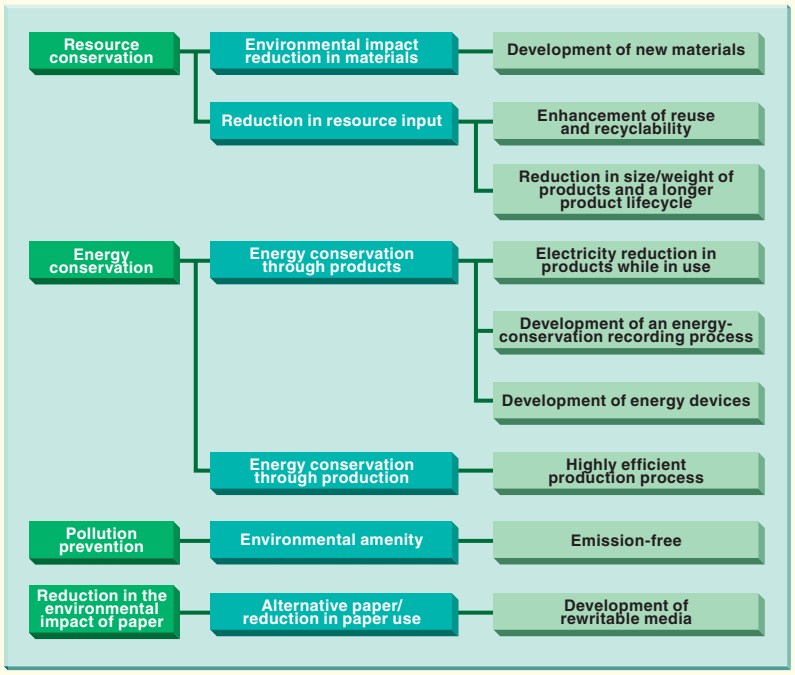
Promoting the development of environmental technologies and environmentally-friendly products based on the Extra-Long-Term Environmental Vision

● Concept of Product Development

The Ricoh Group develops products to keep the integrated environmental impact[1] of all products during their life cycles below the limit at which the global environment is sustainable. First, the Eco Balance[2] data on the environmental impact caused by overall business activities are identified, and based on the results, targets for products covered by the action plans are set (Plan). The design division then draws up LCA-based designs to achieve the targets (Do). Results from the LCA-based designs are reviewed again (Check) before being reflected in development goals for the next models (Action). The Group is also committed to developing new product materials that effectively reduce environmental impact throughout the product lifecycle and environmental technologies that reduce paper consumption. The Group also discloses relevant information.

1. See page 54. 2. See page 55.

Focused Areas for Environmental Technologies



Promotion of Development of Environmental Technologies

The development of environmental technologies is one of the most important efforts to realize sustainable environmental management. It is the basis for providing customers with "products that unobtrusively contribute to a reduction in environmental impact while in use" and for simultaneously realizing both a reduction in environmental impact and the creation of economic value. In addition, based on the Year 2050 Extra-Long-Term Environmental Vision, the Ricoh Group has established medium- and long-term plans for the four fields, namely, "energy conservation," "resource conservation and recycling," "pollution prevention (environmental comfort)," and "reduction in paper use in printing/copying." Not only the R&D Division but also all business divisions and affiliates are engaged in developing environmental technologies and products.

INTERVIEW

Employee Interview | **Development of plant-based toner**

We have developed a toner containing plant-based resin (about 40%)

Shinya Nakayama (Left) and **Akihiro Kotsugai** (Right)
Functional Materials Development Center, Imaging Engine Development Division

We have satisfied the quality levels and are attempting to put it into practical application, keeping costs low.

Ricoh has developed copier materials to replace petroleum-based resins, focusing on the development of product materials with less environmental burden. In 2005, we succeeded in putting plant-based plastic containing resin made from corn (more than 50%) into practical application. Ricoh is the first in the copier and printer industry to adopt this new material for use in copier and printer parts. Following that, noticing the fact that more than 80% of the components of the toner supplied to copiers and printers are petroleum-based resins, Ricoh began developing a plant-based toner. Having overcome various technical hurdles, we succeeded in developing a toner containing about 40% of plant-based elements by using a newly-developed polyester resin made from corn and other materials. The fixation temperature for this plant-based toner is the same as that for traditional energy-saving fixation type toner. This new toner satisfies similar high standards for heat resistance and picture quality as traditional toner. The remaining issue is cost, and compared with traditional products, the new toner is currently 20 to 30% more expensive. We are aiming to establish a mass production system within two years to achieve cost reductions and to put this plant-based toner into practical application. The amount of toner produced annually across the globe—including toner produced by Ricoh—has reached 185,000 tons*. If this amount of toner is replaced by plant-based toner, this is expected to reduce CO_2 emissions by approximately 120,000 tons.

*"Worldwide toner production in 2005" researched by Data Supply Inc.

Non-contact Rewritable Laser Technology

Ricoh has developed and put into practical use its own rewritable technology to write and erase characters and images on a sheet using the difference in temperature. To apply this technology, Ricoh is also developing a non-contact rewritable technology that can write and erase images from a distance using a laser beam, without making contact with the rewritable sheet. With this technology, for example, rewritable sheets used as address labels can be rewritten repeatedly while still attached to containers/boxes. This enables us to reuse containers/boxes with their labels as a unit. Since there is no need to use a printer to print the label and erase it, this saves the trouble of peeling off sheets whenever they need to be rewritten. We expect the use of rewritable sheets to expand significantly.

Disclosure of Information Using Environmental Labels

It is important not only to develop environmentally-friendly products through the use of environmental technologies and LCA-based design, but also to disclose information in an easy-to-understand manner. Ricoh is actively engaged in introducing environmental labels so that customers will understand that our products are environmentally-friendly. We are making efforts to gain Eco Mark approval in Japan and also Type I environmental label approval in other countries.

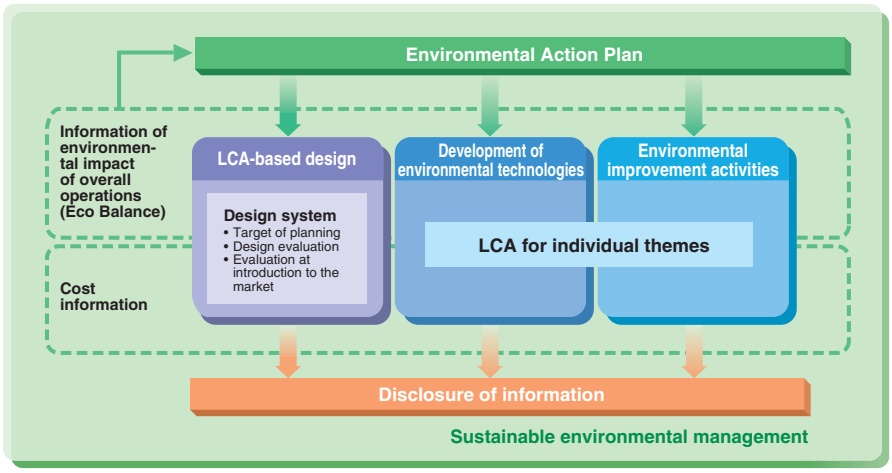
* For details on environmental labels, refer to our web site.
http://www.ricoh.com/environment/label/index.html

Lifecycle Assessment (LCA)
LCA means quantitatively identifying which and how much environmental impact exists in the lifecycle of a product, from the gathering of resources for the production of raw materials to manufacturing, transportation, marketing, use, maintenance, collection, recycling, and disposal. LCA may also be applied to part of the above cycle.

Promotion of LCA-based Design

LCA-based design is a process where targets are set to reduce the environmental impact of products throughout their lifecycles, and the PDCA cycle is used to achieve these targets. To effectively reduce the environmental impact of all its products over generations, the Ricoh Group quantifies targets for reduction by "integrated environmental impact" and promotes LCA-based design. In addition, the Group is developing a CAD system and LCA calculation tool to facilitate the design process.

Position of LCA in Sustainable Environmental Management



TOPIC

Reducing Environmental Impact in the Production Process

As part of implementing LCA-based design, Ricoh is engaged in activities to reduce environmental impact in the production process. First, Ricoh has developed its own calculation tool to quantitatively grasp the environmental impact of the targeted production process. The environmental impact per part or per processing process is calculated automatically after inputting the types of raw materials, the type of production equipment and facilities, the energy consumption, and the operating time. This allows us to grasp in minute detail the level of environmental impact that occurs in a production process as a whole or in specific processes. Ricoh is using this calculation tool to actively reduce CO_2 emissions by improving its production processes. We use the figures calculated by the calculation tool to consider where we should put the emphasis in reducing CO_2 emissions effectively and to extract specific improvement themes. For example, it was found out that on the production line for fusing rollers, the drying process generates a large environmental impact. So we switched from a large drying furnace for 400 units to a small hot-air drying machine for each individual unit. This gave a reduction in CO_2 emissions of 16 tons a year. We conducted this kind of process improvement for multiple lines in parallel, shortened the cycle time (improved productivity), and carried out quality improvement activities. As a result, we succeeded in reducing CO_2 emissions generated in the parts production process by 690 tons a year. Ricoh's policy is to promote these activities at its suppliers and establish them as a method to manufacture products with less environmental burden while improving quality and productivity.