

Environmental Protection Activities of TOYOTA Material Handling Company



Main Business Activities: Manufacturing & Sale of Such Industrial Equipment as Forklift Trucks and Material Handling Systems, Including Automated Storage and Retrieval Systems

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Environmental Approach

As companies proceed with the manufacturing of industrial equipment that is more compatible with the global environment, the environmental friendliness of forklift trucks and material handling systems is becoming a key product specification. Responding to this trend, TOYOTA Material Handling Company has accumulated various technologies for reducing exhaust emissions from internal-combustion forklift trucks and for improving the performance of electric forklift trucks. While continuing to emphasize the development of the next generation of environment-friendly technologies, we are working to supply products that assist our customers in building the distribution systems of the future.

Activities

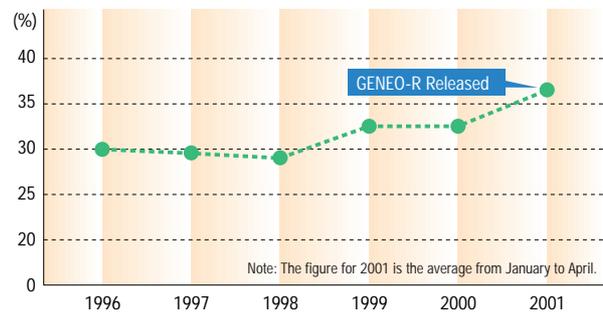
Development and Design

Development of the GENE0-R* Electric Reach Truck that Reduces Environmental Impact

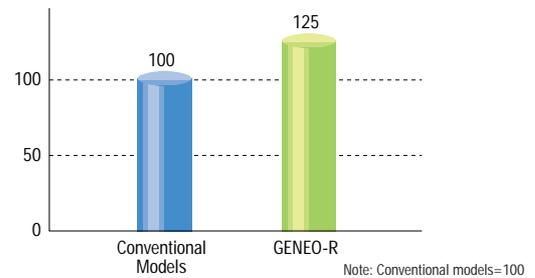
The GENE0-R electric reach truck, which was released in January 2001, was well received as a product that met the needs of customers. Since its release, the GENE0-R has been gaining market share in Japan.

As with the GENE0-B electric counterbalanced forklift truck, the GENE0-R comes standard with an AC motor drive system. AC motors feature a simple construction with no expendable parts, such as motor brushes. In addition, due to this motor's compact structure, output has been increased 15% compared to conventional DC motors. Furthermore, using the drive system's excellent motor control, we have developed a new control system that compensates for power loss resulting from a decline in battery voltage, enabling a 25% increase in efficient operating time.

Domestic Market Share of Electric Reach Trucks



Improvement in Efficient Operating Times



Toyota Industries developed an energy-saving control system using electrokinetic energy to recharge the battery when the brakes are applied and while the accelerator is released, when the vehicle is in motion. This regenerative braking system extends operating time, reduces break-lining wear, and reduces maintenance costs.

The controller also features an environment-friendly design. In conventional models, four contactors are used for driving and lifting. The new models use only one, thus reducing the number of expendable parts. In addition, the coating on the condenser terminal has been changed from solder plating to gold plating, and the connection between the condenser and the copper wiring board now employs micro resistance welding, thus reducing the amount of lead solder used.



*The GENE0-R is sold only in Japan.

Production

Reduction in VOC Emission Volumes through the Introduction of Powder-Coating Facilities

To reduce VOC emissions, the recycling of cleansing thinner and various other measures to increase efficiency in painting, such as the reduction of the use of cleansing thinner when changing colors and adjusting the pressure of paint guns, have been implemented.

The backrest (see photo) part of the forklift truck is very difficult to paint efficiently. In fiscal 2000, powder-coating facilities were introduced to the painting process. Powder coating is an adhesive painting method in which powdered paint is evenly spread on the surface to be painted and then melted in a drying furnace. No VOCs are emitted.

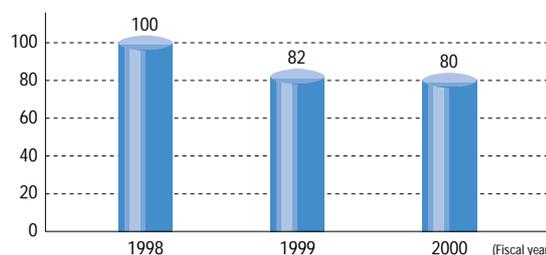
In addition, by developing a low-heat-type paint powder and switching the drying furnace fuel from kerosene to natural gas, VOC emissions were reduced by 16 tons per year and CO₂ emissions were reduced by 8 tons per year. Through the collection and reuse of paint, waste emissions were reduced by 11 tons per year.

As a result, VOC emissions were reduced by 20% compared with fiscal 1998 on a per vehicle basis.



Painting facilities

■ VOC Emissions per Forklift Truck (Fiscal 1998 = 100)



Waste Reduction through Discontinuing Use of Nitric Acid When Cleaning Heat Exchangers and Recycling Shot Waste

To maintain chemical membrane processing liquid at a constant temperature, heat exchangers are used in the electrocoating paint facility. Previously, due to tight vertical sealing, it was impossible to clean these heat exchangers with a brush, and so they were normally cleaned once a year with nitric acid cleaner. In fiscal 2000, Toyota Industries switched to a plate-type heat exchanger that can be disassembled and cleaned using a water jet. As a result, the amount of nitric acid used was reduced by 112kg per year and the amount of effluent emitted was reduced by 4.5 tons per year.



Plate-type heat exchanger

To remove the oxidized membrane from the frame of the forklift truck before painting, the surface of the frame is bombarded with small metal balls called shotblast. As a result of recycling the remains of the membrane, the waste liquid, and oil, the amount of industrial waste emitted in fiscal 2000 (excluding repurposed waste) was 204 tons, a 30% reduction compared with fiscal 1999. This amounts to an 85% reduction in the amount of waste compared with fiscal 1990 (1,393 tons), thus successfully achieving the goal set out in the Second Environmental Action Plan.

■ Takahama Plant Industrial Waste Emissions (Fiscal 1990 = 100)

