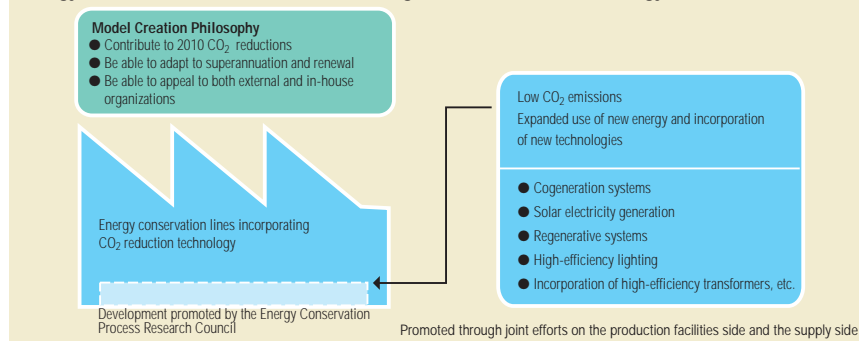


Perfect Energy Factory

Energy conservation model factories striving to achieve minimum energy loss

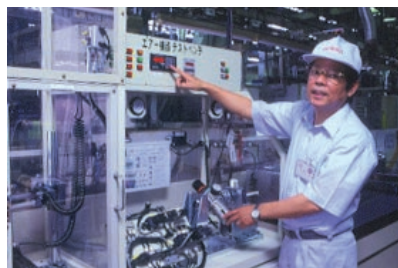


strainers after washing, and costs the Company approximately ¥3.5 billion annually.

Energy Conservation Group Leader Mr. Yamazaki reflects on the project: “As our department uses a particularly large amount of air, we resolved to endeavor to reduce consumption. At that time, air leaks were ignored as long as they posed no immediate threat to production. We started by coming to work on the weekends and checking each and every one of the 4,000 pieces of equipment for air leaks by hand.”

Air devices that were previously thrown out are currently fitted for reuse at the air device repair center that has come to be known as the Air Conservation Dream Workshop.

“It’s extremely motivating to actually observe the progress we make in air conservation. Everyone is working very hard. Right now, we are making preparations to be able to supply recycled parts to other divisions. We are steadily progressing toward our goal of becoming an advanced energy conservation and zero-emission plant in the near future,” remarks Mr. Yamazaki on the “dream.”



Energy Conservation Group Leader Mr. Yamazaki at work in the Air Conservation Dream Workshop.

Reducing the Use of Hazardous Substances

Our Philosophy

We are prioritizing an absolute reduction in the use of hazardous substances and their replacement with materials that place less of a burden on the environment. By reducing the use of chemical substances at our facilities, we aim to lighten the burden that making DENSO products places on the atmosphere, water quality, and soil. Furthermore, we are pushing ahead with the deployment of manufacturing systems with low environmental impact and the importation of chemical removal and treatment technologies.

Targets and Results

As part of our plans to reduce pollutants in factory wastewater we have installed liquid-concentration measuring devices, replaced nitric acid with other cleaning agents, and set targets for the reduction of nitrogen and phosphorous in factory wastewater.

Water Quality Control

There are two principal causes of water pollution associated with manufacturing facilities: discharges from dining halls and toilets and discharges that occur in the course of such production processes as heat treatment, plating, and machine processing. We treat wastewater according to which one of the two categories it belongs, and we release it into public waterways only when we have confirmed that it meets our voluntary standards, which are more stringent than those decreed in law, or the standards we have established in conjunction with the cooperation of local communities.

DENSO’s voluntary standards regarding water quality are severe. For harmful substances—as designated by the Water Pollution Control Law—we use whichever of the three following standards is the

most stringent. These are a numerical value one-fifth of that stipulated by law or local ordinance, the numerical value either contained in an agreement signed with representatives of the locality, or the value set out in the policy of the local authority. For other substances, apart from using a numerical value one-half of that stipulated by law or local ordinance, we use identical criteria.

● Discharge Management System

At all DENSO production facilities, we have installed a discharge management system unique to the Company. We collect wastewater that has been cleaned at a wastewater treatment plant in a series of discharge storage tanks, and only after the water has been thoroughly checked do we release it. By sequentially changing the functions of the various tanks, it is possible to treat wastewater continuously, and, should water quality be unsatisfactory, the system is designed to allow wastewater to be sent back to the wastewater treatment plant for additional processing.

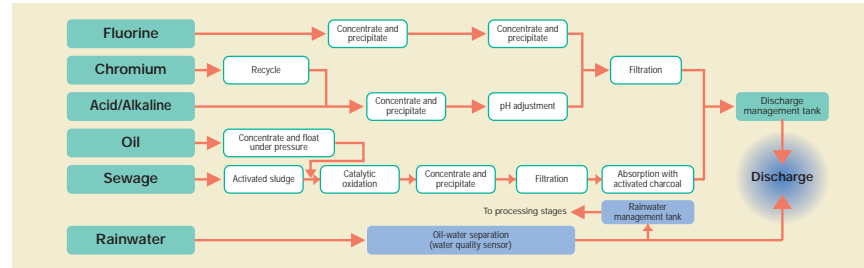
● Rainwater Management System

We have installed rainwater management systems at DENSO premises that have rainwater discharge outlets. Rain that falls within the boundaries of the premises is collected, and any oil is removed in a water-oil separating tank, which is under constant surveillance by water quality sensors. Even if only slight impurities are detected in the water, it is automatically sent to the wastewater treatment plant, where it is cleaned thoroughly prior to release.

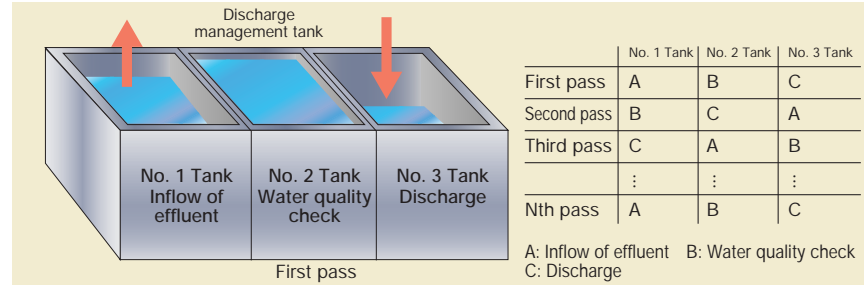
● Reducing Nitrogen and Phosphorous in Effluent

DENSO is pushing ahead with measures to reduce the use of chemicals that contain phosphorous or nitrogen or find substitutes for them to help prevent the eutrophication of rivers into which wastewater is released as well as the Ise and Mikawa bays.

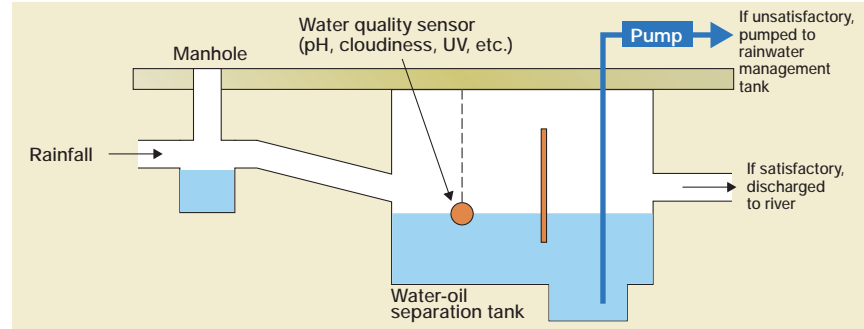
Water Quality Management System



Discharge Management System



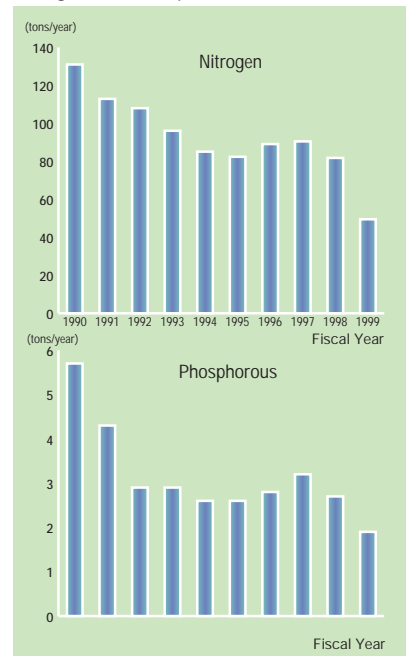
Rainwater Management System



DENSO is prioritizing the substitution of nitric acid—used in the cleaning of aluminum products—with sulfuric acid because nitric acid contains harmful nitrogen. We are also making it a priority to dilute the concentration of aqueous ammonia used in cleansing semiconductor wafers.

In addition, with the intention of further reducing the quantities of nitrogen and phosphorous in wastewater, we have installed denitrifying and dephosphorizing wastewater treatment facilities at some of our production plants. These facilities can also remove nitrogen from high-nitrogen content waste for later disposal by means of a condenser.

Nitrogen and Phosphorous Emission Volumes

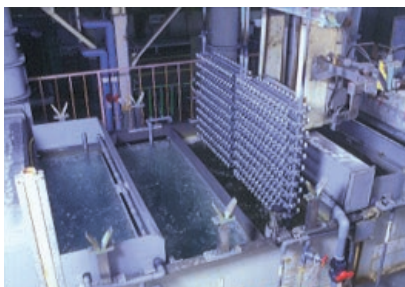


● Reducing Nitrogen in Wastewater—
A Case Study Switching to Nitric Acid
Substitutes in Alunite Treatment

In December 1999, the Components Production Department at DENSO's Nishio Plant completed the switch from using nitric acid (HNO_3) to using sulfuric acid (H_2SO_4) in the alunite pretreatment of production components. This move marks a milestone in Companywide efforts to substitute and reduce the use of chemicals, including nitrogen, which cause eutrophication.

Aluminum components are subjected to alunite treatment to improve their corrosion resistance and general durability. It is a process particularly appropriate for gasoline and diesel pumps. This etching process is designed to neutralize and activate the surface of the aluminum, and, until recently, nitric acid was used. There was no potentially harmful wastewater produced directly by this etching process because the waste acid was safely disposed of by an outside company. However, with certain components, subsequent cleaning processes generated wastewater containing nitric acid due to trace residues on the surfaces of the components. This wastewater was deemed to be acidified wastewater and was subjected to on-site wastewater treatment. However, with current wastewater treatment systems, it is difficult to entirely remove nitrogen, and the nitrogen that could not be removed was discharged in the wastewater into the public water system.

Alunite treatment process—now free of nitric acid



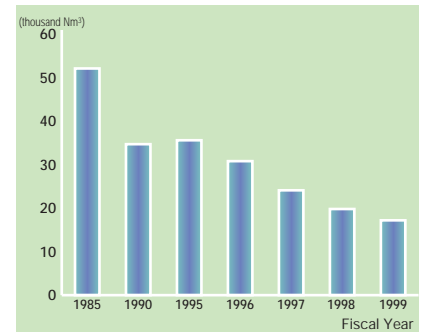
The two central Japanese prefectures of Aichi and Mie about the bays of Ise and Mikawa, which have eutrophication problems, and the prefectures have strengthened their regulations to deal with this eutrophication. In response, DENSO determined to make the switch to using sulfuric acid in alunite treatment. To make the use of sulfuric acid practicable, two obstacles had to be overcome: an alkali had to be found that would not generate smut in the initial degreasing process and the concentration of sulfuric acid had to be precisely adjusted so that it would have the same etching capability as the formerly used nitric acid.

By switching to sulfuric acid, DENSO was able to reduce the concentration of nitrogen in discharged water from 12.5mg/l to 8.4mg/l. Moreover, the acid-containing waste liquid generated by the alunite treatment that was formerly treated by an outside company is now reusable, resulting in reductions in waste and in the cost of chemicals.

● Reducing Cyanide and Chromium
in Wastewater

DENSO plants that use cyanide and chromium in the plating and surface treatment of products decontaminate the wastewater from these processes at a wastewater treatment plant. Additionally, to prevent any environmental pollution before it occurs, we are striving to remove chromium and cyanide from the chemicals that we use in the surface-treatment process. We are moving to a sealed-off system whereby the harmful substances in the chromium-containing effluent generated in the underground coating treatment process are recovered, the wastewater is reused, and there is no release of any sort into rivers or other bodies of water.

SO_x Emissions



Atmospheric Pollution

Nitrogen oxide (NO_x) compounds, sulfur oxide (SO_x), and particulate matter (P.M.), all of which are atmospheric pollutants, are emitted by melting furnaces and boilers. To reduce emissions of these substances into the atmosphere, DENSO is moving ahead with a shift to higher-quality, less-polluting fuels and installing dust-collection devices. Of particular note is DENSO's success in reducing SO_x emissions through a switch from using heavy oil to using town gas for powering furnaces and boilers as well as the increased utilization of low-sulfur fuels.

● Compliance with Incinerator
Regulations

At DENSO, slurry generated in the course of wastewater treatment is reduced in volume in incinerators. This slurry contains almost no chlorine, which is considered to be one of the factors in dioxin formation, and, by maintaining the incinerator at a temperature of around 800°C and operating it in a responsible manner, the production of dioxins can be averted.

All of DENSO's incinerators that have a treatment capacity of between 200kg and 2 tons an hour are already fully compliant with new dioxin emission standards (10ng-TEQ/Nm³) that will come into effect from December 2002.

Management of Chemical Substances

DENSO carries out a thorough prior assessment—covering environmental, safety, and fire prevention considerations—using materials safety data sheets (MSDSs) whenever the Company considers using a chemical substance it has not used before or whenever it installs or improves chemical-handling equipment. In fiscal 1999, we carried out 1,007 such prior assessments of chemical substances and 2,324 prior assessments of equipment.

Adhering to the spirit of the Pollutant Release and Transfer Register (PRTR), we have taken the necessary steps to keep careful track of the volumes of chemicals contained in semifinished and other materials, the volumes handled in production processes, and the volumes released into the environment. At the same time, we are working to reduce the volumes of chemicals that we use, manage them in a proper fashion at all times, and prevent pollution of the soil, atmosphere, and water. We are also working to construct a comprehensive chemicals management system that includes information on chemical substances contained in our products. Simultaneously, we are aiming to expand the number of chemicals that are subject to rigorous management.

DENSO uses 24 of the 176 chemicals targeted by the Japanese Environmental Agency's PRTR Pilot Program. For more details on DENSO's handling of these substances, please refer to page 43, where the relevant data is set out for each plant.

Eliminating the Use of Ozone-Depleting Substances

In the past, DENSO used CFC-113 (a designated chlorofluorocarbon) and 1,1,1-trichloroethane in the manufacture of electronic components and the processing of machine parts. Both of these substances are recognized as contributing to the depletion of the ozone layer. In advance of international regulations to protect the ozone layer under the Montreal Protocol, DENSO phased out the use of CFC-113 in December 1994 and 1,1,1-trichloroethane in August 1995.

From 1995, DENSO used HCFC-225 as a cleaning agent to remove flux (an auxiliary soldering agent) from automotive IC parts after soldering, as HCFC-225 has a lower ozone depleting coefficient than CFC-113. However, under international regulations, HCFCs

must be completely eliminated by 2020. In light of this, DENSO decided to develop the technology that would render the early elimination of HCFCs from the workplace possible. We committed to the joint development with other manufacturers of water-soluble cleaning agents, and, as a result, we were able to phase out HCFC-225 completely by the end of fiscal 1999, in line with our initial plans. With this success, DENSO workplaces now use no ozone-depleting substances whatsoever.

HCFC-225 Use

