

# Examples of Environmentally Friendly Product Development

The entire Nikon group is implementing the “Nikon Product Assessment” to create new products which offer enhanced power consumption efficiency, are smaller and lighter, use less harmful

substances, and utilise eco-glass. We believe these improvements will be most beneficial to the global environment. Here are a few examples:

## Precision Equipment Company Products

### 1. KrF excimer scanning IC stepper NSR-S205C

Overall power consumption efficiency is improved thanks to the enhancements in resolution, total alignment accuracy and throughput combined with efforts to minimise the increase in power consumption. Design modifications made it possible to change the supported wafer from 200mm to 300mm, providing new-generation semiconductor manufacturing capabilities without the need to replace equipment, enabling continued use of existing assets.

<Power consumption efficiency> Increased by more than 20% over the NSR-S204B in exposure of a 200mm wafer (internal reference).

<Ozone layer protection> New HFC refrigerant with zero ODP (Ozone-depletion Potential) used for temperature control and air conditioning chillers.

<Global warming substances> New HFE refrigerant with low global warming potential used in equipment internal cooling.

Nikon steppers lead the IC industry with highly integrated circuits, greatly contributing to revolutionary improvements in resource usage efficiency.

### 2. LCD stepper FX-21S

Power consumption efficiency is greatly improved thanks to significantly enhanced throughput (substrates exposed per hour) made possible by the development of sophisticated, proprietary Nikon technology and a range of innovations, primarily in multi-lens projection optical systems and scanning exposure systems.

<Power consumption efficiency> (Compared with FX-701M)

Exposure process for 15-inch TFT LCD panel +50%

Exposure process for 18-inch TFT LCD panel +150%

Exposure process for 21-inch TFT LCD panel +100%

Nikon's LCD steppers are used in the production of high-definition liquid crystal displays\*, which replace CRT monitors and offer lower environmental loading. They are expected to contribute to the preservation of the global environment in the 21st century.

\* Reduction in environmental loading of a 15-inch LCD when compared to a 17-inch CRT. (Example used was from a research report published in an industry journal.)

•Total power consumption during usage — 65% less •Resources consumed — 65% less •Total CO<sub>2</sub> emission from material manufacturing phase through product disposal — 60% less



NSR-S205C



FX-21S

## Imaging Company Products

### 1. Silver-halide film cameras and interchangeable lenses

#### ● F65

Energy-saving design enables shooting up to 75 rolls of 24-shot film using only two CR2 3-volt lithium batteries (when not using Speedlight).

<Power consumption efficiency> +20% compared to F60.

#### ● Nuvis V

This Advanced Photo System™ 3x zoom compact camera achieves a significant reduction in weight thanks to a stylish aluminium and plastic shell, while inheriting the advanced technologies and functions of its predecessor, the Nuvis S.

<Product mass> 33% less than Nuvis S.

#### ● AF Zoom-Nikkor 28-80mm f/3.3-5.6G

With a plastic lens body and the adoption of composite aspherical lenses to reduce the total number of lenses, this lens has become the world's smallest and lightest AF 28-80mm zoom lens (as of February 2001).

<Product mass> 36% less than AF Zoom-Nikkor 28-80mm f/3.5-5.6D.

<Eco-glass usage> 100%.

#### ● AF Zoom-Nikkor 70-300mm f/4-5.6G

The plastic lens body and hybrid mount make this the lightest among nearly all comparable AF 70-300mm class zoom lenses from other makers, as well as our own 70-300mm f/4-5.6D ED.

<Product mass> 7.5% less than AF Zoom-Nikkor 70-300mm f/4-5.6D ED.

<Eco-glass usage> 100%.

### 2. Digital cameras

#### ● COOLPIX 880

Battery consumption — and subsequently waste — significantly reduced through the adoption of a newly developed rechargeable, recyclable exclusive EN-EL1 battery.

<Eco-glass usage> 100%, including projection lens.

#### ● COOLPIX 995

A fully charged EN-EL1 battery can operate the power-efficient COOLPIX 995 for up to 100 hours of continuous shooting — even with the LCD monitor on. Like the COOLPIX 880, it significantly reduces battery consumption and waste materials generated.

<Eco-glass usage> 100%, including projection lens.

<Power consumption efficiency> +30% compared to COOLPIX 990.

### 3. Film scanners

#### ● SUPER COOLSCAN 4000ED/COOLSCAN IV ED

Both scanners employ an LED light source for minimal power consumption and longer light source life, increasing efficiency of resource usage. Clears the high-level energy-saving standards of the “International Energy Star Program”, and is an internationally recommended and registered product.



F65



COOLPIX 995



COOLSCAN IV ED

## Targets

- Improvement in energy efficiency of 30% or greater for functions on products marketed during fiscal 2003, compared with products sold since fiscal 1998.
- Reduction of models using ozone layer-damaging HCFC, used as refrigerant for IC and LCD steppers to fewer than 30% of all products shipped in fiscal 2003, with ultimate goal of total elimination of use of HCFC by fiscal 2006.



## Instruments Company Products

### 1. Industrial microscope ECLIPSE ME600L

Minimises power consumption of power supply unit and improves illumination of darkfield observation for brighter images, resulting in enhanced power consumption efficiency.

A single model can run off power supplies from 100 to 240 V, which facilitates global plant relocation, reduces wasteful expenditures and provides longer product service life.

(Prior ME600 was manufactured in 100, 120 and 230 V models.)

<Power consumption efficiency> +36% in comparison to ME600. (\*observed field brightness/consumed power)

(Observed field brightness measured for various observation types, and frequency of use is factored in for each.)

<Eco-glass usage> 60% (25% in ME600).

### 2. Automatic macro inspection system AMI-2000

This system automates external macro inspection of wafer surfaces in the semiconductor manufacturing process, detecting a range of defects such as pattern variations caused by coating inconsistencies and stepper defocus, defects caused during development, foreign objects and scratches.

As this system was developed under a new product concept, there are no prior systems to use as a reference, but the design was improved in a number of ways from the original prototype as indicated below, and the final product assessment is an impressive 68 points.

<Product mass> Reduced by 11%.

<Product volume> Reduced by 51%.

<Power consumption efficiency> +47% improvement through reduction in number of printed circuit boards, simplification of electrical system, use of LCDs, and enhanced throughput.

<Harmful substances> Reduced use of vinyl chloride cable and lead solder, and elimination of PBDPE brominated flame retardants.

<Easier repair> Simpler construction through reduction in part count.



ECLIPSE ME600L



AMI-2000

## Nikon Group Products

### 1. Outdoor binoculars 8x30E II, 10x35E II

The standard for bird-watching, these binoculars employ eco-glass: the perfect viewing tools for true lovers of nature.

<Eco-glass usage> 100% (up from 10% in prior models 8x30E CF and 10x35E CF).

### 2. Surveying instrument Total Station DTM-350

This surveying instrument combines rapid distance measurement capability, waterproofing, light weight and an affordable price, using an energy-saving design and high-performance Ni-MH batteries for 16 hours of operation from a single charge. The quantity of waste batteries is expected to drop significantly as a result.

<Power consumption> 42% reduction compared to DTM-300.

<Battery drive time> +120% in comparison to DTM-300.

<Battery discards> 50% less than DTM-300.



8x30E II



DTM-350

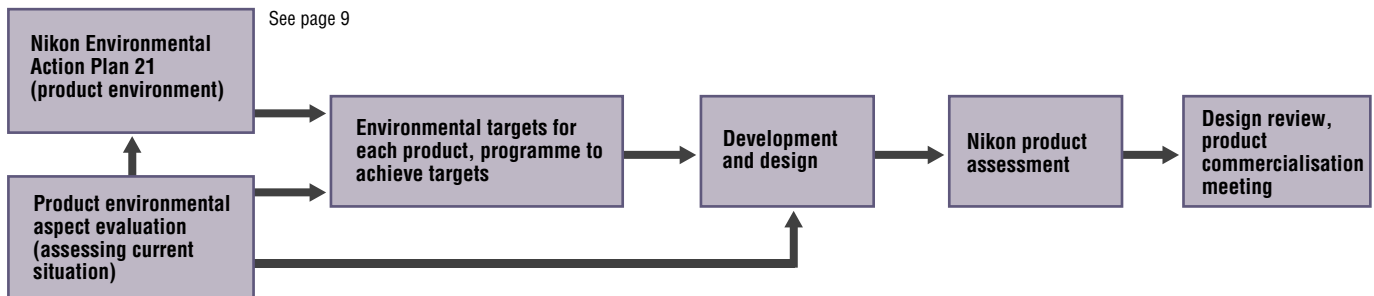
NOTE: Most of the products introduced here were released during fiscal year 2001 in Japan.

## Future Activities

We have established a rigorous system for environment-oriented design activities and enhancement of the ISO 14001-compliant environmental management system as shown below, and are applying this system to the development of products which will

display an entirely new level of environmental friendliness.

We are also involved in a variety of individual projects such as technical development work on practical lead-free solders and reduction in vinyl chloride use.



## Activities in the Product Environment

# Containers and Packaging

### Targets

- 40% reduction in plastic containers used in consumer products by fiscal 2003, compared with figures for fiscal 1999.
- Total elimination of non-separable multi-material for new packaging from fiscal 2001 onward.



Nikon defined its “Environmental Policy Regarding Packaging Materials” in May 1998, and reviewed it in June 2000. This policy has seven main points:

1. Elimination of harmful substances
2. Reduction in volume and content
3. Recyclability
4. Safety and ease of separation of materials
5. Use of recycled resources
6. Reusability
7. Marking regarding packaging materials and handling precautions

The activities implemented based on this policy are as described in the following chart:



Pulp moulding

Theme	Policy	Contents	Application
Non-vinyl chloride film	1. Elimination of harmful substances	Switch from use of vinyl chloride material, which is considered a major source of dioxin, to non-vinyl chloride materials such as polypropylene.	Wrapping materials for equipment such as steppers
Plant-derived filler materials	2. Reduction in volume and content	Plant-derived filler materials are made from bean and wheat husks. They are significantly safer and more environmentally friendly filler materials than those derived from crude oil. We also use biodegradable resins in packaging containing filler materials.	Gap filler (Instruments Company products)
Reinforced cardboard boxes	2. Reduction in volume and content 3. Recyclability 5. Use of recycled resources	Adoption of reinforced three-layer cardboard boxes has enabled a significant reduction in weight and volume of packaging in comparison with old-style wooden boxes.	Stepper body (for shipping to certain destinations)
Single-material presentation cases	4. Safety and ease of separation of materials	Use of film in presentation cases has been eliminated. Cases are now made from paper only, for ease of breakdown and decomposition.	Accessories
Assembly-type packaging	4. Safety and ease of separation of materials	The filler material and the cardboard are assembled manually for ease of separation later. Old-style packaging involved a fusing of different materials (cardboard and a crude-oil derived filler material).	Instruments Company products
Pulp moulding	5. Use of recycled resources	A paper filler material consisting of 55% recycled paper. This material is gradually being introduced as an alternative to crude oil derivatives.	Cameras, lenses, microscopes
Dedicated transport containers	6. Reusability	Dedicated containers are used for shipment to certain corporations.	Microscopes
Polyethylene bags	7. Marking regarding packaging materials and handling precautions	All packaging material is marked to facilitate separation. All bags, other than those of extremely small size, are marked with a warning of suffocation risk to infants.	



Reinforced cardboard boxes



Plant-derived filler material

So far, we have achieved the following in our challenge to meet targets:

- Plastic containers and packaging for consumer products have been reduced by 24% in weight against fiscal 1999 levels, through the progressive use of pulp moulding and other techniques.
- Through the use of single-material presentation cases and assembly-type packaging, as well as other methods, we achieved our target of eliminating the use of non-separable multi-material for new packaging in fiscal 2001.

## Activities in the Product Environment

# Examples of Implementation in Sales and Distribution

Nikon is working tirelessly to reduce the total and long-term environmental impact of its products and services. Since Nikon supplies products worldwide, we must also pay strict attention to

### 1. Sales of used steppers for reuse

Nikon has been collecting used steppers discarded by customers, and reconditioning and reselling them for new users, with the appropriate services supplied. This is an example of Nikon actively reusing its own products.

Not many steppers have been resold to date, but this business is still in its developmental stage, with consideration being given to marketability, dedication to environmental conservation, profitability and customer satisfaction.

sales and distribution activities. The following are some examples of our reuse and recycling efforts in these areas:

### 2. Recycling of packaging materials and batteries in Europe

#### (1) Packaging materials

Our overseas sales subsidiaries have contracted the services of DSD (Duales System Deutschland) to collect and recycle packaging materials used during the sale of Nikon products.

#### (2) Batteries

Our overseas sales subsidiaries have contracted the services of GRS (Stiftung Gemeinsames Rücknahmesystem Batterien) to collect and recycle batteries for cameras and other products discarded by consumers.