Environment Compatibility Technology for Cooling Fans

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1. Introduction

Efforts to curb environmental pollution as one of the greatest concerns in the '60s and '70s had some tangible results. The environmental problems we are facing now, however, are not something to be dealt with locally, as they used to be. Rather, they are something to be dealt with globally, as evidenced by global warming, acid rain, ozone layer depletion, destruction of rain forests, deforestation, pollution of lakes, extinction of wild animals, and harmful industrial waste crossing national borders.

These industrial development problems are becoming increasingly more serious, and governments, corporations, and individuals are called upon to come up with new ways to combat these problems.

It is with this perception that our company puts "Global Environment Preservation" at the top of its agenda, fully committed to the development of new technologies and products that will realize the following three technological objectives; "Technology to preserve global environment," "Technology to preserve human health and safety," and "Technology to utilize new energy and save energy."

This article presents environment compatibility technologies and products related to cooling fans.

2. Background on Environment Compatibility Technologies

The industry, now increasingly called upon to be active in environmental preservation, and held accountable for their business activities, is expected not only to abide by the rules and regulations for preventing environmental pollution but also required to provide a product design that will reduce environmental strain.

This means we are being called upon to establish a production cycle of design, recovery, and recycling that allows energy to be saved in selecting materials, assembling, and operation of products and those products or their parts to be re-used or recycled, thus reducing environmental strain.

Our Technology Center, certified with "Environment Management System" ISO 14001 in Nov. 1999 and working toward "Striving for Environment Compatibility Design", has been committed to "The Establishment of Criteria for Environment Compatibility Design" as the target to achieve for 2000. The year 2001 finds us working toward "Creating Products Certified as of Environmentally Compatible Design."

3. Overview of Environment Compatibility Technologies For Cooling Fans

To supply environmentally compatible products is to design products where we consider energy saving, material selection, material/energy efficiency, and reuse of the material as well as maintenance, degradability, and recycling of the materials. This means the product life cycle (Material procurement → Production → Distribution → Operation → Recycling → Disposal) needs to relieved its environmental strain at each different stage.

Table 1 shows the inventory assessment of each procedure in general-purpose cooling fan production.

Table 1 Inventory assessment of each procedure

Process	CO_2 emission	Petroleum Consumption
Material production	3%	8.5%
Processing/Assembling parts	2%	1.5%
Operation	94%	89%
Distribution/decomposition/disposal	1%	1%

The table shows that operation by causes the greatest environmental strain as far as cooling fans are concerned, indicating the cooling fans should be designed with the greatest emphasis on energy-saving aspect to contribute to the reduction of environmental strain.

3.1 Implementing Environment Compatibility Design

(1) Implementing Product Assessment

The product will be evaluated at an early stage and the final stage of development with respect to the following:

①Materials: Standardization, selection, harmfulness, etc.
②Resource saving: Weight reduction, re-use, longer service life
③Disassembling: Ease of disassembly, number of components
④Labeling: Material labeling
⑤Energy saving: Number of processes, power consumption
⑥Packaging material: Recovery, re-use, material, material labeling
⑦Disposal: Safety in disposal
⑧Recycling: Study for methods and procedures

(2) Assessment of Environment Compatibility Design Products

The product will be certified as environment compatibility design product if it satisfies requirements of the Environment Compatibility Design Certifying Checklist.

3.2 Example of Environment Compatibility Design

Following is an actual design that was implemented.

(1) Materials

We have specified the materials that should be prohibited those that should be controlled as materials to be contained in components and those to be used in the manufacturing process in our efforts to achieve environment compatibility design.

We have decided not only not to use the prohibited materials but also not to use such controlled materials as special bromine (PBBs, PBBEs) and cadmium. Our challenge is to find alternatives for polyvinyl chloride (PVC) and lead and its compounds so we can stop using these materials or eliminate the processes using them.

(2) Resource Saving

①For longer life

The new product line consists of Long Life Fan Series "L-type" (60, 80, 92, 120, and 140 sq., ϕ172) with their life expected to last 100,000 to 200,000 hours, which is about 2.5 to 5 long than existing types.

Fig. 1 shows improvement in the service life of a general-purpose fan.

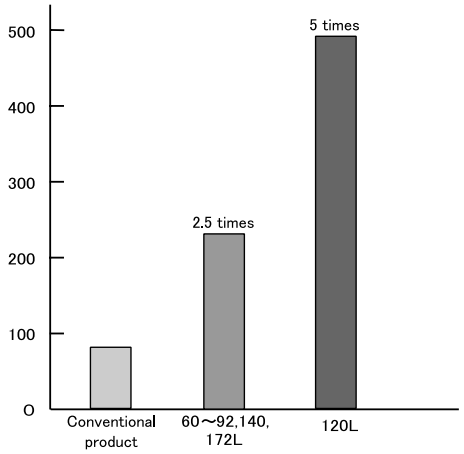

Fig. 1 Life expectancy relative to that of ordinary fan

②Weight Reduction

Using smaller fans to provide as much airflow as larger fans can reduce relative weight. Following is an actual example of weight reduction achieved by the following two models.

・"SAN ACE 120" G type 38 thickness (120×38G)
・"SAN ACE 120" G type 25 thickness (120×25G)

Fig. 2 shows their weight as compared to that of a conventional product.

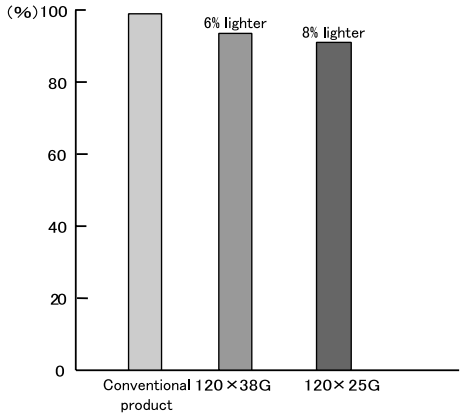

Fig. 2 Weight Comparison

(3) Disassembly

To facilitate disassembly, the number of components must be reduced and the ease of disassembly must be improved. In our effort to reduce the number of components, we have stopped using base blocks for some electronic components and shaft fixing bushes. Finding ways to make disassembly easier remains a challenge.

(4) Labeling

The resin parts are labeled, if they can be, to indicate the materials used.

Fig. 3 is an example.

Fig. 3 Example of Label Indicating Materials Used

(5) Energy Saving

A new motor was designed to reduce the power consumption for the following two models.

・"SAN ACE 120" G type 38 thickness (120×38G)
・"SAN ACE 120" G type 25 thickness (120×25G)

Fig. 4 shows their power consumption as compared to that of a conventional product.

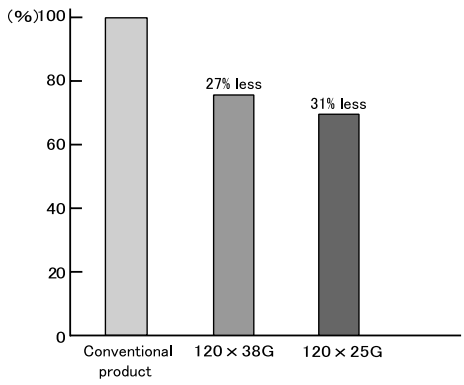

Fig. 4 Power Consumption Comparison

(6) Packaging Materials

Re-usable materials (styrofoam, cardboard) are used. Styrofoam has a label indicating its materials while recyclable material is used for cardboard.

(7) Ease of Disposal

Study is under way to find ways to do without "polyvinyl chloride (PVC)" and "lead and its compounds."

(8) Recycle

The resin used in blades, frames, and insulators of fan motor is recyclable thermoplastic resin.

3.3 Assessment of Environment Compatibility Design Products

" SAN ACE 120" G-type 25 thickness fan, designed to preserve the environment, is the first product from the Cooling Systems Division to be certified by in-house evaluation as an environment compatibility design product. (Fig. 5)

Fig. 5 Symbol Mark for Environment Compatible Design Certified Product

4. Conclusion

I have presented the specific points of the environment compatibility design for cooling fans that are in place and some of its examples. The environmental strain results mostly from operation, indicating the utmost importance of finding ways to save more energy. But equally important is to consider the weight reduction, longer life, safety, recycling, disassembly ease, disposal, recovery/transport, and disclosure of information by starting with the easiest objective.

It is absolutely necessary to practice product assessment by using the existing developing tools (environmental strain material data base, Life Cycle Assessment "LCA," Disassembly Evaluation Method "DEM"), thus working toward the realization of environment compatibility design.

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Joined company in 1973
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