our social contribution activities.

Dry methane fermentation reactor



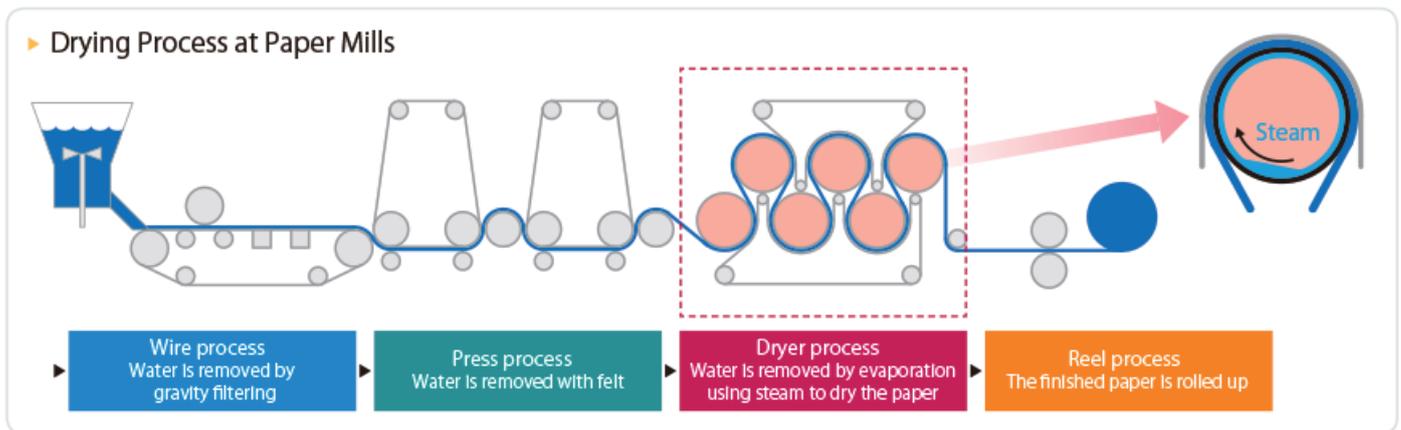
Mr. Hisato Kinjo
General Manager, Renewable Energy Department
Dry Methane Fermentation Plant

Examples of Energy-Use Reduction at Paper Mills (Initiative by Kurita Water Industries Ltd.)

Per-unit Use of Steam Reduced by **5 to 10%**

At paper mills, paper is created through a pulping process and paper-milling process. In the paper milling process, the water content is removed from the wet paper that will become the finished paper through application of pressure and a mechanical water removal process. After that, the paper is dried with a dryer and rolled up. The dryer used in this process is formed from a metal cylinder. The paper is spread over the surface, which is then heated. To heat the dryer, steam is passed through the interior. Heating accounts for most of the overall energy usage at the plants. Therefore, reducing the energy used in the process was an important challenge at paper mills.

Kurita Water Industries noted that water from the steam adhering to the inside of the dryer caused a drop in heat conduction efficiency. At many paper mills we have proposed adding a water treatment chemical that forms a water-repellent film to the steam, so that the film adheres to the inside of the dryer and improves heat conduction efficiency. Plants that have adopted this proposal are able to reduce their per-unit use of steam by around 5-10% per year on average, with the reduction in energy leading to a reduction in CO₂ emissions.



Examples of Energy-Use Reduction at Daicel Safety Systems Inc. (Initiative by Kurita Water Industries Ltd.)

Electric power consumption Reduced by **44%**

Daicel Safety Systems Inc., which mainly produces inflators for car airbags, needed to improve the energy efficiency of its businesses activities in line with the Daicel Group's Responsible Care Basic Policy.

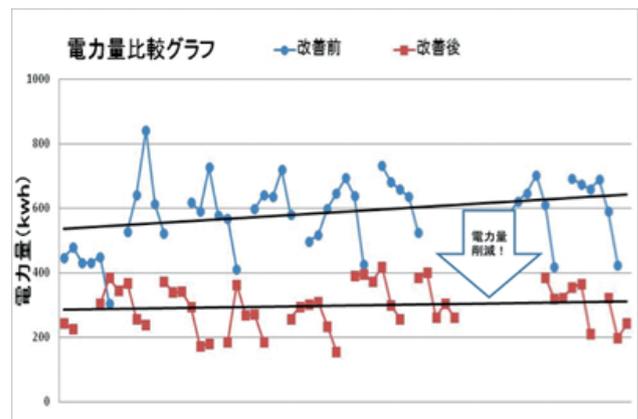
For this customer, one of the issues was improving the energy efficiency and reducing energy use of its cooling water equipment for air conditioning. Kurita Water Industries proposed first removing scales that formed on the heat exchanger of the cooling water equipment and then inhibiting their formation using water treatment chemicals.

Having adopted these proposals, the Company reduced power use 44% by optimizing the heat exchange efficiency of the cooling water facilities, and it was possible to maintain those benefits.

Heat exchanger interior before the cleaning (left)
After cleaning (right)



Comparison of electricity use before and after proposal adopted



Voice of the Customer

We thought highly of Kurita Water Industries' proposal because it was appropriate for the issues we faced and it was possible to dramatically reduce energy use as expected.

In the future, we expect to work with Kurita Water Industries to introduce the proposal horizontally throughout the plant and receive other proposals to improve the quality of industrial water.



Mr. Kosuke Inoue
Production Engineering
Department

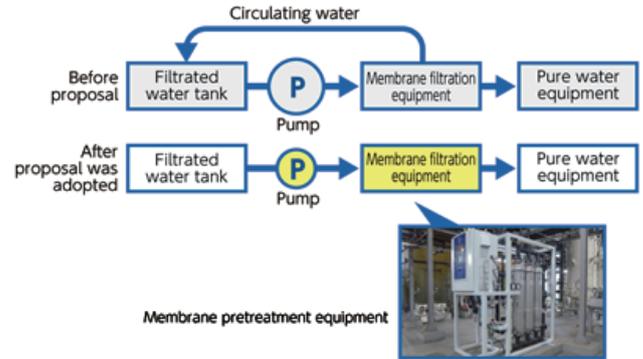
*Position is as of fiscal 2018.

Examples of Energy-Use Reduction at HGST Japan Ltd. (Initiative by Kurita Water Industries Ltd.)

Electric power consumption Reduced by **90%**

HGST Japan, a manufacturer of hard disk drives and other electronic devices, is striving to reduce the environmental impact of its business activities in line with the Western Digital Group's environmental policy.

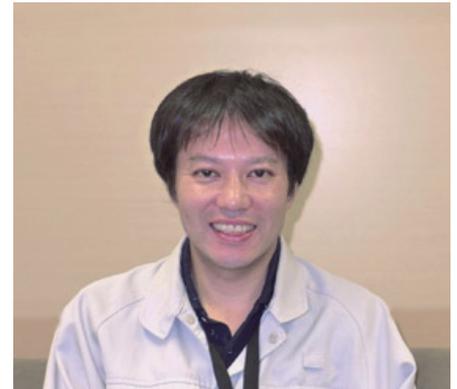
For the customer, a continuous reduction in energy use became an issue because it is a designated energy management factory. Kurita Water Industries proposed replacing the membrane filtration equipment with a more efficient one. The previous equipment included a large pump because circulating water returning to the previous stage was necessary due to the original operational condition, but with the new equipment, a small pump can be used because circulating water is not required.



Voice of the Customer

In this case, the proposal was made when we were working to improve energy efficiency, and we adopted it as the improvement was easy to understand and there were substantial benefits. Replacing the old equipment with new smaller equipment made it easier to conduct maintenance and lowered costs, which was helpful.

Improving energy efficiency is an ongoing issue, and we hope for additional proposals for improvements.



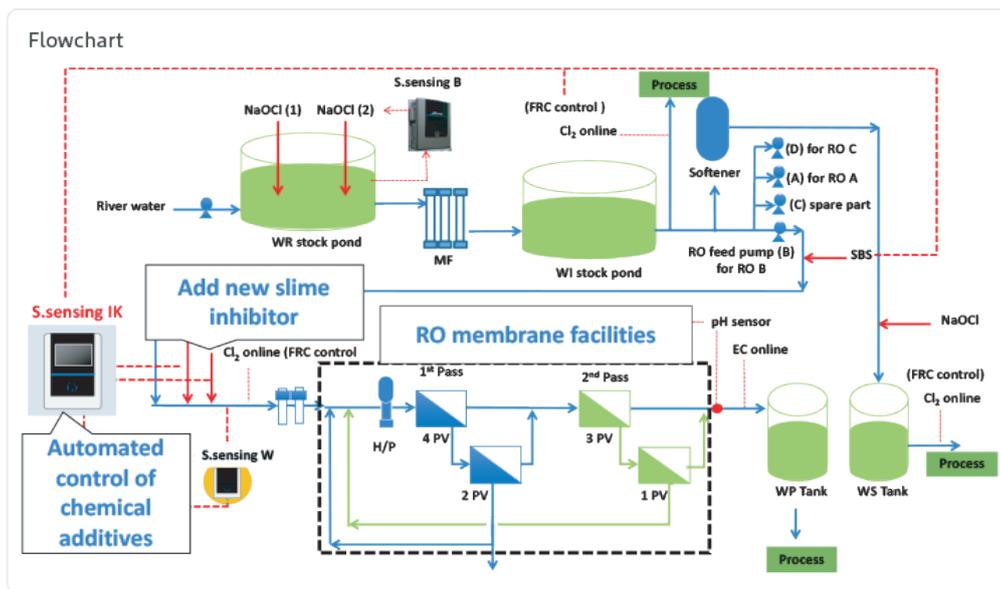
Mr. Haruki Chiba
Real estate operations
Facility engineering
Engineering Manager
*Position is as of fiscal 2018.

Environmental Improvements at Ajinomoto Co., (Thailand) Ltd. (Ayutthaya Plant) (Initiatives of Kurita-GK Chemical Co., Ltd.)

Ajinomoto Co., (Thailand) Ltd. (Ayutthaya Plant) in Thailand primarily produces umami seasonings. The company is a member of the Ajinomoto Group and as such works to reduce greenhouse gases and plastic waste. To reduce the environmental impact of RO membrane facilities that are used to manufacture industrial water at the plant, Kurita-GK Chemical Co., Ltd. proposed lengthening the operational life of the RO membranes to reduce waste and electricity consumption.

RO membranes can collect biofouling* and other substances on their surface, making it difficult for water to pass through. This increases the load on the pumps used to supply water to the membranes and increases electricity consumption as a result. Moreover, to maintain water production volumes, the RO membranes have to be cleaned and replaced regularly. The solution proposed by Kurita-GK Chemical applies new water treatment chemicals that inhibit biofouling and uses sensors to optimize the levels of chemical additives needed for stable membrane operations. After the solution was adopted by the plant, cleaning frequency decreased, RO membrane waste declined 0.4 tons per year and electricity consumption dropped by the equivalent of 8.5 tons-CO₂. The amount of cleaning agents and wastewater from membrane cleaning also decreased. In addition, sensor-based control has made it possible to reduce the amount of chemical additives as well.

* Pollutants formed by microorganisms such as bacteria and algae in water.



Voice of the Customer

S.sensing and IK from KURITA can control the amount of chemicals use in the RO system very well and save maintenance cost of membrane RO.



Mr. Sanan Kinkasorn
Utility & Biomass Department

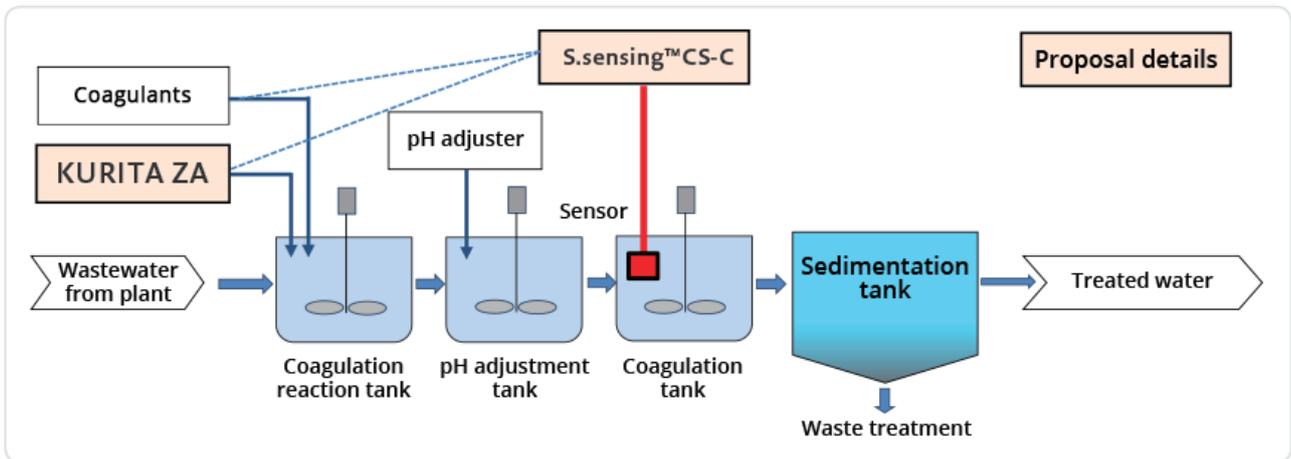
Reducing Waste at a Precision Equipment Manufacturing Plant

Reducing Waste Arising from Chemicals

At the plant of a customer who manufactures precision equipment in Thailand, wastewater from the manufacturing process is purified by coagulating suspended solids from the dicing process and so forth in a wastewater treatment facility. The coagulation process separates out matter suspended in the water by solidifying it into a mass using chemicals. The chemicals used are formed into a solid mass along with the suspended solids, and emitted as final waste product. Reducing the waste product at the plant was therefore a matter of reducing the amount of chemicals used.

Kurita-GK Chemical Co., Ltd. proposed using the water treatment chemical KURITA ZA to promote the coagulation effect of the chemicals used at the plant, and the introduction of the S.sensing™ CS-C sensor to confirm the coagulation status in real-time, allowing optimization of the amount of chemicals used. After implementing this proposal, the customer achieved a reduction of more than 80% in the amount of chemical usage, which led to an attendant reduction in the amount of chemical originated waste. Furthermore, since the coagulation status is now able to be grasped using the sensor, the customer is also able to reduce the amount of labor used in management.

Image of Wastewater Treatment Process and Proposal Details



Waste Reduction at Sabae Murata Manufacturing Co., Ltd. (Initiative by Kurita Meiki Ltd.)

Waste volume Reduced by **95%**

Electronics manufacturer Sabae Murata Manufacturing Co., Ltd. is part of the Murata Group, and is making efforts to reduce its environmental impact towards achieving the Group's medium-term environmental targets. Changes in the company's production items and an increase in production volume caused some of the production facilities to generate concentrated wastewater that could not be treated with its existing wastewater treatment facility. Since the entire volume of this was treated as waste, reducing the amount of concentrated wastewater became an urgent priority.

Kurita Meiki proposed reducing the volume of concentrated wastewater using a vacuum concentrator. This equipment reduces the atmospheric pressure, causing the water content to evaporate at a lower boiling point and thereby reducing the volume. Heat is required to evaporate the water, but the evaporation heat is reclaimed using a heat pump and then reused for heating. After accepting the proposal, Sabae Murata Manufacturing Co., Ltd. was able to achieve a 95% decrease in the volume of concentrated wastewater that was treated as waste.

Voice of the Customer

Thanks to this proposal, we can now see the way forward to increasing production while reducing waste. Moreover, the proposal has been reported to the Murata Environment Committee and has also been highly appreciated by management. Waste reduction is a never-ending task, and we hope to receive further assistance from Kurita Meiki, going forward.

Vacuum concentrator



Mr. Daisuke Yokozawa
Team Leader,
Administration Section
*Position is as of fiscal 2019.

Waste Reduction at NIPPON SURFACTANT INDUSTRIES CO., LTD. Nasu Factory (Initiative by Kurita Water Industries Ltd.)

Reduction in waste amount **28.5%**

The Nasu Factory of NIPPON SURFACTANT INDUSTRIES CO., LTD. manufactures various chemical products that form the raw materials for pharmaceuticals, cosmetics, and so forth. The factory has acquired ISO 14001 certification and works continuously to reduce its environmental impact.

The company's wastewater processing facility was obliged to undertake sporadic pH adjustments and regular sludge removal to combat odors and destabilization of biological treatment caused mainly by coagulants. Moreover, the amount of chemical treatment usage was increasing, and elimination of the resulting sludge had become an issue. Kurita Water Industries proposed the use of a coagulant that did not contain the component that had been the primary cause of odors. The coagulant efficiently complemented the contaminant materials, so that the amount of additive could be reduced. This enabled a reduction in the amount of waste from coagulant as well. Furthermore, since the coagulant is slightly acidic, it had less of an impact on microbes. After the client accepted the proposal, their waste volume was successfully reduced by 28.5%.

Voice of the Customer

Kurita Water Industries' proposal not only reduced the amount of waste, but also reduced the amount of labor required for operation management and improve the level of safety. Since adopting the proposal, the frequency of sludge removal has been gradually declining, so we expect the amount of waste to decrease even further. We look forward to receiving more proposals from our trusted water treatment professional going forward.

Waste water treatment facility



Right/Mr. Riichi Ohoke
General Manager of Environment Division
Left/Mr. Masaru Tomizawa
Environment 2Group, Environment Division

*Position is as of fiscal 2018.