Environmental Technologies and Products Development (Resource Conservation and Recycling)

In an effort to improve profitability in the recycling business on a global scale, the Ricoh Group is promoting its product platform and module design and refining its recyclable designs. For example, decreasing the number of parts used will help reduce costs, mechanical failure, and environmental impact and improve customer satisfaction. It will also help in the more-efficient reuse and recycling of used products. Ricoh manufactures products based on the 3R concept of reduce, reuse, and recycle, taking the following into consideration: product design, capital investment, marketing, maintenance, and more efficient recycling.

* See page 16, for Reconditioned digital copiers.

The Ricoh Group's Concept of Product Development, 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's life has ended thanks to the use of modular designs and more-advanced recyclable designs.

Recycle
Promoting the recycling of parts and materials as much as possible within the Ricoh Group.

Product Platform and Module Design

Ricoh is introducing a product platform and module design to next-generation products in order to develop and market products with less environmental impact in a more efficient and timely manner. The purpose of this design scheme is to aid decision making on the product platform (structure), modules mounted on and sharing the platform, and modules used throughout the product line and across generations. This plan is best suited for "the era of the environment" because it allows products to keep up with the changes of the times by simply having the necessary modules updated.

Recyclable Design

More-efficient reuse and recycling can be realized by improving the disassembly and sorting of products collected after use and choosing materials that contain less chemical substances and are easily recyclable. In 1993, Ricoh announced its policy on recyclable designs for significantly reducing the time and cost it takes for recycling (e.g., fewer screws used in the machine and standardizing plastic materials). Ricoh also expanded its policy on recyclable designs and product assessment system to cover its entire line of copiers, facsimiles, laser printers, and multifunctional copiers.

Provisions for Recyclable Designs

1. Provision for the entire product line
2. Provision for reuse
3. Provision for recycling
4. Provisions for the recycling of chemicals and the recovery of energy
5. Provision for supplies (e.g., toner cartridges)
6. Provision for packaging

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 calking prohibited
- The use of toxic chemical substances prohibited
- Grading for outer packaging set (New)
- Indicating material grades on labels made mandatory (New)

● Level 2 (1994)
- Grades reorganized pursuant to the completion of the Comet Circle concept
- Provisions for reusable designs extended
- The use of resin that contains chlorine prohibited (dioxin prevention)
- The reduction in the number of parts and screws to be removed when changing main components

● 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
- An overall revision for set values of allowable change in speed for machine's shock resistance has been made.

● Level 5 (2001)
- New provisions for the reuse of general parts added
- The use of electronic counters prohibited, and the mounting of nonelectronic counters made mandatory
- Regulation on environmentally sensitive substances (e.g., batteries, hexavalent chromium, and lead) tightened
- Polyethylene terephthalate added to materials used in making toner bottles
- New provisions for logos added to the Container Packaging Recycle Law

Recycling of Toner Cartridges

Ricoh started the full-scale collection of all office supplies, such as toner cartridges, in 1998 and completed the establishment of a nationwide recovery and recycling network in fiscal 2001. The network started operations in fiscal 2002. Collected toner cartridges are recovered and shipped according to Ricoh's quality standards. Cartridges that satisfy these standards are disassembled, sorted, cleaned, inspected, and supplied to production lines as parts while others that do not satisfy are recycled into raw materials.

Recovered toner cartridge

Further Recycling of Materials

In fiscal 2002, Ricoh Group companies in Japan collected end-of-life products and recycled 90% or more of the materials used in them, including metals and plastics. This activity was based on the idea of "Priority on Inner Loop Recycling."* Compared with the recovery of energy by incineration, the recycling of materials is more useful in the cost-efficient reduction of environmental impact.

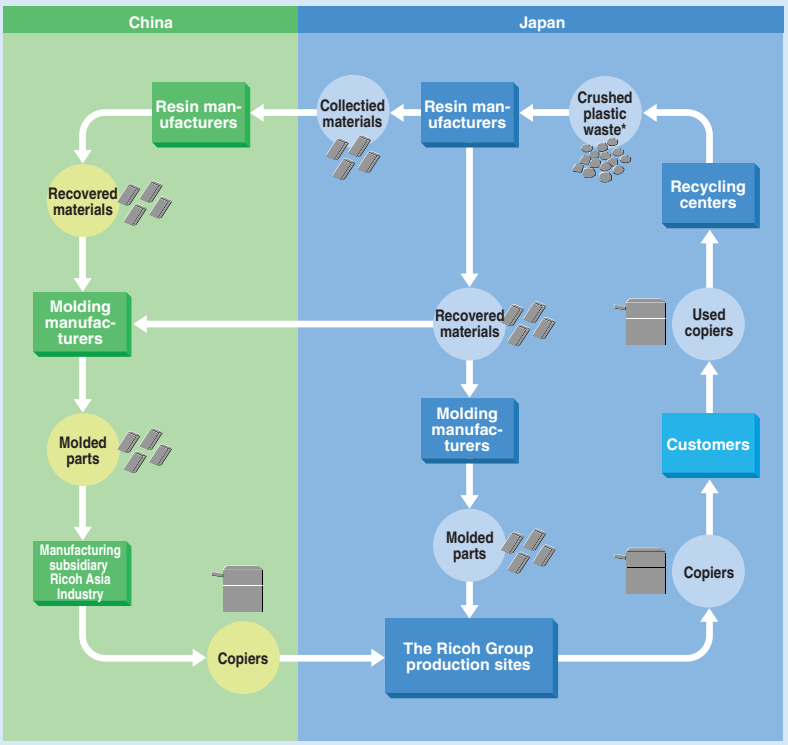
* See page 12.

Recycling of Plastic Parts

In 1994, Ricoh began indicating the grade and type of plastic materials used in each part of a product on labels according to the Company's recyclable design policy. Since then, labeling has been conducted to ensure the better recycling of plastic materials. The plastic parts of end-of-life products are sorted and crushed by grade and mixed with virgin plastics to be reused in Ricoh products. Ricoh's recycled plastic parts contain up to 20% to 30% recycled materials. In Japan, in fiscal 2002 Ricoh collected approximately 200 tons of six different types of plastics and processed them into approximately 600 tons of recycled materials by adding virgin materials to them. Recycled materials are reused in Ricoh products manufactured in Japan and China. Ricoh has thus achieved a closed recycling of plastic materials on a global scale.

* See figure above.

Recycling Flow of Plastic Parts in the Ricoh Group in Japan and China



* Copiers are collected from the market and disassembled. After removing foreign materials from the plastic parts sorted from disassembled copiers, the plastic parts are cleaned with air pressure and then crushed.

Recyclable Design for Toner Cartridges

To reduce the environmental impact caused by toner cartridges throughout their life cycles, Ricoh independently developed a soft toner cartridge. Under this system, only the soft cases housed within hard cases need to be replaced with new ones when refilling toner cartridges. The hard cases can be used continuously. The system is used in the Aficio CL7000 (IPSiO CX7200/8200) color printer and other products. The system reduced the environmental impact caused by toner cartridges throughout their life cycle 70% or more compared with that caused by replacing old cartridges with new ones*. Also, the system reduced cost approximately 10%. Because toner can be replenished easily by inserting the cartridge downward, it is very attractive to users.

* When reused five times (environmental impact calculated in terms of CO_2 emissions)
Ricoh has filed more than 150 patent applications (as of March 2003) in Japan for the soft toner cartridge refilling system.

Soft case for the soft toner cartridge refilling system