

Environmentally Conscious Products

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Recently, the requirement that industrial products have low environmental impacts has been given increased importance. Kawasaki, providing both "environmentally conscious products and technologies" and "products and technologies that contribute to environmental protection", wants to promote the formation of a sustainable society.

Product Assessment

For the environmental protection activities of FY2002, we encouraged each business division to start exercising environmental consciousness as early as possible in the product design phase. To this end, we attempted to promote the development and application of product assessment regulations.

At present, 10 out of 13 divisions have established these regulations, and the remaining three are on the way to establishing the regulations. The rate of implementation in five divisions has reached 100% for the subjects stipulated in the regulations and the number of cases of product assessment in the past two years has exceeded 120.

We are going to further increase the range of product assessment implementation and will revise the regulations as necessary to enhance their effectiveness.

[Implementation of Product Assessments in Past Years]

FY	1998	1999	2000	2001	2002
Divisions with regulation/Total divisions	1/14	7/14	10/14	11/14	10/13*
Cases of product assessment	10	47	69	138	123

*The total has decreased from the previous year due to the integration of two divisions.

LCA (Life Cycle Assessment)

LCA for model products has already been executed, and based on these results, efforts to disseminate the LCA technique to all business divisions have commenced.

Rolling Stock, Construction Machinery & Crushing Plant Company

We have studied the life cycle energy trend data provided by the Railway Technical Research Institute and each of the Japan Railway Companies to extend our LCA activities to rolling stock.

Aerospace Company

Aiming at finding a right direction of environmentally conscious products in the aerospace industries, LCA studies have started. In the studies, a simulation model that identifies what effects emerged with improvements, for example in material, will be developed.

Plant & Infrastructure Engineering Company

LCA for waste treatment was performed with the value anticipated in design and the actual value obtained from an actual facility. The results of the comparison between the actual and design values were reported to the Japan Society of Waste Management Experts (JSWME).

Consumer Products & Machinery Company

With the goal of developing a unified LCA technique for the automotive industry, we joined an LCA Subcommittee of the Japan Automobile Manufacturers Association, Inc. in which four motorcycle manufacturers are jointly studying LCA.

Kawasaki Shipbuilding Corporation

We are investigating and reviewing the feasibility of applying LCA techniques to propulsion system of ships. So far, a summary LCA for merchant ships has been performed on an experimental basis.

Green Procurement

We regard green procurement as one element of product assessment and are expanding this practice throughout Kawasaki in accordance with our Basic Policy of Green Procurement. So far, the scope of our green procurement, which began with the purchase of office supplies, is expanding to production stage.

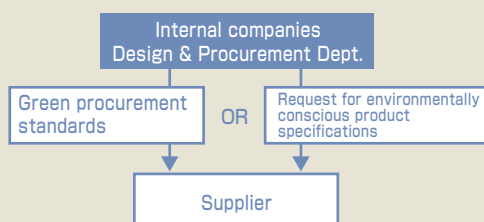
We are going to expand the green procurement rate through an e-Procurement System (starting in FY2003) for indirect materials. With this system, we will monitor the amount of materi-

als purchased by green procurement policy.

Additionally, to encourage the promotion of this practice by each internal company, we are developing procurement standards for equipment purchases for the environmental considerations that must be included in product specifications.

[Basic Policy of Green Procurement] Implemented in 1999

- 1 Environmental impact must be considered across the entire lifecycle of all products from resource mining to waste.
- 2 In the selection of a supplier, if multiple suppliers are equal in terms of quality, price and delivery, a supplier who is most seriously committed in environmental conservation is given priority over other suppliers.
- 3 Environmental product information must be obtained from suppliers.



Representative Products for Environmental Impact Reduction

80% Reduction in 30 Years

● Control of CO₂ emission for container ships

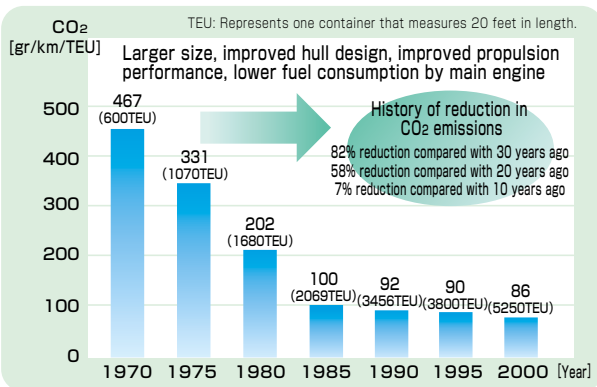
Container ships provide speedy maritime transportation for the large amounts of cargo that are vital for maintaining the abundance of modern lifestyles, but they consume fossil fuels including heavy oil and, in turn, emit CO₂.

In the work of developing container ships, Kawasaki fully employs its expertise in shipbuilding technology in order to contribute to global environmental preservation. Improvement of marine vessels requires a wide range of technology and a long time span. Over the past 30 years, we have succeeded in attaining dramatic decreases in CO₂ emissions

through larger ship size, improved hull design, enhanced propulsion performance and reduction in fuel consumption of the main engine. The CO₂ emissions associated with transportation of one container for 1 km dropped by 80% in the 30-year span from 1970 to 2000.

Compared with trucks and railway trains, container ships emit much less CO₂. Notwithstanding, we are determined to further reduce environmental impacts through continued technological innovation.

[CO₂ emission of transferring one container for 1 km by marine transportation]



Most modern container ship

10% Increase in Payload at Same CO₂ Emission Amount

● Control of CO₂ emissions for helicopter

In the aviation sector, helicopters play an important role in swiftly transporting personnel and cargo. Kawasaki has dramatically improved the performance of its BK117 helicopter by introducing newly designed main rotor blades and fuselage. This new design has also improved environmental efficiency.

In this design, the new main rotor blade is reverse-tapered toward the outer edge instead of the previous rectangular shape, and the outermost portion of the new blade has an oval shape. Though the newly designed fuselage was made larger than the one in the previous models in order to increase the transportation capacity, the fuselage drag is much smaller. The advantages of the new design are:

① Improved lift increases payload.

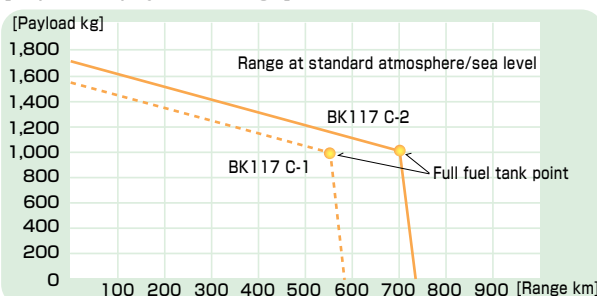
② Decreased fuselage drag increases the cruising speed.

The new main rotor blades were designed for the BK117 C-2, which is the newest model of the BK117 series helicopter. 400 BK117s have been sold so far in the civil helicopter market throughout the world. Though the C-2 is equipped with the same engine as its predecessor C-1, its maximum payload is 10% greater. This means that at the same total fuel consumption the C-2 can transport 10% more weight, reducing the CO₂ emissions per unit of payload.

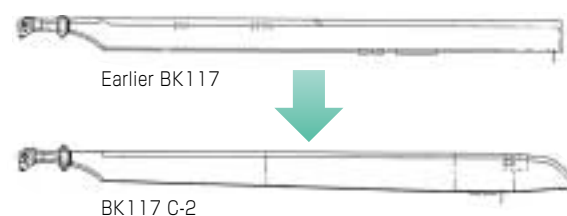


BK117 C-2

[Improved payload/Range]



■ Main rotor blade



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Kawasaki has been committed to promoting "Design for Environment" (DfE) (through product assessment, LCA, etc.) for its major products. Furthermore, both the 4th Environmental Management Activities Plan drawn up this year and the key measures for FY2003 strongly emphasize the importance of DfE.

At present, we are determining the specific areas where our products and technologies need improvements from an environmentally consciousness viewpoint and implementing improvements wherever and whenever possible. Examples of these efforts are summarized in the table below.

※ The examples indicated with ① through ⑧ are described in detail on page 14.

Item	※	Example of Improvement Effort
Energy Consumption Efficiency	① ② ③	<ul style="list-style-type: none"> Light-weight rolling stock designs and direct-drive motors are introduced to help reduce the energy consumption during operation Adopted a system for decreasing tire slippage during the operation with wheel loaders, thereby improving fuel consumption Reduced weight, improved aerodynamics and adopted low power-consumption equipment on aircraft, thereby improving fuel consumption Reduced fuel consumption and noise emissions, and cleaner exhaust from the engines for future supersonic transport (SST) Reduced energy demand and NOx emissions by regeneration burner in hot strip mill Added convection part to the cooling boiler for a converter gas recovery system, thereby lowering gas temperature and increasing gas treatment capacity or dedusting efficiency Recovered uncombusted CO gas and sensible heat from a converter exhaust gas treatment system in order to reduce fuel consumption Incorporated fluidized bed for cement kilns, thereby reducing energy consumption below that of rotary kilns Installed waste heat recovery boiler (exhaust gas driven) at a cement plant to generate power, thereby reducing system power consumption Evaluated fuel consumption improvement rate of newly developed motorcycles against reference year in product assessment phase A novel bow form "Sharp Entrance Angle bow as an Arrow" (SEA-Arrow) was introduced that, by reducing wave-making resistance, improves the propulsion performance of vessels An energy-saving arrangement "Rudder Bulb System with Fins" (RBS-F) is added to the rudder that, by reducing the energy loss, improves the propulsion performance of vessels Electro-hydraulic hybrid system reduces the power consumption through adjusting the discharge rate of the hydraulic pump by controlling the speed of the pump
Greenhouse Gas Emissions		<ul style="list-style-type: none"> Reduced emissions of greenhouse gases resulted from the energy consumption reduction described above Reduced use of air conditioner refrigerant (CFC) in wheel loaders Information about the mandatory recovery of air conditioner refrigerant (CFC) in the wheel loader and the road roller is clearly indicated in the operation manual and warning label
Product Weight	④	<ul style="list-style-type: none"> Downsized all 19 models of back-up gas turbine generators, thereby greatly reducing weight The running speed of a steam turbine was increased by 12%, and by reducing the number of stages the weight of turbine was also reduced Adopted fluidized bed for cement kilns, thereby reducing equipment weight below that of rotary kilns Adoption of the hovering stage has enabled designs for unique multi-purpose domes (with baseball fields, soccer fields, etc.) to help promote resources conservation Set targets for newly developed motorcycles and evaluated weight reduction ratio in product assessment phase The ration of the weight of industrial robots to their load-bearing ability has been decreased Developed high specific output (high discharge rate per unit weight) hydraulic motor
Hazardous Substances/ Pollutants	⑤ ⑥	<ul style="list-style-type: none"> Changed rolling stock body material from steel to stainless steel to reduce paint consumption through a paint-free design Currently developing low NOx diesel engine for marine power generator The concentration of pollutants in exhaust gas was greatly decreased for construction machinery including wheel loaders In the development of the Super Marine Gas Turbine (for the Super Eco-Ship), great reduction in concentration of pollutants in exhaust gas was successfully demonstrated Use of PVC resin is limited in the electric counter for gas turbine engines Used atmospheric corrosion resisting steel members for bridge girders, thereby eliminating the need for painting or repainting Use of four-stroke engines on Jet Skis has realized low noise and emission levels Evaluated reduction of lead use in newly developed motorcycles against reference year in product assessment phase Confirmed compliance of motorcycles with exhaust gas reduction regulations and gained approval from countries around the world To decrease the amount of chlorinated rubber based coating used on marine vessels, polyurethane-based coating was introduced to replace chlorinated rubber based coating To decrease the amount of thinner used in the coating work of marine vessels, a solvent-free coating was introduced for fresh water tank coating Currently investigating the application of bio-degradable hydraulic fluid for hydraulic pump
Containers & Packaging		<ul style="list-style-type: none"> The wooden crates for tugboat propellers were replaced with steel racks to eliminate the use of wood materials Changed packaging for Jet Ski watercraft engines for overseas from wood and cardboard to returnable steel pallet-type Changed packaging for hydraulic equipment knockdown parts for overseas from steel container to basket-type returnable container
Product Service life	⑦	<ul style="list-style-type: none"> Implemented a maintenance following maintenance inspection schedule for gas turbines, thereby extending the service life A truss-type doweled composite slab is used as a highly durable slab for road bridges Evaluated model change interval for newly developed motorcycles in product assessment phase
Ratio of Use for Reusable & Recyclable Parts		<ul style="list-style-type: none"> Worn cast iron components (liners, etc.) are recovered from crushers and used as a raw material for castings Developed a system for reusing internal parts of shield machine Evaluated recycle rate of newly developed motorcycles in product assessments (90% or higher recyclable)
Product Disassembly Time		<ul style="list-style-type: none"> For wheel loaders and road rollers, use of metal embedded FRP components is discontinued Reduced number of parts used in motorcycles
Recovery of Used Products, Containers & Packaging		<ul style="list-style-type: none"> Material type is indicated by a symbol on resin components (wheel loaders, road rollers, emergency gas turbine power generators, hydraulic equipment, motorcycles) Currently promoting standardization of plastic materials used in back-up gas turbine generator
Vibrations & Noise	⑧	<ul style="list-style-type: none"> Adopted low noise-generating nose shape and optimally smooth profile of cars on rolling stock, thereby reducing noise Reduced number of pantographs in rolling stock and adopted streamlined, low noise-generating pantograph design Ultra-low noise level requirement was satisfied with compact vibration rollers Optimized the shape of the rotor blade section and blade tip in helicopters to reduce noise in flight Enveloped back-up gas turbine generator in package to reduce machine side noise emission to 55 dB A noise reduction hangar for testing aero-engines significantly reduces the noise occurring from engine testing on the ground Proposed effective noise reducing construction for subways using noise evaluation technology Estimated and reduced noise of steel viaduct for railway A soundproofing device is installed at the top of sound insulating walls to dampen road traffic noise effectively Confirmed compliance of motorcycles with noise reduction regulations and gained approval from countries around the world

E993 Series AC Train

①

- Lighter rolling stock reduces energy consumption during operation

The E993 Series AC Train, developed by the East Japan Railway Company Research & Development Center, is an environmentally conscious train model. Kawasaki is actively taking part in the development and manufacturing for this model. In the development, we not only employ ready-to-sort recyclable materials and structure to achieve zero waste disposal, but also incorporate a light-weight rolling stock design and a direct drive motor in order to further reduce energy consumption needed for operation and, thus, greatly reduce CO₂ emissions. Also, we are attempting to improve comfort for passengers by applying a barrier-free, low-noise design.



New Bow Form (SEA-Arrow)

③

- Reduces wave-making resistance by half, improving the propulsion performance of vessels

Kawasaki Shipbuilding Corporation has developed a new bow form called "Sharp Entrance Angle bow as an Arrow" (SEA-Arrow) that best suits medium-speed vessels such as LPG carriers. While retaining the effect of a bulbous bow, the SEA-Arrow reduces the wave-making resistance by half so as to improve the propulsion performance of vessels. Compared with the conventional one, this bow reduces the necessary main engine output by 6 to 10%, contributing to great energy saving.



Upper: New bow form (SEA-Arrow)
Lower: Conventional bulbous bow

Super Marine Gas Turbine

⑤

- Kawasaki established a new technology for realizing the Super Eco-Ship

Four companies including Kawasaki teamed up to organize a technical research joint-venture to develop the Super Marine gas turbine that has recently successfully completed a test. This engine can burn A type heavy oil and output 2,500 kW. The fuel consumption with this engine is approximately 30% less compared with conventional gas turbines. The NO_x emissions with this engine are as low as approximately 1/10 compared with diesel engines, and less than 1/3 compared with conventional industrial gas turbines. This high-performance gas turbine is the first step to the realization of our Super Eco-Ship, which is scheduled to be demonstrated in FY2007 and is part of the domestic vessel modernization project sponsored by the Japanese Ministry of Land, Infrastructure and Transport.



Highly Durable Slab for Road Bridges

⑦

- A truss-type doweled composite slab realizes a longer life for road bridges

A "truss-type doweled composite slab" is defined as a slab that is formed by welding a truss-type dowel (consisting of truss diagonals and chord members) to a bottom steel plate to prevent displacement, so as to form a composite member with the bottom steel plate and concrete. Compared with conventional reinforced concrete slab, our doweled composite slab is much more durable. Therefore, its long service life contributes to resource conservation in addition to the resource conservation effect in the construction work. We are developing and constructing this unique slab for road bridges at various sites.

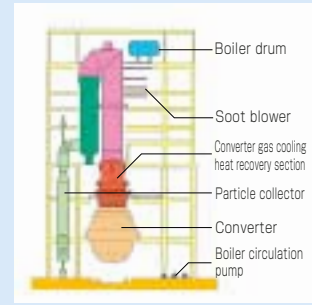


Oxygen Converter Gas Recovery System(OG) with Heat Recovery

②

- Decreases CO₂ emissions by approximately 380,000 t-CO₂ annually

Unburned CO from a steel-making converter is cooled and particles are collected, then the CO is used as fuel, etc. Additionally, the heat is recovered while the gas is cooled and then reused, thereby the energy utilization efficiency of the converter is greatly improved. The reduction in CO₂ emissions with this equipment in use at a large-scale steel mill that has three converter units each rated at 250 t/charge will amount to approximately 380,000 t-CO₂/year.



Sapporo Dome Hovering Stage

④

- Hovering stage helps realize resource-conserving multi-purpose dome

The Sapporo Dome was one of the 2002 World Cup Soccer stadiums. This dome is a resource-conserving facility that is equipped for a variety of purposes, including a soccer field, a baseball field, and an event site. The natural lawn soccer field is usually kept outside the dome to promote the growth of the grass and returned to the inside of the dome before games. This unprecedented moving field is realized by a unique air-levitation (hovering) stadium system. Kawasaki proposed, fabricated and constructed this system together with the movable guest seats that make an opening when the field is being transferred.



Low Noise and Emission Jet Ski—STX-12F

⑥

- Four-stroke engines have been incorporated into Jet Skis

Kawasaki has marketed its first Jet Ski model that runs on a four-stroke engine. Having been newly developed based on a world-class motorcycle engine, this engine boasts a high output, low noise and low emission levels, and meets the 2006 EPA and 2008 CARB regulations. The new Jet Ski design suppresses noise more effectively by incorporating a twin water muffler and a large capacity air intake box.



EPA: U.S. Environmental Protection Agency
CARB: California Air Resource Board

All-Weather Engine Test Noise-Reduction Hangar

⑧

- Silences noise created by aero-engines during ground tests

The all-weather engine test noise-reduction hangar constructed at the Narita International Airport features roof and wall members capable of both sound absorption and sound insulation, as well as a uniquely designed construction that smoothly discharges engine blast, so the hangar can reduce the engine test noise of various aircraft types. This round-the-clock operation-capable facility efficiently enables the engine tests that are indispensable for the safe operation of aircraft.



Environmentally Conscious Products

Environmental Protection Products

Kawasaki is working on a number of products that protect the environment in diverse ways such as effective energy use, prevention of air, water and soil pollution, and waste treatment and recycling. Our FY2003 environmental key measures emphasize accurate understanding of the trends in the governmental environmental regulations and the environmental protection needs of society, as well as expansion of the scope of Kawasaki's

environmental protection products.

Some of the environmental protection products and technologies that help realize our environmental policies are summarized in the table below. We are confident these products and technologies contribute to society by solving many of the increasingly aggravated environmental problems.

*The examples indicated with ① through ⑧ are described in detail on page 16.

Technological Field		※	Product	※	Research & Development
Energy	Conservation and Effective Utilization of Energy		<ul style="list-style-type: none"> · Combined cycle power plant · Gas turbine co-generation system · Waste heat recovery boiler · Cement plant waste heat power generation system · Top-pressure recovery plant for blast furnace · High efficiency Low-NOx coal fired boiler · Ice storage cooling system · District heating and cooling system · Optimization and diagnosis of industrial energy system 	①	<ul style="list-style-type: none"> · High performance coal gasified generation technology · High performance gas turbine · Ceramic gas turbine · High efficiency combustion technology (Various combustion system/Engine) · Fuel cell power system · Advanced battery
	Renewable Energy System	②	<ul style="list-style-type: none"> · Photovoltaic system · Wind turbine generation system · Geothermal generation system · Co-generation system using biogas produced by methane fermentation of food and livestock waste 		<ul style="list-style-type: none"> · Black liquor gasification technology · Wood-based biomass energy utilization technology
	New Energy System				
Air Pollution Control	SOx/NOx Reduction, Dust Collection		<ul style="list-style-type: none"> · De-SOx/De-NOx plant and dust collector for flue gas · Low-NOx gas turbine generation system · Low-NOx slag-tap firing boiler · Low-NOx combustion system for heavy oil fired boiler · De-NOx system for road tunnel · Ventilation filter for road tunnel · Electrostatic precipitator for road tunnel 		<ul style="list-style-type: none"> · Low-NOx combustion technology (Gas turbine, Boiler, Diesel, Jet engine) · De-NOx technology for lower temperature flue gas
	Air Pollution Control		<ul style="list-style-type: none"> · Photocatalytic coating business (For environmental protection) 		
Water Pollution Control	Sewage/Sludge Treatment	③	<ul style="list-style-type: none"> · Sewage/Sludge treatment system · Reverse-osmosis membrane water treatment system (Recycled water etc.) · Sewage sludge processing system (Transformation of sludge into activated charcoal, fuel, fertilizer, etc.) · On vehicle sludge drying system · Turbid water filter 		<ul style="list-style-type: none"> · Dehydration technology for sludge · Membrane water treatment technology (Leachate etc.)
	Water Pollution Control				<ul style="list-style-type: none"> · Purifying technology for closed water basin
Soil Pollution Control	Decontamination of contaminated soil				<ul style="list-style-type: none"> · Cleaning technology for dioxin polluted soil
Waste Treatment/ Recycling	Waste Incineration	④	<ul style="list-style-type: none"> · High-performance refuse incineration system (Stoker-type furnace, Internal circulation fluidized bed-type furnace) 		<ul style="list-style-type: none"> · Monitoring technology for dioxin surrogates
		⑤	<ul style="list-style-type: none"> · Refuse gasifying-melting system (Fluidized bed-type gasifying-melting furnace, Shaft-type gasifying-melting furnace) · High-efficiency refuse power generation system (Power generation from refuse combined with gas turbine, etc.) · Waste-to-energy system (RDF power generation, Boiler for soda recovery, etc.) · Paper sludge burning power generation system · Flue gas treatment system for dioxin removal · Dioxin thermal decomposition system for fly ash 		
	Crushing, Sorting	⑥	<ul style="list-style-type: none"> · Bulky waste crushing and recycling system · Waste automobile/electrical appliance crushing and recycling system · Construction waste crushing and recycling system · Waste tire freeze-crushing system · Waste glass bottle/plastic sorting system 		
	Recycling, Pollution Control	⑦	<ul style="list-style-type: none"> · Incineration ash treatment system (Melting, Recycling) · Refuse derived fuel (RDF) production system (Domestic waste, Industrial waste) · Refuse paper and plastic fuel (RPF) production system · Treatment system for slag from refuse incineration ash · Food waste treatment system (Methane fermentation, Compost, Feed, etc.) · Livestock waste treatment system (Methane fermentation, Compost etc.) · Coal fired boiler's ash recycling system (Road base material etc.) · Ultrasonic air filter cleaning system (Reusing air filter) 		<ul style="list-style-type: none"> · Refuse incineration ash melting slag utilization technology · Refuse incineration ash utilization technology · Paper sludge ash utilization technology · Organic wastes treatment technology (Gasification, etc.) · Waste plastic gasification technology · Dredged mud recycling technology · Removing technology of unburned carbon in coal ash · PCB decomposition technology
	Radioactive Waste Treatment		<ul style="list-style-type: none"> · Radioactive waste treatment system 		<ul style="list-style-type: none"> · Nuclear reactor decommissioning technology
Others	Natural environment protection	⑧	<ul style="list-style-type: none"> · Beach Cleaner 		
	Monitoring & Measuring				<ul style="list-style-type: none"> · Offshore monitoring platform on greenhouse gases

Advanced Battery

①

● High-capacity version is available for power storage

Kawasaki has developed a unique high-capacity battery that uses granular-shaped active materials (electrode) that is the first of its kind in the world. The design is capable of being scaled-up in height, width and depth dimensions, allowing a higher-capacity battery pack to be made available easily. Thus, this battery is an ideal choice for storing electricity, and will greatly contribute to leveling the power load for fluctuating energy sources such as wind and solar power. Furthermore, this battery can not only be recycled easily, but it does not contain any harmful materials, such as lead or cadmium, or expensive materials, such as cobalt.



Wind Turbine Generation System

②

● System is optimized for Japanese climate to realize more common use

Kawasaki is actively developing and marketing wind power generation equipment, a power generation system that does not emit CO₂. The total estimated energy generation with our already installed wind power generation equipment has reached 35,000,000 kWh/year which is equivalent to a reduction of 12,950 t-CO₂/year. Currently, we are constructing a wind power generation plant that is rated at 16,000 kW in Sakata City. To cope with this expanding market sector, we are attempting to develop made-in-Japan controllers and generators that are optimized for the wind profile unique to Japan's climate.



Turbid Water Filter

③

● Eliminates sub-micron particles from process effluent and industrial wastewater

This filtering system efficiently captures sub-micron particles from turbid water with a hybrid filtration arrangement. This arrangement consists of a metal spring filter with a particle layer coated surface that serves as a filtration auxiliary, thus allowing the output of highly clean filtrate. We are now producing and marketing this unique filtering system that is an ideal choice for treating wastewater from the metal plating process, liquid coolant from machine tools, and wastewater from painting equipment. As the need for wastewater treatment equipment with excellent filtering performance grows, this unique compact system featuring low power consumption will find many users.

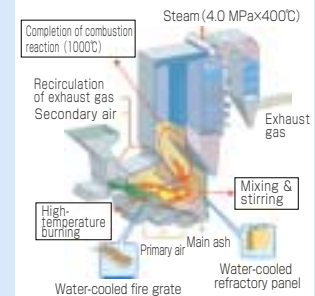


High-Performance Refuse Incineration System (Advanced Stoker-type Furnace)

④

● Low air ratio and high-temperature burning

Introduction of a water-cooled fire grate has eliminated the need for cooling a fire grate by the combustion air, and the air volume can now be adjusted (low air ratio) to optimize the combustion characteristics of the furnace. Use of a parallel flow incinerator and exhaust gas recirculation arrangement has realized stable combustion (minimization of unburned CO) at a higher temperature. This effectively inhibits the occurrence of dioxins and decreases the amount of exhaust gas. In the current fiscal year, we were awarded a contract for this equipment by the Kishiwada-Kaizuka Municipal Public Cleaning Facility Cooperative. (A part of the specification has been modified.)

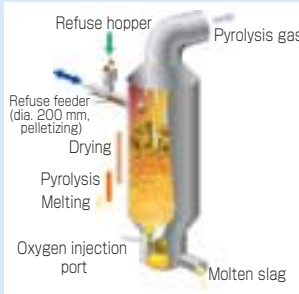


Refuse Gasifying-Melting System (Shaft-Type Gasifying-Melting Furnace)

⑤

● Refuse volume reduction to approximately 1/40

Using oxygen injection, this equipment gasifies and melts refuse and sludge at a high temperature. The equipment transforms ash into slag, thereby greatly decreasing the amount of refuse being disposed of in landfills. Use of oxygen helps decrease the amount of gas generated, leading to a compact design. The Minamata-Ashikita Regional Administrative Affairs Cooperative Clean Center, which treats domestic wastes, bulky wastes and sludge, adopted this system. Since then, the system has been effective in decreasing the amounts of dioxins and NO_x in the exhaust gas.



Waste Glass Bottle/Plastic Sorting System (Waste Plastic Material Sorter)

⑥

● Automatically sorts a bulk amount of waste plastic materials

When a plastic item is irradiated with near-infrared rays, it absorbs a particular waveband unique to its material type. This system sorts plastic materials. The system is capable of handling large amounts of plastic products including bottles, bags and trays as long as the products measure 30 mm or more. This compact and easy-to-operate system (multi-sorter) is very useful in material recycling for waste plastic materials, and helps support thermal recycling by reliably sorting RPF type plastic materials.



RPF: Refuse Paper & Plastic Fuel

Coal Fired Boiler's Ash Recycling System (Road Base Material)

⑦

● Safely utilizes coal ash

The amount of coal ash produced by coal-burning thermal power plants throughout Japan reaches 20,000 t/day. Hitherto, this coal ash has been used as a raw material for cement production or disposed of for land reclamation. However, owing to a decreasing demand for cement and a shortage of sites possibly used for land reclamation, it is necessary to find a different way to utilize coal ash. To address this problem, Kawasaki has developed a technique to transform coal ash into road base material by steaming. In our demonstration on an actual road construction work, the road base material has proven to be satisfactory in terms of workability, serviceability and safety.



Beach Cleaner

⑧

● Maintains litter-free clean beaches

When its rotating rubber rake and scraper plow a beach, the equipment scoops up litter together with beach sand. The sand is separated from the litter by our proprietary rotary-blade type separator. The sand is returned to the beach but litter, including separated bottles, cans and cigarette butts, is collected. The Kawasaki Beach Cleaner is available in either a self-propelled or towed model. With the towed model, the tractor can collect driftwood and concrete blocks. The Kawasaki Beach Cleaner is already in action on the beaches of many cities and villages.

