Research and Development

To facilitate sustainable management, Ricoh strives to promote environmental technology. As a part of these efforts, the Company established a new laboratory—the Environmental Technology R&D Center.

In order to have effective sustainable management and reduce society's impact on the environment as a whole, we must develop outstanding environmental conservation technologies, apply them to our products, and supply them to our customers. With this in mind, Ricoh has developed its own unique energy saving technology, applied it to the Aficio 1035/1045 (imagio Neo 350/450) series*, and marketed in fiscal 2000. In fiscal 2001, Ricoh promoted its product platform and module design and refined its recyclable designs in an effort to improve profitability in the recycling business. Also, the Company engaged in developing products that encourage customers to reduce paper consumption. In April 2002, Ricoh established the Environmental Technology R&D Center to enhance its environmental technology skills. At the center, relevant data and information from past activities, including those concerning energy saving and resource conservation, are compiled for use in developing more profitable environmental technologies.

*See pages 47–48.

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 Group.

■ Product Development, Manufacturing, and Recycling

A decrease in the number of parts 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. The Ricoh Group manufactures products based on the 3R concept of reduce, reuse, and recycle, taking the following into consideration: environmental technology, capital investment, marketing, after-sales service, and recycling.

Product Platform and Module Design

Ricoh is creating a product platform and module design under the new corporate structure 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 environmentally sesitive 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
- Overall set values for acceptable change in speed when machine is jarred revised

● 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 Plastic Parts

In 1994, Ricoh began indicating the exact type and grade of materials used in each part according to the Company's recyclable design policy in order to improve recycling quality. Plastic parts removed from collected products 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 2001, an Eco Mark for printers was established. Eighteen types of IPSiO laser printers, including those already on the market, were awarded the Eco Mark mainly because of the recovered plastic parts used in them*.

* See pages 41–42.

■ Efficient Paper Use

The Eco Balance evaluation[1] revealed that the largest environmental impact during the entire product life cycle assessment (LCA) was caused by the copy paper while the machine is running at customers sites. In addition to developing new products and technologies, Ricoh provides products[2] that encourage efficient paper use.

1. See page 25.
2. See page 49.

Rewritable Printers and Paper

According to a survey, 70% of the paper used in offices will never be used again, which means only 30% is stored after being printed on. Ricoh, making the most of its exceptional thermal paper technology, developed a rewritable printer and paper that can be reused more than 200 times. The rewritable paper is very similar in texture to ordinary paper and can be written on using an exclusively developed red-colored pen.

A rewritable printer and paper

■ Reducing Environmentally Sensitive Substances

To reduce the amount of environmentally sensitive substances in products, the Ricoh Group worked together with suppliers in adopting lead-free solder, reducing the use of PVC-coated wires, and reducing the use of hexavalent chromium in steel plates. Environmentally sensitive substances do not affect the environment when customers use them properly, but they may harm when they are mined or improperly disposed of. This is an important issue in recyclable designs as well because such substances may limit the recovery and recycling of used products. Reducing the use of these substances will ultimately lessen recycling costs as well as the environmental impact a product has during its life cycle. Ricoh has taken on these challenges as part of its environmental management activities. The Aficio 1027 (imagio Neo 220/270), marketed in June 2001, reduced the use of lead in printed circuit boards, PVC-coated wires, and chromium-contained galvanized steel plates. Those products are highly evaluated in the Green Purchasing Network (GPN)* database in Japan.

*** GPN provides information on eco-friendly products to promote green-purchasing approaches.
http://www.gpndb.jp/
(Japanese language only)**

Lead-Free Solder

More than 400 types of copiers[1] are listed in the copier division of the GPN database. Fourteen products, 13 of which are from Ricoh, are rated A[2] under the "lead contained in solder" item.

1. As of March 29, 2002
2. There are four rating categories for solder used in joining printed circuit boards to other parts of the copiers, namely, AA (100% lead-free solder), A (lead content reduced at least 50%), B (lead content reduced at least 10%), and C (lead content reduced less than 10%). There are no products marketed in Japan that are rated AA.

Reducing the Use of PVC-Coated Wires

There are five copiers listed[1] in the GPN database that are rated II[2] for the PVC used to cover their wires; all five are manufactured by Ricoh. Of the five copiers, the imagio Neo 600 and 750 were the first to be given a II rating for using nonhalogenous wiring cords. There are 21 products that are rated III, 8 of which are from Ricoh.

1. There are four rating categories for PVC-coated wires used in copiers, namely, I (100% PVC-free coating), II (coating that uses at least 50% substitute materials), III (coating that uses at least 10% substitute materials), IV (coating that uses less than 10% substitute materials). There are no products marketed in Japan that are rated I.
2. As of March 29, 2002

Reducing the Use of Hexavalent Chromium in Steel Plates

The Ricoh Group is making further efforts to reduce the use of hexavalent chromium in steel plates. The Aficio 1013/RICOH FAX 3310L series, which are marketed in Europe and the United States, use only hexavalent-chromium-free steel plates*.

* Refers only to parts designed by the Ricoh Group and does not include those purchased from subcontractors

Reducing Environmentally Harmful Substances Contained in Office Equipment (As of March 29, 2002)

	GPN database rating		Hexavalent-chromium-free steel plates
	Lead contained in solder	PVC used to cover wires	
imagio Neo 220/270 (Aficio 1027)	A	III	90% min.
imagio Neo 600/750	A	II	85% min.
IPSiO NX730N/630N/630 (Aficio AP2610/2610N)	C	IV	90% min.
Aficio 1013/RICOH FAX 3310L series*	–	–	100%

*The Aficio 1013 and RICOH FAX 3310L series are not listed in the GPN database because they are not marketed in Japan.

Reducing Environmentally Harmful Substances Contained in Personal Equipment

RDC-i500 (digital camera)	• Reduces PVC 80% against that of fiscal 1998 as well as partially lead-free contained in solder
MP-9200A (disk drive)	• Reduces hexavalent chromium approximately 70% and PVC almost 50% compared to fiscal 1999 values. • The first Ricoh disk drive to use hexavalent-chromium-free steel plates