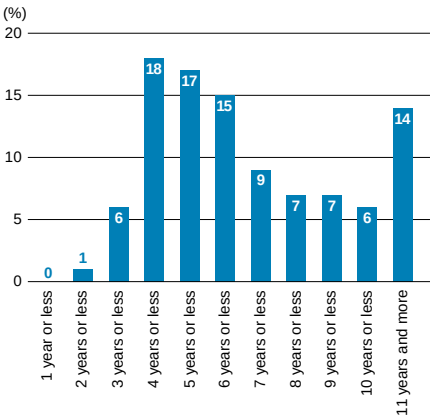
Recycling

The recycling of products also causes environmental impact when the products are collected, disassembled, reused, and recovered. In case of reusing or recycling a product, which is to last for four or five years, over and over in a short period of time, its environmental impact would be increased significantly.

It is one of the important issues for the Ricoh Group to make the product lives last longer as well as reuse and recycling. The Group established a nationwide recycling system in fiscal 2000 to collect products after use.

Lifespan of Ricoh Copiers Collected*



* Data based on copiers collected after use
Ricoh copiers are collected and reused or recycled at the end of their lifecycles.

● The Ricoh Group's Concept of Manufacturing and Recycling

Reduce
Environmental impact is reduced if products are made smaller, lighter, and longer lasting.

Reuse
The reuse of products is possible long after the product life has ended thanks to the use of modular designs and more advanced recyclable designs.

Recycle
Recycling with less environmental impact is possible by giving priority to the inner loops of the Comet Circle.

Recyclable Design

More efficient reuse and recycling can be realized by improving the disassembly and sorting of products after collection and choosing materials that are easily recyclable. In 1993, Ricoh announced its policy on recyclable designs, and in 1994 it introduced the Spirio 2700 series, the first line of copiers based on the recyclable design. The Spirio 2700 series was designed to significantly reduce the time and cost it takes to disassemble a copier and sort the materials after collection (e.g., fewer screws used in the machine and more-consistent plastic materials).

The Ricoh Group expanded its policy on recyclable designs and product assessment to cover its entire line of copiers, facsimiles, laser printers, and multifunctional copiers in 1993. The Group is thus improving its recyclable designs year by year.

Comprehensive Recycling Plan

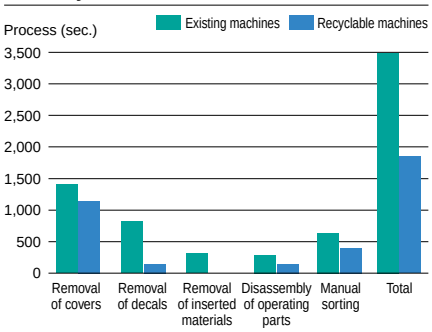
A more efficient level of reuse and recycling requires identifying the parts that are to be recycled for each product line at the concept stage and establishing a reuse and recycling system for the parts collected. Based on this idea, Ricoh introduced its Comprehensive Recycling Plan in fiscal 1998.

An LCA study revealed that preparations done at the design stage could significantly influence a reduction in environmental impact. With the proposed use of modular designs and the making of smaller, lighter products that last longer, environmental impact throughout a product's lifecycle can be reduced.

● Provisions for Recyclable Designs

1. Provision for the reuse of products, units, and parts
2. Provision for the recycling of materials
3. Provision for the recycling of chemicals
4. Provision for the recovery of energy
5. Provision for the reduction in size and weight of products
6. Provision for the reduced use and recycling of packaging materials

Disassembly and Sorting of Existing and Recyclable Machines



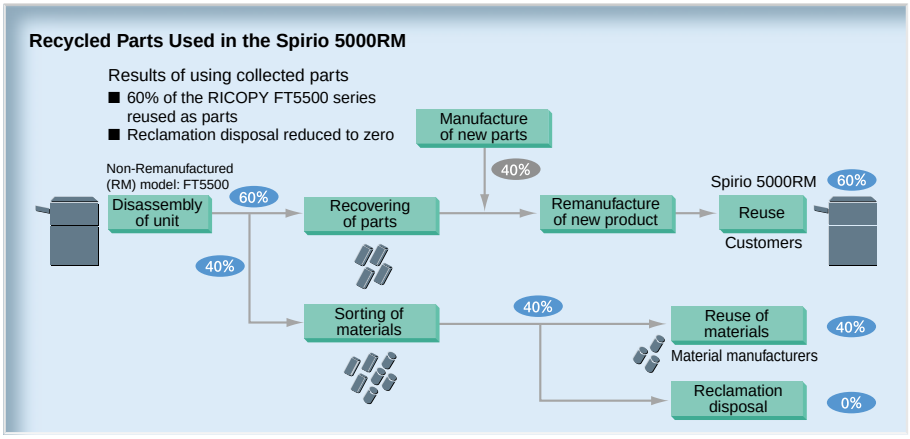
Recyclable Design Policy

● Level 1 (1993)
- The use of insert molding prohibited
- The number of parts and screws to be removed when changing main components set
- The use of E-rings prohibited
- The adhesion of resin materials to different materials prohibited
- The amount of packaging reduced
- The use of heat crimping prohibited
- The use of toxic chemical substances prohibited

● Level 2 (1994)
- Grading for outer packaging set
- Indicating material grades on labels made mandatory
- The use of resin that contains chlorine prohibited (dioxin prevention)
- The number of parts and screws to be removed when changing main components made stricter

● Level 3 (1996)
- New provisions for recycling supplies added
- New provisions for harness layouts added
- New provisions for the restricted use of nitrous resin added
- The use of nylon clamps restricted
- Articles revised, taking economic benefits into consideration

● Level 4 (1999)
- Appropriate design items for process cartridges added
- New provisions for recyclable printed circuit board designs added
- The number of screw types reduced
- The use of nonhalogenous, fire-retardant resin introduced
- Overall set values for acceptable change in speed when machine is jarred revised



Collection, Recovery, and Recycling of Copier Toner Cartridges

Full-scale collection of all office supplies, such as toner cartridges, started in 1998. Ricoh's new nationwide recovery and recycling network is scheduled for completion in fiscal 2001. Toner cartridges are disassembled, sorted, cleaned, and inspected before their parts are reused in production lines. Product quality standards for some of the cartridges were revised to include recovered and recycled parts.

Aiming at improving the resource recovery rate to 100%, Ricoh is working with NK Kankyo Corporation and Mansei Corporation to develop technologies that can be applied to all kinds of supplies, including toner, ink cartridges, and bottles.

Recycled toner cartridge

Reconditioned (RC) Products (Copiers) and Products Manufactured with Recycled Parts (RM Copiers)

As part of its environmental conservation activities, Ricoh is working toward extending the life of its products—so that customers can benefit from their use for as long as possible—and advocating the appropriate time for the reuse and recycling of products and parts. Used products are collected, disassembled, and either reassembled into RC or RM machines or their parts are reused in new products.

● RC Copiers

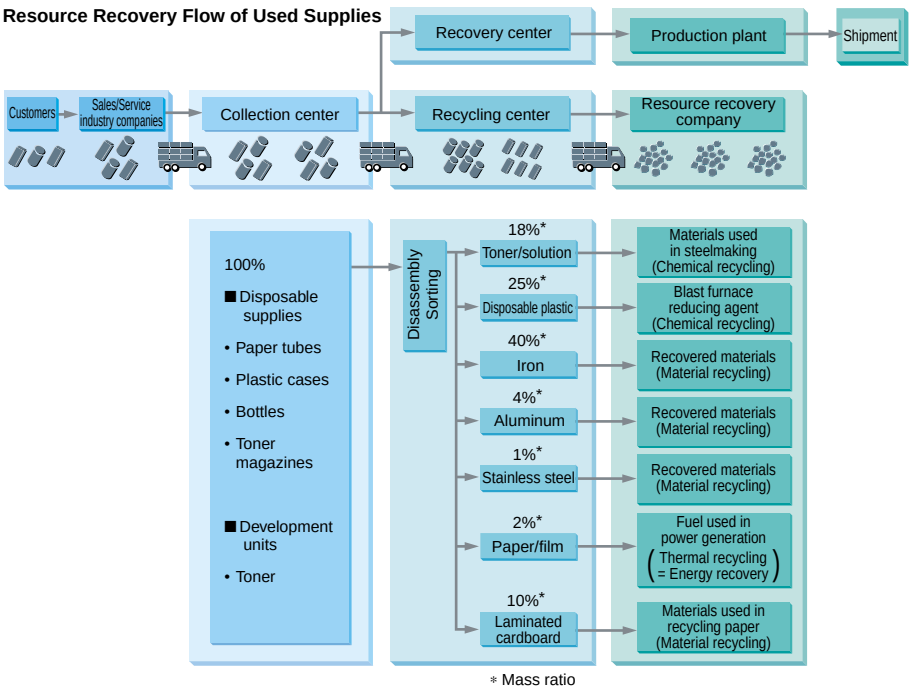
Ricoh replaces all the necessary parts in the used products it collects and rents the RC machines out to customers with a guarantee on their quality. The Company rents out analog RC copiers, including the Spirio 5000RC, 6000RC, and 7000RC. Ricoh is planning to start mass-producing digital RC copiers in December 2001.

● RM Copiers

In October 1997, Ricoh marketed the Spirio 5000RM copier, the first to incorporate recycled parts. More than 60% (mass ratio) of the RICOPY FT5000 series, the Spirio 5000RM's predecessor, was reused as parts in the 5000RM. All 5000RM units are manufactured using recycled parts, including the inner cover, which is made from recycled plastic. Performance of the copier was enhanced by making the liquid crystal panel easier to see. Following the Spirio 5000RM, Ricoh marketed other RM models, such as the Spirio 7210RM series and the Spirio 8210RM series.

Spirio 5000RM made of recycled parts

Resource Recovery Flow of Used Supplies



* Mass ratio

Recycling of Plastic Parts

Plastic parts account for approximately 20% of the weight of such OA equipment as copiers. The quality of plastic drops when different types or grades of plastic are mixed and, because such plastic materials cannot be reused for copier parts, plastics are difficult to recycle. For this reason, Ricoh began indicating, in 1994, the exact type and grade of materials used in each part according to the Company's recyclable design policies. Ricoh established certain grades of plastic to help improve the recycling rate of collected products. Plastic parts removed from products collected at recycling centers are sorted, graded, and crushed. They are then mixed with virgin plastic to be reused in Ricoh product parts. Ricoh's recovered plastic parts contain a relatively high rate of collected plastic, up to 30%. The average amount of recovered plastic in any given part is 20%–25%.

In fiscal 2000, Ricoh used about 300 tons of recycled plastic parts. With enhanced partnerships with resin manufacturers, Ricoh is aiming at switching 30% of 10,000 tons of plastic parts used for external covers to recycled plastic parts.

Plastic parts material grading

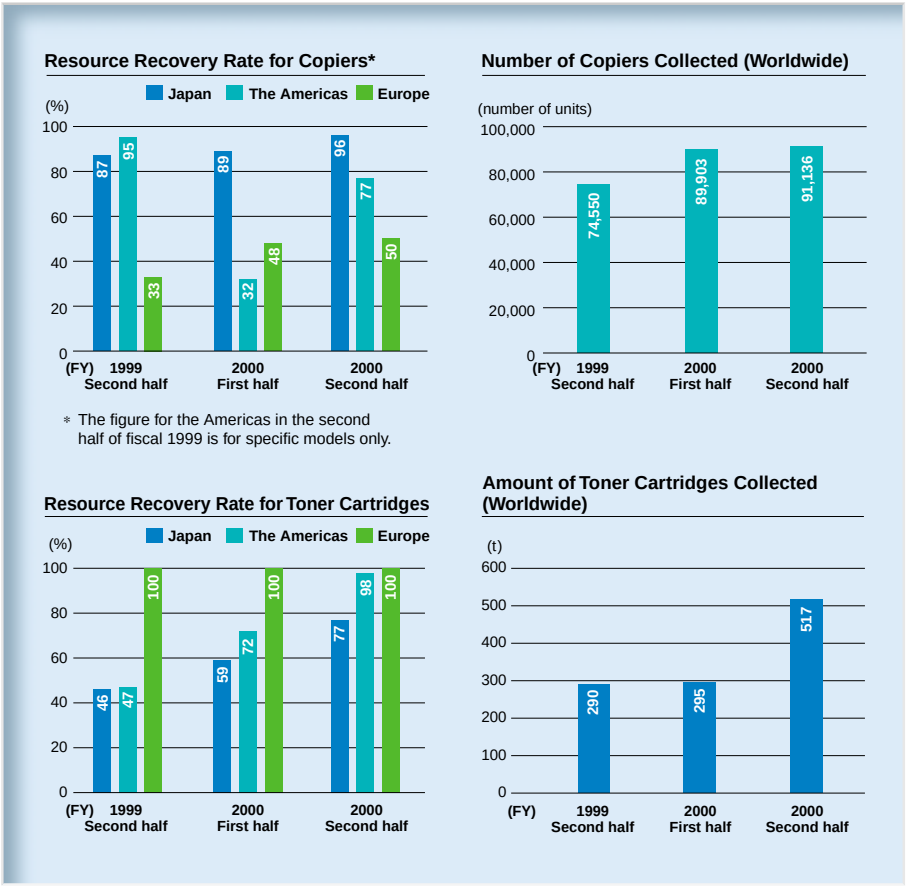
■ Establishment of a Global Recycling System

The Ricoh Group, in developing its business worldwide, conducts recycling activities at business and production sites all over the world to reduce environmental impact from a global point of view.

Improving the recovery rate and establishing a recycling system is important for efficient recycling. In Japan, the collection rate for office equipment, including copiers, is relatively high because old machines are collected at the customers' offices when the new machines are delivered. To make recycling and collection more efficient, the Ricoh Group established a network of product collection and recycling systems in Japan in fiscal 2000. The reuse and recycling rate for copiers reached 96.3%.

The Group is making efforts to establish a similar network of systems overseas to recycle and remanufacture copiers. To improve the collection rate of toner cartridges, the Group is developing extensive activities in business and production sites all over the world. Examples include asking customers to cooperate in the collection of toner cartridges through video presentations and on its Web site as well as by including collection-promoting prepaid labels in product packages. In Japan, the Ricoh Group is aiming to make the recycling business profitable by fiscal 2004 by developing recycling activities that focus on the inner loops of the Comet Circle* so that products and parts are recirculated at the appropriate time.

*** See pages 9–10.**



Nationwide Recycling System

A well-run nationwide recycling system for collecting and recycling Ricoh products is needed to efficiently reduce total environmental impact. In fiscal 1998, Ricoh started collaborating with collection centers, recycling centers, recovery centers, and plastic part manufacturers to establish a nationwide network that would facilitate the more economically efficient recovery and recycling of used products collected from all over Japan. The Company started collecting and recycling supplies and parts, such as toner cartridges, as well as the products themselves.

● Collection Centers

Used products are collected from sales companies, shops, and consumers at collection centers throughout Japan. To improve the efficiency and quality of collection operations, Ricoh established a vehicle-dispatching system linked with the customer collection order information. Products collected at collection centers are forwarded to recovery centers or recycling centers according to sorting standards.

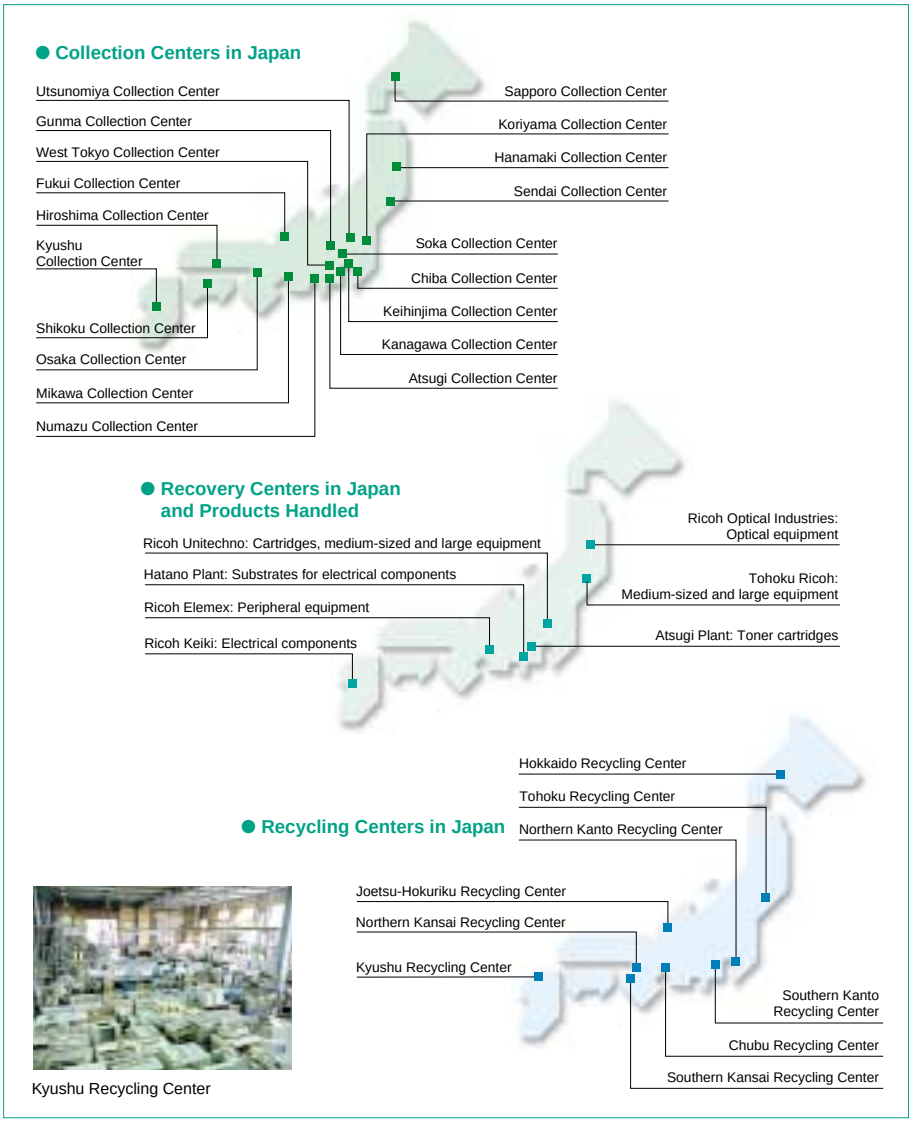
● Recovery Centers

Products forwarded to recovery centers are disassembled, cleaned, reassembled (with some parts being replaced), and inspected before going out as RC copiers*, RM copiers*, recycled parts, or recycled units. Ricoh plants and Ricoh Group companies that have production lines capable of such processing act as recovery centers.

* See page 40.

● Recycling Centers

Products forwarded to recycling centers are disassembled, and the parts and units that can be reused or recycled are sorted out. Those that can be reused are sent to recovery centers to be remanufactured. The material recycling rate for copiers improved to 99.7 % thanks to the cooperation of NKK Corp. in experiments with the company's thermo-bath technology. This technology made it possible to recover metal and plastic from shredder dust.

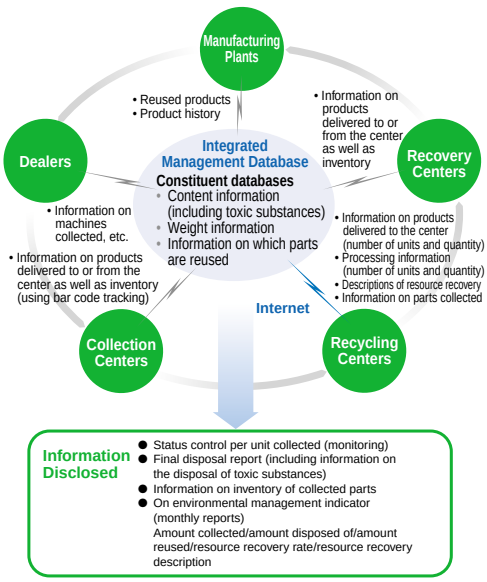


Kyushu Recycling Center

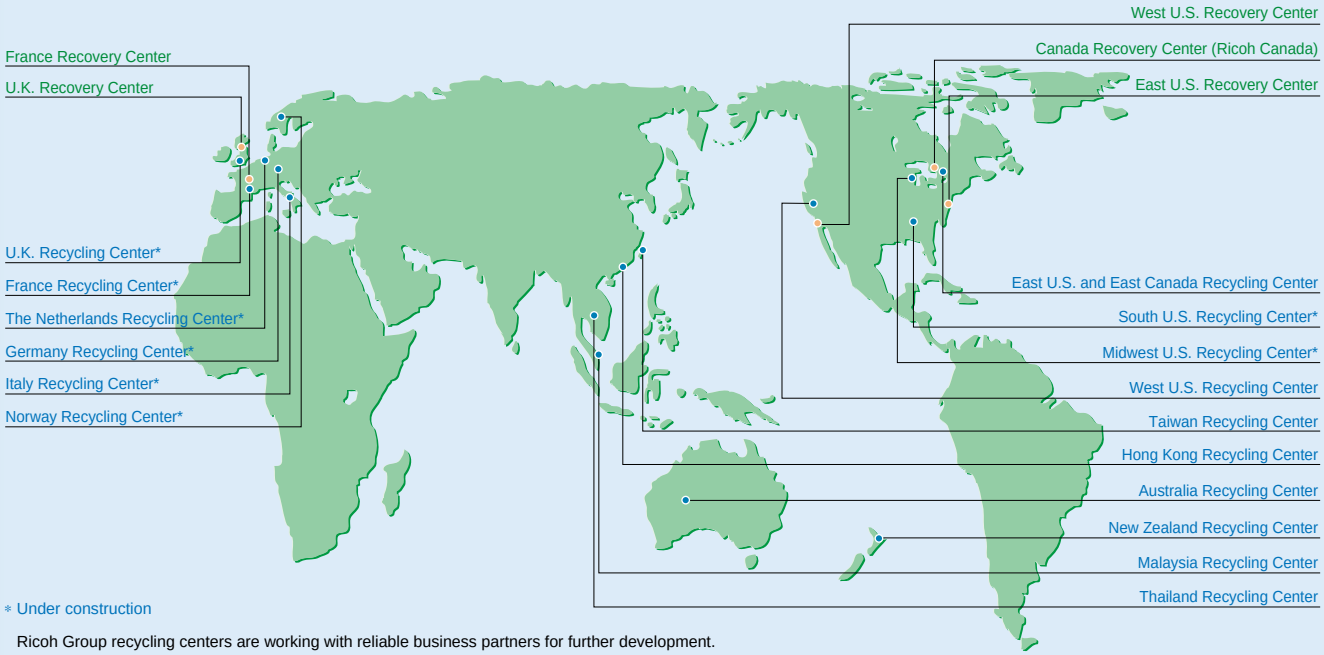
● Recycling Information Sharing System

Under this system, recovery and recycling centers can share information on the amount and rate of used products collected. Precise information can be obtained simply by entering the model code of the desired product. Ricoh is planning to use this system as part of its environmental impact information system*.

* See pages 19–20.



Recovery and Recycling Centers around the World



* Under construction

Ricoh Group recycling centers are working with reliable business partners for further development.

Global Recycling Activities

The Ricoh Group is expanding its business globally in five regions: Japan, the Americas, Europe, China-Taiwan, and the Asia-Pacific region. In 1999, the Ricoh Group began establishing its recycling system in four of the regions overseas to improve collection and recycling rates. In fiscal 2001, the Group aims to further improve those rates by making use of the recycling information system* developed in Japan.

* See page 42.

● The Americas

Through partnerships with courier companies, a toner cartridge collection system was established in 1995. Collection has expanded to include all models, thus achieving a high rate of collection. To gain the cooperation of customers in collecting toner cartridges, Group companies are actively promoting customers awareness by preparing videos and materials for their Web sites.

Group companies are also making intense efforts to collect, recover, and resell rented copiers. REI (Ricoh Electronics, Inc.) is acting as a recovery center in the United States under Ricoh's quality standards to recover copiers and toner cartridges. Resource recovery companies that satisfy Ricoh's quality standards achieve a high resource recovery rate.

Toner cartridge recovery line at REI

● Europe

Environment-related laws and regulations have long been enforced in European countries. Municipal governments and industry organizations were in charge of collecting and disposing toner cartridges and other parts. To further encourage the collection of toner cartridges, the Ricoh Group established a collection system in Europe in early 2000. Relevant companies sent direct mail and distribution stickers to promote customer awareness of the collection system.

As for recovery, Ricoh UK Products and Ricoh Industrie France have been designated as recovery centers for both machine units and toner cartridges according to Ricoh's quality standards. Waste that is difficult to recover is sent to designated resource recovery companies under the Ricoh quality standards modified for each country because there are legal difficulties in some European countries in transporting waste. By the end of fiscal 2001, some of the leading countries will have selected resource recovery companies in their continuing efforts towards resource recovery.

Toner cartridge recovery and recycling line in Ricoh Industrie France

RM copier production line in Ricoh UK Products

● China-Taiwan

Pursuant to the China-Taiwan collection program, Hong Kong started collecting toner cartridges in 2000. Focusing on the reuse of products, some regional plants also started the recovery of collected toner cartridges in the first half of fiscal 2001. Coverage of models that are to be collected and recovered is scheduled to be expanded in the future. To promote customer awareness of the collection system, Ricoh Group companies in the region spread their corporate views through brochures and stickers.

Waste that is difficult to recover is sent to designated resource recovery companies under the Ricoh quality standards modified for each country because there are legal difficulties in some countries in transporting waste.

Product units that are traded are to be recovered for resale pursuant to the internal quality standards of each dealer. Waste that is difficult to be recovered is carefully disassembled and sorted manually to achieve a higher resource recovery rate.

● Asia-Pacific Region

Pursuant to country-specific collection programs, the collection of toner cartridges started in autumn 2000. Collected products and parts are recovered at resource recovery companies that satisfy Ricoh's quality standards modified for each country. The reuse of products will be a future issue, taking into consideration recovery at plants outside the region. To attract customers' attention to the efforts of the companies involved, stickers are distributed and information on collection activities is provided on their Web sites.

Similar approaches as those in China-Taiwan for the recycling of product units are being taken.

■ New Approaches to Resource Conservation

In addition to its reuse and recycling activities, Ricoh has introduced modular designs to reduce the amount of resources used.

Modular Designs: Extending Product Life

Products that no longer satisfy the ever-changing customer needs are cast aside. Most of those products, although still usable, cease to be used only because they are outdated.

If product performance is able to change and keep pace with customer needs, the life of a product may be significantly extended. Following this line of thought, if copiers are divided into several modules, such as for paper loading, paper feeding, and ink fixing, then, after setting module size and intermodule interface, new copiers can be developed and designed so as to be upgradeable and able to respond to more demanding customer needs by simply exchanging old modules for newer ones. In the future, such upgrading may be done at the customer's office rather than having the products collected to exchange modules.

Design Improvement from an LCA Point of View

It is important for more efficient recycling to also reduce costs. LCA studies show that improvements in design would significantly affect recycling costs. Ricoh, based on its recyclable design policy, checks materials as well as design methods at the design stage. Ricoh will, in the future, endeavor to make product lives longer through such means as modular designs in efforts to reduce environmental impact as well as relevant costs throughout a product's life cycle.

Modular Designs Will Change the Way Manufacturers Think

If the idea of modular designs spreads throughout the world, products provided by manufacturers will no longer be static but rather dynamic, ever evolving. As a result, manufacturers will have to change their strategies from recycling-oriented (how to reuse products) to life cycle-oriented (how to deal with products throughout their life cycles). Thus, modular designs will change us from being manufacturers to life cycle service providers.

Modular Designs and Life Cycle Business Strategies